NASA SP-5021(18)

CUMULATIVE INDEX TO NASA TECH BRIEFS 1970 - 1975

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Introduction

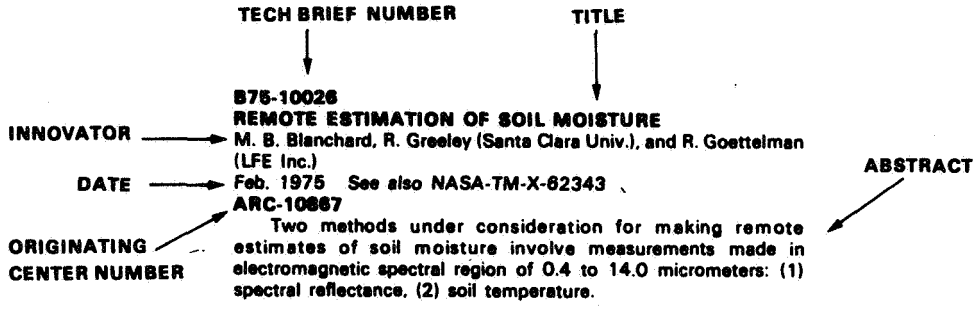
Tech Briefs are short announcements of new technology derived from the research and development activities of the National Aeronautics and Space Administration. These briefs emphasize information considered likely to be transferrable across industrial, regional, or disciplinary lines and are issued to encourage commercial application.

This *Index to NASA Tech Briefs* contains abstracts and four indexes for subject, personal author, originating Center, and Tech Brief number for 1970-1975 Tech Briefs.

Abstract Section

The abstract section is divided into nine categories: Electronics/Electrical; Electronic/Electrical Systems; Physical Sciences; Materials/Chemistry; Life Sciences; Mechanics; Machinery, Equipment, and Tools; Fabrication Technology; and Computer Programs. Within each category, abstracts are arranged sequentially by Tech Brief number.

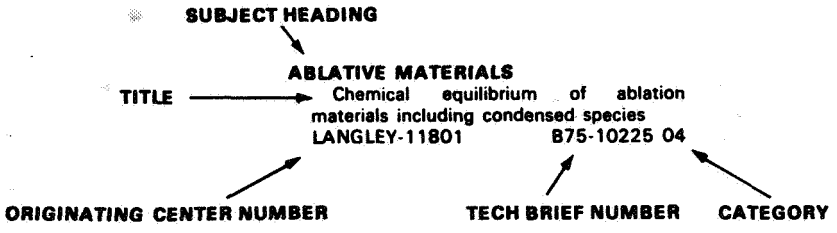
A typical abstract entry has these elements:



The originating Center number in each entry includes an alphabetical prefix that identifies the NASA Center where the Tech Brief originated. A list of prefixes and the corresponding Center names are given on page iii.

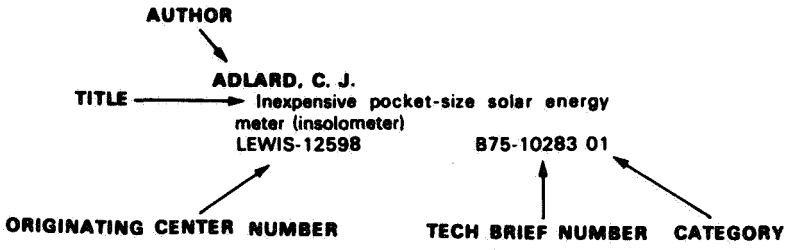
Indexes

Four indexes are provided. The first is a subject index, arranged alphabetically by subject heading. Each entry in the subject index includes a Tech Brief number and a category number to aid the user in locating pertinent entries in the abstract section.

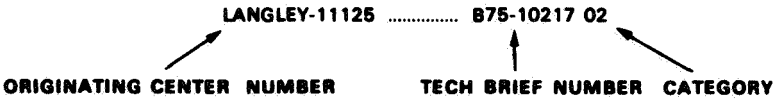


The January 1976 edition of the *NASA Thesaurus* (NASA SP-7050) is used as the authority for the indexing vocabulary that appears in the subject index. The *NASA Thesaurus* should be consulted in examining the current indexing vocabulary, including associated cross-reference structure. Only the subject terms that have been selected to describe the documents abstracted in this issue appear in the subject index. Copies of the *NASA Thesaurus* may be obtained from the National Technical Information Service or the U.S. Government Printing Office at $23.50 for the two-volume set.

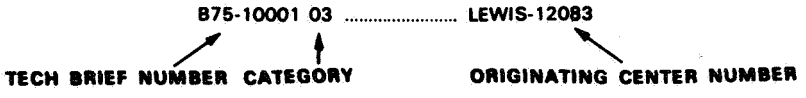
The second index is a personal author index. Entries in this index are arranged alphabetically by author's name. Tech Brief and category numbers are supplied to help the user find the appropriate entries in the abstract section.



The third index relates each originating Center number to the corresponding Tech Brief number and category. Entries in this index are arranged in alphanumeric order by Center number.



The fourth index relates each Tech Brief number to its originating Center number. Entries are arranged in ascending Tech Brief number order.



Originating Center Prefixes

ARC	Ames Research Center
GSFC	Goddard Space Flight Center
HQ	NASA Headquarters
KSC	Kennedy Space Center
LANGLEY	Langley Research Center
LEWIS	Lewis Research Center
M-FS	Marshall Space Flight Center
MSC	Johnson Space Center (formerly Manned Spacecraft Center)
NPO	Jet Propulsion Laboratory/NASA Pasadena Office

Availability of NASA Tech Briefs

NASA Tech Briefs, a quarterly publication, is distributed free to U.S. citizens to encourage commercial application of U.S. space technology.

Requests for individual Tech Briefs or for copies of the quarterly publication should be addressed to the Director, Technology Utilization Office, P.O. Box 8757, Baltimore/Washington International Airport, Maryland 21240.

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Abstract Section

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Cumulative Index to NASA Tech Briefs 1970—1975

Abstract Section

01 ELECTRONICS/ELECTRICAL

B70-10003
FUSE AND SWITCH FUNCTIONS COMBINED WITHIN A SINGLE HOUSING
COHN, E. M. MAXWELL, P. T. DATE- SEP. 1970
HQ-10497
Fuswitch provides both switch and fuse functions within a single housing. A mercury capillary is used to alternately vaporize and condense the mercury within a reservoir. The housing is impervious to mercury and the fuse portion of the device operates on the principle of the self-healing mercury fuse.

B70-10005
BUCK-BOOST DC VOLTAGE REGULATOR
LA VIGNA, T. DATE- JUN. 1970
GSFC-10735
Circuit provides voltage regulation through a wide range of operating frequencies without intervals of high power dissipation.

B70-10010
DIGITAL FREQUENCY DISCRIMINATOR
REID, W. J. /MOTOROLA, INC./ DATE- MAY 1970
M-FS-14322
Frequency discriminator has five integrated circuit chips interconnected to provide a divide function, exclusive OR function, phase shifting, and holding so that a single binary output signal results. The state of the binary signal indicates which one of the two input signals has a lower frequency than the other.

B70-10016
ECONOMICAL WEATHERPROOF HELICAL ANTENNA
CRIBB, H. E. DATE- JUL. 1970
XKS-08485
Semi-rigid coaxial cable forms the helical element of antennas. Antennas are inexpensive, corrosion resistant, require minimum maintenance, and can be easily transported and assembled.

B70-10018
IMPROVED BEAM-LEAD INTERCONNECTION STRUCTURE FOR UNCASED INTEGRATED CIRCUIT CHIPS
MARLEY, J. /ITT FEDERAL LABS./ DATE- JUL. 1970
LANGLEY-10227
Interconnection structure eliminates several levels of manually made interconnections and shortens the path lengths from generator to load, permitting reduction in consumed power.

B70-10021
SEVERAL NEW CATALYSTS FOR REDUCTION OF OXYGEN IN FUEL CELLS
CATTABRIGA, R. A. /TYCO LABS., INC./ COHN, E. M. GINER, J. D. MAKRIDES, A. C. SWETTE, L. L.
DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-97624
HQ-10452 HQ-10453 HQ-10454
Test results prove nickel carbide or nitride, nickel-cobalt carbide, titanium carbide or nitride, and intermetallic compounds of the transition or noble metals to be efficient electrocatalysts for oxygen reduction in alkaline electrolytes in low temperature fuel cells.

B70-10022
SOLID STATE SWITCH PROVIDES HIGH INPUT-TO-OUTPUT ISOLATION
MAGEE, R. L. /GE/ TROWBRIDGE, L. E. DATE- APR. 1970
HQ-10488
Switch uses a combination of N-channel and P-channel Metal Oxide Semiconductor Field Effect Transistors /MOSFET/ to obtain a normally open switch with no power applied. Series-shunt-series MOSFET switching achieves high input-output isolation.

B70-10024
ELECTRODYNAMIC INDUCTION FLOWMETER
MELCHER, J. A. /MIT/ DATE- JUN. 1970
HQ-10230
Device determines velocity and electrical conductivity of a moving fluid of high electrical resistance by imposing a transverse electro-quasistatic field on the fluid. Position changes of charge accumulations induced within the fluid by the field are sensed by relative movement between fluid and sensor.

B70-10025
A RANGE-RATE EXTRACTION UNIT FOR DETERMINING DOPPLER EFFECT
SPON- INNOVATOR NOT GIVEN /GEN. DYN./ ASTRONAUTICS/ DATE- APR. 1970 REAN- SEE ALSO NASA-CR-107905
GSFC-10750
Active ranging technique devised for VHF or S-band radar systems divides target Doppler frequency by counter-generated number that is proportional to transmitting frequency, thus producing target velocity data in terms of speed and distance relative to target transponder.

B70-10029
IMPROVED SILICON SOLAR CELLS
KAUTZ, H. E. DATE- MAY 1970
LEWIS-10964
Redistribution of phosphorus within the n-type layers of n-on-p silicon solar cells results in significant improvements in cell performance. Electrical current output is increased, reduction in current output due to radiation damage is lessened, and very shallow junctions are no longer needed.

B70-10033
A SIMPLE TESTER PROVIDES RESONANT FREQUENCY MEASUREMENTS OF FERRITE DEVICES
CLAUSS, R. C. DATE- JUL. 1970
NPO-10678
Tester enables direct measurement of the resonant frequency of an yttrium iron garnet disk. The disk is tested while mounted on the isolator strip with less regard for dimensional flaws.

B70-10034
ACTIVE RESISTANCE CAPACITANCE FILTER DESIGN
KERWIN, W. J. DATE- MAY 1970
ARC-10020
Filters, formed by combinations of distributed RC elements with positive-feedback voltage amplifiers, provide transfer functions similar to those the heavier LC filters ordinarily employ. They also provide signal amplification.

B70-10035
NICKEL-SILVER COMPOSITION SHOWS PROMISE AS CATALYST FOR HYDROGEN-OXYGEN FUEL CELLS
MAGERL, J. A. /ALLIS-CHALMERS RES. DIV./ MURRAY, J. N. DATE- JUN. 1970
HQ-10565
Carburized 3-1 nickel-silver preparation exhibits considerable catalytic activity, although not as high as platinum black. Cost and availability

factors warrant further evaluation of nickel-silver materials.

B70-10039
HIGH-RESOLUTION SPECTRAL ANALYSIS
GILLMORE, W. F., JR. DATE- JUL. 1970
NPO-10748
Analyzer extends the range and resolution of a digital spectrum analyzer without placing stringent stability requirements on the sampling rate. It compares an unknown signal with a stable frequency standard.

B70-10043
DATA ACQUISITION FROM HIGH-SPEED ROTATING SHAFTS
LESCO, D. J. NIEBERDING, W. C. STURMAN, J. C.
DATE- JUN. 1970 REAN- SEE ALSO NASA-TN-D-5678
LEWIS-10886
Data system, when used with a rotary transformer, results in increased life, negligible noise, and capability for a large number of data channels in testing rotating equipment. It is used to multiplex many channels of analog transducer output data and convert this signal to binary digital output.

B70-10045
COMMUTATING BRUSHES TESTED IN DC MOTORS IN DRY ARGON ATMOSPHERES
BERNSTEIN, G. J. COLEMAN, L. F. SLAWECKI, M. A.
DATE- JAN. 1970 REAN- SEE ALSO ANL-7262
ARG-10243
Test apparatus, procedures, and results are given for dc-motor brushes operating in dry argon. Minimum concentrations of argon impurities are also determined.

B70-10046
CONSTANT-VOLTAGE DRIVE CURRENT-STEERING SWITCH
CAPLETTE, R. K. DATE- JUL. 1970
NPO-10743
Two-element voltage control system regulates a magnetic switch consisting of dual ferrite-core shift registers. The system has a magnetic, two-core-per-bit, voltage-controlled shift register.

B70-10049
HIGH-FREQUENCY WATTAGE-TO-VOLTAGE CONVERTER
VRANCIK, J. E. DATE- JUN. 1970 REAN- SEE ALSO NASA-TN-D-5674
LEWIS-10822
Solid state device, which measures electric power over a wide frequency range, multiplies two electrical input signals to produce an output voltage that is proportional to their product. Quarter-square type of electronic analog multiplier is used.

B70-10051
BLOCK ENCODERS FOR REED-MULLER CODES
ANDERSON, T. O. DATE- SEP. 1970
NPO-10629 NPO-10636
Encoding algorithms generate a 32 x 64-bit matrix Reed-Muller code from a 6-bit orthogonal code-word. This increases error-free reception by a high rate telemetry channel under adverse signal noise with minimal use of additional hardware.

B70-10053
WIDE-RANGE PULSE-HEIGHT DISCRIMINATOR
CANCRO, C. A. GARRAHAN, N. M. DATE- SEP. 1970
GSFC-10837
Improved pulse amplitude discriminator has discriminator level in millivolt range, permits simple adjustment over wide range, and is stable within one percent at temperatures between minus 20 degrees and plus 60 degrees C. The discriminator responds to narrow pulses /500 nsec/, draws little power /milliwatts/, and requires simple circuitry.

B70-10057
MASS SPECTROMETER DETECTS HIGH MOLECULAR WEIGHT COMPONENTS
HERZOG, R. F. /GCA CORP./ DATE- JUL. 1970
HQ-10477
Monopole mass spectrometer uses sweep method to detect vacuum system contaminants. Method requires little increase of total scanning time.

B70-10059
MECHANISM OF OPERATION OF THE TFE-BONDED GAS-DIFFUSION ELECTRODE
GINER, J. /TYCO LABS., INC./ HUNTER, C. /MIT/
DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-97624
HQ-10536
Mathematical analytical model predicts the performance of an electrode as a function of certain measurable physical characteristics. Concept assumes the catalyst particles form porous electrically conductive agglomerates which are completely flooded with electrolyte.

B70-10064
GENERAL TECHNIQUE FOR MEASUREMENT OF REFRACTIVE INDEX VARIATIONS
SPON- INNOVATOR NOT GIVEN /STANFORD UNIV./ DATE-
JUN. 1970 REAN- SEE ALSO NASA-CR-95479
HQ-10359
Time variation of amplitude and phase fluctuations, impressed on waves propagating through a medium which has a randomly varying refractive index, is used to examine isolated regions along the line of propagation. Technique employs only one antenna at each end of the line.

B70-10065
A STABILIZED LOW-FREQUENCY ALTERNATING-CURRENT ELECTRIC ARC
LANZO, C. D. DATE- MAY 1970 REAN- SEE ALSO
NASA-TM-X-52424
LEWIS-10442
Establishing an arc between water-cooled tungsten-tipped electrodes, maintaining the arc along the centerline of a central jet of argon gas, and surrounding the argon jet with a coaxial sheath of nitrogen stabilizes operation of a low-frequency ac electric arc.

B70-10070
STRANDED SUPERCONDUCTING CABLE OF IMPROVED DESIGN
BROOKS, J. LAVERICK, C. LOBELL, G. PURCELL, J.
DATE- APR. 1970
ARG-90108
High-current cable developed in liquid helium cooled magnets uses aluminum wire interspersed with the superconductor strands. The aluminum maintains higher electrical conductivity, is light in weight, and has low thermal capacity.

B70-10073
CONTINUOUSLY VARIABLE VOLTAGE-CONTROLLED PHASE SHIFTER
JOHNS, C. E. DATE- JUN. 1970
NPO-11129
Phase shifter circuit adjusts the phase relationship between a locally generated reference frequency and a received RF signal applied to a phase-coherent detector. It is small enough to be integrated into a receiver subassembly and operates on command from remote control panels.

B70-10074
IMPROVED SOLID STATE ELECTRON-CHARGE-STORAGE DEVICE
KUPER, A. B. /CASE WESTERN RESERVE UNIV./ DATE-
JAN. 1970 REAN- SEE ALSO NASA-CR-90046
HQ-10152
Storage device is applicable in memory systems and in high-resolution arrays for light-responsive image sensing. The device offers high yield in multiple arrays and allows charge release with light striking only the edge of a metal electrode.

B70-10075
NEW TRANSVERSE PIEZORESISTANCE AND PINCH EFFECT ELECTROMECHANICAL TRANSDUCERS - A CONCEPT
PITTELLI, E. RINDER, W. DATE- SEP. 1970
ERC-10088
Device, under longitudinal bias, responds to pressure input with a transverse voltage proportional to the pressure signal. In the absence of a signal, the transverse voltage is zero even with bias, and, regardless of temperature, if the transverse contacts are

appropriately positioned along a zero-pressure equipotential.

B70-10076
IMPROVED LOW COST AC-TO-DC CONVERTER
CREMER, H. C. DATE- JUN. 1970
NPO-11055
Circuit converts an rms, ac voltage to a proportional dc voltage with good accuracy over a voltage range of approximately 6-1. It incorporates a pair of vacuum thermocouples in a dc feedback circuit.

B70-10079
TELEMETRY FOR IMPACT ACCELERATION MEASUREMENTS
HARRISON, D. R. DATE- APR. 1970
ARC-10289
Telemetry package uses three separate FM/AM transmitters, one for each axis of measurement. Three AM receivers and a tape recorder are used for receiving, demodulating, and recording the acceleration signal.

B70-10082
SUPERCONDUCTING **TRANSISTOR** ACTS AS HIGH-SPEED SWITCH
MEISSNER, H. /STEVENS INST. OF TECH./ DATE- DEC. 1970
HQ-10547
Cryogenic, three-terminal device yields current-voltage characteristics of ordinary transistor. Device consists of two superconducting tin rods in a crossed-wire geometry, separated by a thin gold film. New construction technique is described and possible applications are discussed.

B70-10096
SIGNAL CONDITIONER CIRCUIT FOR PHOTOMULTIPLIER TUBE
CELLIER, A. /TEX. INSTR. INC./ HOOVER, W. M. DATE- JAN. 1970
XLA-10773
Miniaturized circuit improves measurement of radiation dose absorbed in a scintillation crystal. The temperature coefficient of the field-effect transistor gate-source voltage in the isolation amplifier can be readily controlled.

B70-10097
FOAMING-ELECTROLYTE FUEL CELL
NANIS, L. /PA. UNIV./ SAUNDERS, A. P. DATE- JAN. 1970
HQ-10147
Foam structure feeds fuel gas solution into electrolyte. Fuel gas reacts at static, three-phase interface between fuel gas, electrolyte, and electrode material. The foam forms an electrical contact between main body of electrolyte and the electrode, and aids in removal of by-products of the chemical reaction.

B70-10109
IMPROVED QUICK-DISCONNECT ELECTRICAL CONNECTOR
HORTON, R. F. DATE- FEB. 1970
M-FS-20610
Electrical connector is fitted with an O ring, moisture-proof seal, is shielded in both the mated and unmated positions, and is equipped with one keying and three locking spheres.

B70-10117
INTEGRATED CIRCUIT FLAT-PACK LEAD BENDER
KOSTER, C. H. /LOCKHEED ELECTRON. CO./ DATE- JUL. 1970
MSC-13489
Tool bends leads quickly and accurately for mounting on printed circuit boards. It has grooves and bend-angles aligned for particular circuit board applications.

B70-10118
ACOUSTIC VIBRATION TEST DETECTS INTERMITTENT ELECTRICAL DISCONTINUITIES
GRIEVE, S. M. /N. AM. ROCKWELL CORP./ ROBERTS, D. E. DATE- APR. 1970
MSC-15158
Nondestructive test method detects faulty electrical connections in inaccessible or hidden portions of electronic harness assemblies and connectors. Method employs readily available commercial equipment.

B70-10119
GRAPHICAL METHOD TO PREDICT THE DYNAMIC RESPONSE OF FM RECEIVERS
MERZ, K. /BOEING CO./ DATE- JUN. 1970
KSC-10111
Graphical method determines the rms threshold point, saturation point, and operating points for an FM receiver utilizing various modulation indices and degrees of submodulation.

B70-10123
HOLOGRAPHIC STRESS ANALYSIS
WILLIAMS, J. R. DATE- JUN. 1970
M-FS-20687
Device for nondestructive testing of soldered joints correlates stress with load to predict printed circuit board lifetime.

B70-10141
PULSE RATES RECORDED BY DIGITAL FILM POSITIONER
GLASS, I. S. /MIT/ RICHARD, K. F. DATE- APR. 1970
HQ-10358
System converts detector pulse rates to photographs of binary scale indicator lights on continuously moving film. The system then scans the film and transfers the data to computer-compatible magnetic tape.

B70-10142
HIGHLY STABLE BIASED AMPLIFIER AND STRETCHER SYSTEM
RODDICK, R. G. DATE- FEB. 1970
ARC-10354
Amplifier and stretcher system, which minimizes thermal effects and compensates for repetition-rate effects, maintains resolution levels in spectrum analysis. An additional inverting amplifier is used in the system to provide a noiseless charge restorer.

B70-10145
NEW ELECTROCATALYSTS FOR HYDROGEN-OXYGEN FUEL CELLS
CATTABRIGA, R. GINER, J. /TYCO LABS., INC./ PARRY, J. SWETTE, L. DATE- FEB. 1970 REAN- SEE ALSO NASA-CR-97624
HQ-10537
Platinum-silver, palladium-gold, and platinum-gold alloys serve as oxygen reduction catalysts in high-current-density cells. Catalysts were tested on polytetrafluoroethylene-bonded cathodes and a hydrogen anode at an operating cell temperature of 80 degrees C.

B70-10148
DIFFUSION TECHNIQUE FOR LITHIUM-DOPED SILICON
KENDALL, D. L. /TEX. INSTR., INC./ DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-97077
GSFC-10827
Sample is doped by constructing a sandwich of five slices of silicon with lithium dopant deposited on the outside surfaces of the second and fourth slices and placing the sample in the middle. Upon heating, the lithium diffuses through the carrier slices and into the sample wafer.

B70-10149
TESTING DEVICE FOR VERIFYING THE PERFORMANCE OF DIGITAL RECORDERS
WILSON, W. C. /BOEING CO./ DATE- JUN. 1970
KSC-10300
Test device, consisting of a pulse generator section and a manual program section, checks and calibrates digital recorder-printers. It is adaptable to other recorder configurations.

B70-10150
DETERMINATION OF DIFFUSION LENGTHS IN SILICON BY AN X-RAY METHOD
LAMNECK, J. H., JR. DATE- SEP. 1970 REAN- SEE ALSO NASA-TM-X-1894
LEWIS-10984

By calibrating X-ray machine with cells of known diffusion lengths, measurements on test cells can be madeate rate of one every two minutes with standard deviation of less than two percent. test cells are compared with calibration cells whose diffusion lengths have been measured by an electron beam method.

B70-10151
HIGH ENERGY DENSITY ELECTROCHEMICAL CELL
BYRNE, J. J. /MONSANTO RES. CORP./ WILLIAMS, D. L. DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-90547
LEWIS-10969
Primary cell has an anode of lithium, a cathode containing dihaloisocyanuric acid, and a nonaqueous electrolyte comprised of a solution of lithium perchlorate in methyl formate. It produces an energy density of 213 watt hrs/lb and can achieve a high current density.

B70-10153
IMPROVED ALKALINE ELECTROCHEMICAL CELL
FLEISCHMANN, C. W. /LEESONA MOOS LAB./ OSWIN, H. G. OXLEY, J. E. DATE- FEB. 1970
GSFC-10792
Addition of lead ions to electrolyte suppresses zinc dendrite formation during charging cycle. A soluble lead salt can be added directly or metallic lead can be incorporated in the zinc electrode and allowed to dissolve into the electrolyte.

B70-10154
A NEW LOW-EXPANSION NONFLAMMABLE PRINTED CIRCUIT BOARD
KENNEDY, B. W. DATE- MAY 1970
M-FS-20408
Printed circuit board has a thermal coefficient of expansion similar to that of the electronic component leads. High-expansion composite materials are sandwiched between the outer layers of copper and woven fiber glass.

B70-10157
PIEZOELECTRIC TRANSDUCER
CONRAGAN, J. /CALIF. UNIV./ MULLER, R. S. DATE- JUL. 1970
HQ-10548
Transducer consists of a hybrid thin film and a piezoelectric transistor that acts as a stress-sensitive device with built-in gain. It provides a stress/strain transducer that incorporates a signal amplification stage and sensor in a single package.

B70-10172
A VAPOR BARRIER FOR COLD TESTING PRINTED CIRCUIT CARDS
CROSS, D. A. /BOEING CO./ MC NEILL, R. E. DATE- APR. 1970
M-FS-15115
Cold testing method prevents formation of frost on printed circuit boards and part holders during testing at sub-zero temperatures. Freon permits rapid attainment of the required testing temperature.

B70-10174
ELECTRONIC POSITION INDICATOR FOR LATCHING SOLENOID VALVES
FISCHER, R. FRYE, R. J. WIMMER, H. L. DATE- APR. 1970 REAN- SEE ALSO NASA-TM-X-1760
LEWIS-10926
Electronic circuit connected to solenoid valve coils visually indicates the position of the valve stem. Transient suppression is provided to prevent damaging voltage spikes.

B70-10179
A 225 MHZ FM OSCILLATOR WITH RESPONSE TO 10 MHZ
SPON- INNOVATOR NOT GIVEN /AUBURN UNIV./ DATE- JUN. 1970
M-FS-14977
Frequency-modulated transistor oscillator is used in wideband television transmitters. It provides near-sinusoidal output waveforms and has good frequency stability.

B70-10180
AUDIO SIGNAL PROCESSOR
HYMER, R. DATE- JUN. 1970
MSC-12223
System provides automatic volume control for an audio amplifier or a voice communication system without introducing noise surges during pauses in the input, and without losing the initial signal when the input resumes.

B70-10181
TRANSISTOR BONDING PAD CONFIGURATION FOR UNIFORM INJECTION AND LOW INDUCTANCE
JACOBSON, D. S. /RCA/ DATE- MAY 1970
GSFC-10790
Modification of process for fabricating transistors, which comprises a metallization-pattern design for emitter and base areas together with a double bonding configuration for each emitter and base-bonding lead, improves uniformity of carrier injection in transistors and of reducing lead inductances at base-emitter terminals.

B70-10186
NONDISSIPATIVE OPTIMUM CHARGE REGULATOR
ROSEN, R. /HUGHES AIRCRAFT CO./ VITEBSKY, J. N. DATE- APR. 1970 REAN- SEE ALSO NASA-CR-79093
XGS-10439
Optimum charge regulator provides constant level charge/discharge control of storage batteries. Basic power transfer and control is performed by solar panel coupled to battery through power switching circuit. Optimum controller senses battery current and modifies duty cycle of switching circuit to maximize current available to battery.

B70-10188
HALL EFFECT ENCODING OF BRUSHLESS DC MOTORS
BERARD, C. A. /RCA/ FURIA, T. J. GOLDBERG, E. A. GREENE, R. C. DATE- MAY 1970
GSFC-10789
Encoding mechanism integral to the motor and using the permanent magnets embedded in the rotor eliminates the need for external devices to encode information relating the position and velocity of the rotating member.

B70-10190
DOPANT FOR SODIUM NIOBATE CAPACITOR DIELECTRIC
KANDLER, H. A. /TRW SYSTEMS GROUP/ RADKE, R. P. DATE- MAY 1970 REAN- SEE ALSO B68-10163
MSC-11773
Sodium niobate dielectric doped with barium titanate has potential application in integrated circuits with high packing densities and voltage levels below 5 to 8 volts.

B70-10191
FUSE-HOLDER CONCEPT EXPEDITES ELECTRONIC COMPONENT CHANGES
WINSLOW, D. J. DATE- APR. 1970
M-FS-20615
Mounting circuit components in fuse holders facilitates component changing and extends component life with an estimated fifty percent saving of breadboard test time. Glass sleeves of the fuse holders allow easy component identification.

B70-10192
NULL TYPE INSTRUMENT FOR SIMPLIFYING TWO DIMENSIONAL FIELD PLOTTING
DAMERON, C. E. WOOD, G. M., JR. DATE- APR. 1970
XLA-08493
Vacuum tube bridge operates in two modes, tracing and fixed potential. It reduces plotting time by fifty percent and improves measurement precision.

B70-10200
OHMIC DIODE
AEGERTER, S. /CALIF. UNIV. BOARD OF PAT./ LIBBY, W. F. DATE- APR. 1970
HQ-10534
Process produces linearly responding surface barrier diodes. Hydrogen-fired, conducting strontium titanate crystals provide linear characteristics. The process uses space charge

potentials and depletion layer phenomena to achieve conduction and insulation.

B70-10203
LOW POWER NAND GATE
LIN, H. C. /WESTINGHOUSE ELEC. CORP./ DATE- APR. 1970
M-FS-14487
Complementary p-n-p transistor, used as the load resistor in an integrated circuit, reduces the switching time and the steady state dc current, and allows for a lower supply voltage. Current limiting is achieved by a novel unity-gain transistor.

B70-10214
SHELF AND CYCLE LIFE EVALUATION OF SILVER-ZINC CELLS
BOGNER, R. S. UCHIYAMA, A. A. DATE- JUL. 1970
REAN- SEE ALSO NASA-SP-132
NPO-11258
Silver-zinc cells having a separator system of cross-linked high-density polyethylene with a methacrylic acid graft withstand corrosion when subjected to thermal sterilization treatments.

B70-10216
ULTRASTABLE REFERENCE PULSER FOR HIGH-RESOLUTION SPECTROMETERS
BRENNER, R. LENKSZUS, F. R. SIFTER, L. L. STRAUSS, M. G. DATE- APR. 1970
ARG-10364
Solid-state double-pulse generator for a high resolution semiconductor detector meets specific requirements for resolution /0.05 percent/, amplitude range /0.1-13 MeV/, and repetition rate /0.1-1000 pulses per second/. A tag pulse is generated in coincidence with each reference pulse.

B70-10217
IMPROVED SHIELDING TERMINATION ADAPTER FOR ELECTRICAL CABLE CONNECTORS
VANASSE, M. A. /N. AM. ROCKWELL CORP./ DATE- APR. 1970
MSC-15565
Termination adapter replaces braid ring and ensures permanent attachment and grounding of sheath wires. The inner ferrule of the termination is slipped inside the exposed ends of the sheath wires and the outer ferrule is placed over the wires and crimped in place to secure the wires for grounding.

B70-10218
TECHNIQUE FOR PRODUCING BIPOLAR AND MOS FIELD EFFECT TRANSISTORS ON A SINGLE CHIP
GALLAGHER, R. C. /WESTINGHOUSE ELEC. CORP./ WILLIAMS, D. W. DATE- APR. 1970
MSC-13358
Several cycles of photoetching, dopant deposition, and drive-in produce selectively-doped regions and semiconductor junctions within a single chip.

B70-10219
LIQUID LEVEL SENSOR
MATICA, S. W. /N. AM. ROCKWELL CORP./ DATE- APR. 1970
M-FS-16648
Potentiometer-type pressure transducer improves liquid level sensing by using the pressure-induced motion of a diaphragm to alter the resistance of the sensor.

B70-10229
ELECTRO-OPTICAL TIME MARKER FOR HIGH-SPEED CAMERAS
COPELAND, J. T., JR. DATE- OCT. 1970
KSC-10294
Electro-optical device converts high-frequency electrical pulses into permanent optical records on film. Accurate, well defined images are formed of electronic pulses having repetition rates greater than 10,000 pulses/sec and pulse widths of 20 microseconds or less. Small electronic switch drives a silicon carbide electroluminescent diode.

B70-10232
TWO TERMINAL CURRENT LIMITER
DOUBT, L. S. DATE- OCT. 1970
NPO-11350
Two terminal device protects dc electronic circuits and experimental solid state devices, and replaces fuses and circuit breakers directly. The device consists of two transistors and two resistors and draws its necessary supply voltage from power source being protected. The limiter acts as a voltage regulator.

B70-10237
IMPROVED ULTRAVIOLET RESONANCE LAMP
BASS, A. M. /NBS/ DATE- SEP. 1970
ARC-10030
Removal of the seal area from the path of the lamp discharge eliminates the gradual deterioration of lithium fluoride window surfaces from condensation of products formed by interaction of a resonant rare-gas discharge with window sealing materials. The discharge is confined to the inner tube.

B70-10247
OPTICALLY ACTIVATED MAGNETIC RECORDING TAPE
MARKS, A. M. /MARKS POLARIZED CORP./ SHULMAN, A. DATE- NOV. 1970
GSFC-10275 GSFC-10276
Optically activated data storage medium visually and electromagnetically reproduces a recorded signal. In an electric field, particles in heat-fluidized thermoplastic layer form a visible image of the recorded signal. Refluidizing the thermoplastic layer erases the signals. Very high data packing densities are achieved.

B70-10249
A MINIATURE 1/4-INCH DIAMETER 24-PIN PLUG AND RECEPTACLE
PHELPS, W. R. DATE- AUG. 1970
LANGLEY-10607
Miniature plug and receptacle, which eliminates the need for permanent fixed leads, is used on wind-tunnel force balances, in the interface connections of microelectronic modular assemblies, and in electric and electronic systems where subsystems must be removed or interchanged.

B70-10250
SWITCHING CIRCUITS WITH FAST RESPONSE AND LOW POWER DRAIN
CANCRO, C. A. DATE- SEP. 1970
GSFC-10878
New logic circuits have response times no longer than 10 nanoseconds and drain only milliwatts of power. The family includes AND and NAND gates and forms the basis of all logic functions. The basic circuits are used in various types of digital-data-processing systems.

B70-10262
POWER SEMICONDUCTOR DEVICE WITH NEGATIVE THERMAL FEEDBACK
BORKY, J. M. /MIT/ THORNTON, R. D. DATE- DEC. 1970
HQ-10577
Composite power semiconductor avoids second breakdown and provides stable operation. It consists of an array of parallel-connected integrated circuits fabricated in a single chip. The output power device and associated low-level amplifier are closely coupled thermally, so that they have a predetermined temperature relationship.

B70-10264
COLOR IDENTIFICATION TESTING DEVICE
BRAWNER, E. /BENDIX CORP./ MARTIN, R. PATE, W. DATE- APR. 1970
KSC-10278
Testing device, which determines ability of a technician to identify color-coded electric wires, is superior to standard color blindness tests. It tests speed of wire selection, detects partial color blindness, allows rapid testing, and may be administered by a color blind person.

B70-10266
MOTOR BRUSH WEAR MEASURED WITH STRAIN GAGES
FARRELL, W. T. /RCA/ PEEK, C. R. DATE- MAY 1970
GSFC-10886
Balanced bridge circuit, supplied with low-voltage direct current and connected to a readout device, measures remaining brush material, rate of brush wear, armature runout, and brush signature.

B70-10267
EQUIPMENT-TOLERANT RANGE CODE DEMODULATION METHOD - A CONCEPT
WELTER, N. /MOTOROLA, INC./ DATE- OCT. 1970
M-FS-13987
Demodulation loop of automatic range-measuring system uses reference signal wave of locally generated pseudo-noise plus square wave of same period as the clock. Phase instabilities in IF amplifiers appear only as gain changes in the loop, and do not cause errors in range determination.

B70-10275
AN INVESTIGATION OF THE STRENGTH OF ALUMINUM WIRE USED IN INTERGRATED CIRCUITS
ADAMS, M. A. DATE- AUG. 1970
NPO-11219
Microloop pull test is developed to stress wire loops in situ until failure. The applied loads, the nature of the fracture, and its location are recorded. This test also stresses the wire bonds.

B70-10276
TEMPERATURE-INDEPENDENT RESISTOR FOR MICROELECTRONIC CIRCUITS
AEGERTER, S. /CALIF. UNIV./ LIBBY, W. F. DATE- MAY 1970
HQ-10382
Heat treating insulating crystals in gaseous hydrogen atmosphere produce resistive device which is temperature-independent from 77 to 295 degrees K. Increasing the concentration of hydrogen within the crystal yields semiconductor, hybrid, and metallic conduction characteristics which are combined with a depletion layer at the surface.

B70-10277
FILM BREAKERS PREVENT MIGRATION OF AQUEOUS POTASSIUM HYDROXIDE IN FUEL CELLS
HESS, P. D. /ALLIS-CHALMERS MANUFACTURING CO./ DATE- MAY 1970
MSC-13174
Electrolyte film breakers made from polytetrafluoroethylene are installed in the reactant and water vapor removal outlets of each cell and sealed by elastomers. Use of these devices in the water vapor removal cavity outlets prevents loss of KOH solution through film migration during water removal.

B70-10278
P-I-N DIODE SWITCH
VANEK, C. S. DATE- APR. 1970
GSFC-10661
Solid state switches use the same voltage and power supply as the RF amplifier. This simplifies circuit design and reduces input power requirements.

B70-10286
REMOTELY ACTUATED RELEASE MECHANISM
ROTTA, J. W., JR. DATE- MAY 1970
NPO-10698
Release mechanism for actuation of automatic device operates on system of restrained energy force, which is automatically released by electrical charge that may be applied by manual switch or, in remote application, by RF impulse, received by conventional electronic circuitry.

B70-10298
HALL EFFECT TRANSDUCER GIVES ELECTRICAL OUTPUT PROPORTIONAL TO METER SHAFT ROTATION
SMITH, D. DATE- JUN. 1970
LANGLEY-10620
Electrical output transducer for measuring angular displacements does not introduce frictional contact between stationary and moving parts. It produces output voltages directly proportional to small rotary shaft displacements.

B70-10303
SIMPLE, ACCURATE TEMPERATURE-MEASURING INSTRUMENT
MC FADIN, L. W. DATE- DEC. 1970
MSC-12327
Compact instrument, composed of integrated circuits and a temperature-sensitive platinum resistor, measures temperature over a wide dynamic range. Ultimate accuracy is limited by nonlinearity of the platinum resistor. With proper calibration and current regulation to within 0.01 percent, a measurement accuracy of 0.05 percent can be achieved.

B70-10304
AN EXPLOSION-PROOF BATTERY CASE
KEATHLEY, W. H. DATE- DEC. 1970
MSC-12335
Battery case, equipped with relief valve, connector, and two covers, separates the explosive mixture from all potential spark sources. Bottom ends of vent tubes are cemented into cell vents and upper ends fit through the gas barrier cover. This arrangement isolates generated gases from the electric power.

B70-10305
ONE-SHOT MULTIVIBRATOR WITH COMPLEMENTARY METAL-OXIDE-SEMICONDUCTOR COMPONENTS
ONEILL, R. W. /LOCKHEED ELECTRON. CO./ DATE- APR. 1970
MSC-13492
Breadboard model is tuned to produce output pulses from one microsecond up to several seconds in width with up to 95 percent duty cycle, and with lower power consumption than previously existing circuits.

B70-10314
TWO TECHNIQUES FOR DIGITAL FILTER DESIGN
CARROLL, C. C. /AUBURN UNIV./ JONES, J. W., JR. NAGLE, H. T., JR. DATE- AUG. 1970
M-FS-20015 M-FS-20016
Digital controllers, one using a special-purpose computer and the other using a combination of digital and analog techniques, are designed around /1/ computers that simulate the transfer function and interface with the system, and /2/ analog and digital circuits, converters, amplifiers, constant multipliers, and delay lines that form a digital filter.

B70-10323
COULOMETER BATTERY STATE-OF-CHARGE INDICATOR
BIRCHENOUGH, A. SECUNDE, R. DATE- NOV. 1970
REAN- SEE ALSO NASA-TN-D-5773
LEWIS-11083
Mercury-column electrochemical coulometer is a linear ampere-hour integrating device consisting of a sealed glass tube containing two columns of mercury separated by a gap containing an electrolyte. The drive circuit uses operational amplifier techniques to match nonlinear charge-discharge characteristics of an alkaline battery.

B70-10326
STRAIN GAGE LOAD MEASURING DEVICE - A CONCEPT
MICKEY, F. E. /NORTHROP VENTURA/ DATE- SEP. 1970
MSC-13385
Instrumenting tape members of textile parachutes to determine load capability is accomplished by mounting strain-gage instrumented metal plates to the tape by stiff rubber pads. The pads permit gradual transfer of the load from the tape to the plates without stress concentrations in the tape.

B70-10328
SAFE/ARMED EXPLOSIVE SQUIB
PARKER, L. C. DATE- JUN. 1970
XLA-10372
Safe/Armed Firing-Type Initiator /SAFTI/ combines the safety features of existing electromechanical safe-arm devices with the weight and size of a standard initiator and the functioning speed of a relay.

B70-10329
LOW PRESSURE ARC ELECTRODE
LENN, P. D. /ELECTRO-OPT. SYSTEMS, INC./
RICHTER, R. DATE- AUG. 1970
ARC-10012
Reducing the pressure in the vicinity of the arc attachment point by allowing the gas to flow through a supersonic nozzle minimizes local heating rates, prevents ablation, and increases the efficiency of coaxial gas-flow arcs.

B70-10335
SELF-CONTAINED MINIATURE ELECTRONICS TRANSCEIVER PROVIDES VOICE COMMUNICATION IN HAZARDOUS ENVIRONMENT
CRIBB, H. E. DATE- SEP. 1970
KSC-10164
Two-way wireless voice communications system is automatic, provides freedom of movement, allows for complete awareness of the environment, and does not present any additional hazards such as activation of electromagnetic sensitive devices.

B70-10336
PENTAL CIRCUIT MAY BE USED IN CONVERSIONLESS DECIMAL COUNTER
GALVIN, D. H., JR. /MIT/ DATE- JUN. 1970
HQ-10146
Pental counter circuit, a five-stage ring of NOR gates, is used with a standard flip-flop and several AND gates to construct a decimal counter. Pental circuit eliminates the conversion circuitry which is used when binary circuits generate numeric information.

B70-10337
A SELF-TUNING FILTER
DEBOO, G. J. HEDLUND, R. C. DATE- JUL. 1970
ARC-10264
Self-tuning filter automatically adjusts its center frequency to track signal frequency. This permits the use of a filter with a bandwidth smaller than the range of input signal frequencies.

B70-10338
CONSTANT-AMPLITUDE RC OSCILLATOR
KERWIN, W. J. WESTBROOK, R. M. DATE- SEP. 1970
ARC-10262
Sinusoidal oscillator has a frequency determined by resistance-capacitance /RC/ values of two charge control devices and a constant-amplitude voltage independent of frequency and RC values. RC elements provide either voltage-control, resistance-control, or capacitance-control of the frequency.

B70-10340
A BATTERY SIMULATOR
FERRELL, S., JR. /BOEING CO./ LAHR, N. DATE- AUG. 1970
KSC-10172
Simulator verifies proper operation of a battery cell voltage-monitoring device. It also contains variable ac voltage to ascertain that a battery scanner will perform its function at all possible ac voltages.

B70-10345
TWO-AXIS FLUX GATE MAGNETOMETER
ACUNA, M. H. /FAIRCHILD HILLER CORP./ PELLERIN, C. J. DATE- NOV. 1970
GSFC-10441
Magnetometer uses single sensing head to measure magnetic flux density along two axes simultaneously. The sensor head consists of permalloy core and four windings. Two windings perform a multivibrator function, the two remaining windings sense magnetic fields. The smaller magnetometer performs same functions as more complex devices.

B70-10351
A TRANSFORMER OF CLOSELY SPACED PULSED WAVEFORMS
NIEDRA, J. DATE- AUG. 1970 REAN- SEE ALSO NASA-TN-D-5473
LEWIS-11045
Passive circuit, using diodes, transistors, and magnetic cores, transforms the voltage of repetitive positive or negative pulses. It combines a pulse transformer with switching devices to effect a resonant flux reset and can transform various pulsed waveforms that have a nonzero average value and are relatively cosely spaced in time.

B70-10365
REDUCING STREAK FILM DATA VIA ELECTRONIC CROSS CORRELATOR
DICKERSON, R. A. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970
M-FS-18804
Continuous /nonframing/ motion picture projector, two photocells, a cross-correlator, and a ground glass screen where the photocells intercept the stream image determine the time delay between successive streak images. Velocities corresponding to the streaks are determined from the delay together with the distance separating the photocells.

B70-10370
PULSE-RATE AVERAGING CIRCUIT
JESSEE, R. D. /WESTINGHOUSE ELEC. CORP./ DATE- SEP. 1970
GSFC-10718
Averaging circuit provides a secondary control signal during inoperative periods of an intermittent primary control system. It can also provide an average pulse rate over a fixed time interval, such as in a digital frequency meter.

B70-10372
INTEGRATED CIRCUIT RANDOM-ACCESS MEMORY DECODER
KATZ, S. /RCA/ DATE- OCT. 1970 REAN- SEE ALSO NASA-CR-86115
ERC-10211
Decoder circuit with complementary-symmetry circuit configuration composed of MOS and n-p-n bipolar devices minimizes power consumption. Emitter-follower drive scheme results in low power dissipation and high speed operation.

B70-10373
COMPLEMENTARY-MOS BINARY COUNTER WITH PARALLEL-SET INPUTS
KELLER, K. R. /RCA/ YUNG, A. K. DATE- SEP. 1970
REAN- SEE ALSO NASA-CR-86171
ERC-10122
Metal oxide semiconductor four-stage binary counter contains reset capability as well as four parallel-set inputs gated in by a logic signal. Parallel-set inputs permit setting the counter into any of sixteen possible states.

B70-10376
RADIOMETRIC ABSOLUTE NOISE-TEMPERATURE MEASUREMENT SYSTEM FEATURES IMPROVED ACCURACY AND CALIBRATION BASE
BROWN, W. EWEN, H. /EWEN KNIGHT CORP./ HAROULES, G. DATE- SEP. 1970 REAN- SEE ALSO NASA-TR-R-271
ERC-90066
Radiometric receiver system, which measures noise temperatures in degrees Kelvin, does not require cryogenic noise sources for routine operation. It eliminates radiometer calibration errors associated with RF attenuation measurements. Calibrated noise source is required only for laboratory adjustment and calibration.

B70-10378
COPLANAR INTERCONNECTION MODULE
STEWARD, R. D. /GE/ WINDSOR, H. F. DATE- AUG. 1970 REAN- SEE ALSO NASA-CR-86039
ERC-10237
Module for interconnecting a semiconductor array to external leads or components incorporates a metal external heat sink for cooling the array. Heat sink, extending down from the molded block that supports the array, is immersed in a liquid nitrogen bath which is designed to maintain the desired array temperature.

B70-10380
CONTACT MATERIAL FOR PRESSURE-SINTERING FERRITES

WENTWORTH, C. /RCA/ DATE- SEP. 1970
ERC-10213
Pressure-sintering, in which the unfired laminated ferrite plane is placed between two flat punches and pressed during firing, reduces lateral firing shrinkage to less than one percent. A decrease in thickness of the laminate produces the require volume shrinkage. Phlogopite is the most suitable contact material investigated.

B70-10382
BIMORPH PIEZOELECTRIC DEVICE FUNCTIONS AS FLAPPER VALVE
VAN DER HEYDEN, J. /MARTIN MARIETTA CORP./ DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-86105
ERC-10082
Flapper valve using a bimorph piezoelectric ceramic bender converts an electrical input into a pneumatic output signal capable of operating fluidic logic elements in a decoder and display system.

B70-10383
SOLID STATE BISTABLE POWER SWITCH
BARTKO, J. /ISOTOPES INC./ SHULMAN, H. DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-86103
ERC-10290
Tin and copper provide high current and switching time capabilities for high-current resettable fuses. They show the best performance for trip current and degree of reliability, and have low coefficients of thermal expansion.

B70-10384
QUASI-OPTICAL EQUIVALENT OF WAVEGUIDE SLIDE SCREW TUNER
KURPIS, G. P. /CUTLER-HAMMER AIRBORNE INSTR. LAB./ DATE- AUG. 1970 REAN- SEE ALSO
NASA-CR-1453
ERC-10312
Tuner utilizes a metal plated dielectric grid inserted into the cross sectional plane of an oversized waveguide. It provides both variable susceptance and variable longitudinal position along the waveguide to provide a wide matching range.

B70-10385
NONEQUAL ITERATION DIRECTIONAL FILTERS PERMIT SELECTIVE CLEARANCE OF RIPPLES IN PASSBAND CIRCUITS
KURPIS, G. P. /CUTLER-HAMMER AIRBORNE INSTR. LAB./ DATE- AUG. 1970 REAN- SEE ALSO
NASA-CR-1453
ERC-10313
Modified directional filter is comprised of alternate pairs of dielectric and air gap filter sections with unequal electrical lengths. Filter provides more flexibility in choosing dielectric material thickness and permits switching from specially ground to standard thicknesses.

B70-10387
FLAT CONDUCTOR CABLE CONNECTOR WITH CONTACT SEPARATION SEAL
ANGELE, W. DATE- AUG. 1970 REAN- SEE ALSO
NASA-SP-5043, NASA-SP-5924/01/
M-FS-20757
Cable connector is developed in which each pair of contact elements is isolated by plastic cells and the mating interface is sealed by an elastic gasket. So insulated, the connector may be operated under high vacuum conditions at voltages up to 600 V ac without electrical leakage or intercontact ionization.

B70-10392
DUAL CURRENT READOUT FOR PRECISION PLATING
ICELAND, W. F. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970
MSC-15673
Bistable amplifier prevents damage in the low range circuitry of a dual scale ammeter. It senses the current and switches automatically to the high range circuitry as the current rises above a preset level.

B70-10393
SIGNAL PHASE SWITCHES OFFER GREATER DYNAMIC RANGE
CROW, R. B. DATE- OCT. 1970 REAN- SEE ALSO
NASA-CR-90199
NPO-10709
Circuit, placed in the signal path of a closed-loop receiver to modulate telemetered data in the 10-MHz spectrum, improves signal-to-noise ratio by 3 db in a communication receiver. The switch enables bandwidth reduction which reduces noise,overload on the following stages, giving the system greater dynamic range.

B70-10407
THUMB-ACTUATED CONTROL DEVICE
HADLAND, W. O. IWASAKI, N. DATE- SEP. 1970
ARC-10019
Rotary potentiometer device on the spoke of an aircraft steering wheel provides servo control of certain flight characteristics with no visual attention and a minimum of operational movement.

B70-10414
TRANSISTOR CURRENT AND VOLTAGE LIMITING SWITCH
HILBERT, E. E. DATE- SEP. 1970
NPO-11166
Limiting circuit protects the main power supply of electronic modules and limits the current drawn by each module should a short circuit occur. It limits current within one mA when used with direct current of either polarity, or with pulse or ac power sources from direct current to 100 kHz.

B70-10425
EFFICIENT/RELIABLE DC-TO-DC INVERTER CIRCUIT
PASCIUTTI, E. R. DATE- NOV. 1970 REAN- SEE ALSO
NASA-TM-X-63118
XGS-06226
Feedback loop, which contains an inductor in series with a saturable reactor, is added to a standard inverter circuit to permit the inverter power transistors to be switched in a controlled and efficient manner. This inverter is applicable where the power source has either high or low impedance properties.

B70-10437
LASER SCRIBING OF SILICON WAFERS
CALIHAN, C. /SPACERAYS, INC./ DATE- OCT. 1970
ERC-10386
Laser scribing eliminates microcracking at scribe line intersections, minimizes or eliminates preparation of scribe channels, and increases yield during the breaking process. Rapid overlapping of spots in the form of a line permits scribing speeds of 1.5 to 2.5 in./sec at 50 pulses/sec.

B70-10440
LUMINESCENT SCREEN COMPOSITION AND APPARATUS
HILBORN, E. H. DATE- OCT. 1970
ERC-10010
Ultraviolet light projects photographically produced images on a screen composed of a mixture of linear and nonlinear phosphors whose spectral emissions are different. This allows the display of polychromatic luminescent images, which gives better discrimination of the objects being viewed.

B70-10448
MULTIPORT SEMICONDUCTOR DEVICES
HOLMSTROM, F. R. RINDNER, W. DATE- DEC. 1970
ERC-10293
Device, made of a variety of semiconductors, incorporates three or more terminals. Between at least two terminals, switching action occurs. The other terminal pair performs either another switching function or a control function. This device is useful for computer-logic or memory applications.

B70-10454
MULTILAYER SCREEN GIVES CATHODE RAY TUBE HIGH CONTRAST
BULLINGER, H. HILBORN, E. H. DATE- SEP. 1970
ERC-10217
Fabrication method for cathode ray tubes uses low-cost siloxane resin formulations. The resins contain sufficient methyl or phenyl groups for solubility in organic solvents. After

vaporization and baking, the polymerized material is stable under vacuum and under temperatures required for tube fabrication.

B70-10459
HIGH-TEMPERATURE ELECTRIC STATOR
KUESER, P. /WESTINGHOUSE ELEC. CORP./ LINDBERG, R. DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-1592
LEWIS-10889
Thermal vacuum tests are conducted on high-temperature stator without a rotor. Electrical characteristics remained satisfactory during tests, insulation improved slightly, and conductor resistance remained constant. The assembly included a bore seal for hermetically sealing the stator from the rotor cavity.

B70-10460
FABRICATION OF ELECTROACOUSTIC RF AMPLIFIERS
TRENT, R. L. DATE- SEP. 1970
ERC-10266
Anodic bonding of a lithium niobate piezoelectric crystal over a silicon-on-sapphire structure with the crystal mounted over a closely controlled oxide provides a point-contact mount for two rectangular slabs /one piezoelectric and the other a silicon semiconductor/ within 600 A of each other.

B70-10462
ELECTRODEPOSITED INORGANIC SEPARATORS FOR ALKALINE BATTERIES
CARSON, W. N., JR. /GE/ CONSIGLIO, J. A. MC QUADE, J. M. DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-84002
GSFC-10943
Coating electrodes of silver-cadmium cells with thermostable electrodeposits of calcium hydroxide or magnesium hydroxide reduces silver migration and increases cell life. Absence of organic matter enables assembled cells to be sterilized without oxidation of the material of the separators.

B70-10470
LOAD CELL FOR THERMIONIC CONVERTER TESTS
BREITWIESER, R. MANISTA, E. J. DATE- SEP. 1970
LEWIS-11068
Stable, low duty cycle transistorized emitter follower load cell controls and absorbs large currents at low voltages. The use of energy storage in capacitors reduces auxiliary power source requirements. Low duty cycle pulse mode of operation reduces the average power handling requirement of all components.

B70-10474
VISIBLE LIGHT ELECTROLUMINESCENT DIODES OF INDIUM-GALLIUM PHOSPHIDE
CLOUGH, R. /RCA/ RICHMAN, D. TIETJEN, J. DATE- OCT. 1970 REAN- SEE ALSO NASA-CR-86192, NASA-CR-110194
ERC-10303
Vapor deposition and acceptor impurity diffusion techniques are used to prepare indium-gallium phosphide junctions. Certain problems in preparation are overcome by altering gas flow conditions and by increasing the concentration of phosphine in the gas. A general formula is given for the alloy*s composition.

B70-10476
VISUAL DISPLAY PANEL FUNCTIONS AS COMPUTER INPUT/OUTPUT DEVICE
HILBORN, E. H. DATE- OCT. 1970
ERC-10223
Display panel permits information entry and erasure using a probe, and has an inherent storage capability for use on time-shared systems. Data input need not be online. Other advantages include direct display of input and output, simplicity, and low fabrication cost.

B70-10477
GLASS-TO-METAL BONDING PROCESS IMPROVES STABILITY AND PERFORMANCE OF SEMICONDUCTOR DEVICES
TRENT, R. L. DATE- OCT. 1970 REAN- SEE ALSO NASA-CR-85026
ERC-10264
Anodic bonding of glass coverslips to photodiodes and photovoltaic devices eliminates the need for adhesive. The process requires relatively low temperatures /less than 560 degrees C/ and the metals and glass remain solid throughout the bonding process.

B70-10482
IMPROVED MODIFIED TURNSTILE ANTENNA
LEMSON, P. H. DATE- AUG. 1970
MSC-12209
Improved antenna design embodies the principles of turnstiling, broadbanding, and delta dipole matching. Antenna is useful in commercial broadcast applications.

B70-10483
A CONCEPTUAL CURRENT SURGE PROTECTOR FOR INCANDESCENT LAMPS
MACOMBER, G. A. /N. AM. AVIATION CORP./ DATE- AUG. 1970
M-FS-16658
Negative-temperature coefficient device /thermistor/ in series with a lamp filament alleviates high filament surge current during initial application of power. The thermistor should be selected for a cold resistance approximately equal to one fourth of the normal hot resistance of the filaments to be protected.

B70-10488
ELECTRICAL TEST WIRE ATTACHMENT DEVICE
FERRY, R. T. /BOEING CO./ RABB, L. W. DATE- SEP. 1970
KSC-10562
Test lead wire attachment quickly and securely engages screw head by expansion against the side walls of the screw head slot. Heat shrinkable tubing is used for the forward and shaft ends to insulate the device from accidental contact.

B70-10492
SOLID STATE VARIABLE TIME DELAY
FITZGERALD, T. M. DATE- NOV. 1970
ERC-10032
Variable time delay line does not require use of a magnetic field to control a time delay, and can both amplify and delay a signal. Device is inexpensive and space saving, it does not require mecanically moving components, eliminating detrimental vibrations in a sensitive environment.

B70-10494
CONTROLLED CURRENT INDUCTORS
THALER, S. DATE- NOV. 1970
ERC-10139
Magnetic permeability and shape of special core inserts are varied to produce desired changes in saturation characteristics of current dependent inductor, thus improving its inductance-to-current properties. Materials and saturation levels of the core pieces are selected to permit a wide variety of relationships between inductance and current.

B70-10495
SEMICONDUCTOR COOLING BY THIN-FILM THERMOCOUPLES
TICK, P. A. VILCANS, J. DATE- OCT. 1970
ERC-10149
Thin-film, metal alloy thermocouple junctions do not rectify, change circuit impedance only slightly, and require very little increase in space. Although they are less efficient cooling devices than semiconductor junctions, they may be applied to assist conventional cooling techniques for electronic devices.

B70-10498
A POWER SEMICONDUCTOR TEST CIRCUIT WITH REDUCED POWER REQUIREMENTS
BEEN, J. F. DATE- DEC. 1970
LEWIS-11175
Switching circuit utilizing silicon controlled rectifier reduces input power requirements normally associated with testing power semiconductors in an operational type mode. Circuit alleviates problems of inaccessibility, lack of large amounts of power, physical size of power resistors, wiring, and heat generation.

B70-10499
THERMIONIC TRIODE GENERATES AC POWER
KNIAZZEH, A. G. F. SCHARZ, F. C. DATE- NOV. 1970
ERC-10284
Electrostatic grid controls conduction cycle of thermionic diode to convert low dc output voltages to high ac power without undesirable power loss. An ac voltage applied to the grid of this new thermionic triode enables it to convert heat directly into high voltage electrical power.

B70-10500
P-N JUNCTIONS FORMED IN GALLIUM ANTIMONIDE
CLOUGH, R. /RCA/ RICHMAN, D. TIETJEN, J. DATE- NOV. 1970
ERC-10302
Vapor phase deposition process forms a heavily doped n-region on a melt-grown p-type gallium antimonide substrate. HCl transports gallium to the reaction zone, where it combines with antimony hydride and the dopant carrier, hydrogen telluride. Temperatures as low as 400 degrees C are required.

B70-10505
CHARACTERISTICS OF STEP-RECOVERY-DIODE FREQUENCY MULTIPLIERS
SPON- INNOVATOR NOT GIVEN /RYAN AERON. CO./ DATE- DEC. 1970
M-FS-20558
Investigation into the uses of step-recovery diodes /SRD*s/ leads to the development of necessary circuitry for using fast current-switching capabilities of SRD*s in frequency multiplication, the design of solid-state X-band transmitters employing SRD multipliers, and the use of SRD multipliers in a phased-array receiving antenna.

B70-10508
LOG AMPLIFIER INSTRUMENT MEASURES PHYSIOLOGICAL BIOPOTENTIALS OVER WIDE DYNAMIC RANGE
KADO, R. T. /CALIF. UNIV., LOS ANGELES/ DATE- NOV. 1970
ARC-10032
To record biopotentials with extreme dynamic ranges, biopotential inputs are capacitatively coupled to a miniature, low power, solid-state signal conditioner consisting of a two-stage differential preamplifier that has a low noise figure. The ouput of the preamplifier uses diodes to provide an overall gain which is nearly logarithmic.

B70-10511
METAL DETECTOR SYSTEM
LEE, R. D. DATE- NOV. 1970
ARC-10265
Signal voltage resulting from the disturbance of an electromagnetic field within the volume of a sensitive area is compared with a reference ac voltage for polarity information, which identifies the material. System output amplitude and polarity indicate approximate size and type of metal, respectively.

B70-10515
FAULT DETECTION MONITOR CIRCUIT PROVIDES **SELF-HEAL CAPABILITY** IN ELECTRONIC MODULES - A CONCEPT
KENNEDY, J. J. /IBM CORP./ DATE- SEP. 1970
KSC-10394
Self-checking technique detects defective solid state modules used in electronic test and checkout instrumentation. A ten bit register provides failure monitor and indication for 1023 comparator circuits, and the automatic fault-isolation capability permits the electronic subsystems to be repaired by replacing the defective module.

B70-10521
EXTENDED-LIFE MAGNETIC RECORDING HEADS
KERN, J. D. /APPL. MAGNETICS CORP./ VODICKA, V. W. DATE- SEP. 1970
GSFC-10097
Recording head has standard ferrite core directly coated with a thin film of a magnetic alloy composed of aluminum, iron, and silicon. Coated head has a lifespan from five to ten times longer than that of conventional heads and shows superior inductance characteristics and frequency response.

B70-10524
LATCHING OVERCURRENT CIRCUIT BREAKER
MOORE, M. L. DATE- SEP. 1970
NPO-11131
Circuit breaker consists of a preset current amplitude sensor, and a lamp-photo-resistor combination in a feedback arrangement which energizes a power switching relay. The ac input power is removed from the load at predetermined current amplitudes.

B70-10530
INEXPENSIVE AUTOMATIC RANGING FOR DIGITAL VOLTMETERS AND FREQUENCY COUNTERS
ROLLER, R. F. /WESTINGHOUSE ASTRONUCL. LAB./ DATE- OCT. 1970
NUC-10240
Seven integrated circuits incorporated at very low cost into frequency counters and digital voltmeters performing a voltage-to-frequency conversion permit automatic range changing. Extra decades are switched into and out of the counting chain as a function of the counter during the previous counting period.

B70-10533
ELECTRONIC FLAW SIMULATOR FOR EDDY CURRENT PROBE CALIBRATION
ALMASY, L. J. /WESTINGHOUSE ASTRONUCL. LAB./ COWFER, C. D. DATE- OCT. 1970
NUC-10211
Electronic flaw simulator cycled into the eddy current system eliminates errors in probe calibration. A discrimination level reference established in the probe permits recognition of those flaws in materials with an equivalent volume equal to or greater than the reference.

B70-10534
CIRCUIT MINIMIZES CURRENT DRAIN CAUSED BY NEON INDICATOR LAMPS
DRYLIE, C. D. /WESTINGHOUSE ASTRONUCL. LAB./ SHAW, W. J. DATE- OCT. 1970
NUC-10157
Circuit lights neon lamp by back leakage current of the driving transistor, rather than by the transistors saturation or **on-state** current, thereby eliminating lowering of the voltage necessary for indication. Circuit has operating speed greater than indication circuit using a saturation principle and aids in power rationing.

B70-10541
CIRCUIT SUPPRESSES SPURIOUS SIDEBANDS
READY, P. J. /TRW SYSTEMS GROUP/ DATE- NOV. 1970
MSC-13425
Circuitry requires modulated subcarrier to be split, part going to a phase modulator, and part going to a new circuit which utilizes a square law detector, a balanced mixer, and an amplifier to remove spurious sidebands. A summer recombines the two outputs, and final signal no longer includes spures.

B70-10552
HIGH-TEMPERATURE, LONG-TERM DRIFT OF PLATINUM-RHODIUM THERMOCOUPLES
SZANISZLO, A. J. DATE- OCT. 1970 REAN- SEE ALSO NASA-TN-D-5287
LEWIS-11111
Contamination of thermocouples is minimized by use of pure alumina insulators and a controlled low-impurity-level high-vacuum environment. Average thermal electromotive force change for platinum-rhodium thermocouples was -2.8 deg K after 3700 hours exposure to a mean temperature of 1530 deg K.

B70-10553
CONNECTOR LOCKING DEVICE
RABB, L. W. /BOEING CO./ DATE- DEC. 1970
KSC-10537
Slidable spring-loaded locking device eliminates need for safety wiring. Locking device is placed between the connector plug and connector

receptacle. The threaded plug cannot vibrate loose because the insert is wedged into slots formed on the outer diameter of the receptacle.

B70-10560
ECONOMICAL PRINTED CIRCUIT FRONT PANEL FOR COMPUTER USE
NEWMAN, J. /IBM/ DATE- NOV. 1970 REAN- SEE ALSO B70-10561
KSC-10573
Techniques for preparing printed circuit boards are used to provide an alternate method for producing panel symbology for ground computer test trap. After processing, the panel unit is either solder or gold plated.

B70-10562
DIGITAL INPUT IS BUFFERED TO REAL-TIME ANALOG DISPLAY
BOWER, K. F. DATE- NOV. 1970
KSC-10397
Buffering technique utilizes nine-bit binary counter and holding register of eight flip-flops. These flip-flops form the memory device that allows precise asynchronous conversion of the digital source data. Counter generates a waveform which is passed through a low pass filter to recover data in analog form.

B70-10565
REDUNDANT ELECTRONIC CIRCUIT PROVIDES FAIL-SAFE CONTROL
ARCHER, J. W. /AEROJET-GEN. CORP./ DATE- NOV. 1970
NUC-10389
Circuit using dual control amplifiers and dual position demand potentiometers powered from separate sources is used for reliable hydraulic valve controller that prevents closure of valve when control circuits fail, and maintains valve control to close tolerance for more common modes of controller failure.

B70-10569
FLEXIBLE ELECTRICAL CONDUCTORS FOR HIGH-TEMPERATURE SWITCHGEAR
KOUTNIK, E. A. MUELLER, L. A. SNIDER, W. E.
DATE- OCT. 1970 REAN- SEE ALSO NASA-TM-X-1986
LEWIS-11109
Arch-shaped conductors fabricated from flat strips of beryllium oxide dispersion-strengthened copper alloy serve as flexible electrical connectors capable of operating in 1000 deg F temperature range, under vacuum conditions for periods of 10,000 hours or more without failure.

B70-10570
HIGH-ACCURACY DETECTOR FOR LASER RADAR
AMMON, G. /RCA CORP./ DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-92485
MSC-13275
Signal processing technique permits accurate timing of pulse position independent of pulse amplitude. Technique utilizes differentiator, limiter amplifier, Schmitt trigger, and monostable multivibrator to produce standard-width pulse whose leading edge corresponds with the maximum of the received signal. This pulse stops the range counter.

B70-10579
SOLID STATE REMOTE CIRCUIT SELECTOR SWITCH
PETERSON, V. S. DATE- OCT. 1970
LEWIS-10387
Remote switching circuit utilizes voltage logic to switch on desired circuit. Circuit controls rotating multi-range pressure transducers in jet engine testing and can be used in coded remote circuit activator where sequence of switching has to occur in defined length of time to prevent false or undesired circuit activation.

B70-10584
IMPROVED COVER FOR CADMIUM SULFIDE SOLAR CELLS
ANAGNOSTOU, E. BERNATOWICZ, D. T. SPAKOWSKI, A. E. DATE- NOV. 1970 REAN- SEE ALSO NASA-TM-X-1905
LEWIS-11003
Solar cell performance and radiation resistance is improved by application of 1-mil thickness of Teflon FEP protective material. Cells produce 30 percent more power than similar cells with conventional Kapton covers.

B70-10607
MICROBALANCE ACCURATELY MEASURES EXTREMELY SMALL MASSES
PATASHNICK, H. /DUDLEY OBS./ DATE- DEC. 1970
HQ-09962
Oscillating fiber microbalance has a vibrating quartz fiber as balance arm to hold the mass to be weighed. Increasing fiber weight decreases its resonant frequency. Scaler and timer measure magnitude of the shift. This instrument withstands considerable physical abuse and has calibration stability at normal room temperatures.

B70-10629
GAGE FOR MEASURING COASTAL EROSION AND SEDIMENTATION
CARPINI, T. D. MOUGHON, W. C. DATE- NOV. 1970
LANGLEY-10779
Underwater sand height gage, which measures heights up to 12 inches, is comprised of two standard flush-diaphragm pressure transducers. Gage is very sensitive to buried water heights and is useful as a research tool in study of wet earth and landslide phenomena.

B70-10630
BONDING OF STRAIN GAGES TO FIBER REINFORCED COMPOSITE PLASTIC MATERIALS
CHAMIS, C. C. HANSON, M. P. SERAFINI, T. T.
DATE- NOV. 1970
LEWIS-11151
Strain gage is installed during molding of composite and utilizes the adhesive properties of the matrix resin in the composite to bond the strain gage in place. Gages thus embedded provide data at all temperatures that the matrix can withstand.

B70-10643
CONSTANT CURRENT LOAD MATCHES IMPEDANCES OF ELECTRONIC COMPONENTS
ALEXANDER, R. M. /TRW SYSTEMS GROUP/ DATE- DEC. 1970
GSFC-10982
Constant current load with negative resistance characteristics actively compensates for impedance variations in circuit components. Through a current-voltage balancing operation the internal impedance of the diodes is maintained at a constant value. This constant current load circuit can be used in simple telemetry systems.

B70-10648
A COMPUTER PROGRAM FOR EVALUATING PROPELLANT HEATING AND RADIATION DOSAGE TO CREWS OF NUCLEAR-POWERED ROCKET VEHICLES
LAHTI, G. P. DATE- DEC. 1970
LEWIS-10951
Program evaluates propellant heating in a nuclear rocket stage. Program code employs infinite-medium buildup factors to calculate gamma dosage and employs the Albert-Welton kernal to calculate the fast neutron dosage.

B70-10650
TECHNIQUE FOR LOWERING THE NOISE FIGURE IN RF AMPLIFIERS
BELLOMO, A. F. /MIT/ DATE- DEC. 1970
HQ-10435
Low-level RF amplifiers are operated at noise figures at or near the theoretical minimum, while maintaining high-gain stability. Formulas for the minimum amplifier noise figure value are derived from the analytical noise-figure expression involving the parameters of the equivalent circuit representing the actual system.

B70-10651
AC-COUPLED ULTRAHIGH INPUT IMPEDANCE AMPLIFIER
BIRCHENOUGH, A. G. DATE- DEC. 1970
LEWIS-11154
Input impedances of several hundred megohms and input capacitances of less than one picofarad are achieved with a conventional unity gain source buffer

amplifier modified by addition of positive feedback. The circuit is stable over a temperature range of 25 to 70 deg C.

B70-10655
THERMOCOUPLE INSTALLATION IN THIN-WALLED TUBES
CURREN, A. N. WYCOFF, K. C. DATE- DEC. 1970
LEWIS-11222
Brazing process attaches thermocouples to slot in type-347 stainless steel tube flush around its circumference. Electrolytic flashing with gold enhances brazing process. This installation procedure does not significantly change calibration of thermocouples used and does not cause major wear spots in the thin-walled devices.

B70-10684
SMALL, EFFICIENT POWER SUPPLY FOR XENON LAMPS
GOODWIN, J. E. /MARTIN-MARIETTA CORP./ DATE- DEC. 1970
MSC-13637
Device, which operates from 28 V dc, has four sections, a preregulator, a dc-to-dc converter, a current regulator, and a high voltage starter. The unique characteristics of the individual sections are described.

B70-10687
COMPOSITE METAL-OXIDE DEVICE HAS VOLTAGE SENSITIVE CAPACITANCE
MATTAUCH, R. J. /VA. UNIV./ VIOLA, T. J., JR. DATE- DEC. 1970
HQ-10594
Device with step function variation of the capacitance is useful for voltage-controlled oscillator circuits and as a voltage-sensitive switch. Simplicity of construction makes the device suitable for large-scale integration, microelectronic circuits.

B70-10689
CIRCUIT MODIFICATION AIDS IN ATOMIC PARTICLE DISCRIMINATION
BLUE, J. W. SHOOK, D. F. DATE- DEC. 1970
LEWIS-11155
Circuit, using a bialkali photomultiplier tube and liquid scintillator, eliminates disadvantages of Owen circuit. It distinguishes between recoil protons /energies of 200 keV/ and Compton electrons /energies of 20 keV/.

B70-10696
ADVANCES IN ELECTROMETER VACUUM TUBE DESIGN
SPON- INNOVATOR NOT GIVEN /RAYTHEON CO./ DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-96797
GSFC-10729 GSFC-10730 GSFC-10731
Single-ended, miniature-cathode tube with a relatively low grid current level is constructed. Adequate cathode temperature at relatively low heater power drain is provided by designing the supporting spacers to provide a square cathode hole. Method of assembling the mount and bonding the elements is discussed.

B70-10700
LAMP MODULATOR PROVIDES SIGNAL MAGNITUDE INDICATION
ZEMAN, J. R. DATE- DEC. 1970
KSC-10565
Lamp modulator provides visible indication of presence and magnitude of an audio signal carrying voice or data. It can be made to reflect signal variations of up to 32 decibels. Lamp life is increased by use of a bypass resistor to prevent filament failure.

B70-10702
FERRITE ATTENUATOR MODULATION IMPROVES ANTENNA PERFORMANCE
HOOKS, J. C. /WESTERN ELEC. CO., INC./ LARSON, S. G. SHORKLEY, F. H. WILLIAMS, B. T. DATE- DEC. 1970
NPO-12011
Ferrite attenuator inserted into appropriate waveguide reduces the gain of the antenna element which is causing interference. Modulating the ferrite attenuator to change the antenna gain at the receive frequency permits ground tracking until the antenna is no longer needed.

B70-10721
HIGH TEMPERATURE CIRCUIT BREAKER
EDWARDS, R. N. /GE/ TRAVIS, E. F. DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-1719
LEWIS-90265
Alternating current circuit breaker is suitable for reliable long-term service at 1000 deg F in the vacuum conditions of outer space. Construction materials are resistant to nuclear radiation and vacuum welding. Service test conditions and results are given.

B70-10722
MEASUREMENT OF SURFACE ROUGHNESS SLOPE
CASSIDY, J. F. DONNER, H. C. DATE- DEC. 1970
LEWIS-11080
Instrument, consisting of isolator, differentiator, absolute value circuit, and integrator, uses output signal from surface texture analyzer profile-amplifier to calculate surface roughness slope. Calculations provide accurate, instantaneous value of the slope. Instrument is inexpensive and applicable to any commerical surface texture analyzer.

B70-10724
MINIATURE MULTICONTACT CONNECTORS
HOLDEN, D. G. ROBELEN, D. B. DATE- DEC. 1970
LANGLEY-10740
Connectors, which have 4 to 9 contacts, are engaged through a hole with a minimum diameter of 0.030 inch. They are constructed of concentric brass and nylon components assembled with a light, firm press-fit. They withstand several thousand mating cycles and each outer contact has a one ampere capacity.

B71-10011
UNIVERSAL INTERFACE ENABLES ONE RECORDER TO SERVE NUMEROUS MEASURING INSTRUMENTS
DONLIN, N. E./BOEING CO./
JAN. 1971
M-FS-15134
Circuit handles data, regardless of polarity and amplitude, in 10-line decimal form or in any form of binary coded decimal. When measuring instruments have common chassis grounds, Zener diodes prevent low-leak circulating currents from unbalancing the circuit.

B71-10013
SATURABLE-REACTOR MOTOR STARTER REDUCES LINE VOLTAGE FLUCTUATIONS
CURRIE, N. G./N. AM. ROCKWELL CORP./
JAN. 1971
M-FS-18921
Saturable reactor starter uses back electromotive force /emf/ generated by large motors /18,650 to 596,800 watts/ to limit and control the starting current.

B71-10014
AUTOMATIC REFERENCE LEVEL CONTROL FOR AN ANTENNA PATTERN RECORDING SYSTEM
LIPIN, R., JR./SPERRY RAND CORP./
JAN. 1971
M-FS-20257
Automatic gain control system keeps recorder reference levels within 0.2 decibels during operation. System reduces recorder drift during antenna radiation distribution determinations over an eight hour period.

B71-10016
ELECTROMAGNETIC SIMULATION OF MICROWAVE BACKSCATTER FROM THE OCEAN SURFACE - A FEASIBILITY STUDY
WARD, R. B./LOCKHEED MISSILES AND SPACE CO./
JAN. 1971 SEE ALSO NASA-CR-98454
M-FS-20476
Photochemical etching is most successful method for obtaining simulated microwave backscatter pattern from ocean surface. Process is adaptable to integrated circuit and thin film semiconductor fabrications. The attained horizontal resolution of 10 should improve with equipment refinement.

B71-10021
STUDY OF SECOND BREAKDOWN IN POWER TRANSISTORS USING INFRARED TECHNIQUES
INNOVATOR NOT GIVEN /RAYTHEON CO./ JAN. 1971
M-FS-20748

Infrared thermal maps pinpoint exact location where second breakdown will occur before phenomenon happens and before physical damage develops at hot spot. Crystal structure analysis at that point determines cause of fault. Absolute power of radiation emitted from hot spot is direct indication of voltage level at which second breakdown occurs

B71-10025
RADIAL ROTATING ANTENNA-FEED SYSTEM
DODD, L. R. KELLER, G. C. MAXWELL, M. S.
FEB. 1971
GSFC-11013
System incorporating two or more radial feed assemblies tracks and communicates with multiple moving transmitters, receivers, or transponders. System utilizes a fixed parabolic reflector or other beam-forming device such as a lens or spherical reflector.

B71-10029
LONG-LIFE ELECTROMECHANICAL SINE-COSINE GENERATOR
FLAGGE, B.
MAR. 1971
LANGLEY-10503
Sine-cosine generator with no sliding parts is capable of withstanding a 20 Hz oscillation for more than 14 hours. Tests show that generator is electrically equal to potentiometer and that it has excellent dynamic characteristics. Generator shows promise of higher-speed applications than was previously possible.

B71-10032
CONDUCTIVE ELASTOMERIC EXTENSOMETER
GAUSE, F. L. GLENN, C. G.
FEB. 1971
M-FS-21049
Bridge circuit, in which conductive elastomeric material is the variable leg, precisely measures surface area changes in the human body. Circuits are used singularly, or in quantity by adding elements and amplifier circuits. Elastomeric strips can be located in a form-fitting garment.

B71-10033
WIDE-ANGLE, CIRCULARLY POLARIZED, OMNIDIRECTIONAL-ARRAY ANTENNA
BOYER, R. B./RADIATION, INC./ CASE, E. W. ROSA, J.
FEB. 1971
GSFC-10928
Modified conventional turnstile antenna features bifoliate pattern with relatively high gain and good circularity over solid area enclosed by the 0.26 and 1.31 radian angles of elevation. These antennas are intended for high altitude balloon use, their permissible weight is restricted to one pound.

B71-10035
IMPROVED METHODS OF FORMING MONOLITHIC INTEGRATED CIRCUITS HAVING COMPLEMENTARY BIPOLAR TRANSISTORS
BOHANNON, R. O., JR./TEX. INSTR. CORP./ CASHION, W. F. STEHLIN, R. A.
FEB. 1971
LANGLEY-10358
Two new processes form complementary transistors in monolithic semiconductor circuits, require fewer steps /infusions/ than previous methods, and eliminate such problems as nonuniform h sub FE distribution, low yield, and large device formation.

B71-10040
ACTIVE PARALLEL REDUNDANCY FOR ELECTRONIC INTEGRATOR-TYPE CONTROL CIRCUITS
PETERSON, R. A./WESTINGHOUSE ASTRONUCL. LAB./
FEB. 1971
NUC-10231
Circuit extends concept of redundant feedback control from type-0 to type-1 control systems. Inactive channels are slaves to the active channel, if latter fails, it is rejected and slave channel is activated. High reliability and elimination of single-component catastrophic failure are important in closed-loop control systems.

B71-10043
INEXPENSIVE SYSTEM PROTECTS MEGAWATT RESISTANCE-HEATING FURNACE AGAINST HIGH-VOLTAGE SURGES
STEARNS, E. J./WESTINGHOUSE ASTRONUCL. LAB./
MAR. 1971
NUC-10239
Coolant gas extinguishes arcing across the break in a heater element. Air-gap shunt which bypasses high voltage impressed across the circuit prevents damage if the resistance elements break and open the inductive circuit.

B71-10069
DUAL-CHANNEL CIRCUIT CONDITIONS/AMPLIFIES TRANSDUCERS' INPUTS AND OUTPUTS
MURPHY, K. M./N. AM. ROCKWELL CORP./
APR. 1971
MSC-15712
Circuit includes two data channels and one shared precision power supply installed on a single 11.4 cm square circuit card. The unit is relatively inexpensive, compact, and suitable for most tests where low-noise and high-gain signal processing is required.

B71-10071
SUBMERSED SENSING ELECTRODE USED IN FUEL-CELL TYPE HYDROGEN DETECTOR
NIEDRACH, L. W./GE/ RUDEK, F. P. RUTKONESKI, M. D.
APR. 1971
M-FS-14655
Electrode has silicone rubber diffusion barrier with fixed permeation constant for hydrogen. Barrier controls flow of hydrogen to anode and Faraday relationship establishes upper limit for current through cell. Electrode fabrication is described.

B71-10075
MICROWAVE DOSIMETER - A CONCEPT
BARTLETT, R./ALLIED RES. ASSOCIATES, INC./ BIRD, F.
APR. 1971
HQ-10407
Dosimeter determines time-integrated radiation dosage to which an individual is exposed. Integration is measured chemically in proportion to radiation detected. Wearer receives an exposure measurement representing an average of the dose over the entire body.

B71-10084
CERAMIC WIRING BOARD INCREASES PACKAGING DENSITY OF ELECTRONIC MODULES
HAMLEY, L. D./MIT/ MARTIN, J. H.
APR. 1971
MSC-13497
Ceramic multilayer wiring board interconnects large scale integration /LSI/ modules which dissipate nearly 2W/cc. Extremely high packaging density is possible by application of alumina cover hermetically sealed to board. Signal interconnections are completely dependent on transfer heat between layers.

B71-10088
HIGH DENSITY ELECTRONIC PACKAGING MODULE WITH IMPROVED COOLING ASSEMBLY
MARTIN, J. H./MIT/
APR. 1971
MSC-13639
Cold plate increases heat transfer within high density electronic module. Tapered pins improve heat transfer process by providing larger surface pressure with increased planar area. Cooling technique increases thermal contact where planar area is limited, interface pressure increases the heat transfer coefficient.

B71-10089
WEIN BRIDGE OSCILLATOR CIRCUIT
LIPOMA, P. C./LOCKHEED ELECTRON. CO./
APR. 1971
MSC-13686
Circuit with minimum number of components provides stable outputs of 2 to 8 volts at frequencies of .001 to 100 kHz. Oscillator exhibits low power consumption, portability, simplicity, and drive capability, it has application as loudspeaker tester and audible alarm, as well as in laboratory and test generators.

B71-10102
IMPROVED HIGH-TEMPERATURE METAL-SHEATHED CABLES
FOX, H. A., JR./AEROJET-GEN. CORP./
MAY 1971
NUC-10413
Process prevents moist air degradation of cables insulated with magnesium oxide. Electrical-grade silicone oil is polymerized by heat application to produce water repellant surface coating. Insulation treated with this oil repels moisture.

B71-10114
SUBMINIATURE TRANSDUCER MEASURES UNSTEADY PRESSURES
RAMAN, K. R.
MAY 1971
ARC-10349
Transducer has thin piezoelectric sensing element of 0.051-cm-thick lead zirconate titanate crystal which is cut as a conical frustum. Sensing crystal and titanium wire are protected from mechanical shock and vibration. Transducer is insensitive to mechanical vibrations of instrument plug on which it is mounted.

B71-10121
LOW-COST QUASI-PARABOLIC ANTENNA
TAGGART, R. B., JR./STANFORD UNIV./
MAY 1971 SEE ALSO NASA-CR-72773
LEWIS-11291
Antenna design employs flat petal-shaped aluminum sheets and novel rim configuration. New antenna is inexpensive and has only slightly degraded performance. Design advantages are low-cost tooling and fabrication, convenient size and shape for transport and assembly, and simple assembly procedure.

B71-10125
SELF-REPLACEABLE THERMOCOUPLE FOR MOLTEN STEEL BATH - A CONCEPT
BLAU, P./WESTINGHOUSE ASTRONUCL. LAB./ ZELLNER, G.
MAY 1971 SEE ALSO B66-10461
NUC-10223
Thermocouple wires, consisting of tungsten-rhenium alloy protected by ablative ceramic coating, are wound on a reel and fed continuously into bath. Tests indicate accuracy and reliability are comparable to conventional devices.

B71-10128
HIGH CURRENT COMPENSATION NETWORK FOR DC LOGARITHMIC AMPLIFIERS
WILSON, J. H./WESTINGHOUSE ASTRONUCL. LAB./
MAY 1971
NUC-10148
Circuit voltage output is reduced by voltage equivalent to ampere resistance drop of nonlogarithmic resistances of practical diodes; therefore, output is same as circuit using ideal diode. Circuit applies to meter and electronic recorder movements, and improves performance of radiation detectors and several microbiological monitoring devices

B71-10132
HYBRID REDUNDANCY SYSTEM FOR IMPROVING RELIABILITY - A CONCEPT
MATHUR, F. P.
MAY 1971 SEE ALSO JPL-TR-32-1467
NPO-11546
System combines two concepts - triple modular redundancy (TMR) and spares (replacement system) redundancy. System has triplicated active unit core with associated bank of specifically arranged standby spare units. Curves plotted from characteristic equation show hybrid system is more reliable than conventional TMR systems.

B71-10136
HIGH VOLTAGE LIGHTNING GROUNDING DEVICE
HOFFMAN, R. G. PETERSON, V. S.
MAY 1971
LEWIS-11282
Grounding device insertion in wire termination cabinets and terminal block modification prevent lightning-induced high voltage transients from reaching inputs or outputs of solid state instruments and control systems. Installation minimizes wiring confusion and achieves 100 percent protection.

B71-10142
SATURATION CURRENT SPIKES ELIMINATED IN SATURABLE CORE TRANSFORMERS
SCHWARZ, F. C.
MAY 1971
ERC-10125
Unsaturating composite magnetic core transformer, consisting of two separate parallel cores designed so impending core saturation causes signal generation, terminates high current spike in converter primary circuit. Simplified waveform, demonstrates transformer effectiveness in eliminating current spikes.

B71-10162
DESIGN OF HYSTERESIS CIRCUITS USING DIFFERENTIAL AMPLIFIERS
COOKE, W. A./LOCKHEED MISSILES AND SPACE CO./
JUN. 1971
ARC-10070
Design equations for hysteresis circuit are based on the following assumptions: amplifier input impedance is larger than source impedance; amplifier output impedance is less than load impedance; and amplifier switches state when differential input voltage is approximately zero. Circuits are designed to any given specifications.

B71-10170
ELECTRONIC RIPPLE INDICATOR
DAVIDSON, J. K. HOUCK, W. H.
JUN. 1971
KSC-10162
Electronic circuit for monitoring excessive ripple voltage on dc power lines senses voltage variations from few millivolts to maximum of 10 volts rms. Instrument is used wherever power supply fluctuations might endanger system operations or damage equipment. Device is inexpensive and easily packaged in small chassis.

B71-10171
VOLTAGE-CONTROLLED OSCILLATOR
DURAND, J. L./SYSTEMS TECHNOL., INC./
JUN. 1971
ARC-10078
Oscillator generates symmetrical triangular waveform when inverting and noninverting inputs are equal. Oscillator portion of circuit has integrated circuit, high-performance operational amplifier wired as differential integrator, and two silicon controlled rectifiers.

B71-10174
A 20 KHZ POWER OSCILLATOR
STURMAN, J. C.
JUN. 1971
LEWIS-11319
Circuit providing stable sine wave power up to 10 W supplies small amounts of power at frequency other than 60 Hz. Circuit has Wien bridge oscillator which uses operational amplifier to feed power amplifier stage. Power amplifier stage uses booster amplifier and two discrete transistors for power output.

B71-10177
MULTILOOP DISTRIBUTED RC ACTIVE NETWORKS
KERWIN, W. J.
JUN. 1971
ARC-10200
Distributed RC active two-port network and voltage amplifier provides advantage over lumped elements in that second-order bandpass function is obtained with single distributed passive element. Incorporating positive and negative feedback loops provides improvement in Q, sensitivity, and gain-Q sensitivity product compared to single-loop networks.

B71-10179
IMPROVED SHEATH REMOVAL TECHNIQUE FOR VERY SMALL THERMOCOUPLES
MUELLER, R.
JUN. 1971
LEWIS-11228
Standard ''weldmatic'' spotwelder and tweezer-type welding head burns and vaporizes sheath material to expose undamaged thermocouple wire. Firing is

repeated to remove additional sheathing and after three or four firings electrodes require cleaning.

B71-10182
DETERMINATION OF NONLINEAR RESISTANCE VOLTAGE-CURRENT RELATIONSHIPS BY MEASURING HARMONICS
STAFFORD, J. M./IBM CORP./
JUN. 1971
M-FS-20402
Test configuration measures harmonic signal amplitudes generated in nonlinear resistance. Vacuum-type voltmeter measures low frequency sinusoidal input signal amplitude and wave-analyzer measures amplitude of harmonic signals generated in junction. Input signal harmonics amplitude must not exceed that of harmonics generated in nonlinear resistance.

B71-10190
INEXPENSIVE, LARGE-DIAMETER, RADAR TRACKING AND CALIBRATION SPHERES
HOLDREN, R. H.
JUN. 1971
XLA-11154
Plastic models of polystyrene beads are produced to within 0.02 cm accuracy, in various diameters designed to meet exact requirements of particular radar system frequency spectrum. They are inexpensive and do not require special handling imposed on metal spheres.

B71-10193
SMALL SIZE TRANSFORMER PROVIDES HIGH POWER REGULATION WITH LOW RIPPLE AND MAXIMUM CONTROL
MANOLI, R./N. AM. ROCKWELL CORP./ ULRICH, B. R.
JUN. 1971
M-FS-16709
Single, variable, transformer/choke device does work of several. Technique reduces drawer assembly physical size and design and manufacturing cost. Device provides power, voltage current and impedance regulation while maintaining maximum control of linearity and ensuring extremely low ripple. Nulling is controlled to very fine degree.

B71-10201
AN IMPROVED TELEMETRY SYSTEM
LUMB, D. R.
JUN. 1971 SEE ALSO NASA-TN-D-4105, NASA-TN-D-4402
ARC-10336
Transmission of parity bits together with data bits by a rate one half convolutional code of 25-bit constraint length, with sequential decoding of received signal increases quantity and accuracy of data transmitted by pulse code modulated system operating at given power level.

B71-10204
COARSE ROLL-RATE GAIN-CONTROL CIRCUIT
COOKE, W. A./LOCKHEED MISSILES AND SPACE CO./
JUN. 1971
ARC-10064
Circuit is used in spin-rate computing unit of control system for solar pointing rocket during its acquisition mode. Direction cosines from magnetometers and coarse sun sensors derive function that is approximately roll-rate times sum of absolute value of direction cosines.

B71-10221
AUTOMATIC CROSS-SECTIONING AND MONITORING SYSTEM LOCATES DEFECTS IN ELECTRONIC DEVICES
JACOBS, G./SPERRY RAND/ SLAUGHTER, B.
JUL. 1971
GSFC-11221
System consists of motorized grinding and lapping apparatus, sample holder, and electronic control circuit. Low power microscope examines device to pinpoint location of circuit defect, and monitor displays output signal when defect is located exactly.

B71-10231
ELECTROLYSIS CELL FUNCTIONS AS WATER VAPOR DEHUMIDIFIER AND OXYGEN GENERATOR
CLIFFORD, J. E./BATTELLE MEM. INST./
JUL. 1971 SEE ALSO NASA-CR-771, NASA-CR-73170
ARC-10316
Water vapor is absorbed in hygroscopic electrolyte, and oxygen generated by absorbed water electrolysis at anode is added simultaneously to air stream. Cell applications include on-board aircraft oxygen systems, portable oxygen generators, oxygen concentration requirements, and commercial air conditioning and dehumidifying systems.

B71-10234
CATHETER TRANSDUCER AND CIRCUIT
HARRISON, D. R. KERWIN, W. J.
JUL. 1971 SEE ALSO B67-10669
ARC-10132
Simple integrated circuit located at transducer, enables use of single coaxial cable for both input and output connections. Circuit is sensitive to changes in RC time constant, has much improved sensitivity characteristics, and is unaffected by changes in cable capacitance effects.

B71-10242
FLAT-CONDUCTOR CABLE HAS ROTARY AND LINEAR FLEXIBILITY
CARDEN, J. R.
JUL. 1971 SEE ALSO NASA-TM-X-53960
M-FS-21096
Report describes capabilities and limitations of flat-conductor cable /FCC/ relative to flexure in bending, folding, rotating, and extending, it also compares FCC mechanical and endurance characteristics with round-wire cable, and compares qualities of various types of insulation for FCC. Several configurations exemplify FCC flexibility.

B71-10274
FAST CARRY ACCUMULATOR DESIGN
MASTIN, W. C./ASTRIONICS LAB./
AUG. 1971 SEE ALSO NASA-TM-X-53983
M-FS-20902
Simple iterative accumulator combined with gated-carry, carry-completion detection, and skip-carry circuits produces three accumulators with decreased carry propagation times. Devices are used in machine control, measurement equipment, and computer applications to increase speed of binary addition. NAND gates are used in combining network.

B71-10275
OSCILLATING TANK CIRCUIT ELIMINATES BALLAST RESISTOR IN LAMP CONTROL CIRCUIT
LISTER, L. R./SPERRY RAND/
AUG. 1971
M-FS-20891
Circuit limits lamp current, replacing the series current-limiting resistor.

B71-10279
ISOSCELES DETECTOR PROVIDES MAXIMUM RESOLUTION IN EXPANDED RANGE
WATTERSON, R. F./SANDERS ASSOCIATES, INC./
AUG. 1971
GSFC-10932
Dynamic range expansion system for radio frequency /RF/ signal detection equipment consists of RF amplifiers, RF amplitude modulated detectors, and operational amplifier. The analog output gives maximum resolution over fixed voltage range, without switching. Two minor drawbacks of this circuit are cited.

B71-10286
OSCILLATOR WITH WIDE DYNAMIC TUNING RANGE
RIPPY, R. R.
AUG. 1971
GSFC-11086
Two or more tandem amplifier stages, one of which is tuned, added to a circuit permit tuning an oscillator over frequency range of six decades. Oscillator operates in distributed mode for increased frequency stability. Within practical limitations, stability increases by increasing number of tuned stages.

B71-10287
ENHANCING EFFICIENCY OF SINGLE, LARGE-APERTURE ANTENNAS
COHEN, M./ADVANCED TECHNOL. CORP./ GRIMES, D. E. LITTLEPAGE, R. S.

AUG. 1971 SEE ALSO NASA-CR-101352
HQ-10597
Numerical analysis method provides means of describing energy distribution in focal plane of parabolic surface in terms of phase and wavelength. Two approaches for enhancing antenna efficiency include single, large reflector focused to feeding element, and array of smaller apertures whose individual outputs are summed.

B71-10292
IMPROVED RELAY CHATTER DETECTOR
REYNOLDS, R. K.
AUG. 1971
NPO-10355
Detector provides go/no-go sensing of momentary relay or contact opening during vibration testing. Device compares duration of unwanted openings to calibrated standard and lights indicator if standard is exceeded. Stability and reliability are higher than in any other comparable device.

B71-10304
A CONTINUED FRACTION GENERATOR FOR SMOOTH PULSE SEQUENCES
COHN, M./SPERRY RAND/ EVEN, S. LINCOLN, S. J.
AUG. 1971
MSC-13697
Digital circuit produces rational output pulse rate at fraction of continuous input pulse rate. Output pulses have average rate with least possible deviation from absolute correct time spacing. Circuit uses include frequency synthesizing, fraction generation, and approximation of irrational sequences.

B71-10309
CALIBRATION-INTERNAL ADJUSTMENT INDICATOR - A CONCEPT
HEDENE, P. S./N. AM. ROCKWELL CORP./
AUG. 1971
M-FS-18693
Circuit, when used with decision table, permits relatively unskilled personnel to maintain effective quality control. Design determines required changes in calibration intervals. Interval readings are recorded to nearest integer, making high precision unnecessary. Specific required performance-history information is discussed.

B71-10313
MICROWAVE BIASING IMPROVES DETECTOR RESPONSE IN THE INFRARED REGION
SUN, C./RCA/ WALSH, T. E.
AUG. 1971
GSFC-11050
Detection system, which incorporates advantages of microwave biasing, measures output of a carbon dioxide laser at 10.6 microns with a factor of 1,000 improvement in sensitivity. Material lifetime, rather than external circuitry, limits detector response time.

B71-10322
NOVEL SHIFT REGISTER ELIMINATES LOGIC GATES AND POWER SWITCHING CIRCUITS
CLIFF, R. A.
AUG. 1971
GSFC-10517
Register requiring two integrated circuits per stage has nominal power dissipation of 3.5 mW per stage, its use eliminates reset pulse, allowing data transfer to occur in less than 1 microsecond, and eliminates power application to both right and left portions of the register simultaneously.

B71-10323
PRESSURE TRANSDUCER WITH FOUR-DECADE DYNAMIC RANGE
INNOVATOR NOT GIVEN /BOEING CO./ AUG. 1971
KSC-10384
Adjustable resistor taps in gain-control feedback loop of the transducer permit wide sensing range, shorting the pins on electrical connector allows selection of appropriate range. Electrical specifications of the transducer and its applications are cited.

B71-10334
ION IMPLANTATION REDUCES RADIATION SENSITIVITY OF METAL OXIDE SILICON /MOS/ DEVICES
INNOVATOR NOT GIVEN /RES. TRIANGLE INST./ SEP. 1971
SEE ALSO NASA-CR-1584
LANGLEY-10630
Implanting nitrogen ions improves hardening of silicon oxides 30 percent to 60 percent against ionizing radiation effects. Process reduces sensitivity, but retains stability normally shown by interfaces between silicon and thermally grown oxides.

B71-10341
PICTORIAL DISPLAY OF MATERIALS AND PROCESSES AIDS IN FABRICATING COMPLEX ASSEMBLIES
EHRET, R. M./N. AM. ROCKWELL CORP./ FAWKES, G. J.
SEP. 1971
M-FS-24006
Method uses assembly consisting of single pictorial display showing cutaway view of assembly, subassemblies identified by name and materials, and processes identified by both specification and commercial design. Display is used in engineering, manufacturing, and personnel training.

B71-10345
DIGITAL DECODER FOR PHASE-DELAY CODED DATA
LEWIN, J./RCA/
SEP. 1971
GSFC-10894
Coded or modulated digital data converts to nonreturn to zero /NRZ/ data. Technique includes logic implementation and pertinent timing diagrams. Demodulation to NRZ facilitates digital logic operations on incoming data. Phase-delay modulation has advantage of inherent self-timing not present in NRZ modulation.

B71-10346
NONVOLATILE READ/WRITE MEMORY ELEMENT - A CONCEPT
CRICCHI, J. R./WESTINGHOUSE ELEC. CORP./ LYTLE, W. J.
SEP. 1971 SEE ALSO NASA-CR-106493
GSFC-10993
Memory, with limited number of programming cycles, is achieved by using verticle, fusible links in series with oxide breakthrough elements. Memory elements are fabricated with integrated circuit technology and are ideal for low power digital computer application.

B71-10347
DIODE MATRIX REDUCES COMPUTER MEMORY POWER REQUIREMENTS
CRICCHI, J. R./WESTINGHOUSE ELEC. CORP./
SEP. 1971 SEE ALSO NASA-CR-106493
GSFC-10994
Bidirectional MOS driver, integrated with diode matrix reduces fuse read current to only that of junction leakage and transient MOS gate charging current. No current, except junction leakage current, flows in unaddressed cells. Current required to drive MOS gate flows through unfused branch only during read mode.

B71-10349
DOUBLE PHASE-LOCK LOOP WITH RAPID TRANSIENT RESPONSE A CONCEPT
BALCEWICZ, J. F./RCA/
SEP. 1971
GSFC-10864
Integration loop, with narrow bandwidth and long response time, integrates phase estimate of sampling loop, resulting in slower but less jittery response to phase step changes. Sampling loop has wide bandwidth and quick response to phase steps of burst sync interval.

B71-10361
SYSTEMS MANAGEMENT TECHNIQUES AND PROBLEMS
INNOVATOR NOT GIVEN /NASA. MARSHALL SPACE FLIGHT CENTER/ SEP. 1971
M-FS-21401
Report is reviewed which discusses history and trends of systems management, its basic principles, and nature of problems that lend themselves to systems approach. Report discusses systems engineering as applied to weapons

acquisition, ecology, patient monitoring, and retail merchandise operations.

B71-10365
DISCRETE-COMPONENT S-BAND POWER AMPLIFIER
LINE, L. G. RIPPY, R. R.
SEP. 1971
GSFC-11248
Amplifier uses low Q input and output circuitry incorporating four variable air dielectric capacitors. Performance over conventional designs includes - increased power output, decreased likelihood of parametric oscillation, and increased thermal stability.

B71-10368
SILICON CONTACT FOR AREA REDUCTION OF INTEGRATED CIRCUITS
LIN, H. C.
SEP. 1971
M-FS-20688
Semiconductor contact is used in place of metal contact forming a low leakage junction with the background material even if misalignment occurs.

B71-10379
FLAT CONDUCTOR CABLE HANDBOOK
ANGELE, W. HANKINS, J. D.
OCT. 1971 SEE ALSO NASA-SP-5043, NASA-SP-5924/01/
NASA-TM-X-53975
M-FS-21009
Handbook includes discussion of FCC advantages, status of FCC regarding military specifications, hardware availability, and existing applications, descriptions and data on available cable, connectors, fasteners and hardware, design techniques and applications, wiring, manufacturing and installation techniques - and inspection and test procedures.

B71-10380
PROGRAM AUDIT A MANAGEMENT TOOL
MILLER, T. J./BOEING CO./
OCT. 1971
KSC-10557
Program gives in-depth view of organizational performance at all levels of the management structure, and provides means by which managers can effectively and efficiently evaluate adequacy of management direction, policies, and procedures.

B71-10426
RF-CONTROLLED IMPLANTABLE SOLID STATE SWITCH
FRYER, T. B.
NOV. 1971
ARC-10136
Miniature, totally implantable, solid state RF-controlled switching circuit for biotelemetry systems consumes zero power in off condition and turns on or off by pulse of RF energy. Switch, the size of small coin, is reducible by integrated circuit techniques.

B71-10428
CLOCKING CONNECTOR REPLACES ADAPTER CABLES
ARRIOLA, S./N. AM. ROCKWELL CORP./ RASMUSSEN, R. A.
NOV. 1971
M-FS-14778
Single cable using simplified, versatile clocking connector satisfies clocking variations that previously required many cables. Connector consists of specially fabricated grommet follower dial housing, dial assembly, and modified insert.

B71-10429
WAVESHAPING ELECTRONIC CIRCUIT
HARPER, T. P./IBM/
NOV. 1971
M-FS-14916
Circuit provides output signal with sinusoidal function in response to bipolar transition of input signal. Instantaneous transition shapes into linear rate of change and linear rate of change shapes into sinusoidal rate of change. Circuit contains only active components; therefore, compatibility with integrated circuit techniques is assured.

B71-10438
RADIOGRAPHIC INSPECTION SPECIFICATIONS FOR ELECTRONIC COMPONENTS
INNOVATOR NOT GIVEN /TRW, INC./ NOV. 1971
M-FS-20723
Quality assurance provisions cover personnel training, radiographic equipment, radiographic test procedures, and inspection and examination of radiographs. Supplementary information includes accept and reject criteria for radiographic inspection of resistors, capacitors, transistors, hybrid microcircuits, diodes, small coils and transformers.

B71-10450
DIGITAL PARALLEL-TO-SERIES PULSE-TRAIN CONVERTER
HUSSEY, J./GRUMMAN AEROSPACE CORP./
NOV. 1971
MSC-12417
Circuit converts number represented as two level signal on n-bit lines to series of pulses on one of two lines, depending on sign of number. Converter accepts parallel binary input data and produces number of output pulses equal to number represented by input data.

B71-10452
PRECISION, TRIPLE-PARAMETER, NONDESTRUCTIVE-TEST SYSTEM FOR IN-PROCESS MICROWELDING
INNOVATOR NOT GIVEN /WALTER V. STERLING, INC./ NOV. 1971 SEE ALSO NASA-CR-73207, NASA-CR-73385
ARC-10402
System simultaneously and automatically monitors weld pulse voltage, dynamic setdown, and infrared radiation of weld as it is formed. Features of system include minimum complexity, measurement reliability, simple signaling, and no impediment to operator manipulations.

B71-10469
LOW-FREQUENCY TRIANGULAR WAVE GENERATOR
THOMPSON, J. P./LOCKHEED MISSILES AND SPACE CO./
DEC. 1971
ARC-10259
Triangular waveform is generated by a combination of two integrated circuit operational amplifiers, one to produce square wave and other to integrate square wave and generate triangular wave.

B71-10471
CONTACT-RESISTANCE TEST PROBES- A CONCEPT
MAXWELL, J. H. MC DERMOTT, R. J.
BROOKS, C. H./N. AM. ROCKWELL CORP./
DEC. 1971
M-FS-16891
Devices are used in inspection of contact resistance in plated connectors after assembly into cables. System permits rapid inspection of connectors when mating connectors or special apparatus are not available, and enables source of excessive resistance to be precisely determined.

B71-10486
INSTRUMENT ACCURATELY MEASURES STRESS LOADS IN THREADED BOLTS
ROLLINS, F. R., JR./MIDWEST RES. INST./
DEC. 1971 SEE ALSO NASA-CR-10292
M-FS-21121
Interferometric instrument response is linearly related to axial tensile stresses, and, under idealized conditions, measurement errors are within approximately plus or minus 1 percent. Ultimate accuracy of instrument depends on a number of variables, such as bolt material, dimensions, and geometry and uniformity of stresses and temperature.

B71-10497
PULSE WIDTH-PULSE RATE MODULATOR
COOKE, W. A./LOCKHEED MISSILES AND SPACE CO./
DEC. 1971
ARC-10025
Attitude control system designed for rockets regulates duty cycle of pneumatic valves so less fuel is required. Operation time of each valve is directly proportional to error signal and the dead band about a null is controlled by independently adjustable threshold circuits.

B71-10498
WIDE-RANGE LOGARITHMIC RADIOMETER FOR MEASURING HIGH TEMPERATURES
LISTON, E. M./STANFORD RES. INST./
DEC. 1971
ARC-10254
Filter radiometer utilizing photomultiplier circuit, in which a direct-coupled amplifier varies dynode voltage to maintain constant anode current, measures rapid variations of temperature of white-hot charred body at 2000 K to 3000 K.

B72-10007
PEAK ACCELERATION LIMITER
C. P. Chapman
Dec. 1972
NPO-10556

Device is described that limits accelerations by shutting off shaker table power very rapidly in acceleration tests. Absolute value of accelerometer signal is used to trigger electronic switch which terminates test and sounds alarm.

B72-10014
PIEZOELECTRIC TRANSDUCER MOSAIC
R. C. Haborak (TRW Systems Group)
1972
ARC-10509

Crystal substrate is used to form a transducer mosaic by employing single X-cut crystal and transferring desired pattern from stainless steel mask. Result is a less tedious and costly method of producing a mosaic of matched crystals having the same fundamental frequency.

B72-10021
BERYLLIUM THIN FILMS FOR RESISTOR APPLICATIONS
O. Fiet (TRW Systems Group)
1972
ARC-10485

Beryllium thin films have a protective oxidation resistant property at high temperature and high recrystallization temperature. However, the experimental film has very low temperature coefficient of resistance.

B72-10042
PSEUDO-SATURATING POWER CONVERTER
R. G. Radys (Hughes Aircraft Co.) and C. V. Agnew (Hughes Aircraft Co.)
1972
NPO-11368

Relative performance of three basic configurations of electronic conversion units (saturating, pseudo-saturating, nonsaturating) requiring low power levels is compared. Pseudo-saturating mode exhibits best overall performance, nonsaturating a close second, saturating a poor third.

B72-10043
DEEP SPACE NETWORK
F. M. Flanagan, P. S. Goodwin, and N. A. Renzetti
1972 See also NASA-CR-12898
NPO-11562

Background, current status, and sites of Deep Space Network stations are briefly discussed.

B72-10045
ELECTRICAL GROUNDING BRACKET
C. E. Carroll (TRW Systems Group)
1972
ARC-10041

Device serves as common grounding point for shielded wires of multipin electrical connector and permits addition or removal of ground leads without disturbing other grounded wires.

B72-10047
HIGH NOISE IMMUNITY ONE SHOT
G. L. Schaffer
1972
ARC-10137

Multivibrator circuit, which includes constant current source, isolates line noise from timing circuitry and field effect transistor controls circuit's operational modes. Circuit has high immunity to supply line noise.

B72-10054
PULSE EXCITATION OF BOLOMETER BRIDGES
S. J. Rusk (Lockheed Missiles and Space Co.)
1972
ARC-10292

Driving bolometer bridge by appropriately phased excitation pulses increases signal-to-noise ratio of bolometer sensor which operates on a chopped light beam. Method allows higher applied voltage than is possible by conventional ac or dc excitation.

B72-10055
TOPOLOGICAL SOLUTION OF BILATERAL SWITCHING NETWORKS
L. Mazer
1972
ARC-10294

Topological method uses the eye as pattern detector to trace path of transmission on truth table. Pathway selection is continually supervised by logician, allowing him to seek planar iterative solution desirable for fabrication of monolithic circuits. Method applies to parity generators, multiple output functions, full adders, and bit comparators.

B72-10056
COAXIAL INVERTED GEOMETRY EPITAXIAL TRANSISTOR
R. J. Hruby, W. R. Dunn (Lockheed Missiles and Space Co.), and S. B. Cress (Lockheed Missiles and Space Co.)
1972
ARC-10330

Silicon transistor, developed for use in biotelemetry circuits, provides high current gain at low levels of power and voltage. Device operates from biopotential or miniature batteries and is suitable for incorporation into monolithic integrated circuits. Coaxial configuration and small size offer promise for high frequency application.

B72-10057
CIRCUIT PERMITS INDEPENDENT ADJUSTMENT OF GAIN AND OFFSET AT CONSTANT INPUT IMPEDANCE
V. B. Holland
1972
ARC-10348

Circuit with single operational amplifier conditions input signals for data acquisition systems by applying offset voltage correction signal to feedback circuit instead of one of the input terminals of operational amplifier.

B72-10059
IMPROVED AUDIO REPRODUCTION SYSTEM
C. S. Chang (Lockheed Missiles and Space Co.)
1972 See also NASA-CR-114287
ARC-10404

Circuitry utilizing electrical feedback of instantaneous speaker coil velocity compensates for loudspeaker resonance, transient peaks and frequency drop-off so that sounds of widely varying frequencies and amplitudes can be reproduced accurately from high fidelity recordings of any variety.

B72-10060
LIGHTWEIGHT, BROAD-BAND SPECTRUM ANALYZER
G. M. Crook (TRW Systems Group)
1972
ARC-10405

Spectrum analyzer, utilizing techniques similar to those used to classify energy levels of nuclear particles, is incorporated into electric field detector. Primary advantage is ability to perform qualitative broad-band frequency analysis over a large dynamic amplitude range with minimum weight and electrical power requirements.

B72-10077
VOLTAGE-TUNABLE PARALLEL-T FILTER FOR REMOTE OPERATION
R. E. Brantner
1972
NPO-11165

Filter is devised by using insulated-gate field-effect transistors for remote control. Transistors are P-channel devices that operate in enhancement mode and are commercially available.

B72-10079
CIRCUIT CONTROLS TURN-ON CURRENT
K. G. Holmes

1972
NPO-11339

Single choke used in primary circuit with diode arrangement, maintaining dc current flow through choke and setting up a unidirectional magnetic field, limits turn-on current of transformer-rectifier power supply. Technique reduces number and weight of components and minimizes effect of initial inrush surge current on source.

B72-10080
WIDE ANGLE SOLAR SENSOR
L. F. Schmidt and W. E. Crawford
1972
NPO-11341

Method for correcting orientation of spacecraft with respect to sun is discussed. System consists of two photocells on either side of sensor. When photocells are evenly illuminated, no output is made from sensor. When photocells are unevenly illuminated, sensor sends signal to gas jets to change orientation.

B72-10092
PRECISION VOLTAGE REGULATOR
P. J. Hand and R. A. Crawford
1972
NPO-11502

Balanced positive and negative voltage output circuit, in which error voltage for control is developed from difference in absolute value of positive and negative voltages referenced to a common point, regulates voltage for use with inertial reference unit. Fast-acting, temperature-compensated, high-gain operational amplifier circuits maintain common point.

B72-10096
PIEZOELECTRIC ACTUATOR USES SEQUENTIALLY-EXCITED MULTIPLE ELEMENTS: A CONCEPT
E. E. Sabelman
1972
NPO-11527

Utilizing arrays of sequentially-excited piezoelectric elements to provide motion in a nonmagnetic motor provide built-in redundancy and long life required for deployment or actuation of devices on spacecraft. Linear-motion motor devices can also be fabricated.

B72-10100
STABLE PHOTOSENSOR AMPLIFIERS
H. Fujimoto
1972
NPO-11561

Minimization of common mode effects in differential amplifier arrangement which processes signals from two high impedance photosensors is achieved by connecting one photosensor in feedback loop of amplifier and using field effect transistors in the input circuit.

B72-10102
SIGNAL TO NOISE MEASUREMENT CIRCUIT
L. F. Deerkoski
May 1972
GSFC-11239

Phase lock reference provides a rapid and accurate method of determining the signal-to-noise ratio at the intermediate frequency stage of a receiver.

B72-10103
LONGITUDINAL FRICTION FORCES IN PIPING DESIGN
C. S. Parker (GE)
May 1972
M-FS-13754

Scheme measures sliding support friction forces and incorporates them into software programs which are used to analyze piping flexibility.

B72-10106
TORNADO DETECTOR AND ALARM
A. R. Moss
May 1972
M-FS-20915

Automatic device which attaches to an active television set sounds an audible alarm when a tornado is within 29 km (18 miles) of device.

B72-10112
FLEXIBLE DESK TOP COMPUTERS USING LARGE SCALE INTEGRATION (L.S.I.) CHIPS
H. Garett and R. C. Asquith
1972
M-FS-21277

Microprogrammable modular computer utilizing only seven different types of L.S.I. elements lowers manufacturing cost and improves reliability. Chips can be standarized and used to implement variable bit length computers.

B72-10116
TIME-ADJUSTED VARIABLE RESISTOR
R. C. Heyser
Dec. 1972
NPO-11306

Timing mechanism was developed effecting extremely precisioned highly resistant fixed resistor. Switches shunt all or portion of resistor; effective resistance is varied over time interval by adjusting switch closure rate.

B72-10124
FREQUENCY SWITCH KEYED OSCILLATOR
L. Katchis (Randonics, Inc.)
1972
ARC-10412

Oscillator changes resonant frequency of the LC tank circuit by shunting one of a pair of parallel capacitors. Technique reduces amount of hardware required to interrogate and control remote systems.

B72-10134
HIGH-TEMPERATURE, LONG-LIFE THYRATRON
E. A. Baum (GE) and N. D. Jones (GE)
May 1972 See also B69-10376; NASA-CR-1684
LEWIS-11327

Thallium and xenon filled thyratron was developed that operates at tube envelope temperatures up to 750 C. This tube performs at peak voltage ratings of 2000 V forward and reverse and at an average current rating of 15 A for up to 11,000 hours.

B72-10138
COMPENSATION OF VOLTAGE DROPS IN SOLID-STATE SWITCHES USED WITH THERMOELECTRIC GENERATORS
K. Shimada
Dec. 1972
NPO-11388

Seebeck effect solid state switch was developed eliminating thermoelectric generator switch voltage drops. Semiconductor switches were fabricated from materials with large Seebeck coefficients, arranged such that Seebeck potential is generated with such polarity that current flow is aided.

B72-10145
A RELIABLE LIQUID HELIUM DETECTOR
W. M. Krawczonek and B. Stephenson
May 1972
LEWIS-11487

Detector and indicator system, utilizing commercial perforated germanium cryogenic thermometer as level sensor containing adjustable level discriminator with indicators, operates reliably over pressure range from 50 to 900 mm Hg without electronic adjustments.

B72-10149
GATE PROTECTIVE DEVICE FOR INSULATED GATE FIELD-EFFECT TRANSISTORS
R. A. Sunshine (RCA)
May 1972
M-FS-21626

Device, which protects insulated gate field-effect transistors, improves reliability through utilization of layers of conductive material on top of each alternating semiconductor material region. Separation of layers is necessary to prevent shorting out junctions between alternating regions.

B72-10155
CRYSTAL-CONTROLLED MULTIVIBRATOR
R. C. Schober
Dec. 1972
NPO-11627

Method is described for designing crystal oscillator which has frequency and symmetry stability suitable for system-clock-generators used in spacecraft data systems. Simple multivibrator is used in which timing capacitor is replaced by a crystal.

B72-10156
SELECTING DIGITAL FILTERS
R. E. DeMandel (Lockheed Missiles and Space Co.) and S. J. Krivo (Lockheed Missiles and Space Co.)
May 1972
M-FS-20933

Technique reduces task of filter design by using cut off frequency, termination frequency and weight number to determine filter effect on frequency domain of digital filter input data function.

B72-10159
ZIPPER-TYPE ELECTRICAL CONNECTORS
C. E. Levoe
Dec. 1972
NPO-11639

Electrical connector is described of zipper-like configuration, in which sequentially interlocking tines serve as electrical contacts or insulators.

B72-10165
DIFFERENTIAL INPUT PREAMPLIFIER
P. W. Callaway (Santa Barbara Res. Center)
1972
ARC-10489

Preamplifier chops and amplifies very low level output of thermopile infrared detectors that will be used to measure thermal energy flux of Jupiter and its departure from a blackbody spectrum. Output signal has negligible phase shift. AC signal is RC-coupled to input stage of other amplifiers.

B72-10176
LONG-TERM DRIFT OF THERMOCOUPLES AT 1600 K
G. E. Glawe
May 1972 See also NASA-TN-D-7027
LEWIS-11471

Thermal electromotive-force changes for 30 commercially available noble- and refractory-metal thermocouples have been determined in air, argon, and vacuum, at 1600 K for exposures up to 10,000 hours. Investigation techniques can serve as guidelines for future studies of other thermocouple systems.

B72-10181
IMPROVED HIGH VOLTAGE INSULATOR FOR USE IN VACUUM
D. C. Byers, P. M. Margosian, and G. E. Mealy
Dec. 1972
LEWIS-11401

High voltage insulator for electron bombardment ion thruster has electric field directed through dielectric material and electrons emitted by field emission are constrained in negative junction region. Surface flashover and unstable operation are eliminated, and maximum voltage is limited only by dielectric strength of material, aluminum oxide in this case.

B72-10184
SPEED ENHANCEMENT OF COMPLEMENTARY MOS DEVICES
M. Devlin (GE)
1972
ARC-10387

Speed required for Sisyphus experiment on Pioneer probe was attained at supply voltage well within component limitations by combining supply voltage higher than nominal with low reactance interconnections. Speed was found to be far in excess of typical parameters suggested by manufacturers of MOS devices.

B72-10185
LOW PHASE-SHIFT AMPLIFIER
G. F. Lutes and R. C. Coffin
Dec. 1972
NPO-11663

Single-stage MOSFET amplifier is described which is identical to standard neutralized amplifier except that neutralization provided by broadband transformer is applied to AGC gate instead of signal gate. Neutralization of drain-to-control gate capacity minimizes the phase change induced by variation in AGC.

B72-10186
PERFORMANCE OF SILICON SOLAR CELL ASSEMBLIES
R. G. Ross, Jr., R. K. Yasui, W. Jaworski, L.-C. Wen, and E. L. Cleland
Dec. 1972
NPO-11847

Solar cell assembly current-voltage characteristics, thermal-optical properties, and power performance were determined. Solar cell cover glass thermal radiation, optical properties, confidence limits, and temperature intensity effects on maximum power were discussed.

B72-10218
TEMPERATURE COMPENSATION OF LIGHT-EMITTING DIODES
G. J. Deboo and C. N. Burrous
1972
ARC-10467

Circuit which includes a thermistor-resistor combination to compensate for temperature fluctuations by supplying input voltage to light-emitting diode, maintains constant light output. Similar circuits can be used for temperature-induced variations in photodiode applications.

B72-10226
IMPROVED FEEDBACK SHIFT REGISTER
M. Perlman
May 1972
NPO-10351

Design of feedback shift register with three tap feedback decoding scheme is described. Application for obtaining sequence synchronization patterns is examined. Operation of the circuitry is described and drawings of the systems are included.

B72-10236
ELECTRONIC SWITCHING CIRCUIT USES COMPLEMENTARY NON-LINEAR COMPONENTS
O. S. Zucker
Dec. 1972
AEC-10060

Inherent switching properties of saturable inductors and storage diodes are combined to perform large variety of electronic functions, such as pulse shaping, gating, and multiplexing. Passive elements replace active switching devices in generation of complex waveforms.

B72-10255
NARROWBAND, CRYSTAL-CONTROLLED BIOMEDICAL TELEMETRY SYSTEM
R. M. Westbrook and T. B. Fryer
Dec. 1972
ARC-10708

Telemetry system utilizing miniature, single-channel, crystal-controlled transmitter is described suitable for biomedical applications. Receiver used in conjunction with transmitter is narrowband superheterodyne FM receiver with crystal control in both conversion stages.

B72-10268
DRIVER CIRCUIT FOR INDUCTIVE LOADS
W. A. Cooke (Lockheed Missiles and Space Co.)
1972
ARC-10073
Circuit, based on use of power transistors which do not display second breakdown under valve loading, drives inductive loads. Peak voltages, power dissipations, heat sink requirements, and thermal stability considerations can be obtained by theoretical analysis.

B72-10275
AN INGESTIBLE TEMPERATURE-TRANSMITTER
J. M. Pope, T. B. Fryer, and H. Sandler
Jul. 1972
ARC-10583
Pill-sized transmitter measures deep body temperature in studies of circadian rhythm and indicates general health. Ingestible device is a compromise between accuracy, circuit complexity, size and transmission range.

B72-10304
CONTROL OF OSCILLATIONS IN A DISCHARGE CIRCUIT
D. Y. Cheng
Sep. 1972
ARC-10556
Development of electric discharge circuit damping element which increases in resistance with current and time is described. Damping element is resistor made of tungsten wire which has large resistance-temperature coefficient. Specifications of tungsten resistor and incorporation into circuit are explained.

B72-10308
A SIMPLE TACHOMETER CIRCUIT
J. Dimeff
Sep. 1972
ARC-10603
Electric circuit to measure frequency of repetitive sinusoidal or rectangular wave is presented. Components of electric circuit and method of operation are explained. Application of circuit as tachometer for automobile is discussed.

B72-10315
SIMPLE NON-DESTRUCTIVE TESTS FOR ELECTROEXPLOSIVE DEVICES
L. A. Rosenthal (Rutgers, Univ.) and V. J. Menichelli
Jun. 1972
NPO-11563
Electrothermal behavior of bridgewire-explosive interface is defined by pulsing electroexplosive device with a safe level of current and examining the resistance variation of bridgewire. Bridgewire provides signal which describes average wire temperature and heat sinking to the explosive and enclosure.

B72-10316
PROPERTIES OF IONIZATION BREAKDOWN OF AIR AT MICROWAVE FREQUENCIES AND OPTIMIZATION OF COMPONENT DIMENSIONS FOR MAXIMUM MICROWAVE POWER
L. L. Rainwater (Sperry Rand Corp.)
Jul. 1972
M-FS-21924
Method provides optimization of dimensions in vented RF components for predictable performance at critical pressures, eliminates leakage from hermetically sealed types, and utilizes coaxial RF multicouplers.

B72-10347
OVERLAP DIFFUSION FOR INCREASING PHOTOTRANSISTOR DYNAMIC RANGE
D. H. McCann (Westinghouse Elec. Corp.)
Jul. 1972
M-FS-20407
Construction of improved phototransistors to provide increased base-collector capacitance is described. Silicon or germanium semiconductor wafers are used as examples. Operation of transistors and electrical properties are discussed and illustrations of the devices are included.

B72-10363
IMPROVED UNIVERSAL ELECTRICAL CONNECTOR
B. W. Kennedy
Jul. 1972
M-FS-14741
Universal electrical connector for use with various types of electric cable, inserts, and pin styles is described. Connector may be used over variety of environmental conditions. Details of construction are discussed. Illustrations of connector are included.

B72-10369
A MANUALLY SET MAGNETIC WIRE COUNTER
Innovator not given (Sandia Labs.) Dec. 1972
AEC-10039
Magnetic storage wire counter design principles are given. Magnetic storage wire was coupled with two phase propagational driver in manual set counter shift register. Time delay between magnetic counter domain insertion and corresponding output pulse provides counting functions.

B72-10370
TWO-STAGE MAGNETOMETER MEASURES WEAK MAGNETIC FIELDS
R. W. Buntenbach
Dec. 1972
AEC-10068
Sensitive magnetometer capable of measuring field strengths of 10 nanogauss is described. High permeability core is aligned parallel to magnetic field in first stage. In second stage, ferromagnetic toroid saturates rapidly. Adjustment of turns and area ratios of each stage provides wide range of sensitivities.

B72-10376
A SONIC TRANSDUCER TO DETECT FLUID LEAKS
I. Cimerman (Dynamatec Corp.) and J. Janus (Dynamatec Corp.)
Jul. 1972 See also NASA-CR-124618
KSC-10704
Ultrasonic detector utilizes set of contact transducers and bandpass filters to detect and analyze sonic energy produced by flow or leakage. Detector covers wide frequency range and is operable at cryogenic temperatures and in vacuum.

B72-10393
GUIDELINES FOR FABRICATION OF HYBRID MICROCIRCUITS
W. D. McKee, Jr. (N. Am. Rockwell Corp.), J. E. Varga (N. Am. Rockwell Corp.), J. V. Brandewie (N. Am. Rockwell Corp.), and A. P. Poole, Jr. (N. Am. Rockwell Corp.)
Jul. 1972
M-FS-21964
Document is summary of approaches that may be taken in designing hybrid microcircuits similar to those for aerospace application.

B72-10452
MINIATURE INTERMITTENT CONTACT SWITCH
A. Sword (Stanford Univ.)
Aug. 1972
ARC-10450
Design of electric switch for providing intermittent contact is presented. Switch consists of flexible conductor surrounding, but separated from, fixed conductor. Flexing of outside conductor to contact fixed conductor completes circuit. Advantage is small size of switch compared to standard switches.

B72-10453
CURRENT SWITCH HAS BUILT-IN TIME DELAY: A CONCEPT
C. D. Jesch (N. Am. Rockwell Corp.)
Aug. 1972
MSC-17324
Switch concept provides simple means of achieving electromechanical time delay function. Unit consists of reed-type circuit

breaker enclosed by copper tubing with electromagnetic coil wound around tubing and entire assembly mounted on insulating platform. Characteristics are affected only by geometry of system so device is expected to be very stable.

B72-10455
NEW METER PROBES PROVIDE PROTECTION FROM HIGH CURRENT POWER SOURCES AT POTENTIALS UP TO 600 VOLTS
H. Long and J. Getsug
Aug. 1972
LANGLEY-10804

Meter probes incorporating integral fuse holder which contains limitation fuse of 600 V, 5A, with interruption rating of 50,000 KVA. provide required protection and minimize danger incurred by defective or improperly operated meter.

B72-10462
INTERFEROMETER USING RF SWITCHING MATRIX
R. N. VanVleet (GE)
Aug. 1972
GSFC-11051

Radio frequency switching technique for single receiver and data processing channel to be used for phase movement measurement is discussed. Components of interferometer radio frequency unit, X-band receiver, and interferometer data processing unit are illustrated. Elimination of major measurement error source is described.

B72-10463
AMPLIFIER FOR SIGNAL FROM THIN FILM TRANSDUCER
K. A. Jensen
Aug. 1972
LEWIS-11494

Electronic circuitry is devised to raise low level signal from platinum film type transducer to sufficient amplitude to trigger oscilloscope or time interval counter. Circuit can be used wherever it is necessary to raise level of low amplitude, low impedance positive polarity pulse source to a 5 or 6 volt level.

B72-10474
SPECIFICATION GUIDELINES FOR HYBRID MICROCIRCUITS
S. V. Caruso
Aug. 1972
M-FS-22090

Guidelines establishing manufacturing and control procedures for hybrid microcircuits used in aerospace programs may have possible commercial and industrial applications. Guidelines encompass parts, materials, and process controls, as well as assembly, packaging methods, screening, and inspection procedures for procurement of custom packaged, high reliability microcircuits.

B72-10477
LOW FREQUENCY SINUSOIDAL PRESSURE GENERATOR
J. S. Curreri
Aug. 1972 See also NASA-TN-D-6166
LEWIS-11465

Low frequency pressure generator is built to provide sinusoidal driving function in frequency range from 0.05 to 50 Hz for frequency response testing of pressure transducers used in liquid-filled systems. Generator consists of piston-in-cylinder, scotch-yoke mechanism machined into piston, and adjustable eccentric.

B72-10479
IMPROVED OPERATION OF RECHARGEABLE OXYGEN ELECTRODES
P. A. Malachesky (Tyco Corporate Technol. Center) and G. L. Holleck (Tyco Corporate Technol. Center)
Aug. 1972 See also NASA-CR-72999
LEWIS-11619

Procedure for enhancing operating life and performance of oxygen electrodes in rechargeable metal-oxygen batteries and hydrogen-oxygen fuel cells is discussed. Accumulation of refractory anodic oxide layer and inhibiting effects on oxygen reduction are described. Improvements in service life of batteries by following procedure are explained.

B72-10480
HIGH INTENSITY SOLAR CELL RADIOMETER
H. W. Brandhorst and E. W. Spisz
Aug. 1972
LEWIS-11549

Device can be employed under high intensity illumination conditions such as would occur in a close-solar-approach space mission or in monitoring high intensity lamps. Radiometer consists of silicon solar cells with thin semi-transparent coatings of aluminum deposited on the front surfaces to permit transmission of small percentage of light and reflect the remainder.

B72-10492
IMPROVED ELECTRICAL SPOT TERMINALS
C. D. Baker
Aug. 1972
NPO-10034

Improved electrical spot terminal has been developed which can be rigidly attached to terminal mounting board. Mounting board is bonded to epoxy board which in turn is bonded to printed circuit board with high temperature adhesive. Conductive lead is coupled between electrical terminal and circuit trace on circuit board. Shape is usually clover-leaf.

B72-10505
NOVEL DIELECTRIC REDUCES CORONA BREAKDOWN IN ac CAPACITORS
J. L. Loehner (McDonnell-Douglas Corp.)
Aug. 1972
M-FS-21486

Dielectric system was developed which consists of two layers of 25-gage paper separated by one layer of 50-gage polypropylene to reduce corona breakdown in ac capacitors. System can be used in any alternating current application where constant voltage does not exceed 400 V rms. With a little research it could probably be increased to 700 to 800 V rms.

B72-10506
WATERTIGHT LOW-COST ELECTRICAL CONNECTOR
J. E. Dudenhoefer and M. N. Miraldi
Dec. 1972
LEWIS-11552

Fabrication is described of waterproof electrical connector assembly for use with Teflon jacketed cables and constructed so that assembly will remain sealed under extreme environmental conditions. Conditions are specified as: pressure from vacuum to atmospheric; temperature from 280 K to 450 K; exposure to saturated steam; and steam suddenly introduced into vacuum.

B72-10518
A VOLTAGE-TUNABLE THREE-TERMINAL GUNN DEVICE
R. J. Schwartz (Purdue Univ.) and J. J. Nahas (Purdue Univ.)
Aug. 1972
HQ-10783

Newly developed Gunn oscillator is three-terminal device which consists of piece of gallium arsenide with source, drain, and gate contacts. Voltage tunable three-terminal device does not require bulky resonant cavity and allows oscillation frequency to be rapidly tuned with simple circuitry.

B72-10523
MECHANICALLY AND THERMALLY STABLE MASER CAVITY RESONATOR
R. F. C. Vessot (Smithsonian Astrophys. Obs.), T. E. Hoffman (Smithsonian Astrophys. Obs.), and M. W. Levine (Smithsonian Astrophys. Obs.)
Aug. 1972
HQ-10790

New type cavity resonator is designed for hydrogen maser. Resonator consists of three pieces of glass-ceramic material having extremely low thermal coefficient of expansion and provides very stable mechanical tuning.

B72-10527
Al/Cl2 MOLTEN SALT BATTERY
J. Giner (Tyco Labs., Inc.)
Aug. 1972
HQ-10696

Molten salt battery has been developed with theoretical energy density of 5.2 j/kg (650 W-h/lb). Battery, which operates at 150 C, can be used in primary mode or as rechargeable battery. Battery has aluminum anode and chlorine cathode. Electrolyte is mixture of AlCl3, NaCl, and some alkali metal halide such as KCl.

B72-10530
CATHODE FOR USE WITH LOW DENSITY GASES
W. H. Bennett (N. C. State Univ.)
Aug. 1972
HQ-10687

Method for preventing deterioration of mixed oxide cathodes in low density gas tubes caused by ion bombardment is discussed. Construction of cathode is described and illustration is furnished. Electron emission through space charge to neutralize ion-filled regions is basic process.

B72-10555
ELECTRONIC INTEGRATOR FOR GYRO RATE OUTPUT VOLTAGES
R. A. Crawford, P. J. Hand, and H. H. Horiuchi
Sep. 1972
NPO-11499

Circuit which integrates spacecraft gyro output voltages to provide analog position signals has been developed. Accurate integration is provided by all solid state system which uses no choppers and takes advantage of commercially available flight qualified components.

B72-10561
PHOTOMULTIPLIER BLANKING CIRCUIT
J. O. McClenahan
Sep. 1972
ARC-10593

Circuit for protecting photomultiplier equipment from current surges which occur when exposed to brilliant illumination is discussed. Components of circuit and details of operation are provided. Circuit diagram to show action of blanking pulse on zener diode is included.

B72-10578
AN ABSENTEE MONITORING DEVICE
A. L. Meadows (Boeing Co.) and D. C. Birch (Boeing Co.)
Sep. 1972
KSC-10668

Development of audio alarm system to provide remote monitoring of warning devices is discussed. Device uses photodiode connected to self-powered audio alarm unit. Photograph of equipment is included.

B72-10643
REDUNDANCY APPROACHES IN BUBBLE DOMAIN MEMORIES
G. S. Almasi (IBM) and S. E. Schuster (IBM)
Oct. 1972
M-FS-21915

Fabrication of integrated circuit chips to compensate for faulty memory elements is discussed. Procedure for testing chips to determine extent of redundancy and faults is described. Mathematical model to define operation is presented. Schematic circuit diagram of test equipment is provided.

B72-10646
DUAL FIELD ALIGNMENT DISPLAY AND CONTROL FOR ELECTRON MICROPATTERN GENERATOR
P. R. Malmberg (Westinghouse) and T. W. OKeeffe (Westinghouse)
Oct. 1972
M-FS-22118

Application of electron beam lithography to replace photolithography process in fabrication of integrated circuits is discussed. Procedure for using electron beam lithography equipment is described. Diagram of electron micropattern generator is provided.

B72-10673
HIGH TEMPERATURE GALLIUM PHOSPHIDE RECTIFIERS
M. G. Craford (Monsanto Co.) and D. L. Keune (Monsanto Co.)
Dec. 1972 see also NASA-CR-2098
LEWIS-11804

Development of high reverse breakdown voltage and low forward voltage drop stability in high power Schottky GaP rectifier for high temperature application is reported.

B72-10691
DIODE-QUAD BRIDGE FOR REACTIVE TRANSDUCERS AND FM DISCRIMINATORS
D. R. Harrison and J. Dimeff
Oct. 1972
ARC-10364

Diode-quad bridge circuit was developed for use with pressure-sensitive capacitive transducers, liquid-level measuring devices, proximity deflection sensors, and inductive displacement sensors. It may also be used as FM discriminator and as universal impedance bridge.

B72-10696
DEVELOPMENT OF CHIP PASSIVATED MONOLITHIC COMPLEMENTARY MISFET CIRCUITS WITH BEAM LEADS
L. J. Ragonese (GE), M. J. Kim (GE), B. L. Corrie (GE), J. W. Brouillette (GE), and R. E. Warr (GE)
Dec. 1972 See also NASA-CR-123742
M-FS-22264

Fabrication method is described for alumina passivated silicon MISFET arrays. Technique involves total passivation beam-lead approach and provides completely sealed chip with double level interconnect capability. Refractory metal alloy is used to form interconnect system and obtain metal contacts that withstand temperatures of 873 K for short periods of time.

B72-10697
OPTIMAL READ/WRITE MEMORY SYSTEM COMPONENTS
A. Kozma (Radiation, Inc.), A. Vander Lugt (Radiation Inc.), and D. Klinger (Radiation Inc.)
Dec. 1972
M-FS-22044

Two holographic data storage and display systems, voltage gradient ionization system, and linear strain manipulation system are discussed in terms of creating fast, high bit density, storage device. Components described include: novel mounting fixture for photoplastic arrays; corona discharge device; and block data composer.

B72-10705
WAVEGUIDE SWITCH PROTECTOR
R. B. Kolbly
Oct. 1972
NPO-11592

Device for detecting excessive operation of electric motors used to drive waveguide switches is described. Purpose of device is to prevent burnout of electric motor in event of waveguide stoppage at some point other than extreme limits of travel. Operation of equipment, components used to sense motor performance, and schematic diagram are included.

B72-10719
IRRADIATION OF MOS-FET DEVICES TO PROVIDE DESIRED LOGIC FUNCTIONS
V. Danchenko and D. H. Schaefer
Dec. 1972
GSFC-11061

Gamma, X-ray, electron, or other radiation is used to shift threshold potentials of MOS devices on logic circuits. Before irradiation MOS gates to be shifted are biased positive and other gates are grounded to substrate. Threshold lasts 10 years. Thermal annealing brings circuit back to original configuration.

B72-10729
FREQUENCY-TO-AMPLITUDE CONVERTER: A CONCEPT
C. H. Stewart
Dec. 1972
MSC-12395

Circuit allows direct frequency to amplitude conversion without special counters and discriminators and provides for individual or simultaneous emphasis of high or low frequencies. Circuit is simple, small, light weight, and versatile in its frequency range and region of conversion.

B72-10731
INSULATED-GATE FIELD-EFFECT TRANSISTOR STRAIN SENSOR
C. Gross
Dec. 1972
LANGLEY-11012

Strain sensors that can be switched on and off were fabricated from p-channel IGFET on thin filament n-type silicon crystals with silicon dioxide layer sputtered over transistor for passivation. Applications include integration with microelectronic circuits for multiplexing.

B72-10735
A PANEL SPACE FOR RFI SHIELDING GASKET: A CONCEPT
W. T. Goins (N. Am. Rockwell Corp.)
Dec. 1972
MSC-17827

Method for spacing and shielding console chasis from panel is described. Small Teflon buttons are force-fitted into standard holes in console.

B72-10737
WIDEBAND WATTMETER FOR INSTANT MEASUREMENT OF REAL POWER
L. G. Landes (Barnes and Reinecke, Inc.) and Y. Y. Liu (Barnes and Reinecke, Inc.)
Dec. 1972 See also NASA-CR-72752
LEWIS-11698

Portable, solid state wattmeter with wideband (dc to 1 MHz) linear multiplier which provides true four quadrant operation permitting instantaneous indication of real power as oscilloscope display is described.

B72-10741
DESIGN OF MICROSTRIP COMPONENTS BY COMPUTER
T. C. Cisco (CAED Corp.)
Dec. 1972
LANGLEY-11210

Development of computer programs for component analysis and design aids used in production of microstrip components is discussed. System includes designs for couplers, filters, circulators, transformers, power splitters, diode switches, and attenuators.

B72-10755
GATE PROTECTIVE DEVICE FOR SOS ARRAY
J. E. Meyer, Jr. (David Sarnoff Res. Center) and J. H. Scott (David Sarnoff Res. Center)
Dec. 1972
HQ-10745

Protective gate device consisting of alternating heavily doped n(+) and p(+) diffusions eliminates breakdown voltages in silicon oxide on sapphire arrays caused by electrostatic discharge from person or equipment. Diffusions are easily produced during normal double epitaxial processing. Devices with nine layers had 27-volt breakdown.

B73-10004
IMPULSE COMMUTATING CIRCUIT WITH TRANSFORMER TO LIMIT REAPPLIED VOLTAGE
J. H. McConville (Martin Marietta Corp.)
Mar. 1973
LEWIS-11849

Silicon controlled rectifier opens circuit with currents flowing up to values of 30 amperes. Switching concept halves both current and voltage in middle of commutating cycle thereby lowering size and weight requirements. Commutating circuit can be turned on or off by command and will remain on in absence of load due to continuous gate.

B73-10015
SIGNAL CONDITIONER FOR POTENTIOMETER TYPE TRANSDUCERS
E. C. Armentrout and E. Gross
Mar. 1973
LEWIS-11822

Low cost method is described for signal conditioning of pot-type transducers utilizing printed circuitry. Conditioner fits into standard rack, accommodates 56 channels, and can be operated by one attendant.

B73-10035
DIGITAL DATA COMMAND BUS
G. C. Milligan
Feb. 1973
NPO-11637

Command bus constructed from coaxial cable has short segments of its outer jacket and shield removed and replaced with small ferrite cores carrying multiturn windings connected to decoder. Device reduces number of wire pairs required to communicate command data to systems and subsystems.

B73-10054
GLASS ENCAPSULATION PROVIDES EXTRA PROTECTION FOR IC SEMICONDUCTOR DEVICES
W. L. Doelp, Jr. (Philco-Ford Corp.)
Feb. 1903
M-FS-21310

Oxide-passivated semiconductor chip is given protective glass coating by means of vapor deposition over metallic substrate of integrated circuit (IC). Method provides more reliable oxide-passivation and hermetic sealing in current use. Chips and scratches incurred during dicing, testing, and assembly are markedly reduced.

B73-10055
FLAT CONDUCTOR CABLE SURVEY
C. R. Swanson (Hayes Intern. Corp.) and G. L. Walker (Hayes Intern. Corp.)
Feb. 1973
M-FS-22493

Design handbook contains data and illustrations concerned with commercial and Government flat-conductor-cable connecting and terminating hardware. Material was obtained from a NASA-sponsored industry-wide survey of approximately 150 companies and Government agencies.

B73-10096
FABRICATION OF MAGNETIC BUBBLE MEMORY OVERLAY
Innovator not given (IBM) Mar. 1973
M-FS-22377

Self-contained magnetic bubble memory overlay is fabricated by process that employs epitaxial deposition to form multi-layered complex of magnetically active components on single chip. Overlay fabrication comprises three metal deposition steps followed by subtractive etch.

B73-10097
A PROPOSED ADJUSTABLE RF CABLE CONNECTOR
E. J. Stringer (Rockwell Intern. Corp.) and J. D. Doyle (Rockwell Intern. Corp.)
Mar. 1973
M-FS-24271

In system that requires negligible loss, it may be necessary to adjust cable length to exact multiple of transmitted wavelength. Adjustable cable connector saves time and cost by eliminating need to add to or cut from cable. Device was especially designed for use with high frequencies. For particular application, connector of suitable dimensions should be used.

B73-10109
A NEW PACKAGING AND TESTING CONCEPT FOR MICROELECTRONIC COMPONENTS
G. L. Filip and S. V. Caruso
May 1973
M-FS-20936

Parts are securely held on sealed, printed circuit board that is both package and test fixture. Parts can be handled, stored, and tested in sealed package.

B73-10135
LOW PHASE-NOISE DIGITAL FREQUENCY DIVIDER
G. F. Lutes
Mar. 1973
NPO-11569

Digitally generated countdown pulse at submultiple frequency is applied to one electrode of FET gate to establish threshold state; gate cannot function until desired portion of reference half-wave pulse which is to be passed appears on second electrode.

B73-10136
BRAID READ-ONLY MEMORY
J. F. McKenna (MIT)
Mar. 1973
NPO-11570

Transformer-type memory is fault-tolerant array of independent read-only memory units. Information pattern in each unit is written by weaving wires through array of linear (nonswitching) transformers. Presence or absence of a bit is determined by whether a given wire threads or bypasses given transformer.

B73-10139
SIMULTANEOUS PROCESSING OF VIBRATION TEST DATA
E. E. Redderman
Mar. 1973
NPO-11616

Data from record tracks of all accelerometers is injected simultaneously into electronic circuits which convert inputs into single, composite graphical representation. Three adequate methods of processing data: peak acceleration at a frequency, average of all channels, and quad-mean of all channels.

B73-10152
A VACUUM CHAMBER FEEDTHROUGH
V. D. Brown (Memphis State Univ.)
Mar. 1973
M-FS-21133

Simple and inexpensive microwave feedthrough has been designed which transfers 130 ns, 5kV pulse into vacuum chamber. Feedthrough may be used over wide range and is adaptable to most coaxial cables, since either multistrand or single strand center conductor cable can be used.

B73-10160
SYNCHRO PHASE SELECTOR AID
F. H. Austin and G. C. Moen
May 1973
LANGLEY-11282

Phase selector permits multiple leads of synchro devices to be randomly connected while proper interconnections are determined by operating selector switches. Operation of these switches varies both phase and rotation relationship of synchro devices.

B73-10164
LIQUID METAL POROUS MATRIX SLIDING ELECTRICAL CONTACT: A CONCEPT
H. Ferguson
Jun. 1973
LEWIS-11735

Concept utilizes porous metal or nonmetal matrix containing liquid metal in porous structure and confines liquid metal to contact area between rotor and brush by capillary forces. System may also be used to lubricate bearing systems.

B73-10171
COMPACT 20-KILOAMPERE PULSE-FORMING-NETWORK CAPACITOR BANK
S. J. Posta and C. J. Michels
May 1973
LEWIS-12009

Bank uses commercially available high-energy-density capacitors for energy storage and silicon-controlled rectifiers for switching. Low voltage design employing solid-state switching is utilized in lieu of conventional gas discharge switching.

B73-10174
COMPLEMENTARY MOS FOUR-PHASE LOGIC CIRCUITS
H. L. Petersen (Lockheed Missiles & Space Co.) and D. K. Kinell (Lockheed Missles & Space Co.)
Jun. 1973
JSC-14240

Technique can provide four-phase clock signal from single-phase clock and requires only one power supply voltage. This arrangement saves considerable power compared to circuits having load resistor between power supply and ground.

B73-10179
MICROSTRIP ANTENNAS
J. Q. Howell
Jun. 1973
LANGLEY-11284

It is possible to design and construct simple, efficient microwave antenna, either linearly or circularly polarized, which should be useful in phased arrays. Mounted on thin dielectric substrate, it extends slightly above ground plane. Space behind ground plane is required for feed line and mounting hardware.

B73-10185
PROPOSED ELECTROMAGNETIC WAVE ENERGY CONVERTER
R. L. Bailey (Catholic Univ.)
Jun. 1973
GSFC-11394

Device converts wave energy into electric power through array of insulated absorber elements responsive to field of impinging electromagnetic radiation. Device could also serve as solar energy converter that is potentially less expensive and fragile than solar cells, yet substantially more efficient.

B73-10196
AN IMPROVED METHOD FOR OBTAINING A NORMALIZED JUNCTION TEMPERATURE FOR SEMICONDUCTORS: A CONCEPT
S. N. Trivedi (Martin Marietta Corp.)
Jun. 1973
JSC-14136

Failure rate for given semiconductor device is simply determined by reading value of normalized junction temperature from printout for any given combination of ambient temperature, stress ratio, and maximum rated junction temperature, and obtaining corresponding failure rate from graph.

B73-10197
P-CHANNEL SILICONE GATE FET
S. Ostis (Sperry Rand Corp.) and D. S. Woo (Sperry Rand Corp.)
Jun. 1973
M-FS-22505

Modified fabrication technique for P-channel MOSFET devices eliminates problems involving gate placement and gate overlap. Technique provides self-aligned gate, eliminating complexity of mask aligning. Devices produced by this process are considerably faster than conventional MOSFET's and process increases yield.

B73-10199
SRC SEAL TESTING
E. D. Miller (McDonnell Douglas Corp.) and G. J. Kohout (McDonnell Douglas Corp.)
Aug. 1973
M-FS-22426

Small venthole drilled in semisealed silicon-controlled rectifier (SCR) cavity eliminates entrapped helium. Although these devices show slightly greater leak than those before lead installation, it is now possible to distinguish device with good hermetic seal from defective one.

B73-10211
MANUFACTURE AND QUALITY CONTROL OF INTERCONNECTING WIRE HARNESSES
Jun. 1973
M-FS-22511

Four-volume series of documents has been prepared as standard reference. Each volume may be used separately and

covers wire and cable preparation as well as harness fabrication and installation. Series should be useful addition to libraries of manufactures of electrical and electronic equipment.

B73-10237
BATTERY CELL THERMAL-CONDUCTIVE COATING INCREASES EFFICIENCY
H. M. Doyle (Martin Marietta Corp.)
Aug. 1973
LANGLEY-10963

Thin coating of high-temperature epoxy resin provides necessary electrical insulation, as well as good thermal conductivity between battery cells. Insulation increases efficiency of nickel-cadmium battery, as it would any multicell battery assembly in which cell-to-cell thermal balance is critical.

B73-10249
RELIABLE LOW-COST BATTERY VOLTAGE INDICATOR FOR LIGHT AIRCRAFT AND AUTOMOBILES
R. L. Miller
Dec. 1973
LEWIS-12020

Voltage indicator fits into cigarette lighter socket and utilizes light emitting and Zener diodes to display three levels of battery voltage. Indicator is superior to typical conventional electrical system indicators in that it gives a positive discrete indication of battery voltage. It is simple, inexpensive, and rugged.

B73-10259
FREQUENCY SHIFTING WITH A SOLID-STATE SWITCHING CAPACITOR
R. J. Mattauch (Univ. of Virginia) and T. J. Viola, Jr. (Univ. of Virginia)
Sep. 1973
HQ-10812

Frequency shifting, commonly used in electronic signal processing, is applied in tuning, automatic frequency control, antenna element switching, phase shifting, etc. Frequency shifting can be accomplished economically and reliably with simple circuit comprising conventional resistor and solid-state switching device which can be equivalent to two capacitors, depending on switching state.

B73-10264
MULTILAYER FLAT ELECTRICAL CABLE
P. G. Silverman (TRW Systems Group)
Jun. 1973
ARC-10734

Flat electrical cable is lightweight, flexible over wide temperature range, withstands continuous exposure to high levels of nuclear radiation, and can carry high currents with minimum of temperature rise. Its magnetic cleanliness is equal to or better than twisted pair of wires, and it can be terminated in conventional electrical connector.

B73-10278
EVENT-SEQUENCE DETECTOR
M. F. Hanna
Jun. 1973
NPO-11703

Detector consists of matrix of storage elements which are activated by coincidence of failure-voltage pulses and clock pulses. Clock frequency used for event sequence detector can be selected to provide time resolution demanded by test at hand.

B73-10286
A NEW METHOD FOR THE DETERMINATION OF THIN FILM POROSITY
T. R. Beck (Boeing Co.), C. J. Bishop (Boeing Co.), and W. F. Springgate (Boeing Co.)
Sep. 1973
HQ-10673

Internal reflection spectroscopy may be used to determine presence of water in thin film pores. Presence of water in such pores is function of relative humidity and pore size. Thus, one can determine pore size by controlling humidity. Fluids with surface tension different from that of water can be used to detect pores.

B73-10292
MINIMAL HARDWARE, BINARY SEQUENCE PSEUDO-NOISE GENERATOR AND DETECTOR
M. Perlman
Jul. 1973 See also JPL-TR-32-1432
NPO-11406

General purpose sequence generator which includes 35-stage field shift register determines mathematical properties of polynomials such as divisibility, period, order of roots, and other parameters that effect desirability of various sequences for specific applications; for example, irreducible polynomials which characterize sequences with randomness properties.

B73-10295
SILICON SWITCHING TRANSISTOR WITH HIGH POWER AND LOW SATURATION VOLTAGE
E. Stonebraker (Westinghouse Elec. Corp.), D. Stoneburner (Westinghouse Elec. Corp.), and H. Ferree (Westinghouse Elec. Corp.)
Jul. 1973 See also NASA-CR-112870
NPO-11565

Assembly of two individually encapsulated silicon-chip transistors produces silicon power-transistor that has low electrical resistance and low thermal impedance. Electrical resistance and thermal impedance are low because of short lead lengths, and external contact surfaces are plated to reduce resistance at interfaces.

B73-10304
AN ELECTRIC MOTOR WITH MAGNETIC BEARINGS: A CONCEPT
P. A. Studer
Aug. 1973
XGS-07805

Because same magnetic flux is used to control rotor as to drive it, size, weight, and power required are minimized. Constant total current keeps motor torque invarient, and absence of mechanical bearings eliminates wear and reduces frictional power loss.

B73-10333
MILLIMETER-WAVE ANTENNA SYSTEM
J. Evans and W. I. Gould, Jr.
Sep. 1973
GSFC-10949

Parabolic reflectors fabricated from Carbon Fiber Reinforced Plastic (CFRP) composite material will not distort their shape by more than 3 percent of millimeter wavelength, despite large temperature differences on reflector surfaces. CFRP has zero thermal expansion. It is derived from charred polyacrylonitrite plastic filaments that are combined with epoxy resin.

B73-10346
OPERATIONAL SLOPE-LIMITING CIRCUIT
A. Engel
Aug. 1973
NPO-11773

Circuit limits slope of arbitrary waveform to avoid exceeding rate limit of subsequent amplifier, or to form trapezoidal wave with adjustable rise and fall rates from square wave of arbitrary frequency. Integrator provides delay needed to develop output waveform. DC coupling is used to preserve original dc offset.

B73-10350
ALL-DIGITAL PHASE-LOCK LOOPS FOR NOISE-FREE SIGNALS
T. O. Anderson
Aug. 1973
NPO-11914

Bit-synchronizers utilize all-digital phase-lock loops that are referenced to a high frequency digital clock. Phase-lock loop of first design acquires frequency within nominal range and tracks phase; second design is modified for random binary data by addition of simple transition detector; and third design acquires frequency over wide dynamic range.

B73-10351
FREQUENCY CONTROL CIRCUIT FOR ALL-DIGITAL PHASE-LOCK LOOPS
T. O. Anderson
Aug. 1973 See also B73-10350
NPO-11936

Phase-lock loop references all its operations to fixed high-frequency service clock operating at highest speed which digital circuits permit. Wide-range control circuit provides linear control of frequency of reference signal. It requires only two counters in combination with control circuit consisting only of flip-flop and gate.

B73-10356
DATA-AIDED CARRIER TRACKING LOOPS
W. C. Lindsey and M. K. Simon
Aug. 1973
NPO-11282

Power in composite signal sidebands is used to enhance signal-to-noise ratio in carrier tracking loop, thereby reducing radio loss and decreasing probability of receiver error. By adding quadrature channel to phase-lock-loop detector circuit of receiver, dc component can be fed back into carrier tracking loop.

B73-10366
SAFE ELECTRICAL RECEPTACLE AND MODIFIED PLUG
L. W. Rabb (Boeing Co.)
Oct. 1973
KSC-10817

Recently-developed electrical receptacle has internal sliding protective cover that prevents accidental contact with live terminals. Sliding protective cover is used in combination with modified male plug. Design provides excellent protector against electrical shock and should interest manufacturers of electrical connectors.

B73-10368
A HIGH-SPEED SPECTROGRAPH SHUTTER
M. H. Miller (Maryland Univ.) and S. M. Wood, Jr. (Maryland Univ.)
Oct. 1973 See also NASA-CR-72660
HQ-10635

Device can operate in close-open-close mode. Beam splitter placed behind static-slit assembly allows use of more than one camera. Each frame in particular series may be conveniently varied in exposure time and spacing. This can be done independent of other frames in the series. In "open" position, shutter transmits light over wide wavelength range.

B73-10374
SILICON-FIBER BLANKET SOLAR-CELL ARRAY CONCEPT
J. T. Eliason (Sperry Rand Corp.)
Oct. 1973
M-FS-22458

Proposed economical manufacture of solar-cell arrays involves parallel, planar weaving of filaments made of doped silicon fibers with diffused radial junction. Each filament is a solar cell connected either in series or parallel with others to form a blanket of deposited grids or attached electrode wire mesh screens.

B73-10386
NOMOGRAPH FOR PREDICTION OF RF-BREAKDOWN VOLTAGES
F. S. Hickernell (Motorola, Inc.) and B. E. Mathes (Motorola, Inc.)
Sep. 1973
NPO-11819

Information in nomograph is derived from data obtained from RF-breakdown tests on components of uniform and nonuniform geometry. Nomograph also can be used in design work to predict breakdown margins; if operational minimum pressure is established giving minimum value on nomograph, minimum breakdown voltage consistent with allowed value can be predicted.

B73-10387
GATED COMPRESSOR, DISTORTIONLESS SIGNAL LIMITER
R. C. Woodbury
Sep. 1973
NPO-11820

Comparator/multiplier arrangement is capable of limiting input power to voice coil so that desired maximum current level is never exceeded. Overall test system consists of signal source which produces frequency spectrum required for acoustic test, gated compressor circuit, and power amplifier feeding transducer.

B73-10390
SAMPLING COMMAND GENERATOR CORRECTS FOR NOISE AND DROPOUTS IN RECORDED DATA
T. O. Anderson
Sep. 1973
NPO-11886

Generator measures period between zero crossings of reference signal and accepts as correct timing points only those zero crossings which occur acceptably close to nominal time predicted from last accepted command. Unidirectional crossover points are used exclusively so errors from analog nonsymmetry of crossover detector are avoided.

B73-10393
WELDED PRINTED CIRCUIT (PC) STICK
F. Kreis
Oct. 1973
GSFC-11773

Printed-circuit stick module has reduced comb technique to six steps, cutting process time by approximately 50%. Method incorporates all type of components into one assembly. It reduces design and fabrication time for 14-lead flat pack to less than four hours and for the 22-lead flat pack to four hours. Average weight of each flat pack is also reduced to 2 g.

B73-10427
HERMETIC-COAXIAL PACKAGE DESIGN FOR MICROWAVE TRANSISTORS
D. S. Jacobson (RCA)
Dec. 1973
GSFC-10791

Semiconductor package has been developed for high power semiconductor devices that operate in the GHz-frequency range at several watts. Package includes stud, insulating ring, electrically conductive washer, insulating washer, braze ring, and cap. It is mechanically strong and can be used with variety of circuits.

B73-10442
GaAs TRANSISTORS FORMED BY Be OR Mg ION IMPLANTATION
R. G. Hunsperger (Hughes Aircraft Co.) and O. J. Marsh (Hughes Aircraft Co.)
Feb. 1974
LANGLEY-11204

N-p-n transistor structures have been formed in GaAs by implanting n-type substrates with Be ions to form base regions and then implanting them with 20-keV Si ions to form emitters. P-type layers have been produced in GaAs by implantation of either Mg or Be ions, with substrate at room temperature, followed by annealing at higher temperatures.

B73-10459
DESIGN PARAMETERS FOR TOROIDAL AND BOBBIN MAGNETICS
W. T. McLyman
Feb. 1974 See also JPL-TM-33-651
NPO-13441

Handbook has been published to facilitate conversion to metric system. Conversion data makes it possible for transformer designers to obtain fast and close approximation of significant parameters. For greater convenience, derivations of some transformer and inductor parameters are also presented.

B73-10476
PLUG-IN INTEGRATED/HYBRID CIRCUIT

E. J. Stringer (Rockwell Intern. Corp.)
Mar. 1974
M-FS-24470

Hybrid circuitry can be installed into standard round bayonet connectors, to eliminate wiring from connector to circuit. Circuits can be connected directly into either section of connector pair, eliminating need for hard wiring to that section.

B73-10509
RF SHIELDED CONNECTORS
A. Fisher and C. Clatterbuck
Mar. 1974
GSFC-11215

Gap, where cable joins connector housing, is shielded effectively by composite RF shielding made from suitable potting resin material (fumed silica, thixotropic prepolymer composition), conductive coating (silver-filled, flexible, polyurethane resin), and protective jacket (wax coated housing formed around another wax form having contours shaped to match configuration).

B73-10512
NEW STANDOFFS PROVIDE HIGH-RELIABILITY COMPONENT MOUNTING FOR PRINTED WIRING BOARDS
W. H. McCandliss (Martin Marietta Corp.)
Mar. 1974
LANGLEY-11176

Designs provide such advantages as inspectable solder joints from both sides of boards; stress relief in lead wires; low-impedance thermal paths; matched coefficients of lead wire thermal expansion; minimum webbing of conformal coatings to lead wires; positive mounting of part bodies to boards; and conductive mass for transient heat sink requirements.

B73-10515
CORRUGATED BATTERY ELECTRODE
J. McCallum (Battelle Mem. Inst.)
Mar. 1974 See also B73-10519
GSFC-11368

Performance of porous electrodes in batteries and other electrochemical cells is greatly improved when supports for active material have pores of uniform size, extending completely through electrodes, from side to side, with no interconnections between pores.

B73-10519
HONEYCOMB BATTERY PLAQUE
G. R. Schaer (Battelle Mem. Inst.)
Mar. 1974 See also B73-10515
GSFC-11367

Performance of porous electrodes in batteries and other electrochemical cells is greatly improved when supports for active material have pores of uniform size, extending completely through electrodes, from side to side, with no interconnections between pores.

B73-10520
DESIGN METHOD FOR MINIMIZING RF VOLTAGE BREAKDOWN
R. T. Woo
Mar. 1974 See also JPL-TR-32-1500
NPO-13408

Research study was conducted and results were published. Using principles of similarity and minimum of experimental data, a number of universal curves have been constructed covering wide range of experimental parameters. Gases other than air, such as argon and carbon dioxide, also are included in study.

B74-10006
HIGH VOLTAGE SOLID-STATE RELAY
B. L. Sater, T. J. Riley, and W. A. Janssen (Sterer Eng. and Mfg. Co.)
Mar. 1974 See also NASA-TM-X-68248
LEWIS-12096

Hybrid microelectronics relay has characteristics significantly superior to conventional solid state relays. Relay provides 2500 Vdc input to output isolation and operates from high threshold logic signal to switch load of 400 Vdc at 2 mA. Technology should be of interest to manufacturers of discrete components.

B74-10015
LOW COST INSTRUMENTATION AMPLIFIER
J. C. Sturman
Jun. 1974
LEWIS-12222

Amplifier can be used for many applications requiring high input impedance and common mode rejection, low drift, and gain accuracy on order of one percent. Performance of inexpensive amplifier approaches that of some commercial instrumentation amplifiers in many specifications.

B74-10026
RADIATION HARDENING OF METAL-OXIDE SEMICONDUCTOR (MOS) DEVICES BY BORON
V. Danchenko
Apr. 1974
GSFC-11425

Technique using boron effectively protects metal-oxide semiconductor devices from ionizing radiation without using shielding materials. Boron is introduced into insulating gate oxide layer at semiconductor-insulator interface.

B74-10047
THREE-POINT BRIDGE CALIBRATION WITH ONE RESISTOR
D. R. Harrison and R. M. Brown
May 1974
ARC-10762

Method calibrates transducer bridge curing unbalanced condition and line resistance errors are negligible. Series resistance method can be automated easily and controlled by 2-bit information source which provide 4 states for switches.

B74-10064
ELECTROMETER SYSTEM MEASURES NANOAMPS AT HIGH VOLTAGE
J. C. Sturman, G. R. Sharp, R. R. Robson, N. J. Stevens, D. H. F. Priebe, and R. G. Wetli (Boeing Co.)
Jul. 1974
LEWIS-12267

Floating electrometer eliminates major source of error since any leakage from electrometer case, which is at high voltage, appears only as load on high voltage supply and not as part of current being measured. Commands to and data from floating electrometer are transferred across high voltage interface by means of optical channels.

B74-10068
ROTATING TURBINE BLADE PYROMETER
D. R. Buchele and D. J. Lesco
Aug. 1974 See also NASA-TM-X-68113
LEWIS-12218

Non-contacting pyrometer system optically measures surface temperature distribution on rotating turbine blade, comprising line-by-line scan via fiber optic probe. Each scan line output is converted to digital signals, temporarily stored in buffer memory, and then processed in minicomputer for display as temperature.

B74-10069
SELF-PROTECTING SOLID STATE ISOLATED SWITCH
A. C. Hoffman and S. T. Gooder
Aug. 1974
LEWIS-12268

Solid state switch has following capabilities: (1) Hybrid or IC from compatible with direct mounting on solar array substrate; (2) Continuous signal is not required to hold it in either on or off state; (3) Separate signal lines for on and off control; (4) Electrically isolated from input signals; and (5) Current surges will not cause switch failure.

B74-10079
VERY HIGH VOLTAGE LATCHING RELAY
R. R. Lovell, N. J. Stevens, and D. D. Renz
Aug. 1974

LEWIS-12265

Relay consists of high voltage reed switch actuated by rotating permanent magnet mounted on stepper motor shaft, with actuation assembly isolated from high voltage circuit. Unit can be modified for use as double pole or double pole double throw latching relay and can be used in either air or vacuum.

B74-10089
PIEZOELECTRIC RELAY
D. H. Fryklund (Accumetrics Corp.)
Aug. 1974
GSFC-11627

Bimorph configurations reduce sensitivity to shock and vibration and yet respond to weak electric fields. Two bimorphs provide sum of individual movements, simulating double length.

B74-10090
EFFICIENCY INCREASED IN NEW SOLAR CELL: A CONCEPT
J. A. Hutchby
Aug. 1974
LANGLEY-11174

Graded band-gap cell should be able to convert solar radiation into electrical energy more efficiently than any solar cell currently available. Thickness of band-gap region should be chosen to maximize both quantity of light absorbed in region and fraction of photogenerated charge carriers collect at junction.

B74-10100
THIN-FILM TEMPERATURE SENSOR
J. Maserjian and J. R. Gatewood
Aug. 1974
NPO-11775

Sensor measures rapid temperature changes in fluid streams. Sensor withstands contacts with various corrosive fluids, high fluid-flow rates, and turbulences caused by rapid changes in flow rates. Capacitor is part of resonant bridge circuit which produces ac voltage that is proportional to temperature.

B74-10107
IMPROVED SOLID-STATE TRIODE CONSTRUCTION
A. Shumka
Aug. 1974
NPO-13064

Triode is constructed from rectangular filament made of near-intrinsic n-type silicon. Collector and emitter are formed on opposite faces of filament and are spaced approximately 0.13 mm apart. Gate electrodes are alloyed to filament and extend longitudinally along midsection of other two opposite sides, approximately 0.06 mm apart.

B74-10110
INTEGRATED STRUCTURE VACUUM TUBE: A CONCEPT
J. Dimeff and W. J. Kerwin (Univ. of Ariz.)
Aug. 1974
ARC-10445

Cathode emission is made to occur by heating entire structure to 600 C, and positive potential is applied to anode with negative potential on grids. Electron flow takes place from ring to circular anode through electric field produced by grids.

B74-10112
BIO-ISOLATED DC OPERATIONAL AMPLIFIER
R. D. Lee
Aug. 1974
ARC-10596

Possibility of shocks from leakage currents can be reduced by use of isolated preamplifiers. Amplifier consists of battery-powered operational amplifier coupled by means of light-emitting diodes to another amplifier which may be grounded and operated from ac power mains or separate battery supply.

B74-10120
DECIMAL DIGIT GENERATOR FOR COMMUTATED DATA: A CONCEPT
S. J. Rusk (Lockheed Missiles and Space Co.)
Aug. 1974
ARC-10856

Perform analog-to-digital conversion on input signal with staircase circuit having 10% resolution, convert digital result to analog voltage, subtract it from original input signal; read out feedback signals as decimal digit representation during one clock phase and servo-error difference between input and feedback as analog portion during following clock phase.

B74-10160
POCKET GAUGE FOR CHECKING INSERT CLOCKING OF MULTIPIN CIRCULAR CONNECTORS
E. Billmeyer
Sep. 1974
NPO-11924

Prototype gauge has been constructed of heavy clear plastic with engraved degree lines, numerals, and alignment lines. With suitable modification, gauge can be mass produced. It could be marketed directly to users or to manufacturers of circular multipin connectors.

B74-10180
MINIATURE BIAXIAL STRAIN TRANSDUCER
I. S. Hoffman
Oct. 1974
LANGLEY-11648

Transducer is completely reusable and permits relocation to alternate points to be accomplished quickly. Size permits measurements to be made simultaneously over small areas and yields outputs directly proportional to strains measured. Transducer verifies elastic modulus, Poisson's ratio, and principal strain axes on materials.

B74-10192
MICROELECTRONICS PACKAGING TECHNIQUE: A CONCEPT
E. J. Stringer (Rockwell Intern. Corp.)
Nov. 1974
MSC-19399

Plug-in flat packs and flat conductor cable (FCC) can be used to make compact, lightweight, external monitoring system requiring minimum of hard wiring. Microelectronic monitoring panel includes replaceable integrated or hybrid circuit flat packs and FCC.

B74-10196
HEART-RATE PULSE-SHIFT DETECTOR
M. Anderson (Northrop Corp./Electronics Div.)
Nov. 1974
ARC-10729

Detector circuit accurately separates and counts phase-shift pulses over wide range of basic pulse-rate frequency, and also provides reasonable representation of full repetitive EKG waveform. Single telemeter implanted in small animal monitors not only body temperature but also animal movement and heart rate.

B74-10197
REFERENCE APPARATUS FOR MEDICAL ULTRASONIC TRANSDUCER
R. D. Lee, R. J. Hudock, and D. I. Shute
Nov. 1974
ARC-10753

Once reference apparatus has been located properly, and its position on chest of patient has been recorded on skin by means of indelible fiducial marks, it is simple matter at later time to reposition probe on chest over heart. In this way, signals from exact same area of heart can be re-examined.

B74-10209
INTERPLEX MODULATION AND A SUPPRESSED-CARRIER TRACKING LOOP FOR COHERENT COMMUNICATIONS SYSTEMS
S. Butman and U. Timor
Nov. 1974
NPO-11572

Simple addition to hardware and new mode of operation of transmitter and receiver in coherent, PCM/PSK/PM configuration

greatly improves channel efficiency. Procedure reduces amount of power lost to intermodulation products.

B74-10234
A METHOD FOR POLYCRYSTALLINE SILICON DELINEATION APPLICABLE TO A DOUBLE-DIFFUSED MOS TRANSISTOR
J. L. Halsor (Westinghouse Elec. Corp.) and H. C. Lin (Westinghouse Elec. Corp.)
Dec. 1974
LANGLEY-11536; LANGLEY-11598

Method is simple and eliminates requirement for unreliable special etchants. Structure is graded in resistivity to prevent punch-through and has very narrow channel length to increase frequency response. Contacts are on top to permit planar integrated circuit structure. Polycrystalline shield will prevent creation of inversion layer in isolated region.

B74-10239
IMPROVED CIRCUIT-BOARD INTERCONNECTORS
J. H. Martin (Charles Stark Draper Lab., Inc.)
Dec. 1974
MSC-12661

One component serves three functions, electrical interconnections, thermal control, and mechanical integrity, at same time. Several versions of design: (1) Insulated support plate contains holes; (2) Alternate support plate configuration uses rivets instead of pins; and (3) Another configuration includes leaf-spring contacts instead of pins or rivets.

B74-10242
HIGH-VOLTAGE DISTRIBUTORS
J. F. McChesney, Jr.
Dec. 1974
GSFC-11849

Two distributors reduce high-voltage breakdowns and corona discharges. Both distributors are constructed to prevent air traps and facilitate servicing without soldering. Occurrence of coronas is also minimized due to smooth surfaces of device.

B74-10251
PHASED-ARRAY ANTENNA PHASE CONTROL CIRCUIT USING FREQUENCY MULTIPLICATION
R. J. Mailloux and P. R. Caron
Jan. 1975
ERC-10285

Circuit separates out, from multiplied signals, antenna element signals which have desirable phase angles and feeds them to appropriate antenna elements of phased array. System may be used in either transmitting or receiving mode.

B74-10253
SELF-PROTECTED ELECTRODES LIMIT FIELD-EMISSION CURRENT
W. L. Lees
Jan. 1975
ERC-10015

One cathode includes array of square-shaped conductor columns. Columns are electrically interconnected by conducting plate on bottom. Each column provides field-emission current. Another cathode includes array of rodlike conductors. Layer is covered by control film made of conducting material. Film is isolated from each conductor.

B74-10255
AMPLITUDE-STEERED, PSEUDOPHASED ANTENNA ARRAY
C. C. Johnson, R. J. Martel (Westinghouse), F. J. Dietrich (Philco Ford Corp.), and G. J. Koloboff (Philco Ford Corp.)
Jan. 1975
GSFC-11446

Beam may be smoothly scanned around ring array without instantaneous phase transitions while maintaining constant radiated power by gradually transferring power from receding element to element next to leading edge of driven segment, and by accomplishing antenna element switching during intervals when no power is being applied to elements being switched.

B74-10256
SYNCHRONIZED FREQUENCY TRANSPOSER
J. F. Sutton
Jan. 1975
GSFC-11763

Transposer operates entirely in analog domain. Input analog signal is serially loaded into analog register at rate determined by voltage-controlled oscillator. At same time, signal is serially unloaded from other register at expanded time rate determined by divider output feeding through switch.

B74-10257
BIDIRECTIONAL ZOOM ANTENNA
R. F. Schmidt
Jan. 1975 See also B74-10041
GSFC-11862

Antenna comprises two parabolic cylinders placed orthogonally to each other. One cylinder serves as main reflector, and the other as subreflector. Cylinders have telescoping sections to vary antenna beamwidth. Beamwidth can be adjusted in elevation, azimuth, or both. Design has no restriction as to choice of polarization.

B74-10258
OPTICAL COMMUNICATION CHANNEL SIMULATOR SYSTEM
M. W. Fitzmaurice and M. Tycz
Jan. 1975
GSFC-11877

Optical transmission link is simulated by positioning linear optical modulator between optical carrier source and receiver for carrier. Optical modulator is driven by analog signal, derived from analog computer circuit, having random variations indicative of characteristics of transmission link.

B74-10259
COLOR-CODED AREA SENSITIVITY MAPS OF PHOTOMULTIPLIERS
O. Youngbluth, Jr.
Jan. 1975
LANGLEY-10320

Technique was devised specifically for testing photomultipliers and other photodetectors, but it could also be used to color code any type of mapping data, such as weather or topographical maps, thermal or pressure distributions on reentry surfaces, or any other three-dimensional data to be displayed in two-dimensional form.

diodes, fuses, inductors, microcircuits, relays, fixed resistors, transformers, and transistors. Each class is contained in separate section and includes discussion of inherent failure modes, screening rationale, general screening requirements, derating criteria, and stress-analysis data.

B74-10260
HORN ANTENNA WITH V-SHAPED CORRUGATED SURFACE
F. B. Beck, C. A. Mentzer (Ohio State Univ.), and L. Peters, Jr. (Ohio State Univ.)
Jan. 1975 See also NASA-CR-2317
LANGLEY-11112

Corrugated shape is easily machined for millimeter wave application and is better suited for folding antenna designs. Measured performance showed "V" corrugations and rectangular corrugations have nearly the same pattern beamwidth, gain, and impedance. Also, "V" corrugations have higher relative power loss.

B74-10262
DEPOSITING SPACING LAYERS ON MAGNETIC FILM WITH LIQUID PHASE EPITAXY
J. W. Moody (Monsanto Res. Corp.), R. W. Shaw (Monsanto Res. Corp.), and R. M. Sanfort (Monsanto Res. Corp.)
Jan. 1975 See also NASA-CR-2413
LANGLEY-11528

Liquid phase epitaxy spacing layer is compatible with systems which are hard-bubble proofed by use of second magnetic garnet film as capping layer. Composite is superior in that: circuit

fabrication time is reduced; adherence is superior; visibility is better; and, good match of thermal expansion coefficients is provided.

B74-10274
DIGITAL SECOND-ORDER PHASE-LOCKED LOOP
J. K. Holmes, C. Carl, and C. R. Tagnelia
Jan. 1975
NPO-11905

Actual tests with second-order digital phase-locked loop at simulated relative Doppler shift of 1x0.0001 produced phase lock with timing error of 6.5 deg and no appreciable Doppler bias. Loop thus appears to achieve subcarrier synchronization and to remove bias due to Doppler shift in range of interest.

B74-10280
RELIABILITY DATA FOR ELECTRONIC AND ELECTRO-MECHANICAL COMPONENTS: A REPORT
W. R. Scott
Jan. 1975
NPO-13153

Ten classes of parts covered in report: capacitors, crystals, diodes, fuses, inductors, microcircuits, relays, fixed resistors, transformers, and transistors. Each class is contained in separate section and includes discussion of inherent failure modes, screening rationale, general screening requirements, derating criteria, and stress-analysis data.

B74-10281
STRAIGHT-LINE IC REMOVAL TOOL
R. A. Marzek and W. S. Read
Jan. 1975
NPO-13157

Tool operates by applying force perpendicularly to socket plane. Tool can be operated in cramped or confined quarters and can effect integrated circuit removal without damage. It may also be useful to hold nut or bolt in confined space while tightening, when it is not possible to use conventional tool.

B74-10282
DC-TO-AC INVERTER RATIO FAILURE DETECTOR
T. J. Ebersole (GE) and R. E. Andrews (GE)
Jan. 1975
NPO-13160

Failure detection technique is based upon input-output ratios, which is independent of inverter loading. Since inverter has fixed relationship between V-in/V-out and I-in/I-out, failure detection criteria are based on this ratio, which is simply inverter transformer turns ratio, K, equal to primary turns divided by secondary turns.

B74-10283
LOW-LOSS, CIRCULARLY-POLARIZED DICHROIC PLATE
R. T. Woo and A. Ludwig
Jan. 1975
NPO-13171

Dichroic plate has orthogonally-disposed, loaded dipole apertures with their orientations arranged so as to cancel cross-coupling effects which would otherwise result in power loss to circularly polarized signal.

B74-10286
MICROMETEOROID VELOCITY-AND-TRAJECTORY ANALYZER
S. O. Auer (Natl. Acad. of Sci.)
Feb. 1975
GSFC-11889

By adding potential energy of charged capacitor to kinetic energy of impacting particle, new technique causes major fraction of atoms in microscopic particle impacting on particle-receiving surface to be ionized. Chemical constituents of impacting particle are represented by generated ion mass spectrum in approximately correct proportions.

B74-10287
MICROMETEOROID COMPOSITION ANALYZER
S. O. Auer (Natl. Acad. of Sci.)
Feb. 1975
GSFC-11892

Technique has been developed to detect moving charged particles and to determine their positions and/or their velocity vectors, relative to three mutually orthogonal axes, without particle impact or any elements of detector and without changing particle charge or motion.

B74-10290
ALINEMENT FIXTURE FOR PRECISION CUTTING OF PRINTED-WIRING BOARDS
M. L. Holliday
Feb. 1975
LANGLEY-11658

Six alinement templates are used to trim-cut majority of boards fabricated. Their use has reduced time required for cutting operation and has also reduced high rejection rate of cut boards to near zero.

B74-10294
IMPROVED FABRICATION OF ELECTROLYTIC CAPACITORS
F. J. Gamari (Sprague Elec. Co.) and J. L. Moresi (Sprague Elec. Co.)
Feb. 1975
M-FS-23133

After processing parts for assembly, insulative cup is fitted to bottom of can, then electrolytic solution consisting of white sulfuric acid gel is inserted into can. Pellet is put in can and is fitted tightly into cup. Finally, bead weld is formed between can and header plug.

B74-10295
STABLE GROUP DELAY CABLE
P. A. Clements
Feb. 1975
NPO-13138

It was found that group delay is function of pressure in air dielectric coaxial cable. For example, 600-ft air dielectric cable will change phase 10 deg at 150 MHz when air pressure in cable changes from zero to 20 psi.

B75-10014
ISOMETRIC SCAN METHOD FOR ULTRASONIC EVALUATION OF COMPOSITE PANELS
A. Vary and R. L. Sorg
Apr. 1975
LEWIS-12437

I-scan form of data presentation provides more direct information on nature and severity of flaws present in test specimen and is more easily interpreted by inspector than conventional C-scans currently used. It also offers potential savings in inspection time and cost.

B75-10025
TRIELECTRODE CAPACITIVE PRESSURE TRANSDUCER
G. W. Coon
Feb. 1975
ARC-10711

Capacitive transducer eliminates adverse effects of temperature and humidity; it is especially suited for measuring pressure changes in high-temperature environment. Transducer basically is three-electrode device.

B75-10031
VARACTOR DIODE ASSEMBLY WITH LOW PARASITIC REACTANCES
L. E. Dickens (Westinghouse Elec. Corp.)
Apr. 1975
GSFC-11617

Development of varactor diode assembly overcomes parasitic reactances of conventional varactor packages. In specially constructed assembly very high idler-frequency to signal-frequency ratios are used to obtain low-noise operation over maximum bandwidth.

B75-10036
INTERFACE CONTROL SCHEME FOR COMPUTER HIGH-SPEED INTERFACE UNIT
B. K. Ballard (RCA)

Apr. 1975
M-FS-23083

Control scheme is general and performs for multiplexed and dedicated channels as well as for data-bus interfaces. Control comprises two 64-pin, dual in-line packages, each of which holds custom large-scale integrated array built with silicon-on-sapphire complementary metal-oxide semiconductor technology.

B75-10039
IMPROVED PRINTED-WIRING BOARDS FOR HIGH-RELIABILITY CIRCUITS
W. J. Patterson
Apr. 1975
M-FS-23147

Experimental board includes three layers of special tridirectionally woven fabric. Alumina particles play major role in reducing coefficient of expansion. They also serve as heat sink for heat-generating components.

B75-10049
SHOCK AND VIBRATION ISOLATION MOUNT FOR SMALL ELECTRONIC COMPONENTS
F. R. Dillon (Martin Marietta Corp.) and C. R. Mayne
Apr. 1975
NPO-13253

Mount includes metallic cup and support ring placed in mold fixture. Viscoelastic material is injected between these parts by means of large hypodermic needle. Circular projections on cup and ring extend into material and are kept in place without dependence on quality of adhesion between material and metal.

B75-10069
HIGH-TEMPERATURE CAPACITIVE STRAIN MEASUREMENT SYSTEM
J. E. Wilson and L. R. Egger (Boeing Co.)
May 1975
FRC-10053

Capacitive strain gage and signal conditioning system measures stress-induced strain and cancels thermal expansion strain at temperatures to 1,500 F (815 C). Gage does not significantly restrain or reinforce specimen.

B75-10070
FOURIER WAVEFORM ANALYZER
F. J. Sutton
May 1975
GSFC-11747

Real-time Fourier analysis is provided by 'bucket brigade' charge-transfer shift register. Device is small, inexpensive integrated circuit which does analog-to-digital-to-analog conversion, data processing, and time delay.

B75-10071
HEATER IMPROVES COLD-TEMPERATURE CAPACITY OF SILVER-CADMIUM BATTERIES
W. H. Webster, Jr. and P. T. Jackson
May 1975
GSFC-11913

Eight heaters are included in 14-cell package to provide 14-Vdc. Each heater is 11-ohm self-adhesive strip placed across broad face of each pair of cells. They are installed before cells are wired. Heaters are in series and are connected through pair of redundant thermostats.

B75-10088
ONE-DIMENSIONAL MULTIMODE AND MULTISTATE OSCILLATOR: A CONCEPT
M. H. Aumann (Wisconsin Univ.)
Jun. 1975
HQ-10851

Device's voltage amplitude distribution is similar to that of standing waves on transmission line. It can be used for fast, efficient information encoding, decoding, and memory. Device operates in response to brief tone burst setting up standing-wave mode of oscillation which is unique for each possible burst frequency.

B75-10091
DUAL-BAND RIDGED WAVEGUIDE
M. J. Franke
Jun. 1975
LANGLEY-11781

Waveguide-in-waveguide technique involves routing two waveguides through same passageway. Smaller waveguide can be soft or silver soldered inside X-band waveguide to form single ridge guide and to propagate frequencies at C-band.

B75-10096
INTERACTIVE GRAPHICAL COMPUTER-AIDED DESIGN SYSTEM
M. T. Edge
Jun. 1975
M-FS-23157

System is used for design, layout, and modification of large-scale-integrated (LSI) metal-oxide semiconductor (MOS) arrays. System is structured around small computer which provides real-time support for graphics storage display unit with keyboard, slave display unit, hard copy unit, and graphics tablet for designer/computer interface.

B75-10101
HIGH-PERFORMANCE SCHOTTKY DIODES ENDURE HIGH TEMPERATURES
E. L. Dickens (Westinghouse Elec. Corp.), G. F. Trageser (Westinghouse Elec. Corp.), and B. H. Kim (Westinghouse Elec. Corp.)
Jun. 1975
M-FS-23184

Fabrication process and aluminum/GaAs (gallium arsenide) coupling are used to produce Schottky diodes that have high cutoff frequencies and can withstand operating temperatures in excess of 500 C.

B75-10102
INTEGRATED-CIRCUIT BALANCED PARAMETRIC AMPLIFIER
E. L. Dickens (Westinghouse Elec. Corp.)
Jun. 1975
M-FS-23193

Amplifier, fabricated on single dielectric substrate, has pair of Schottky barrier varactor diodes mounted on single semiconductor chip. Circuit includes microstrip transmission line and slot line section to conduct signals. Main features of amplifier are reduced noise output and low production cost.

B75-10109
FLUORESCENT COLOR CODING OF POWER RECEPTACLES
C. C. Oleson (Rockwell Intern. Corp.) and D. A. Vidana (Rockwell Intern. Corp.)
Jun. 1975
MSC-19504

Receptacles, color coded according to power ratings, can be easily located. Low-light visibility of fluorescent paint saves considerable time during repair or replacement. Technicians using flashlights have located and identified painted receptacles from as far away as 50 feet (15 meters).

B75-10120
MICROELECTRONIC FABRICATION OF SUPERCONDUCTING DEVICES AND CIRCUITS
K. R. Kirschman, E. J. Mercereau, and A. H. Notarys
Jun. 1975
NPO-13419

It is expected that thin-film superconductors can be used as detectors or sources of infrared and microwave radiation, as magnetometers, as voltage standards, and for voltage and current measurements, for electronic signal processing, and in digital circuitry.

B75-10171
SYSTEM FOR SIMULTANEOUS, BIDIRECTIONAL DATA TRANSMISSION
C. C. Schmidt (Lockheed Electronics Co.)

Aug. 1975
MSC-14810

Single, inexpensive system uses two identical circuits for simultaneous, bidirectional data transmission. Frequency response with currently available amplifiers is from dc to over 70 kHz.

B75-10195
STRIPE-LINE COIL FOR MAGNETIC-FIELD GENERATION IN BUBBLE MEMORY DEVICES
T. T. Chen (Rockwell Intern. Corp.) and E. J. Ypma (Rockwell Intern. Corp.)
Sep. 1975
LANGLEY-11705

Coil etched from conductive film has better field uniformity than wire-wound coils and less coil loss at high-frequency operation.

B75-10196
LOW-LOSS STRIPE-LINE COIL FOR MAGNETIC BUBBLE MEMORY
T. T. Chen (Rockwell Intern. Corp.) and L. C. Zachry (Rockwell Intern. Corp.)
Sep. 1975 See also B75-10195
LANGLEY-11707

Stripe-line pattern is etched on both sides of double-sided film. Since conductor thickness is only half that of single-sided film, problems in wrapping and etching are greatly reduced.

B75-10197
BUBBLE-DOMAIN CIRCUIT WAFER EVALUATION COIL SET
T. T. Chen (Rockwell Intern. Corp.) and L. J. Williams (Rockwell Intern. Corp.)
Sep. 1975
LANGLEY-11728

Coil structures have been designed to permit nondestructive testing of bubble wafers. Wafers can be electrically or optically inspected and operated from quasi-static frequency to maximum device operating frequency.

B75-10213
MICROWAVE DIODE AMPLIFIERS WITH LOW INTERMODULATION DISTORTION
W. H. Cooper (Westinghouse Elec. Corp.), M. Cohn (Westinghouse Elec. Corp.), and C. D. Buck (Westinghouse Elec. Corp.)
Oct. 1975
GSFC-11668

Distortions can be greatly reduced in narrow-band applications by using the second harmonic. The ac behavior of simplified diode amplifier has negative resistance depending on slope of equivalent I-V curve.

B75-10219
OPEN COIL STRUCTURE FOR BUBBLE-MEMORY-DEVICE PACKAGING
T. T. Chen (Rockwell Intern. Corp.) and E. J. Ypma (Rockwell Intern. Corp.)
Oct. 1975
LANGLEY-11704

Concept has several important advantages over close-wound system: memory and coil chips are separate and interchangeable; interconnections in coil level are eliminated by packing memory chip and electronics in single structure; and coil size can be adjusted to optimum value in terms of power dissipation and field uniformity.

B75-10220
IMPROVED PHOTOVOLTAIC DEVICES, USING TRANSPARENT CONTACTS
H. J. Hovel (IBM) and J. M. Woodall (IBM)
Oct. 1975
LANGLEY-11761

Transparent conducting coating is applied to narrow pn junction surface to provide ohmic contact for majority carrier flow. Coating can be made thick to prevent series resistance problem.

B75-10221
VARIABLE-GAP BIAS STRUCTURE FOR MAGNETIC BUBBLE MEMORY PACKAGE
T. T. Chen (Rockwell Intern. Corp.)
Oct. 1975
LANGLEY-11765

Size and thickness of field adjusting plate can be varied. Memory chip specification is relaxed, since chips in structure need not be matched in bias margin.

B75-10222
A 1-1/2-LEVEL ON-CHIP-DECODING BUBBLE MEMORY CHIP DESIGN
T. T. Chen (Rockwell Intern. Corp.)
Oct. 1975
LANGLEY-11766

Design includes multi-channel replicator which can reduce chip-writing requirement, selective annihilating switch which can effectively annihilate bubbles with minimum delay, and modified transfer switch which can be used as selective steering-type decoder.

B75-10230
ELLIPSOMETER MEASUREMENTS OF EPITAXIAL GAAS LAYERS: A CONCEPT
J. D. DeSmet (Alabama Univ.)
Oct. 1975
M-FS-23238

Report discusses analysis involving Maxwell's equations formed in a 6-by-6 matrix. By applying boundary conditions at proper points in sample, equation for propagation of light through anisotropic medium is reduced to eigenvalue problem resulting in 4-by-4 matrix.

B75-10233
100-AMPERE-HOUR NICD BATTERY SYSTEM
Innovator not given (Grumman Aerospace Co.) Oct. 1975 See also NASA-CR-140380; NASA-CR-140381; NASA-CR-141600
MSC-14774

Cells use potassium hydroxide electrolyte and are hermetically sealed in stainless steel casings. Each cell provides 1.56 volts and has a minimum operating life of 17,000 hours and a maximum of approximately 48,000 hours.

B75-10255
START/STOP SWITCHES FOR TESTING DETONATION VELOCITY OF EXPLOSIVES
P. J. Wise and E. W. Grimes
Oct. 1975
KSC-10793

Printed-circuit process produces ordnance-initiated start/stop switches. Method is faster and less costly than fabriction by hand, and produces switches of uniform quality.

B75-10260
SIMPLE TEMPERATURE SENSOR WITH DIRECT READOUT
W. A. Love (Rockwell Intern. Corp.)
Oct. 1975
LANGLEY-11818

Sensor is easy to construct, requires only one operational amplifier, and has very fast response. It provides direct readout of temperature on digital voltmeter.

B75-10274
RESPONSE OF TANTALUM CAPACITORS TO FAST TRANSIENT OVERVOLTAGES
A. J. Zill and D. K. Castle
Oct. 1975 See also NASA-TM-X-58152
MSC-14822

Report describes tests used to determine mimimum time for capacitors to fail due to overvoltage and maximum amount of overvoltage that capacitors could sustain without permanent damage.

B75-10277
HIGHLY STABLE ANALOG-TO-DIGITAL CONVERTER
H. C. Lucas
Oct. 1975
NPO-13385

Device has been developed for use in pulse-height analyzer of gamma-ray telescope. Unit shows integral linearity of 0.05 percent and differential linearity of less than 2 percent.

B75-10283
INEXPENSIVE POCKET-SIZE SOLAR ENERGY METER (INSOLOMETER)
F. A. Forestieri, M. T. Klucher, J. C. Adlard, and K. R. Shaltens
Nov. 1975
LEWIS-12598

Device directly measures amount of energy available in sunlight falling on the earth over range from 1 to 1250 watts per square meter. Insolometer is ideally suited to making on-site measurements of available solar energy.

B75-10289
SOLAR POWER ROOF SHINGLE
F. A. Forestieri, F. A. Ratajczak, and G. L. Sidorak
Dec. 1975
LEWIS-12587

Silicon solar cell module provides both all-weather protection and electrical power. Module consists of array of circular silicon solar cells bonded to fiberglass substrate roof shingle with fluorinated ethylene propylene encapsulant.

B75-10304
MICROCIRCUIT TESTING AND FABRICATION, USING SCANNING ELECTRON MICROSCOPES
P. D. Nicolas
Dec. 1975
M-FS-23159

Scanning electron microscopes are used to determine both user-induced damages and manufacturing defects subtle enough to be missed by conventional light microscopy. Method offers greater depth of field and increased working distances.

B75-10306
TEMPERATURE-STABLE GUNN-DIODE OSCILLATOR
E. J. Dengenford (Westinghouse Elec. Corp.), E. L. Dickens (Westinghouse Elec. Corp.), W. D. Maki, and A. B. Newman (Westinghouse Elec. Corp.)
Dec. 1975
M-FS-23242

Oscillator consisting of Gunn diode embedded in coaxial circuit has excellent temperature stability and low fabrication costs as compared with automatic-frequency-control crystal oscillators.

B75-10312
QUALITY CONTROL OF MICROELECTRONIC WIRE BONDS
A. R. Thiel (Gen. Dyn. Corp.) and D. C. Schmidt (Gen. Dyn. Corp.)
Dec. 1975
M-FS-23327

Report evaluates ultrasonic bonding of small-diameter aluminum wire joined to ceramic substrates metalized with thin-film and thick-film gold. Quick testing technique for nondestructive location of poor wire bonds is also presented.

B75-10324
ACID/ALKALI BROMIDE SECONDARY BATTERY
C. England
Dec. 1975
NPO-13237

Secondary electrochemical battery has been developed which has high energy/ weight density. Battery is rechargeable and works on reaction between hydrogen and bromine.

B75-10330
HIGHLY-EFFICIENT HORN/REFLECTOR ANTENNA
A. K. Green (Microwave Res. Corp.)
Dec. 1975
NPO-13568

Antenna has beam efficiency of 96 percent. Configuration is compact and relatively inexpensive.

B75-10337
TRIGGER CIRCUIT FORCES IMMEDIATE SYNCHRONIZATION OF FREE-RUNNING OSCILLATOR
S. Nagano
Dec. 1975
NPO-13646

Device provides positive triggering for inverter synchronization in uninterruptible power supplies. Integrated-circuit oscillator frequency may be higher, lower, or the same as that of the synch pulse and is always synchronized by first clock pulse.

02 ELECTRONIC/ELECTRICAL SYSTEMS

B70-10002
DEVICE FOR PRINTING ALPHANUMERIC LISTINGS AND DIGITAL DATA PLOTS
OGLESBEE, J. DATE- APR. 1970
LEWIS-10954

Modified high-speed printer performs x-y plotting of digital data. The device produces a 7-inch square plot with any number of points in less than 25 seconds and has a resolution of 0.2 percent.

B70-10007
SLOW-SPEED DRIVES FOR MINIATURE DEVICES
BAHM, E. J. DATE- MAY 1970
NPO-10700

Hysteresis motor minimizes motor torque variations during shaft revolution when operated at high frequency and with a sinusoidal motor current. Motor speed is stabilized by a feedback servo.

B70-10008
TELEMETRY RECEIVER
GILCHRIEST, C. GOLDSTEIN, R. MATHISON, R. DATE- AUG. 1970
NPO-10746

Communications system maintains phase lock of weak telemetry signals with a minimal expenditure of power and bandwidth. An estimate of the frequency variation as a function of time is used to achieve coherent phase demodulation.

B70-10009
DIGITAL DATA TRANSITION TRACKING LOOP IMPROVES DATA RECEPTION
ANDERSON, T. O. HURD, W. J. LINDSEY, W. C.
DATE- SEP. 1970
NPO-10844

Transition tracking loop eliminates drifts, leakages, and instabilities inherent in analog filters. Major components are the phase detector, loop filter, voltage-controlled oscillator and timing logic.

B70-10023
IMPROVED MAGNETRON COLD-CATHODE ION SOURCE
ROEHRIG, J. /NORTON RES. CORP./ TORNEY, F.
DATE- APR. 1970 REAN- SEE ALSO NASA-CR-66793
LANGLEY-10367

Cold cathode ionization source generates smaller amounts of spurious gases and has a higher sensitivity than commonly used hot-filament ion sources. Photon and X-ray background noise are reduced below detectable levels.

B70-10032
MOUNTING, SUPPORT, AND ISOLATION OF VARIOUS COMPONENTS OF A HYDROGEN MASER
CUTLER, L. /HEWLETT PACKARD/ VAN HEYST, H.
DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-94937
HQ-10563 HQ-10564

Polytetrafluoroethylene tubing partially collapsed during assembly protects the shields from thermal expansion stress in isothermal and magnetic canisters. Thermal insulation between the shields is made from epoxy foam cast in position and cured under high temperature. Stacked mounting array supports the maser*s hexapole

magnet and hydrogen atom source.

B70-10047
ARRAY MULTIPLIER
WANG, G. Y. DATE- DEC. 1970
ERC-90076
Digital array multiplier consisting of any number of identical digital adder cells in a repetitive planar configuration functions as a modular multiplier for use in computer applications of airborne vehicles. The modular multiplier utilizes large scale integration and metal oxide semiconductors.

B70-10056
THERMODIELECTRIC RADIOMETER
BEAM, B. H. RUSSELL, L. D. DATE- JUN. 1970
ARC-10138
Radiometer measures microsecond pulses of radiant flux in the presence of electromagnetic noise. It consists of a charged capacitor that delivers a voltage pulse proportional to the thermally induced depolarization of its polymeric dielectric.

B70-10060
RANGING CODE PROCESSOR
ANDERSON, T. O. DATE- JUL. 1970
NPO-10066
System extracts range data from pseudorandom-coded range radar used to track a moving body. Pseudorandom binary waveforms with favorable correlation properties are transmitted and their reflections received and processed. The phase difference between the received and transmitted codes gives an accurate measure of the distance to the moving body.

B70-10069
RADIO FREQUENCY BASEBAND RECORDING TECHNIQUE
HECKMAN, D. C. /GE/ DATE- JUN. 1970
HQ-10317
Technique uses a helical-scan video recorder with auxiliary signal-conditioning equipment to provide an inexpensive, high-capacity magnetic tape recording of a 112 channel, phase-locked, multiplexed, baseband signal.

B70-10086
PRECISE AUDIO-FREQUENCY MARKERS FOR NUCLEAR MAGNETIC RESONANCE SPECTRA
COHEN, E. A. MANATT, S. L. DATE- APR. 1970
NPO-11147
System calibrates and records the responses of a nuclear magnetic resonance spectrometer. Calibration markers which have a highly stable frequency source are utilized to maintain frequency stability.

B70-10095
ANTENNA-ARRAY, PHASE QUADRATURE TRACKING SYSTEM
CUBLEY, H. D. DATE- DEC. 1970
MSC-12205
Phase relationship between input signals appearing on widely-spaced parallel connected antenna elements in array is automatically adjusted in phase quadrature tracking system. Compact and lightweight design permit use in wide variety of airborne communications networks.

B70-10098
MULTI-FREQUENCY RESONANT ANTENNA
TEMPS, A. J., JR. /FAIRCHILD HILLER CORP./ VISSCHER, J. DATE- AUG. 1970 REAN- SEE ALSO NASA-CR-82795
HQ-10215
Antenna is simultaneously resonant at 8.75 MHz, 11.825 MHz, and 20.562 MHz. It provides a near-field radiator which has a constant current distribution across its radiating elements for each of the resonant frequencies.

B70-10110
ELECTRONIC SLEEP ANALYZER
FROST, J. D., JR. /BAYLOR UNIV. COLL. OF MED./ DATE- APR. 1970
MSC-13282
Electronic instrument automatically monitors the stages of sleep of a human subject. The analyzer provides a series of discrete voltage steps with each step corresponding to a clinical assessment of level of consciousness. It is based on the operation of an EEG and requires very little telemetry bandwidth or time.

B70-10112
ANALYSIS AND OPTIMIZATION OF AN OMNIDIRECTIONAL DIRECTION-FINDING SYSTEM
BESTE, J. M. /AUBURN UNIV./ GRAF, E. R. DATE- APR. 1970
M-FS-14346
System determines the direction of arrival of an electromagnetic wave with the direction information in a readily usable form. It presents a relatively small physical structure and does not require mechanical positioning.

B70-10115
NEW PROCEDURE FOR DESIGN OF SELF-ADAPTIVE CONTROL SYSTEMS
HOFMANN, L. G. /SYSTEMS TECHNOL., INC./ DATE- FEB. 1970 REAN- SEE ALSO NASA-CR-1152
LANGLEY-10255
Adaptive control system compensates for changes in the dynamic characteristics of linear controlled elements. It is mechanized so that the actual input of each control approaches the ideal input.

B70-10128
WAVEFORM SIMULATOR SYNTHESIZES COMPLEX FUNCTIONS
MALMBERG, J. /GULF GEN. ATOMIC, INC./ MOORE, C. DATE- JUN. 1970
NPO-10251
Multichannel apparatus produces or simulates a complex curve which can be viewed on an oscilloscope display surface and can be adjusted to match an original complex experimentally produced curve.

B70-10138
ELECTRON ENERGY ANALYZER
SAMSON, J. A. R. /GCA CORP./ DATE- JUN. 1970
HQ-10373
Electrostatic deflection analyzer with three spherically concentric grids allows production of electrons within a small volume at the center of the inner sphere. By applying a retarding potential between the middle and inner spheres, the energies of the electrons can be measured.

B70-10143
LASER-DOPPLER GAS VELOMETER
HUFFAKER, R. M. DATE- APR. 1970
M-FS-20583
Three dimensional laser Doppler instrument measures both local mean and fluctuating gas velocity of air flow. Technique is used for measuring atmospheric wind velocity and turbulence. Under certain conditions liquid flows can be measured.

B70-10147
SOLID-STATE AC-TO-DC CONVERTER
MONROE, C. M. /GE/ DATE- JUN. 1970
HQ-10545
Converter uses solid-state ac-to-dc rectification circuitry, filter circuitry, a tuned transformer, ac chopper circuitry, and an automatic current-control network. It has a dc power source which operates from 5 to 100 percent load at a 72 to 94 input to output efficiency.

B70-10152
PERFORMANCE-LIMIT CRITERIA FOR THE DESIGN OF FAST-RESPONSE SERVO-ACTUATION SYSTEMS
ZELLER, J. R. DATE- FEB. 1970 REAN- SEE ALSO NASA-TN-D-5388
LEWIS-11022
Analysis of a typical nonlinear electrohydraulic servo-model establishes the dynamic-performance capabilities of servo-actuation systems.

B70-10159
BURST SYNCHRONIZATION DETECTION SYSTEM
LIPOMA, P. C. /LOCKHEED ELECTRON. CORP./ SEAY, B. P., JR. DATE- APR. 1970
MSC-90317

System uses digital logic and a voltage-controlled oscillator to obtain appropriate horizontal and vertical sync signals from the sync bursts contained in the original transmitted signal. It is useful in systems that exhibit considerable single amplitude fluctuation.

B70-10161
PRECISION FULL-WAVE RECTIFIER
DEBOO, G. J. HEDLUND, R. C. DATE- APR. 1970
ARC-10101
Simplified circuit uses one operational amplifier and two precision resistors. The amplifier is operated open loop for switching and closed loop for linear gain, both simultaneously.

B70-10163
COMMUNICATIONS LINK FOR SDS 900 SERIES COMPUTERS
LAYLAND, J. W. MARTIN, W. L. ZYGIEBAUM, A. I.
DATE- SEP. 1970
NPO-11161
High speed, self-clocking single channel control and data link apparatus interfaces between two computers. This combined system reduces data errors.

B70-10164
CONSTANT CURRENT SOURCE FOR CONVERTING ABSOLUTE TEMPERATURES TO ANALOG VOLTAGES
PADILLA, J. R. DATE- SEP. 1970
NPO-10733
Circuit configuration consisting of matched differential amplifier, temperature compensated zener diode, and low pinchoff-voltage field effect transistor provides accurate and stable current supply for temperature sensor devices.

B70-10169
REDUCTION OF BACKGROUND IN AN X-RAY PROPORTIONAL COUNTER
GORENSTEIN, P. /AM. SCI. AND ENG., INC./
MICKIEWICZ, S. P. DATE- AUG. 1970 REAN- SEE ALSO
NASA-CR-96716
HQ-10253
Proportional counter has increased sensitivity for high resolution X-ray surveys. It locates weak cosmic X-ray sources while reducing non-X-ray background.

B70-10195
VOLTAGE REGULATOR WITH MULTIPLE PARALLEL POWER SOURCE SECTIONS
BINCKLEY, W. G. /TRW SYSTEMS GROUP/ WRIGHT, W. H. DATE- APR. 1970
GSFC-10891
Voltage regulator provides improved voltage-regulating system in which power dissipation and consequent heat generation are minimized. Each power source section is controlled sequentially so that only one operates in a linear range at a time.

B70-10196
LASER ALTIMETER
KOLKER, M. /RAYTHEON CORP./ DATE- AUG. 1970
M-FS-13691
Ruby laser operating at 6943 angstroms at the heart of an electronic ranging system provides a highly accurate range measurement to an extremely small area.

B70-10211
HIGH EFFICIENCY OPTICAL BEAMSPLITTER DESIGNED FOR OPERATION IN THE INFRARED REGION
BASTIEN, R. C. /PERKIN-ELMER CORP./ HEINRICH, P. L. DATE- SEP. 1970
GSFC-10721
Beamsplitter system uses potassium bromide as substrate for operating in the spectral region between 5 and 30 microns and calcium fluoride for narrowband applications. It uses a 13-layer film which yields nearly equal broadband infrared reflectance and transmittance.

B70-10212
SIMPLIFIED METHOD FOR MEASURING THE IMPEDANCE OF RF POWER SOURCES - A CONCEPT
OAKLEY, E. C. DATE- SEP. 1970
NPO-10734
Bolometer detector and bridge circuit measure the RF power. A varied bridge reference resistor achieves maximum power transfer allowing the output impedance of the RF source to be determined from the known circuit parameters.

B70-10220
ECONOMIC GAS CHROMATOGRAPH SYSTEM FOR SUBAMBIENT PRESSURE GAS SAMPLING
MITCHELL, S. M. /N. AM. ROCKWELL CORP./ DATE- JUL. 1970
M-FS-16298
Gas chromatograph sampling system consists of a manifold with a gas-sample valve, a minimum-volume pressure transducer with a portable monitor, a vacuum-source valve, and a sample inlet valve. Increased accuracy of analysis is obtained by better control of sample size.

B70-10234
BRUSHLESS DIRECT-CURRENT MOTORS
BAHM, E. DATE- SEP. 1970 REAN- SEE ALSO
NASA-CR-106071
NPO-11351
Survey results are presented on the use of unconventional motor windings and switching sequences to optimize performance of brushless dc motors. A motor was built, each coil terminal having a separate, accessible lead. With the shaft and all electronics excluded, length and outside diameter measured 1.25 and 0.75 in., respectively.

B70-10238
DESIGN PROCEDURE FOR IMPROVED ACTIVE FILTERS
GUSSOW, S. /SPERRY RAND CORP./ WEATHERS, G.
DATE- DEC. 1970
M-FS-20445
Synthesis technique for active filters gives high degree of accuracy for frequencies as high as 500 kHz and covers frequencies most used for telemetry. Frequency response can be realized within few percent of specified cutoff frequencies without need for tuning.

B70-10239
REGULATED-CURRENT DC POWER SUPPLY FOR GASEOUS-DISCHARGE LAMPS
FREEMAN, W. HUGUENIN, D. DATE- SEP. 1970
GSFC-10293
Controlled current source having a high output resistance feeds continuous-flow hydrogen lamps in vacuum-ultraviolet photometric equipment. The power supply, also used with low-pressure sealed lamps, has a short recovery time and smooth regulation without overshoot.

B70-10242
BLOCK-CODED COMMUNICATIONS
LINDSEY, W. C. DATE- OCT. 1970 REAN- SEE ALSO
NASA-CR-105796
NPO-11397
Theory for block-coded telemetry systems is useful in testing performance of one- and two-way, phase-coherent telemetry systems when double-conversion, superheterodyne, phase-locked receiver, preceded by bandpass limiter is used to track carrier.

B70-10246
OXYGEN-HYDROGEN FUEL CELL WITH AN IODINE-IODIDE CATHODE - A CONCEPT
JAVET, P. /PA. UNIV./ DATE- SEP. 1970
HQ-10379
Fuel cell uses a porous cathode through which is fed a solution of iodine in aqueous iodide solution, the anode is a hydrogen electrode. No activation polarization appears on the cathode because of the high exchange-current density of the iodine-iodide electrode.

B70-10263
A PROPOSED LASER MEASUREMENT SYSTEM FOR DETERMINING SURFACE CONTOUR
NEUBERT, H. D. /GEN. DYN./ DATE- JUL. 1970
HQ-10326
Electro-optical system can scan a large /100 ft./ antenna in 30 seconds. Comparison of the reflected signal with a reference signal from a Pockel-cell modulator driver yields a signal that

can be correlated with the distance covered by the laser. A scanning arrangement then enables contour measurement.

B70-10281
FORMULAS ESTABLISH AUDIO RANGE INDUCTANCE IN BERYLLIUM COILS
BALL, B. J. /MISS. STATE UNIV./ CATLEDGE, C. G. WIER, D. D. DATE- JUL. 1970 REAN- SEE ALSO NASA-CR-77415
M-FS-14244
Mathematical modeling is used to determine the effects of resistance and capacitance upon the audio-inductance range of beryllium hammer coils and beryllium nylon-potted coils.

B70-10282
HIGH SPEED TELEVISION CAMERA SYSTEM PROCESSES PHOTOGRAPHIC FILM DATA FOR DIGITAL COMPUTER ANALYSIS
HABBAL, N. A. DATE- AUG. 1970
NPO-10745
Data acquisition system translates and processes graphical information recorded on high speed photographic film. It automatically scans the film and stores the information with a minimal use of the computer memory.

B70-10284
VERY HIGH FREQUENCY DIGITAL RANGING SYSTEM
SOBEL, S. E. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970
MSC-15763
Digital ranging system measures slant range /from 500 feet to 200 nautical miles/ and provides digital range readout during range tracking between any two airborne vehicles.

B70-10290
SLIDE CHECKOUT CONSOLE
NIDES, A. S. /PHILCO-FORD CORP./ SWENINGSON, E. S. DATE- JUN. 1970
MSC-12318
Semiautomatic 35-mm photographic slide checkout console optically and electronically verifies registration of slides at a minimum rate of 250/hr. The console compares slide registration with a registration standard within the console. It verifies a binary code number on the bottom of the slide and visually displays its equivalent.

B70-10332
FLUERIC-CONTROLLER PNEUMATIC STEPPING MOTOR SYSTEM
DUSTIN, M. O. GRIFFIN, W. S. WALLHAGEN, R. E. DATE- AUG. 1970 REAN- SEE ALSO NASA-TN-D-4495, NASA-TN-D-5155, NASA-TM-X-52250
LEWIS-11051
Nutating stepping motor consists of an output rotating gear and a nutating gear. A flueric logic circuit controls the nutating motor. The complete system constitutes a reliable, open loop actuator system with inherently high output stiffness, reasonable slewing speeds and small step size.

B70-10344
RADIOMETRIC EVALUATION OF ANTENNA-FEED COMPONENT LOSSES
OTOSHI, T. Y. STELZRIED, C. T. DATE- AUG. 1970
NPO-11238
Radiometric method accurately calibrates the principal line sections of an antenna, including the section which contains the antenna-feed component /mode generator and polarizer/. Precise knowledge of the absolute antenna temperature is not required.

B70-10346
ELECTRONICALLY CONTROLLED MOTOR DRIVE SYSTEM HAS ULTRA-HIGH RELIABILITY AND LONG LIFETIME
VEILLETTE, L. J. DATE- SEP. 1970
GSFC-10065
Direct drive electromechanical system is composed of brushless dc torque motor, offset-tooth magnetic sensor that derives position and rate information directly from output shaft, and rotary power transformer that transfers electrical power from external source to proper load. System has high servo loop stiffness and minimum power consumption.

B70-10355
DIGITAL PHASE-MODULATION/MULTIPLEX SYSTEM
COUVILLON, L. A. DATE- SEP. 1970
NPO-11338
System combines and modulates subcarriers and pulse code modulation data entirely with digital logic, and phase modulates an RF carrier with a digital representation of the composite subcarrier signal. It permits programmed control and modification of the modulation indices.

B70-10377
PICOSECOND PULSE MEASUREMENT BY TWO-PHOTON EXCITATION OF PHOTOGRAPHIC FILM
BILLMAN, K. W. BURNHAM, D. C. DATE- SEP. 1970
ERC-10227
Technique shoots two broad light beams onto a photosensitive surface which responds nonlinearly to the intensity in the beams. The resultant signal contains a component depending on the intensity correlation function between the two light beams.

B70-10421
ARTIFICIAL-FEEDBACK SYSTEM
SUTTON, J. P. DATE- NOV. 1970
GSFC-10324
System suppresses spurious sinusoidal responses of any sinusoidally driven amplifier showing time-dependent phase shift versus frequency function. System is applicable to any sinusoidally driven amplifier. Technique eliminates, or reduces, unwanted spurious vibrations during tests to determine dynamic frequency responses of mechanical systems.

B70-10422
IMPROVED MANUAL RADIO FREQUENCY DIRECTION FINDER
GREENWOOD, T. L. DATE- SEP. 1970
M-FS-20507
Antenna loop direction finder, consisting of two separate loops mounted rigidly together at right angles to each other, requires single rotation for operation. The loops, one for bearing, the other for sensing, are rotated manually. Sensing loop, in conjunction with nondirectional antenna, produces signal with directional pattern.

B70-10434
SUPPRESSION OF ZINC DENDRITES IN ZINC ELECTRODE POWER CELLS
DAMJANOVIC, A. /PA. UNIV./ DIGGLE, J. W. DATE- DEC. 1970
HQ-10550
Addition of various tetraalkyl quarternary ammonium salts, to alkaline zincate electrolyte of cell, prevents formation of zinc dendrites during charging of zinc electrode. Electrode capacity is not impaired and elimination of dendrites prolongs cell life.

B70-10435
OPTIMAL ELECTRIC-DRIVE SYSTEM FOR VEHICLES
SAHINKAYA, Y. E. DATE- OCT. 1970
NPO-11210 NPO-11227
Pulse-width-modulated controller, for vehicle electrically driven by direct current from storage battery and requiring highest possible efficiency in battery use, varies electrical power through silicon controlled rectifiers for permanent magnet dc motors. System is not restricted to dc motors.

B70-10451
WIDE-RANGE TRACKING OSCILLATOR GENERATES PHASE AND FREQUENCY COHERENT OUTPUT
HOWARD, J. R. /BOEING CO./ DATE- SEP. 1970
M-FS-14518
Tracking oscillator consists of modified phase-lock loop which controls voltage-controlled oscillator capable of automatic lock-on and track of periodic input waveform over frequency ratio 500-1. It is used in telemetry and communications systems where large signal fluctuations are encountered.

B70-10457
PHASE INTERPOLATION CIRCUITS USING FREQUENCY MULTIPLICATION FOR PHASED ARRAYS
CARON, P. R. MAILLOUX, R. S. DATE- OCT. 1970
ERC-10285
Antenna phasing circuit is described with the following advantages - 1/ increased number of phased elements, 2/ current repetition for each array element, 3/ circuit simplicity, and 4/ accurate phase interpolation. This circuit functions with Huggins Scan or with nearly any other phasing system.

B70-10464
COLOR TELEVISION SYSTEM USING SINGLE GUN COLOR CATHODE RAY TUBE
GAISER, E. E. HILBORN, E. H. DATE- OCT. 1970
ERC-10098
Two-primary color and single gun system provides quality differential color and variation in brightness for specific colors by varying current and controlling duty cycle of electron beam. Number of video amplifiers, deflection circuits, and guns required to display color TV picture is reduced and less complex tube is required.

B70-10478
INDUCTION GENERATOR PRODUCES CONSTANT-FREQUENCY VOLTAGE FROM VARIABLE-SPEED DRIVE
RIAZ, M. DATE- OCT. 1970
ERC-10065
Two-stage polyphase generator is usable as induction motor operable over range of speeds while powered from constant frequency source. It requires neither slip rings nor special adjustable-frequency power supplies or external reactive sources.

B70-10479
GROWING SINGLE CRYSTALS IN SILICA GEL
RUBIN, B. DATE- SEP. 1970
ERC-10306
Two types of chemical reactions for crystal growing are discussed. The first is a metathetical reaction to produce calcium tartrate tetrahydrate crystals, the second is a decomplexation reaction to produce cuprous chloride crystals.

B70-10480
THERMAL TUNING OF ORGANIC DYE LASERS
BILLMAN, K. W. BURNHAM, D. C. SCHAPPERT, G. T.
DATE- DEC. 1970
ERC-10187
Non-mechanical method for tuning liquid laser wavelengths involves electrically varying temperature of laser medium. Technique is used to investigate behavior of laser dyes, and may lead to broad, tunable, light source for spectroscopy measurements of long path absorption.

B70-10481
CONCEPT FOR A DISTRIBUTED PROCESSOR COMPUTER
BOGUE, P. N. /N. AM. ROCKWELL CORP./ BURNETT, G. J. KOCZELA, L. J. DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-1446, NASA-CR-1158
ERC-10271
Future generation computer utilizes cell of single metal oxide semiconductor wafer containing general purpose processor section and small memory of approximately 512 words of 16 bits each. Cells are organized into groups and groups interconnected to form computer.

B70-10485
ELECTRONIC SCANNING OF 2-CHANNEL MONOPULSE PATTERNS
SCHMIDT, R. F. DATE- NOV. 1970 REAN- SEE ALSO NASA-TM-X-55580, NASA-TM-X-55938
GSFC-10299
Scanning method involves separation of scanning capability into two independent degrees of freedom. One degree of freedom corresponds to azimuthal scanning and other to elevation scanning on spiral coordinate axes. Scanning of both prime-feed and mirrored patterns is accomplished with reduction of mechanical vibration damage to large antennas.

B70-10487
QUICK CALCULATION METHOD FOR FLUID FLOW THROUGH DUCT SYSTEMS
SCOTT, L. R., JR. /BOEING CO./ DATE- DEC. 1970
M-FS-15069
Conditions for subsonic compressible flow through duct systems are quickly and easily calculated using compact series of curves showing dimensionless parametric functions of Mach number and specific heat ratio. Method is directly applicable to analysis and design of compressible flow systems in industrial fields or processes.

B70-10507
LASER WAVELENGTH SELECTOR AND OUTPUT COUPLER
HARD, T. M. DATE- DEC. 1970
ERC-10248
Optical system eliminates displacement occurring when wavelengths are selected in multiple wavelength laser utilizing intracavity wavelength selection by first-order Littrow reflection of plane grating. Output coupling varies direction of output beam as different wavelengths are selected by grating rotation.

B70-10518
DIGITAL DEMODULATION WITH DATA SUBCARRIER TRACKING
SANGER, D. K. DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-73514
NPO-10858
Digital demodulator is based on early-late bit timing scheme coupled with Costas data tracking loop. System is successful in enhancement of weak signals from space where atmospheric and other interference media cause bit error rate to reach excessive level.

B70-10519
A RADIOMETRIC METHOD FOR MEASURING THE INSERTION LOSS OF RADOME MATERIALS
SEIDEL, B. L. STELZRIED, C. T. DATE- NOV. 1970
NPO-11423
Radiometer system measures effective noise temperature directed towards sky, with and without radome over antenna horn. Data is then translated into computer format. With additional transmission line insertion loss data from other measurements, computer calculates insertion loss of radome material.

B70-10522
FAIL-SAFE NUMERICAL CONTROL
THOMPSON, G. A. /N. AM. ROCKWELL CORP./ DATE- NOV. 1970
M-FS-12613
System provides duplicate set of control logic circuitry. Comparators insure that the same data is present in both circuits. If any discrepancy is found, the machine is automatically stopped, before damage can occur.

B70-10538
LIGHTWEIGHT S-BAND HELIX ANTENNA
CRIBB, H. E. DATE- NOV. 1970
KSC-10392
Pyrotechnically operated S-band helical antenna is developed in which helix is deployed subsequent to antenna placement. Antenna is small, lightweight, and novel in that deployable helix is used in place of fixed dish or horn. It can be designed to cover L- and X-band frequencies.

B70-10554
DESIGN AND EVALUATION OF BRUSHLESS ELECTRICAL GENERATORS
COLLINS, F. A. /LEAR SIEGLER INC./ ELLIS, J. N. DATE- OCT. 1970 REAN- SEE ALSO NASA-CR-54320, N65-29717, N65-30693, N65-30694, N65-30695, N65-30696
LEWIS-10124
Ten design manuals assembled and nine computer programs are developed for evaluation of proposed designs of brushless rotating electrical generators. Design manual package provides all information required for generator design, and computer programs permit calculation of performance of specific designs including effects of materials.

B70-10572
SPECTRAL ANALYSIS OF OSCILLATION INSTABILITIES IN FREQUENCY STANDARDS
LIPPINCOTT, S. /ADCOM RES. AND DEVELOP./ DATE- NOV. 1970
M-FS-20778
Phase and frequency fluctuations, inherent in oscillators used as frequency standards, are measured over spectral frequency range of 1 Hz to 5 kHz. Basic measurement system consists of electromechanical phase-locked loop that extracts phase and frequency fluctuations and error multiplier that extends threshold sensitivity.

B70-10590
DIGITAL-VOLTAGE CURVE GENERATOR
PERLMAN, M. DATE- NOV. 1970
NPO-11104
Curve generator capable of producing precisely repeatable curve for any single-valued function of voltage versus time uses digital approach, implemented by means of clocked feedback shift register, large scale integrated circuit diode matrix comprising about 12,000 diodes, counter, and digital-to-analog converter.

B70-10616
SYSTEM AUTOMATICALLY TUNES HYDROGEN MASERS
LEVINE, M. W. /HEWLETT-PACKARD CO./ VESSOT, R. F. C. DATE- NOV. 1970 REAN- SEE ALSO
NASA-CR-94937
HQ-10502
Automatic tuning system permits frequency synchronization between two hydrogen masers. System matches spaceborne clock performance with that of ground-based clock to test red shift theory. This system, used in conjunction with radio astronomy for long-baseline interferometer experiments, serves as a tool for investigation of distant universe phenomena.

B70-10617
SWEPT-FREQUENCY UHF RADIOMETER FOR DEEP PROBES OF EARTH - A CONCEPT
KOPPL, W. /MARTIN MARIETTA CORP./ DATE- DEC. 1970
MSC-13428
Radiometer, developed for use on moon or planets, could be used to - determine layering and structure as deep as 100 feet below earth surface, determine physical properties of subsurface by variation of dielectric constants, identify types of materials including ore bodies and oil, and locate subsurface deposits of moisture.

B70-10633
A NEW SOLID-STATE LOGARITHMIC RADIOMETER
BURROUS, C. N. DEBOO, G. J. PAGE, W. A. WHITING, E. E. DATE- DEC. 1970
ARC-10287
Combination of temperature-compensated logarithmic amplifiers and p-i-n photodiodes operating in zero-bias mode provides lightweight radiometer for detecting spectral intensities encompassing more than three decades over a range of at least 300 to 800 nanometers at low power levels.

B70-10638
INTRUDER DETECTION SYSTEM
LEE, R. D. DATE- NOV. 1970
ARC-10097
Moving coil geophones are utilized to develop a small, rugged, battery operated system capable of detecting seismic disturbances caused by intruders. Seismic disturbances sensed by each geophone are converted into electrical signals, amplified, and transmitted to remote receiver which provides listener with aural signal.

B70-10639
INTEGRATOR FOR ON-LINE MEASUREMENT OF BUFFET SIGNALS
BATTS, C. N. DATE- DEC. 1970
LANGLEY-10627
Device determines average rms value of buffet signals by integrating rms signals from strain gages for preselected period of time. System measures average rms value of other transient data, and the upper frequency limit depends on the frequency response of the amplifiers.

B70-10641
TRAVELING-WAVE PHOTODETECTOR HAS SUB-NANOSECOND RESPONSE
SUN, C. /RCA/ WALSH, T. E. DATE- DEC. 1970
GSFC-10831
Mercury-doped germanium photodetector uses waveguide which increases the absorption of microwave energy within the photodetectors. Waveguide and photodetector are placed in liquid helium Dewar and cooled. A carbon dioxide laser is light source and klystron provides microwave energy. Measured response times are approximately 1 nanosecond.

B70-10662
WATER VELOCITY METER
ROBERTS, C. W. SMITH, D. L. DATE- DEC. 1970
LANGLEY-10619
Simple, inexpensive drag sphere velocity meter with a zero to 6 ft/sec range measures steady-state flow. When combined with appropriate data acquisition system, it is suited to applications where large numbers of simultaneous measurements are needed for current mapping or velocity profile determination.

B70-10664
RC FILTER WITH LOW DISTRIBUTED CAPACITANCE PROVIDES 60 DB ISOLATION AT 500 MHZ
CESSNA, J. R. /IOWA UNIV./ DATE- DEC. 1970
GSFC-10983
Resistance-capacitance RC filter coupled to a high input impedance receiver preamplifier provides signal isolation from an RF transmitter. High isolation is achieved by minimizing the inductive impedance to ground and using the distributed capacitance of the filter components.

B70-10691
BRUSHLESS DIRECT-CURRENT MOTOR WITH STATIONARY ARMATURE AND FIELD
STUDER, P. DATE- DEC. 1970
XGS-05290
Electronically commutated dc motor has an active fixed field winding, and active fixed armature winding, and passive rotor. By use of brushless dc motor switching technique, motor provides continuous controllable and reversible torque without use of sliding contacts.

B70-10716
ELECTRONIC STRAIN-LEVEL COUNTER
PITTS, F. L. SPENCER, J. L. DATE- DEC. 1970
LANGLEY-10756
Counter for aircraft counts and records number of times the strain at a point in a structural member exceeds each of four preset levels. Counter uses 28 volt dc power supply, metallic resistance strain gage bridge as sensor, integrated and solid state circuits for signal processing, and electromechanical counters for data storage and readout.

B70-10718
DEVELOPMENT OF A SILVER-ZINC BATTERY SYSTEM
MOSES, A. J. /HUGHES AIRCRAFT CO./ UCHIYAMA, A. A. DATE- DEC. 1970 REAN- SEE ALSO
NASA-CR-108207
NPO-11444
Summary report is described of historical documentation and detailed design data for development of silver-zinc battery for use on Surveyor spacecraft. Electrical and physical characteristics of battery models are included, along with data on qualification, acceptance, solar-thermal-vacuum, mission simulation testing, and actual flight performance.

B71-10001
DIAGNOSTIC CAPABILITY ADDED TO DIGITAL EVENTS EVALUATOR
PRASKETI, A. S./BOEING CO./ HANSON, G. E.
JAN. 1971
KSC-10526
Digital events evaluator reviews events preceding system malfunction and automatically prints out most probable cause of problem. Analysis is performed by comparing input data with nominal values stored in tables. Each table has

associated system mask to restrict comparison to preselected critical parameters within a given system.

B71-10019
THERMAL AND STRUCTURAL MODELING OF SUPERINSULATION
MARSHALL, K. N./LOCKHEED MISSILES AND SPACE CO./
MURRAY, D. O. BOLLING, R. E.
JAN. 1971 SEE ALSO NASA-CR-98241
M-FS-20324
Model permits direct physical measurement of the thermal response of critical components of space telescopes, thus providing flexibility for systems studies and design changes.

B71-10049
HIGH-SPEED DIGITAL PLOTTER
GRAY, J., JR.
MAR. 1971
ARG-90001
Modified typewriter mechanism with standard logic components provides digital plot of output of multichannel analyzer. Unit plots irregular curves at approximately 14 channels per second, and smooth curves at over 25 channels per second, and is not subject to analog error or drift.

B71-10056
DUAL-FREQUENCY FEED-HORN ANTENNA
SCHUCHARDT, J. M./MARTIN MARIETTA CORP./
MAR. 1971
GSFC-10820
Antenna with novel two-port diplexer separates high power /31.65 GHz/ transmitted signal from low power /15.2 GHz/ received signal. Two-port network feeds dual-frequency horn and excites antenna with minimal loss in power. Isolation between transmit port and receive port ranges from 60 db to 80 db.

B71-10057
ECONOMICAL PHASED-ARRAY ANTENNA FOR ENVIRONMENTAL APPLICATIONS
HIGGINS, W. T./MIT/
MAR. 1971 SEE ALSO NASA-CR-101683
HQ-10434
Antenna system handles data acquisition and tracking, functions as a sensitive radio telescope, and serves as a radiometer in earth atmosphere investigations. Antenna's sensitivity permits resolution of solar disk quadrants in Doppler radar observations. Antenna also serves as a planetary radar device and link to commercial aircraft.

B71-10064
MINIATURE FUEL CELLS RELIEVE GAS PRESSURE IN SEALED BATTERIES
FRANK, H. A./DOUGLAS AIRCRAFT CO./
APR. 1971 SEE ALSO NASA-CR-80339
XGS-11370
Miniature fuel cells within sealed silver zinc batteries consume evolved hydrogen and oxygen rapidly, preventing pressure rupturing. They do not significantly increase battery weight and they operate in all battery life phases. Complete gas pressure control requires two fuel cells during all phases of operation of silver zinc batteries.

B71-10082
DIGITAL TELEMETRY SYSTEM ELIMINATES DATA REDUNDANCY
HYMER, R. L.
MAY 1971
MSC-12388
Floating aperature, zero-order predictor /ZOP/ circuit eliminates telemetered data redundancy by examining data from each sensor before it is multiplexed and transmitted. Digital devices to implement design are off-the-shelf items such as gates, registers and flip-flops, which are readily amenable to large-scale integration techniques.

B71-10087
PERFORMANCE EVALUATION SYSTEM FOR INERTIAL NAVIGATION EQUIPMENT
MC KERN, R. A./MIT/
APR. 1971
MSC-13542
Testing system studies inertial characteristics of gyroscopic devices. System consisting of instrument support package, dynamic test table, torque control electronics, and real-time computer evaluates performance of prototype gyroscopic strapdown units in inertial-grade attitude-reference systems. System is applicable to commercial aircraft.

B71-10090
POLAROGRAPHIC CARBON DIOXIDE TRANSDUCER AMPLIFIER
STILLMAN, G./BECKMAN INSTR., INC./
APR. 1971
MSC-13728
Electronic amplifier contains matched pair of metal oxide semiconductor field effect transistor devices which have high input impedance and long-term stability. Thermistor in feedback loop provides temperature compensation for large drifts in the sensor.

B71-10091
ELECTRONIC DEVICE INCREASES THRESHOLD SENSITIVITY AND REMOVES NOISE FROM FM COMMUNICATIONS RECEIVER
CONRAD, W. M./PHILCO-FORD CORP./ LOCH, F. J.
MAY 1971
MSC-12165
Threshold extension device connected between demodulator output and filter output minimizes clicking noise. Device consists of click-eliminating signal transfer channel with follow-and-hold circuit and detector for sensing click impulses. Final output consists of signal plus low level noise without high amplitude impulses.

B71-10119
STABILIZATION OF INTERFEROMETER FRINGE PATTERNS
BROWN, R. M.
MAY 1971
ARC-10392
Fringe pattern motion is compensated by closed-loop servo system that adjusts a mirror mounted on piezoelectric crystal, so that path difference in interferometer is maintained at constant values at one point in the field. System is applicable to holography with continuous wave laser sources.

B71-10126
PORTABLE LOW-FREQUENCY VIBRATION MEASURING AND RECORDING SYSTEM
CLEVENSON, S. A. DIBBLE, A. C.
MAY 1971
LANGLEY-10543
Information gathering system measures and records vibrations which affect personnel comfort in space, air, and surface vehicles. Three vibration transducers with mutually perpendicular axes control the frequency output of voltage controlled oscillators /VCO/. Outputs of VCO'S are multiplexed and then recorded on one track of stereo tape recorder.

B71-10141
NEW FILTER TECHNIQUE IMPROVES HOME TELEVISION RECEPTION
DEVELET, J. A., JR./TRW SYSTEMS GROUP/ HUANG, M. Y.
STUBER, F. M.
MAY 1971 SEE ALSO NASA-CR-108506
MSC-13729
Program studies and designs combline filters and analyzes their effectiveness in improving TV quality. Signal tracking methods are improved. Combline phase-lock loop provides significant sensitivity improvement above and below threshold.

B71-10148
ISOLATED-LINE COMMUTATOR-AMPLIFIER
FARNSWORTH, D. L./WESTINGHOUSE ELEC. CORP./
JUN. 1971
M-FS-20734
Commutator device combines several individual signal-input lines into single output line. Its desirable characteristics are - low input impedances, high output impedance, very high forward-to-reverse transmission ratios, and minimal gating spike coupling to either the inputs or the output.

B71-10164
A TOPOLOGICAL APPROACH TO COMPUTER-AIDED SENSITIVITY ANALYSIS

CHAN, S. P. MUNOZ, R. M.
JUN. 1971
ARC-10214
Sensitivities of any arbitrary system are calculated using general purpose digital computer with available software packages for transfer function analysis. Sensitivity shows how element variation within system affects system performance. Signal flow graph illustrates topological system behavior and relationship among parameters in system.

B71-10169
A FREQUENCY DIVISION MULTIPLEX TECHNIQUE FOR TRANSMITTING COMMANDS
BREY, H./SPERRY RAND CORP./
JUN. 1971
KSC-10521
Reliable random access multiplexer is controlled and operated over two twisted-pair telephone lines at distances of 5.6 to 8.0 km with control signals of less than 10 volts rms. Technique adapts to any process or environmental control system where data source is necessary.

B71-10176
IMPROVED REVERSIBLE COULOMETER CELL
BOETTCHER, G. E.
JUN. 1971
SAN-10051
Cell operates either as timer or current-time integrating device in any physical orientation with better than 2 percent accuracy over temperature range of 283 K to 398 K, with input current range from few microamperes to approximately 1000 microamperes over time period of 1 sec to several hours.

B71-10205
STANDARDIZED PEARSON TYPE 3 DENSITY FUNCTION AREA TABLES
COHEN, A. C./GA. UNIV./ HELM, F. R. SUGG, M.
JUL. 1971 SEE ALSO NASA-CR-61266
M-FS-20541
Tables constituting extension of similar tables published in 1936 are presented in report form. Single and triple parameter gamma functions are discussed. Report tables should interest persons concerned with development and use of numerical analysis and evaluation methods.

B71-10213
AIRCRAFT-CRASH-LOCATING TRANSMITTER FEATURES DESIGN IMPROVMENTS
MANOLI, R./N. AM. ROCKWELL CORP./ ULRICH, B. R.
JUL. 1971
M-FS-16609
Crash locater is automatically ejected from aircraft at time of crash and begins transmitting at emergency radio frequencies monitored by all airports and airport control towers. Advantages are smaller size, simpler design and installation, extended transmitting range and life, greater deployment reliability and increased crash resistance.

B71-10218
EFFICIENT DIGITAL COMPARISON TECHNIQUE FOR LOGIC CIRCUITS
MC CARTHY, C. E../IBM FEDERAL SYSTEMS DIV./
JUL. 1971
M-FS-21080
Tolerance compare technique indicates discompare only when numerical difference value exceeds prescribed limit. Algorithm involving binary number properties is defined, in lieu of arithmetic operation which requires relatively complex circuitry. Extension of algorithm may be made to encompass tolerances other than one unit.

B71-10220
A PSEUDO RANDOM-ACCESS SYNCHRONOUS METEOROLOGICAL SATELLITE SYSTEM
DARCEY, R. J. MARTEL, R. J./WESTINGHOUSE ELEC. CORP./
JUL. 1971
GSFC-10895
Communications satellite system uses pseudo-random time frequency multiplexing technique for extracting real-time meteorological data from great number of isolated weather stations /data collection platforms/ situated randomly throughout the world.

B71-10223
SOLAR CELL POWER SCANNER
EVANS, J. C., JR.
JUL. 1971
LEWIS-11280
System locates high- and low-output regions in cadmium sulfide thin film photovoltaic cells. High resolution photograph shows conversion efficiency of each scanned area. X-Y recorder fed by amplified signal from solar cell also produces power contour map. Photo and map reveal high- and low-conversion-efficiency regions.

B71-10224
ATMOSPHERIC POLLUTION MEASUREMENT BY OPTICAL CROSS CORRELATION METHODS - A CONCEPT
FISHER, M. J. KRAUSE, F. R.
JUL. 1971 SEE ALSO B67-10030
M-FS-12078
Method combines standard spectroscopy with statistical cross correlation analysis of two narrow light beams for remote sensing to detect foreign matter of given particulate size and consistency. Method is applicable in studies of generation and motion of clouds, nuclear debris, ozone, and radiation belts.

B71-10226
MULTILAYERED PRINTED CIRCUIT BOARDS INSPECTED BY X-RAY LAMINOGRAPHY
ARNESON, B. E. /IIT RES. INST./ BENNETT, H. F. GREGG, P. C. HAGEDORN, R. H. KASPARAS, R. MOLER, R. B. PAPE, R. C. RILEY, D. L.
JUL. 1971 SEE ALSO NASA-CR-98249
M-FS-20849
Technique produces high resolution cross-sectional radiographs with close interplane spacing for inspecting multilayer boards to be used in providing circuitry routing and module structural support.

B71-10228
MULTICHANNEL INTERCOM WITH SIMULTANEOUS SEND/RECEIVE CAPABILITY
BUROWICK, E. A./N. AM. ROCKWELL CORP./
JUL. 1971
M-FS-18808
System, using only one amplifier and operating multiple inputs, eliminates push-to-talk requirement of previous systems and inhibits acoustical feedback by using microphones and headphones.

B71-10230
CONSTANT-AMPLITUDE, FREQUENCY-INDEPENDENT PHASE SHIFTER
DEBOO, G. J.
JUL. 1971
ARC-10269
Electronic circuit using operational amplifiers provides output with constant phase shift amplitude, with respect to sinusoidal input, over wide range of frequencies. New circuit includes field effect transistor, Q, operational amplifiers, A1 and A2, and phase detector.

B71-10246
PORTABLE CIRCUIT-INTERRUPTION INDICATOR
BEZANT, K. R./TWA/
JUL. 1971
KSC-10546
Device locates transient power interruptions occurring in electrical equipment. Indicator operates on principle that circuit in normal use retains residual current in the line prior to an interruption.

B71-10251
VARIABLE SWEEP-RATE SHORTENS DYNAMIC TESTING TIME
LORENZO, C. F.
JUL. 1971 SEE ALSO NASA-TN-D-7022
LEWIS-11238
Method adjusts sweep frequency of tested system such that sweep is nominal when selected dynamic event occurs, but is rapid otherwise. Technique achieves time reductions of 7.5 to 1, maintains

0.5 percent accuracy in the results, and has several industrial applications.

B71-10258
STUDY OF NONDESTRUCTIVE TECHNIQUES FOR REDUNDANCY VERIFICATION
INNOVATOR NOT GIVEN /RADIATION INC./ JUL. 1971 SEE ALSO NASA-CR-111765
KSC-10661
Redundant functional element, together with basic elements of system, constitutes a redundant system with primary and backup capability for performing particular functions with increased reliability. Methodology is applicable to design of a verification system for hypothetical complex communication system.

B71-10263
MAN-MACHINE COMMUNICATION - A TRANSPARENT SWITCHBOARD FOR COMPUTERS
RASMUSSEN, H./MIT/
JUL. 1971
MSC-13746
Device uses pattern of transparent contact touch points that are put on cathode ray tube screen. Touch point system compels more precise and unambiguous communication between man and machine than is possible with any other means, and speeds up operation responses.

B71-10276
A REAL-TIME STATISTICAL TIME-SERIES ANALYZER
STEWART, C. H.
AUG. 1971
MSC-12428
Device extracts average frequency of human speech and produces second, third, and fourth moments of instantaneous frequency about this average. It operates on electrical time representation of input signal, performs statistical analysis on zero-crossing of almost any signal, and does not require specialized personnel to operate it.

B71-10282
ENVIRONMENTAL EFFECTS ON SILICON SOLAR CELLS
BERMAN, P. MOSS, R.
AUG. 1971 SEE ALSO NASA-CR-99338
NPO-11475
Test results indicate that solder coating cells produces protective or deleterious effect, depending on the environment. Major problem for solder coated cells is in control of solder thickness and uniformity. Problem area for non-solder coated cells is not identified.

B71-10288
AUTOMATIC TRANSMISSION LINE MONITOR
PARSONS, W. E. RICHARDS, L. O.
AUG. 1971
KSC-10385
Monitor improves complex network reliability in computer data links and command transmission lines. System evaluates circuit performance against preselected criteria, identifies and stores data indicating out-of-tolerance conditions, conducts closed loop testing, and provides for operation under command of digital computer that determines restoration priorities.

B71-10298
PRECISION CALIBRATION AND REFERENCE VOLTAGE SOURCE FOR DATA ACQUISITION SYSTEMS
INNOVATOR NOT GIVEN /GEN. INSTR. CORP./ AUG. 1971
M-FS-20950
Hybrid integrated circuit operational amplifiers, which have inherent characteristics of low quiescent power dissipation and extended operational lifetime with high reliability, are source for digital systems. Amplifiers are coupled to Zener reference diode in current control and buffer configuration.

B71-10299
DATA SAMPLING SYSTEM FOR MONITOR AND CONTROL STATION
INNOVATOR NOT GIVEN /GEN. INSTR. CORP./ AUG. 1971
M-FS-20948
System design is based on development of standardized, interchangeable modules that minimize power dissipation, interconnecting cables and size. Maximum flexibility is achieved by using building block approach where all data modules are identical and are connected at any remote location and addressed in random fashion from central unit.

B71-10307
TONE-ACTIVATED, REMOTE, ALERT COMMUNICATION SYSTEM
BAKER, C. D. COUVILLON, L. A. HUBBARD, W. P. KOLLAR, F. J. POSTAL, R. B. TEGNELIA, C. R.
AUG. 1971
NPO-11132
Pocket sized transmitter, frequency modulated by crystal derived tones, with integral loop antenna provides police with easy operating alert signal communicator which uses patrol car radio to relay signal. Communication channels are time shared by several patrol units.

B71-10318
MULTIFUNCTION AUDIO DIGITIZER FOR COMMUNICATIONS SYSTEMS
MONFORD, L. G., JR.
AUG. 1971
MSC-13855
Digitizer accomplishes both N bit pulse code modulation /PCM/ and delta modulation, and provides modulation indicating variable signal gain and variable sidetone. Other features include - low package count, variable clock rate to optimize bandwidth, and easily expanded PCM output.

B71-10324
SEL-SYNCHRONIZING, BI-ORTHOGONAL CODED PCM TELEMETRY SYSTEM
MILLER, W. MULLER, R. TAYLOR, T. YAGELOWICH, J.
AUG. 1971 SEE ALSO NASA-TR-R-292
GSFC-11237
Communications and data handling system improves signal to noise ratio when transmission channel is perturbed by noise. Telemetry system consists of airborne source, Gaussian additive noise channel, and ground receiver unit. Advantages of system are given.

B71-10325
MULTISPECTRAL INFRARED IMAGING INTERFEROMETER
POTTER, A. E., JR.
AUG. 1971
MSC-12404
Device permitting simultaneous viewing of infrared images at different wavelengths consists of imaging lens, Michelson interferometer, array of infrared detectors, data processing equipment for Fourier transformation of detector signal, and image display unit. Invention is useful in earth resources applications, nondestructive testing, and medical diagnoses.

B71-10326
PHASE LOCKING OF FIELD SEQUENTIAL COLOR WHEEL FOR SMALL TV CAMERA
NIEMYER, L. L./WESTINGHOUSE ELEC. CORP./
AUG. 1971
MSC-13857
System employs synchronous motor driven by deflection waveform of TV and connected directly to color filter wheel to phase lock wheel to deflection unit. Innovation stabilizes color response of small TV cameras and allows for small, lightweight installations. Problems associated with motor phase changes are cited.

B71-10344
COMMUNICATIONS SYSTEM FOR ZERO-G SIMULATION TESTS IN WATER
SMITH, H. E.
SEP. 1971
M-FS-21357
System connects seven observers, diver, and spare station, and utilizes public address system with underwater speakers to provide two-way communications between test subject and personnel in control of life support, so that test personnel are warned immediately of malfunction in pressure suit or equipment.

B71-10360
LASER NET - A CONCEPT FOR MONITORING WINGTIP VORTICES ON RUNWAYS
FUNK, B. H. JOHNSTON, K. D.
SEP. 1971 SEE ALSO NASA-TM-X-64525
M-FS-20857
Network of laser beams passes over runway to photodetectors on opposite side, magnitude of beam deflection indicates magnitude of density gradient encountered. Visual display of beam deflections affects go, no-go decision for takeoff and landing.

B71-10366
SOLID-STATE DATA INTERPRETATION SYSTEM - A CONCEPT
HAGENAU, K./BOEING CO./ PINSON, G. T.
SEP. 1971
M-FS-20587
Device, serving as substitute for cathode ray tubes, applies to computer input-output devices such as microfilm readers, data displays, and optical scanners. Each device operates at speed of modern computer.

B71-10370
IMPROVED CIRCUIT AVOIDS PREMATURE POWER TRANSISTOR FAILURE
MC LYMAN, W. T.
OCT. 1971
NPO-11365
Reactor inserted in the base-drive circuit of each power transistor delays the turn-on of one transistor until the other has turned off.

B71-10371
HIGH EFFICIENCY TELEMETRY METHOD
LIM, L. Y.
OCT. 1971
NPO-10388
Analog and digital mechanizations contain new combinations of known circuits that generate coefficients of Fourier series terms in accordance with harmonic content of waveform to be transmitted. Technique represents information signal more accurately that previous methods and requires fewer information bits.

B71-10391
TELEVISION MULTIPLEXING SYSTEM
SIMPKINS, L. G.
OCT. 1971
KSC-10654
System with single, standard, wideband line transmits ten or more real time TV video data displays over hard wire to recorders more than 22.5 km from source. Digital logic and integrated circuits ensure high reliability and low maintenance. System is adaptable for video sampling applications.

B71-10404
APPLICATION OF CALIBRATION MASKS TO TV VIDICON TUBE
BRAWNER, E. L./BENDIX CORP./ BROWN, J. J. JONKER, W. J.
OCT. 1971
KSC-10589
Photographic application method devised for overlaying test pattern masks on TV camera vidicon tubes prints the mask within 0.0076 cm of the vertical and horizontal center lines of the tube face. Entire process, including mask fabrication and alignment procedure, requires less than 10 minutes.

B71-10408
PRINCIPLES OF ERROR DETECTION AND ERROR CORRECTION CODES
PERLMAN, M.
NOV. 1971
NPO-11487
Report is reviewed which considers theoretical basis of groups, rings, fields, and vector spaces, and their relationship to algebraic coding theory. Report serves as summary for engineers and scientists involved in data handling and processing systems.

B71-10410
COMPOSITE ANTENNA FEED SYSTEM OPERATES FROM VHF TO X-BAND
JAKSTYS, V./PHILCO-FORD CORP./
NOV. 1971
GSFC-11046
System has high radiation efficiency and minimal interaction between elements when inserted between a multimode, multifrequency transponder and a parabolic reflector in an airborne communications system.

B71-10439
A MULTIPLE-PLATE, MULTIPLE-PINHOLE CAMERA FOR X-RAY GAMMA-RAY IMAGING
HOOVER, R. B.
NOV. 1971
M-FS-20546
Plates with identical patterns of precisely aligned pinholes constitute lens system which, when rotated about optical axis, produces continuous high resolution image of small energy X-ray or gamma ray source. Camera has applications in radiation treatment and nuclear medicine.

B71-10440
DIGITAL ASPECT CLOCK
BARTLEY, W. C./SOUTHWEST CENTER FOR ADVANCED STUDIES/
NOV. 1971
ARC-10088
Digital clock precisely set and reset by pulses from a solar sensor, combined with a logic system, provides accurate time-sector division of spin-stabilized satellite. Integral times for viewing physical phenomena from various directions are equal and mean angles of viewing can be determined.

B71-10444
BEAM SQUINT CORRECTION FOR A DIPLEX, RETRODIRECTIVE PHASED ARRAY
BARITT, P. SATRE, W./CUTLER-HAMMER, INC./ SIELMAN, P.
DEC. 1971
GSFC-11023
Beam squint is eliminated by using received phase at each array element to control transmitted phase at another element. Correction method may extend to multi-element array by using ring structure.

B71-10445
PLANET GEOMETRIC CENTER TRACKER
FLEENOR, E. G./LOCKHEED MISSILES AND SPACE CO./
DEC. 1971 SEE ALSO NASA-CR-73162, NASA-CR-73163
ARC-10084
Tracker has angular accuracy on order of one arc-second. Device locates planet centers even when they appear gibbous or crescent. Automatic operation without requirement for planet size input is achieved by incorporating planet radius seeking circuit.

B71-10451
THEORY AND APPLICATION OF FEEDBACK SHIFT REGISTERS
PERLMAN, M.
NOV. 1971
NPO-11486
Document summarizes state-of-the-art in data processing techniques on-board spacecraft, and serves as an aid for personnel requiring tutorial knowledge of ultrareliable data processing techniques.

B71-10502
STATISTICAL MEASUREMENTS OF THE ZERO-CROSSING TIME OF A NOISY SINEWAVE
COST, S. T./IBM/
DEC. 1971
GSFC-11004
Standard deviation of difference in zero crossing times of two identical sinewaves distorted by narrowband noise behaves similarly to average value of error, but deviation is approximately one order of magnitude larger.

B71-10504
VOTER COMPARATOR SWITCH PROVIDES FAIL SAFE DATA COMMUNICATIONS SYSTEM - A CONCEPT
KOCZELA, L. J./N. AM. ROCKWELL CORP./ WILGUS, D. S.
DEC. 1971
MSC-13932
System indicates status of computers and controls operational modes. Two matrices are used - one relating to permissible system states, the other

relating to requested system states. Concept is useful to designers of digital data transmission systems and time shared computer systems.

B71-10517
PROGRAMMED MULTIPLEXING SYSTEM SIMULTANEOUSLY MONITORS SEVERAL VOLTAGES
WRIGHT, L. S./N. AM. ROCKWELL CORP./
DEC. 1971
MSC-17139
System consists of digital voltmeter with binary coded decimal output, programmer, multiplexer, and two to six gated digital displays. Maximum number of circuits monitored is determined by digital voltmeter, rate of change of parameter being measured and complexity of multiplexer design.

B71-10530
BRUSHLESS DC MOTOR WITH DUAL WINDINGS
AUCLAIR, G. F./GE/ HERTZENDORF, B. H. MANTEUFFEL, E. W.
DEC. 1971 SEE ALSO NASA-CR-102675
M-FS-21290
Motor has high starting torque and high running speeds. Control system consists of Hall effect generator/resolver and associated electronic amplifiers and switches. Motor operation is described.

B72-10018
A HYBRID ELECTROMECHANICAL SOLID STATE SWITCH FOR ac POWER CONTROL
Innovator not given (Teledyne Kinet.) 1972 See also B67-10165
MSC-14005
Bidirectional thyristor coupled to a series of actuator driven electromechanical contacts generates hybrid electromechanical solid state switch for ac power control. Device is useful in power control applications where zero crossover switching is required.

B72-10030
THIRD ORDER DIGITAL-TO-ANALOG CONVERTER
W. P. Dotson
1972
MSC-12458
System, consisting of sample and hold digital-to-analog converter, clock circuit, sample delay circuit, initial condition circuit and interpolator circuit, improves accuracy of reconstructed analog signal without increasing sample rates.

B72-10050
ELECTRODES FOR SEALED SECONDARY BATTERIES
D. B. Boies (IIT Res. Inst.) and F. T. Child (IIT Res. Inst.)
1972
ARC-10238
Self-supporting membrane electrode structures, in which active ingredients and graphite are incorporated in a polymeric matrix, improve performance of electrodes in miniature, sealed, alkaline storage batteries.

B72-10051
IMPROVED DEVICE MEASURES PERFORMANCE OF BATTERIES UNDER LOAD
J. D. Powell (TRW, Inc.)
1972
ARC-10252
Kordesch-Marko interrupter bridge circuit includes capability of varying frequency of interruption in steps from 60 Hz to 2000 Hz range extension, and addition of operating modes to allow instrument to serve as steady dc constant-current source or load, or source of interrupted constant current.

B72-10052
ADAPTIVE POSITION CONTROL LOOP
W. L. Keltz (GE)
1972 See also NASA-CR-73304
ARC-10255
Design of attitude control system for a sounding rocket is established by using a control loop which incorporates a lead network to convert position output into a feedback signal that is approximately proportional to position, plus a constant times rate.

B72-10074
OXYGEN PRESSURE CONTROL FOR ELECTROLYSIS CELLS
J. D. Powell (TRW, Inc.)
1972
ARC-10250
Duty cycle of switched, constant current circuit controlled by pressure sensor provides oxygen at a constant pressure from a cell which electrolyzes water, eliminating possibility of cell damage by excessive oxygen demand.

B72-10076
QUICK RELEASE ACOUSTIC SENSOR HOLDING FIXTURE
W. McMahon (N. Am. Rockwell Corp.) and E. S. Scherba (N. Am. Rockwell Corp.)
1972
MSC-17457
Quick-release spring holder secures acoustic sensor to test material surface eliminating adhesive bonding to test material and achieving acoustic emission evaluation from tensile tests. Reusability of sensors reduces test cost.

B72-10086
INTRODUCTION OF LITHIUM INTO THE FRONT SURFACE OF SOLAR CELLS
P. A. Iles (Globe-Union, Inc.)
1972
NPO-11404
Time-temperature cycle provides sufficient lithium in the active regions of solar cells. Gradient of lithium is less subject to alteration by P-N junction field.

B72-10088
TECHNIQUE MINIMIZES THE EFFECTS OF DROPOUTS ON TELEMETRY RECORDS
T. O. Anderson and W. J. Hurd
1972
NPO-11421
Recorder deficiencies are minimized by using two-channel system to prepare two tapes, each having noise, wow and flutter, and dropout characteristics of channel on which it was made. Processing tapes by computer and combining signals from two channels produce single tape free of dropouts caused by recording process.

B72-10089
ACCURATE MEASUREMENT OF TELEMETRY PERFORMANCE
R. W. Burt, N. C. Ham, C. T. Sterlzried, and M. S. Reid
1972
NPO-11457
Performance of high rate telemetry stations used in the Deep Space Network is verified. Measurement techniques are discussed.

B72-10091
CONTROL OF ACCELERATION IN SINE/RANDOM VIBRATION TESTS
R. C. Woodbury
1972
NPO-11482
Sampling output levels of accelerometers using largest output or any combination of outputs provide control of shaker for spacecraft vibration qualification tests.

B72-10094
INERTIAL REFERENCE UNIT
R. A. Crawford
1972
NPO-11518
Unit provides rate damping, linear velocity changes and angular position information to attitude control system during turns and motor burns.

B72-10098
SOLDERING IRON TEMPERATURE INDICATOR
C. D. Baker and G. A. Wiker
1972
NPO-11545

Thermocouple implanted in metal mass simulates heat transfer characteristics of connection which is to be soldered. Light signals indicate whether temperature is right, too high, or too low.

B72-10099
ARC PROTECTION SYSTEM FOR HIGH-POWER RF AMPLIFIERS
R. C. Chernoff
1972
NPO-11560

Protective system prevents damage or destruction of high-power RF amplifiers by arcs which may occur in output transmission line. Advantages of system are listed.

B72-10101
STANDARD ENVIRONMENTAL TESTING PRACTICES
R. Daniel, E. Gregory, J. Stoker, F. VanBiene, and R. C. Woodbury
1972
NPO-11567

Manual on procedural requirements for performing certain environmental tests on space flight equipment provides information for test equipment designers, quality control and production engineers. Contents of manual are summarized.

B72-10108
LOW NOISE ELECTROMAGNETIC FLOWMETER
V. J. Cushing (Eng.-Phys. Co.)
May 1972
M-FS-21291

Parasitic hum is removed by using an isophase magnetic field created within flowmeter and an enclosure which prevents leakage of flux field. Method prevents contamination of flow conduit and eliminates zero point drift.

B72-10109
TECHNIQUES FOR IMPROVING RELIABILITY OF COMPUTERS
W. C. Cater (IBM), C. E. McCarthy (IBM), D. C. Jessep (IBM), A. B. Wadia (IBM), F. G. Milligan (IBM), and W. G. Bouricius (IBM)
May 1972
M-FS-21326

Modular design techniques improve methods of error detection, diagnosis, and recovery. Theoretical computer (MARCS (Modular Architecture for Reliable Computer Systems)) study deals with postulated and modeled technology indigenous to 1975-1980. Study developments are discussed.

B72-10119
HIGH VOLTAGE PROTECTION NETWORK
J. M. Cambra
1972
ARC-10197

Circuit protects technical personnel and test equipment from hazardous currents conducted through safety barriers and into data acquisition equipment. Network isolates energy source, restricts arcing to remote area, and dissipates harmlessly residual energy transient.

B72-10131
HEART SIMULATOR
E. Palmer
May 1972
M-FS-21609

Unijunction oscillator controlled by potentiometer to generate a spike that may be converted by transformer action to the simulated heart beat is used as a calibrator for heart monitoring equipment.

B72-10139
AIRCRAFT COMMUNICATION VIA TELEFACSIMILE SYSTEM
R. L. Brown, Sr.
1972
M-FS-20839

Based on reading rate of between 500-1000 words/minute, transmitting typewritten matter only, system uses lowest possible bandwidth to avoid overcrowding, while furnishing data as fast as it can be absorbed by pilot. Bandwidth requirements are less than 150 kHz, a considerable saving over conventional television.

B72-10141
ERRORS IN HYBRID COMPUTERS
C. O. Alford (Ga. Inst. of Tech.) and J. L. Hammond (Ga. Inst. of Tech.)
1972
M-FS-21289

Method is described for reduction of error components in numerical integration, sampling with zero hold order, and execution time delay.

B72-10164
INTERCONNECTIONS FOR FLUIDIC CIRCUITS
C. Mangion (TRW Systems Group)
1972
ARC-10481

Circuit elements are grouped on functional basis in rectangular two-dimensional planar arrays or modules. Another interconnection method brings all connections out to module edge. For smaller fluidic circuits, manifold and interconnections are fabricated as single blocks. Advantages of methods are given.

B72-10167
ILLUMINATION CONTROL SYSTEM
C. Beckman (Gen. Tech. Serv., Inc.)
1972
ARC-10527

Experiment, testing effects of constant light intensity on Arabidopsis growth, utilizes wide-spectrum fluorescent lamps monitored by photocell which controls the power supplied to lamp.

B72-10177
FLEXIBLE, LOW-COST SILICON SOLAR CELL ARRAYS
A. F. Forestieri, J. D. Broder, and D. T. Bernatowicz
May 1972 See also NASA-TM-X-52875
LEWIS-11069

Silicon solar cell arrays are pressure-bonded to flexible backing and protected by fluorinated ethylene propylene cover in one mechanized operation. Arrays packaged by this method are flexible, lightweight, insulated, breakage resistant and less expensive.

B72-10191
OVERLAY BOARD FOR CONTROL CONSOLES
C. T. Jackson
May 1972
ARC-10007

Board that fits over the control panel decreases errors and time loss. Device has cutouts for controls and indicators, bears all appropriate labeling information, can be removed with the changing computer assignments, and guards against accidental changes in control settings.

B72-10254
SOLID STATE TELEVISION CAMERA HAS NO IMAGING TUBE
C. T. Huggins
Jun. 1972
M-FS-21553

Camera with characteristics of vidicon camera and greater resolution than home TV receiver uses mosaic of phototransistors. Because of low power and small size, camera has many applications. Mosaics can be used as cathode ray tubes and analog-to-digital converters.

B72-10272
LIGHTNING FLASH DETECTION SYSTEM
W. J. Borucki and D. Billings
1972
ARC-10562

Array of photodetectors and associated circuitry continuously monitors entire horizon to measure distance and direction of lightning flashes.

B72-10285
VIDICON STORAGE TUBE ELECTRICAL INPUT/OUTPUT
P. Lipoma (Lockheed Electron. Co.)
Jun. 1972
MSC-14053
Electrical data storage tube is assembled from standard vidicon tube using conventional amplification and control circuits. Vidicon storage tube is simple, inexpensive and has an erase and preparation time of less than 5 microseconds.

B72-10286
DESIGN CURVE FOR LIQUID HELIUM STORAGE VESSELS
J. A. DiCarlo
Jun. 1972
LEWIS-11498
Development of equipment for storage of liquid helium is discussed. Derivation of design curve and working equations for estimating effects of either perfect or imperfect heat transfer in storage device are described. Mathematical models of heat transfer conditions are provided.

B72-10295
THE DESIGN OF AN AUTOMATED VERIFICATION OF REDUNDANT SYSTEMS
F. A. Ford (Radiation, Inc.), T. W. Hasslinger (Radiation, Inc.), and F. J. Moreno (Radiation, Inc.)
Jun. 1972 See also NASA-CR-125311
KSC-10702
Handbook describes design processes, presents design considerations and techniques, gives tutorial material on implementation and methodology, shows design aids, illustrates use of design aids and application samples, and identifies general practices to be adhered to or avoided.

B72-10296
NONDESTRUCTIVE TESTING OF MICROTAB WELDS
L. Feinstein and R. J. Hruby
Sep. 1972
ARC-10176
Introduction of sinusoidal signal across welded structure to determine reliability of integrated circuit connections is discussed. In-phase frequencies and quadrature frequency functions are used to evaluate weld reliability. Schematic diagram of test equipment and components is provided.

B72-10357
ZONE RADIOMETER MEASUREMENTS ON A MODEL ROCKET EXHAUST PLUME
Innovator not given (Cornell Aeron. Lab., Inc.) Jul. 1972
M-FS-21693
Radiometer for analytical prediction of rocket plume-to-booster thermal radiation and convective heating is described. Applications for engine combustion analysis; incineration, and pollution control by high temperature processing are discussed. Illustrations of equipment are included.

B72-10361
A STUDY OF THE POWER SPECTRAL DENSITY OF AN FM SIGNAL
H. L. Deffebach (Auburn Univ.)
Jul. 1972
M-FS-21070
Mathematical expressions describe an FM signal modulated by a composite video wave. Three general spectrum equations for FM signals are obtained by using three types of video information.

B72-10372
AUTOMATIC LIGHTNING LOCATION SYSTEM
T. Holdsworth and D. N. March
Dec. 1972
AEC-10077
Hyperbolic triangulation method was used for locating lightning storm path and position from VHF lightning charge emissions. Possible applications in electric power companies, forest fire lookout centers, airports, and pipeline companies are indicated.

B72-10383
SURVEY OF AIRCRAFT ELECTRICAL POWER SYSTEMS
C. H. Lee (AiRes. Mfg. Co.) and J. J. Brandner (AiRes. Mfg. Co.)
Jul. 1972 See also NASA-CR-110693
LEWIS-11678
Areas investigated include: (1) load analysis; (2) power distribution, conversion techniques and generation; (3) design criteria and performance capabilities of hydraulic and pneumatic systems; (4) system control and protection methods; (5) component and heat transfer systems cooling; and (6) electrical system reliability.

B72-10390
A CLOSED LOOP CRYOGENIC ENVIRONMENT PRESSURE REGULATING SYSTEM
J. C. Huguley (Brown and Root/Northrop) and L. A. Goudie (Brown and Root/Northrop)
Jul. 1972
MSC-13880
Nonlinear closed loop control system to regulate the pressure in a cryogenic environment is described. System employs four position contactor with two control bands to react to the signals. Diagrams of element transfer function and required equipment are included.

B72-10392
TWO-AXIS LEVELING DETECTOR SYSTEM
L. Weiner (Bendix Corp.)
Jul. 1972
M-FS-21344
Electro-mechanical device for measuring tilt angles in order to establish level base without optical reference is described. Angular displacement is detected by movement of bubble in conducting fluid containing electrode network. Electrical signal causes compensation for small movements in horizontal and vertical planes.

B72-10409
A SIMPLE DEAD-RECKONING NAVIGATIONAL SYSTEM
B. F. Walls, W. C. Mastin, and P. H. Broussard, Jr.
Jul. 1972
M-FS-21165
Simple navigation system is designed for vehicles operating in remote locations where it is not feasible to transport extensive equipment. System consists of four main components: directional gyrocompass to establish inertial direction; odometer to measure distance; signal processor to combine measured distance and direction; and sun compass to determine initial direction.

B72-10411
LASER BEAM DEFLECTION CONTROL: A CONCEPT
C. L. Garvie (Lockheed Electron. Co.)
Jul. 1972
MSC-13814
Improved control of laser beam deflection angles may result from new conceptual device. Reflectively coated magnetized particles are suspended in liquid-filled cell surrounded by two pairs of crossed electromagnetic coils and are selectively aligned by controlling magnetic fields. Ultrasonic energy source keeps particles suspended.

B72-10417
ROLL FUNCTION IN A FLIGHT SIMULATOR
A. E. Brain (Stanford Res. Inst.)
Aug. 1972
ARC-10557
Method introduces roll into the flying-spot scanner by modifying the scanning waveforms.

B72-10442
VERY HIGH SPEED DIRECT-READOUT, CONTROL AND RECORDING SYSTEM
J. W. Turner
Jul. 1972
M-FS-20658
Characteristics of electronic system for high speed readout, control, and recording of data are discussed. Operation of system

is described to show rate of data processing and accuracy obtainable. Primary advantage of system is providing direct recording of parameter value several times per second.

B72-10448
A BRUSHLESS dc SPIN MOTOR FOR MOMENTUM EXCHANGE ALTITUDE CONTROL
D. Stern (GE) and J. W. Rosenlieb (GE)
Jul. 1972
M-FS-14952

Brushless dc spin motor is designed to use Hall effect probes as means of revolving rotor position and controlling motor winding currents. This results in 3 to 1 reduction in watt-hours required for wheel acceleration, a 2 to 1 reduction in power to run wheel, and a 10 to 1 reduction in the electronics size and weight.

B72-10467
AIRLOCK CAUTION AND WARNING SYSTEM
W. J. Mayfield (McDonnell-Douglas Corp.), L. Z. Cork (McDonnell-Douglas Corp.), R. G. Malchow (McDonnell-Douglas Corp.), and G. L. Hornback (McDonnell-Douglas Corp.)
Aug. 1972
M-FS-21576

Caution and warning system, used to monitor performance and warn of hazards or out-of-limit conditions on space vehicles, may have application to aircraft and railway transit systems. System consists of caution and warning subsystem and emergency subsystem.

B72-10468
NEUTRON RADIOGRAPHIC VIEWING SYSTEM
W. Leysath (Zenith Radio Corp.) and R. L. Brown
Aug. 1972
M-FS-22024

Neutron radiographic viewing system consisting of camera head and control processor is developed for use in nondestructive testing applications. Camera head consists of neutron-sensitive image intensifier system, power supply, and SEC vidicon camera head. Both systems, with their optics, are housed on test mount.

B72-10471
UNSUPPORTED THIN FILM BEAM SPLITTER
R. C. Bastien (Perkin Elmer Corp.) and R. J. Scheuerman (Perkin Elmer Corp.)
Aug. 1972
GSFC-10525

Multilayer beam splitter system yielding nearly equal broadband infrared reflectance and transmittance in the 5 to 50 micron spectral region has been developed which will significantly reduce size and cost of light path compensating devices in infrared spectral instruments.

B72-10481
ENHANCED LAMB DIP FOR ABSOLUTE LASER FREQUENCY STABILIZATION
A. E. Siegman (Stanford Univ.), R. L. Byer (Stanford Univ.), and S. C. Wang (Stanford Univ.)
Aug. 1972
HQ-10695

Enhanced Lamb dip width is 5 MHz and total depth is 10 percent of peak power. Present configuration is useful as frequency standard in near infrared. Technique extends to other lasers, for which low pressure narrow linewidth gain tubes can be constructed.

B72-10501
INDEXING FILM WITH A FLUIDIC SENSOR
A. N. Maciel, Jr. (Singer/Gen. Precision, Inc.)
Aug. 1972
MSC-14117

Fluidic sensor is used to measure passage of film without mechanical contact with counting device. Same sensor system may be used for different sizes of film. System has two fluidic sensors and operates on principle of electrically recording interruptions in air stream.

B72-10507
PULSE-WIDTH-MODULATED DEVICE FOR PRECISION TEMPERATURE CONTROL
R. C. Heyser
Dec. 1972
NPO-11407

Temperature controller is described which reduces difference between temperature oscillations about control point. Standard temperature-sensitive resistor element is utilized which is highly stable and reproducible. Temperature sensing circuitry is conventional dc bridge with power supplied by battery or highly regulated supply source.

B72-10508
RADIO DIRECTION FINDER
L. M. Hershey
Dec. 1972
NPO-11573

Three-antenna interferometric system is described for homing on very high frequency transmitters. Antenna signals are sequentially sampled with single receiver and receiver output pulses are held for comparison of signals from outermost antennas with those of center antenna. System can be installed as redundant navigation system in case of failure of VOR receivers.

B72-10510
UNIVERSAL dc SIGNAL CONDITIONER
P. A. Bradanini (N. Am. Rockwell Corp.)
Aug. 1972
MSC-17526

Signal conditioner was designed which can condition dc signals over range of + or - volts. It is lighter, has lower initial and maintenance costs, and higher reliability than conventional discrete circuit designs. System incorporates linear integrated circuits in conjunction with hybrid, thin film circuit technology to achieve high degree of circuit miniaturization.

B72-10535
MAGNETIC CIRCUITRY MUTUAL COUPLING PROBE
P. L. Anthony (N. Am. Rockwell Corp.)
Sep. 1972
M-FS-21664

Development of magnetic probe for nondestructive testing of multilayer printed circuit boards to determine existence of opens or shorts is reported. Components of probe are described and procedures for operation are discussed. Two illustrations are provided to show magnetic circuits and principles of operation.

B72-10541
POTENTIOMETER, CONSTANT TENSION AND LUBRICATION DEVICE
H. J. Smith (Boeing Co.)
Dec. 1972
KSC-10723

Wiper assembly is described for feedback potentiometers which provides self cleaning, self lubrication, and tension within controlled limits. Each end of the assembly contains loose fitting leather pad thoroughly soaked in wiper lubricating fluid. Cleaning and lubrication of potentiometer resulting from use of lubrication soaked leather accomplishes noise free operation.

B72-10545
A COMPACT BATTERY POWERED DIGITAL THERMOMETER
G. Zivley (SCI Electron., Inc.)
Sep. 1972
MSC-14084

Development of thermometer to provide quick and accurate temperature readings using thermal resistance probe as temperature-to-resistance transducer is discussed. Details of construction and operations are described. Illustration of circuit and components is provided.

B72-10548
THE THIN FILM MICROWAVE IRIS
R. L. Ramey (Va. Univ.), H. S. Landes (Va. Univ.), and E. A. Manus (Va. Univ.)

Sep. 1972 See also NASA-CR-1364
LANGLEY-10511

Development of waveguide iris for microwave coupling applications using thin film techniques is discussed. Production process and installation of iris are described. Iris improves power transmission properties of waveguide window.

B72-10564
NEW PULSING TECHNIQUE MAY IMPROVE RADAR RANGING SYSTEMS
M. V. Gowdey
Sep. 1972
ARC-10600

Mode of operation for radar ranging system based on ringing frequencies is described. Methods for measuring range and range rate are discussed. Mathematical model is included to describe ringing frequency. Application to acoustic sounding devices is proposed.

B72-10573
AN IMPROVED LEARNING DECODER
G. D. Doland (Lockheed Electron. Co., Inc.)
Oct. 1972
MSC-14070

Learning decoder was developed which operates at system data rate without limiting data rate. Decoder is much simpler than those in existence, operates near Shannon's channel capacity, and automatically recovers operation after loss of signal.

B72-10591
A SIMPLIFIED, COMPACT STATIC SHIFT REGISTER
R. L. Pryor (RCA) and A. M. Smith (RCA)
Sep. 1972
HQ-10723

Shift register was developed which uses only one D type flip-flop and improves packaging density by approximately 25% over the usual arrangement. Circuit is compromise between full master-slave arrangement and dynamic shift register, with limitation only of length of time that clock can be held high during new data entry.

B72-10609
OSCILLATING HOT-WIRE ANEMOMETER
J. M. Conley
Dec. 1972
NPO-11634

Performance analysis was made of oscillating hot-wire anemometer electrical output in gas stream. Advantages include no calibration and measurement of fluid direction as well as fluid speed.

B72-10639
A RANGE EXPANDING SIGNAL CONDITIONER
W. A. Russell (McDonnell-Douglas Corp.), R. L. Grant (McDonnell-Douglas Corp.), and M. L. Scheer (McDonnell-Douglas Corp.)
Oct. 1972
M-FS-21720

Telemetry system modifications to improve signal resolution are described. Process uses zero suppression technique which consists of subtracting known voltage from input and amplifying remainder. Schematic diagram of circuit is provided and details of operation are presented.

B72-10647
A VISUAL-DISPLAY AND STORAGE DEVICE
D. R. Bosomworth (RCA) and W. H. Moles (RCA)
Oct. 1972
GSFC-10901

Memory and display device uses cathodochromic material to store visual information and fast phosphor to recall information for display and electronic processing. Cathodochromic material changes color when bombarded with electrons, and is restored to its original color when exposed to light of appropiate wavelength.

B72-10664
FAST RESPONSE DENSITOMETER FOR MEASURING LIQUID DENSITY
Innovator not given (Ind. Nucleonics Corp.) Oct. 1972
M-FS-14478

Densitometer was developed which produces linear voltage proportional to changes in density of flowing liquid hydrogen. Unit has fast response time and good system stability, statistical variation, and thermal equilibrium. System accuracy is 2 percent of total density span. Basic design may be altered to include measurement of other flowing materials.

B72-10668
TWO-SPEED DEFLECTION SYSTEM FOR ELECTRON MICROPATTERN GENERATOR
P. R. Malmberg (Westinghouse)
Oct. 1972
M-FS-22117

Development of dual speed deflection system for electron beam micropattern generator system is discussed. Factors affecting application of electron beam lithography are analyzed. Procedure for using two speed deflection system is described.

B72-10680
AN IMPROVED DATA TRANSFER AND STORAGE TECHNIQUE FOR HYBRID COMPUTATION
A. M. Hansing (Lockheed Missiles and Space Co.)
Oct. 1972
M-FS-22043

Improved technique was developed for transferring and storing data at faster than real time speeds on hybrid computer. Predominant advantage is combined use of electronic relays, track and store units, and analog-to-digital and digital-to-analog conversion units of hybrid computer.

B72-10682
LOW DISTORTION AUTOMATIC PHASE CONTROL CIRCUIT
G. Hauge (Martin Marietta Corp.) and C. W. Pederson (Martin Marietta Corp.)
Oct. 1972
M-FS-21671

Circuit for generation and demodulation of quadrature double side band signals in frequency division multiplexing system is described. Circuit is designed to produce low distortion automatic phase control. Illustration of circuit and components is included.

B72-10694
PEAK-POWER-POINT MONITOR FOR SOLAR PANEL
A. I. Schloss
Dec. 1972
NPO-11708

Attempt was made to determine solar cell panel peak power capability without disrupting power flow from panel. Separate solar cell strings were switched from panel circuits, and increasingly larger loads were added rapidly until peak power points were transversed. String wattage output was recorded and all stored string measurements summed together indicate peak power point in panel.

B72-10724
ANALYSIS OF CIRCUITS INCLUDING MAGNETIC CORES (MTRAC)
G. R. Hanzen, D. Nitzan, and J. R. Herndon
Dec. 1972
NPO-11494

Development of automated circuit analysis computer program to provide transient analysis of circuits with magnetic cores is discussed. Allowance is made for complications caused by nonlinearity of switching core model and magnetic coupling among loop currents. Computer program is conducted on Univac 1108 computer using FORTRAN IV.

B72-10751
ACOUSTICAL ANALYSIS SYSTEM
R. B. Tatge (GE) and P. F. Scott (GE)
Dec. 1972
GSFC-11087

Integrated system is described which replaces several instruments normally used to analyze acoustical data in failure detection of mechanical or fluid systems. Analysis system extracts and measures repetitive waveforms superimposed on noisy background and compares amplitude with internally stored waveforms. Equipment used in system may be interfaced with general purpose digital computer.

B72-10752
AUTOMATIC METHOD OF MEASURING SILICON-CONTROLLED-RECTIFIER HOLDING CURRENT
E. A. Maslowski
Dec. 1972 See also NASA-TM-X-2463
LEWIS-11898

Development of automated silicon controlled rectifier circuit for measuring minimum anode current required to maintain rectifiers in conducting state is discussed. Components of circuit are described and principles of operation are explained. Illustration of circuit is provided.

B73-10006
A REMOTE TEST PARAMETER PROFILE DISPLAY
J. L. Harrold and J. E. Dudenhoefer
Mar. 1973
LEWIS-11872

Multiplexed digital recording system with simple interface between it and standard commercially available oscilloscopes was developed. System included: rapid set-up, minimum input cabling, low cost, display expansion capability, and portability.

B73-10010
REMOTE MEASUREMENTS BY TELEPHONE
R. L. Miller
Mar. 1973
LEWIS-11704

Inexpensive device permits measurement and remote interrogation of variables such as voltage, temperature, pressure, or humidity by standard telephone equipment. Remote interrogation of wind direction and velocity, humidity, or water levels on flood-prone river are other possible representative uses for this device.

B73-10011
LOW COST UNIFORM HEAT SOURCE
R. B. Smith and G. M. Prok
Mar. 1973 See also NASA-TM-X-2374
LEWIS-11903

Electrically powered heat source was developed for ground simulation of isotope heat-source assembly in Brayton power system. Heat source, which operates on ordinary 110 vac power, consists of tungsten filament heating element wound onto a spirally grooved boron nitride core and inserted in a hollowed-out graphite hexahedron.

B73-10043
AN AUTOMATIC LIGHTNING DETECTION AND PHOTOGRAPHIC SYSTEM
R. J. Wojtasinski, L. Holley, J. L. Gray, and R. B. Hoover
Feb. 1973
KSC-10728

Conventional 35-mm camera is activated by an electronic signal every time lightning strikes in general vicinity. Electronic circuit detects lightning by means of antenna which picks up atmospheric radio disturbances. Camera is equipped with fish-eye lense, automatic shutter advance, and small 24-hour clock to indicate time when exposures are made.

B73-10051
PROTOTYPE ULTRASONIC INSTRUMENT FOR QUANTITATIVE TESTING
L. C. Lynworth (Panametrics, Inc.), J. L. Dubois (Panametrics, Inc.), and P. R. Kranz (Panametrics, Inc.)
Feb. 1973
M-FS-22350

Ultrasonic instrument has been developed for use in quantitative nondestructive evaluation of material defects such as cracks, voids, inclusions, and unbonds. Instrument is provided with standard pulse source and transducer for each frequency range selected and includes integral aids that allow calibration to prescribed standards.

B73-10052
OVEN TEMPERATURE CONTROLLER FOR ELECTRONIC COMPONENTS
S. W. Billingsley
Feb. 1973
GSFC-11466

Simple, inexpensive circuit has been developed which provides active temperature control to certain precision electronic components such as crystal oscillators and Zener diodes.

B73-10074
MEASURING THE ELECTRIC FIELD OF A CLOUD
R. J. Wojtasinski and D. D. Lovall
Mar. 1973
KSC-10731

Network of electric field measuring stations has been developed to assess lightning hazard of charged clouds. Sensor data are digitized and transmitted to central processing area for display.

B73-10093
FOUR-PHASE DIFFERENTIAL PHASE SHIFT RESOLVER
P. M. Hopkins (Lockheed Electronics Co.) and W. M. Wallingford (Lockheed Electronics Co.)
Jun. 1973
JSC-14065; JSC-14066

Two systems have been developed to resolve phase uncertainty without transmitting reference signals. In both methods signal is impressed on carrier as differential, rather than absolute, phase shift. At the receiver four-phase demodulation and logic process unambiguously resolves differential phase shift of input carrier.

B73-10094
CARRIER EXTRACTION CIRCUIT
K. Solomon (RCA), J.R. Allen (RCA), A. Jackson (RCA), and R. W. Allen (RCA)
Mar. 1973
JSC-14262

Feedback loop extracts demodulated reference signals from IF input and feeds signal back to demodulator. Since reference signal is extracted directly from carrier, no separate reference need be transmitted. Circuit obtains coherent carrier from balanced or unbalanced four-phase signal of varying characteristics.

B73-10100
AUTOMATIC SPEED CONTROL OF HIGHWAY TRAFFIC
E. E. Klingman
Feb. 1973
M-FS-21791

Vehicle control system monitors all vehicles in its range, and automatically slows down speeding vehicles by activating governor in vehicle. System determines only maximum speed; speeds below maximum are controlled by vehicle operator. Loss of transmitted signal or activation of emergency over-ride will open fuel line and return control to operator.

B73-10106
A TECHNIQUE TO ELIMINATE FALSE LOCK IN PCM DEMODULATION
H. S. Kobayashi
May 1973 See also B73-10107
JSC-12494

One loop provides error signal which adjusts voltage controlled oscillator. Second loop multiplies input signal with generated in-phase signal. Both signals are integrated over bit period. First loop detects null which indicates lockup, and second loop emphasizes impact signal information.

B73-10107
PHASE SHIFT KEYED, PULSE CODE MODULATED SIGNAL SYNCHRONIZER
H. S. Kobayashi
May 1973 See also B73-10106
JSC-12462

Signal is demodulated and synchronized by three loop circuits: "Q" loop uses quadrature signal to stabilize frequency; "B" loop acts on baseboard signal to stabilize phase; and decoding "I" loop acts on in-phase signal. Synchronizer may be used to eliminate false-lock.

B73-10112
DIGITAL NOTCH FILTER
B. Z. Meers, Jr.
Aug. 1973
KSC-10182

Filter determines whether time pericd of incoming signal matches time preset in filter. When signals do not match, high or low frequency deviation reading is displayed digitally.

B73-10118
AN AMPERE-HOUR METER FOR BATTERIES
B. D. Eklund (McDonnell Douglas Corp.)
Jun. 1973
M-FS-22067

Up-down counter records charge as well as discharge in tests of rechargeable batteries. System uses reversible counter preset to represent 100% charge. As battery discharges, total count decreases; as battery is recharged, counter moves back to 100% indication.

B73-10119
NEW MOTOR SHAFT ANGULAR ACCELEROMETER CONCEPT
F. O. Smetana (North Carolina Univ.)
Mar. 1973
LANGLEY-11030

Concept permits measurement of the acceleration of continuously rotating shafts without use of slip rings or telemetry and with little additional inertial load. Concept has application in servomotor control circuits and easy-to-fly airplane controls.

B73-10122
LEAPS (LASER ELECTRO-OPTICAL ALIGNMENT POLE FOR SURVEYING)
L. Caudill
May 1973
GSFC-11262

Azimuthal bearing between two obscured points is measured by placing laser beam at one of the points. Beam is directed straight up into the air so that some part of it may be detected from any position a reasonable distance away.

B73-10123
BRAKE WEAR WARNING DEVICE: A CONCEPT
S. F. Hawkins (Rockwell Intern. Corp.)
May 1973
JSC-19157

Heat-insulated wire is introduced through brake shoe and partially into brake lining. Wire is connected to positive terminal and light bulb. When brakes wear to critical point, contact between wire and wheel drum grounds circuit and turns on warning light.

B73-10126
INTENSIVE CARE ALARM SYSTEM
J. L. Christensen (George Washington Univ.) and A. L. Herbert (George Washington Univ.)
May 1973
GSFC-11377

Inductive loop has been added to commercially available call system fitted with earphone receiver. System transmits high frequency signals to nurse's receiver to announce patient's need for help without disturbing others.

B73-10127
AUTOMATIC QUADRATURE CONTROL AND MEASURING SYSTEM
J. F. Hamlet
May 1973
M-FS-21660

Quadrature is separated from amplified signal by use of phase detector, with phase shifter providing appropriate reference. Output of phase detector is further amplified and filtered by dc amplifier. Output of dc amplifier provides signal to neutralize quadrature component of transducer signal.

B73-10129
SOLAR ASPECT DETERMINATION SYSTEM
W. H. Farthing and H. F. Frisbie
May 1973
GSFC-11444

Sensor containing commercially available solid-state position-sensitive light detector provides complete space-vehicle sun or moon vector information.

B73-10132
DIGITAL VIDEO DISPLAY SYSTEM
A. I. Zygielbaum, W. L. Martin, and A. Engle
Mar. 1973
NPO-11342

System displays image data in real time on 120,000-element raster scan with 2, 4, or 8 shades of grey. Designed for displaying planetary range Doppler data, system can be used for X-Y plotting, displaying alphanumerics, and providing image animation.

B73-10134
LOW-NOISE MICROWAVE POLARIMETER
G. S. Levy, D. A. Bathker, and F. E. McCrea
Mar. 1973
NPO-11512

Two quarterwave-plate polarizers inserted between rotary waveguide joints transform received signals from arbitrary linear to circular polarizations and then from circular to fixed linear polarizations. Fixed linear polarizations are applied to amplifiers and filters in usual fashion.

B73-10138
COMPUTER-CONTROLLED VIBRATION TESTING
C. P. Chapman and B. Sotomayor
Mar. 1973
NPO-11612

System features quickly achieved steady state, increased accuracy of spectrum definition, and true Gaussian amplitude distribution of resulting signals. Controlled shock-tests might also be tried with this system.

B73-10141
CODE-REGENERATIVE CLEAN-UP LOOP FOR A RANGING TRANSPONDER
W. J. Hurd
Mar. 1973
NPO-11707

Digital processing system phase locks on received ranging signal and creates clean replica of received ranging code. System is broadly applicable to variety of terrestrial ranging problems, including oceanic navigation.

B73-10144
A NONLINEAR-COHERENCE RECEIVER
M. K. Simon and W. C. Lindsey (Univ. of Southern Calif.)
Mar. 1973
NPO-11921

Mathematical analysis and detailed study of generic model for coherent receiver has demonstrated that nonlinear coherence between given biphase-modulated input signal and supplied reference signal can be used in receivers to improve telecommunication systems.

B73-10145
POSITIVE CONTACT RESISTANCE SOLDERING UNIT
R. D. Banta (Boeing Co.)
Mar. 1973
KSC-10242

Ohmmeter is used to indicate positive contact between electrodes and workpiece. This permits good soldering and prevents damage to electronic devices.

B73-10146
A NEW DRY BIOMEDICAL ELECTRODE

R. S. Luce (Lockheed Missiles & Space Co.) and G. J. Cleveland (Lockheed Missiles & Space Co.)
May 1973
JSC-14321

Electronic circuitry contains new operational amplifier which incorporates monolithic super-gain transistors. Electrode does not provide voltage amplification; instead, it acts as current amplifier to make it possible to pick up electrical potentials from surface of highly resistant dry skin.

B73-10154
TIME-BASED PRIORITY SELECTION FOR ANALOG CIRCUITS
J. D. Fageol (Rockwell Intern. Corp.)
Jun. 1973
M-FS-24242

Unlimited channel capacity multiplexing circuit is hierarchially structured to achieve priority encoding. Circuit could be used for automatic patient monitoring systems and diagnostic test systems in automotive and communications industry.

B73-10157
AN INEXPENSIVE VEHICLE SPEED DETECTOR
P. H. Broussard
May 1973
M-FS-22601

Low-power minicomputer can plug into automobile cigarette lighter. It measures time it takes observed car to travel premeasured distance and provides immediate readout of speed. Potentially, detector could be manufactured for less than $200 per unit and would have very low maintenance cost.

B73-10159
INTEGRABLE POWER GYRATOR
E. Hochmair (NAS)
May 1973
M-FS-22342

Further study of Y-matrix and Z-matrix configuration has led to development of efficient, dependable high-quality gyrators. Efficiency of new gyrators may approach theoretical limit of 78.5% with further improvements. Both designs are comparatively easy to integrate by implementing technology used with conventional operational amplifiers.

B73-10161
GYRATOR CIRCUIT USING FIELD EFFECT TRANSISTORS
E. S. Hochmair (NAS)
May 1973
M-FS-21433

Gyrator circuit is especially useful in integrated circuits for such purposes as simulating inductors with capacitors. Circuit is adaptable to semifloating and full floating configurations. It has excellent response, low power consumption, and high energy storage capacity.

B73-10167
BIPOTENTIAL MONITORING WITH INEXPENSIVE OFFICE-TYPE CASSETTE RECORDERS
R. L. Wilbur (Southwest Res. Inst.)
Jun. 1973
M-FS-22566

Low-cost, modified cassette is part of system that accepts biomedical data for storage. System accepts wide range of data and is compactly packaged for portability. Standard office recorder with automatic level control, multiple inputs, radio, and battery operation may be used for recording stage.

B73-10169
REAL TIME OPTICAL FIGURE SENSOR
H. J. Robertson (Perkin-Elmer Corp.)
Jun. 1973
M-FS-22123

Mirrors produced for various optical systems require precise surface finishing. Sensor, developed for measuring mirror surface, is compensated for interferences from temperature and air disturbances and is capable of measuring mirrors with diameters of up to 2 meters.

B73-10170
PRE-EMPHASIS DETERMINATION FOR AN S-BAND CONSTANT BANDWIDTH FM/FM STATION
G. R. Wallace (Sperry Rand Corp.) and W. E. Salter (Sperry Rand Corp.)
May 1973
M-FS-22135

Telemetry bands are being reassigned to UHF at 1500 and 2200 MHz. Conversion primarily requires changes in equipment used in RF link, while many of same subcarrier oscillators, mixer amplifiers, and frequency discriminators can be used.

B73-10173
RECOVERY OF RECORDINGS FROM HEAT DAMAGED MAGNETIC TAPES
J. F. Melugin and D. E. OBrien, III
Jun. 1973
JSC-14219

Damaged tapes can now be repaired at home as long as damage does not extend to layer-to-layer adhesion within tape roll. Splice repaired section into good roll or cassette for copying. Every effort should be made to complete copying on first run, because fidelity in repaired section deteriorates with each repetition.

B73-10178
DETERMINING DISTANCE TO LIGHTNING STROKES FROM A SINGLE STATION
L. H. Ruhnke (NOAA)
Jun. 1973
KSC-10698

Electronic system can rapidly determine location of lightning strikes occurring within 30 km range. Longer distances are also determined, but with reduced accuracy. Studies have shown that lightning bolt emits electromagnetic wavefront; distance to lightning is determined from ratio of magnetic to electric field.

B73-10189
SIGNAL CONDITIONER TEST SET
W. H. Houck and J. D. Stiberg
Jun. 1973
KSC-10750

Compact, light-weight, solid-state test set can be used to check signal conditioning modules while they are installed in system. Test sets may also be used to cycle ground computer, if it is suspected of malfunctioning, rather than using signal conditioners.

B73-10191
JUNCTION RANGE FINDER
S. Morissette (Illinois Inst. of Tech.), R. G. Sea (Illinois Inst. of Tech.), and M. J. Frazier (Illinois Inst. of Tech.)
Jun. 1973
KSC-10108

Electronic system locates interferences in radar reception. System utilizes well known frequency-modulated continuous-wave technique to locate objects with nonlinear impedances. FM transmitter generates signal through bandpass filter which eliminates higher order harmonics around carrier frequency.

B73-10195
AUTOMATED OPERATION OF AN INSTRUMENTATION FM TAPE RECORDER
A. S. Asadourian and D. A. Perz
Nov. 1973
LEWIS-11941

Recorder did not possess erase head nor was it capable of automatically rewinding reel of tape for reuse. Test results show that FM carrier recording signal with sufficient intensity will by itself erase previously recorded data as new data are being recorded. Automatic rewinding was accomplished by adding conventional metal leaders and appropriate circuitry.

B73-10202
TETRAD BUBBLE DOMAIN CHIP ARRANGEMENT FOR MULTIPLEXING

G. S. Almasi (IBM)
Jun. 1973
M-FS-22296

Rotating magnetic field of bubble domain memory is used to obtain time-division multiplexing of bubble domain circuits into quadrants. Memory bits are assigned on bit-per-chip rather than bit-per-module basis; power is reduced by circulating only portion of bubbles at a time.

B73-10217
INTEGRATED P-CHANNEL MOS GYRATOR
E. Hochmair (NAS)
Aug. 1973
M-FS-22343

Several circuits can be integrated into one chip for applications which require more than one gyrator. They can also be integrated with other p-channel MOS circuits to eliminate need for external connections. Devices can operate at economical low-power levels, because they use FET amplifiers that do not degrade with decreases in supply.

B73-10223
HIGH-SENSITIVITY RECEIVER FOR CO2 LASER COMMUNICATIONS
B. Peyton (Cutler Hammer Corp.), A. Dinardo (Cutler Hammer Corp.) (Cutler Hammer Corp.), G. Kanischak, R. Lange (Cutler Hammer Corp.), and F. R. Arams (Cutler Hammer Corp.)
Aug. 1973
GSFC-11455

Wideband heterodyne receiver provides detection and demodulation of incident frequency modulated laser signal; search and acquisition circuitry to align two stations; tracking circuitry to maintain spatial alignment; and laser frequency monitor to frequency lock the transmit and local oscillator lasers.

B73-10225
IMPROVED DESIGN OF ELECTROPHORETIC EQUIPMENT FOR RAPID SICKLE-CELL-ANEMIA SCREENING
J. M. Reddick (Howard Univ.) and I. Hirsch (Howard Univ.)
Feb. 1974
GSFC-11794

Effective mass screening may be accomplished by modifying existing electrophoretic equipment in conjunction with multisample applicator used with cellulose-acetate-matrix test paper. Using this method, approximately 20 to 25 samples can undergo electrophoresis in 5 to 6 minutes.

B73-10226
A CLOSED, DIGITAL TELEPHONE SYSTEM
L. G. Monford, Jr.
Aug. 1973
JSC-13912

Digital system can accommodate sixteen or more telephone or data units and eight, simultaneous two-way conversations through only four interconnecting wires. It uses fewer circuit components, is not bulky or complex, and requires no central exchange control.

B73-10235
FLAMMABILITY CONTROL FOR ELECTRICAL CABLES AND CONNECTORS
W. O. Wick (McDonnell Douglas Corp.) and D. L. Buckey (McDonnell Douglas Corp.)
Aug. 1973
M-FS-21584

Technique of covering fire-hazardous sections of electrical wiring with fireproof materials prevents fires from spreading in oxygen-enriched atmospheres and eliminates use of heavy metal enclosures. Materials used to cover potting on connectors and ground terminals are made from Teflon-coated Beta cloth and Fluorel, a nonflammable fully-saturated polymer.

B73-10236
MICROMINIATURIZED, BIOPOTENTIAL CONDITIONING SYSTEM (MBCS)
N. Belasco, S. L. Pool, G. J. Cleveland (Lockheed Missiles & Space Co.), G. M. Loh (Lockheed Missiles & Space Co.), R. S. Luce (Lockheed Missiles & Space Co.), M. I. Lipanovich (Lockheed Missiles & Space Co.), H. L. Petersen (Lockheed Missiles & Space Co.), and D. W. Mangold (Boeing Co.)
Aug. 1973
JSC-14180

Multichannel, medical monitoring system allows almost complete freedom of movement for subject during monitoring periods. System comprises monitoring unit (biobelt), transmission line, and data acquisition unit. Belt, made of polybenzimidazole fabric, is wrapped around individual's waist and held in place by overlapping sections of Velcro closure material.

B73-10243
LASER SYSTEM DETECTS TOWER DEFLECTIONS
R. H. Fabik
Nov. 1973
LEWIS-11870

Continuously measure and record deflection of facility during testing. Facility deflections are then subtracted from shroud deflections during data reduction on computer. System is based on tracking light beam by using two-axis photo detector and feeding signals into X and Y servo system.

B73-10255
A MAGNETICALLY FOCUSED IMAGE TUBE EMPLOYING AN OPAQUE PHOTOCATHODE
C. B. Johnson (Bendix Corp.) and K. L. Hallam (Bendix Corp.)
Aug. 1973
GSFC-11602

Image converter has been developed which uses opaque photocathode for improved efficiency. Device is easier to fabricate than previous semi-transparent photocathode converters and uses compounds from Groups 3-5 that are responsive to wave-lengths between ultraviolet (approximately 100 nm) and near infrared region (approximately 1000 nm).

B73-10257
FAST RECHARGE CIRCUIT FOR Q-SWITCHED LASERS
R. L. Hansen (GTE Sylvania Inc.)
Aug. 1973
GSFC-11510

Cavity-dumped lasers employ electrooptic-effect cell to alternately block and release laser pulse. Cell requires high-speed switching circuit that can apply and remove high voltage. Solid-state circuit employs complementary transistor switches which can switch at rates greater than 5 kHz, eliminate warmup time, provide variable voltage wave-form, and allow polarity reversal.

B73-10261
ELECTROSHOCK PROTECTION CIRCUIT
H. Heskett (Martin Marietta Corp.), J. Meincer (Martin Marietta Corp.), and A. L. Inglis
Aug. 1973
JSC-14222

Circuit was developed to prevent accidental shock through electrodes used to test subjects as part of Skylab program. This circuit is placed between electrical apparatus and electrode that is attached to patient's body. Thus, patient is effectively protected from dangerous electrical shock that might be caused by failure in electrical apparatus.

B73-10267
LASER VELOCIMETER FOR SIMULTANEOUS TWO-DIMENSIONAL VELOCITY MEASUREMENTS
K. L. Orloff, G. R. Grant, and W. D. Gunter, Jr.
Jul. 1973
ARC-10637

Laser velocimeter provides simultaneous orthogonal measurements in manner which minimizes many problems attending prior systems, and allows spatial traversing of flowfield in order to obtain velocity profiles. Velocimeter permits rapid interrogation of unsteady flows where area of interest is of the order of one meter in extent and flow does not vary appreciably over time of about one second.

B73-10273
TWO-CARRIER COMMAND MODULATION SYSTEM
M. F. Easterling
Jun. 1973
NPO-11548

Two carriers transmit two high-power signals from single transmitter, each phase-modulated by subcarrier which, in turn, is modulated by data bits; switching between two carriers is alternated at high rate. Resulting composite signal is multiplied up to desired frequency and used to drive power amplifier which feeds transmitting antenna.

B73-10275
TIME-SYNCHRONIZED VLF PHASE-TRACKING RECEIVER
S. C. Ward
Jun. 1973
NPO-11600

Coded signals transmitted at very low frequencies by National Bureau of Standards via its radio facility WWVL contain both primary time and frequency information. Synchronization of local time with WWVL signal standard requires comparison of phase differences between transmitted signal and output of traveling atomic clock such as rubidium frequency standard.

B73-10277
IMAGE DATA RATE CONVERTER: A CONCEPT
F. C. Billingsley
Jun. 1973
NPO-11659

Establish data tracks on periphery of rotating drum and axially displace entire drum to place given track in alignment with either fixed or rotating read/record head. Accurate control of speed drum and rotating head can be accomplished by using separate synchronous motors driven by digitally-set oscillators to provide required difference in speed.

B73-10280
PRESSURIZED LIGHTING SYSTEM
G. A. Phlieger
Aug. 1973
KSC-10644

Safe lighting assembly has been constructed for hostile environments. Assembly is ventilated by inert gas to prolong life of lamps. Lighting assembly contains control box, number of lamps connected in parallel, several pilot lights, and ventilating circuit. Control box is provided with components for monitoring and controlling flow of ventilating gas through lamp assemblies.

B73-10281
HIGH SPEED DIRECT-BINARY TO BINARY-CODED-DECIMAL CONVERTER AND SCALER
P. C. Toole
Aug. 1973
KSC-10326

Telemetry (pulse code modulated) digital system usually sends binary numbers representing some parameter that is not value of binary number. Received binary number must be scaled and converted to binary coded decimal to operate readout device to display true value. Group of adders speed up binary number conversion and scaling in one operation.

B73-10282
COSMIC DUST OR OTHER SIMILAR OUTER-SPACE PARTICLES LOCATION DETECTOR
S. Aver
Aug. 1973
GSFC-11291

Cosmic dust may be serious radiation hazard to man and electronic equipment caught in its path. Dust detector uses two operational amplifiers and offers narrower areas for collection of cosmic dust. Detector provides excellent resolution as result of which recording of particle velocities as well as positions of their impact are more accurately determined.

B73-10285
DIGITAL TV IMAGE ENHANCEMENT SYSTEM
G. A. Biernson (GTE Sylvania)
Aug. 1973
GSFC-11256

Efficient, digital image-enhancement process has been developed for high-resolution slow-scan TV images. Scan converter is no longer subject to registration errors, which become more serious as resolution increases. To implement feedback image enhancement system, digital processing is used; otherwise there is excessive loss of image information, particularly in video delay lines.

B73-10288
CIRCULARLY-POLARIZED MULTIBAND TELEMETRY TRACKING ANTENNA
K. E. Woo
Jul. 1973
NPO-11264

Utilize coaxial horn feed to illuminate reflector; feed has inner horn for X-band, and outer horn for S-band. Tracking error signals for servo correction are derived from measurements of relative phase and relative amplitude between two modes.

B73-10289
DATA MULTIPLEXER USING A TREE SWITCH
R. A. Easton and E. E. Hilbert
Jul. 1973 See also B73-10290
NPO-11333

Self-decoding FET-hybrid or integrated-circuit tree configuration uses minimum number of components and can be sequenced by clock or computer. Redundancy features can readily be incorporated into tree configuration; as tree grows in size and more sensors are included, percentage of parts that will affect given percentage of sensors steadily decreases.

B73-10290
FLEXIBLE FORMAT, COMPUTER ACCESSED TELEMETRY SYSTEM
R. A. Easton and E. E. Hilbert
Jul. 1973 See also B73-10289
NPO-11358

With this system, it is possible to sample and generate two or more simultaneous formats; one can be transmitted to ground station in real time, and other is stored for later transmission. Sensor output comparison data, plus information to control format, compression algorithm, and allowable degree of sensor activity, are stored in memory.

B73-10291
HIGH-GAIN ANTENNA WITH SINGLY-CURVED REFLECTOR
A. C. Ludwig
Jul. 1973
NPO-11361

Reflector collects energy over large region of space and focuses it toward small region where antenna feed is located. When incident energy is in form of plane wave, logical choice for shape of reflecting surface is paraboloid which converts plane wave into spherical wave that converges at a point.

B73-10293
IMPROVED MASERS FOR X-BAND AND Ku BAND
R. C. Clauss and R. B. Quinn
Jul. 1973
NPO-11437

Slow-wave structure of traveling-wave maser utilizes comb system which is comprised of ruby on one side and alumina on other; alumina also supports isolator material. Radiation at pump frequency is coupled to ruby through shaped alumina strips. Contact between ruby bars and comb completes conductance path for heat transfer.

B73-10294
NUMERICAL INTERACTIVE CONTROLLER
S. S. Brokl and A. I. Zygielbaum
Jul. 1973 See also B73-10132
NPO-11497

Device allows interaction of operator with data in computer central processor in order to shift frame of data in Cartesian coordinates and slew desired data into view. "Cursor generator

program," in conjunction with device, provides light pen with sufficient resolving power to identify any particular set of coordinates with single-cell accuracy.

B73-10297
DIGITAL SERVO CONTROL OF RANDOM SOUND FIELDS
R. B. Nakich (Time Zero Corp.)
Jul. 1973 See also B73-10139
NPO-11623

It is necessary to place number of sensors at different positions in sound field to determine actual sound intensities to which test object is subjected. It is possible to determine whether specification is being met adequately or exceeded. Since excitation is of random nature, signals are essentially coherent and it is impossible to obtain true average.

B73-10299
MULTIPLE-REFLECTION CONICAL MICROWAVE ANTENNA
R. E. Oliver
Jul. 1973 See also B73-10291
NPO-11661

Conical-Gregorian antenna concept, using conical reflector, promises excellent rf performance and offers potential advantages in areas of mechanical and structural design, surface measurement, and in furlability. Multiple reflection scheme between one or more subreflectors and main reflector is utilized. Subreflector can be reduced to as little as 0.1 the diameter of main reflector.

B73-10305
DYNAMIC POWER LOAD SIMULATOR
K. P. Joncas (Avco Corp.), S. Birnbach (Avco Corp.), and M. Lambert, III (Avco Corp.)
Aug. 1973 See also NASA-CR-115760
JSC-14285; JSC-14286

Two independent models simulate dynamic and steady-state responses of electrical and electronic equipment under power load. One is resistance/capacitance/inductance network, and the other is variable resistance analog device. Resistance, inductance, and/or capacitance are selected by iterative process; time-domain response is compared with that of real equipment to select optimal values.

B73-10306
RF TO DIGITAL CONVERTER
T. E. Flanders (GE) and G. Kosa (GE)
Sep. 1973
JSC-14419

Converter can be used for automatic spectrum analysis. Automatic gain amplifier digitizes RF amplitude, and amplifier gain is measured by binary counter. Amount of gain corresponds to signal level and is proportional to count in counter. System can be used to calculate AM and FM modulation index and other parameters of pulse-modulated FM waves.

B73-10308
INEXPENSIVE PROGRAMMABLE COMPUTER CLOCK
J. E. Vrancik
Dec. 1973 See also NASA-TM-X-2500
LEWIS-11797

Clock's computer interface accepts pulses from computer (computer commands) and translates them into control signals for clock, and vice versa. Clock is preset by computer to a fixed number of time pulses, and then started. After fixed number of time pulses has occured, clock reads pulse (via interface) to computer and stops.

B73-10313
EXTENDED RANGE HARMONIC FILTER
H. Jankowski (GE), A. J. Geia (GE), and C. C. Allen (GE)
Dec. 1973 See also NASA-CR-120927
LEWIS-12064

Two types of filters, leaky-wall and open-guide, are combined into single component. Combination gives 10 db or greater additional attenuation to fourth and higher harmonics, at expense of increasing loss of fundamental frequency by perhaps 0.05 to 0.08 db. Filter is applicable to all high power microwave transmitters, but is especially desirable for satellite transmitters.

B73-10317
PEAK-HOLDING CIRCUIT FOR EXTREMELY NARROW PULSES
R. W. ONeill (Lockheed Aircraft Corp.)
Sep. 1973
JSC-14129

Circuit was developed which can stretch pulses in 50- to 3200-ns range to make them acceptable for pulse-height analyzers. Circuit uses high-speed wide-band amplifier, does not need excessive frequency compensation, and can handle pulses one-tenth of width normally required by pulse analyzers.

B73-10318
SCANNING BEACON LOCATOR SYSTEM: A CONCEPT
P. W. Shores
Sep. 1973
JSC-12593

If aircraft and ships are equipped with beacons capable of communicating with satellites, rescue efforts may speed up significantly. In event of disaster, beacons can transmit distress message to satellite which, in turn, will relay message to nearest rescue center, indicating distress location.

B73-10321
ELECTRO-OPTICAL DEVICE FOR MONITORING WIRE SIZE
E. E. Burcher and W. L. Kelly, IV
Oct. 1973
LANGLEY-11358

Device recognizes variations in wire size and is being used during computer memory-plane fabrication. Decrease in wire diameter, due to stretching, permits removal of wire from memory-plant mold. Monitoring provides means of detecting imperfect wire and permits fabrication of computer memory plane to be stopped prior to its insertion into mold.

B73-10323
SYNCHRONOUS TEN-MEGABIT BIPHASE DETECTOR
L. Balliet (IBM)
Oct. 1973
M-FS-22546

Synchronous phase-lock-loop detector accepts distorted input and generates jitter-free clock. Data-detection circuitry takes advantage of this clock and employs integrate-and-dump decision circuit to provide near-theoretically ideal data decoding.

B73-10327
LASER SCANNER FOR TESTING SEMICONDUCTOR CHIPS
T. C. Hall (Hughes Aircraft Co.)
Oct. 1973
M-FS-22693

Individual "fingerprint" signals are produced when system photoexcites chips. "Fingerprints" are analyzed for characteristics associated with defects, including many not visible to the naked eye. Electromagnetic radiation photogenerates free electrons and holes in semiconductor chip. These carriers produce electrical signals at terminals. Signals vary depending on what defects are present.

B73-10331
ISOLATED OUTPUT FOR CLASS-D dc AMPLIFIERS
M. A. Honnel (Auburn Univ.) and J. K. Newell (Auburn Univ.)
Sep. 1973
M-FS-21616

Transformer-coupled output stage is used with pulse-width modulated class-D dc amplifiers. Circuit is comprised of two channels corresponding to negative and positive input signals. Amplitude of secondary-current triangular pulse is function of duration of driving pulse. Therefore, circuit converts pulse-width modulated driving signal to pulse-amplitude modulated signal.

B73-10334
ACTIVE TUNING CIRCUIT
L. L. Kleinberg
Oct. 1973
GSFC-11340

Low-cost, inductorless, high Q active-tuning circuit can be made by coupling pair of transistors and their supporting circuitry

to take advantage of frequency dependent energy storage effects. Circuit may be manufactured by standard micro-electronic techniques; has very low noise factor; and input-output matching networks are not necessary.

B73-10337
DIGITAL SERVO CONTROLLER BEHAVES LIKE SYNCHRO
F. Byrne
Oct. 1973
KSC-10769

Encoder has been used for years to measure accurately positional parameters of controlled devices with very high accuracy and reliability. Digital control system has been designed using digital shaft angle encoders.

B73-10342
SINGLE-CHANNEL DIGITAL COMMAND-DETECTION SYSTEM
C. C. Carl, L. A. Couvillon, R. M. Goldstein, E. C. Posner, and R. R. Green
Aug. 1973
NPO-11302

System, fabricated of highly-reliable digital logic elements, operates on binary pulse-code-modulated signals and derives internal synchronization from data signal. All-digital implementation of detector develops synchronization from data signal by computer cross-correlation of command modulation signal with its expected forms in sequence and adjusts detector phases in accordance with correlation peaks.

B73-10343
AUTOMATIC CARRIER ACQUISITION SYSTEM FOR PHASE-LOCK-LOOP RECEIVERS
R. C. Bunce
Aug. 1973
NPO-11628

Programmable oscillator and zero-beat detector acquires phase-lock of carrier by frequency scanning. Generation of high-level dc pulse at instant of zero crossing provides positive trigger for decision gate to stop search and close loop for phase-coherent tracking.

B73-10345
IMPROVED NOISE-ADDING RADIOMETER FOR MICROWAVE RECEIVERS
P. D. Batelaan, C. T. Stelzried, and R. M. Goldstein
Aug. 1973
NPO-11706

Use of input switch and noise reference standard is avoided by using noise-adding technique. Excess noise from solid state noise-diode is coupled into receiver through directional coupler and square-wave modulated at low rate. High sensitivity receivers for radioastronomy applications are utilized with greater confidence in stability of radiometer.

B73-10352
SAFETY MONITORING SYSTEM FOR RADIOISOTOPE THERMOELECTRIC GENERATORS
A. Zoltan
Aug. 1973
NPO-13285

System alerts personnel of hazards which may develop while they are performing tests on radioisotope thermoelectric generator (RTG). Remedial action is initiated to minimize damage. Five operating conditions are monitored: hot junction temperature, cold junction temperature, thermal shroud coolant flow, vacuum in test chamber, and alpha radiation.

B73-10353
LASER ENERGY CONVERTED INTO ELECTRIC POWER
K. Shimada
Aug. 1973
NPO-13308

Apparatus verifies concepts of converting laser energy directly into electric energy. Mirror, placed in beam and inclined at angle to it, directs small amount of incident radiation to monitor which establishes precise power levels and other beam characteristics. Second mirror and condensing lens direct bulk of laser energy into laser plasmadynamic converter.

B73-10354
PROCESSOR FOR HIGH-DENSITY DIGITAL TAPE-RECORDED SIGNALS
J. C. Ashlock
Aug. 1973
NPO-11399

Linear filter and detection theory can bear on problem of reconstructing recorded bit stream. Problem can be taken from realm of nonlinear problems even though basic record process is still recognized as highly nonlinear. Digital tape recorder can be modeled as particular type of linear communication channel with intersymbol interference.

B73-10355
DIGITAL SLOPE-THRESHOLD DATA COMPRESSOR
T. O. Anderson
Aug. 1973
NPO-11630

Slope-threshold compression scheme for telemetered video data is efficient, and its principle of operation is as follows: when slope of raw data exceeds threshold decision reference, previous sample is transmitted. All-digital design is more economical than analog system. It exhibits well-defined accuracy, provides unlimited storage time, and is convenient and reliable.

B73-10361
AUTOMATIC FOCUS CONTROL FOR FACSIMILE CAMERA
A. R. Sinclair, S. J. Katzberg, and E. E. Burcher
Oct. 1973
LANGLEY-11213

Focus control performs function of automatically focusing facsimile camera throughout object field being scanned. It does this by determining and adjusting focus of imaging sensor accordingly. Since facsimile camera images a scene by scanning discrete strips, it is possible to have entire three-dimensional scene in perfect focus at point of imaging by use of focus control.

B73-10365
PULSE STRETCHER FOR NARROW PULSES
R. S. Lindsey, Jr. (Lockheed Electronics Co.)
Oct. 1973
JSC-14130

Pulse stretching circuit can linearly stretch pulses as narrow as 50 nanoseconds and block incoming pulses following accepted input pulse until processing has been completed. It also removes baseline distortion by being completely direct coupled and provides monitor output which measures true number of input events that exceed predetermined threshold.

B73-10367
PROGRAMMABLE RANDOM INTERVAL GENERATOR
R. S. Lindsey, Jr. (Lockheed Electronics Co.)
Oct. 1973
JSC-14131

Random pulse generator can supply constant-amplitude randomly distributed pulses with average rate ranging from a few counts per second to more than one million counts per second. Generator requires no high-voltage power supply or any special thermal cooling apparatus. Device is uniquely versatile and provides wide dynamic range of operation.

B73-10370
ALPHANUMERIC CHARACTER GENERATOR FOR OSCILLOSCOPE
D. C. Lockerson and R. E. Boston
Oct. 1973
GSFC-11582

Compact portable alphanumeric display device can be used with any general-purpose externally-triggered oscilloscope without need for Z-axis modulation. Factors limiting size of display are: output line capacitance, read-only memory speed, and persistence of cathode-ray-tube.

B73-10382
DATA COMPRESSION BY A DECREASING SLOPE-THRESHOLD TEST
L. Kleinrock
Sep. 1973
NPO-10769

Resolution can be obtained at large compression ratios with method for selecting data points for transmission by telemetry in television compressed-data system. Test slope of raw data stream and compare it to symmetric pair of decreasing thresholds. When either threshold is exceeded, data are sampled and transmitted; thresholds are reset, and test begins again.

B73-10389
METER CIRCUIT FOR TUNING RF AMPLIFIERS
J. E. Longthorne
Sep. 1973
NPO-11865

Circuit computes and indicates efficiency of RF amplifier as inputs and other parameters are varied. Voltage drop across internal resistance of ammeter is amplified by operational amplifier and applied to one multiplier input. Other input is obtained through two resistors from positive terminal of power supply.

B73-10392
ANKYLOSIS-STABILIZED OSCILLATOR
L. L. Kleinberg
Oct. 1973
GSFC-11513

One feature of this mechanism is reduction of self-modulation, a source of harmonic generation. Since amplitude of oscillation is large, cutoff frequency is varied in proportion to the amplitude and frequency of oscillation. While one transistor is experiencing a positive alteration, the other is experiencing a negative alteration. Net effect is reduction in self-modulation.

B73-10401
VECTORCARDIOGRAM
M. Costello (Martin Marietta Corp.)
Nov. 1973
JSC-14427

System measures electrocardiographic potentials to produce precise quantitative measurement of changes that occur in individual's cardiac function. System is rugged, built to sustain extremes of temperature, pressure, humidity, shock, and vibration. It can also be used in pure oxygen environment without danger of combustion.

B73-10408
LOGIC CONTROLLED SOLID STATE SWITCHGEAR
E. Buchanan (Martin Marietta Corp.) and D. Waddington
Dec. 1973 See also NASA-CR-121140
LEWIS-12044

Logic controlled solid state circuit breakers and power transfer switches have been designed and built to demonstrate their use for 270 V dc power systems. This switchgear provides remote operation, automatic current level, and operates several orders of magnitude faster with much greater accuracy of response than conventional switchgear.

B73-10410
COMBINED DIPLEXER AND HARMONIC FILTER
C. C. Allen (GE)
Dec. 1973 See also NASA-CR-120927
LEWIS-12059

By using two directional filters having circular waveguide filter cavities, diplexing and harmonic filtering functions can be combined into a more compact integrated waveguide assembly. Device is filter which passes power within its pass band limits, but also has a directional characteristic so power transmitted into two-port output waveguide will travel in only one direction.

B73-10411
LOW-COST CLEARANCE INDICATOR FOR HIGH SPEED TURBOMACHINERY
R. C. Evans, D. J. Lesco, A. B. McLachlan, and F. A. Dellatorre
Dec. 1973
LEWIS-12128

System consists of hermetically sealed capacitance probe, compact electronic driver, power supply, and oscilloscope and/or voltmeter for readout. System requires no mechanical connection to the rotating parts of turbomachinery, and does not disrupt rotor mainstream flow pattern. It can be effectively used in other applications to measure dynamic clearances between moving and stationary parts.

B73-10425
FLARED-CONE TURNSTILE ANTENNA
T. G. Gavrillis (Martin Marietta Corp.) and D. J. Bottoms (Martin Marietta Corp.)
Dec. 1973
LANGLEY-10970

Antenna could be used in any application where increased ultrahigh frequency beamwidth is desired. Possible applications include aircraft, communication links, ground omniranges, and satellites. It is also possible that antenna could be adapted for use in television transmission and receiving.

B73-10426
RF ANTENNA-PATTERN VISUAL AIDS FOR FIELD USE
J. H. Williams
Dec. 1973
KSC-10821

Series of plots must be made of antenna pattern on polar-coordinate sheet depicting vertical planes. Separate sheets are plotted depicting antenna patterns in vertical plane at azimuth positions. After all polar plots are drawn, they are labeled according to their azimuthal positions. Transparencies are then stiffened with regular wire, cardboard, or molded plastic.

B73-10431
TELEVISION NOISE-REDUCTION DEVICE
J. C. Stamps and B. L. Gordon (Taft Broadcasting Corp.)
Dec. 1973
JSC-12607

System greatly improves signal-to-noise ratio with little or no loss in picture resolution. By storage of luminance component, which is summed with chrominance component, system performs mathematical integration of basically-repetitive television signals. Integration of signals over interval of their repetition causes little change in original signals and eliminates random noise.

B73-10449
DATA-MATCHED FILTER
N. R. Scheinberg (RCA) and D. Hampel (RCA)
Feb. 1974
JSC-14264

After amplification and normalization, incoming data bits are fed, alternately, to pair of integrators. While one integrator is operating, content of other is on hold, sample, and dump. Clock derived in bit-timing extractor times and controls integrators. Frequency of clock is one-half data rate.

B73-10451
HIGH-POWER MICROSTRIP SWITCH
S. D. Choi
Mar. 1974
NPO-11965

Switch, which uses only two p-i-n diodes on microstrip substrate, has been developed for application in spacecraft radio systems. Switch features improved power drain, weight, volume, magnetic cleanliness, and reliability, over currently-used circulator and electromechanical switches.

B73-10452
MEANS FOR MAPPING RADIATED FIELDS AND FOR MEASURING DIFFERENTIAL MOVEMENT OF ANTENNA ELEMENTS
C. C. Lundy
Jan. 1974
NPO-13053

Null seeking system uses two transponders located at selected points on dish to detect phase-front of received signal. One

signal line has continuously variable phase shifter driven by reversible stepmotor. Each of two transponders on dish is a dipole with mixer crystal between elements. Crystal is driven, in turn, by 181.6MHz signal carried by miniature coaxial cable.

B73-10454
PROBES FOR MEASURING NOISE CURRENT IN AN ELECTRONIC CABLE
C. C. Lundy
Feb. 1974
NPO-13123

Electromagnetic interference in deep-space network receiver is often caused by stray coupling from power lines. These stray signals create potential differences between ground terminals, which leads to excessive noise in receiver circuits. Pair of probes detect and measure noise currents in conductors.

B73-10460
COMBINED SUN-ACQUISITION AND SUN GATE-SENSOR SYSTEM FOR SPACECRAFT ATTITUDE CONTROL
L. F. Schmidt
Jan. 1974
NPO-13051

Arrangement combines acquisition and gate functions and reduces sensitivity so that attitude control is effective regardless of changes in solar intensity. There are five photoconductive detectors all electrically interconnected. Detectors are so positioned that, regardless of spacecraft orientation at any instant of interest, at least one detector is illuminated.

B73-10467
VERSATILE, ANALOG-TO-DIGITAL, POWER-REGULATOR CONTROLLER
W. T. McLyman
Mar. 1974
NPO-13178

Power controller uses digital techniques to vary duty ratio of switching-type power regulators. Duty ratio is adjusted by comparing error signal with ramp voltage signal. As compared to previously-used switching regulators, controller uses fewer components and no magnetics and is readily adaptable to thick-film technology.

B73-10479
INPUT-OUTPUT, EXPANDABLE-PARITY NETWORK
J. F. McKevitt, III (Hughes Aircraft Co.)
Mar. 1974
HQ-10728

Large-scale integrated circuit generates and checks parity of four eight-bit registers. In addition, circuit will indicate by output signal whether parity error exists. Circuit can also generate or check parity of words up to 32 bits. This is done by making appropriate internal wiring connections on the large-scale integrated chip.

B73-10480
PSEUDOTACHOMETER FOR MOBILE METABOLIC ANALYZER
J. R. Currie
Mar. 1974
M-FS-22909

Metabolic analyzer determines a patient's walking or ambulation speed and simultaneously measures his metabolic parameters. Analyzer is designed to move at some preselected human ambulation speed. During test, patient is connected to system and follows analyzer closely while his metabolic data is being monitored.

B73-10486
RECHARGEABLE, SILVER-ZINC BATTERY CONDITIONER/MONITOR UNIT AND STATE-OF-CHARGE INDICATOR
C. E. Thomas (Chrysler Corp.)
Mar. 1974
M-FS-22835

Unit automatically charges batteries to desired state-of-charge levels, monitors functional battery parameter data both on meters and printer, and automatically activates alarm in event of battery malfunctions. Unit consists of state-of-charge indicator panel, control panel, monitor panel, power panel, charging-current power supply, and load panel.

B73-10487
BINARY-SELECTABLE DETECTOR HOLDOFF CIRCUIT
K. A. Kadrmas
Mar. 1974
M-FS-22898

High-speed switching circuit protects detectors from sudden, extremely-intense backscattered radiation that results from short-range atmospheric dust layers, or low-level clouds, entering laser/radar field of view. Function of circuit is to provide computer-controlled switching of photodiode detector, preamplifier power-supply voltages, in approximately 10 nanoseconds.

B73-10491
SUBMINIATURE MICROPOWER DIGITAL RECORDER
R. M. Goodman (The Franklin Inst. Res. Labs.) and R. W. Pitman (The Franklin Inst. Res. Labs.)
Dec. 1973
ARC-10746

High-density digital data, collected periodically or randomly from multiplicity of sensors, are recorded by subminiature recorder. Magnetic recording head is energized with suitable pulsatile signals to reverse polarization on magnetically-sensitive tape while tape is immobilized at recording head. Prior to next recording, set tape so new area of tape is at recording head.

B73-10499
STEREOSCOPIC TELEVISION SYSTEM
J. L. Jones
Dec. 1973
ARC-10160

In this system, both left and right optical images pass through same set of optical lenses and same TV transmission and receiving systems. Transmitted stereo images are of high quality because differences in image tone and gray scales, disparities in relative focusing and magnification, and nonsimilar distortions produced by electrical and optical imperfections are minimized.

B73-10500
IMPROVED 135.6-MHz ANTENNA
E. H. Gross
Dec. 1973
ARC-10743

Commercially available four-element array can be readily modified to receive 135.6-MHz signals. Directibility of each of the four elements is improved by lengthening them, repositioning feed elements, and changing total element-to-element spacing in both planes.

B73-10506
TRUE AIRSPEED MEASURED BY AIRBORNE LASER DOPPLER VELOCIMETER
R. Munoz, H. W. Mocker (Honeywell Inc.), and L. E. Koehler (Honeywell Inc.)
Dec. 1973
ARC-10763

Velocimeter utilizing carbon dioxide laser measures true airspeed of aircraft. Results of flight tests indicate that clear-weather airspeeds can be measured with accuracy better than 0.1% at altitudes up to 3000 meters; measurements can be made at much greater altitudes in cloudy or turbid air.

B73-10510
AUTOMATIC PCM GUARD-BAND SELECTOR AND CALIBRATOR
T. T. Noda (New Mexico State Univ.)
Mar. 1974
KSC-10812

Automatic method for selection of proper guard band eliminates human error and speeds up calibration process. There is also an option which allows a single channel to be calibrated, independently of other channels. Entire system is designed on

3- by 4-inch printed-circuit cards and may be used with any pulse code modulation system.

B73-10511
DIGITAL TRANSMITTER FOR DATA BUS COMMUNICATIONS SYSTEM
G. E. Proch (Lockheed Electronics Co.)
Mar. 1974
JSC-14558

Digital transmitter designed for Manchester coded signals (and all signals with ac waveforms) generated at a rate of one megabit per second includes efficient output isolation circuit. Transmitter consists of logic control section, amplifier, and output isolation section. Output isolation circuit provides dynamic impedance at terminals as function of amplifier output level.

B73-10513
ISOLATED TRANSFER OF ANALOG SIGNALS
T. Bezdek (Martin Marietta Corp.)
Mar. 1974
LANGLEY-11312

Technique transfers analog signal levels across high isolation boundary without circuit performance being affected by magnetizing reactance or leakage inductance. Transfers of analog information across isolated boundary are made by interrupting signal flow, with switch, in such a manner as to produce alternating signal which is applied to transformer.

B73-10514
EYE-CONTROLLED "TELETYPEWRITER"
J. D. Holt, L. D. Leavitt, and H. D. Bowen (LTV Aerospace Corp.)
Mar. 1974
LANGLEY-11564

Oculometer provides dynamic measurement of subject's look direction, and its outputs can be used to generate visual display of his look pattern and/or to cause equipment operation associated with his lookpoint at given times. Measured eye-direction information could be used as control input at man/machine interface.

B73-10525
VARIABLE-FREQUENCY INVERTER CONTROLS TORQUE, SPEED, AND BRAKING IN ac INDUCTION MOTORS
F. J. Nola
Mar. 1974
M-FS-22088

Dc to ac inverter provides optimum frequency and voltage to ac induction motor, in response to different motor-load and speed requirements. Inverter varies slip frequency of motor in proportion to required torque. Inverter protects motor from high current surges, controls negative slip to apply braking, and returns energy stored in momentum of load to dc power source.

B74-10004
SELF-HEALING FUSE
N. D. Jones (GE), R. E. Kinsinger (GE), and L. P. Harris (GE)
Mar. 1974 See also NASA-CR-121244
LEWIS-11964

Fast-acting current limiting device provides current overload protection for vulnerable circuit elements and then re-establishes conduction path within milliseconds. Fuse can also perform as fast-acting switch to clear transient circuit overloads. Fuse takes advantage of large increase in electrical resistivity that occurs when liquid metal vaporizes.

B74-10021
DATA PROCESSOR WITH CONDITIONALLY SUPPLIED CLOCK SIGNALS
R. J. Lesniewski
Apr. 1974
GSFC-10975

Parallel data processor clock pulses are conditionally supplied to processing unit in response to relative values of binary bit of control source and binary bit derived on single lead. Use of single lead simplifies fabrication of large-scale integrated networks.

B74-10024
TRAFFIC CONTROL SYSTEM AND METHOD
C. R. Laughlin, R. C. Hollenbaugh, and W. K. Allen
Apr. 1974
GSFC-10087

Frequency of carrier received by aircraft is measured and compared with reference to indicate magnitude of Doppler shift. One Doppler frequency range is selected and indicated by digital signal. Difference between frequency is offset of apparent carrier frequency transmitted by aircraft.

B74-10025
LOW-DISTORTION RECEIVER FOR BILEVEL, BASEBAND PCM WAVEFORMS
G. E. Proch (Lockheed Electron. Co.)
Apr. 1974
MSC-14557

Digital receiver improves discrimination between information signals and noise and provides order to magnitude reduction in systematic distortion. Receiver combines advantages of band-limiting prefilter and high-amplitude thresholds to provide asynchronous discrimination between information signals and spurious signals.

B74-10035
HIGH Q BAND-PASS RESONATORS UTILIZING COMPOSITE BAND-STOP RESONATOR PAIRS
H. C. Okean (AIL Div., Cutler-Hammer Corp.)
Jul. 1974
GSFC-10990

Resonator pairs are formed of composite series- or parallel-connected transmission-line elements, which are exclusively quarter-wavelength half-wave-length lines. Resonator elements are constructed with microstriplines in parallel planes separated by dielectric. Striplines of coaxial transmission lines can be used in construction also.

B74-10041
VARIABLE-BEAMWIDTH ANTENNAS
R. F. Schmidt
Jul. 1974
GSFC-11760

Two effective designs have been developed for Cassegrain and Gregorian antenna configurations. Each provides for both high-gain and low-gain operations. Cassegrain system sacrifices some efficiency due to small amount of increased spillover loss. Gregorian system provides for independent spillover control with two feeds.

B74-10050
HIGH-DIRECTIVITY ACOUSTIC ANTENNA
H. M. A. EL-Sum (EL-Sum Consultants)
May 1974 See also NASA-CR-114636
ARC-10789

Acoustic antenna with unique electronic steering control is used to identify and define aerodynamic noise sources in free field, particularly in wind tunnel which is quite reverberant. Provision is made for high directivity as well as improved discrimination against unwanted background noise such as reverberation or echoes.

B74-10078
FAIL-SAFE FIRE DETECTION SYSTEM
E. T. Bloam
Aug. 1974
LEWIS-12238

Fire detection control system continually monitors its own integrity, automatically signals any malfunction, and separately signals fire in any zone being monitored. Should be of interest in fields of chemical and petroleum processing, power generation, equipment testing, and building protection.

B74-10083
ELECTRONIC HIGH PASS FILTER
V. S. Peterson and I. G. Hansen
Aug. 1974
LEWIS-11600

Ultra accurate filter is used with static type pressure transducers where it is desirable to extract low frequency dynamic signals from combined static and dynamic signal. System can be calibrated at any time with dc voltages.

B74-10086
A LOW COST "AIR MASS 2" SOLAR SIMULATOR
K. Yass, H. B. Curtis, and P. Harlamert, Jr.
Sep. 1974 See also NASA-TM-X-3059
LEWIS-12266

Tungsten halogen projection lamps have integral ellipsoidal reflector, and hexagonal shaped plastic Fresnel lenses. Reflector is dichroic coated to reduce infrared content of reflected radiation. Array of lamps and lenses produces uniform collimated beam having near AM2 spectrum and intensity that can be used for testing flat plate solar collectors.

B74-10088
TIME-CONTROL SYSTEM FOR COMMUNICATION BETWEEN DATA-COLLECTION AND ORBITING
C. W. Kurvin (Radiation, Inc.)
Aug. 1974
GSFC-11182

Platform design includes timers which limit data transmission to times when satellites are within radio communication range. As result of reduced power requirement, data-collection platforms now can be equipped with significantly lighter battery packages.

B74-10093
GENERALIZED CURRENT DISTRIBUTION RULE
M. A. Tapia (Ga. Inst. of Tech.)
Aug. 1974
LANGLEY-11565

Method helps determine branch current in parallel-series network in relation to total input current by inspection. Method is particularly useful for circuits with many elements when branch elements are described as admittances. If element values are variables, then these values may be expressed as admittances to find currents readily in desired branches.

B74-10097
POCKET-SIZE MICROWAVE RADIATION HAZARD DETECTOR
R. B. Kolbly
Aug. 1974
NPO-11461

Inexpensive lightweight unit is easily carried in coat pocket or attached to belt, detector sounds alarm in presence of dangerous microwave radiation levels. Unit consists of antenna, detector, level sensor, keyed oscillator, and speaker. Antenna may be single equiangular spiral or set of orthogonal slot dipoles. Signal detector is simple diode in small package.

B74-10098
FREQUENCY DISCRIMINATOR/PHASE DETECTOR
R. B. Crow
Aug. 1974
NPO-11515

Circuit provides dual function of frequency discriminator/phase detector which reduces frequency acquisition time without adding to circuit complexity. Both frequency discriminators, in evaluated frequency discriminator/phase detector circuits, are effective two decades above and below center frequency.

B74-10099
FACILITY FOR TESTING SOLAR CELLS
R. K. Yasui
Aug. 1974
NPO-11761

Primary components of facility are test chamber and external solar simulator. Voltage--current performance characteristics of solar cells at various combinations of temperature and light intensity are plotted on X-Y recorder. Data are fed into computer for calculation of maximum power, curve shape factor, cell efficiency, and averages of each parameter.

B74-10104
THIRD-ORDER PHASE-LOCKED LOOP RECEIVER
R. B. Crow and R. C. Tausworthe
Aug. 1974
NPO-11941

Third-order extension to present second-order systems extends their Doppler tracking capabilities. It widens receiver pull-in range, decreases pull-in time, lowers voltage-controlled oscillator (VCO) noise (determining when no signal is present), and lessens susceptibility to VCO drift.

B74-10106
TEMPERATURE COMPENSATION OF DIGITAL INERTIAL SENSORS
P. J. Hand
Aug. 1974
NPO-13044

Heaters for thermal stabilization are unnecessary when analog dc voltage provided by gyroscope temperature sensor is used to change outputs to compensate for temperature variations. Sensor is normally installed on all precision gryoscopes.

B74-10109
FAST SIGNAL AVERAGER
T. N. Cornsweet (Stanford Res. Inst.)
Aug. 1974
ARC-10090

Electron beam of cathode ray tube with fast phosphor is intensity-modulated by input signal to produce repetitive horizontal trace of luminous intensity proportional to time-varying signal strength. Horizontal trace of cathode ray tube occurs so repetitive portion of signal of interest is encompassed within its length.

B74-10115
ANALYSIS OF ORBITAL HEAT TRANSFER
T. Buna (Martin Marietta Corp.)
Aug. 1974
ARC-10842

Radar mapping of planets can be accomplished at lower cost and with reduced emphasis on propulsion system capability from spacecraft operating in elliptical orbit than from circular orbit.

B74-10137
ANTI-MULTIPATH DIGITAL SIGNAL DETECTOR
J. H. Painter
Sep. 1974
LANGLEY-11379

Detector operates in conjunction with radio frequency portion of receiver to detect digital signals transmitted in known modulation formats. Signal is constructed by assigning known and distinct modulation waveforms to sequence of message symbols. It reconstructs transmitted digital sequence with minimum probability that any reconstructed digit will be in error.

B74-10142
MAGNETOMETER WITH MINIATURE TRANSDUCER AND AUTOMATIC TRANSDUCER SCANNING APPARATUS
R. A. Breckenridge, W. J. Debnam, Jr., C. L. Fales, and A. V. Pohm (Iowa State Univ.)
Sep. 1974
LANGLEY-11617

Magnetometer is simple to operate and has fast response. Transducer is rugged and flat and can measure magnetic fields as close as 0.08 mm from any relatively flat surface. Magnetometer has active region of approximately 0.64 by 0.76 mm and is capable of good spatial resolution of magnetic fields as low as 0.02 Oe (1.6 A/m).

B74-10147
ERROR-CORRECTING CODES FOR HIGH-SPEED DIGITAL COMPUTERS
R. D. Campbell (Sperry Rand Corp.)
Sep. 1974
M-FS-22887

Published document discusses method for correcting errors. According to this method, computer operation becomes fault-tolerant, i.e., its operation is error-free in spite of single hardware element malfunction. Also, method provides for detection and correction of repetitive and spurious processing and transmission errors.

B74-10150
CLOSED-CIRCUIT-TELEVISION WELDING-ELECTRODE GUIDANCE SYSTEM
H. E. Smith, D. L. Stephens, R. A. Taylor, W. A. Wall, R. M. Avery, and H. P. Wunsch (Hayes Intern. Corp.)
Sep. 1974
M-FS-23026

Closed-circuit TV camera is mounted parallel to electrode and moves along with it. Camera is scanned along seam so seam is viewed parallel with scan lines on TV monitor. Two fiber optics illuminators are attached to guidance system; they illuminate seam for TV camera.

B74-10158
IMPROVED THERMAL ISOLATION FOR SUPERCONDUCTING MAGNET SYSTEMS
E. R. Wiebe
Sep. 1974
NPO-11875

Closed-cycle refrigerating system for superconductive magnet and maser is operated in vacuum environment. Each wire leading from external power source passes through cooling station which blocks heat conduction. In connection with these stations, switch with small incandescent light bulb, which generates heat, is used to stop superconduction.

B74-10162
IMPROVED CAPACITANCE MULTIPLIER CIRCUIT
A. J. Kline, Jr. (Motorola, Inc.)
Sep. 1974
NPO-11948

Circuit multiplies capacitance without increasing overall circuit gain. In addition, circuit may be designed to include lag or lead/lag transfer function and independent gain adjustment.

B74-10163
MINICOMPUTER-CONTROLLED FREQUENCY GENERATOR
R. A. Winkelstein
Sep. 1974
NPO-11962

Extremely-accurate and low-phase-noise frequency generator varies oscillator frequency as predetermined function of time. System could be used: (a) to automatically vary transmission frequencies in accordance with seasonal and diurnal changes in ionospheric conditions, (b) as automatic tuner for heterodyne receivers, or (c) as control element for phase-locked telemetry receivers.

B74-10165
ADVANCED-PRIORITY INTERRUPT MODULE
H. L. Jeane
Sep. 1974
NPO-13067

Module contains mask register, line register, primary sync register, secondary sync register, push-pop stacking register, control section, and interrupt address generator. APIM operates in conjunction with logic found in majority of minicomputers to provide fully-vectored interrupt capabilities.

B74-10170
CONTINUOUS FOURIER TRANSFORM SYSTEM
R. M. Munoz
Sep. 1974
ARC-10466

Complex digital computer is not required, only summing amplifiers and attenuators are used for transformation of signal. Continuous transform system may be used for spectrum analysis, filtering, transfer function synthesis, and communications.

B74-10171
G-LOAD INDICATOR AND WARNING DEVICE FOR AIRCRAFT
J. C. Howard
Sep. 1974
ARC-10806

Device facilitates pilot control of g-load maneuvers and provides immediate indication of g-load constraint violations. It may be used in test flights, in aircraft simulators, or in displays of performance of remotely piloted aircraft.

B74-10176
MAGNETIC-HEADING REFERENCE DEVICE
H. D. Garner
Oct. 1974 See also NASA-TN-D-7460
LANGLEY-11387

Inexpensive and reliable device is used in conjunction with fluidic-electronic wing-leveler system. Single magnetometer is placed so pilot can make adjustments in aircraft heading simply by rotating magnetometer itself.

B74-10178
WIDE DEVIATION PHASE MODULATOR
R. H. Couch, C. P. Hearn, and L. R. Wilson (LTV Aerospace Corp.)
Oct. 1974
LANGLEY-11607

Modulator produces phase-modulated waveform having high modulating linearity. Technique is inherently wideband with respect to carrier frequency and can operate over decade carrier frequency range without adjustments. Circuit performance is both mathematically predictable and highly reproducible.

B74-10191
REDUCTION OF QUANTIZATION ERROR IN MEASUREMENT OF FREQUENCY
E. J. Nossen (RCA) and E. R. Starner (RCA)
Nov. 1974
MSC-14649

Method reduces quantization errors using new digital circuit. Circuit provides very high resolution (10 to the minus 2nd power to 10 to the minus 3rd power Hz) without high-speed counters. It lends itself to microminaturization and is simple to construct. Unknown frequency is compared to standard frequency by means of zero-crossing coincidence-detecting circuit.

B74-10198
SPACECRAFT ATTITUDE DETERMINATION BY FANSCAN TECHNIQUE
H. A. Lassen (TRW Systems Group, TRW, Inc.) and J. H. Decanini (TRW Systems Group, TRW, Inc.)
Nov. 1974
ARC-10827

To determine orientation, or attitude, of spacecraft in flight relative to data-receiving antenna on earth use fanbeam antenna which is offset in angle from spin axis of spacecraft and provides fan-like radiation pattern.

B74-10250
IMPROVED CIRCULARLY POLARIZED ANTENNA
L. C. Van Atta and R. J. Mailloux
Jan. 1975
ERC-10214

Antenna includes two sets of linearly polarized elements. Each set contains slots in parallel array. Sets are mutually orthogonal and are driven in phase quadrature. By changing lengths of slots or their separations, antenna beamwidth can be changed over wide range. Similar results are achieved with dipole configuration.

B74-10276
NEGATIVE ION SPECTROMETRY FOR DETECTING NITRATED EXPLOSIVES
H. G. Boettger and J. Yinon
Jan. 1975
NPO-13082

Ionization procedure is modified to produce mainly negative ions by electron capture. Peaks of negative ions are monitored conventionally. Nitrated organic materials could be identified directly from sample sniff inlet stream by suitably modified mass spectrometer because of unique electronegativity which nitro group imparts to organic material.

B74-10277
FULL-FLOW FLUID FILTER
L. R. Toth and R. Hagler, Jr.
Jan. 1975
NPO-13118

Etched-disk filter was developed with fluid passageways in configuration which allows relatively unrestricted flow of fluid and has stagnation areas for collection of impurities. In addition, filter housing without center post was developed to improve flow characteristics.

B74-10284
TELECOMMUNICATIONS SYSTEMS DESIGN TECHNIQUES HANDBOOK
R. E. Edelson, J. R. Gilder, G. W. Garrison, A. J. Spear, P. M. Kotani, B. D. Trumpis, B. K. Levitt, C. E. Hanna, and B. Dorsch
Jan. 1975
NPO-13245

Handbook presents design and analysis of tracking, telemetry, and command functions utilized in these systems with particular emphasis on deep-space telecommunications. Antenna requirements are also discussed. Handbook provides number of tables outlining various performance criteria. Block diagrams and performance charts are also presented.

B74-10285
LOGARITHMIC-FUNCTION GENERATOR
P. R. Caron
Feb. 1975
ERC-10267

Solid-state logarithmic-function generator is compact and provides improved accuracy. Generator includes a stable multivibrator feeding into RC circuit. Resulting exponentially decaying voltage is compared with input signal. Generator output is proportional to time required for exponential voltage to decay from preset reference level to level of input signal.

B74-10288
HIGH-EFFICIENCY MULTIFREQUENCY FEED
J. S. Ajioka (Hughes Aircraft Co.), G. I. Tsuda (Hughes Aircraft Co.), and W. A. Leeper (Hughes Aircraft Co.)
Feb. 1975
GSFC-11909

Mutual blockage and mutual coupling are eliminated with multifrequency feed. Feed provides common aperture for 6-GHz and 4-GHz bands and crossed dipole for 1-GHz band. Design is highly efficient and has good polarization diversity.

B74-10296
HIGH-SPEED FAULT-TOLERANT TELEMETRY/COMPUTER INTERFACE
G. C. Gilley
Feb. 1975
NPO-13139

Fault-tolerant telemetry/computer interface allows memory sharing by two data processing systems and maintains integrity of fault-tolerant environment of computer.

B74-10299
APPARATUS FOR HEAT TREATING PLASTIC BELTS
A. Topits, Jr.
Feb. 1975
NPO-13205

Apparatus performs programed rotating, stretching/shrinking and heat treatment necessary to fabrication of high-performance plastic belts. Belts can be treated in lengths varying from 7 to 48 in., in widths up to 1 in., and in thicknesses up to approximately 0.003 in.

B74-10300
LOCATION OF VEHICLES USING AM STATION BROADCASTING SIGNALS
G. R. Hansen, Jr.
Feb. 1975
NPO-13217

Imaginary hyperbolic grid patterns formed by three local AM broadcasting stations were utilized in study. Each hyperbola is defined by constant phase difference between arbitrary signals integrally related to those coming from two stations. When three stations are used, grid is formed covering area with intersecting hyperbolas.

B75-10012
IN-SERVICE TURBINE WHEEL CRACK MONITOR
P. J. Barranger
Apr. 1975 See also NASA-TN-D-7483
LEWIS-12422

System can be utilized in flight or at flight line. It monitors disk rim for surface cracks emanating from blade root interface. System consists of eddy-current sensor, mounted approximately 1 1/2 mm (1/16 in) away from face of disk, and remotely located electrical capacitance-conductance bridge and signal analyzer.

B75-10037
FILL-IN BINARY LOOP PULSE-TORQUE QUANTIZER
C. B. Lory (Charles Stark Draper Lab., Inc.)
Apr. 1975
M-FS-23100

Fill-in binary (FIB) loop provides constant heating of torque generator, an advantage of binary current switching. At the same time, it avoids mode-related dead zone and data delay of binary, an advantage of ternary quantization.

B75-10046
MULTIBEAM-ANTENNA FEED SYSTEM TO ISOLATE ORTHOGONALLY POLARIZED BEAMS
J. E. Ohlson and W. F. Williams
Apr. 1975
NPO-13140

System is polarization tracker and comprises variable polarizer, polarization control, and receiver servo loop. System simultaneously receives desired signal and undesired signal which are approximately orthogonal. They can be either paired as left and right circular polarizations or as cross-linear polarizations.

B75-10059
BUFFER CONTROL UNIT FOR COMPUTER COMMUNICATIONS
A. K. Okinaka (Hawaii Univ.)
Apr. 1975
ARC-10870

Unit provides character echoing for keyboard display, parity and syndrome generation (error detection), half or full data-packet generation, automatic retransmission of packets, and keyboard lock-up.

B75-10068
A TEST AND MEASUREMENT TECHNIQUE FOR DETERMINING POSSIBLE LIGHTNING-INDUCED VOLTAGES IN AIRCRAFT ELECTRICAL CIRCUITS
J. A. Plumer (GE) and L. C. Walko (GE)
Jul. 1975 See also NASA-CR-2348
LEWIS-12109

Transient analyzer consists of four 0.5 microfarads capacitors chargeable by self-contained solid state 50 KV dc power supply operating from standard 110 Vac line voltage. Unit can circulate unidirectional current impulses of up to 500 amperes through aircraft at waveshapes similar to those of natural lightning strokes.

B75-10073
AUTOMATED DATA ACQUISITION AND REDUCTION SYSTEM FOR TORSIONAL BRAID ANALYZER
G. L. Carl, A. T. Inge, N. J. Johnston, and S. K. Dalal (Wyle Labs., Inc.)
May 1975

LANGLEY-11578

Automated Data Acquisition and Reduction System (ADAR) evaluates damping coefficient and relative rigidity by storing four successive peaks of waveform and time period between two successive peaks. Damping coefficient and relative rigidity are then calculated and plotted against temperature or time in real time.

B75-10086
TECHNIQUES FOR DECODING SPEECH PHONEMES AND SOUNDS: A CONCEPT
D. C. Lokerson and H. G. Holby
Jun. 1975
GSFC-11898

Techniques studied involve conversion of speech sounds into machine-compatible pulse trains. (1) Voltage-level quantizer produces number of output pulses proportional to amplitude characteristics of vowel-type phoneme waveforms. (2) Pulses produced by quantizer of first speech formants are compared with pulses produced by second formants.

B75-10092
MINIATURE SONAR FISH TAG
R W. Lovelady and R. L. Ferguson
Jun. 1975
LANGLEY-11814

Self-powered sonar device may be implanted in body of fish. It transmits signal that can be detected with portable tracking gear or by automatic detection-and-tracking system. Operating life of over 4000 hours may be expected. Device itself may be used almost indefinitely.

B75-10103
CENTRAL CONTROL ELEMENT EXPANDS COMPUTER CAPABILITY
R. A. Easton (Hughes Aircraft Co.)
Jun. 1975
M-FS-23216

Redundant processing and multiprocessing modes can be obtained from one computer by using logic configuration. Configuration serves as central control element which can automatically alternate between high-capacity multiprocessing mode and high-reliability redundant mode using dynamic mode switching in real time.

B75-10107
HIGH-EFFICIENCY K-BAND TRACKING ANTENNA FEED
R. L. Beavin (McDonnell Aircraft Co.) and A. I. Simanyi (McDonnell Aircraft Co.)
Jun. 1975 See also NASA-CR-134193
MSC-14717

Antenna feed features high aperture efficiency of multimode near-field horn and develops tracking signals without conventional monopulse bridge. Feed assembly is relatively simple and very compact. However, feed is sensitive to cross-polarized energy which couples into orthogonal error channel.

B75-10108
HIGH-POWER AC/DC VARIABLE LOAD SIMULATOR
K. P. Joncas (Avco Corp.), S. Birnbach (Avco Corp.), L. D. Bruce (Avco Corp.), and L. Smith (Avco Corp.)
Jun. 1975 See also B73-10305; NASA-CR-140331
MSC-14788

Design of medium-power dynamic electrical load simulator has been extended to permit simulation of ac as well as dc loads and to provide for operation at higher power levels. Simulator is internally protected against reverse voltage, overvoltage, overcurrent, and overload conditions.

B75-10114
QUASARS AS VERY-ACCURATE CLOCK SYNCHRONIZERS
W. J. Hurd and R. M. Goldstein
Jun. 1975
NPO-13276

Quasars can be employed to synchronize global data communications, geophysical measurements, and atomic clocks. It is potentially two to three orders of magnitude better than presently-used Moon-bounce system. Comparisons between quasar and clock pulses are used to develop correction or synchronization factors for station clocks.

B75-10122
TRANSMITTER SWITCH FOR HIGH-POWER MICROWAVE OUTPUT
C. P. Wiggins and R. K. Leu
Jun. 1975
NPO-13439

Combiner system can be used for combining output powers of two transmitters or for switching from one to the other. This can be done when pair of transmitters operate on same frequency and carriers are phase coherent as by excitation from single exciter.

B75-10129
HIGH-SPEED DATA WORD MONITOR
M. N. Wirth
Jun. 1975
ARC-10899

Small, portable, self-contained device provides high-speed display of bit pattern or any selected portion of transmission, can suppress filler patterns so that display is not updated, and can freeze display so that specific event may be observed in detail.

B75-10136
WIND ENERGY UTILIZATION: A BIBLIOGRAPHY
Innovator not given (New Mexico Univ.) Jul. 1975
LEWIS-12518

Bibliography cites documents published to and including 1974 with abstracts and references, and is indexed by topic, author, organization, title, and keywords. Topics include: Wind Energy Potential and Economic Feasibility, Utilization, Wind Power Plants and Generators, Wind Machines, Wind Data and Properties, Energy Storage, and related topics.

B75-10150
SOLID STATE REMOTE POWER CONTROLLERS FOR 120 VDC POWER SYSTEMS
G. R. Sundberg and D. E. Baker (Westinghouse Elec. Corp.)
Oct. 1975 See also NASA-CR-134772
LEWIS-12523

Solid state remote power controllers can be applied to any dc power system up to 120 Vdc and distribute power up to 3.6 kW per hour. Devices have demonstrated total electrical efficiencies of 98.5 percent to 99.0 percent at rated load currents.

B75-10152
LOW-COST, COMPACT, COOLED PHOTOMULTIPLIER ASSEMBLY FOR USE IN MAGNETIC FIELDS UP TO 1400 GAUSS
R. W. Patch, R. A. Tashjian, and T. A. Jentner
Sep. 1975 See also NASA-TM-X-71635
LEWIS-12445

Use of vortex tube for cooling and concentric shielding have produced smaller and more compact unit than was previously available. Future uses of device could include installation in gas chromatographs and mass spectrometers. Additional uses would include measurements and controls in magnetohydrodynamic power generators and fusion reactors.

B75-10153
DIGITAL TAPE DRIVE MONITOR
R. T. McKenna
Aug. 1975
GSFC-11925

Network checks skew and character spacing of digital tape drive systems automatically. Tape drive is set up and calibrated to check any written tape when tape is read back. It will indicate track errors or character spacing errors should they exceed specifications.

B75-10154
VOLTAGE MONITORING SYSTEM
C. L. Canicatti
Aug. 1975
KSC-10736

System serves as central station which can monitor voltage variations through transmission lines connnected to equipment scattered in different locations. Voltage-controlled oscillator is optional. It is used in some systems to condition signal to make it compatible with certain types of oscillographs.

B75-10156
NONDESTRUCTIVE MEASUREMENT OF CAPILLARY TUBE INTERNAL DIAMETER
W. W. Ho (Rockwell Intern. Corp.), A. W. Love (Rockwell Intern. Corp.), and M. J. VanMelle (Rockwell Intern. Corp.)
Aug. 1975
LANGLEY-11647

Technique provides nondestructive method of making quick, accurate determination by measuring electrical resistance of capillary tube when it is filled with electrolyte of known conductivity. Apparatus consists of conductivity cell and equipment for measuring resistance and for monitoring and controlling temperature.

B75-10161
PAGE COMPOSER TO TRANSLATE BINARY ELECTRICAL DATA TO OPTICAL FORM
G. A. Bailey and L. S. Cosentino (RCA)
Aug. 1975
M-FS-22589; M-FS-23173

Composer converts binary data to optical form for storage as hologram. Device consists of an array of deformable metal membranes controlled by MOSFET's. Device is fast, produces high contrast ratios, does not degrade with extended use, and can be addressed from diverse angles.

B75-10162
ZENER-REGULATED SOLAR ARRAY/BATTERY POWER SYSTEM
J. T. Eliason (Sperry Rand Corp.)
Aug. 1975
M-FS-23195

Zener diode limits solar cell voltage used to charge battery. System improves life and reliability of solar cells.

B75-10169
A HYBRID GENERAL-PURPOSE BIT SYNCHRONIZER
J. J. Stiffler (Raytheon Co.) and A. H. VanDoren (Raytheon Co.)
Aug. 1975 See also NASA-CR-115751
MSC-14330

Synchronizer is not affected by severe noise environments. Device uses both analog and digital techniques in its tracking loop. It accommodates any one of three signal formats. Rapid acquisition sequences are used to minimize acquisition time.

B75-10175
FAST FOURIER TRANSFORMATION COMPUTER USING FAST COUNTERS
S. Zohar
Aug. 1975
NPO-13110

Two designs have been developed for cost-effective, fast transformation of data points in small batches (where N is equal to or less than 32). One design is applicable to N prime and one to all N.

B75-10180
NEW BROADBAND SQUARE-LAW DETECTOR
M. S. Reid, R. A. Gardner, and C. T. Stelzried
Aug. 1975
NPO-13410

Compact device has wide dynamic range, accurate square-law response, good thermal stability, high-level dc output with immunity to ground-loop problems, ability to insert known time constants for radiometric applications, and fast response times compatible with computer systems.

B75-10184
PROGRAMED ASYNCHRONOUS SERIAL DATA INTERROGATION IN A TWO-COMPUTER SYSTEM
N. A. Schneberger (Honeywell, Inc.)
Sep. 1975
GSFC-11778

Technique permits redundant computers, with one unit in control mode and one in MONITOR mode, to interrogate the same serial data source. Its use for program-controlled serial data transfer results in extremely simple hardware and software mechanization.

B75-10191
HIGH-VOLTAGE STEPPING SUPPLY WITH FAST SETTLING TIME
H. Doong and M. H. Acuna
Sep. 1975
GSFC-11844

Waveform generator is used to derive low-voltage staircase waveform that feeds relatively long response time power supply. Power supply has high output voltage that is predetermined multiple of the input voltage.

B75-10192
VIDEO SWITCHER FOR COUPLING VIDEO CAMERAS TO SINGLE TV MONITOR
I. A. Richter
Sep. 1975
KSC-10782

Device couples up to 60 TV cameras to single monitor. Video switching is provided by diode matrix arranged in a 60-by-1 configuration. Switcher can be operated manually or automatically.

B75-10204
MEASUREMENT OF TRAP DENSITY IN DIELECTRIC FILM
J. E. Guisinger and J. Maserjian
Sep. 1975
NPO-13443

Method uses basic circuit to examine quality and trap density of film used in insulated gate field effect transistors. Data are measured as function of performance and life expectancy.

B75-10205
REAL-TIME SPEECH ANALYZER
J. P. Hong
Sep. 1975
NPO-13465

System uses phase-locked loops to give real-time information on speech spectrum by tracking the fundamental and its first 19 harmonics.

B75-10215
VARIABLE-BEAMWIDTH ANTENNA WITHOUT MOVING PARTS
L. F. Deerkoski and R. F. Schmidt
Oct. 1975 See also B74-10041; B74-10257
GSFC-11924

Basic configuration consists of large parabolic dish reflector, smaller hyperboloidal subreflector, and two sets of monopulse feeds located in conjugate focal region on boresight axis of dish.

B75-10217
AUTOMATED STATISTICAL ANALYSIS PROGRAM (ASAP)
S. J. Bavuso
Oct. 1975
LANGLEY-11125

Pattern recognition subprogram is used to produce table which indicates sections of input data. Program then uses data to write set of Kirchhoff equations algebraically solved by Gaus reduction method.

B75-10218
CONTINUOUS-PHASE FREQUENCY-SHIFT-KEYED GENERATOR
M. S. Feryszka
Oct. 1975

LANGLEY-11638

Device combines features of crystal oscillator frequency stability and voltage-controlled oscillator phase continuity.

B75-10240
HIGH-ACCURACY PROGRAMABLE SQUARE-LAW DETECTOR SYSTEM
M. S. Reid, R. A. Gardner, and C. T. Stelzried
Oct. 1975 See also B75-10180
NPO-13525

Programable system introduces correction factor to compensate for detector deviation from square-law response. If detector output voltage is V, the corrected output voltage is determined as V corrected = aV squared where 'a' is correction factor. Factor is determined and used automatically with digital computer techniques.

B75-10247
THREE-PHASE DC MOTOR DECODER
P. A. Studer
Oct. 1975
GSFC-11824

Circuit minimizes components required to provide six properly timed drive signals from three equal-interval sensor inputs.

B75-10254
PORTABLE HEADSET MICROPHONE CHECKER
J. Davenport, J. A. Foster, and W. R. Langley
Oct. 1975
KSC-10699

Simple and reliable test system gives go/no-go indication of output level of headset microphones. Portable system has its own internal battery power supply and can be used in field or in laboratory with wide variety of headset types.

B75-10265
REAL-TIME VIDEO CORRELATOR
P. E. Geise (Sperry Rand Corp.), M. Petcher (Sperry Rand Corp.), and D. F. Cornwell (Sperry Rand Corp.)
Oct. 1975
M-FS-23200

Device provides two-dimensional correlation of video data. Operation is reliable, accurate, and predictable.

B75-10275
LASER-EXCITED FLUORESCENCE FOR MEASURING ATMOSPHERIC POLLUTION
R. T. Menzies
Oct. 1975
NPO-13231

System measures amount of given pollutant at specific location. Infrared laser aimed at location has wavelength that will cause molecules of pollutant to fluoresce. Detector separates fluorescence from other radiation and measures its intensity to indicate concentration of pollutant.

B75-10281
LOW-NOISE K(U)-BAND RECEIVER INPUT SYSTEM
R. W. Berwin, P. R. Dachel, and E. R. Weibe
Oct. 1975
NPO-13645

Improved maser and superconducting magnet, which operates in vacuum of closed-cycle helium refrigerator, comprise a low-noise, reliable, field-operational receiver input system.

B75-10291
DELAY-LOCK-LOOP CODE-CORRELATION SYNCHRONIZER
C. T. Pardoe (Johns Hopkins Univ.)
Dec. 1975
GSFC-11868

Temperature dependence and sensitivity to noise are greatly reduced in system designed to process biphase-level pulse-code-modulated signals.

B75-10296
MONITOR FOR CHECKING ELECTRIC-FIELD METERS
L. D. Holley
Dec. 1975
KSC-10851

Portable monitor can be used to check electric-field meters on location. Faulty communication line or faulty unit can be determined on the spot.

B75-10297
TIME-OF-ARRIVAL LIGHTNING ACTIVITY LOCATION SYSTEM
C. L. Lennon
Dec. 1975
KSC-11006

System fixes location of charge buildup in clouds. It provides range, azimuth, and elevation in real-time so that warning of charge buildup can be implemented.

B75-10316
SOLID-STATE MOTOR CONTROL AND MONITOR SYSTEM
L. G. Monford, Jr.
Dec. 1975
MSC-12721

Compact solid-state system may be used for multifunction motor control. System can provide 12 control functions for under $100.

B75-10323
MULTICHANNEL HIGH-SPEED CORRELATOR
T. O. Anderson
Dec. 1975
NPO-13097

Device is used in real-time signal processing system for detection of radar signals in noise.

B75-10325
SYNCHRONIZER FOR RANDOM BINARY DATA
T. O. Anderson, J. K. Holmes, and W. J. Hurd
Dec. 1975
NPO-13286

Simplified binary-data transition detector, for synchronization of relatively noise-free signals, can be used with radio or cable *data-control links. It permits reception of binary data in absence* of clock signal or self-clocking coder.

B75-10326
COMPUTER/COMPUTER INTERFACE
T. O. Anderson
Dec. 1975
NPO-13428

System synchronizes data transfer between two computers by generating data strobe pulses when computers are ready for data transfer. In addition, interface filters noise by sampling.

03 PHYSICAL SCIENCES

B70-10020
REINFORCEMENT OF POLYMERIC STRUCTURES WITH ASBESTOS FIBRILS
RADER, C. A. /HARRIS RES. LABS., INC./ SCHWARTZ, A. M. DATE- JUN. 1970 REAN- SEE ALSO
NASA-CR-893, NASA-CR-77225
HQ-09954 HQ-09955

Investigation determines structural potential of asbestos fibrils. Methods are developed for dispersing macrofibers of the asbestos into colloidal-sized ultimate fibrils and incorporating these fibrils in matrices without causing reagglomeration.

B70-10031
COLORIMETRIC DETECTION OF ETHYLENE GLYCOL VAPOR
HELM, C. /INST. FOR RES./ MOSIER, B. VEROSTKO, C. E. DATE- FEB. 1970
MSC-13222
Very low concentrations of ethylene glycol in air or other gases are detected by passing a sample through a glass tube with three partitioned compartments containing reagents which successively convert the ethylene glycol vapor into a colored compound.

B70-10036
COMPACT APPARATUS FOR PHOTOGENERATION OF HYDRATED ELECTRONS
HART, E. SCHMIDT, K. DATE- JUN. 1970
ARG-10487
Flash-photolysis instrument generates hydrated electrons and studies their reactions. It has a three-dimensional, multiple-reaction cell and the capacity to produce up to .1 micromole hydrated electron in a single 40 microsec light pulse.

B70-10055
IMMERSED ULTRASONIC INSPECTION OF HIGH ACOUSTICAL ATTENUATIVE STRUCTURES
STUCKENBERG, F. H. /N. AM. ROCKWELL CORP./ DATE- MAY 1970
MSC-15702
By building a floating isolator box of cork around the test object and using a low frequency transducer, automated conventional C scan equipment is adapted to inspect the object ultrasonically. Vibrations are isolated and reflected noise is reduced.

B70-10061
HIGH-FIELD SUPERCONDUCTING NESTED COIL MAGNET
LAVERICK, C. LOBELL, G. M. DATE- JAN. 1970 REAN- SEE ALSO ANL-7002
ARG-10060
Superconducting magnet, employed in conjunction with five types of superconducting cables in a nested solenoid configuration, produces total, central magnetic field strengths approaching 70 kG. The multiple coils permit maximum information on cable characteristics to be gathered from one test.

B70-10071
COST-REDUCING MULTIPURPOSE MICROFILM CARD
SMITH, A. V. /BOEING CO./ DATE- JAN. 1970
KSC-10508
Microfilm-aperture card is printed in the same format on both sides which enables the use of one card for mounting films that are **right reading** on both the base side and the emulsion side. This reduces the number of microfilm-card formats.

B70-10085
A METHOD FOR RAPIDLY EVALUATING THE LINEARITY OF CALIBRATION DATA
BARI, F. A. N. /BOEING CO./ DATE- JUL. 1970
M-FS-14834
Simple technique determines whether or not a set of five data points lies within a specified close tolerance of a linear fit.

B70-10099
ESTIMATING SENSITIVITY OF VACUUM GAGES
SUMMERS, R. L. DATE- APR. 1970 REAN- SEE ALSO NASA-TN-D-5285
LEWIS-11007
Gage sensitivity for a particular gas is estimated using the known performance of the gage with a reference gas /nitrogen/ and employing several empirical rules which have usable accuracy. Relative gage sensitivities have been estimated for over 100 gases and vapors.

B70-10102
OPTIMIZING INSULATION WEIGHT ON CRYOGENIC STORAGE TANKS
SAFAR, L. A. /BOEING CO./ DATE- SEP. 1970
KSC-10399
Mathematical model uses boil-off rate, insulation density, tank surface area, performance level, and mission requirements to arrive at approximate insulation requirements for cryogenic storage tanks.

B70-10106
WATER-FILLED HEAT PIPE USEFUL AT MODERATE TEMPERATURES
MC KINNEY, B. G. DATE- SEP. 1970 REAN- SEE ALSO NASA-TM-X-53849
M-FS-20543
Heat pipe is used in the primary heat exchanger for nuclear power plants, as a heat sink for high-power electronic devices, and in a closed-cycle heat rejection mechanism for cryogenic storage tanks. It serves simultaneously as a heat transfer device and as a structural member.

B70-10108
FLUID MIXING TECHNIQUE INCREASES THE GAIN AND OUTPUT POWER OF CARBON DIOXIDE LASER SYSTEMS
COOL, T. A. /CORNELL UNIV./ DATE- JUN. 1970
HQ-10389
High speed flowing gas system provides uniform mixing in short times compared to flow transit times and carbon dioxide vibrational relaxation times. This system minimizes the effects of surrounding surfaces and provides a uniformly high gain that is independent of dimensions transverse to the flow direction.

B70-10111
PASSIVE HEAT TRANSFER CONTROL
FITZ, F. A. /SOUTHERN METHODIST UNIV./ DATE- JUL. 1970
HQ-10041
Model maintains a preselected temperature in the near vicinity of a variable source of thermal energy. Heat input is controlled by a variable transformer and a voltage drop across the heater is used to calculate power dissipated.

B70-10113
PHOTOIONIZATION MASS SPECTROMETER
WARNECK, P. /GCA CORP./ DATE- FEB. 1970 REAN- SEE ALSO NASA-CR-84871
HQ-10167
Photoionization source with a vacuum UV monochromator is used in ion reaction kinetics. Monochromator passes only the photon energies near the threshold of the selected ionization process. Absence of electron impact alleviates creation of different type ions that result in ion fragmentation.

B70-10122
CONTROL OF EQUILIBRIUM PRESSURE-TEMPERATURE CONDITIONS IN CRYOGENIC STORAGE
FORD, W. /N. AM. ROCKWELL CORP./ VOSS, J. DATE- JUN. 1970
M-FS-18115
Metered vent controls the pressure within a liquid hydrogen tank. Vent size is chosen to permit a gas flow which corresponds to the boil-off rate necessary to maintain the desired bulk temperature of the cryogen.

B70-10129
STRESS CORROSION CRACK INHIBITING METHOD FOR TITANIUM
BECK, T. R. /BOEING CO./ DATE- SEP. 1970
NPO-10271
Addition of oxyanions to liquid solvents in excess of the number of chloride, bromide, or iodide ions present prevents cracking of titanium-aluminum alloys under exposure to aqueous and other solvent environments. The molar concentration of oxyanion is set from 10 to 100 times higher than concentration of halide ions.

B70-10130
ULTRA-HIGH MOLECULAR SINK VACUUM CHAMBER
STEPHENS, J. B. YAGER, S. P. DATE- JUN. 1970
NPO-10799
Double-wall vacuum chamber can be separated from the remainder of the system and pumped by ultra-clean techniques. Ultrahigh vacuum is maintained by the cryogenic effect of a cold wall and titanium chemisorption.

B70-10135
PROCEEDINGS OF THE THIRD SOUTHEASTERN SEMINAR ON THERMAL SCIENCES
SPON- INNOVATOR NOT GIVEN /MARSHALL SPACE FLIGHT CENTER/ DATE- NOV. 1970
M-FS-20627
Report contains papers discussing rheology, low temperature thermodynamics with emphasis on the helium system, aerodynamic heating, and thermophysics research at Marshall Space Flight Center. Abstracts of selected research and development programs covering entire spectrum of thermal sciences are included.

B70-10137
ULTRASONIC PROPAGATION IN GASES AT HIGH TEMPERATURES
CAREY, C. /PANAMETRICS, INC./ CARNEVALE, E. H. LYNNWORTH, L. C. UVA, S. DATE- SEP. 1970 REAN- SEE ALSO AD-670192
HQ-10498
Ultrasonic pulse method /1 to 3 MHz/ measures both sound speed and absorption in monatomic and polyatomic gases in a temperature range of 300 to 20000 degrees K at atmospheric pressure. Helium, nitrogen, oxygen, and argon are investigated.

B70-10167
TEMPERATURE-CONTROLLED FLUIDIC DEVICE A CONCEPT
REHSTEINER, F. H. /STANFORD UNIV./ DATE- NOV. 1970
HQ-10446
Symmetrical fluidic device directly converts electrical signals to mechanical signals in the form of a fluid-flow parameter. This device eliminates or reduces effects of all undesirable parameters on the departure angle, leaving it a function of the controlled wall and jet temperatures.

B70-10168
VAPOR FEEDING OF LIQUID METAL CATHODES
ECKHARDT, W. O. /HUGHES AIRCRAFT CO./ DATE- AUG. 1970 REAN- SEE ALSO NASA-CR-93771
HQ-10213
Modified liquid metal cathode apparatus permits vapor feeding in the diffuse-spot pattern mode. Vapor-fed cathode has advantages over liquid-fed systems.

B70-10173
IMPROVED CALIBRATION OF ACCELEROMETERS AT TEMPERATURES DOWN TO -450 DEGREES F
BUFFUM, R. D. /N. AM. ROCKWELL CORP./ DE CARLO, T. A. PEPKINS, W. E. DATE- SEP. 1970
M-FS-18561
Improved technique calibrates piezoelectric accelerometers throughout temperature range from ambient to -450 degrees F. Method employs liquid helium as coolant, a cryogenic temperature chamber, a vibration measurement system, and a temperature measurement system.

B70-10187
NEW MICROWAVE SPECTROMETER/IMAGER HAS POSSIBLE APPLICATIONS FOR POLLUTION MONITORING
TOOLEY, R. D. /NORTHROP NORTRONICS/ DATE- OCT. 1970
NPO-10535
Microwave imager forms thermal-emissivity image of solid portion of planet Venus and provides data on the planet*s atmosphere, surface, terminator, and temperature changes. These thermally produced multifrequency microwaves for image production of temperature profiles can be applied to water pollution monitoring, agriculture, and forestry survey.

B70-10197
CRYOGENIC THERMOCOUPLE CALIBRATION TABLES
HALL, W. J. /INST. FOR BASIC STANDARDS, NBS/ POWELL, R. L. SPARKS, L. L. DATE- APR. 1970
NUC-10551
Thermocouple calibration standards are developed for low-temperature thermocouple materials. Thermovoltage, thermopower, and the thermopower derivative are presented in tabular and graphical form.

B70-10209
TELEVISION CAMERA AS A SCIENTIFIC INSTRUMENT
SMOKLER, M. I. DATE- JUL. 1970
NPO-11164
Rigorous calibration program, coupled with a sophisticated data-processing program that introduced compensation for system response to correct photometry, geometric linearity, and resolution, converted a television camera to a quantitative measuring instrument. The output data are in the forms of both numeric printout records and photographs.

B70-10221
COERCIVE FORCE OF THIN MAGNETIC FILMS
BALDWIN, J. A. DATE- SEP. 1970
NPO-10750
Phenomenological model aids in understanding the mechanisms responsible for the easy-axis coercive force in thin magnetic films of NiFe, MnBi, and gadolinium iron garnet.

B70-10223
USE OF THERMODYNAMIC PROPERTIES OF METAL-GAS SYSTEMS AS LOW-PRESSURE STANDARDS
LUNDIN, C. E. /DENVER RES. INST./ DATE- AUG. 1970 REAN- SEE ALSO NASA-CR-1271
LANGLEY-10452
Modified version of Sievert*s apparatus accurately calibrates low pressure measuring instruments. Metal-gas system is composed of hydrogen in two-phase equilibrium with erbium to obtain reproducible hydrogen pressures.

B70-10226
DIFFUSION FILTER ELIMINATES FRINGE EFFECTS OF COHERENT LASER LIGHT SOURCE
OLSASKY, M. J. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970
NPO-10417
Diffusion filter comprised of small particles in colloidal suspension reduces the coherence of a laser beam used as a photographic light source. Interference patterns which obscure details in photographic film are eliminated, the intensity and collimation are moderately affected.

B70-10231
COMBINING MICRO DRY COLUMN CHROMATOGRAPHY AND MASS SPECTROMETRY
BAUMAN, A. J. DATE- NOV. 1970
NPO-11240
Dry column chromatography principles applied in microscale produce technique to minimize time in preparing and analyzing colorless constituents of soluble mixtures. Glass pipette microcolumns filled with finely sieved adsorbents permit capillary attraction and separation in 3 to 15 minutes. Technique is adaptable to gas chromatography.

B70-10240
NEUTRON-IMAGE INTENSIFIER
BERGER, H. DATE- APR. 1970
ARG-10249
Electronic intensifier tube with a demagnification ratio of 9-1 enhances the usefulness of neutron-radiographic techniques. A television signal can be obtained by optical coupling of a small-output phosphor-light image to a television camera.

B70-10256
SHORT-DURATION, TRANSONIC FLOW, VARIABLE-POROSITY TEST SECTION

DAVIS, J. W. HILL, O. E. DATE- SEP. 1970 REAN-
SEE ALSO NASA-TM-X-53571
M-FS-20509
Short-duration test facility obtains extremely high Reynolds number flows in subsonic, transonic, and supersonic speed ranges, and aids in solving Reynolds number-dependent aerodynamic and thermodynamic problems in design and testing of large, high speed vehicles. The modified blowdown wind tunnel avoids data confusion and aerodynamic noise.

B70-10260
METHODS FOR MEASURING THE LOUDNESS AND *NOISINESS OF COMPLEX SOUNDS*
KRYTER, K. /BOLT, BERANEK, AND NEWMAN, INC./
DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-422
HQ-10332
Physical and temporal aspects of sound which influence the rating of subjective noisiness are intensity, spectrum shape and bandwidth, spectral complexity, and duration. Objective rating methods include a graphic method, full octave and one-third octave methods, and methods that measure one value over all frequencies.

B70-10268
THE EFFECT OF OBJECT MOTION IN FRAUNHOFER HOLOGRAPHY WITH APPLICATION TO VELOCITY MEASUREMENTS
DOTSON, W. P., JR. DATE- SEP. 1970 REAN- SEE ALSO NASA-TN-D-5515
MSC-12295
Experimental results extend the Fraunhofer holography theory to include moving objects. Conclusions indicate objects may move up to ten times their mean diameter during observation time. Their motion produces fringe patterns descriptive of that motion from which it is possible to reconstruct the hologram and measure the velocity.

B70-10269
MAGNESIUM OXIDE DOPING REDUCES ACOUSTIC WAVE ATTENUATION IN LITHIUM METATANTALATE AND LITHIUM METANIOBATE CRYSTALS
CROFT, W. /SPERRY RAND RES. CENTER/ DAMON, R.
KEDZIE, R. KESTIGIAN, M. SMITH, A. WORLEY, J.
DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-86145
ERC-10463
Single crystals of lithium metatantalate and lithium metaniobate, grown from melts having different stoichiometries and different amounts of magnesium oxide, show that doping lowers temperature-independent portion of attenuation of acoustic waves. Doped crystals possess optical properties well suited for electro-optical and photoelastic applications.

B70-10270
MANUALLY OPERATED ELASTOMER HEAT PUMP
HUTCHINSON, W. D. DATE- JUL. 1970
NPO-10677
Device consisting of a rotating mechanism, a frame with multiple wide bands of rubber, and a fluid bath, demonstrates the feasibility of a human operated device capable of cooling or producing heat. This invention utilizes the basic thermodynamic properties of natural rubber.

B70-10271
FINITE FRINGE HOLOGRAM
HEFLINGER, L. O. /TRW SYSTEMS GROUP/ DATE- MAY 1970
HQ-10347
In holographic interferometry a small movement of apparatus between exposures causes the background of the reconstructed scene to be covered with interference fringes approximately parallel to each other. The three-dimensional quality of the holographic image is allowable since a mathematical model will give the location of the fringes.

B70-10272
THE EFFECTS OF NUCLEAR POWER GENERATORS UPON ELECTRONIC INSTRUMENTATION
MILLER, C. G. TRUSCELLO, V. C. DATE- SEP. 1970
NPO-11217
Radiation sensitivity of electronic instruments susceptible to neutron and gamma radiation is evaluated by means of a radioisotope thermoelectric generator /RTG/. The gamma field of the RTG affects instrument operation and requires shielding, the neutron field does not affect operation via secondary capture-gamma production.

B70-10280
THERMALLY CASCADED THERMOELECTRIC GENERATOR
FLAHERTY, R. /WESTINGHOUSE ELEC. CORP./ DATE-MAY 1970
NPO-10753
High efficiency thermoelectric generator utilizes a high-temperature thermoelectric material in thermal series with a low-temperature material. A thermally cascaded generator increases system efficiency.

B70-10292
NONCONTACTING-OPTICAL-STRAIN DEVICE
SILVER, R. H. DATE- AUG. 1970
NPO-10778
Noncontacting-strain-measuring gauge and extensometer remotely measures the mechanical displacement along the entire length of a test specimen. Measurement is accomplished by continuous scanning of a reflected light from reflective bench markings or stripes previously affixed to the specimen.

B70-10296
INEXPENSIVE NET SOLAR FLUX RADIOMETER
DARKOW, G. L. /MO. UNIV./ DATE- AUG. 1970
HQ-10087
Radiometer measures the absorption and reflection of solar radiation by opaque and translucent surfaces. Surface-coating modifications permit measurements over selected broad wavelength bands within the solar spectrum.

B70-10299
THERMALLY INDUCED OSCILLATIONS IN FLUID FLOW
ZUBER, N. /GE/ DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-84801
M-FS-20449
Theoretical investigation distinguishes the various mechanisms responsible for oscillations of pressure, temperature, and flow velocity, derives a quantitative description of the most troublesome mechanisms, and develops a capability to predict the occurrence of unstable flow.

B70-10311
COMPUTERIZED POLAR PLOTS BY A CATHODE RAY TUBE/GRID OVERLAY METHOD
FREEMAN, J. M. /BOEING CO./ SHOUP, E. L. DATE-JUN. 1970
M-FS-14464
Overlay is aligned with four calibration dots so it is not affected by CRT drift or changes in vertical or horizontal gain when producing Nyquist /frequency-response phase/amplitude/ plots. Method produces over 50 plots per hour.

B70-10315
CHEBYSHEV MINIMAX CONTROL THEORY
JOHNSON, C. D. /GEN. DYN./CONVAIR/ DATE- JUN. 1970
M-FS-20639
General, closed-form, analytical solutions are determined for certain classes of C-minimax control problems, several alternative mathematical theories are derived, and a controller design theory is developed to give optimal control in the presence of unmeasureable external disturbances.

B70-10318
IMPROVED HEAT SHIELD/RADIATOR
SMITH, J. W. DATE- SEP. 1970
NPO-11105
Thermally conductive metal shield is put in direct thermal contact with the mounting plate for the radiation detectors. External surfaces of the shield are insulated by an insulation blanket. The internal faces are covered with a thin layer of quartz with a metallic thermally conductive coating on the hidden faces.

B70-10319
STELLAR SPECTRUM CLASSIFIER
REID, J. H. /LOCKHEED ELECTRON. CO./ DATE- JUN. 1970
MSC-13450
Stellar classification is accomplished by correlating holograms of classified spectra with the Fourier transform of the spectral images to be classified.

B70-10321
DIRECTIONAL CONTROL OF RADIANT HEAT
HOWELL, J. R. PERLMUTTER, M. DATE- JUL. 1970
LEWIS-90237
Surface with grooves having flat bases gives directional emissivities and absorptivities that can be made to approximate a perfect directional surface. Radiant energy can then be transferred in desired directions.

B70-10324
RADIANT HEATING CONCEPT EFFICIENT FOR LIGHT-TRANSMITTING WINDOWS
NEUMAN, J. R. /MARTIN MARIETTA CORP./ NOVORYTA, R. J. DATE- OCT. 1970
M-FS-20630
Single-pane, uncoated windows absorb infrared rays and transmit visible and near-visible wavelengths. Two opposed rod heaters direct infrared rays at the pane, reflectors aid in this heating which prevents condensation. These windows are useful for telescopes and cameras for oceanographic and related studies.

B70-10325
VARIABLES IN TURBINE EROSION
BAUGHMAN, J. R. /N. AM. ROCKWELL CORP./ SPIES, R. DATE- SEP. 1970
M-FS-18677
Study of impact erosion in the operation of turbomachinery is undertaken to predict the results for particular designs. The test program investigates the effects of turbine stator blade shape, rotor blade shape, and variations in test conditions.

B70-10341
NONLINEAR DAMPING IN STRUCTURES
CHANG, C. S. /LOCKHEED CORP./ DATE- SEP. 1970
M-FS-20701
Experimental results prove the feasibility of substructure testing to measure local damping properties directly. Dynamic responses of a structure can be predicted quantitatively, and specimens are less costly and more easily tested with better controlled tests and environments.

B70-10354
IMPROVED OPTICAL LENS SYSTEM
SCHMIDT, L. F. DATE- SEP. 1970
NPO-11311
Objective lens produces a backwardly curving image of a star field that matches the similarly curved surface of the photocathode of an image dissector tube. Lens eliminates the need for a fiber-optics translation between the flat plane image and curved photocathode.

B70-10356
CALORIMETER MEASURES HIGH NUCLEAR HEATING RATES AND THEIR GRADIENTS ACROSS A REACTOR TEST HOLE
BURWELL, D. /WESTINGHOUSE ASTRONUCL. LAB./, COOMBE, J. R. MC BRIDE, J. /IDAHO NUCL. CORP./
DATE- OCT. 1970
NUC-10227
Pedestal-type calorimeter measures gamma-ray heating rates from 0.5 to 7.0 watts per gram of aluminum. Nuclear heating rate is a function of cylinder temperature change, measured by four chromel-alumel thermocouples attached to the calorimeter, and known thermoconductivity of the tested material.

B70-10357
DATA FROM VARIOUS SOURCES PROVIDE STANDARD SINGLE-LEVEL RESONANCE PARAMETERS FOR URANIUM 233
SCHNEIDER, M. J. /WESTINGHOUSE ASTRONUCL. LAB./
DATE- SEP. 1970
NUC-10229
Method of calculating Breit-Wigner resonance parameters for uranium 233 allows for different sources of data. Parameters for 63 resonances in the neutron-energy range 0 to 62 eV are yielded by simultaneous fit to three sets of data.

B70-10360
MULTISPECTRAL FACSIMILE REPRODUCER
BURCHER, E. E. HUCK, F. O. DATE- OCT. 1970
LANGLEY-10618
Facsimile reproducer records spatially well-registered true-color and false-color video data on tape. Proposed optical arrangement allows light sources to be adjusted along the mirror scanning direction in such a manner that no electronic delays are required if the reproducer is operated synchronously with the camera.

B70-10371
HOLOGRAPHIC PHOTOGRAPHY OF HIGH VELOCITY PARTICLES
DYES, W. A. /TECH. OPERATIONS, INC./ MC CABE, B. J. WARD, J. H. DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-86147
ERC-10318
Fourier transform hologram camera increases the velocity range for holography by a factor of 10 to 1000. Two different optical systems, using a triangular arrangement of beam splitters and a mirror to illuminate the object from two directions, are investigated.

B70-10379
HIGH TEMPERATURE ION SOURCE
SWIFT, R. /AM. SCI. AND ENG., INC./ DATE- OCT. 1970 REAN- SEE ALSO NASA-CR-86022
ERC-10197
Modified Nielsen-type ion source produces temperatures up to 1500 degrees C and permits obtaining a plasma from low vapor-pressure materials. Design minimizes thermal stresses. Dual-filament discharge chamber achieves the high temperature and provides independent control of the heating and electron emission functions.

B70-10381
DIRECTIONAL COUPLER FOR OPTICAL WAVEGUIDES
SCHINELLER, E. R. /WHEELER LABS., INC./ WILMOT, D. W. DATE- SEP. 1970 REAN- SEE ALSO
NASA-CR-332
ERC-10094
Feasibility study of transmitting optical energy in single mode through photonic waveguides results in a conceptual directional coupler consisting of two types of optical waveguides /a stratified /core/ dielectric and a mirror wall/. Waveguide medium analysis produced formulation of mode cutoff conditions, field distributions, and propagation characteristics.

B70-10405
INTERFEROMETER FOR MEASUREMENT OF OPTICAL POLARIZATION
ABHYANKAR, K. FYMAT, A. DATE- NOV. 1970
NPO-11239
Standard two-beam interferometer with polarizers in each beam and an analyzer at the recombined focal point provides greater accuracy and higher resolution than any other known method for measuring variation of polarization within a spectral line and in the surrounding continuum.

B70-10413
IMPROVED LININGS FOR INTEGRATING SPHERES
FERGERSON, P. O. FRENCH, B. O. DATE- OCT. 1970
MSC-12237
Sphere surface is covered with plain weave of glass fibers coated with polytetrafluoroethylene and one or two layers of magnesium oxide vapor. The resultant lining is suitable for measurement of radiation in the ultraviolet, visible, and near-infrared wavelengths, is not damage prone, and is easily cleaned.

B70-10415
EVALUATION OF TWO DESIGNS FOR CRYOGENIC INSULATION
GETTY, R. C. /GEN. DYN./ DATE- SEP. 1970
M-FS-14740

Shingle-type, crinkled, aluminized polyethylene ester is thermally and structurally tested for cryogenic insulation. Insulation systems require thermal efficiency with minimum weight, and the ability to withstand vibration, acceleration, and rapid pressure drops.

B70-10426
MULTIPASS HOLOGRAPHIC INTERFEROMETER IMPROVES IMAGE RESOLUTION
BROOKS, R. E. /TRW SYSTEMS GROUP/ HEFLINGER, L. O. DATE- NOV. 1970
HQ-10499
Multipass holographic interferometer forms a hologram of high diffraction efficiency, and hence provides a bright and high contrast interferogram. It is used to study any effect which changes the index of refraction and to study surface deformations of a flat reflecting surface.

B70-10438
AIRBORNE SPECTROMETER SENSES SEVERAL GASES
MC DOWALL, J. /BARRINGER RES., LTD./ MOFFAT, A. J. DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-99609
MSC-13234
Spectrometer*s variable shutter permits observation of a wide range of plume widths. Adjustable grating, counter, and access window enable operator to reset grating*s position during flight by resetting the counter to a predetermined number. Quartz correlation mask and spectral-aperture instrument-function filter are mounted in a replaceable precision frame.

B70-10439
LASER METHOD FOR FINDING AXIS OF ROTATION
MASSEY, G. A. /SYLVANIA ELECTRON. SYSTEMS/ DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-985
ARC-10388
Illumination of rotating surface with laser beam and examination of interference patterns resulting from diffused reflections determines position of axis and direction of motion. Interference patterns are viewed through a lens or recorded on film as circular streaking patterns.

B70-10441
HYDROGEN MASER - MEASUREMENT OF WALL SHIFT WITH A FLEXIBLE BULB
BRENNER, D. /HARVARD UNIV./ DATE- NOV. 1970
HQ-10552
Flexible bulb is squeezed to change mean free path of hydrogen atoms, and to change bulb*s volume without changing its surface area. Volumes in the different configurations are measured to learn the change in mean free path and calculate wall shift. Various bulb coating materials are described.

B70-10442
DERIVATION OF A GENERAL PERTURBATION SOLUTION - ITS APPLICATION TO DETERMINATION OF ORBIT
BORN, G. H. /TEX. UNIV./ DATE- DEC. 1970
MSC-13377
Analytical solution to three-body problems is applied to the problem of predicting the orbit of a lunar satellite and determining the orbit of a near-earth satellite. Using this solution, the state vector may be generated at any time without intermediate numerical extrapolation.

B70-10445
ALUMINUM-SILICON EUTECTIC ALLOY IMPROVES ELECTRICAL AND MECHANICAL CONTACT TO SILICON CARBIDE
SHIER, J. S. DATE- NOV. 1970
ERC-10277
Alloy contact layer is made at relatively low temperature and has good wetting characteristics. Contacts adhere well to silicon carbide surface, penetrating about 300 to 500 angstroms into it. Contacts are ohmic on p-type silicon carbide and blocking on n-type.

B70-10461
VERY LOW VELOCITY FLOW SENSOR USES FLUIDIC TECHNIQUES
TUREK, R. F. /BOWLES ENG. CORP./ DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-86352
ERC-10404
Parallel-flow wind sensor provides differential pressure output which is nearly linear and relatively insensitive to supply pressure over a wide range of wind velocities. Cross-flow wind sensor outputs are input to a fluidic amplifier to obtain high pressure output for low wind velocities without changing output characteristics.

B70-10471
APPARATUS FOR SIMULTANEOUS ION COUNTING AND CURRENT RECORDING IN MASS SPECTROMETRY
KOHL, F. J. ROBERTS, W. K. STEARNS, C. A. DATE- SEP. 1970
LEWIS-11103
Ion counting system is coupled to the last dynode of an Allen-type electron multiplier on the mass analyzer of a double focusing mass spectrometer. This leaves the anode available for an electrometer, making possible simultaneous measurements. Coupling is achieved by a ferrite core transformer and associated circuitry.

B70-10472
AMBIENT-LIGHT-ABSORBING SCREEN FOR FRONT PROJECTION
HILBORN, E. H. DATE- NOV. 1970
ERC-90017
Screen permits front surface projection of collimated light beam under conditions of high extraneous illumination. Screen has high reflective efficiency over any desired viewing area. Its optical properties are maintained when moisture droplets are present on the external front planar surface. Surface is easily cleaned and maintained.

B70-10473
GROWTH OF SINGLE-CRYSTAL GALLIUM NITRIDE
CLOUGH, R. /RCA/ RICHMAN, D. TIETJEN, J. DATE- OCT. 1970 REAN- SEE ALSO NASA-CR-86192, NASA-CR-110194
ERC-10301
Use of ultrahigh purity ammonia prevents oxygen contamination of GaN during growth, making it possible to grow the GaN at temperatures as high as 825 degrees C, at which point single crystal wafers are deposited on /0001/-oriented sapphire surfaces.

B70-10491
KINETIC INDUCTANCE MEASURED IN A SUPERCONDUCTING WIRE
MESERVEY, R. H. /MIT/ TEDROW, P. M. DATE- NOV. 1970 REAN- SEE ALSO N69-33783
ERC-10305
Ultrasensitive technique to measure kinetic inductance has test specimen included as part of the inductance of a tank circuit of a tunnel diode oscillator. Frequency counter measures shift in frequency of oscillator, caused by changes in inductance. Frequency shift in tank circuit is proportional to change in kinetic inductance

B70-10493
VACUUM LEAK DETECTOR FEATURES HIGHER SENSITIVITY
BARRINGTON, A. E. DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-86243
ERC-10034
Technique for measuring partial pressures utilizes extremely large resonance scattering cross section of xenon at 1471 angstroms to scatter light in a vacuum cell. Output signal of ultraviolet-sensitive photodetector is proportional to the partial pressure and to the rate of inleakage of xenon probe gas.

B70-10510
PLASMA CONDUCTIVITY GAGE
GILL, S. P. /STANFORD RES. INST./ DATE- NOV. 1970
ARC-10147
Gage permits determination of stagnation conductivity from measurement of shunt impedance presented by the plasma between the inner and outer conductors of a segment of coaxial transmission line. Response of gage permits its

use in shock-tube work and research on explosive propagation.

B70-10536
OVERLAPPED CONIC SIMULATION OF THREE-BODY TRAJECTORIES
WILSON, S. W., JR. /TRW SYSTEMS GROUP/ DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-101862
MSC-13460
Trajectory computation technique for three-body motion is based on analytical derivation and empirical validation of pseudostate theory. Application of technique yields **overlapped conic** trajectories with error magnitudes only 20 percent as great as those of patched conic trajectories.

B70-10539
THE DETERMINATION OF STABILITY DOMAINS FOR NONLINEAR DYNAMICAL SYSTEMS
ABBATE, J. V. /GRUMMAN AIRCRAFT ENG. CORP./ GEISS, G. R. DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-84042
M-FS-14832
Research effort is described which is directed toward several aspects of the stability problem pertinent to the analysis of space vehicle quidance systems. Problems encountered during this study are mentioned.

B70-10549
MINIATURE SPRAY-PAINTING BOOTH
FEE, K. W. /N. AM. ROCKWELL CORP./ DATE- NOV. 1970
MSC-15811
Transparent spray booth provides method for quality painting and repair of surfaces in clean room or other specialized environments. Overspray and virtually all contaminating vapor and odor can be eliminated. Touch-up painting is achieved with spray gun.

B70-10563
NOVEL WAVE GENERATOR ADAPTABLE TO INDOOR SURFBOARDING
HEIDMANN, M. F. PHILLIPS, B. R. DATE- DEC. 1970 REAN- SEE ALSO NASA-TN-D-4380
LEWIS-11096
Method is devised for generating strong acoustic waves in confined body of water. Strong travelling acoustic waves or modes are created by rotation of radial jet of gas at center of short cylindrical chamber. Method and wave structure suggest novel facility for water sports.

B70-10564
HIGH-TEMPERATURE RAPID-RESPONSE THERMOCOUPLE FOR REDUCING ATMOSPHERES
GRACEY, C. M. /AEROJET-GEN. CORP./ HOFF, R. G. DATE- NOV. 1970
NUC-10530
Thermocouple measures continuously in flowing gaseous hydrogen at temperatures up to 4000 deg F, in environments made hazardous by radiation, and where rapid response and calibration reproducibility are critically important. Thermocouple wires extend continuously, without splice or foreign material, from cold junction to probe*s tip.

B70-10575
A SIMPLIFIED METHOD FOR DETERMINING CONVECTIVE HEAT-TRANSFER COEFFICIENTS
HUFF, R. G. DATE- OCT. 1970 REAN- SEE ALSO NASA-TN-D-5520, NASA-TM-X-1980
LEWIS-11156
Convective heat transfer coefficients are determined by measuring temperatures of hot and cold fluids separated by wall, and temperature of wall at single point. Method is applicable to heat exchangers and rocket engines.

B70-10581
MULTIPLE FOCUSING MAGNETS USED FOR VELOCITY SELECTION OF ATOMS
SPON- INNOVATOR NOT GIVEN /HEWLETT-PACKARD CO./ DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-89275, B67-10146
GSFC-10128
Computer techniques are used in calculating velocity selection of hydrogen atoms for use in maser frequency standard. Technique permits designer to resolve design problems of multiple focusing magnets employed in atomic velocity selection. There is excellent agreement with hand calculations in constant magnetic moment approximation.

B70-10591
THE WATER-CRYOGEN HEAT EXCHANGER
BARTLIT, J. R. /LOS ALAMOS SCI. LAB./ BOYER, K. WILLIAMSON, K. D. DATE- OCT. 1970
NUC-11029
Heat exchanger, using water as heat medium, converts liquid hydrogen to gaseous hydrogen at a very high rate. Possible applications include treatment of liquified natural gas in cities to bring the gas on-line quickly, conversion of liquid oxygen and liquid nitrogen for steel mills, and high volume inert purging.

B70-10592
THE LOW-COST CRYOSTAT
BRONSON, J. C. /LOS ALAMOS SCI. LAB./ DATE- OCT. 1970
NUC-11034
Inexpensive method of fabricating cryostats uses polyurethane, super insulation, fiber glass, and cardboard/plywood. Cryostat weighs 1/10 of Dewar, occupies about same volume, is easy to handle, requires no metal parts, and can be formed into virtually any configuration.

B70-10593
FROST AS AN INSULATOR
BRONSON, J. C. /LOS ALAMOS SCI. LAB./ DATE- OCT. 1970
NUC-11039
Insulating qualities of frost and mechanisms for using frost in specific applications in controlled experiments are discussed. With available supply of moist air, frost possesses inherent advantage of easy insulation of cryogenic lines and improvement of overall system efficiency.

B70-10596
HIGH-STRENGTH MAGNETIC MATERIALS
DETERT, K. /WESTINGHOUSE ELEC. CORP./ DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-1460
LEWIS-10697
Two new precipitation-hardened magnetic alloys are suitable for operation in 800 to 1600 deg F range. One is a martensitic alloy and the other a cobalt-based alloy. They possess improved creep resistance and have application in high temperature inductors and alternators.

B70-10608
EVALUATION OF DECAY CURVES OF A CHEMICAL SPECIES UNDERGOING SIMULTANEOUS FIRST- AND SECOND-ORDER DECAY
SCHMIDT, K. H. DATE- DEC. 1970 REAN- SEE ALSO ANL-7400
ARG-10281
IBM 1620 computer prepares tables to enable fast calculation of the first- and second-order rate constants from two half-lives and the corresponding initial concentrations, obtained from either one or two decay curves.

B70-10611
AN IMPROVED ORBITRON IONIZATION GAGE MEASURES ULTRAHIGH VACUUM
GOSSELIN, C. M. /MIDWEST RES. INST./ DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-1300
LANGLEY-10535
Ionization gage with improved signal-to-noise ratio has a helical coil electrode which separates the solid cathode ion collector from the volume where ionization of gas molecules takes place. Helical coil increases lifetime of electrons and reduces secondary emission from the collector.

B70-10620
QUADRUPOLE IONIZATION GAGE MEASURES ULTRAHIGH VACUUM
SCHWARZ, H. J. /RENSSELAER POLYTECH. INST./ DATE- DEC. 1970
LANGLEY-10397
Quadrupole system, energized with a 200 MHz electric field, restrains ionizing electrons

within the center of the ionization gage. Oscillatory trajectory of the electrons increases the probability of ionizing the gas molecules, lowers background X-ray level, and increases the signal-to-noise ratio.

B70-10622
RUGGED, LOW-CONDUCTANCE, HEAT-FLOW PROBE
BOUDREAU, E. J. /LITTLE /ARTHUR D./, INC./
HINCKLEY, R. B. LUCAS, R. M. MC CULLOUGH, J. E.
DATE- DEC. 1970
MSC-13443
Lightweight, compact probe structure has low thermal conductance to enable accurate measurement of slight temperature gradients. Probe combines ruggedness, high precision, accuracy, and stability. Device can withstand vibration, shock, acceleration, temperature extremes, and high vacuums, and should interest industrial engineers and geologists.

B70-10628
ACCURATE, RAPID, TEMPERATURE AND LIQUID-LEVEL SENSOR FOR CRYOGENIC TANKS
DE WITT, R. L. STOCHL, R. J. TERBEEK, H. G.
DATE- NOV. 1970 REAN- SEE ALSO NASA-TN-D-4339
LEWIS-11208
Thermopiles measure ullage gas temperatures to within plus or minus 1.65 deg K between 20 and 300 deg K, and also serve as point liquid-level sensors. Thermopile technique measures smaller temperature differences by keeping the reference junctions inside the tank and near the temperature range of the measuring junction.

B70-10631
LASER BEAM HYDROCARBON DETECTOR
BEAM, B. H. BURROUS, C. N. JAYNES, D. N. DATE-
NOV. 1970
ARC-10156
Portable instrument passes light from helium-neon laser at a wavelength of 3.39 microns through the atmosphere being monitored and measures attenuation of the laser beam. Since beam attenuation is due almost exclusively to absorption of radiation by hydrocarbons, a quantitative measure of their concentration is available.

B70-10632
TOROIDAL MIRRORS PROVIDE VIRTUAL WALLS FOR BREAKS IN LIGHT PIPES
YOUNG, N. /BLOCK ENG., INC./ DATE- NOV. 1970
ARC-10031
Section of light pipe consists of separated segments having opposed toroidal mirrors that intercept meridional rays to present virtual wall in space between mirrors, thus insuring uninterrupted light transmission down the pipe. Design affords internal access to pipe section. Segments are electrically or thermally insulated from one another.

B70-10646
LIGHTWEIGHT, SELF-EVACUATED INSULATION PANELS
DENGLER, R. P. NIENDORF, L. /UNION CARBIDE
CORP./ NIES, G. PERKINS, P. J., JR. DATE- DEC.
1970 REAN- SEE ALSO NASA-TN-D-4375
LEWIS-90361
Multilayer insulation of prefabricated panels is developed for cryogenic storage tanks. System utilizes panels of aluminized Mylar separated by sheets of low conductivity polyurethane foam. Panels are self-evacuated by cryopumping of gaseous carbon dioxide at time of use.

B70-10649
PROCEEDINGS OF THE SYMPOSIUM ON LONG-LIFE HARDWARE FOR SPACE
SPON- INNOVATOR NOT GIVEN /MARSHALL SPACE FLIGHT
CENTER/ DATE- DEC. 1970
M-FS-20638
Two-volume edition of the papers of the symposium is described. It is divided into six sections - parts, materials, management, system testing, component design, and system test. Material presented focuses attention on problems created by the increased complexity of technology and long-term mission requirements.

B70-10656
ORBIT, REENTRY, AND LANDING ATTACHMENT FOR GLOBES
PRITCHARD, E. B. DATE- DEC. 1970
LANGLEY-10626
Navigational device, invented to aid recovery of spacecraft from any orbit, also illustrates motions of satellites relative to earth and their entry-ranging requirements. Device rapidly and accurately defines lateral range requirements for spacecraft returning to any desired site without manual or computerized calculation of orbital equations of motion.

B70-10658
DUAL-WAVELENGTH SYSTEM MONITORS DEPOSITION OF FILMS - A CONCEPT
ZURASKY, J. L. DATE- DEC. 1970
M-FS-20675
System monitors fabrication of high-quality optical filters and other precise film deposition operations. System generates output signal of an element that changes rapidly when deposition process changes or stops, and eliminates defects of single-wavelength systems. Five additional advantages of dual-wavelength system are listed.

B70-10659
OPTICAL CONTAMINATION DURING THERMAL TESTING IN VACUUM
ZWIENER, J. M. DATE- DEC. 1970
M-FS-20736
Comparative tests are described for optical degradation in vacuum systems served by oil-type or ion-type pumping operation. Results show that degradation occurs only during ultraviolet irradiation in vacuum systems with oil-type pumping systems and that it increases with exposure time. Degradation does not occur with ion systems.

B70-10665
OPTICAL PROBING OF SUPERSONIC AERODYNAMIC TURBULENCE
CIKANEK, H A., JR. FUNK, B. H. DATE- DEC. 1970
REAN- SEE ALSO N69-38125
M-FS-20686
Laser quasi-schlieren system and laser shadow-correlation system retrieve flow-related signals sufficient for computing accurate, reproducible correlation peaks. Statistical method for obtaining one-shot measurements of the decay history of turbulent structures in a stationary frame of reference is discussed.

B70-10667
HEAT-TRANSFER DATA FOR HYDROGEN
MC CARTHY, J. R. /N. AM. ROCKWELL CORP./ MILLER,
W. S. OKUDA, A. S. SEADER, J. D. DATE- DEC.
1970
M-FS-18754
Information is given regarding experimental heat-transfer data compiled for the turbulent flow of hydrogen within straight, electrically heated, round cross section tubes. Tube materials, test conditions, parameters studied, and generalized conclusions are presented.

B70-10670
FLOW CHARACTERISTICS OF AN AIR JET IMPINGING ON A FLAT SURFACE
GAUNTNER, J. W. HRYCAK, P. /NEWARK COLL. OF
ENG./ LEE, D. T. LIVINGOOD, J. N. B. DATE- DEC.
1970 REAN- SEE ALSO NASA-TN-D-5652,
NASA-TN-D-5690
LEWIS-11129
Survey develops adequate heat transfer correlations for design use. Flow characteristics studies include - potential core length, velocity and pressure distribution through the jet, and spread of jet and velocity decay along jet axis.

B70-10673
LOW TEMPERATURE USES OF HELIUM
BROWN, G. V. DATE- DEC. 1970
LEWIS-11171
Helium is used for purging and pressurizing cryogenic rocket propellants, welding, atmosphere control, leak detection, and refrigeration. It

provides the lowest possible liquid-bath temperature and produces superconductivity in certain materials. Its superfluid effects are used in superconducting magnets.

B70-10677
COMPACT ELECTRIC HEATER
BLOCK, H. B. LUMANICK, S. MACOSKO, R. P. RICHTER, C. W. DATE- DEC. 1970 REAN- SEE ALSO NASA-TM-X-52778
LEWIS-11172
Forced convection electric heater heats inert gas flows to temperatures of from 1250 to 1650 deg F and tests Brayton power systems for advanced spacecraft. Heater has two basic components, a heat exchanger core and a containment vessel.

B70-10678
DEVELOPMENT OF SUPERCONDUCTIVE MAGNETS
LAURENCE, J. C. DATE- DEC. 1970
LEWIS-11170
Survey of superconductive magnets considers - stabilization problems, advances in materials and their uses, and design evolution. Uses of superconducting magnets in particle accelerators and bubble chambers, as well as possible applications in magnetohydrodynamic and thermonuclear power generation and levitation are discussed.

B70-10680
ASTRONAUT RESCUE AIR PACK /ARAP/ AND EMERGENCY EGRESS AIR PACK /EEAP/
BARNHART, W. L. /BENDIX CORP./, CLEW, R. D. WADDELL, H. M., JR. /N. AM. ROCKWELL CORP./
DATE- DEC. 1970
KSC-10522
Two designs for a lightweight, low profile, mobile rescue apparatus providing a 15-minute air supply and self-contained two-way communications assembly are described. Units are designed for astronaut use in hazardous environments.

B70-10681
LESS-EXPENSIVE ROCHON PRISMS
AMMANN, E. O. /SYLVANIA ELECTRON. SYSTEMS/ MASSEY, G. A. DATE- DEC. 1970
M-FS-20554
Inexpensive Rochon prisms can be produced by substituting easily polished glass for one-half of the calcite. Reciprocal polarizing properties of a conventional Rochon prism are retained, and angular separation between ordinary and extraordinary rays is the same as in all-calcite prism.

B70-10683
THEORETICAL STUDY OF A PLASMA ACCELERATOR
PEYRET, R. DATE- DEC. 1970 REAN- SEE ALSO N67-16558
NPO-11480
Two-dimensional unsteady flow established in an electrodeless traveling wave plasma accelerator was theoretically analyzed to help explain, and possibly predict, phenomena appearing during experiments on problems of acceleration of an ionized fluid plasma.

B70-10686
SINGLE-LEVEL RESONANCE PARAMETERS FIT NUCLEAR CROSS-SECTIONS
DRAWBAUGH, D. W. /WESTINGHOUSE ASTRONUC. LAB./ GIBSON, G. MILLER, M. PAGE, S. L. DATE- DEC. 1970
NUC-10101
Least squares analyses of experimental differential cross-section data for the U-235 nucleus have yielded single level Breit-Wigner resonance parameters that fit, simultaneously, three nuclear cross sections of capture, fission, and total.

B70-10690
COMPARISON OF AERODYNAMIC NOISE FROM THREE NOSE-CYLINDER COMBINATIONS
GUENTHER, R. A. /LOCKHEED MISSILES AND SPACE CO./ REDING, M. P. DATE- DEC. 1970
M-FS-20816
Results of experiments with three different cylinder and blunted nose combinations are discussed. Combinations include smooth cylinder with single 15 deg cone, smooth cylinder with double cone of 25 and 10 deg, and longitudinally corrugated cylinder with similar double cone.

B70-10694
HIGH INTENSITY HEAT-PULSE SOURCE OPERATES WITHOUT COOLING SYSTEM
RUSSELL, L. D. DATE- DEC. 1970
ARC-10178
Tungsten-iodine quartz lamp with on-off control is mounted at focus of ellipsoidal reflector and shutter is mounted at conjugate focus. Flux sensor monitors lamp and actuates shutter which emits a heat pulse when the radiant flux builds up to requisite level.

B70-10711
AN IMPROVEMENT IN BLACKBODY CAVITY DESIGN
SCHMIDT, R. M. /HONEYWELL, INC./ DATE- DEC. 1970
REAN- SEE ALSO NASA-CR-1583
LANGLEY-10292
Setting the axis of the conical cavity at an angle to the axis of observation removes the imperfection at the apex of the cone from the direct observation area of the radiometer. Fillet no longer behaves as a nonuniformity in the blackbody.

B70-10726
PERFORMANCE MAP OF A HEAT PIPE CHARGED WITH AMMONIA
SCHWARTZ, J. DATE- DEC. 1970 REAN- SEE ALSO N65-20720
NPO-11454
Test results are presented which describe dryout in type-304 stainless steel heat pipes when ammonia is the working fluid. Graph compares heat transfer capabilities of both ammonia and water. Heat pipe apparatus and performance are described.

B71-10015
RESISTIVITY AND HALL MEASUREMENTS OF THERMOELECTRIC MATERIALS
RUFF, R. D.
JAN. 1971 SEE ALSO NASA-TM-X-53763
M-FS-20470
Instrumentation setup measures resistivity values between .000003 and 100,000 ohm-cm and Hall values between 0.2 and 10 billion cc/coulomb, with an absolute error of less than 5 percent. Results of measurement are given for 8 electrical brush specimens and pure silver.

B71-10022
DESIGN AND DEVELOPMENT OF A FAST SCAN INFRARED DETECTION AND MEASUREMENT INSTRUMENT
DOSTOOMIAN, A. S./RAYTHEON CO./ HAMITER, L. NOWAKOWSKI, M. VANZETTI, R.
JAN. 1971
M-FS-20749
Infrared microscope instrument measures and plots the infrared profile of semiconductor chips, transistors and integrated circuits. Infrared analyses yields information on electrical and physical properties, enabling manufacturing improvements in semiconductor performance and reliability. Operational performance and main sections of the instrument are given.

B71-10026
ULTRAVIOLET INTERFEROMETER
DAY, R. A./OKLA. UNIV./
JAN. 1971
HQ-10546
Grazing-incidence multi-beam interferometer /GIMBI/ obtains high resolution spectroscopic data from ultraviolet region of the spectrum without use of concave diffraction gratings or partially reflecting coatings. Device produces interference pattern whose fringes may be sharper than those produced by a Fabry-Perot interferometer.

B71-10031
IMPROVED SOURCE OF INFRARED RADIATION FOR SPECTROSCOPY
BURKHARD, D. G./P. E. C. RES. ASSOCIATES, INC./ RAO, K. N.
FEB. 1971
M-FS-20613
Radiation from a crimped V-groove in the electrically heated metallic element of a

high-resolution infrared spectrometer is more intense than that from plane areas adjacent to the element. Radiation from the vee and the flat was compared by alternately focusing on the entrance slit of a spectrograph.

B71-10036
A 7.6M /25-FT/ EXTREME ENVIRONMENTS SIMULATOR
ARGOUD, M. J. HARRELL, J. W.
FEB. 1971 SEE ALSO NASA-CR-106222
MPO-11353
Stainless steel cylindrical simulation chamber permits testing equipment under extreme cold, high partial vacuums, and intense solar radiation. Applications include heat balance and temperature distribution studies, investigations of subsystem interactions, tests of attitude control equipment and sensors, and acceptance tests of complete systems.

B71-10041
AN UNCONFINED, LARGE-VOLUME HYDROGEN/AIR EXPLOSION
KNIGHT, H. T./LOS ALAMOS SCI. LAB./ OTWAY, H. J.
REIDER, R.
MAR. 1971
NUC-11000
Cause and results of the autoignition of 283 cubic meters of hydrogen gas, of which only about 10 percent exploded, are given. Results indicate that autoignition produces an explosion which could be described as a deflagration of explosive velocity, with a shock wave of sonic velocity and minor damage potential.

B71-10046
INEXPENSIVE HIGH-TEMPERATURE FURNACE FOR THERMOCOUPLE CALIBRATION
GRACEY, C. M./AEROJET-GEN. CORP./ HOFF, R. G.
MAR. 1971
NUC-10372
New furnace calibrates unknown thermocouple by comparing its electrical output to a reference thermocouple /previously calibrated by optical pyrometry/, as both are heated simultaneously. Thermocouples may be radioactive, thus heat source must be accessible by remote manipulation and inspection measurements. Advantages of furnace operation are cited.

B71-10065
MULTIPLE SHUTTERS FOR A STEREOSCOPIC CAMERA
MARKER, L. W./GOERZ OPT. CO., INC./ PERKINS, D. B.
RIKER, J. G. SAMPEY, H. R.
APR. 1971
MSC-13507
Focal plane shutter assembly composed of three mechanically separate rotary shutters permits exposure of three separated photographic films simultaneously with exposure time of 0.08 second. Exposure time is repeatable within 2 percent, uniformity of exposure over all three films is within 5 percent.

B71-10066
TECHNIQUE FOR EXPERIMENTAL DETERMINATION OF RADIATION INTERCHANGE FACTORS IN SOLAR WAVELENGTHS
BOBCO, R. P./HUGHES AIRCRAFT CO./ HOLTE, L. J.
WENSLEY, J. R.
APR. 1971 SEE ALSO NASA-CR-101945
MSC-13476
Process obtains solar heating data which support analytical design. Process yields quantitative information on local solar exposure of models which are geometrically and reflectively similar to prototypes under study. Models are tested in a shirtsleeve environment.

B71-10068
KALEIDOSCOPIC LIGHT FEEDBACK FOR TELEVISION SYSTEMS
DAVIS, J. G. WOODS, J. M.
APR. 1971
MSC-12386
Technique generates special effects for broadcast television to study effects of light feedback on television systems. Signals are produced for tape recording, broadcasting, or displaying on black-and-white or color monitors. The patterns have from three to eight sides and expand, contract, or rotate at various speeds.

B71-10085
MODIFIED BUBBLE LEVEL SENSES PITCH AND ROLL ANGLES OVER WIDE RANGE
MATTSON, E. J./GOERTZ OPT. CO., INC./ MC NALLY, P. F.
APR. 1971
MSC-13506
Bubble level sensor with fiber-optic field flattener is simple, rugged, small, and impervious to temperature and vibration effects. Pitch angles from -15 deg to +40 deg and roll angles of +30 deg are determined within 0.5 deg.

B71-10110
IMPROVED REFLECTIVE COATING FOR INTEGRATING SPHERES
STUART, J. W.
MAY 1971
GSFC-10855
Inorganic salts or oxide material is transparent in single-crystal form, has high refractive index, smooth cleavage, and chemical stability, is stable to radiations of interest, partially soluble and easily dispersed in liquid for spraying, and readily dried /cured/ with reasonable cohesion and adhesion, and has good mechanical stability.

B71-10111
EXHAUST CLOUD RISE AND DIFFUSION IN THE ATMOSPHERE
CHANDLER, M. W./GEOMET, INC./ CHU, R. T. THAYER, S. D.
MAY 1971 SEE ALSO NASA-CR-61331
M-FS-21119
Analytical approach develops physical-mathematical model of rocket engine exhaust cloud rise, growth, and diffusion. Analytic derivations and resultant model apply to hot exhaust cloud study or industrial stack plumes, making work results applicable to air pollution. Model formulations apply to all exhaust cloud types and various atmospheric conditions.

B71-10112
RADIANT ENERGY ABSORPTION ENHANCEMENT IN OPTICAL IMAGING SYSTEMS
BROWN, R. M. GUNTER, W. D., JR.
MAY 1971
ARC-10194
Reimaging system efficiently uses incident light and overcomes previous imaging detector problems. Optical system collects reflected and focal plane transmitted light and redirects it so it again impinges on focal plane in register with original image. Reimaging unabsorbed light increases light absorption and detector use probability.

B71-10113
OPTICAL ENHANCEMENT OF PHOTOMULTIPLIER SENSITIVITY
GRANT, G. R. GUNTER, W. D., JR.
MAY 1971
ARC-10213
Transmission and reflection light losses are reduced by introducing light into end-window of device at an angle large enough to normal so total internal reflection occurs at both photocathode-vacuum and window-air interfaces.

B71-10118
SYSTEM ACCURATELY CONTROLS PRESSURE IN CRYOGENIC TANKS
KIRCHNEIER, W. E., JR.
MAY 1971
LEWIS-11329
High-resolution differential pressure transducer senses very small positive or negative pressure variations in the cryogenic tank relative to absolute reference pressure. System is useful in calibrating instruments where working fluid must be maintained at closely controlled temperature, or in processes requiring very fine pressure control.

B71-10120
LASER DOPPLER INSTRUMENT MEASURES FLUID VELOCITY WITHOUT REFERENCE BEAM
BOURQUIN, K. R. SHIGEMOTO, F. H.
MAY 1971 SEE ALSO B66-10693, B68-10349,
NASA-TN-D-4453
XAC-10770
Fluid velocity is measured by focusing laser beam on moving fluid and measuring Doppler shift in frequency which results when radiation is

scattered by particles either originally present or deliberately injected into moving fluid.

B71-10131
ACTIVE CAVITY RADIOMETER, TYPE III - AN AUTOMATIC, ABSOLUTE STANDARD, HIGHLY ACCURATE DETECTOR
WILLSON, R. C.
MAY 1971
NPO-11504
Instrument of simple construction operates without vacuum enclosure over wide pressure range and temperatures from 218 to 398 deg K and defines absolute radiometric scale to within less than 0.5 mW/sq cm. It has potential application to meteorology and climatology and operates on electrical substitution calorimeter principle.

B71-10139
MICROWAVE CRYOGENIC THERMAL-NOISE STANDARDS
STELZRIED, C. T.
MAY 1971 SEE ALSO NPO-10610
NPO-11424
Field operational waveguide noise standard with nominal noise temperature of 78.09 plus/minus 0.12 deg K is calibrated more precisely than before. Calibration technique applies to various disciplines such as microwave radiometry, antenna temperature and loss measurement, and low-noise amplifier performance evaluation.

B71-10143
ELECTRICAL INSTRUMENT MEASURES POSITION AND VELOCITY OF SHOCK WAVES
DANNENBERG, R. E. HUMPHRY, D. E.
MAY 1971
ARC-10356
Instrument employs a sensor consisting of twin-electrode probe mounted in shock tube wall, with small dc voltage impressed across electrodes. Power supply, amplifier, and gate pulse generator complete the system. Instrument provides data for construction of wave diagrams, as well as measurement of shock velocity.

B71-10144
SCINTILLATION DETECTOR FOR CARBON-14
KNOLL, G. F./MICHIGAN UNIV./ ROGERS, W. L./BENDIX CORP./
MAY 1971 SEE ALSO NASA-CR-73384
ARC-10378
Detector consists of plastic, cylindrical double-wall scintillation cell, which is filled with gas to be analyzed. Thin, inner cell wall is isolated optically from outer (guard) scintillator wall by evaporated-aluminum coating. Bonding technique provides mechanical support to cell wall when device is exposed to high temperatures.

B71-10145
VIBRATION DETECTION USING LASERS
MASSEY, G. A./SYLVANIA ELECTRON. SYSTEMS/
MAY 1971
ARC-10389
Interference displacement patterns produced when light from a laser illuminates diffusely reflecting, vibrating surface are observed and photographed. Standing wave modes on model surface can be interpreted in order to yield amplitude and frequency of vibrations. Flat, white surfaces yield best interference patterns, even over considerable surface curvature.

B71-10157
DIGITAL DECORRELATOR SAVES TIME AND EXPENSE IN ACOUSTIC TESTING OF STRUCTURES
NAKICH, R. B./TIME ZERO CORP./ WOODBURY, R. C.
JUN. 1971
NPO-11542
Instantaneous signals from coherent random sound field are summed and time delayed to avoid introducing vectorial addition errors. Resultant statistically independent signals are applied to spectrometer. Displayed sound pressure level is proportional to square root of sum of squares of sound pressure levels taken over frequency range of interest.

B71-10160
DROPOUTS IN MAGNETIC TAPE RECORDING AND REPRODUCTION
VAN, K. W.
JUN. 1971
NPO-11519
Judicious selection and maintenance of tape and tape transports minimizes dropouts.

B71-10166
TRIANGULAR-WAVE GENERATOR WITH CONTROLLED SWEEP POLARITY
WONG, H. Y./LOCKHEED MISSILES AND SPACE CO./
JUN. 1971
ARC-10332
Generator, comprised largely of integrated circuits, has operational amplifier connected as integrator to provide linear voltage ramp, pair of logic gates and one-shot multivibrator function as sweep reverse circuit feeding the integrator. Solid state switch effects generator hold capability.

B71-10180
IMPROVED THERMAL PAINT FORMULATION
GATES, D. W. ROGER, F. O./IIT RES. INST./ ZERLAUT, G. A.
JUN. 1971
M-FS-14706
Potassium silicate-treated zinc oxide paint stabilizes pigment against ultraviolet-induced, bleachable degradation in infrared region, and permits use of ZnO as pigment in ultraviolet-stable coatings based upon polymethyl siloxane elastomers and resins. Material has low absorptance/emittance ratio.

B71-10191
COMPUTER-CONTROLLED MASS SPECTROMETER FOR ON-LINE GAS ANALYSIS
HAFNER, F. W. HOUSEMAN, J.
JUN. 1971
NPO-11427
System detects gases in combustion chambers and records their levels of concentration. Simplified data recording and reduction process permits analysis rate of 9 msec per peak and recording of probe position, pressures, temperatures, and mass spectrometer data on same tape. System is applicable to air pollution control.

B71-10203
WATER ELECTROLYSIS MODULE
SCHUBERT, F. H./TRW, INC./
JUN. 1971 SEE ALSO NASA-CR-73394
ARC-10246
Module utilizes static water-feed electrolysis system and air-cooled fins to remove heat generated by cell inefficiencies. Module generates 0.15 pounds of oxygen and 0.0188 pounds of hydrogen at current density of 100 amps per square foot. Generator operates in aircraft, spacecraft, or submarine cabins.

B71-10232
LASER INTERFEROMETRY METHOD FOR ABSOLUTE MEASUREMENT OF THE ACCELERATION OF GRAVITY
HUDSON, O. K.
JUL. 1971 SEE ALSO NASA-TM-X-53832, NASA-TM-X-53856, NASA-TM-X-64503
M-FS-21225
Gravimeter permits more accurate and precise absolute measurement of g without reference to Potsdam values as absolute standards. Device is basically Michelson laser beam interferometer in which one arm is mass fitted with corner cube reflector.

B71-10235
DEVICE MEASURES CONDUCTIVITY AND VELOCITY OF IONIZED GAS STREAMS
COOK, G. R. POSCH, R. E. ROSSOW, V. J. VENDELL, E. W./UTAH STATE UNIV./
JUL. 1971 SEE ALSO NASA-TN-D-4538
XAC-05695
Coaxial arrangement of primary coil and two sensing secondary coils contained inside slender quartz tube inserted into ionized stream permits simultaneous determination of conductivity and linear velocity. System results agree favorably with theory.

B71-10236
NOISE DIFFRACTION PATTERNS ELIMINATED IN COHERENT OPTICAL SYSTEMS
GREBOWSKY, G. R. HERMANN, R. L. PAULL, H. B. SHULMAN, A. R.
JUL. 1971
GSFC-11133
Lens rotation technique of noise diffraction pattern elimination spreads diffracted energy, normally concentrated over small area of image, over much larger annular area. Technique advantages include simplified lens selecting process, reduced clean room requirements, and low cost equipment requirements.

B71-10249
LASER VIBRATION ANALYZER
FOSTER, J. V.
JUL. 1971 SEE ALSO B70-10439, B71-10145, NASA-CR-985
XAC-01670
Instrument system uses laser and optical heterodyne receiver to measure Doppler phase shifts produced on a laser beam by the deflection of the vibrating surface of a structure under test or in operation.

B71-10252
OPTICAL PROBING OF SUPERSONIC FLOWS WITH STATISTICAL CORRELATION
FUNK, B. H.
AUG. 1971 SEE ALSO NASA-TM-X-53870
M-FS-20642
Remote sensing tool reliably measures statistical properties of supersonic turbulence. Tool neither affects nor is adversely affected by flow field. Device determines characteristics of supersonic flow with optical system and provides method and apparatus for separating translational and rotational motions of turbulent structures in supersonic flow.

B71-10260
THERMAL HELIOTROPE - A PASSIVE SUN-TRACKER
BYXBEE, R. C./LOCKHEED MISSILES AND SPACE CO./
JUL. 1971
GSFC-10945
Continuous sun tracking device consists of helical bimetallic coil and control mechanism. Coil produces torque and angular displacement with temperature change, and acts as device's driving element. Control mechanism, concentric shading mechanism containing bimetallic sensor coil, controls tracking rate and provides for reset cycle.

B71-10262
SURVEY OF HEAT TRANSFER TO NEAR CRITICAL FLUIDS
HENDRICKS, R. C. SIMONEAU, R. J. SMITH, R. V./NBS/
JUL. 1971 SEE ALSO NASA-TN-D-5886
LEWIS-11289
Survey topics include - heat transfer boundaries of near critical region, free, natural, and forced convection experiments, oscillations, geometric effects, parameters which appear to be significant to heat transfer in critical region, and theories which have been proposed for region.

B71-10264
DURABLE CATHODES FOR HIGH-POWER INERT-GAS ARCS
DECKER, A. J. GETTLEMAN, C. C. GOLDMAN, G. C. HALL, J. H. POLLACK, J. L.
AUG. 1971
LEWIS-11162
Cathode design minimizes evaporation of electrode material which may deposit on associated optical surfaces. It also results in stable operation and precise positioning of arc relative to optical collector. Innovation applies to high power light sources and to arcs used in industrial furnaces.

B71-10265
VARIABLE RATIO BEAM SPLITTER FOR LASER APPLICATIONS
BROWN, R. M.
AUG. 1971
ARC-10391
Beam splitter employing birefringent optics provides either widely different or precisely equal beam ratios, it can be used with laser light source systems for interferometry of lossy media, holography, scattering measurements, and precise beam ratio applications.

B71-10269
DYNAMIC RESPONSE OF VISCOUS COMPRESSIBLE FLUIDS IN RIGID TUBES
GOLDSCHMIED, F. R.
AUG. 1971
M-FS-20542
Data on experimental verification of Iberall's analysis applies to such problems as pressure sensing, pneumatic control circuits with bellows, measuring irregular shaped volumes, and transmitting fluid power by pulsating flow.

B71-10272
COMPRESSED GAS HANDBOOK
COTA, R. A. KUNKLE, J. S. WILSON, S. D.
AUG. 1971 SEE ALSO NASA-SP-3045
KSC-10662
Handbook includes thermodynamic and related fluid flow data required to analyze high pressure compressible and incompressible fluid systems. Some theory and applications include thermodynamic fundamentals, gas behavior, adiabatic and isentropic flow, shock waves, flow measurement, and adiabatic and isothermal friction flow in pipes.

B71-10273
APPROXIMATE PROPERTIES OF THE RESPONSE OF NONLINEAR DYNAMIC SYSTEMS TO STOCHASTIC INPUTS
ZIRKLE, L. D./TEX. UNIV./
AUG. 1971
M-FS-20717
Indirect method considers effect of nonlinearity and obtains approximate probability densities of certain characteristics, from these densities various statistical properties are calculated. Direct method determines response moments directly. Neither method is restricted by system motion with regard to whether or not it is stationary.

B71-10283
IMPROVED CHARGED-PARTICLE ANALYZER - A CONCEPT
DIMEFF, J.
AUG. 1971
XAC-05506
Device utilizes concept that charged-particle analysis is achievable by applying sinusoidal voltage across two conductive deflection plates with predetermined curvature and constant spacing to define selective passageway for charged particles to be analyzed. Four advantages of improved device are cited.

B71-10311
RADIAL HEAT FLUX TRANSFORMER
BASIULIS, A./RCA/ BUZZARD, R. J.
AUG. 1971
NPO-10828
Unit moves heat radially from small diameter shell to larger diameter shell, or vice versa, with negligible temperature drop, making device useful wherever heating or cooling of concentrically arranged materials, substances, and structures is desired.

B71-10333
VIBRATION ANALYSIS BY TIME-AVERAGE HOLOGRAPHY
APRAHAMIAN, R./TRW, INC./ EVENSEN, D. A.
SEP. 1971 SEE ALSO NASA-CR-1671
LANGLEY-10614
Method photographs vibration modes as high as 100 kHz. Technique also measures vibration decay and damping characteristics. Compensation techniques for structural size limitations and for background noise excitations are discussed.

B71-10335
FLAME ZONE OF A COMPOSITE PROPELLANT EXPANDED BY A LASER SOURCE
FRIEDMAN, R. HERTZBERG, M. MC HALE, E. VON ELBE, G./ATLANTIC RES. CENTER/
SEP. 1971
LANGLEY-10660
Technique scales flame structure linearly with gas kinetic mean free path, which increases two to three orders of magnitude as pressure decreases

like amount. Kinetic and transport time scales expand in proportion so that regression rates for laser-induced flames are two to three orders of magnitude slower.

B71-10340
LIQUID-HYDROGEN/NUCLEAR-RADIATION RESISTANT SEALS
VAN AUKEN, R./WHITTIER CORP./
SEP. 1971
M-FS-21364
Seal employs aromatic heterocyclic polymer, polyquinoxaline, and features resin starved laminate consisting of alternate layers of woven glass fabric and polymer film. Design gives gasket a mechanical spring characteristic, eliminating cold flow and resulting in elastic recovery when gasket is unloaded.

B71-10343
REMOTE CONTROL RADIOACTIVE-WASTE REMOVAL SYSTEM USES MODULATED LASER TRANSMITTER
BURCHER, E. E. KOPIA, L. P. ROWLAND, C. W. SINCLAIR, A. R.
SEP. 1971
LANGLEY-10311
Laser remote control system consists of transmitter, auto tracker, and receiver. Transmitter and tracker, packaged together and bore sighted, constitute control station, receiver is slave station. Model has five command channels and optical link operating range of 110 m.

B71-10350
A STUDY OF NITRIDE DEVICES FOR COMPUTER MEMORY APPLICATIONS
RABURN, W. D./ALA. UNIV./
SEP. 1971
M-FS-20971
Metal-nitride-oxide-silicon /MNOS/ capacitors act like metal-nitride-silicon /MNS/ capacitors with extra interface where sheet of charge can be stored in slow states. Flatband voltage shifts over a wide range by adjusting store charge density.

B71-10351
STATISTICAL ANALYSIS TABLES FOR TRUNCATED OR CENSORED SAMPLES
COHEN, A. C./GA. UNIV./ COOLEY, C. G.
SEP. 1971 SEE ALSO NASA-CR-61330
M-FS-21024
Compilation describes characteristics of truncated and censored samples, and presents six illustrations of practical use of tables in computing mean and variance estimates for normal distribution using selected samples.

B71-10352
VIBRATION TESTING AND ANALYSIS USING HOLOGRAPHY
INNOVATOR NOT GIVEN /GCO, INC./ SEP. 1971 SEE ALSO NASA-CR-103053
M-FS-21050
Time average holography is useful in recording steady state vibrational mode patterns. Phase relationships under steady state conditions are measured with real time holography and special phase shifting techniques. Data from Michelson interferometer verify vibration amplitudes from holographic data.

B71-10353
LITERATURE REVIEW AND EXPERIMENTAL INVESTIGATION OF HEAT PIPES
BARSCH, W. O./PURDUE UNIV./ SCHOENHALS, R. J. VISKANTA, R. WINTER, E. R. F.
SEP. 1971 SEE ALSO NASA-CR-102943
M-FS-21074
Tests on heat pipes determine operational limits, external boundary conditions, noncondensable gas effects, startup behavior, and geometric configurations. Experiment consists of design, construction, and testing of an apparatus for measuring wick properties, conventional heat pipes and coplanar heat pipes.

B71-10357
OPTIMUM DOPING ACHIEVES HIGH QUANTUM YIELDS IN GAAS PHOTOEMITTERS
SONNENBERG, H./SYLVANIA ELECTRON. SYSTEMS/
SEP. 1971
M-FS-20962
Experimental data indicate that optimum doping exists. Measured quantum yield curves indicate optimum overall response is obtained in GaAs emitters with doping in high 10 to the 18th power per cu cm range. Doping for optimum response is not necessarily in this range.

B71-10364
INSULATION ASSEMBLY USES CRYOPUMPING TO REDUCE HEAT TRANSFER IN CRYOGENIC LIQUID LINE
MURSINNA, R. C./AMETEC/STRAZA/
SEP. 1971
KSC-10518
Flush joint coupling using foil jacketed annular cone, backfilled with carbon dioxide, eliminates inherent connection problems of conventional bayonet type joints used for vacuum jacketed assemblies.

B71-10378
SIMPLE SPECTROSCOPE USED WITH SOLID STATE IMAGE AMPLIFIER OVER WIDE SPECTRAL RANGE
BROWN, R. L., SR.
OCT. 1971 SEE ALSO B68-10363
M-FS-21345
Prism plus image amplifier panel provides visual image of many infrared spectral lines from carbon arc impregnated with metal compound. Different metal compounds generate various desired spectra. Panel also aligns and focuses simple spectroscopes for detecting spectral lines inside and outside visible region.

B71-10383
HIGH DENSITY PLASMA GUN GENERATES PLASMAS AT 190 KILOMETERS PER SECOND
ESPY, P. N.
OCT. 1971
M-FS-20589
Gun has thin metal foil disc which positions or localizes gas to be ionized during electrical discharge cycle, overcoming major limiting factor in obtaining such plasmas. Expanding plasma front travels at 190 km/sec, compared to plasmas of 50 to 60 km/sec previously achieved.

B71-10385
SUPERCONDUCTOR TRANSITION TEMPERATURES STUDY
BOZOWSKI, S./RCA/ GITTLEMAN, J. T. HANAK, J. J. PELLICANE, J. P.
OCT. 1971 SEE ALSO NASA-CR-110432
M-FS-21247
Compounds having beta tungsten structure exist as solid solutions over composition range of several percent. However, for most of these compounds, relationship between composition and superconducting transition temperature is not known.

B71-10388
IMPROVED ELECTRON EMITTER
NAKANISHI, S.
OCT. 1971
LEWIS-10814
Emitter applies to devices in which a plasma is generated by electron bombardment. Device is conventional hollow cathode modified by addition of integral keeper cap containing small aperture which encloses outlet of the cathode and is held in position by ceramic tube.

B71-10395
TONE-BURST TECHNIQUE MEASURES HIGH-INTENSITY SOUND ABSORPTION
POWELL, J. G./LING-TEMCO-VOUGHT, INC./ VAN HOUTEN, J. J.
OCT. 1971 SEE ALSO NASA-CR-1698
LANGLEY-10667
Tone-burst technique, in which narrow-bandwidth, short-duration sonic pulse is propagated down a standing-wave tube, measures sound absorbing capacity of materials used in jet engine noise abatement. Technique eliminates effects of tube losses and yields normal-incidence absorption coefficient of specimen.

B71-10406
OPACIFIED FIBROUS THERMAL INSULATION
CHAMBELLAN, R. E. MC GREW, J. L./MARTIN MARIETTA CORP./
NOV. 1971
LEWIS-11235
Lightweight, opacified, glass fiber batting for high temperature insulation in cryogenic tanks has lower apparent thermal conductivity than untreated insulations. Decrease results from impeding the transmission of radiant energy without increasing the solid conductance of the material.

B71-10425
ELEMENTS OF ORBIT-DETERMINATION THEORY - TEXTBOOK
SOLLOWAY, C. B.
NOV. 1971
NPO-11466
Text applies to solution of various optimization problems. Concepts are logically introduced and refinements and complexities for computerized numerical solutions are avoided. Specific topics and essential equivalence of several different approaches to various aspects of the problem are given.

B71-10427
VIRTUAL-IMAGE DISPLAY SYSTEM FOR FLIGHT SIMULATORS
CHASE, W. D.
NOV. 1971
ARC-10175
Dual TV monitor and collimated lens system in windscreens of standard aircraft cockpit simulator permits both pilot and copilot to simultaneously view three dimensional presentation. Proper design of complete system permits depth and viewpoint of visual displays to be accurately presented.

B71-10432
THERMAL SCALE MODELING
MAC GREGOR, R. K./BOEING CO./
NOV. 1971 SEE ALSO NASA-CR-102671
M-FS-21268
Complex system study data indicate that factors associated with multilayer insulation pose major problem in scale modeling, that numerical analysis aids correction for known compromises of scaling criteria, and that probable errors in scale modeling experiments fall within range predicted by statistical analysis.

B71-10436
TABLE FOR ESTIMATING PARAMETERS OF WEIBULL DISTRIBUTION
MANN, N. R./N. AM. ROCKWELL CORP./
NOV. 1971
M-FS-18817
Table yields best linear invariant /BLI/ estimates for log of reliable life under censored life tests, permitting reliability estimations in failure analysis of items with multiple flaws. These BLI estimates have uniformly smaller expected loss than Gauss-Markov best linear unbiased estimates.

B71-10454
IMPROVED PLASMA ACCELERATOR
CHENG, D. Y.
NOV. 1971
ARC-10109
Converging, coaxial accelerator electrode configuration operates in vacuum as plasma gun. Plasma forms by periodic injections of high pressure gas that is ionized by electrical discharges. Deflagration mode of discharge provides acceleration, and converging contours of plasma gun provide focusing.

B71-10470
PSYCHROMETRIC CHART FOR PHYSIOLOGICAL RESEARCH
CHAMBERS, A. B.
NOV. 1971
ARC-10394
Chart facilitates use of graphical techniques for solving problems involving thermodynamic properties of moist air. The properties are presented, and their units of measurement are listed. Chart presenting conditions at standard atmosphere pressure at sea level is most useful.

B71-10478
IMPROVED MOLECULAR SORBENT TRAP FOR HIGH-VACUUM SYSTEMS
KNECHTEL, E. D. PITTS, W. C.
DEC. 1971
ARC-10056
Closed cycle refrigeration loop in which trays holding molecular sorbent are made to serve as cooling baffles improves the performance of high vacuum systems. High performance is obtained with almost no decrease in pumping speed.

B71-10484
COMPUTERIZED METHODS FOR TRAFFICABILITY ANALYSIS
LEWANDOWSKI, G. M./CORNELL, AERON. LAB., MC ADAMS, H. T. REESE, P. A.
DEC. 1971 SEE ALSO NASA-CR-1881
M-FS-21423
Computer program produces trafficability maps displaying terrain characteristics in digital form for computer analysis. Maps serve as aid to vehicular operation and highway planning based on maneuverability parameters.

B71-10494
MODIFIED CAMERA RECORDS LENS SETTINGS ON FILM
THOMPSON, R. E.
DEC. 1971
MSC-12363
Camera is modified by inserting optical imaging system between lens and film. This system requires no electrical power, is low in weight, and adds nothing to external size of the camera.

B71-10506
SHUTTER DESIGN FOR STEREOSCOPIC CAMERA
INNOVATOR NOT GIVEN /EASTMAN KODAK CO./ DEC. 1971
MSC-13613
Shutter design consists of two axially mounted spring driven rotating blades with two lenses mounted between the blades. Features include excellent repeatability and flash synchronization. Design permits packaging in small volume and is beneficial where focal distance, magnification, and exposure time are fixed.

B71-10519
ANEMOMETER CALIBRATOR
BATE, T./INCA ENG. CORP./ CALKINS, D. E. PRICE, P. VEIKINS, O.
DEC. 1971
M-FS-21424
Calibrator generates accurate flow velocities over wide range of gas pressure, temperature, and composition. Both pressure and flow velocity can be maintained within 0.25 percent. Instrument is essentially closed loop hydraulic system containing positive displacement drive.

B71-10526
MULTICHAMBER CONTROLLABLE HEAT PIPE
SHLOSINGER, A. P./TRW SYSTEMS GROUP/
DEC. 1971 SEE ALSO NASA-CR-1400
ARC-10199
Valve throttles transfer of vapor between heat input surface and heat rejection surface of heat pipe to control rate of transfer of energy. Valve is operated by control signals which sense temperatures or pressures.

B71-10527
IMPROVING LASER BEAM COHERENCE - A CONCEPT
HEFLINGER, L. O./TRW SYSTEMS GROUP/
DEC. 1971 SEE ALSO NASA-CR-114274
ARC-10417
Laser frequencies may be reduced to single frequency or selected frequencies. For single frequency performance, spacing of frequencies falls in natural line width. For two or more frequencies, thicker spacing is used. Configuration adapts to operation with Kerr or Pockel cell for Q switching.

B71-10534
MULTIFREQUENCY LASER BEAMS FOR HOLOGRAPHIC CONTOURING
HEFLINGER, L. O./TRW SYSTEMS GROUP/ WUERKER, R. F.
DEC. 1971 SEE ALSO NASA-CR-114274
ARC-10341

Pulsed ruby laser emits two optical frequencies simultaneously so holographic recordings of test object give images showing desired range contours. Process enables generation of contour maps for practical applications such as gaging size and shape of mechanical parts and other structures.

B71-10536
MINIATURE CARBON DIOXIDE SENSOR
MC HENRY, T. F./BARNES ENG. CO./
DEC. 1971
MSC-13332

Sensor with no moving parts measures carbon dioxide partial pressures of 0 to 40 mm Hg for total pressures up to 14 psia with a full scale accuracy of 5 percent.

B72-10001
IMPROVED LABORATORY GRADIOMETER CAN BE A FIELD SURVEY INSTRUMENT

L. G. D. Thompson (Gen. Oceanology, Inc.), M. H. Houston (Gen. Oceanology, Inc.), D. A. Rankin (Gen. Oceanology, Inc.), and E. M. Yavner (Gen. Oceanology, Inc.)
1972
MSC-13980

Improvements made to quartz gradiometer minimize or eliminate disturbing effects from known error sources and permit sensitivity of + or - 1 times 10 to the minus 9th power/sec sq or better and measuring accuracy of + or - 5 times 10 to the minus 9th power/sec sq.

B72-10003
URBAN AIR POLLUTION DISPERSION MODEL

J. J. Robert
1972
AEC-10004

Three-dimensional integrated puff model simulates smoke plume dispersion processes and estimates pollutant concentration during periods of low wind speed. Applications for model are given.

B72-10004
EFFECT OF THERMAL DISCHARGES ON THE MASS ENERGY BALANCE OF LAKE MICHIGAN

J. G. Asbury
1972
AEC-10013

Effects of electric utility generating stations and steel mills on physical quality of Lake Michigan are considered. Study is based on extension of heat exchange model developed by Edinger and Geyer for small lakes and cooling ponds.

B72-10008
PROPELLANT-POWERED ACTUATOR FOR GAS GENERATORS

M. J. Makowski (TRW Systems Group)
1972
ARC-10484

Hydrazine operated monopropellant generators are used for spacecraft rocket engines and propellant pressurization systems. Measured work output of monopropellant actuators compares favorably with output of squib-type actuators.

B72-10016
REMOTE SENSING X-RAY SPECTROMETER

I. Adler (NASA. Goddard Space Flight Center), J. Trombka (NASA. Goddard Space Flight Center), H. Gursky (Am. Sci. and Eng., Inc.), and P. Gorenstein (Am. Sci. and Eng., Inc.)
1972
MSC-13978

Spectrometer measures chemical composition of lunar rocks by remote sensing from orbit and senses lunar X-rays produced by interaction of solar X-rays and elements on the lunar surface. Instrument features high sensitivity, data handling system that accumulates and prepares data for telemetry, and automatic calibration.

B72-10020
SOLAR EXPERIMENT ALIGNMENT SYSTEM

D. L. Fain (Exotech, Inc.)
1972
ARC-10471

Sensor system determines absolute alignment of optical axis of experiment package relative to solar vector and provides control information to permit pointing experiment anywhere on solar disc to absolute accuracy of the order of two arc seconds in center and five arc seconds on limb.

B72-10026
RISING-PLATE RHEOMETER

R. H. Globus (Aerojet Liquid Rocket Co.) and E. M. VanderWall (Aerojet Liquid Rocket Co.)
1972
ARC-10524

Technique eliminates hazards of handling propellants and permits determination of structure index of gel by remote control. Rheometer weighs cone of propellant gel which remains on a disc that has been slowly pulled out of the gel.

B72-10033
ANALOG TABLE LOOK-UP DEVICE IDENTIFIES UNKNOWN TERRAIN

R. H. Dye (Bendix Corp.)
1972
MSC-13816

Table provides a probability map defining unknown terrain in terms of known terrain inputs. Device consists of analog transformation network and flying spot scanner. Information is useful to manufacturers and users of remote sensing equipment and applies to automated quality control.

B72-10034
A LIQUID RADIATION DETECTOR WITH HIGH SPATIAL RESOLUTION

L. Alvarez (Calif. Univ.)
1972
MSC-13965

Detector, using point anode, minimizes problem of oblique tracks by permitting construction of very thin counter. Detector is useful in cosmic ray and high energy physics research and X-ray and neutron diffraction technology.

B72-10039
HYDRAULIC MODELING OF HEAT DISPERSION IN LARGE LAKES

E. Silberman and H. Stefan
1972
AEC-10003

Case studies of hydraulic models are described for four major generating plants, including information and maps of thermal distribution. Information is of interest to agencies involved in thermal pollution control.

B72-10048
PULSED HIGH-POWER ARC HEATER WITH IMPROVED CATHODE AND TRIGGERING MECHANISM

R. Dethlefsen (Gen. Dyn./Convair) and J. Tinkham (Gen. Dyn./Convair)
1972 See also NASA-CR-1246
ARC-10173

System employs pulsed, constricted arc heater capable of multi-MW power, permitting quasi-stationary flow conditions during latter half of pulse of about 5 msec. System description is given.

B72-10053
INCREASING THE RESPONSE OF PIN PHOTODIODES TO THE ULTRAVIOLET

C. N. Burrous and E. E. Whiting
1972
ARC-10274

Solid state device uses sapphire windows and avoids coatings which absorb ultraviolet radiation and ultimately alter detector geometry. Ultimate solution for ultraviolet response is geometry with maximum peripheral area and horizontal field structure to draw out photon induced current carriers.

B72-10082
VELOCITY ACCELERATOR FOR PARTICLES
A. H. Wilson
1972
NPO-11349
Sheet explosive and metal tube, fitted to the inner periphery of a cam-shaped chamber, accelerate particles to velocities nearing 20 km/sec to evaluate efficacy of spacecraft meteoroid shields.

B72-10083
NEMATIC LIQUID CRYSTALS FOR OPTICAL SHUTTERS: A CONCEPT
R. E. Imus
1972
NPO-11367
Nonmechanical shutter utilizes nematic crystals to attenuate illumination, thus protecting light-sensitive devices such as vidicon or image orthicon tubes and phototubes. Opacity of liquid crystals is controlled by photosensor.

B72-10085
OXYGEN-LAYER STRUCTURE IMPROVES LITHIUM-DOPED SILICON SOLAR CELLS
P. A. Iles (Globe-Union, Inc.)
1972
NPO-11403
Technique fabricates hybrid structure utilizing low oxygen silicon as bulk cell material and shallow overlay of silicon with high oxygen concentration.

B72-10087
GAS LEAK-DETECTION SYSTEM
F. G. Roselli-Lorenzini
1972
NPO-11405
Data monitoring of gas leakage in satellites and spacecraft is facilitated by adding gaseous radioisotopes to cold compressed gas and mounting a detector in the thrust nozzle.

B72-10107
MANGANESE BISMUTH THIN FILM FOR LARGE CAPACITY DIGITAL MEMORIES
D. Chen (Honeywell, Inc.), R. L. Aagard (Honeywell, Inc.), F. M. Schmit (Honeywell, Inc.), and T. S. Liu (Honeywell, Inc.)
1972
M-FS-21246
Material and system research defines accurate memory characteristics in regard to write, read, erase and data operations of manganese bismuth materials.

B72-10113
HEXAPOLE MAGNET FIELD ANALYSIS
R. F. Lacey (Hewlett-Packard Co.)
1972
GSFC-10995
Method rotates magnet about a wire loop of rectangular shape placed inside the pole tips and measures induced loop voltage with a wave analyzer. Quantitative field characteristics are determined from voltage induced at various harmonics of the rotation frequency.

B72-10123
MASS SEPARATOR FOR LOW VELOCITY IONS
H. J. King (Hughes Aircraft Co.)
1972 See also NASA-CR-73443
ARC-10375
Separator provides broad beam of protons free of other charged species to simulate the solar wind in experiments designed to determine effect on materials.

B72-10127
LOW TEMPERATURE CATALYTIC IGNITION OF HYDROGEN AND OXYGEN
H. H. Voge (Shell Develop. Co.), T. J. Jennings (Shell Develop. Co.), and W. E. Armstrong (Shell Develop. Co.)
1972
ARC-10492
Catalyst composed of 32 percent iridium metal supported on granular alumina is most active and most stable of platinum metal catalysts. Catalyst consistently induces reactions at temperatures as low as 78 K.

B72-10128
OPTICAL SHUTTER FOR USE IN SHOCK TUBES
J. O. McClenahan
1972
ARC-10516
Thin metal shutter that is forced into angled optical slit isolates spectrograph from high speed shock tube both optically and mechanically so neither radiation nor particulate material enters spectrograph.

B72-10130
HIGH SOLAR INTENSITY RADIOMETER
J. R. Jack and E. W. Spisz
May 1972 See also NASA-TM-X-2412
LEWIS-11533
Silicon solar cells are used to measure visible radiant energy and radiation intensities to 20 solar constants. Future investigations are planned for up to 100 solar constants. Radiometer is small, rugged, accurate and inexpensive.

B72-10132
GLASS TECHNOLOGY INVOLVED IN THE MANUFACTURE OF MAGNETOMETER COMPONENTS
G. Bergen
1972
GSFC-11283
Glass technology has developed quicker and less costly techniques in sealing and vacuum processing which result in improved lamps and bulbs, thus producing a less costly and more reliable instrument package.

B72-10140
GRAVITATIONAL GRADIOMETER MEASURES MASS CHANGES
C. C. Bell (Hughes Res. Labs.)
1972
M-FS-20814
Differential angular accelerometer, utilizing complex geometric configurations and spring-coupled rotating masses, demonstrates feasibility of measuring mass distributions of celestial bodies by detecting spatial gradients of their fields from orbiting vehicles. Applications include mineralogical surveying, geodetic engineering, and solar system investigation.

B72-10143
ATMOSPHERIC DENSITY VARIATIONS RELATED TO INTERNAL GRAVITY WAVES
E. B. Miller (Northrop Corp.)
1972
M-FS-21637
Report describes method for estimating gravity-wave density variation from wind speed profile between 60 and 100 km. Single profile is inadequate for valid determination of mean or background values and ensemble averaging over several related profiles is recommended.

B72-10146
LOW TEMPERATURE SCALE FOR A 1 TO 20 DEGREE KELVIN REGION
T. C. Cetas and C. A. Swenson
1972
AEC-10007
New temperature scale, accurate to better than plus or minus 0.001 Kelvin over low temperature region, is based on National Bureau of Standards 1955 platinum resistance thermometer scale and utilizes precise susceptibility measurements on two paramagnetic salts.

B72-10147
CONICAL ELECTROMAGNETIC RADIATION FLUX CONCENTRATOR
E. R. Miller
May 1972
M-FS-21613

Concentrator provides method of concentrating a beam of electromagnetic radiation into a smaller beam, presenting a higher flux density. Smaller beam may be made larger by sending radiation through the device in the reverse direction.

B72-10148
DEVICE FOR MEASURING ELECTRIC FIELDS
S. H. Levine (Northrop Corp. Labs.) and S. R. Harrison (Northrop Corp. Labs.)
1972 See also NASA-CR-73177
ARC-10164

Measurement of low-intensity electric fields in space and in presence of weak magnetic fields is accomplished by utilizing a device which permits determination of the extent a beam of cesium ions is deflected by an electric field.

B72-10151
ADVANCES IN INDUCTION-HEATED PLASMA TORCH TECHNOLOGY
J. W. Poole (Humphreys Corp.) and C. E. Vogel (Humphreys Corp.)
May 1972 See also B69-10185; NASA-CR-1764; NASA-CR-1804
LEWIS-11354

Continuing research has resulted in significant advances in induction-heated plasma torch technology which extend and enhance its potential for broad range of uses in chemical processing, materials development and testing, and development of large illumination sources. Summaries of these advances are briefly described.

B72-10152
ADVANCED INFRARED PHOTOMULTIPLIER
H. Sonnenberg (Sylvania Electron. Systems-West) and J. D. Taynal (Sylvania Electron. Systems-West)
1972
M-FS-20941

Photocathode for the 8500 angstrom through 9000 angstrom range, improving efficiency by an order of magnitude, is achieved with a gallium arsenide cesium oxide photocathode. Protection of the GaAs surface from contamination during bake-out is another important function.

B72-10154
METHOD OF DETERMINING THERMAL CONDUCTIVITY IN MULTI-LAYER INSULATION SYSTEMS
K. G. Scrogham (Brown Eng. Co.)
May 1972
M-FS-20213

Repeatable nondestructive method prepares multilayer cryo-insulation material for thermal conductivity measurements. Data acquired are volume of boil-off gas, barometric pressure, gas temperature, chamber pressure, and differential pressure between extremities.

B72-10160
PARTICLE DETECTION BY A LIGHT-SCATTERING TECHNIQUE
S. Kormanyos (Bendix Corp.) and J. Mastroeni (Bendix Corp.)
1972
ARC-10384

Instrument measures concentration of small particles in aqueous medium in terms of amount of light scattered and degree to which light transmission is attenuated. Sensitivity to small particles is optimized because both scattered and transmitted illumination levels are detected by photodiodes.

B72-10166
CELL FOR ELECTROLYSIS OF WATER VAPOR
V. A. Celino (Hamilton Standard) and G. Roebelen (Hamilton Standard)
1972
ARC-10521

Electrolytic cells regenerate oxygen from the water vapor in the air of closed-loop life-support system and remove water vapor from air circulated through them. Water is converted into oxygen and hydrogen; the oxygen is returned to the air, the hydrogen is vented or used elsewhere.

B72-10169
FEEDBACK CONTROL OF VARIABLE CONDUCTANCE HEAT PIPES
W. B. Bienert (Dynatherm Corp.)
1972 See also NASA-CR-73475
ARC-10460

Feedback system monitors source temperature and makes necessary changes of area available for heat rejection by adjusting storage volume of noncondensible gas and position of vapor/gas interface.

B72-10170
VIBRATING RIBBON BOLOMETER: A CONCEPT
J. Dimeff
1972
XAC-10768

Incident electromagnetic radiation pulses maintain bolometer's sensitive element in state of resonant oscillation and correlate amplitude of oscillation with incident radiation power. Bolometer can be employed with other devices for detecting motion of ribbon.

B72-10171
ANNULAR OBJECTIVE APERTURES IMPROVE RESOLUTION OF ELECTRON MICROSCOPES
K. Heinemann and H. R. Poppa
1972
ARC-10448

Hollow-cone illumination techniques, using an annular objective aperture located behind back focal plane of objective lens, increase image contrast and minimize chromatic aberrations.

B72-10180
CRYOGENIC GEL FLOW VISCOMETER
R. H. Globus (Aerojet Liquid Rocket Co.) and E. M. VanderWall (Aerojet Liquid Rocket Co.)
1972
ARC-10523

Coiled section of tubing measures viscous properties of gelled cryogenic propellants under conditions closely resembling flow in rocket engine systems. Characteristic flow curve provides data necessary for the design of prototype hardware systems using the liquid or gel of interest.

B72-10188
RESTARTABLE HEAT PIPE
A. P. Shlosinger (TRW Systems Group)
1972
ARC-10198

Inclusion in heat pipe of auxiliary working fluid which has considerably lower freezing point than main working fluid enables easy starting after main working fluid has been cooled to or below freezing point.

B72-10190
HAND-HELD PHOTOMICROSCOPY SYSTEM
H. R. Zabower
May 1972
ARC-10468

Photomicroscopy system, with simple optics and any standard microscope objective, is used with any type of motion picture, still, or television camera system. Device performs well under difficult environmental conditions and applies to work in ecological studies, field hospitals, and geological surveys.

B72-10192
SOLAR SENSOR WITH AUTOCOLLIMATOR
D. L. Fain (Exotech, Inc.), J. M. Hall (Exotech, Inc.), and D. F. Johnson (Exotech, Inc.)
May 1972 See also NASA-CR-73260
ARC-10148

Monolithic structure, consisting of fused quartz fabricated solar sensor and autocollimator, measures angle between reference surface on spacecraft and solar vector. Device compensates for

errors caused by changes in the alignment of its mountings or component parts. Integrated concept is advantageous whenever sensor mounting errors constitute problems.

B72-10196
WIDE-RANGE DYNAMIC PRESSURE SENSOR
J. Dimeff and J. W. Lane
May 1972 See also NASA-SP-5020
ARC-10263

Transducer measures pressure by sensing the damping of a vibrating diaphragm immersed in the atmosphere to be measured. Improved sensor can be included in rugged, lightweight package for use aboard aircraft, meteorological vehicles, and space probes.

B72-10198
NONDISPERSIVE INFRARED ANALYZER FOR SPECIFIC GASES IN COMPLEX MIXTURES
J. Dimeff, R. W. Donaldson, Jr., W. D. Gunter, and G. J. Deboo
May 1972
ARC-10308

Analyzer identifies and measures particular diatomic or polyatomic gases in complex gas mixtures. Mixing of absorption effects on light energy passing through gases to photodetector produces a signal component that is related to the absorption caused by reference-gas component in unknown gas mixture.

B72-10202
FABRICATION OF LARGE CERAMIC ELECTROLYTE DISKS
S. A. Ring (*Appl. Electrochem., Inc.*)
May 1972
ARC-10320

Process for sintering compressed ceramic powders produces large ceramic disks for use as electrolytes in high-temperature electrolytic cells. Thin, strain-free uniformly dense disks as large as 30 cm squared have been fabricated by slicing ceramic slugs produced by this technique.

B72-10206
DIATOMIC INFRARED GASDYNAMIC LASER PERMITS SELECTION OF WAVELENGTHS
R. L. McKenzie
May 1972 See also NASA-TM-X-62006
ARC-10370

Laser utilizes infrared-active diatomic gas which emits laser energy from numerous upper vibrational levels. Wavelengths depend on particular vibration-rotation transitions and have been obtained throughout the band between 4.78 and 5.4 microns, for example, when using carbon monoxide.

B72-10207
SIMPLE GAS CHROMATOGRAPHIC SYSTEM FOR ANALYSIS OF MICROBIAL RESPIRATORY GASES
G. C. Carle
May 1972
ARC-10403

Dual column ambient temperature system, consisting of pair of capillary columns, microbead thermistor detector and micro gas-sampling valve, is used in remote life-detection equipment for space experiments. Performance outweighs advantage gained by utilizing single-column systems to reduce weight, conserve carrier gas and operate at lower power levels.

B72-10208
HYDROGEN ELIMINATOR
R. J. Kiraly (TRW, Inc.)
May 1972
ARC-10408

Vented hydrogen is converted into water by mixing hydrogen with sufficient air to ensure that a flame cannot be maintained and then passing it through a reactor containing palladium catalyst; reaction takes place at relatively low temperature. Device may have wide range of applications for air purification.

B72-10209
SENSITIVE HOLOGRAPHIC DETECTION OF SMALL AERODYNAMIC PERTURBATIONS
L. O. Heflinger (TRW Systems Group)
May 1972 See also NASA-CR-114274
ARC-10422

Phase modulations enhance the sensitivity of holographic techniques for detecting disturbances which are caused by variations in gas density of the order of 1/10 wavelength or less. In the readout, subject perturbations show up as brightenings on a dark background.

B72-10212
RADIOISOTOPE THERMIONIC POWER SUPPLY FOR SPACECRAFT
W. G. Homeyer (Gulf Gen. Atomic), A. J. Gietzen (Gulf Gen. Atomic), and C. A. Heath
May 1972
ARC-10438

Power supply design for unmanned electric propulsion missions to outer planets utilizes a store of curium-244 in compact array of capsules as energy source. Supply subassemblies are: heat source, converter equipment which supplies power, and safety equipment. System is designed for a 72,000 hour mission.

B72-10217
LIQUID-HELIUM-COOLED MICHELSON INTERFEROMETER
G. C. Augason and N. Young (Block Eng.)
May 1972
ARC-10554

Interferometer serves as a rocket-flight spectrometer for examination of the far infrared emission spectra of astronomical objects. The double beam interferometer is readily adapted to make spectral scans and for use as a detector of discrete line emissions.

B72-10221
SILVER-CHLORINE FUEL CELL: A CONCEPT
M. Lieberman (*ESSO Res. and Eng. Co.*)
1972 See also NASA-CR-94407
ARC-10491

Fuel cell regenerated by photochemical reduction enables novel slurry system to transport particles of reduced silver between regenerator section and anode. Fundamental reactions which provide electrical power from the fuel cell are given.

B72-10227
SIMPLE DYNAMIC ELECTROMAGNETIC RADIATION DETECTOR
J. F. Been
May 1972
LEWIS-11159

Detector monitors gamma dose rate at particular position in a radiation facility where a mixed neutron-gamma environment exists, thus determining reactor power level changes. Device also maps gamma intensity profile across a neutron-gamma beam.

B72-10232
IMPROVED INTENSIFYING SCREEN REDUCES X-RAY EXPOSURE
R. A. Buchanan (Lockheed Aircraft Corp.)
May 1972
AEC-10090

X-ray intensifying screen may make possible radiographic procedures where detection speed and X-ray tube power have been the limiting factors. Device will reduce total population exposure to harmful radiation in the United States.

B72-10240
LABORATORY LEAK TESTER PROVIDES HIGH SENSITIVITY
E. G. Hayes
May 1972
AEC-10042

Detecting unit is capable of measuring leak rates of 10 to the minus 5th power cc/sec or less. Device can be mounted in a carrying case and consists of three vacuum chambers, two pressure gages, and positive seal type control valves.

B72-10242
IMPROVED HIGH-PERFORMANCE SHOCK TUBE

W. A. Menard
Aug. 1972
NPO-11885

Mylar diaphragms in shock tubes are a major improvement over steel diaphragms. Other improvements include: better electrode design; improved flow by opening the throat and removing all constrictions; and improved driver geometry by optimizing volume and shape.

B72-10244
DIRECT ANALYSIS OF HYDROGEN/DEUTERIUM MIXTURES: A CONCEPT
H. C. Lord
Sep. 1972
NPO-11322

Fraction of deuterium/hydrogen mixture is isolated by column chromatography, ionized, and the HD+1-0 band absorption measured with conventional high-resolution infrared spectrophotometer.

B72-10246
WATER CAVITY DEGASSER FOR ELECTROLYSIS CELLS
F. H. Schubert (TRW, Inc.)
Sep. 1972
ARC-10244

Degasser, a cylindrical container made of plastic thick enough to withstand operating pressures of electrolysis module, removes accumulated gases from water cavities without loss of electrolyte.

B72-10248
PRESSURE-PROBE ASSEMBLY FOR WIND TUNNELS
R. L. Warfield (Boeing Co.)
Sep. 1972
ARC-10569

Rake mounting design reduces aerodynamic-surface discontinuities to a minimum when installed in boundary layer bleed area. Mounting base is not required and, because of simplicity, rake can be manufactured at low cost.

B72-10251
AN ELECTROHYDRODYNAMIC HEAT PIPE
T. B. Jones (Colo. State Univ.)
Sep. 1972
ARC-10601

Dielectric liquid for transfer of heat provides liquid flow from the condenser section to the evaporator section in conventional heat pipes. Working fluid is guided or pumped by an array of wire electrodes connected to a high-voltage source.

B72-10259
HIGH-EFFICIENCY COLLECTOR FOR MICROWAVE TUBES
H. C. Kosmahl
Jun. 1972 See also NASA-TN-D-6093
LEWIS-11192

Depressed collector has basic configuration of a dish with a central cone and protruding spike. This geometry velocity sorts and slows the electrons down to minimum velocity at collection, and prevents backstreaming of secondaries and reflected primaries into interaction region of the tube.

B72-10260
HYBRID HOLOGRAPHIC SYSTEM
R. L. Kurtz and B. N. Norden
Jun. 1972
M-FS-20074

Improved holographic system has high degree of resolution and capability of providing a hologram of a moving object without requiring that the system have a high mechanical stability.

B72-10263
EVALUATION OF JET ENGINE NOISE
S. P. Pao (Wyle Labs.)
Jun. 1972
M-FS-21416

Three basic equations, acoustic mode and two Mach modes, characterize jet noise environments. These equations are used to predict noise generation magnitude.

B72-10270
SEPARATION OF GAS MIXTURES BY CENTRIFUGATION
C. Park and W. L. Love
1972
ARC-10449

Magnetohydrodynamic (MHD) centrifuge utilizing electric currents and magnetic fields produces a magnetic force which develops supersonic rotational velocities in gas mixtures. Device is superior to ordinary centrifuge because rotation of gas mixture is produced by MHD force rather than mechanical means.

B72-10273
OXYGEN RECLAMATION WITH SOLID OXIDE ELECTROLYTES
W. Smart (Appl. Electrochem., Inc.) and J. Weissbart (Appl. Electrochem., Inc.)
Jul. 1972 See also NASA-CR-73464
ARC-10487

Electrolyte operated at an elevated temperature in an electrolysis cell regenerates oxygen from metabolic carbon dioxide found in closed-cycle cabin atmospheres.

B72-10274
INTERFEROMETRIC ROTATION SENSOR
T. M. Walsh
Jul. 1972
ARC-10278

Sensor generates interference fringes varying in number (horizontally and vertically) as a function of the total angular deviation relative to the line-of-sight axis. Device eliminates errors from zero or null shift due to lack of electrical circuitry stability.

B72-10276
THERMAL CONTROL FOR STORAGE OF CRYOGENIC PROPELLANTS IN A COMMON-BULKHEAD TANK: A CONCEPT
G. R. Stone (Gen. Dyn./Convair)
Sep. 1972 See also B72-10277; B72-10278; NASA-CR-109833
ARC-10558

Simple, reliable ground-hold refrigeration system for common-bulkhead tank meets design criteria and objectives for ground-hold of oxygen difluoride and diborane. System is failsafe and malfunctions can be rectified without interruption of basic system functions.

B72-10277
SAFE TRANSPORT OF DIBORANE IN A DUAL REFRIGERANT SYSTEM: A CONCEPT
G. R. Stone (Gen. Dyn./Convair)
Sep. 1972 See also B72-10276; B72-10278; NASA-CR-109833
ARC-10559

Mobile transport system, that can be carried by truck and parked in storage area, consists of an inner container capable of holding 363 kg of diborane and an external, dual refrigeration unit which uses liquid nitrogen and Freon-14.

B72-10278
THERMAL CONTROL FOR STORAGE OF CRYOGENIC PROPELLANTS IN A MULTIPLE-TANK SYSTEM: A CONCEPT
G. R. Stone (Gen. Dyn./Convair)
Sep. 1972 See also B72-10276; B72-10277; NASA-CR-109833
ARC-10560

Development of system for storing cryogenic propellants in multiple tank configuration is discussed. System uses single loop and closed loop features. Liquid nitrogen and Freon-14 are used as refrigerants. Diagram of equipment to show components and operation is provided.

B72-10302
MULTIPURPOSE TOP FOR LIQUID HELIUM DEWAR
R. S. Murphy and J. R. Anderholm
Sep. 1972
ARC-10533

Multipurpose top was fabricated for liquid helium Dewar flask which guards against flash vaporization of liquid helium and allows boiling temperature of liquid helium to be lowered by reduction of ambient pressure in Dewar flask. Device is rugged and simple, and does not require frequent calibrations or adjustments.

B72-10307
REDIRECTING ELECTROMAGNETIC BEAMS THROUGH WIDE ANGLES
J. Dimeff, R. M. Brown, and M. Omura
Sep. 1972
ARC-10602

Electromagnetic wave enters reflector array consisting of grid work of metallic reflectors with each reflector obscuring a portion of its neighbors to prevent direct passage of wave through grid. Antenna movement involves reduced amplitude of angular motion and internal cancellations of translational and rotational inertias.

B72-10310
OPTICAL ENHANCEMENT OF SENSITIVITY IN LASER DOPPLER VELOCITY SYSTEMS
G. R. Grant, W. D. Gunter, Jr., and S. A. Shaw
Sep. 1972 See also B71-10113
ARC-10653

Utilization of optical enhancement techniques prevents loss of light by reflections at the photocathode of a photomultiplier and increases signal detection sensitivity.

B72-10312
A SENSITIVE IMAGE INTENSIFIER WHICH USES INERT GAS
Q. A. Kerns (Calif. Univ.) and H. M. Miller (Calif. Univ.)
Dec. 1972
LRL-10024

High gain optical image intensifier utilizes inert gas cavity with copper electrodes to form electron avalanches without excessive pulse voltages. Estimated optical gain for device is two times 10 to the power of seven.

B72-10314
A CRYOPUMP FOR COOLING OBJECTS AT A DISTANCE
P. J. Batson and N. Milleron
Dec. 1972
LRL-10031

Design and construction of cryopump is reported that feeds from primary source to cool component up to 30 ft from source. Liquid oxygen or nitrogen is gravity fed through loop system to copper fibers enclosing component at room temperature where fluid boils, cools object, vaporizes and recycles through tubing loop.

B72-10317
SUNSPOT ANALYSIS AND PREDICTION
Innovator not given (Ark. Univ.) Jul. 1972
M-FS-21724

Evaluation of several procedures that apply rarely used and exotic mathematical functions yields a unique method of application of common trigonometric functions. These functions appear to produce results in the development of a mathematical model capable of describing all available sunspot data.

B72-10324
BAFFLE TO CONFINE GLOW DISCHARGE IN ION PUMP
E. S. J. Wang (McDonnell-Douglas Corp.)
Jul. 1972
M-FS-21575

Electrically-grounded 'optically tight' baffle installed downstream from conventional metal screen prevents discharge from entering test chamber and disturbing test process.

B72-10327
A COMPACT SPECTRORADIOMETER FOR SOLAR SIMULATOR MEASUREMENTS
H. H. Seward (MIT), I. G. McWilliams (MIT), and G. A. Davidson (MIT)
Jul. 1972
HQ-10683

Compact spectral irradiance probe has been designed and built which uses wedge filter in conjunction with silicon cell and operational amplifier. Probe is used to monitor spectral energy distribution of solar simulators and other high intensity sources.

B72-10341
ACOUSTIC SPECTRAL ANALYSIS AND TESTING TECHNIQUES
C. D. Hayes, M. D. Lamers, J. W. Shipley, and R. A. Slusser
Jul. 1972 See also JPL-TM-33-422; JPL-TR-32-928-Rev-1; JPL-TR-32-1052; JPL-TR-32-1141
NPO-11554

Subjects covered in four reports are described including: (1) mathematical techniques for combining decibel levels of octaves or constant bandwidth: (2) techniques for determining equation for power spectral density function; (3) computer program to analyze acoustical test data; and (4) computer simulation of horn responses utilizing hyperbolic horn theory.

B72-10351
COMPOSITE MOBILE SYSTEM FOR HOLOGRAPHIC NONDESTRUCTIVE TESTING
R. L. Kurtz
Jul. 1972
M-FS-21704

Innovation provides a single system flexible enough to test objects ranging from large amplitude displacement and/or velocities down to extremely small displacements and/or velocities by making only a few minor adjustments in the component arrangements.

B72-10354
HELIUM LEAK MEASUREMENTS USING CO2 AS A CARRIER
B. C. Moore (McDonnell-Douglas Astronautics Co.) and R. G. Camarillo (McDonnell-Douglas Astronautics Co.)
Jul. 1972
M-FS-21742

Detection delay defects are omitted by using helium mass spectrometer leak detector combined with several known procedures. Technique combines carbon dioxide purging, cryogenic separating helium accumulation, and use of carbon dioxide as carrier gas.

B72-10360
ALTERNATING CURRENT LOSSES IN SUPERCONDUCTING COILS
S. L. Wipf (N. Am. Rockwell Corp.) and C. A. Guderjahn (N. Am. Rockwell Corp.)
Jun. 1972
M-FS-21129

Report examines relationship between coil loss and frequency and heat loss in coil as a function of the magnetic field H. Information is of value to manufacturers of superconducting magnets, motors and generators.

B72-10368
SONIC LIMITATIONS AND STARTUP PROBLEMS OF HEAT PIPES
J. E. Deverall, J. E. Kemme, and L. W. Florschuetz
Jun. 1972 See also LA-4518
AEC-10036

Introduction of small amounts of inert, noncombustible gas aids startup in certain types of heat pipes. When the heat pipe is closely coupled to the heat sink, the startup system must be designed to bring the heat sink on-line slowly.

B72-10373
LASER FREQUENCY MODULATION WITH ELECTRON PLASMA
T. J. Burgess and V. R. Latorre
Jun. 1972
AEC-10079

When laser beam passes through electron plasma its frequency shifts by amount proportional to plasma density. This density varies with modulating signal resulting in corresponding modulation of laser beam frequency. Necessary apparatus is relatively inexpensive since crystals are not required.

B72-10375
OPTICAL DEVICE FOR PRODUCING COLOR LINE SCAN DISPLAY FROM MONOCHROME OSCILLOSCOPE TRACES
L. P. Kopia
Jul. 1972
LANGLEY-10896

Novel device allows generation of simultaneous color line scan from the face of a monochrome cathode ray tube. Device consists of four dichroic beam splitters, two each of red reflectance (cyan transmittance) and blue reflectance (yellow transmittance).

B72-10379
FILTER CASSETTE FOR HIGH VOLUME AIR SAMPLER
R. B. King, J. S. Fordyce, L. Rosenblum, J. Toma, J. C. Burr, Jr. (Cleveland Div. of Air Pollution Control), and B. L. Burger (EPA)
Jul. 1972
LEWIS-11469

Filter cassette eliminates or substantially reduces contamination of filter media by extraneous material and facilitates handling.

B72-10387
ROTARY SHUTTER MECHANISM CONTAINS OPTICAL ELEMENTS
A. O. Weilbach (Beckman Instr., Inc.)
Dec. 1972
GSFC-11244

Two cylindrical shutter mechanisms having fixed outer sleeves and rotating inner sleeves use single stepping motor and Geneva mechanism to sequentially move optical components into path of ultraviolet monochromator for output control to photomultiplier. Photometric and wavelength calibration sources insure shutter positions according to operational phases.

B72-10388
AN IMPROVED APOCHROMATIC WEDGE UTILIZING OPTICAL MOLECULAR CONTACT BONDING
C. M. Fewell (Sperry Rand Corp.)
Jul. 1972
GSFC-11082

Three elements of the apochromatic wedge are assembled by optical molecular contact, eliminating all difficulties and inaccuracies inherent in cement bonding.

B72-10389
TRANSMISSION OF OPTICAL FREQUENCIES WITH MINIMAL LOSSES
C. H. Townes (MIT), R. Y. Chiao (MIT), and E. M. Garmire (MIT)
Jul. 1972
HQ-10541

Application of diffractionless dielectrics as transmitting media between laser beam source and receiver is discussed. Optical properties of transmitting media are described and general system diagram is illustrated. Use of system in power transmission, communications, surgery, and machinery is explained.

B72-10435
ALIGNMENT MICROSCOPE FOR ROTATING LASER SCANNER
A. Maciel, Jr. (Singer-Gen. Precision, Inc.) and J. C. Beck (Singer-Gen. Precision, Inc.)
Dec. 1972
MSC-14118

Microscopic assembly for alignment of rotary laser focuses on small film area along scan line at oblique angle. Suitable choice of angle and location of optical components project laser beam line as X coordinate reticle. Coordination with horizontal recticle line included in microscope facilitates Y coordinate position indexing.

B72-10440
EFFICIENT WIRE-GRID DUPLEXER-POLARIZED FOR CO2 LASERS
P. K. Cheo (Aerojet-Gen. Corp.) and C. D. Bass (Aerojet-Gen. Corp.)
Dec. 1972
GSFC-11403

Chromium wire grid duplexer-polarizer for 10 micrometer carbon dioxide laser communication system is produced by depositing photo-resist film onto silicon substrate, grating by two collimated cadmium helium laser beams, covering of surface with thin chromium layer, and subsequent stripping of uncoated portion to expose etched wires.

B72-10443
HIGH TEMPERATURE PERMEAMETER FOR MEASURING MAGNETIC PROPERTIES
J. P. Barranger
Aug. 1972 See also NASA-TN-D-6659
LEWIS-11609

Instrument for measuring magnetic permeability of materials undergoing heat treatment as method for monitoring stress relief and tempering is described. Procedure is based on magnetic potentiometer principle with yoke compensating coils to cancel effects of reluctance of yoke and joint gaps. Instrument is heated with specimen being heat treated.

B72-10460
RADIOLOGICAL CONTROL MANUAL
J. W. Noblin
Aug. 1972
M-FS-22092

Objectives of the manual are to (1) ensure compliance with requirements of AEC and governmental health agencies, (2) ensure against excessive and unnecessary exposure of personnel to harmful radiation, and (3) prevent contamination of equipment, materials, and environment with radioactive materials.

B72-10465
MAGNETS WITH STABILIZED CONDUCTORS
C. K. Jones (Westinghouse Elec. Corp.) and J. R. Gavaler (Westinghouse Elec. Corp.)
Aug. 1972
HQ-10727

Method fabricates stabilized composite conductor, for use in construction of magnets, using equal amounts of superconducting and metal materials, thus reducing weight, cost and size.

B72-10472
FREQUENCY-WAVELENGTH CALCULATOR WITH TABLE OF DIELECTRIC PROPERTIES
L. L. Thompson
Aug. 1972
GSFC-11200

Frequency-wavelength calculator has been developed which rapidly and accurately calculates wavelength of given frequency in specific dielectric material. Unit fits into shirt pocket and includes table of dielectric properties and one-step calculator.

B72-10478
WIDE-RANGE NUCLEAR MAGNETIC RESONANCE DETECTOR
J. C. Sturman and R. J. Jirberg
Aug. 1972 See also NASA-TN-D-6338
LEWIS-11513

Compact and easy to use solid state nuclear magnetic resonance detector is designed for measuring field strength to 20 teslas in cryogenically cooled magnets. Extremely low noise and high sensitivity make detector applicable to nearly all types of analytical nuclear magnetic resonance measurements and can be used in high temperature and radiation environments.

B72-10485
METASTABLE ATOM PROBE FOR MEASURING ELECTRON BEAM DENSITY PROFILES
J. M. Lockhart (Mich. Univ.) and J. C. Zorn (Mich. Univ.)
Aug. 1972
M-FS-21593

Metastable atom probe was developed for measuring current density in electron beam as function of two arbitrary coordinates, with spatial resolution better than 0.5 mm. Probe shows effects

of space charge, magnetic fields, and other factors which influence electron current density, but operates with such low beam densities that introduced perturbation is very small.

B72-10487
A COMPTON SCATTER ATTENUATION GAMMA RAY SPECTROMETER
W. E. Austin (GE)
Aug. 1972
M-FS-21441

Compton attenuation technique, utilizing semiconductor sum-Compton detectors, has been proposed for gamma ray spectrometer capable of gamma spectral measurements in radiation fields of 100 R/hr to one million R/hr. Spectrometer consists of two or more separate detectors, with only primary detector exposed to primary incident photon flux.

B72-10495
INTERFEROMETRIC MEASUREMENT OF THE VELOCITY OF RADIATING PARTICLES
S. Aisenberg (Space Sci., Inc.)
Aug. 1972
HQ-10371

Electro-optical system for measuring very small Doppler shift displacements of spectral wavelengths emitted by atoms and ions in high velocity plasma beam is discussed. Operation of circuits is described and circuit diagram is included.

B72-10500
FLEXIBLE SHIELDING SYSTEM FOR RADIATION PROTECTION
A. Babin
Dec. 1972
LRL-10028

Modular construction of low cost flexible radiation shielding panels consists of water filled steels cans, zinc bromide windows, turntable unit, master-slave manipulators, and interlocking lead bricks. Easy modifications of shielding wall thicknesses are obtained by rearranging overall geometry of portable components.

B72-10516
PARTICLE DETECTION WITH INTENSIFIED LASER BEAM
R. G. Knollenberg (Chicago Univ.)
Aug. 1972
HQ-10645

Application of external and laser output mirrors to produce intensified light beam for measurement of light scattered by dispersed particles is described. Use of fiber optics bundles to collect light is discussed. Diagram of equipment and principles of operation are presented.

B72-10520
ACOUSTO-OPTIC FILTER FOR ELECTRONIC LASER TUNING
S. E. Harris (Stanford Univ.)
Dec. 1972
HQ-10715

Electronically tunable lithium niobate filter utilizes acoustic-optic diffraction for tuning laser to desired frequencies. Filter placed inside laser cavity diffracts incident optical signal of one polarization into orthogonal polarization by collinearly propagating acoustic beam to desired wavelength.

B72-10521
IMPROVED OPTICAL FILTERS FOR AUTOMATED VISUAL INSPECTION
D. A. Curtis (Little /Arthur D./ Inc.)
Aug. 1972
HQ-10720

Sides of spatial filter slits are shaped so that their contribution to signal is reduced, thus minimizing the number of scanning errors.

B72-10524
AN ABSORPTION SPECTRUM AMPLIFIER FOR DETERMINING GAS COMPOSITION
E. F. Zalewski (NBS), N. C. Peterson (NBS), M. J. Kurylo (NBS), A. M. Bass (NBS), W. Brown (NBS), and R. A. Keller (NBS)
Aug. 1972
HQ-10752

Compositions of gas samples are frequently studied by laser absorption spectroscopy. Sensitivity is improved by two orders of magnitude when absorption cell is placed inside an organic-dye laser cavity.

B72-10528
HIGH-INTENSITY SOURCE OF EXTREME ULTRAVIOLET
E. Paresce (Calif. Univ.), S. Kumar (Calif. Univ.), and S. Bowyer (Calif. Univ.)
Aug. 1972
HQ-10754

High intensity ultraviolet radiation source was developed which is suitable for emission below 500 A. Source, useful for 100 to 1000 A range, is simple and inexpensive to construct, easy to operate, and very stable. Because of sufficiently intense output spectrum, source can be used with monochromator at wavelengths as low as 160 A.

B72-10532
TEMPERATURE CONTROL OF A CRYOGENIC BATH
I. M. Asher (MIT)
Aug. 1972
HQ-10788

Foreign gas introduced into vapor phase above liquid region cools cryogenic baths. Equipment consists of gas tank and cover of styrofoam. Helium is considered the best choice to produce cooling, though any gas with boiling point lower than that of bath liquid may be used.

B72-10549
HYDROPHOBIC LIQUID/GAS SEPARATOR FOR HEAT PIPES
B. D. Marcus (TRW Systems Group)
Sep. 1972
ARC-10656

Perforated nonwetting plug of material such as polytetrafluoroethylene is mounted in gas reservoir feed tube, preferably at end which extends into heat pipe condenser section, to prevent liquid from entering gas reservoir of passively controlled heat pipe.

B72-10554
OVERFLOW SENSOR FOR CRYOGENIC-FLUID VESSELS
W. M. Tener
Sep. 1972
NPO-10619

Overflow sensor for cryogenic fluid vessels has been designed by winding electrical resistance element on porous tubular coil form. Form is positioned in overflow vent of cryogenic fluid vessel where it can differentiate vapor from liquid at same temperature.

B72-10556
HELIUM WINDOW FOR SHOCK-TUBE MONOCHROMATORS
G. M. Thomas
Sep. 1972
NPO-11852

Technique for coupling vacuum ultraviolet monochromator to shock tube to avoid loss of high energy ultraviolet light during quantitative measurements is described. System consists of helium gas window pumping through small aperture in entrance pupil of monochromator. Diagram of equipment and principles of operation are presented.

B72-10563
MEASUREMENT OF ELECTRON DENSITY AND TEMPERATURE IN PLASMAS
K. W. Billman, P. D. Rowley, L. L. Presley, and J. Stallcop
Sep. 1972
ARC-10598

Application of two laser wavelengths passing through plasma measures electron density and temperature. Function depends on determining absorption of light at two wavelengths. Nature of reaction is explained and schematic diagram of equipment is included.

B72-10567
REMOTE MEASUREMENT OF THE WATER CONTENT OF SNOWPACKS
W. I. Linlor
Sep. 1972
ARC-10651

Electronic equipment for sensing moisture content of snowpacks is described. Components of electronic test equipment are illustrated and methods of conducting tests are explained. Possibilities for airborne sensing are examined.

B72-10571
LASER MASS SPECTROMETER
K. A. Lincoln
Sep. 1972
ARC-10687

Development of time of flight mass spectrometer using laser powered vaporization source is discussed. Operation of equipment to measure thermal velocities of individual mass species is described. Illustration of test equipment installation and detailed line drawing of ion producing equipment are provided.

B72-10572
OSCILLATION OF LASER-BEAM INTENSITY AS OBSERVED WITH BEAM SPLITTERS
D. M. Kuehn
Sep. 1972
ARC-10694

Characteristics of nearly perfectly flat beam splitter for observing laser pulse shapes are discussed. Disadvantages of conventional instruments for observing properties of laser beams are described. Effects of high frequency noise on accuracy of measurement are reported.

B72-10611
A TRANSMITTING AND REFLECTING DIFFUSER FOR ULTRAVIOLET LIGHT
L. S. Keafer, Jr., E. E. Burcher, and L. P. Kopia
Jan. 1972
LANGLEY-10385

Fabrication of ultraviolet radiation diffusing layer in configuration that uses ultraviolet properties of fused silica condensate is discussed. Construction and operation of the device are described. Diagram of reflecting diffuser to show construction and method of operation is included.

B72-10629
MAGNETOMETER USES BISMUTH-SELENIDE
J. A. Woollman, I. L. Spain (Md. Univ.), and H. Beale (Calif. Univ.)
1972
LEWIS-11632

Characteristics of bismuth-selenide magnetometer are described. Advantages of bismuth-selenide magnetometer over standard magnetometers are stressed. Thermal stability of bismuth-selenide magnetometer is analyzed. Linearity of output versus magnetic field over wide range of temperatures is reported.

B72-10654
PREVENTION OF CATHODE DAMAGE FROM POSITIVE ION BOMBARDMENT
W. H. Bennett (N. C. State Univ.)
Dec. 1972
HQ-10688

Mixed alkaline earth oxide compounds deposited into hole at cathode surface center prevent ion back bombardment damage to cathode by reducing oxide layer and by creating metallic diffusion along sides of hole for enhanced electron emission.

B72-10655
A BI-STABLE OPTICAL DEVICE
A. Szoke (MIT)
Dec. 1972
HQ-10701

Device was developed which produces short optical pulses of variable lengths with high peak power and without use of external modulators or independent light beams. Optical field intensity is built up inside cavity. At peak of its intensity, light is switched off.

B72-10662
A STUDY OF RADIATION ENVIRONMENT IN SPACE AND ITS BIOLOGICAL EFFECTS
S. B. Curtis (Boeing Co.) and M. C. Wilkinson (Boeing Co.)
Dec. 1972 See also D2-84274-1; D2-90469; NASA-CR-1037; NASA-CR-1469
HQ-10798

Biological effects on man in space resulting from galactic and solar cosmic radiation are discussed. Importance of secondary ions which contribute to galactic cosmic radiation hazards is analyzed. Mathematical model to show rate of production of secondary ions of given atomic number at various points in absorber is presented.

B72-10665
SELF-CALIBRATING REMOTE ATMOSPHERIC ELECTROMAGNETIC PROBE AND DATA ACQUISITION SYSTEM
K. A. Kadrmas
Oct. 1972
M-FS-21212

Design and development of electromagnetic probe is discussed. Probe is designed to measure wind speed, turbulence levels, and aerosol content of atmosphere. Data are used to construct real-time, three dimensional map of atmospheric composition.

B72-10670
A METHOD OF ELIMINATING HYDROGEN MASER WALL SHIFT
M. W. Levine (Smithsonian Astrophys. Obs.) and R. F. C. Vessot (Smithsonian Astrophys. Obs.)
Dec. 1972
HQ-10663

Maser output frequency shift was prevented by storage bulb kept at temperature at which wall shift is zero and effects of bulb size, shape, and surface texture are eliminated. Servo system is shown, along with bidirectional counter.

B72-10699
ACCURATE MEASUREMENT OF GAS VOLUMES BY LIQUID DISPLACEMENT
J. D. Christian
Dec. 1972
ARC-10723

Mariotte bottle as liquid displacement device was used to measure gas volumes at flow rates that are far below threshold of wet test gas meters. Study of factors affecting amount of liquid displaced by gas flow was completed, and equations were derived which relate different variables.

B72-10700
PARALLEL-PLATE VISCOMETER
H. T. Fearnehough, R. F. Fedors, R. F. Landel, and T. H. Sauer
Dec. 1972
NPO-11387

Viscometer consists of movable vertical rod with one optical flat fixed to its lower end and centered over second optical flat held rigidly parallel to moveable flat. Two perforated diaphragms of thin metal permit limited amount of vertical movement of rod carrying movable flat, but resist lateral movement.

B72-10701
THIN-FILM ULTRAVIOLET DETECTOR AND SPECTROMETER
G. W. Lewicki and J. Maserjian
Dec. 1972
NPO-11432

Typical metal-insulator-metal detector device is formed on quartz substrate. Base electrode is 3 to 6 nm aluminum layer, overcoated with 3 to 6 nm aluminum oxide or aluminum nitride, and capped with counter electrode of gold, lead, magnesium, or aluminum. Photoelectric yield data are given for Al-AlN-Au structure.

B72-10702
COMPARATIVE PERFORMANCE OF DOUBLE-FOCUS AND QUADRUPOLE MASS SPECTROMETERS
S. K. Wilson
Dec. 1972 See also JPL-TM-33-456
NPO-11689

Light-weight flight type double focus and quadruple mass spectrometer models were compared. Data cover size, weight, and power sensitivity required to achieve same resolution sensitivity at given mass number. Comparison was made using mathematical relationships. Analysis was confined to equal ion source area sensitivity variations not more than 40% over mass range.

B72-10703
GAS-FLOW RESTRICTOR
G. J. Bastien
Dec. 1972
NPO-10117

Gas flow restrictor is described, consisting of predetermined length and size of capillary tubing to control flow rate of carrier gas into gas chromatograph of flow rate of sample gas into mass spectrometer inlet system. Length and inner diameter of capillary tubing was estimated with mathematical expressions for viscous flow.

B72-10706
TRANSONIC DIVIDER FOR GAS CHROMATOGRAPH EFFLUENTS
J. B. Wellman
Dec. 1972
NPO-11479

Transonic effluent divider system was developed which permits varying mass input of gas chromatographic effluent into mass spectrometer without affecting performance of gas chromatograph. Mechanisms of operation are described.

B72-10707
COMPUTATION OF LAMINAR HEAT TRANSFER FROM GASEOUS PLASMAS IN ELECTROMAGNETIC FIELDS
T. K. Bose
Dec. 1972 See also JPL-TR-32-1447
NPO-11725

Heat transfer analysis procedure is presented for two-temperature gaseous plasma. Analysis is based on laminar flow of singly-ionized, quasineutral plasma with variable properties. Sheath analysis is described for species in accelerating field, decelerating field, emitted from wall, and recombining at wall.

B72-10720
ERASABLE HOLOGRAPHIC MEDIUM USING CIS-TRANSISOMERIZATION
A. H. Adelman (Battelle-Columbus Lab.) and H. M. Grotta (Battele-Columbus Lab.)
Dec. 1972
M-FS-22062

Photochemical process has been developed for recording of erasable holograms by utilizing reversible transformation of two isomers of molecule upon exposure to light. Hologram system records, reads, and erases in response to changes in refractive index of mixture of isomers.

B72-10727
TECHNIQUE FOR REFOCUSING, DECOMPRESSING, AND CONDITIONING SPENT ELECTRON BEAMS
H. G. Kosmahl
Dec. 1972 See also NASA-CR-121026; NASA-TN-D-6093
LEWIS-11617

System to improve space communication by refocusing spent electron beams is described. System reduces transverse velocity components in beam and dilutes current densities to acceptable levels. Diagram of principles of operation is included.

B73-10009
VIDEO ENHANCEMENT OF X-RAY AND NEUTRON RADIOGRAPHS
A. Vary
Mar. 1973
LEWIS-11944

System was devised for displaying radiographs on television screen and enhancing fine detail in picture. System uses analog-computer circuits to process television signal from low-noise television camera. Enhanced images are displayed in black and white and can be controlled to vary degree of enhancement and magnification of details in either radiographic transparencies or opaque photographs.

B73-10016
CONTINUOUS CATALYTIC DECOMPOSITION OF METHANE
J. E. Clifford (Battelle-Columbus Labs.), L. J. Hillenbrand (Battelle-Columbus Labs.), B. C. Kim (Battelle-Columbus Labs.), E. S. Kolic (Battelle-Columbus Labs.), and J. Zupan (Battelle-Columbus Labs.)
Jan. 1973 See also NASA-CR-1662
ARC-10339

Water is conserved by employing sequence of reactions whereby 75% of methane from Sabatier reaction is decomposed to solid carbon and hydrogen; hydrogen is then separated from residual methane and utilized in usual Sabatier reaction to reduce remaining metabolic carbon dioxide.

B73-10017
HIGH-TEMPERATURE-RADIATION ANALYZER
R. P. Farwell (Barnes Engineering Co.)
Jan. 1973
ARC-10565

Six-channel radiometer with three ultraviolet detection channels measures temperatures at 2-millisecond intervals. One infrared channel measures total radiation, and two infrared channels measure radiation in discrete spectral intervals at rate of 40 intervals per second. Analyzer consists of optical and electrical system.

B73-10018
DETECTION OF NITRIC OXIDE POLLUTION
C. Chackerian, Jr. and M. F. Weisbach
Jan. 1973
ARC-10709

Studies of absorption spectra enhancement of certain atomic and molecular species inserter in dye-laser cavities have indicated that nitric oxide can be determined at low concentrations. Absorption coefficient of small amounts of nitric oxide in intra-laser-cavity absorption cell containing helium is enhanced by more than two orders of magnitude.

B73-10025
APPARATUS FOR MEASURING ELECTRICAL PROPERTIES OF MATERIALS
V. Hadek
Jan. 1973
NPO-11749

Resistance of sample is measured with aid of usual electrical test instruments applied to electrical contacts provided at ram and anvil assemblies. Temperature differential is established between ram and anvil for measurement of Seebeck coefficient. Voltage generated across sample is detected at electrical contacts.

B73-10027
TWO NEW METHODS TO INCREASE THE CONTRAST OF TRACK-ETCH NEUTRON RADIOGRAPHS
J. Morley
Mar. 1973 See also NASA-TM-X-67947
LEWIS-11893

In one method, fluorescent dye is deposited into tracks of radiograph and viewed under ultraviolet light. In second method, track-etch radiograph is placed between crossed polaroid filters, exposed to diffused light and resulting image is projected onto photographic film.

B73-10031
EXPERIMENTAL VERIFICATION OF COMPUTER SPRAY-COMBUSTION MODELS

W. H. Nurick (Rocketdyne/N. Am. Rockwell Corp.), R. M. Clayton, and J. H. Rupe
Feb. 1973 See also NASA-CR-114479
ARC-10689

Analytical model formulation, representing performance of spray-combustion device, is based on understanding of atomization, mixing, vaporization, and combustion which occurs in device. Report lists results of correlations of computed values with values obtained from experiments with rocket combustor. Technique offers excellent method for evaluating validity and ranges of applicability of combustion models.

B73-10050
OPTICAL MONITORING SYSTEM
J. T. Nev (Gen. Dynamics Corp.), E. H. Wrench (Gen. Dynamics Corp.), M. G. Fox (Gen. Dynamics Corp.), and H. Lave (Gen. Dynamics Corp.)
Feb. 1973
M-FS-21692

Instrument can measure optical transmission, reflectance, and scattering. This information can be used to identify changes in optical properties or deviations from required optical standards. Device consists of monochromatic source, photo detector, transfer mirror, and hemiellipsoid. System might be used to measure optical properties of thin film.

B73-10058
SUSPENSION OF OBJECTS IN MAGNETIC AND ELECTRIC FIELDS
L. S. Wilk (MIT)
Mar. 1973
JSC-14170

Device has improved suspension efficiency by simulating characteristics of diamagnetic materials. Pseudodiamagnetic device suspended magnet in magnetic field at rate of 232 Kg/W. Suspension in magnetic field can be produced in two ways: magnetic source can be stationary and pseudodiamagnetic device suspended or vice versa.

B73-10075
VIBRATION MEASUREMENT BY PULSE DIFFERENTIAL HOLOGRAPHIC INTERFEROMETRY
D. A. Evensen (TRW, Inc.) and R. Aprahamian (TRW, Inc.)
Mar. 1973 See also NASA-CR-2028
LANGLEY-11092

Technique measures structural deformation of materials subjected to wide range of temperatures and other environmental conditions. Effects of convection currents are eliminated by operating a pulsed laser in double pulse mode that exposes hologram twice in quick succession.

B73-10086
HOLOGRAPHIC TESTING WITH A DOUBLE REFERENCE BEAM
F. H. Stuckenberg (Rockwell Intern. Corp.)
Mar. 1973
JSC-17959

Image of unstressed object is taken with reflected beam and one reference beam. Object is then stressed and second (double) exposure is made. Developed film plate provides double exposure hologram that can be projected by simultaneous illumination with both reference beams. Appearance of multiple images may be eliminated while manipulating fringe patterns.

B73-10095
A NEW OPTICAL RECORDING MEDIUM
H. Aronson (Isomet Corp.) and G. M. Loiacono (Isomet Corp.)
Mar. 1973
M-FS-22348

Method has been developed for doping lithium niobiate crystals with transition metal to increase rate at which crystal can record optical data. Discovery may facilitate development of system for analog storage of TV frames, printed pages, photographs, and other visual information.

B73-10105
THERMAL CONTACT RESISTANCE IN A NON-IDEAL JOINT
R. T. Roca (MIT) and B. B. Mikic (MIT)
May 1973
M-FS-21775

Analysis has been conducted to determine thermal contact resistance at interface of two heat conductors and effect of roughness of mating surfaces on pressure distribution. Investigation reveals how heat transfer resistance may be decreased or increased by changing surface properties of particular interface being considered.

B73-10116
FAST-NEUTRON SPECTROMETER DEVELOPMENTS
R. B. Moler (IIT Res. Inst.), W. E. Zagotta (IIT Res. Inst.), and S. I. Baker (IIT Res. Inst.)
Jun. 1973
M-FS-22279

Li6 sandwich-type neutron spectrometer is equipped with proportional counter for particle identification. System uses current-sensitive preamplifiers to minimize pile-up of gamma-ray and particle pulses.

B73-10130
MONITOR FOR PHYSICAL PROPERTY CHANGES IN SOLID PROPELLANTS
R. E. Black, Jr. (Thiokol Chem. Corp. Elkton Div.)
Mar. 1973 See also NASA-CR-114456
ARC-10702

Specially designed sensor is attached to or imbedded in propellant. When sensor is driven into vibration, it moves with a phase lag directly proportional to internal friction or loss coefficent. Resonance frequency of the system is related to Young's modulus. Modulus or internal friction can be monitored over long period of time.

B73-10131
LIGHT-DIRECTION SENSOR BASED ON BIREFRINGENCY
A. R. Johnston
Mar. 1973
NPO-11201

Optical system consisting of polarizer, analyzer, quarterwave retarder converts incident light beam to one which has an intensity related to the extent the incident beam is off axis.

B73-10133
GAS-OPERATED ACTUATOR: A CONCEPT
P. G. Simmonds
Mar. 1973
NPO-11369

Recyclable actuator does depend on valves for its operation. Palladium cathode tube in electrochemical cell is used to generate hydrogen by electrolysis. Hydrogen pressure generated inside tube causes expansion of bellows, which raises load. Bellows can be retracted by reversing electrical connections to cell electrodes.

B73-10137
ROCKET PLUME PROPERTIES MEASURED IN SPACE SIMULATORS
J. B. Stephens and J. G. Herrera
Mar. 1973 See also B72-10243
NPO-11608

Molecular sink facility and 25-foot space simulator have been used to distinguish nature of exhaust plumes from nozzles with relatively large internal boundary layer flow. Plume density has been measured by electron beam/photomultiplier system.

B73-10140
MICROWAVE EMISSION FROM GRANULAR SILICATES
J. E. Conel
Mar. 1973 See also JPL-TM-33-458
NPO-11702

Experimental finding is that mass absorption coefficient is independent of frequency but highly dependent on moisture content; effective conductivity increases with frequency, and low tangent is independent of frequency. Computed values of electrical properties are in rough numerical agreement with extrapolated laboratory values on other silicate materials.

B73-10143
IMPROVED TECHNIQUE FOR INSPECTION OF PLANAR SURFACES BY MICROSCOPY AND INTERFEROMETRY
D. S. Doubt
Mar. 1973
NPO-11893

Incident white light and ordinary interferometer attachment provide images that differ in color according to relative heights of planar surfaces. With aid of technique, it is possible to perceive buried layers, such as diffused collectors, as well as discover defects in buried layers.

B73-10155
LASER ADDRESSED HOLOGRAPHIC MEMORY SYSTEM
R. A. Gange (RCA), E. M. Wagle (RCA), and C. C. Steinmetz (RCA)
May 1973 See also B73-10166
M-FS-22565

Holographic r call and storage system uses red-lipid microcrystalline wax a. storage medium. When laser beam strikes wax, its energy heats point of incidence enough to pass wax through transition temperature. Holograph image can then be written or erased in softened wax.

B73-10158
A FLEXIBLE ALL-TEMPERATURE PRESSURE VESSEL
M. L. Strangeland (Rockwell Intern. Corp.)
May 1973
M-FS-19196

By interrupting lines of stress with convolutions, structure can be designed to contain pressure, operate at cryogenic and high temperatures, and provide flexibility necessary for repetitive cycles of parallel-offset shear translation.

B73-10163
REDUCED PREPARATION TIME FOR THERMAL VACUUM CHAMBER TESTS
T. W. Tysor (Rockwell Intern. Corp.)
May 1973
M-FS-24171

Insulation system of test chamber will reach thermal equilibrium more quickly when it is gassy and least efficient than when evacuated and most efficient.

B73-10175
Q-SWITCHED, CAVITY-DUMPED, MODE-LOCKED LASER
W. Fountain (GTE Sylvania)
Jun. 1973
GSFC-11509

Continuous-wave laser can achieve higher rate of emission through Q-switching. Technique keeps Q, energy storage rating, of laser cavity at low value while ion population inversion is being built up. Then Q is suddenly switched to high value just before instability occurs.

B73-10176
ROCKET BORNE INSTRUMENT TO MEASURE ELECTRIC FIELDS INSIDE ELECTRIFIED CLOUDS
L. H. Ruhnke (NOAA)
Jun. 1973
KSC-10730

Simple electric field measuring system is mounted on small rocket and consists of two voltage probes, one extending from nose and other on tail fin. Electric field through which rocket passes is determined by potential difference between probes.

B73-10181
ION MASKING IMPROVES RESOLUTION IN QUADRUPOLE MASS SPECTROMETERS
N. Ierokomos (Perkin-Elmer Corp.) and M. R. Ruecker (Perkin-Elmer Corp.)
Jun. 1973 See also NASA-CR-115781
GSFC-11406

Mass spectrometers analyze molecular composition by determining mass-to-charge ratio of ion fragments of molecules. Study adds significantly to quantitative understanding of quadrupole mass filter. It includes development of quantitative theory of ion oscillations, computer analysis of ion behavior, and identification of determining factors in peak tail size.

B73-10182
DESIGN AND FABRICATION OF AN EXPERIMENTAL IMAGE FORMING LIGHT MODULATOR
R. G. Shackelford (Georgia Inst. of Tech.) and J. R. Walsh, Jr. (Georgia Inst. of Tech.)
Jun. 1973
M-FS-22547

Image forming light modulator transforms electrical signal representation of two dimensional image into optical transparency. All major assemblies are easily demounted for convenience in adapting modulator to other operating modes with different modulation-media. High-speed vacuum pump is incorporated into modulator housing to help reach required operating pressure.

B73-10192
BALLOON-BORNE PACKAGE TEMPERATURE CONTROLLER
M. Schach and J. T. Triolo
Jun. 1973
GSFC-11620

Simple, inexpensive, lightweight enclosure traps upward long wave radiation of earth while reflecting harsh solar radiation in upper atmosphere. It warms enclosed instruments in cold regions and protects them from overheating during the day. Device can be attached to balloon system without any changes in experimental design.

B73-10206
ANGULAR MAGNETIC FIELD BEAM IMPROVES EFFICIENCY IN KLYSTRONS AND TRAVELING WAVE TUBES
W. Neugebauer (GE)
Jun. 1973 See also NASA-CR-12114
LEWIS-11610

Special lens shaping allows variation of focusing strength with radius. Lens can be either converging or diverging depending on charge of particles and direction of angular magnetic field. There is potential use for lens in particle analyzers, electron beam welding systems, microwave tube refocusing systems, and possible display type devices.

B73-10209
A THEORETICAL STUDY OF AERODYNAMIC NOISE GENERATION
A. C. Peter (Rockwell Intern. Corp.)
Jun. 1973
M-FS-24167

Study focuses on physical mechanism of waves in fluid such as air. Strong interaction between energy of wave and fluid particle motion causes energy of wave to be dissipated. Dissipation depends not only on momentum, time-rate, and force, but also upon nature and magnitude of entropic-flow effects.

B73-10210
LASER SYSTEM DETECTS AIR TURBULENCE
W. K. Dahm, J. A. Dunkin, and E. A. Weaver
Jun. 1973
M-FS-21244

Laser beam is emitted from pod on side of aircraft. Some scattered light returns to aircraft, but at shifted frequency caused by Doppler effect from local air speeds. Current work focuses on extending range, including investigations of effects of particle density, focusing, back scatter efficiency, absorption, and other factors.

B73-10212
REAL TIME STATISTICAL ANALYSIS OF ACOUSTIC EMISSION SIGNALS FOR FLAW MONITORING SYSTEMS
F. E. Sugg (Rockwell Intern. Corp.) and F. J. Moskal (Rockwell Intern. Corp.)
Jun. 1973
M-FS-24402

Small structures are checked by monitoring samples for acoustical signal count. Flaws are located by observing relatively

high acoustical activity within given area. Acoustical monitoring has been extended to large structures by dividing large samples into small areas and then monitoring each area separately.

B73-10221
A HEAT FLOW CALORIMETER
W. V. Johnston (Rockwell Intern. Corp.)
Aug. 1973
GSFC-11434

Reaction mechanism for nickel-cadmium cell is not known well enough to allow calculation of heat effects. Calorimeter can measure heat absorbed or evolved in cell, by determining amount of external heat that must be supplied to calorimeter to maintain constant flow to isothermal heat sink.

B73-10242
IMPROVED PHOTOGRAPHIC PRINTS WITH A LINEAR RADIAL TRANSMISSION FILTER
L. M. Weinstein
Aug. 1973
LANGLEY-11221

Linear Radial Transmission Filter (LRTF) is easy to use and yet results in prints which depict more information contained in negative than can be shown by direct printing. LRTF is optical-quality filter which has maximum transmission in center and linear drop in transmission radially out from center.

B73-10251
ATMOSPHERIC TEMPERATURE MEASUREMENTS BY RAMAN LASER SCATTERING
W. J. Masica, J. A. Salzman, and T. A. Coney
Dec. 1973 See also NASA-TN-D-6879; NASA-TN-D-7126
LEWIS-12065

System makes continuous synoptic measurement of air temperatures and temperature profiles from the ground in real time. Development is based on principle that intensity distribution of Raman scattered laser light is a function of temperature and it is theoretically possible to measure air temperature by analyzing its Raman spectrum.

B73-10252
TOTAL-PRESSURE MEASUREMENT IN PULSATING FLOWS
L. N. Krause, T. J. Dudzinski, and R. C. Johnson
Dec. 1973 See also NASA-TM-X-68128
LEWIS-12077

Pneumatic-type probe was used as comparison instrument with total pressure tubes to determine true average pressure and, thus, to determine if nonlinear averaging effects were significant. Since pneumatic probe is more complicated to use than a total-pressure tube, it is used only as a comparison instrument to determine extent of averaging effects.

B73-10262
LASER VELOCIMETER WITH TRANSVERSE AND ON-AXIS SENSITIVITY
K. L. Orloff
Jun. 1973
ARC-10642

Laser Doppler velocimeters are used for measurement of localized fluid velocities without perturbation of flow field. Technique which utilizes only two outgoing beams polarized normally to one another can be processed in such a manner that local oscillator signal is obtained and usual dual-scatter velocity is also retrieved.

B73-10268
OPTICAL DETECTION OF OIL ON WATER
J. P. Millard and J. C. Arvesen
Jul. 1973
ARC-10649

Three radiometric techniques utilizing sunlight reflected and backscattered from water bodies have potential application for remote sensing of oil spills. Oil on water can be detected by viewing perpendicular polarization component of reflected light or difference between polarization components. Best detection is performed in ultraviolet or far-red portions of spectrum and in azimuth directions toward or opposite sun.

B73-10279
WIDE-FIELD REFLECTIVE SCANNING OPTICAL SYSTEMS
I. R. Abel (Honeywell Inc.)
Aug. 1973
JSC-14096

Catoptric optical scanning system provides relatively fast line-scan rate for two-dimensional coverage. Rapid scan rates require low focal ratios between components and smallest possible masses. System is relatively free from monochromatic defects and chromatic aberrations.

B73-10283
MEASUREMENT OF X-RAY SCATTERING BY OPTICAL SURFACES
R. S. Wriston (Martin Marietta Corp.)
Aug. 1973
GSFC-11590

Optical surfaces built for X-ray telescopes are made to reflect very short wavelengths that range in magnitude from 2 to 100 angstroms. Minor irregularities or contamination on sufrace of any telescope mirror can affect quality of optical image.

Apparatus checks reflection of optical surfaces; scattering of X-rays is measured with angular accuracy of one arc-second.

B73-10312
SELF-POWERED MIXER FOR PRESSURIZED CONTAINERS
Y. Y. Hsu and B. T. Ebihard
Dec. 1973
LEWIS-12054

Mechanical stirrer, installed entirely within tank, is powered by turbine driven by discharge flow of fluid. Contents of tank are automatically mixed whenever fluid in tank is discharged. Magnetic coupling eliminates need for shaft seal, particularly in high-pressure tanks.

B73-10330
HOLOGRAM RECORDING TUBES
J. H. Rajchman (RCA)
Oct. 1973
M-FS-22590; M-FS-22591

Optical memories allow extremely large numbers of bits to be stored and recalled in a matter of microseconds. Two recording tubes, similar to conventional image-converting tubes, but having a soft-glass surface on which hologram is recorded, do not degrade under repeated hologram read/write cycles.

B73-10336
A LASER HEAD FOR SIMULTANEOUS OPTICAL PUMPING OF SEVERAL DYE LASERS
P. B. Mumola and B. T. McAlexander
Oct. 1973
LANGLEY-11341

Device accomplishes simultaneous optical pumping using single flashlamp and electrical driver. Dye lasers require relatively low energy to operate (low-threshold pumping requirement) and provide simple method for producing simultaneous independent laser output at number of different wavelengths.

B73-10378
IMAGE FORMATION IN MICROWAVE HOLOGRAPHY
R. W. Cribbs (Electra-Physics Labs, Inc.) and B. L. Lamb (Electra-Physics Labs, Inc.)
Sep. 1973
ARC-10773

Microwave holograms are made without offset reference beam, but it has been found that Van der Lugt filter can be used to produce image offset. Also, filter permits 'decoding' of holograms in contrast with usual practice of reconstructing visible-light analogs of original micro-wave wave fronts.

B73-10379
MICROWAVE HOLOGRAPHY FOR NONDESTRUCTIVE TESTING
R. W. Cribbs (Electra-Physics Labs, Inc.) and B. L. Lamb (Electra-Physics Labs, Inc.)

Sep. 1973
ARC-10774

Holographic methods permit use of very large effective apertures so that weak signals can be collected over wide area and integrated to form image. Technique, modification of side-looking radar principle, can be used at very short ranges needed for nondestructive inspection of test specimens.

B73-10381
CARRIER SUPPRESSION DEVICE FOR A HETERODYNE GAS ANALYZER
E. A. McClatchey (Andros Inc.)
Sep. 1973 See also B72-10198
ARC-10785

Analyzer operates with broadband light from blackbody infrared source. Light is passed sequentially through two gas-filled chambers to suitable infrared detector while pressures in gas-filled chambers are modulated in sinusoidal manner. Because pressure of infrared-absorbing gases in chambers is modulated, amount of light absorbed by gases is also modulated.

B73-10383
SEPARATION OF GAS FROM LIQUID IN A TWO-PHASE FLOW SYSTEM
L. G. Hayes and D. G. Elliott
Sep. 1973
NPO-11556

Separation system causes jets which leave two-phase nozzles to impinge on each other, so that liquid from jets tends to coalesce in center of combined jet streams while gas phase is forced to outer periphery. Thus, because liquid coalescence is achieved without resort to separation with solid surfaces, cycle efficiency is improved.

B73-10399
COHERENCE-LENGTH EXTENDER
R. L. Kurtz
Oct. 1973
M-FS-22434

Holograms of large objects may be formed by using several coherent low-intensity laser sources. If several low intensity laser sources are available, they can be applied simultaneously. Each source is then used to establish one object beam and one reference beam whose path lengths are equal, recording a small portion of the total object.

B73-10409
METHOD OF PREDICTING IONIZATION-TYPE VACUUM GAGE SENSITIVITY FOR VARIOUS GASES
R. Holanda
Dec. 1973 See also NASA-TN-D-6815
LEWIS-12056

Sensitivity of gage for one gas can be correlated to its sensitivity for other gases by the ratio of gas ionization cross sections. Ionization cross sections which best correlate with gage sensitivites vary according to gage type and ionization cross section energy level.

B73-10417
MACH-ZEHNDER OPTICAL CONFIGURATION WITH BREWSTER WINDOW AND TWO QUARTER-WAVE PLATES
T. R. Lawrence (Lockheed Corp.), L. K. Morrison (Lockheed Corp.), and M. C. Krause (Lockheed Corp.)
Dec. 1973
M-FS-22741

Configuration is improvement because of the following: It provides higher efficiency. It reduces or eliminates feedthrough of untranslated local oscillator, which would produce a beat signal at shifted frequency of translator. When used without translator and with low-power detector, telescope secondary mirror reflects portion of output to local oscillator.

B73-10420
ULTRASONIC CALIBRATION DEVICE
J. S. Heyman and J. G. Miller (Wash. Univ.)
Dec. 1973
LANGLEY-11435

Device is an instrument for producing known changes in both acoustic absorption and phase velocity. Calibration signal arises from actual change of acoustic parameters, not from electrical simulation. Instrument is able to simulate changes in sensitivity enhancement achieved by use of ultrasonic resonators, which cannot be achieved using electrical calibration techniques.

B73-10421
A REAL TIME MOVING-SCENE HOLOGRAPHIC CAMERA
R. L. Kurtz
Dec. 1973 See also B73-10434; B73-10435
M-FS-21087

Method can be useful laboratory tool for observation of rapidly moving objects such as bullets, aerodynamic bodies, and bodies undergoing collisions or interactions. Optical components of holographic system are positioned so light paths from laser source will be equal.

B73-10422
ELASTIC LIGHT-SCATTERING MODULATOR: A CONCEPT
D. H. R. Vilkomerson (RCA) and R. S. Mezrich (RCA)
Dec. 1973
M-FS-22724

Simple structure can be used as electrically-controlled light valve, to scatter both transmitted and reflected beams. Its operation is based on physical phenomenon called frosting. Device may be of interest to manufacturers of page composers, alphanumeric displays, flat-panel displays, large-screen televisions, and optical input terminals for computers.

B73-10423
LASER-ACTUATED HOLOGRAPHIC STORAGE DEVICE
R. A. Gange (RCA), E. M. Nagle (RCA), and C. C. Steinmetz (RCA)
Nov. 1973
M-FS-22768

Device permits automatic selection of one out of thousands of pages in holographic memory system by using laser beam. In typical operation for 2 to 3 C temperature interval, using dc power supply with no power regulation, holograms were successfully written and erased over 2- by 2-cm area, using 80-mW argon laser beam.

B73-10434
MOTION COMPENSATOR FOR HOLOGRAPHIC MOTION PICTURE CAMERA
R. L. Kurtz
Dec. 1973 See also B73-10421; B73-10435
M-FS-22517

When reference beam strikes target it undergoes Doppler shift dependent upon target velocity. To compensate, object beam is first reflected from rotating cylinder that revolves in direction opposite to target but at same speed. When beam strikes target it is returned to original frequency and is in phase with reference beam. Alternatively this motion compensator may act on reference beam.

B73-10435
PHOTOGRAPHY OF RANDOM MOTION WITH A HOLOGRAPHIC CAMERA
R. L. Kurtz
Dec. 1973 See also B73-10421; B73-10434
M-FS-22537

Three-dimensional system uses two additional mirrors and path compensators. It is essentially three mutually-orthogonal one-dimensional systems with common focus. Laser beam is split into four parts, three of which are object beams; and fourth is reference beam. Size of each ellipse depends on magnitude of velocity vectors.

B73-10440
FLAW DETECTION BY MECHANICAL RESONANT MEASUREMENT
O. Buck (Rockwell Intern. Corp.), H. L. Marcus (Rockwell Intern.

Corp.), G. A. Alers (Rockwell Intern. Corp.), and R. V. Inman (Rockwell Intern. Corp.)
Feb. 1974
M-FS-19218

Testing technique is based on analysis of varying frequency scan applied to measured samples. Any changes in resonant-frequency harmonics detected in samples are used to indicate size of fault. Testing apparatus uses drive mechanism to apply vibrating force to sample. Force is applied longitudinally along axis to eliminate directionality on flexural vibrations.

B73-10441
IMPROVED DISCRIMINATION IN PHOTOGRAPHIC DENSITY CONTOURING
R. A. Godding (Technicolor Graphic Serv., Inc.)
Feb. 1974
JSC-12588

Density discrimination can be accomplished through use of special photographic contouring material which has two sensitive layers (one negative, one positive) on single support. Process will be of interest to investigators who require finer discrimination of densities of original photograph for purposes such as identification of crops and analysis of energy levels of radiating objects.

B73-10458
VERSATILE ELECTRONIC LOAD
K. R. Mussen
Mar. 1974
NPO-13202

Variable load has very fast response under wide range of simulated dynamic operating conditions, and can accept inputs up to 1000 watts. Many types of signals may be applied to load. Variable pulse generator and flip-flop produce rectangular waveform. Other signals include steady state step and single pulse.

B73-10462
MONEL-SHOT AND SCREEN REGENERATORS
C. W. Browning (Garrett Corp.)
Mar. 1974
GSFC-11593

Monel has been found to be ideal material for matrix of regenerators operating in temperature range of 325 K to 50 K. Two best shapes are as spheres or as wire mesh. For given size of regenerator, spherical shots are preferable for low-temperature operation. At high temperatures, mesh would be superior by virtue of its lower flow resistance.

B73-10468
FINE GUIDANCE FOR A SPACEBORNE TELESCOPE
S. Rosin (Kollsman Instruments Corp.) and M. Amon (Kollsman Instruments Corp.)
Mar. 1974
GSFC-11487

Two transparent plates are mounted at equal and opposite angles in secondary optical-system housing, angles being set for optimum astigmatism correction. Rotation of secondary housing assembly and translation of detector are proportional to angular position of secondary image. Combined movement of two retains image within sagittal foci of secondary system.

B73-10471
IMPROVED METHOD FOR DESIGN OF EXPANSION-CHAMBER MUFFLERS WITH APPLICATION TO OPERATIONAL HELICOPTER
T. L. Parrott
Mar. 1974
LANGLEY-11548

Field test of muffler designed with aid of this method was conducted on helicopter with known exhaust-noise problem. When exhaust noises were compared for hover-flight conditions, muffler system was found to reduce exhaust noise by approximately 11 db. No significant degradation in engine performance was observed.

B73-10482
ANALYSES OF UNSTEADY ENTROPIC-FLOW PROCESSES
A. C. Peter (Rockwell Intern. Corp.)
Mar. 1974
M-FS-24475

One important aspect in these analyses is the derivation of physical mechanism of converted entropic perturbations, which is also directly related to mixing of fluids. In development of frictional fluid motion, entropy gradients of moving fluid particles perpetually increase. This growth is due to fluid particles which have been heated by frictional flow effects and are constantly lagging behind colder fluid.

B73-10488
PROCESS FOR THE PRODUCTION OF STAR-TRACKING RETICLES
A. R. Toft and W. O. Smith
Mar. 1974
GSFC-11188

Reticles designed with quartz bases are masked with desired pattern and then are coated with highly adherent layers of chromium, chromium silver alloy, silver, copper, and black chromium (mixture of chromium and chromium oxides). Black chromium final layer produces required nonreflective surface.

B73-10490
POROUS SURFACE MICROPHONE FOR MEASURING ACOUSTIC SIGNALS IN TURBULENT WINDSTREAMS
D. U. Noiseux (Bolt Beranek and Newman, Inc.)
Dec. 1973 See also NASA-CR-114593
ARC-10776

Microphone sensor transforms pressure variations caused by acoustic signals and turbulence into electrical output. Microphone is protected from direct thrust of slipstream by porous barrier. Airfoil is designed to create no turbulence in air flow over porous surface.

B73-10493
METAL TUBE USED AS SOLAR ENGINE
J. R. Jedlicka, L. R. Guist, and R. M. Beam
Dec. 1973
ARC-10461

Ends of metal tube are fastened to axles which are supported on bearings so tube can rotate about its long axis while subjected to invariant bending moment that stresses it along longitudinal axis of rotation. Heat absorbed leads to expansion of metal, which unbalances internal forces and generates rotational moment in tube.

B73-10501
HIGH-SPEED SPECTROGRAPH FOR SHOCK TUBE STUDIES
W. J. Borucki
Dec. 1973
ARC-10772

Instrument provides information on spatial distribution of electron density of gas flow in high-performance shock tube. System permits measurement of profiles of hydrogen-alpha and -beta lines with enough spectral range to record spectral features from the near ultraviolet to the long-wavelength cutoff of photographic film.

B73-10516
FABRICATION OF OPTICAL REFLECTING DIFFRACTION GRATINGS BY LIGHT-INTERFERENCE PHENOMENON
A. J. Caruso and J. Zaniewski
Mar. 1974
GSFC-11860

Features of technique: major reduction in cost of fabrication; gratings exhibit low stray or scattered radiation, improve signal noise ratio, and eliminate false spectral-lines; gratings can be fabricated free of optical aberrations, with high groove frequencies, and on practically any surface geometry; and fabrication time has been reduced.

B73-10517
STABILIZING A GASEOUS OPTICAL LASER

A. Jauan (MIT) and K. Shimoda (MIT)
Mar. 1974
XGS-03644

Frequency of gaseous optical laser can be stabilized by sinusoidally modulating the geometry of the cavity. Fabry-Perot dielectric mirrors are mounted in two Invar blocks that are connected by four magnetorestrictive bars. Each bar has three coils to sinusoidally modulate system. Ac establishes frequency, and dc the average value; both are supplied to coil from control system.

B74-10012
ZEROS OF CERTAIN CROSS PRODUCTS OF BESSEL FUNCTIONS OF FRACTIONAL ORDER

W. A. Rostafinski
Apr. 1974 See also NASA-TM-X-2698
LEWIS-12221

Interpolation between values given in table of zeros is permitted provided curve is traced between at least three values from table. Zeros have been obtained on digital computer and results were rounded off to the fourth decimal point.

B74-10019
DIRECTORY OF AEROSPACE SAFETY SPECIALIZED INFORMATION SOURCES

E. A. Fullerton (Systems Develop. Corp.), L. S. Rubens (Systems Develop. Corp.), G. Mandel, and P. J. McKenna
Jun. 1974 See also NASA-CR-121206
LEWIS-12223

Directory aids safety specialists in locating information sources and individual experts in engineering-related fields. Lists 170 organizations and approximately 300 individuals who can provide safety-related technical information in form of documentation, data, and consulting expertise. Information on hazard and failure cause identification, accident analysis, and materials characteristics are covered.

B74-10022
RADIOISOTOPE THERMAL GENERATOR (RTG) POWER CONDITIONER

W. S. Stacey (Martin Marietta Corp.)
Apr. 1974
LANGLEY-11313

New regulator: (a) permits operation with high-impedance radioisotope thermal generators at conversion efficiencies typically above 90%; (b) does not require input filtering; (c) eliminates current spiking; and (d) is simple, efficient, and reliable. Converter-charger pair could be adapted for other power levels by changing transistor, diode, capacitor bank, and inductor.

B74-10038
DUALLY-MODE-LOCKED ND: YAG LASER

J. Osmundson, E. Rowe, and D. Santarpia
Jul. 1974
GSFC-11746

Mode-locking is stabilized effectively by conventional loss-modulator and phase-modulator, mode-locking elements placed in laser cavity in optical series with one another. Resulting dually-mode-locked system provides pulses with constant phase relative to mode-lock drive signal without presence of relaxation oscillation noise.

B74-10042
RECORDER/PROCESSOR APPARATUS

I. H. Shim (Image Inform. Inc.) and J. J. Stelben (Image Inform. Inc.)
Jul. 1974
GSFC-11553

Laser beam is intensity modulated in response to incoming video signals. Latent image is recorded on rotating drum which generates raster in conjunction with incrementally-driven lens carriage. Image is fed automatically to thermal processor; actual image is developed by controlled application of heat onto medium containing latent image.

B74-10051
RADIOISOTOPE HEATER

T. H. Smith, III (TRW Systems Group, TRW, Inc.), D. B. Evans (TRW Systems Group, TRW, Inc.), and A. J. Steinberger (TRW Systems Group, TRW, Inc.)
May 1974
ARC-10791

One-watt heater unit is about size of flashlight cell and can be safely handled for several minutes without danger. Unit is completely sealed and can withstand buildup of helium pressure from isotope disintegration for up to 30 years. Number of units can be safely grouped together.

B74-10054
EXTENDIBLE PROBE FOR ATMOSPHERE SAMPLING

W. J. Jones (McDonnell-Douglas Corp.), G. D. Mitchell (McDonnel-l-Douglas Corp.), and G. M. Jones (McDonnell-Douglas Corp.)
May 1974
ARC-10829

Sampling probe is extended through small plug in heat shield by loaded bellows to sample planetary atmosphere for compositional analysis and total pressure during entry of space probe. Assembly prevents contamination of sample by gases from pyrotechnic device and serves as sealed plenum for atmospheric pressure sensor.

B74-10055
TOROIDAL EQUIPMENT PACKAGING

W. J. Jones (McDonnell-Douglas Corp.) and J. W. Sherwood (McDonnell-Douglas Corp.)
May 1974
ARC-10828

For optimal packaging of equipment in shallow-cone vehicle toroidal packaging sets center of gravity of equipment forward. Packages are supported on rings within probe structure to provide low center of gravity. System permits interchanging of units for balance control, so minimum of lateral ballast is required.

B74-10056
BATTERY ACTIVATION SYSTEM

C. Sollo (McDonnell-Douglas Corp.), D. L. Smith (McDonnell-Douglas Corp.), and V. P. King (McDonnell-Douglas Corp.)
May 1974
ARC-10832

Initiator is fired to set off gas generator; gas flows into manifold and as gas pressure increases, chlorotrifluoroethylene diaphragms transfer force to polyethylene bags filled with electrolyte. Small membrane at base of each bag is ruptured, allowing electrolyte to flow into cells.

B74-10060
MEASUREMENT OF TEMPERATURE PROFILES IN HOT GASES AND FLAMES

R. S. Simmons (Univ. of Mich.), H. Y. Yamada (Univ. of Mich.), G. H. Lindquist (Univ. of Mich.), and C. B. Arnold (Univ. of Mich.)
Jul. 1974 See also NASA-CR-120894; NASA-CR-72491
LEWIS-12055

Computer program was written for calculation of molecular radiative transfer from hot gases. Shape of temperature profile was approximated in terms of simple geometric forms so profile could be characterized in terms of few parameters. Parameters were adjusted in calculations using appropriate radiative-transfer expression until best fit was obtained with observed spectra.

B74-10063
LONG LIFE NEUTRON GENERATOR TARGET USING DEUTERIUM PASS-THROUGH STRUCTURE

D. L. Alger
Jul. 1974
LEWIS-11866

Target structure permits all deuterons, except the one-in-a-million that interacts with tritium atom to produce a neutron, to pass completely through target structure and be returned to vacuum system. Since tritium atoms are not displaced as in conventional targets, tritium population will remain unchanged while under deuteron bombardment.

C-2

B74-10065
METHOD OF MEASURING THE THICKNESS OF RADIOACTIVE THIN FILMS
D. L. Alger, R. Steinberg, and M. D. Makinen
Jul. 1974 See also NASA-TM-X-68170
LEWIS-11971

Thickness monitor consists of proportional X-ray counter coupled to pulse counting system, copper filter over face of counter, rotatable collimator containing radioactive source, and rotatable shutter. Monitor can be used as integral part of neutron generator. It has been used to measure titanium tritide film thicknesses from 0.1 to 30 micrometers.

B74-10066
A HIGH YIELD NEUTRON TARGET
D. L. Alger, R. Steinberg, and P. Weisenbach
Aug. 1974 See also B74-10065; NASA-TM-X-68179
LEWIS-12058

Target, in cylinder form, rotates rapidly in front of beam. Titanium tritide film is much thicker than range of accelerated deutron. Sputtering electrode permits full use of thick film. Stream of high-velocity coolant provides efficient transfer of heat from target.

B74-10071
MODULATED HYDROGEN-ION FLAME DETECTOR: A CONCEPT
J. Dimeff
Jun. 1974
ARC-10322

To improve sensitivity of flame ionization detectors chop flow of sample into flame so resulting ionization will be modulated and therefore readily amplified independently of steady-state background ionization, thermoelectric effects, contact potentials, etc. Detector should discriminate sharply between desired signal and undesired signals.

B74-10072
PROBE FOR MEASURING TURBULENT REAL-TIME SHEAR-STRESS WAVES
D. Y. Cheng
Jun. 1974
ARC-10755

To measure spectrum, magnitude, and time-average value of turbulent shear stress in flow of gas use small, hollow sphere suspended in flow to measure drag fluctuations in two 90 deg-directions as function of time.

B74-10081
COBALT BASE SUPERALLOY HAS OUTSTANDING PROPERTIES UP TO 1478 K (2200 F)
R. A. Harlow (Philco-Ford Corp.), F. H. Harf, and J. C. Freche
Aug. 1974 See also NASA-CR-121189; NASA-CR-72726
LEWIS-12089

Alloy VM-103 is especially promising for use in applications requiring short time exposure to very high temperatures. Its properties over broad range of temperatures are superior to those of comparable commercial wrought cobalt-base superalloys, L-605 and HS-188.

B74-10094
VIEWGRAPH PREPARATION MADE EASIER
H. W. Broskie, E. E. Burcher, F. K. Gough, Jr., S. J. Katzberg, and H. B. Pate, Jr.
Aug. 1974
LANGLEY-11612

Rolls of color-reversal film permit exposure of over 200 viewgraphs on one film loading. Time is saved in film development as roll film lends itself readily to automatic processing.

B74-10101
SHORT-RANGE LASER OBSTACLE DETECTOR
W. L. Kuriger
Aug. 1974
NPO-11856

Detector, designed for slow-moving vehicle to explore surface of Mars, will automatically divert vehicle from obstacles as small as 0.5 m in its path. Detector comprises injection laser operating in pulse time-delay measurement, or radar, mode. It is capable of scanning area extending from few meters to approximately 30 m.

B74-10102
LASER-SCANNING TECHNIQUES FOR RAPID BALLISTICS IDENTIFICATION
R. C Woodburgy and R. B. Nakich (Time Zero Corp.)
Aug. 1974
NPO-11861

Two different laser-scanning methods may be utilized. In each case scanned cylindrical bullet surface is displayed "unwrapped" on oscilloscope screen. Bullets are compared by photographing each display and superimposing negatives of two images. With some modifications bullets can be scanned and compared by superimposing images on screen of dual-beam oscilloscope.

B74-10108
IMPROVED DISPENSING TARGETS FOR ION BEAM PARTICLE GENERATORS
C. G. Miller
Aug. 1974
NPO-13112

Beam impinges on palladium-silver tube, which is target, and heats impinged surface causing local hot spot. Contained gas diffuses through hot spot to meet incoming beam and produce desired particles. When beam is turned off, target spot cools and stops dispensing contained gas.

B74-10116
ANALYSIS OF ORBITAL HEAT TRANSFER
T. Buna (Martin Marietta Corp.)
Aug. 1974
ARC-10844

Graphical representation of orbital heat balance in form of polar diagrams is obtained from integral expressions of orbital heat transfer whereby quantities of heat are represented as areas swept by "thermal radii."

B74-10117
VALVE DEGRADATION DETECTOR
N. H. Doshi (TRW Systems Group, TRW, Inc.)
Aug. 1974
ARC-10850

To determine corrosive degradation of valve while it is in service, detect changes in surface roughness or presence of corrosive layers at junction of poppet and seat by measuring temperature gradients created across junction by small heat source.

B74-10118
SURFACE ROUGHNESS MEASURED BY OPTICAL SIGNATURES
R. J. Salvinski (TRW Systems Group, TRW, Inc.) and T. V. Roszhart (TRW Systems Group, TRW, Inc.)
Aug. 1974
ARC-10853

To measure roughness of metal surfaces by nondestructive means direct laser beam at surface and record distribution pattern of intensity of reflected light to obtain optical signature for comparison with calibrated surface. Signature of machined surface with scratch compared to that of regularly-patterned machined surface may also detect imperfections.

B74-10134
WAVELENGTH-SELECTIVE, SEQUENTIAL Q-SWITCHING LASER CAVITY
F. Allario and R. A. Lucht
Sep. 1974
LANGLEY-11045

Single-frequency continuous output of laser is converted into series of high-power laser pulses at high repetition rates. Applications include pollutant detection by absorption, laser gain measurements at discrete wavelengths, laser propagation measurement, and laser plasma diagnostics.

B74-10136
GRAPHITE IONIZATION VACUUM GAUGE
G. A. Beitel (Midwest Res. Inst.) and D. K. Benson (Midwest Res. Inst.)
Sep. 1974 See also NASA-CR-2101
LANGLEY-11338

Triode gauge with electron source, electron collector, and positive ion collector made from either graphite or carbon material extends low-pressure ranges of existing gauges by changing only materials used in construction. Advantages of graphite gauge stem from physical properties of graphite (or carbon).

B74-10139
OPTICAL DISCRIMINATOR SYSTEM
D. B. Robelen
Sep. 1974
LANGLEY-11580

System includes lightweight, inexpensive movie camera to record simultaneously views from three different angles on same filmstrip. This is noncritical system as it is adaptable to many applications requiring similar, but diverse, viewing areas.

B74-10143
RADIO-CONTROLLED, SOUND-OPERATED SWITCH
T. D. Bryant and D. W. Soloman, Jr.
Sep. 1974
LANGLEY-11641

Switch presently provides remote control switching, by radio signals, or pollution sampling devices. Can be used for remote weather station interrogation, firing of pyrotechnics, control of dangerous equipment, or control of device in location where it is impractical to run metallic conductors because of time limitations, distance, or terrain.

B74-10149
REMOTE SUNFALL MONITOR: A CONCEPT
R. B. Lollar (IBM) and R. R. Mandt (IBM)
Sep. 1974
M-FS-22943

Monitor is proposed as spectral monitor system designed to record digital data simultaneously from two types of sensors, mounted on both stationary assembly and tracking assembly. Both direct and total values of solar radiation are recorded. System may measure solar energy collector efficiencies for three main conversion technologies.

B74-10152
AUTOMATIC MARKER FOR PHOTOGRAPHIC FILM
N. M. Gabbard and W. M. Surrency
Sep. 1974
MSC-14705

Commercially-produced wire-marking machine is modified to title or mark film rolls automatically. Machine is used with film drive mechanism which is powered with variable-speed, 28-volt dc motor. Up to 40 frames per minute can be marked, reducing time and cost of process.

B74-10161
ELECTROSTATICALLY CONTROLLED HEAT SHUTTER
L. J. Derr
Sep. 1974
NPO-11942

Electrically controlled chamber filled with inert gas efficiently removes heat from heat-generating components. System can be reversed to bring heat from external source to component.

B74-10166
LASER-ACTUATED MECHANICAL DEVICE
A. J. Murphy and L. C. Yang
Sep. 1974
NPO-13105

Actuator is portable and can be used in high-temperature (over 500 C) environments by incorporating tungsten metal film and quartz window. Actuator can be triggered when it is not directly in laser beam path by utilizing fiber optics. It is advantageous for remotely switching ultra-high voltage systems.

B74-10167
IMPROVED CONTROL FOR NUCLEAR/THERMIONIC POWER SOURCE: A CONCEPT
C. D. Sawyer
Sep. 1974
NPO-13114

Variable-gain power regulator is used to maintain constant load voltage. There are two feedback loops. One is tied directly with regulator to feed error voltage, which is sum of reference and load voltages. Second loop is tied with reactor, where output current of thermionic fuel elements is fed back to signal generator.

B74-10168
METHOD FOR REMOTELY SENSING TURBULENCE OF PLANETARY ATMOSPHERES
R. T. Woo and A. Ishimaru
Sep. 1974
NPO-13154

Based on variances of log-amplitude and phase fluctuations of radio occultation data received from orbital and fly-by missions, structure constant for Venusian planetary atmosphere has been estimated with high-confidence factor. Analysis indicates that effects of inhomogeneity, finite size, and superrefractivity of atmospheric turbulence cannot be ignored.

B74-10173
THROTTLEABLE HEAT PIPE
B. D. Marcus (TRW Systems Group, TRW, Inc.)
Sep. 1974
ARC-10848

Variable thermal conductance is provided by throttling or interrupting vapor flow between evaporator and condenser sections of heat pipe. Potential advantage of throttling technique is that no bulky gas reservoirs are required. Entire condenser is maintained at nearly uniform temperature so there is better thermal interface with surrounding equipment.

B74-10181
SPECTROMETER
D. H. Menzel (Geophysics Corp. of Am.)
Nov. 1974
GSFC-11694

Ultraviolet spectrometer measures pure monochromatic wavelengths in predetermined narrow wave bands. Two stages are incorporated: stationary dispersed beam is intercepted by array of slits cut into plate at discrete wavelength locations; second stage is inverted spectrometer which recombines dispersed spectrum at single exit slit.

B74-10182
DYNAMIC POLARIZATION COMPENSATING SYSTEM FOR OPTICAL COMMUNICATIONS RECEIVER
M. W. Fitzmaurice and J. B. Abshire
Nov. 1974
GSFC-11782

Electro-optic cell is located in optical path of input light beam. Cell includes crystal for controlling phase between two polarization states. Cell axes are rotated 45 deg to receiver axes defined by vertical and horizontal polarization states. Voltage across cell compensates for bias by introducing different phase retardation along crystal axes.

B74-10184
CALORIMETRIC DETECTION OF NEUTRAL-ATOM CONTENT OF ION BEAM
A. S. Roberts, Jr. (Old Dominion Univ.)
Nov. 1974
LANGLEY-11505

Energy deposition technique deduces neutral-beam flux or dose from measured values of incremental resistance increases in platinum wire passed through beam. Steady-state heat balance analysis led to equivalent neutral-beam current. Method was used to detect neutral-atom content of 60-keV argon ion beam.

B74-10187
FLIGHT TESTS OF VORTEX-ATTENUATING SPLINES
J. C. Patterson, Jr.
Nov. 1974

LANGLEY-11645

Visual data on formation and motion of lift-induced wingtip vortex were obtained by stationary, airflow visualization method. Visual data indicated that vortex cannot be eliminated by merely reshaping wingtip. Configuration change will likely have only small effect on far-field flow.

B74-10194
LASER SYSTEM TO DETONATE EXPLOSIVE DEVICES
V. J. Menichelli and L. C. Yang
Nov. 1974
NPO-11743

Detonating system is not affected by electromagnetic interference. System includes laser source, Q-switch, and optical fiber connected to explosive device. Fiber can be branched out and connected to several devices for simultaneous detonation.

B74-10195
IMPROVED XENON LAMP FOR SOLAR SIMULATORS: A CONCEPT
L. F. Schmidt
Nov. 1974
NPO-13128

Short-arc xenon lamp proposes to produce more uniform solar output. With this lamp, both axes of sensors can be tested with same setup. Lamp includes cathode with conical tip and annular anode. Annulus is supported by angled projection to avoid interference with passage of light generated by arc.

B74-10200
DIGITAL MULTICHANNEL PHOTOMETER
E. A. Beaver (Univ. of Ca.) and C. E. McIlwain (Univ. of Ca.)
Nov. 1974
HQ-10791

System was developed for use in astronomy and other research areas concerned with detection of faint-light images. Photometer system is comparable in performance to good photomultiplier tube array except that digital electronics are used instead of analog.

B74-10202
IGNITION OF SOUNDING ROCKET MOTORS WITH HAND-PUMPED AIR
E. L. Rakowsky (Singer Co.) and V. P. Marchese (Singer Co.)
Nov. 1974 See also NASA-CR-2418
LANGLEY-11152

Method demonstrates inexpensive, safe, and foolproof concept for solid propellant rocket motors, using simple handpump to deliver air. Flueric ignition was accomplished using system without stored energy and with complete absence of electrical energy and wiring.

B74-10211
FLUID DYNAMICS TEST METHOD
W. H. Gayman
Nov. 1974
NPO-11895

Test method and apparatus determine fluid effective mass and damping in frequency range where effective mass may be considered as total mass less sum of slosh masses. Apparatus is designed so test tank and its mounting yoke are supported from structural test wall by series of flexures.

B74-10212
ULTRASONIC SCANNER FOR FOOTPRINT IDENTIFICATION
L. J. Derr
Nov. 1974
NPO-13055

Scanner includes transducer, acoustical drive, acoustical receiver, X and Y position indicators, and cathode-ray tube. Transducer sends ultrasonic pulses into shoe sole or shoeprint. Reflected signals are picked up by acoustic receiver and fed to cathode-ray tube. Resulting display intensity is directly proportional to reflected signal magnitude.

B74-10216
HEAT PIPE WITH HOT GAS RESERVOIR
B. D. Marcus (TRW Systems Group, TRW, Inc.)
Nov. 1974 See also NASA-CR-114530
ARC-10847

Heat pipe can reverse itself with gas reservoir acting as evaporator, leading to rapid recovery from liquid in reservoir. Single layer of fine-mesh screen is included inside reservoir to assure uniform liquid distribution over hottest parts of internal surface until liquid is completely removed.

B74-10217
SYSTEM FOR MEASURING TRANSIENTS IN FLUID FLOW
D. J. Pearson (TRW Systems Group, TRW Inc.)
Nov. 1974
ARC-10852

When test valve is actuated, piston is moved by pressurized fluid, and displacement is monitored by electro-optical tracking system and recorded by oscilloscope camera. Electro-optical monitor produces output voltage proportional to displacement of piston.

B74-10223
FIELD-SEQUENTIAL STEREO TELEVISION
W. E. Perry
Nov. 1974
MSC-12616

System includes viewing devices that provide low interference to normal vision. It provides stereo display observable from broader area. Left and right video cameras are focused on object. Output signals from cameras are time provided by each camera. Multiplexed signal, fed to standard television monitor, displays left and right images of object.

B74-10224
INSPECTION OF TRANSPARENT SURFACES USING PHOTOSENSITIVE PAPER
F. R. Minton and U. O. Graham
Nov. 1974
MSC-19442

Window surface is laid flat on top of photosensitive paper. Opposite side of glass is covered by black cloth. Window edges are then illuminated by light flash through fiber optics. Exposed paper is processed and inspected. Paper shows scratches, bubbles, dust particles, and fingerprints on glass surface.

B74-10229
COAXIAL ANODE IMPROVES SENSITIVITY OF GAS RADIATION COUNTERS
W. L. Kraushaar (Univ. of Wisc.)
Dec. 1974 See also B73-10282
GSFC-11492

Anode wire itself is enclosed by three segments. Two on ends are rejector segments, and middle one is primary charge-detecting segment. Anode wire is made from tungsten and is surrounded by enamel insulation. Enamel is covered by segments of vapor-deposited gold. At one point in center segment, gold layer makes direct contact with anode wire.

B74-10230
PARTICLE IMPACT LOCATION DETECTOR
S. O. Auer
Dec. 1974 See also B73-10282
GSFC-11829

Detector includes delay lines connected to each detector surface strip. When several particles strike different strips simultaneously, pulses generated by each strip are time delayed by certain intervals. Delay time for each strip is known. By observing time delay in pulse, it is possible to locate strip that is struck by particle.

B74-10232
COMPACT SOURCE OF SOFT X-RAYS
P. Gorenstein (Am. Sci. and Eng., Inc.) and B. Harris (Am. Sci. and Eng., Inc.)
Dec. 1974
HQ-10732

Sources of soft X-rays uses alpha particles to fluoresce light elements such as boron, carbon, and magnesium. X-ray wavelengths are varied by changing target. Technique supplies broad range of monoenergetic X-rays whose energy can be adjusted very easily.

B74-10243
IMPROVED NONDISPERSIVE INFRARED ANALYZER
J. Dimeff
Dec. 1974 See also B72-10198
ARC-10802

Light from radiant energy source passes through filter, sample, and reference gas chambers to detector. Chamber with amount of gas to be measured is sealed. Filter may be gelatinous, interference, dispersive, or negative-gas, as required.

B74-10246
COMBINED EFFECTS OF A CONVERGING BEAM OF LIGHT AND MIRROR MISALIGNMENT IN MICHELSON INTERFEROMETRY
L. W. Kunz and D. Goorvitch
Dec. 1974
ARC-10889

Expressions have been derived and calculations have been made which show that combined effects lead to asymmetric interferograms and reduction in power at zero path difference. Criteria are given for estimating maximum allowable mirror misalignment.

B74-10254
IMPROVED MAGNETIC SUSPENSION TECHNIQUE
P. A. Studer
Jan. 1975
GSFC-11079

Technique combines electromagnetic coil with polarized permanent magnets. This reduces power consumption of electromagnetic units and improves response of magnetic suspension systems, by increasing their sensitivity to changes in current controlling electromagnet.

B74-10261
NOISE SUPPRESSOR
W. E. Zorumski
Jan. 1975 See also NASA-TR-R-419
LANGLEY-11141

Suppressor reduces noise propagated through ducts. It provides high attenuation in given duct length. Entire device forms acoustic trap which utilizes reflective elements on ends to direct sound energy into sound-dissipating element in center. Device achieves large suppression by utilizing interactive effects of different suppression devices.

B74-10271
VOLUME MEASURING SYSTEM
J. S. Oele (Lockheed Missiles and Space Co.)
Jan. 1975
MSC-13972

Chamber is designed to be airtight; it includes face mask for person to breathe outside air so that he does not disturb chamber environment. Chamber includes piston to vary air volume inside. Also included are two microphone transducers which record pressure information inside chamber.

B74-10275
IMPROVED CHANNEL MULTIPLIER FOR RADIATION-AND-PARTICLE DETECTORS
K. C. Schmidt (Bendix Corp.)
Jan. 1975
NPO-12128

Multiplier is formed of glass and includes cylindrically-shaped main channel element having length-to-diameter ratio of 50 to 1. Element has open slot along its length. Attached to slot edges are two glass plates set at an angle to each other. Inside surfaces are coated with secondary electron emissive coating.

B74-10291
FLAT DEVICE FOR HEAT CONCENTRATION OR DISPERSION
R. V. Jenkins and A. P. Sabol
Feb. 1975
LANGLEY-11699

Device provides low-cost unit for efficiently transferring heat between, either to or from, flat surface and central point or region. It is based upon vapor heat transfer principle and therefore, extends applicability of heat pipe.

B74-10293
ACOUSTIC-OPTIC DEFLECTOR TELESCOPE
W. C. Stewart (RCA)
Feb. 1975
M-FS-23107

In construction of page-organized holographic memories, it is necessary to provide collimated laser beam which can be deflected parallel to itself. This is used for selecting stored holograms from two-dimensional array. Three-lens system significantly reduces optical path length.

B74-10301
THERMOELASTIC ANALYSIS OF SOLAR CELL ARRAYS AND THEIR MATERIAL PROPERTIES
M. A. Salama, W. J. Rowe, and R. K. Yasui
Feb. 1975 See also NASA-CR-135713
NPO-13458

Announced report discusses experimental test program in which five different solar cell array designs were evaluated by subjecting them to 60 thermal cycles from minus 190 deg to 0.0 deg. Results indicate that solder-coated cells combined with Kovar n-interconnectors and p-interconnectors are more durable under thermal loading than other configurations.

B75-10001
A SUPERIOR PROCESS FOR FORMING TITANIUM HYDROGEN ISOTOPIC FILMS
R. Steinberg, D. L. Alger, and D. W. Cooper
Mar. 1975
LEWIS-12083

Process forms stoichiometric, continuous, strongly bonded titanium hydrogen isotopic films. Films have thermal and electrical conductivities approximately the same as bulk pure titanium, ten times greater than those of usual thin films.

B75-10004
PROPERTIES OF AIR AND COMBUSTION PRODUCTS OF FUEL WITH AIR
D. J. Poferl and R. Svehla
Mar. 1975 See also NASA-TN-D-5452; NASA-TN-D-7488
LEWIS-12402

Thermodynamic and transport properties have been calculated for air, the combustion products of natural gas and air, and combustion products of ASTM-A-1 jet fuel and air. Properties calculated include: ratio of specific heats, molecular weight, viscosity, specific heat, thermal conductivity, Prandtl number, and enthalpy.

B75-10008
UNIFORM HIGH IRRADIANCE SOURCE
A. R. Lunde (Boeing Co.), A. Fortini, and D. R. Buchele
Apr. 1975 See also NASA-CR-134523; NASA-SP-298
LEWIS-12360

New 50 Kw xenon short arc lamp mounted within elliptical collector provides irradiance levels up to 4.4 x 10 to the 7th power watts/sq m with non-uniformity ratio of 3.30. Energy mixer or light pipe between lamp source and target improves non-uniformity to required ratio.

B75-10017
A METHOD FOR MEASURING COOLING AIR FLOW IN BASE COOLANT PASSAGES OF ROTATING TURBINE BLADES
C. H. Liebert and F. G. Pollack
Apr. 1975 See also NASA-TN-D-7697
LEWIS-12433

Method accurately determines actual coolant mass flow rate in cooling passages of rotating turbine blades. Total and static pressures are measured in blade base coolant passages. Mass flow rates are calculated from these measurements of pressure, measured temperature and known area.

B75-10024
ELECTRICAL GAS HEATER WITH LARGE FLOW RANGE CAPABILITY
B. A. Benson (Boeing Co.) and A. Fortini
May 1975 See also NASA-CR-134523
LEWIS-12361

Auxiliary heat transfer device in form to tightly-wound helical tube was incorporated into conventional heater design to provide hydrogen heater with turn-down ratio greater than 100. Device greatly increases low flow rate capacity of heater by providing maximum heat-transfer area for low mass flows.

B75-10026
REMOTE ESTIMATION OF SOIL MOISTURE
M. B. Blanchard, R. Greeley (Santa Clara Univ.), and R. Goettelman (LFE Inc.)
Feb. 1975 See also NASA-TM-X-62343
ARC-10867

Two methods under consideration for making remote estimates of soil moisture involve measurements made in electromagnetic spectral region of 0.4 to 14.0 micrometers: (1) spectral reflectance, (2) soil temperature.

B75-10028
STUDY OF FLUID FLOW BY CHARGED PARTICLES
M. Deluca (Ohio State Univ.) and H. R. Velkoff (USAAMRDL)
Feb. 1975
ARC-10925

Analytical and experimental effort explores possibility of using charged particles as diagnostic tool in study of fluid flows. Test program involved right circular cylinder and airfoil located in large wind tunnel; ions were injected into flow and resulting currents at surfaces were monitored.

B75-10034
COAXIAL, SELF-ALIGNING OPTICAL SCANNING SYSTEM
D. B. Rhodes
May 1975
LANGLEY-11711

System provides fast way to sequentially focus optical energy (light) at preselected points in space. It transmits optical energy to point in space while at same time receiving any optical energy generated at that point and then moves on to next selected point and repeats this transmit-and-receive operation.

B75-10035
TRANSMISSION OSCILLATOR ULTRASONIC SPECTROMETER (TOUS): A NEW RESEARCH INSTRUMENT
J. S. Heyman, F. D. Stone, M. S. Conradi (Washington Univ.), and J. G. Miller (Washington Univ.)
Apr. 1975
LANGLEY-11735

TOUS is capable for measuring very small changes in acoustic attenuation and phase velocity. Its high sensitivity to small changes in ultrasonic absorption results in part from operation under marginal conditions. In spite of high sensitivity, TOUS system is relatively simple, inexpensive, and compact.

B75-10040
VIEWFINDER/TRACKING SYSTEM FOR SKYLAB
W. L. Casey (Martin Marietta Corp.)
Apr. 1975 See also NASA-CR-133967; NASA-TM-X-69040
MSC-14407

Basic component of system is infrared spectrometer designed for manual target acquisition, pointing and tracking, and data-take initiation. System incorporates three main subsystems which include: (1) viewfinder telescope, (2) control panel and electronics assembly, and (3) IR-spectrometer case assembly.

B75-10043
REFRACTING LENS SYSTEM FOR LOW-SCATTER STAR-TRACKER: A CONCEPT
Innovator not given (Optics Res Laboratories) Apr. 1975 See also NASA-CR-134224
MSC-14724

"Low Scatter Lens Design/Development" discusses studies of low-scatter lens system. Two sections cover optical design and scattering analysis for model of lens system which rejects radiation. Result of computations are shown on computer printouts attached to report.

B75-10047
ACOUSTICALLY CONTROLLED INTEGRATED LASER FOR COMMUNICATIONS SYSTEMS
C. Elachi
Apr. 1975
NPO-13175

Acoustic wave creates fringes by producing periodic stresses in substrate and in film. Laser carrier frequency is then changed by simply changing acoustical frequency. When two acoustical sources are applied off beam axis, beam can be scanned at very rapid rates.

B75-10048
AUTOMATICALLY-FOCUSING MICROSCOPE SYSTEM FOR LIVE TISSUE OBSERVATION
M. N. Mansour, C. P. Chapman, and H. J. Wayland
Apr. 1975
NPO-13215

System includes focus-sensing arrangement which controls servo to keep microscope constantly focused on target. Microscope objective is moved along optical axis. System includes two video cameras that are used as transducers for sensing focus. Incoming visual image is split by beam splitter so that one-half of information is fed to each camera.

B75-10050
RESONANT CHAMBERS FOR SUSPENDING MATERIALS IN AIR
T. G. Wang, M. W. Saffren, and D. D. Elleman
Apr. 1975
NPO-13263

Acoustical pressure of standing wave is used to suspend materials inside resonant chambers. Material is driven to standing-wave antinodes where pressure is lowest. Pressure at nodes is greatest, which prevents suspended material from collecting there. Material can be moved inside chambers by changing wave patterns.

B75-10075
HANDBOOK OF NOISE RATINGS
K. S. Pearsons (Bolt, Beranek, and Newman, Inc.) and R. L. Bennet (Bolt, Beranek, and Newman, Inc.)
May 1975 See also NASA-CR-2376
LANGLEY-11799

Handbook announced in Tech Brief is compendium of information describing multifarious noise methods now in use. Reference material gives user better access to definitions, application, and calculation procedures of current noise rating methods.

B75-10080
DATA PROCESSING LARGE QUANTITIES OF MULTISPECTRAL INFORMATION
R. E. Haskell (Oakland Univ.)
May 1975
MSC-14472

Method is combination of digital and optical techniques. Multispectral data is coded into binary matrix format and then encoded onto photographic film. Film is holographically correlated with spectral signature to generate single-class classification map. Number of maps are optically superimposed to produce full-color, multiclass classification map.

B75-10081
INFRARED TUNABLE LASER: A CONCEPT

K. W. Billman
May 1975
ARC-10463

Apparatus in which laser wavelengths of two dyes are mixed in intracavity, nonlinear crystal provides intense source of coherent laser radiation which is tunable from visible through infrared wavelengths of electromagnetic spectrum.

B75-10082
A NONDISPERSIVE INFRARED ANALYZER
J. Dimeff
May 1975 See also B72-10198; B74-10243
ARC-10631

Apparatus retains all advantages of prior nondispersive infrared analysis systems and provides significantly more innumity to type of errors that may be introduced by geometric changes in analysis system. Technique also permits construction of instruments of lower weight, smaller volume, and smaller power consumption.

B75-10087
ANTIRESONANT RING INTERFEROMETER FOR LASER CAVITY DUMPING, MODE LOCKING, AND OTHER APPLICATIONS
A. E. Siegman (Stamford Univ.)
Jun. 1975
HQ-10844

Applications in lasers for antiresonant ring interferometer include coupled laser cavities, variable laser-output coupling, intracavity harmonic-output coupling, mode locking, cavity dumping, and pulse code modulation.

B75-10090
HOLOGRAPHIC DIRECT-VISION SPECTROSCOPE
J. M. Franke
Jun. 1975
LANGLEY-11750

Spectroscope incorporates two prisms combined with holographic grating as dispersing element. This provides high dispersion with selective undeviated wavelength. Prisms with different indices of refraction and/or angles for construction and reconstruction may be used. Also, different prisms for input and output may be used.

B75-10097
SUPERCONDUCTING QUANTUM-INTERFERENCE DEVICES
P. N. Peters and L. B. Holdeman
Jun. 1975
M-FS-23163

Published document discusses devices which are based on weak-link Josephson elements that join superconductors. Links can take numerous forms, and circuitry utilizing links can perform many varied functions with unprecedented sensitivity. Theoretical review of Josephson's junctions include tunneling junctions, point contact devices, microbridges, and proximity-effect devices.

B75-10098
LARGE-SCALE SOLAR THERMAL COLLECTOR CONCEPTS
L. W. Brantley
Jun. 1975
M-FS-23167

Thermal collector could be used ultimately to power steamplant to produce electricity. Collector would consist of two major subsystems: (1) series of segmented tracking mirrors with two axes of rotation and (2) absorber mounted on centrally located tower.

B75-10099
DICHROMATED-GELATIN HOLOGRAM PROCESS FOR IMPROVED OPTICAL QUALITY
W. C. Stewart (RCA)
Jun. 1975
M-FS-23170

Optical distortions are eliminated by use of wetting agency followed by sequential immersion in several alcohol-water baths of increasing alcohol concentration. Dehydration proceeds uniformly over surface of gelatin. Dried plate is free of optically-distorting thickness variations.

B75-10105
WIDE-FIELD BIREFRINGENT ELEMENTS
A. Miller (RCA)
Jun. 1975
MSC-12677

Birefrigent array consists of two plates with retardation properties nearly independent of direction of incident light over unlimited range of wavelengths. Array can be used as birefrigent color filter. Optical properties of plates may also be changed electro-optically rather than thermally.

B75-10112
LASER SCANNED IMAGE SENSORS USING PHOTOCONDUCTORS WITH DEEP TRAPS
J. Maserjian
Jun. 1975
NPO-13131

Photoconductor records image when holes and electrons are trapped inside it due to incident photons. Image can be read out by exposing photoconductor to scanning laser beam. Photons from scanning laser empty traps, generating photocurrent. Image information is obtained by detecting this photocurrent synchronously with laser scan.

B75-10115
CHEMICAL-IONIZATION VISIBLE AND ULTRAVIOLET GAS LASERS: A CONCEPT
J. B. Laundenslager
Jun. 1975
NPO-13289

Charge-transfer reactions or Penning ionization reactions are used to produce population inversions between electronic states of molecular ions which should result in stimulated emission in ultraviolet and visible regions. Such lasers could be used in study of short-lived reaction intermediates, crystal structure and scattering, and photolysis.

B75-10116
HEAT-OPERATED CRYOGENIC ELECTRICAL GENERATOR
T. G. Wang, M. M. Saffern, and D. D. Elleman
Jun. 1975
NPO-13303

Generator operation is based upon unusual hydrodynamic properties exhibited by liquid helium below superfluid critical point. Below that temperature, liquid behaves as though it is mixture of two interpenetrating fluids. When transition takes place between superfluid and normal states, conservation of momentum is always balanced by normal fluid.

B75-10118
HIGH-ENERGY LASERS BY USING DISTRIBUTED REFLECTION: A CONCEPT
M. M. Saffren
Jun. 1975
NPO-13346

Lasers may be made with higher energy photons than heretofore possible. It has been proposed that vacuum ultraviolet lasing can be obtained by bombarding superfluid helium with electron beam, while coupling acoustic energy into helium to set up standing waves in fluid.

B75-10119
LASER-TO-ELECTRICITY ENERGY CONVERTER FOR SHORT WAVELENGTHS
J. R. Stirn and Y. C. M. Yeh
Jun. 1975
NPO-13390

Short-wavelength energy converter can be made using Schottky barrier structure. It has wider band gap than p-n junction silicon semiconductors, and thus it has improved response at wavelengths down to and including ultraviolet region.

B75-10123
DOUBLE-DISCHARGE COPPER-VAPOR LASER
J. C. Chen, N. M. Merheim, and G. R. Russell
Jun. 1975
NPO-13348

Power supply for discharge pulses consists of two capacitors that are made to discharge synchronously with adjustable time intervals. First pulse is switched with hydrogen thyratron, and second by spark gap. Lasing action peaks for appropriate combination of these two parameters.

B75-10124
QUARTZ CRYSTAL MICROBALANCES TO MEASURE WIND VELOCITY AND AIR HUMIDITY
J. B. Stephens and E. G. Lave
Jun. 1975
NPO-13462

Instrument includes four temperature-sensing, Y-cut quartz crystals to determine wind direction, velocity, and temperature. Two additional AT-cut crystals are used to determine air humidity. Entire signal processing is provided by built-in electronics circuits.

B75-10125
SCHOTTKY BARRIER SOLAR CELL PROMISES IMPROVED EFFICIENCY
R. J. Stirn
Jun. 1975 See also B75-10119
NPO-13482

Higher current and higher voltage can be obtained by using Schottky barrier device with wide band-gap semiconductor as top layer and lower band-gap semiconductor underneath. Significant amount of solar radiation that is not absorbed by side band-gap material will be absorbed by narrow band-gap material.

B75-10126
TRANSMISSION LINE FOR S-BAND MASERS
R. C. Clauss and E. R. Wiebe
Jun. 1975
NPO-13504

Transmission-line is coaxial. Its outer conductor is made of thin-wall stainless-steel tube; inside is plated with 0.0025 mm copper and 0.0003 mm gold. This combination gives little microwave loss and adequate thermal isolation.

B75-10127
LASER ACTION GENERATED WITHIN A LIGHT PIPE: A CONCEPT
C. Elachi, G. A. Evans, and C. Yeh
Jun. 1975
NPO-13531

Laser light could be generated within light pipe itself, thereby eliminating coupling losses. Theoretical calculations have shown feasibility of light-pipe laser propagating in circularly-polarized TE mode. It is predicted that fiber-optic distributed-feedback laser would have gain on order of 25 dB.

B75-10128
LASER USING LEAD CHLORIDE VAPOR
C. J. Chen
Jun. 1975
NPO-13615

By applying electric discharge, lead chloride vapor in tube is dissociated into lead and chlorine atoms. Population inversion of lead atoms is attained subsequently by second discharge, before chemical recombination of lead and chlorine has occurred. Optimum time interval between two discharges is required for maximum laser output.

B75-10138
LIFE PREDICTION OF MATERIALS EXPOSED TO MONOTONIC AND CYCLIC LOADING: A TECHNOLOGY SURVEY AND BIBLIOGRAPHY
W. F. Stuhrke (Martin Marietta Corp.), J. L. Carpenter, Jr. (Martin Marietta Corp.), N. Moya (Martin Marietta Corp.), and G. Mandel
Aug. 1975 See also B75-10139; NASA-CR-134750; NASA-CR-134751; NASA-CR-134752; NASA-CR-134-753; NASA-CR-134754
LEWIS-12502

Announced survey directs attention toward low cycle fatigue and thermal fatigue experienced at elevated temperatures equivalent to those found in hot end of gas turbine engine. Majority of bibliographic references are on life prediction for materials exposed to monotonic and cyclic loading in high temperature environments.

B75-10139
FRACTURE TOUGHNESS TESTING DATA: A TECHNOLOGY SURVEY AND BIBLIOGRAPHY
W. F. Stuhrke (Martin Marietta Corp.), J. L. Carpenter, Jr. (Martin Marietta Corp.), N. Moya (Martin Marietta Corp.), and G. Mandel
Aug. 1975 See also B75-10138; NASA-CR-134750; NASA-CR-134751; NASA-CR-134752; NASA-CR-134753; NASA-CR-134754
LEWIS-12503

Announced survey includes reports covering fracture toughness testing for various structural materials including information on plane strain and developing areas of mixed mode and plane strain test conditions. Bibliography references cite work and conclusions in fracture toughness testing and application of fracture toughness test data, and in fracture mechanics analysis.

B75-10141
LASER VELOCIMETER MEASUREMENTS OF HIGH-SPEED COMPRESSIBLE FLOWS
D. A. Johnson
Jul. 1975
ARC-10781

Laser velocimeter results were compared and found to be consistent with those obtained with conventional measurement techniques and existing compressible boundary layer theory. Turbulence information at supersonic speed has been successfully obtained in compressible boundary layer with laser system.

B75-10142
QUICK-CHANGE ABSORPTION COLUMN
G. N. McEwen, Jr. (Natl. Res. Council) and B. A. Williams
Jul. 1975
ARC-10952

Column has end caps held in place by springs; prefilled packs of absorbent can be exchanged quickly. Both ends of metal or plastic body tube of size which can hold adequate amount of absorbent are machined to provide seat for perforated plate and groove for its spring retainer ring.

B75-10147
AN EXPERIMENTAL 100 KILOWATT WIND TURBINE GENERATOR
R. L. Thomas, R. L. Puthoff, J. M. Savino, and W. R. Johnson
Aug. 1975 See also NASA-TM-X-71701
LEWIS-12509

Experimental generator consists of two blades mounted on 100 foot tower, driving transmission train and electric generator mounted on top of tower. Machine generates 100 kW of electricity at wind speeds from 18 to 60 miles per hour. Yaw control mechanism automatically orients machine into wind.

B75-10149
INVESTIGATIONS OF MULTIPLE JETS IN A CROSSFLOW
R. E. Walker (Aerojet-Gen. Corp.) and D. L. Kors (Aerojet-Gen. Corp.)
Oct. 1975 See also NASA-CR-121217
LEWIS-12102

Study was conducted to determine penetration and mixing characteristics of multiple jets of ambient temperature air injected perpendicularly into ducted mainstream of hot combustion gases.

B75-10158
ANGULAR DEVICE FOR OPTICAL FILTERS
L. W. Overbay
Aug. 1975
LANGLEY-11796

Device provides a means for precise angular adjustment of optical filters in Raman calibration detector units. Device prevents

stray light from entering system and has the capability of repeated alignments to predetermined angles.

B75-10160
AUTOMATED ELECTRONIC SYSTEM FOR MEASURING THERMOPHYSICAL PROPERTIES
T. R. Creel, Jr., R. A. Jones, R. R. Corwin (Beta Industries, Inc.), and J. S. Kramer (Beta Industries, Inc.)
Aug. 1975 See also B73-10447; NASA-CR-2511
LANGLEY-11883

Phase-charge coatings are used to measure surface temperature accurately under transient heating conditions. Coating melts when surface reaches calibrated phase-charge temperature. Temperature is monitored by infrared thermometer, and corresponding elapsed time is recorded by electronic data-handling system.

B75-10176
COMPACT LASER THROUGH IMPROVED HEAT CONDUCTANCE
L. C. Yang
Aug. 1975
NPO-13147

A 16-joule-pulse laser has been developed in which a boron nitride heat-conductor enclosure is used to remove heat from the elements. Enclosure is smaller and lighter than systems in which cooling fluids are used.

B75-10181
A TWO-DEGREE KELVIN REFRIGERATOR
J. B. Stephens and C. G. Miller
Aug. 1975
NPO-13459

Open-cycle cryogenic refrigerator maintains temperature as low as 2K for periods up to six months. Designed to cool an infrared detector, refrigerator can be used in cooling Josephson-junction devices, magnetic bubble domains, and superconducting devices.

B75-10182
ECONOMICAL SOLAR-HEATING OR COOLING SYSTEM WITH NEW SOLAR-ENERGY CONCENTRATORS
K. Shimada
Aug. 1975
NPO-13497

Economical solar energy collector, made from array of cylindrical Fresnel lenses, does not require tracking mechanism. As the sun changes position, lenses focus solar energy on different collector elements.

B75-10183
HIGH-POWER CW LASER USING HYDROGEN-FLUORINE REACTION
P. I. Moynihan
Aug. 1975
NPO-13623

Continuous-wave laser has been proposed based on reaction of hydrogen and fluorine. Hydrogen is produced by dissociation of hydrazine, which can be stored as liquid in light containers at room temperature.

B75-10185
CHARACTERISTICS AND PERFORMANCE STUDY OF MASS SPECTROMETER RESIDUAL GAS ANALYZERS
W. W. Hultzman
Sep. 1975 See also NASA-TN-D-7554
LEWIS-12393

Types of instruments studied were magnetic sector, omegatron, quadrupole, and monopole. Experimental results obtained included absolute sensitivity to argon, relative sensitivity to ten gases (hydrogen, helium, neon, nitrogen, carbon monoxide, oxygen, argon, carbon dioxide, krypton, and xenon), and cracking patterns for these gases.

B75-10189
COMPARATIVE PERFORMANCE OF TWENTY-THREE TYPES OF FLAT PLATE SOLAR ENERGY COLLECTORS
F. F. Simon
Sep. 1975 See also B74-10086; NASA-TM-X-3059; NASA-TM-X-71793
LEWIS-12511

Report compares efficiencies of 23 solar collectors for four different purposes: operating a Rankine-cycle engine, heating or absorption air conditioning, heating hot water, and heating a swimming pool.

B75-10202
WIDE-ANGLE SUN SENSORS
L. L. Schumacher
Sep. 1975
NPO-13327

Two sensors have been developed: one, single-axis device, is cylindrical; the other, two-axis device, is spherical. Multiple surface deposits of photosensitive material, such as cadmium sulfide, serve as redundancy, ensuring high reliability.

B75-10206
DIFFUSED GUIDES FOR DISTRIBUTED-FEEDBACK LASERS
C. Elachi
Sep. 1975 See also B75-10127
NPO-13544

Proposed wavequide is hollow cylindrical pipe. Inside channel surface is infused with gas or metal molecules, forming periodic cross sections along entire length. Light is scattered at periodic infusions, resulting in distributed feedback. Configuration is suited for capillary gas lasers.

B75-10210
SECONDARY REFLECTORS FOR ECONOMICAL SUN-TRACKING ENERGY COLLECTION SYSTEM: A CONCEPT
C. G. Miller and J. B. Stephens
Sep. 1975 See also B75-10209
NPO-13580

Mechanism is simpler and lower in cost because it moves heat-collector pipe to stay in focus with sun, instead of moving heavy reflectors.

B75-10223
OPTICAL FEEDBACK TECHNIQUE EXTENDS FREQUENCY RESPONSE OF PHOTOCONDUCTORS
S. J. Katzberg
Oct. 1975 See also NASA-TN-D-7727
LANGLEY-11768

Feedback circuit consists of high-gain light-to-voltage converter with frequency-limited nonlinear photoconductor inside feedback loop. Feedback element is visible light-emitting diode with light-out versus current-in characteristic that is linear over several decades.

B75-10224
GUST ALLEVIATION SYSTEM TO IMPROVE RIDE COMFORT OF LIGHT AIRPLANES
E. C. Stewart, W. H. Phillips, and D. E. Hewes
Oct. 1975
LANGLEY-11771

System consists of movable auxiliary aerodynamic sensors mounted on fuselage and connected to trailing-edge flaps by rigid mechanical linkages. System achieves alleviation by reducing lift-curve slope of airplane to such a small value that gust-induced angles of attack will result in small changes in lift.

B75-10226
APPLICATION OF MONOCHROMATIC OCEAN WAVE FORECASTS TO PREDICTION OF WAVE-INDUCED CURRENTS
L. R. Poole
Oct. 1975 See also NASA-TN-D-7861
LANGLEY-11809

Stoke's wave-induced currents are compared, for variety of wind conditions resulting in partially developed seas and for two water depths, with currents induced by average and

significant monochromatic waves related to Bretschneider spectrum.

B75-10227
NEW AIRCRAFT INSTRUMENT INDICATES TURBULENCE INTENSITY
R. A. Champine and C. W. Meissner, Jr.
Oct. 1975
LANGLEY-11833
System consists of accelerometer, indicator, and necessary electronic circuits for summing and averaging accelerations. Averaging-time feature enables pilot to see large values of accelerations over a short time or smaller accelerations over longer period of time.

B75-10228
VISUAL ALIGNMENT AID
J. M. Franke
Oct. 1975
LANGLEY-11842
Device consists of beam-splitter cube and two 90 deg prisms cemented together. Various components can be made as two pieces, eliminating seams, except beam-splitter diagonal.

B75-10229
STEAM AUTOMOBILE ANALYSIS
J. A. Peoples
Oct. 1975
M-FS-23188
Report includes many charts that present graphically the effects of design parameters on performance. Equations and data are given which can assist designer in selecting among such factors as working medium, horsepower, and engine components.

B75-10232
LEVITATION OF OBJECTS USING ACOUSTIC ENERGY
R. R. Whymark (Intersonics, Inc.)
Oct. 1975
M-FS-23261
Activated sound source establishes standing-wave pattern in gap between source and acoustic reflector. Solid or liquid material introduced in region will move to one of the low pressure areas produced at antinodes and remain suspended as long as acoustic signal is present.

B75-10235
MULTISPECTRAL DATA ANALYSIS: LARSYS III
D. A. Landgrebe (Purdue Univ.)
Oct. 1975
MSC-14823
System uses pattern recognition and interactive data handling techniques applied to remotely sensed data. Basic analysis concept consists of locating data points which are believed to be representative of classes of interest.

B75-10236
TABLE-LOOKUP ALGORITHM FOR PATTERN RECOGNITION: ELLTAB (ELLIPTICAL TABLE)
W. C. Jones, III and W. G. Eppler
Oct. 1975 See also B75-10235
MSC-14866
Remotely sensed unit is assigned to category by merely looking up its channel readings in four-dimensional table. Approach makes it possible to process multispectral scanner data using a minicomputer.

B75-10237
AUTOMATIC SOLAR TRACKER
B. L. Conroy
Oct. 1975
NPO-13630
Mechanism uses differential pressure of condensable fluid against fixed piston to equalize radiant energy on pair of blackbody elements.

B75-10239
SOFT X-RAY LASERS USING DISTRIBUTED-FEEDBACK REFLECTION: A CONCEPT
F. J. Grunthaner
Oct. 1975
NPO-13532
Proposed arrangement consists of large evacuated chamber containing smaller Dewar chamber into which liquid neon is introduced. Zeolite crystal is mounted in wall of chamber, with one side in contact with neon and other exposed to evacuated chamber. Electron gun is used to bombard crystal.

B75-10244
CALCULATION PROCEDURE FOR TRANSIENT HEAT TRANSFER TO A COOLED PLATE IN A HEATED STREAM WHOSE TEMPERATURE VARIES ARBITRARILY WITH TIME
J. Sucec
Nov. 1975 See also NASA-TM-X-3238
LEWIS-12558
Heat transfer equations have been developed to calculate surface temperature and surface heat flux for cooled flat plate when temperature of fluid passing over leading edge varies arbitrarily.

B75-10245
A NEW HIGH TEMPERATURE NOBLE METAL THERMOCOUPLE PAIRING
G. E. Glawe
Nov. 1975
LEWIS-12545
Investigation has revealed reasonably oxidation resistant thermocouple pairing suitable for use in combustor gas streams at temperatures above 1873 K and at pressures above 20 atmospheres.

B75-10248
VARIABLE-VOLUME ATOMIC STORAGE VESSEL FOR HYDROGEN MASERS
H. F. Peters
Oct. 1975
GSFC-11895
Vessel, located in maser cavity, is made from cylindrical, convoluted flexible bellows which can be expanded or contracted along the cylinder axis vertically. Inner surface area remains constant with changing volume, permitting measurement of frequency deviations of excited atoms.

B75-10250
OPTICAL DESIGN COMPUTER PROGRAM: LENS II
Oct. 1975
GSFC-11951
Differential-correction program evaluates optical lens design.

B75-10256
DESIGN PROCEDURE FOR LOW-DRAG SUBSONIC AIRFOILS
J. B. Peterson and A. B. Chen (National Res. Council)
Oct. 1975
LANGLEY-11351
Airfoil has least amount of drag under given restrictions of boundary layer transition position, lift coefficient, thickness ratio, and Reynolds number based on airfoil chord. It is suitable for use as wing and propeller aircraft sections operating at subsonic speeds and for hydrofoil sections and blades for fans, compressors, turbines, and windmills.

B75-10262
TUNEABLE DIODE LASER SPECTROMETER WITH INTEGRAL GRATING
P. C. vonThuna (Arthur D. Little, Inc.)
Oct. 1975
LANGLEY-11830
Grating is used in place of required folding mirror. Arrangement eliminates separate monochromator unit and uses retroreflector for alignment.

B75-10266
INCREASING TERMINAL STRIP EFFICIENCY AT CRYOGENIC TEMPERATURES
L. B. Holdeman
Oct. 1975
M-FS-23234
Single-crystal sapphire and quartz have been used to fabricate termally shorting, electrically insulating terminal boards for incorporation in metal heat-sink blocks.

B75-10268
SINGLE CRYSTALS OF METAL SOLID SOLUTIONS: A STUDY
J. F. Miller (Battelle Memorial Institute) and S. H. Gelles (Battelle Memorial Institute)
Oct. 1975
M-FS-23268
Report describes growth of silver-alloy crystals under widely varying conditions of growth rate, temperature gradient, and magnetic field. Role of gravitation and convection on crystal substructure is analyzed, as well as influence of magnetic fields applied during crystallization.

B75-10272
ULTRAVIOLET HYDROGEN-DISCHARGE LAMP
D. E. Kerr (Johns Hopkins Univ.)
Oct. 1975 See also NASA-CR-140316
MSC-14793
Device provides stable flux output for calibration of ultraviolet spectrum.

B75-10279
REFLECTED-WAVE MASER
R. C. Clauss
Oct. 1975
NPO-13490
Reflected wave maser amplifier has significantly greater bankwidth than conventional maser amplifiers. Unit needs no retuning to receive wide range of frequencies.

B75-10285
APPARATUS FOR STUDY OF PLASMAS AT ELEVATED TEMPERATURES
J. D. Christian and W. P. Gilbreath
Nov. 1975
ARC-10958
Microwave discharge plasmas take place within heated zone. Changes in weight of specimens in plasma as well as temperature of sample and plasma can be obtained, facilitating determinations of reaction rates and recombination coefficients.

B75-10286
SOUND SEPARATION PROBE
M. T. Moore (GE) and E. B. Smith (GE)
Nov. 1975
LEWIS-12507
Probe separates sound waves from turbulent flow pressure fluctuations in ducted airstreams by using principle that sound waves and turbulent flow pressure perturbations travel at different velocities.

B75-10288
INDUCTION HEATING SIMPLIFIES METAL EVAPORATION FOR ION PLATING
T. Spalvins and W. A. Bainard
Dec. 1975
LEWIS-12595
Evaporation by induction heating produces significant degree of metal ionization, enhancing degree of penetration of evaporant on substrate.

B75-10305
READ-ONLY OPTICAL STORAGE MEDIUM
R. A. Gange (RCA)
Dec. 1975
M-FS-23169
Photosensitive recording medium consists of thin-film silicone resin deposited on photoconductive substrate. Medium is useful for holographic interferometry studies.

B75-10307
SIGNAL MIXER FOR OPTICAL HETERODYNE RECEIVER
S. Levinson (United Aircraft Corp.)
Dec. 1975
M-FS-23251
Incoming signal is mixed with local oscillator signal by a beam splitter inside laser cavity. Laser power can be reduced by 50 to 100 times.

B75-10311
THE IMPACT OF WATER ON FREE-FALLING BODIES
H. A. Wright (Bolt Beranek and Newman, Inc.), P. J. Remington (Bolt Beranek and Newman, Inc.), and R. Madden (Bolt Beranek and Newman, Inc.)
Dec. 1975
M-FS-23310
Report discussed measures to cushion impact on body falling into water. Heavy loads are generated by impact and by pressures of water cavity collapsing onto the body.

B75-10315
OPTICAL-NOISE SUPRESSION UNIT: A CONCEPT
J. L. Horner (Dept. of Transportation)
Dec. 1975
MSC-12640
Device is used with coherent optical-processing spatial-filtering computer. It is isexpensive to manufacture and is made from readily available standard components. Its alignment is not critical.

B75-10328
ELECTRO-OPTICAL DETECTOR TO IMPROVE SENSITIVITY OF A FOCAL-PLANE MASS SPECTROMETER
C. E. Giffin
Dec. 1975
NPO-13524
Wedge-shaped microchannel electron multiplier array has been proposed to improve sensitivity of focal-plane mass spectrometer by two to four orders of magnitude.

B75-10329
COLLIMATION OF ELECTRON AND X-RAY BEAMS USING ZEOLITE CRYSTALS
F. J. Grunthaner
Dec. 1975
NPO-13557
Zeolite crystals can be used to collimate electron and X-ray beams. Faujasite, naturally occuring crystal in this group, provides structure necessary for collimation.

B75-10332
DEVELOPMENTS IN SPECTROPHOTOMETRY I: AN INSTRUMENT FOR HIGH-RESOLUTION MEASUREMENTS OF OPTICAL INTENSITY AND POLARIZATION
A. L. Fymat
Dec. 1975 See also B75-10333; B75-10335; B75-10338
NPO-13604
Device has resolution required to analyze polarization of the spectra of unknown gases, liquids, or solids (or a mixture of these phases). Such resolution has not been available on conventional instruments.

B75-10333
DEVELOPMENTS IN SPECTROPHOTOMETRY II: A MULTIPLE-FREQUENCY PARTICLE-SIZE SPECTROMETER
A. L. Fymat
Dec. 1975 See also B75-10332; B75-10334; B75-10338
NPO-13606
Instrument can be used to remotely determine complete spectrum of sizes of particles of unknown composition suspended in gas or liquid. Device does not required direct physical sample of particles.

B75-10335
DEVELOPMENTS IN SPECTROPHOTOMETRY III: MULTIPLE-FIELD-OF-VIEW SPECTROMETER TO DETERMINE PARTICLE-SIZE DISTRIBUTION AND REFRACTIVE INDEX
A. L. Fymat
Dec. 1975 See also B75-10332; B75-10333; B75-10338
NPO-13614

Instrument is based on inverse solution to equations for light scattered by a transparent medium. Measurements are taken over several angles of incidence rather than over several frequencies. Measurements can be used to simultaneously determine chemical and physical properties of particles in mixed gas or liquid.

04 MATERIALS/CHEMISTRY

B70-10004
TESTING FILAMENTARY COMPOSITES
DOW, N. F. /GE/ ROSEN, B. W. DATE- MAY 1970
REAN- SEE ALSO NASA-CR-66518
HQ-10268
NOL ring split-dee tensile test has the advantages that the specimen is readily fabricated by winding and the test is performed in a conventional testing machine without special fixtures. Strain gages cannot be mounted, however, and substantial bending moments are introduced.

B70-10011
PREPARATION OF MAGNETIC FERROFLUIDS IN ALTERNATIVE CARRIER LIQUIDS
ROSENSWEIG, R. E. /AVCO APPL. TECHNOL. DIV./
DATE- JUL. 1970
GSFC-10159
Ferrofluids are made by grinding magnetic particles together with a polar surfactant and a nonpolar solvent. The surfactant is adsorbed on the particle surfaces and acts as a coupling agent between the particles and the solvent.

B70-10013
QUANTITATIVE CONVERSION OF WATER TO CARBON DIOXIDE
WARF, J. C. DATE- JUN. 1970
NPO-10731
Method quantitatively converts water vapor to carbon dioxide permitting direct and rapid analysis of mixed-gas streams for water content.

B70-10017
DETERMINATION OF HYDROXYL CONTENT IN IMPURE MAGNESIUM OXIDE
BLOSSER, E. R. HALL, E. H. IDEN, R. B. DATE-
APR. 1970 REAN- SEE ALSO NASA-CR-96385
NPO-10774
Three-step thermal process quantitatively determines the hydroxyl content in samples of magnesium oxide. Analytical method can be adapted to large-scale production of hydroxyl-free magnesium oxide.

B70-10027
A METHOD FOR THE VISUAL DETECTION OF HOLES IN THIN POLYMERIC FILMS
VON VOLKLI, A. D. /BOEING CO./' WIEDEKAMP, K. E.
DATE- APR. 1970
LEWIS-10876
Back-lighting polymeric film with polarized light from a polarizing plate and viewing it through a second plate cross-polarized to the back-lighting provides visual contrast between the flaw and the transparent film.

B70-10054
UNIDIRECTIONAL COMPOSITE STIFFENING
DOW, N. F. /GE/ ROSEN, B. W. DATE- MAY 1970
REAN- SEE ALSO NASA-CR-66518
HQ-10266
Simple structural elements are explored with configurations selected to best utilize composite materials. Combination of the biaxial properties of beryllium or an isotropic composite with the uniaxial properties of one directional filamentary reinforcement is studied.

B70-10058
DIRECTIONALLY SOLIDIFIED SUPERALLOY
WALLACE, J. F. /CASE WESTERN RESERVE UNIV./
DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-89651
NASA-CR-89650
HQ-10522
Cobalt-tungsten superalloy has improved stress rupture characteristics. Appropriate additions were made to this base alloy using microprobe analyses and a fractional factorial experiment.

B70-10080
PROPERTIES OF NONAQUEOUS ELECTROLYTES
FOSTER, J. N. /N. AM. ROCKWELL CORP./ HANSON, D. C. HON, J. F. KELLER, R. MUIRHEAD, J. S. DATE-
JAN. 1970 REAN- SEE ALSO NASA-CR-1425
LEWIS-11017
Physical property measurements and structural studies conducted in aprotic solvents using various solutes are applicable to the further development of lithum batteries. Structural studies utilize nuclear magnetic resonance and electron paramagnetic resonance techniques.

B70-10081
RENE 41 HEAT TREATMENT ELECTRON MICROSCOPY
HENSLEY, W. E. /N. AM. ROCKEWELL CORP./ DATE-
APR. 1970 REAN-SEE ALSO B69-10605 N69-71272
M-FS-18633
Electron microscope helps prevent post-weld strain-age cracking of Rene 41 by identifying in advance microstructures that are detrimental to welding.

B70-10083
MECHANICAL SIEVE FOR SCREENING MINERAL SAMPLES
OTTO, W. P. /CALIF. UNIV./ DATE- AUG. 1970
HQ-10242
Mechanical sieve consists of three horizontal screens mounted in a vertical stack. A combination of rotation and tapping produces an even flow across the screens, dislodges trapped particles, an ensures rapid segregation of the sample.

B70-10084
ELECTRICAL RESISTANCE DETERMINATION OF ACTUAL CONTACT AREA OF COLD WELDED METAL JOINTS
HORDON, M. J. /NORTON RES. CORP./ DATE- JUN.
1970 REAN- SEE ALSO NASA-CR-97678
HQ-10472
Method measures the area of the bonded zone of a compression weld by observing the electrical resistance of the weld zone while the load changes from full compression until the joint ruptures under tension. The ratio of bonding force to maximum tensile load varies considerably.

B70-10092
EFFECT OF HEAT TREATMENT AND SURFACE OXIDATION OF LOW-CYCLE FATIGUE LIFE OF INCONEL
FOSTER, S. D. /N. AM. ROCKWELL CORP./ DATE- JUL.
1970
M-FS-18712
Test program involving specimens with different heat treatment, surface condition, and chemical composition yields low cycle fatigue data on Inconel 718.

B70-10094
ATMOSPHERIC COMPOSITION AFFECTS HEAT- AND MASS-TRANSFER PROCESSES
BLAKELY, R. L. /MCDONNELL DOUGLAS CORP./ NELSON,
W. G. DATE- JUN. 1970 REAN- SEE ALSO
NASA-CR-891
HQ-10271
For environmental control system functions sensitive to atmospheric composition, components are test-operated in helium-oxygen and nitrogen-oxygen mixtures, pure oxygen, and air. Transient heat- and mass-transfer tests are conducted for carbon dioxide adsorption on molecular sieve and for water vapor adsorption on silica gel.

B70-10100
TENSILE CREEP-RATE OF PYROLYTIC CARBON
FISCHBACH, D. B. DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-103846
NPO-11254
Stress-change technique, combined with a graphical-interpolation analysis, yields data on the stress and temperature dependence of the creep rate over broad strain and stress or temperature ranges on as-deposited, substrate-nucleated, pyrolytic carbon.

B70-10104
IMPROVED PROCESS OF FABRICATING FERRITE CORES FOR MAGNETIC LOGIC CIRCUITS
BABA, P. D. /AMPEX CORP./ HECKLER, C. H. /STANFORD RES. INST./ DATE- JUN. 1970
LANGLEY-10036
Method of processing magnetic ferrite structures enhances their partially set-state properties, so that the threshold magnetomotive force required to produce a specified change of flux is increased.

B70-10105
IMPROVED PROCESS FOR SYNTHESIZING ANILINOSILANE COMPOUNDS
DUNNAVANT, W. R. /BATTELLE MEM. INST./ MARKLE, R. A. DATE- APR. 1970
M-FS-14948
New process gives good yields of anilinosilane compounds that can be readily isolated in a high state of purity. S-collidine is used as an HCl acceptor. Silane compounds can be melt-condensed with aromatic diols to provide high molecular weight polyaryloxysilane materials that are of importance in polymer technology.

B70-10114
SOLUBILITY OF NON-POLAR GASES IN ELECTROLYTE SOLUTIONS
WALKER, R. L., JR. /FLA. UNIV./ DATE- APR. 1970
LEWIS-11052
Solubility theory describes the effects of both concentration and temperature on solute activity coefficients. It predicts the salting-out effect and the decrease in solubility of non-polar gases with increased electrolyte concentration, and can be used to calculate heats of solution, entropies, and partial molal volumes of dissolved gases

B70-10131
POLYMERIZATION OF PERFLUOROBUTADIENE
NEWMAN, J. /MCDONNELL DOUGLAS CORP./ TOY, M. DATE- JUL. 1970
NPO-10863
Diisopropyl peroxydicarbonate dissolved in liquid perfluorobutadiene is conducted in a sealed vessel at the autogenous pressure of polymerization. Reaction temperature, ratio of catalyst to monomer, and amount of agitation determine degree of polymerization and product yield.

B70-10140
STRESS CORROSION CRACKING EVALUATION OF PRECIPITATION-HARDENING STAINLESS STEEL
HUMPHRIES, T. S. NELSON, E. E. DATE- JUN. 1970
M-FS-20667
Accelerated test program results show which precipitation hardening stainless steels are resistant to stress corrosion cracking. In certain cases stress corrosion susceptibility was found to be associated with the process procedure.

B70-10146
THE COLUMBIUM-HYDROGEN SYSTEM AND HYDROGEN EMBRITTLEMENT OF COLUMBIUM
WALTER, R. J. /N. AM. ROCKWELL CORP./ DATE- AUG. 1970
M-FS-18659
Columbium specimens are charged uniformly with hydrogen allowing accurate measurement of the hydrogen content by a procedure involving the removal of hydrogen from flowing argon at 2000 degrees F. Hydrogen content effects on the ductile-to-transition temperature are determined for temperatures between 200 and 600 degrees F.

B70-10162
EFFECTS OF HIGH PRESSURE HYDROGEN ON METALS
CHANDLER, W. T. /N. AM. ROCKWELL CORP./ WALTER, R. J. DATE- APR. 1970
M-FS-18612
Hydrogen environment embrittlement causes failure of hydrogen storage vessels at and below design pressures of 5000 to 6000 psi. Investigation of thirty-five alloys determines their susceptibility to such embrittlement.

B70-10175
HIGH TEMPERATURE RARE EARTH SOLID LUBRICANTS
SLINEY, H. E. DATE- JUN. 1970 REAN- SEE ALSO NASA-TN-D-5301
LEWIS-10983
Rare earth trifluorides have potential use as lubricating fillers for mechanical carbons and as coatings on metallic substrates. Friction experiments show that they are effective in reducing metallic wear.

B70-10177
NEUTRON-ACTIVATION ANALYSIS APPLIED TO COPPER ORES AND ARTIFACTS
LINDER, N. F. DATE- APR. 1970
ARG-10446
Neutron activation analysis is used for quantitative identification of trace metals in copper. Establishing a unique fingerprint of impurities in Michigan copper would enable identification of artifacts made from this copper.

B70-10182
PREPARATION OF FINE-PARTICLES AT CRYOGENIC TEMPERATURES
GLOBUS, H. /AEROJET GEN. CORP./ DATE- APR. 1970
NPO-10250
Flash freezing process yields gelling agent for use at cryogenic temperatures. Vaporized material, diluted with an inert gas, is injected below the surface of an agitated cryogenic liquid. This method disperses particles of chlorine trifluoride in liquid oxygen difluoride.

B70-10183
TUNGSTEN FIBER-REINFORCED NICKEL SUPERALLOY WITH GREATLY INCREASED STRENGTH AT 2000 DEGREES F
PETRASEK, D. W. SIGNORELLI, R. A. DATE- JUN. 1970 REAN - SEE ALSO NASA-TN-D-5575
LEWIS-10933
Superalloy has 1000-hour strength of 37,000 psi at 2000 degrees F. The strength to density ratio of the composite is also greater, permitting applications where reduced weight rather than greater strength is desired.

B70-10185
GRINDING AS AN APPROACH TO THE PRODUCTION OF HIGH-STRENGTH, DISPERSION-STRENGTHENED NICKEL-BASE ALLOYS
ORTH, N. W. QUATINETZ, M. WEETON, J. W. DATE- APR. 1970 REAN- SEE ALSO NASA-TN-D-5421
LEWIS-10515
Mechanical process produces dispersion-strengthened metal alloys. Power surface contamination during milling is removed by a cleaning method that involves heating thin shapes or partially-compacted milled powder blends in hydrogen to carefully controlled temperature schedules.

B70-10199
FATIGUE PROPERTIES OF SHEET, BAR, AND CAST METALLIC MATERIALS FOR CRYOGENIC APPLICATIONS
GREEN, E. F. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970
M-FS-18427
Cryogenic fatigue and tensile properties for metallic materials are determined in the operating life-time range of ten thousand to ten million cycles at room temperature, at minus 320 degrees F, and at minus 423 degrees F. Results are presented as stress versus number of cycles to failure.

B70-10205
DESIGN AND EVALUATION OF THREE-PHASE FIBROUS COMPOSITE STRUCTURES
DOW, N. F. /GE/ ROSEN, B. W. DATE- AUG. 1970
REAN- SEE ALSO NASA-CR-66518
HQ-10267

Study reveals composite combination evaluations for boron binder reinforcements for unidirectly reinforced boron/epoxy, glass binder reinforcements for unidirectionally reinforced boron/epoxy, and glass binder reinforcements for unidirectionally reinforced glass/epoxy.

B70-10206
GROWTH OF PHASE-PURE, CRACK-FREE SINGLE CRYSTALS AND LARGE-GRAINED POLYCRYSTALS OF MOLYBDENUM DISILICIDE
ROSSETTI, M. /LITTLE /ARTHUR D./, INC./ DATE- APR. 1970 REAN- SEE ALSO NASA-CR-98504
HQ-10450
High purity molybdenum disilicide crystals are prepared by zone melting sintered compacts. This method yields single crystals or polycrystals free from macrocracks which allow better measurement and evaluation of mechanical properties.

B70-10208
EFFECTS OF DECONTAMINATION, STERILIZATION, AND THERMAL VACUUM ON POLYMERIC PRODUCTS
ROPER, W. D. DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-103426
NPO-11250
Adhesives, coatings, coated fabrics, elastomers, encapsulants, films, hardware and structural materials, and tapes are tested in a series of physical, mechanical, and electrical tests. Material properties are measured before and after exposure to the three environments.

B70-10210
OXIDATION RESISTANT IRON AND NICKEL ALLOYS FOR HIGH TEMPERATURE USE
HILL, V. L. /IIT RES. INST./ MISRA, S. K. WHEATON, H. L. DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-72522
LEWIS-10936
Iron-base and nickel-base alloys exhibit good oxidation resistance and improved ductility with addition of small amounts of yttrium, tantalum /or hafnium/, and thorium. They can be used in applications above the operating temperatures of the superalloys, if high strength materials are not required.

B70-10213
MECHANICAL PROPERTIES OF RENE-41 AFFECTED BY RATE OF COOLING AFTER SOLUTION ANNEALING
PRAGER, M. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970
M-FS-18790
Investigation of Rene-41 cooling rate from 1975 to 1400 degrees F reveals that slow cooling improves high-temperature ductility and provides more uniform properties throughout a manifold. Ambient elongation and impact resistance are not significantly changed.

B70-10222
SELF-LUBRICATING FLUORINE SHAFT SEAL MATERIAL
MUNK, W. R. /PRATT AND WHITNEY AIRCRAFT/ DATE- JUL. 1970
HQ-10112
Lubricating film is produced by a reaction of fluorine with a composite of aluminum oxide and nickel powder. The rate of nickel fluoride generation is proportional to the rate at which the fluoride is rubbed off the surface, allowing the seal to operate with the lowest possible heating.

B70-10233
REACTIONS OF TECHNETIUM HEXAFLUORIDE WITH NITRIC ACID, NITROSYL FLUORIDE, AND NITRYL FLUORIDE
HOLLOWAY, J. H. SELIG, H. DATE- APR. 1970
ARG-10412
Stoichiometry of technetium hexafluoride reactions is studied. Magnetic properties and infrared spectra of reaction products are studied and compared with those of analogous complexes of the hexafluorides of tungsten, rhenium, and osmium.

B70-10235
USE OF NONWETTABLE MEMBRANES FOR WATER TRANSFER
HAUSCH, H. G. DATE- DEC. 1970
LANGLEY-10743
Transfer of water through nonwettable vinyl fluoride membranes has two unique features - /1/ very low water transfer rates can be held constant by holding temperature and solute concentrations constant, /2/ the pressure gradient against which water is transported is limited only by solution breakthrough or membrane strength.

B70-10243
TECHNIQUES FOR FORMING SKIN PANELS FOR LARGE-DIAMETER CYLINDERS FROM ALUMINUM-2014
IRVINE, C. N. DATE- OCT. 1970
M-FS-14385
Study of brake forming of skin panels from 2014 aluminum alloy concludes that forming from T651 temper is the best method available. T451 temper material has the greatest potential for production of stress-free parts. Age-forming characteristics of 2014-T451 and 2219-T37 alloys are compared.

B70-10258
PROGRESS IN RESEARCH ON CHLORATE CANDLE TECHNOLOGY
LITTMAN, J. /GARRETT CORP./ DATE- APR. 1970
MSC-13409 MSC-13410 MSC-13411
Research and development program improves sodium chlorate candle formulation, production method, and igniter design. Cobalt is used as the fuel, dry processing methods are used to lower the water content, and a device based on pyrotechnic heater concepts is used as the igniter.

B70-10259
METAL COOLDOWN, FLOW INSTABILITY, AND HEAT TRANSFER IN TWO-PHASE HYDROGEN FLOW
MANSON, L. /N. AM. ROCKWELL CORP./ MILLER, W. S. DATE- MAY 1970 REAN- SEE ALSO B69-10541
M-FS-18696
Studies of the properties of five metals with varying tube-wall thickness, with or without and internal coating of trifluorochloroethylene polymer, show that wall characteristics influence flow stability, affect heat transfer coefficients, and influence the transition point from dry- to wet-wall flow.

B70-10261
MECHANISM AND KINETICS OF AGING IN INCONEL 718
HENSLEY, W. E. /N. AM. ROCKWELL CORP./ KOEPKE, B. G. ZETO, R. J. DATE- JUN. 1970
M-FS-18775
Age hardening in Inconel 718 is investigated using Brinell hardness measurements. Formation of a precipitate causes an increase in hardness.

B70-10273
LIGHTWEIGHT, HIGH-STRENGTH, REINFORCED PLASTIC TUBE-FRANGING DIE
BUSH, S. /NORTHROP CORP./ CASELDINE, H. SMITH, R. H. DATE- MAY 1970 REAN- SEE ALSO NASA-CR-66301
LANGLEY-10126
Dies of a phenolic molding compound with chopped glass fibers as fill material possess a flexural strength of 20,000 psi and a compressive strength of 28,500 psi.

B70-10285
INVESTIGATION OF THE REACTIVITY OF ORGANIC MATERIALS IN LIQUID OXYGEN
CHAMBERLAIN, D. /STANFORD RES. INST./ IRWIN, K. KIRSHEN, N. MILL, T. STRINGHAM, R. DATE- JUN. 1970
M-FS-20576
Measurements of impact-ignition sensitivity and studies of the relative reactivity of t-butoxy and t-butyl peroxy radicals toward a variety of organic compounds reveal improved methods of selection of materials for safe use in a liquid oxygen environment.

B70-10294
DESIGN METHOD FOR ADSORPTION BEDS
BLAKELY, R. /MCDONNELL DOUGLAS CORP./ JACKSON, J. DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-891
HQ-10269
Regenerable adsorption beds for long-term life support systems include synthetic geolite to remove carbon dioxide and silica gel to dehumidify the atmospheric gas prior to its passage through the geolite beds. Bed performance is evaluated from adsorption characteristics, heat and mass transfer, and pressure drop.

B70-10300
POLYIMIDE POLYMERS PROVIDE IMPROVED ABLATIVE MATERIALS
BURNS, E. /TRW SYSTEMS GROUP/ JONES, J. LUBOWITZ, H. DATE- JUL. 1970 REAN- SEE ALSO
B69-10118
LEWIS-10861
Principle heat absorption of silica-reinforced plastic ablative materials occurs from the in-depth reaction of silica with carbon to form silicon monoxide and carbon monoxide. The higher the degree of completion of this reaction, the higher the capacity of the ablative material to absorb heat.

B70-10310
HIGH PRECISION CRYOGENIC THERMAL CONDUCTIVITY STANDARDS
HUST, J. G. /NATL. BUR. OF STD./ POWELL, R. L. WEITZEL, D. H. DATE- JUN. 1970
NUC-10555 NUC-10556
New apparatus allows accurate simultaneous measurement of thermal conductivity, electrical resistivity, and thermopower for technically important materials, such as new or uncommon alloys. A list of materials investigated is presented. Sources for obtaining data on these materials, as well as the source giving a description of the apparatus, are cited.

B70-10316
BIAXIAL PRESTRESSING OF BRITTLE MATERIALS
GRESZCZUK, L. /MCDONNELL DOUGLAS CORP./ MILLER, R. NETTER, W. DATE- JUN. 1970 REAN- SEE ALSO
NASA-CR-98136
M-FS-20272
Strengthening of chemically consolidated zirconia with tungsten fibers, graphite fibers, sapphire whiskers, and silicon carbide whiskers is investigated. Addition of silicon carbide whiskers gives the highest increase in strength of zirconia at room and elevated temperatures. Prestressing with tungsten cables increases tensile strength and ductility

B70-10327
CONTROLLED ETCHING OF PRINTED-CIRCUIT BOARDS
KOVELL, S. P. SCHUTT, J. B. DATE- AUG. 1970
XGS-06306
Ferric chloride in an aqueous medium etches copper from the surface of printed-circuit boards. Ferric ions are reduced to ferrous ions resulting in a reduced etching rate.

B70-10330
POLYIMIDE POLYMERS PROVIDE HIGHER CHAR YIELD FOR GRAPHITIC STRUCTURES
BURNS, E. A. /TRW SYSTEMS GROUP/ JONES, J. F. LUBOWITZ, H. R. DATE- AUG. 1970 REAN- SEE ALSO
B69-10118
LEWIS-10860
Technique for manufacture of graphite composites uses high-char-forming processable polyimide resin systems to produce the graphitic matrix. Only three cyclic steps are required to yield a 99.7 percent graphite product.

B70-10333
UNIFORM DATA SYSTEM STANDARDIZES TECHNICAL COMPUTATIONS AND THE PURCHASING OF COMMERCIALLY IMPORTANT GASES
JOHNSON, V. J. /NATL. BUR. OF STD./ MC CARTY, R. D. RODER, H. M. DATE- SEP. 1970
NUC-10549
Integrated tables of pressure, volume, and temperature for the saturated liquid, from the triple point to the critical point of the gases, have been developed. Tables include definition of saturated liquid curve. Values are presented in metric and practical units. Advantages of the new tables are discussed.

B70-10334
DIFUNCTIONAL POLYISOBUTYLENE PREPARED BY POLYMERIZATION OF MONOMER ON MOLECULAR SIEVE
MIDLER, J. A., JR. DATE- AUG. 1970
NPO-10893
Process yields difunctional isobutylene polymers ranging in molecular weight from 1150 to 3600. These polymers have the potential for copolymerization and cross-linking with other monomers to form elastomeric materials.

B70-10349
OPEN-CELLED POLYURETHANE FOAM
RUSSELL, L. W. /AMETEK/STRAZA/ DATE- SEP. 1970
KSC-10517
Open-celled polyurethane foam has a density of 8.3 pounds per cubic foot and a compressive strength of 295 to 325 psi. It is useful as a porous spacer in layered insulation and as an insulation material in vacuum tight systems.

B70-10353
PREPARATION OF HIGHLY FLUORINATED DIOLS CONTAINING ETHER LINKAGES.
ROCHOW, S. E. /PENINSULAR CHEMRES., INC./ STUMP, E. C., JR. DATE- SEP. 1970
NPO-10768
Hydroxy-terminated perfluoroethers and polyurethane resins derived from ethers have outstanding chemical resistance and good thermal properties. They can be used as potting compounds, coatings, and seals. The hydroxy-terminated ethers serve as intermediates in the synthesis of highly fluorinated elastomers and adhesives.

B70-10361
SIMPLE METHOD FOR PREDICTING VISCOSITY OF GAS MIXTURES
BROKAW, R. S. DATE- OCT. 1970 REAN- SEE ALSO
NASA-TN-D-4496
LEWIS-11060
Method is derived from the Chapman-enskog theory which describes viscosities at low-to-moderate pressures. Mixtures of nonpolar gases require the viscosities and molecular weights of the constituents in addition to the mixture composition. Dipole moments, boiling points and liquid boiling point densities are also needed with polar gases.

B70-10364
LOW-TEMPERATURE EMBRITTLEMENT OF TI-6AL-4V AND INCONEL-718 BY HIGH PRESSURE HYDROGEN
CHANDLER, W. T. /N. AM. ROCKWELL CORP./ WALTER, R. J. DATE- NOV. 1970
M-FS-18753
Notched specimens of titanium alloy and Inconel-718 exhibit little reduction of notch strength at certain low temperatures under 2000 lb/sq in. hydrogen, unnotched specimens are not embrittled at these temperatures. The degree of Inconel-718 embrittlement is lower than earlier observations under 1000 lb/sq in. hydrogen.

B70-10366
EFFECTS OF HYDROGEN ON ELI TITANIUM ALLOY TI-5AL-2.5SN
CHANDLER, W. T. /N. AM. ROCKWELL CORP./ HENSLEY, W. E. DATE- SEP. 1970
M-FS-18815
Tensile tests on titanium alloy, following abrasion under hydrogen and temperature cycling, reveal lowered tensile strength, increased ductility, and no embrittlement. Fretting the metal on itself in flowing hydrogen or abrading with an iron file in flowing hydrogen produces titanium hydride.

B70-10369
THERMAL TREATMENT AND MECHANICAL PROPERTIES OF ALUMINUM-2021

BRENNECKE, M. W. DATE- SEP. 1970 REAN- SEE ALSO
NASA-TM-X-53847
M-FS-20559
Mechanical properties, after thermal treatments, are summarized for sheet and plate of copper-rich, high-strength, heat-treatable aluminum-2021. The alloy is quench sensitive, quench rate and variations in aging affect corrosion behavior. Aging effects on yield strength, tensile strength, and elongation of sheet and plate are compared.

B70-10386
HEAT-REJECTION WINDOWS FOR TELESCOPES
AUSTIN, R. /PERKIN-ELMER CORP./ REHNBERG, J.
DATE- SEP. 1970
M-FS-20634
Heat-rejection telescope windows reflect incident solar energy outside the hydrogen-alpha line while processing a peak transmission exceeding fifty percent at 6563 angstrom units. The windows also function as secondary blocking filters to the telescope*s Fabry-Perot filter.

B70-10396
INCREASED RESISTANCE TO STRESS CORROSION OF ALUMINUM ALLOYS
BRUMMER, S. B. /TYCO LABS., INC./ COCKS, F. H.
DATE- SEP. 1970
M-FS-20788
Stress corrosion resistance is increased by distorting surface grain-boundary structure and by interrupting the corrosion and stress corrosion. The first is accomplished by machining or shot peening and the second by removal from and later reexposure to the corrosive environment.

B70-10402
IMPROVED PHOTOIONIZATION MASS SPECTROMETER
POSHCHENRIEDER, W. P. /GCA. CORP./ SAMSON, J. A. R. WARNECK, P. DATE- SEP. 1970 REAN- SEE ALSO
NASA-CR-1018
LANGLEY-10180
Improved spectrometer for gas analysis lessens the intensity problem that occurs in obtaining dispersed ultraviolet radiation. A filter, consisting of a selectively transmitting gas cell, a thin film or mirror, or a predispersing grating, alleviates problems of interference from higher-order spectral lines and from scattered ultraviolet light.

B70-10403
NEW HYPERTHERMAL THERMOSETTING HETEROCYCLIC POLYMERS
BILOW, N. /HUGHES AIRCRAFT CO./ LANDIS, A. L. MILLER, L. J. DATE- AUG. 1970 REAN- SEE ALSO
NASA-CR-1310
LANGLEY-10221
Polyimidazopyrrolone polymers, formed by the condensation of aromatic dianhydrides with aromatic tetraamines in various solvents, form moldings that resist degradation in air and retain great strength at 400 to 700 degrees F. The resins have good insulating properties, are easy to mold, and make good protective coatings.

B70-10404
DETONATION HAZARDS WITH **SAFE** INDUSTRIAL SOLVENTS
FINGERHOOD, C. R. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970
LANGLEY-10299
Sensitivities of various metal/halocarbon slurries to impact are given. Barium and lithium shavings show sensitivity with all of the halocarbons tested except methyl chloroform. Powdered aluminum, magnesium titanium, and beryllium show sensitivity with several halocarbons but generally require a higher level of initial energy.

B70-10419
THIN FILM DEVICES USED AS OXYGEN PARTIAL PRESSURE SENSORS
CANADY, K. S. /RES. TRIANGLE INST./ WORTMAN, J. J. DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-1182
XLA-06473
Electrical conductivity of zinc oxide films to be used in an oxygen partial pressure sensor is measured as a function of temperature, oxygen partial pressure, and other atmospheric constituents. Time response following partial pressure changes is studied as a function of temperature and environmental changes.

B70-10423
STRAIN COMPATIBILITY TESTS FOR SPRAYED FOAM CRYOGENIC INSULATION
HILL, W. L. /N. AM. ROCKWELL CORP./ KIMBERLIN, D. O. DATE- DEC. 1970
M-FS-16063
Mechanical stress applied to foam-coated aluminum alloy specimens maintained at cryogenic temperature simulates actual use conditions of the foam insulation. The testing reveals defects in the polyurethane foam or in the foam to metal bond.

B70-10432
READILY FIBERIZABLE GLASSES HAVING A HIGH MODULUS OF ELASTICITY
BACON, J. F. /UNITED AIRCRAFT CORP./ DATE- OCT. 1970 REAN- SEE ALSO NASA-CR-789992
HQ-10593
New glass compositions yield composites having higher moduli of elasticity and specific moduli of elasticity than commercially available glasses. Over a reasonable temperature range the glasses have a viscosity of about 20,000 poises. They consist of silica, alumina, magnesia, and beryllia, plus at least one uncommon oxide.

B70-10444
COPPER-TITANIUM EUTECTIC ALLOY IMPROVES ELECTRICAL AND MECHANICAL CONTACT TO SILICON CARBIDE
SHIER, J. S. DATE- NOV. 1970
ERC-10256
Contact preparation at low temperatures is possible with the use of a copper-titanium eutectic alloy. Contacts formed with this alloy are ohmic on p-type silicon carbide and rectifying on n-type.

B70-10450
INTUMESCENT COATINGS AS FIRE RETARDANTS
FISH, R. H. FOHLEN, G. M. PARKER, J. A. SAWKO, P. M. DATE- SEP. 1970
ARC-10099
Fire-retardant paint, when activated by the heat of fire, reacts to form a thick, low-density, polymeric coating or char layer. Water vapor and sulphur dioxide are released during the intumescent reaction.

B70-10453
PROCESS FOR SYNTHESIZING A NEW SERIES OF FLUOROCARBON POLYMERS
TOY, M. S. /MCDONNELL DOUGLAS CORP./ DATE- NOV. 1970
NPO-10862
Two-step process for preparing fluorocarbon materials includes - /1/ adding gaseous fluorine to a polyperfluoropolyene to create fluorocarbon radicals, with reactive sites at unsaturated carbon atoms, and /2/ introducing a monomer, after evacuation of fluorine gas, and allowing copolymerization with the free radicals.

B70-10463
COLLODION TECHNIQUE OF MIRROR CLEANING
TYNDALL, J. B. DATE- AUG. 1970
LANGLEY-10675
Cleaning method is modified by addition of a layer of cheesecloth between thin coatings of U.S.P. collodion. After drying, the collodion is peeled off by an even pull on the cheesecloth, leaving the mirror clean and ready for use.

B70-10467
FRICTION CHARACTERISTICS OF GRAPHITE AND GRAPHITE-METAL COMBINATIONS AT VARIOUS TEMPERATURES
MANJOINE, M. J. /WESTINGHOUSE ASTRONUCL. LAB./ DATE- NOV. 1970
NUC-10151
Characteristics of the coefficient of friction of graphite and of graphitic combinations between 70 and 4000 degrees F are given. Graphite*s good frictional quality is attributed to a gas film on surface platelets. Major factors investigated

are, surface finish and **wear in**, surface conditioning, temperature, and interfacial pressure.

B70-10475
TECHNIQUE FOR DEPOSITING SILICON DIOXIDE ON INDIUM ARSENIDE IMPROVES ADHESION
SPON- INNOVATOR NOT GIVEN /GE/ DATE- SEP. 1970
REAN- SEE ALSO NASA-CR-86039, NASA-CR-86231
ERC-10130
Planar array processing of indium arsenide wafers includes dicing into a prescribed geometry, then cleaning and drying, and finally pre-oxidizing in an oxygen atmosphere at 500 degrees C. The last step forms an oxide interface between the InAs surface and a glow discharge deposited layer of silicon dioxide.

B70-10490
FLAME-RESISTANT THIN PANELS OF GLASS FABRIC-POLYIMIDE RESIN LAMINATES
KAUMEYER, R. A. /N. AM. ROCKWELL CORP./ YOSHINO, S. Y. DATE- NOV. 1970
MSC-15562
With a cured polyimide resin content of less than about 20 percent by weight of the finished part, glass fabric laminates which have good structural properties and are self-extinguishing in a pure oxygen atmosphere can be prepared in the thickness range of 0.035 to 0.08 inch.

B70-10497
NEW METHOD FOR PHOTORESIST STRIPPING
DAVERN, W. E. /GE/ TOBIN, L. S. DATE- SEP. 1970
ERC-10239
Vacuum dehydration of negatively working photoresist eliminates trace contamination of conventional stripping methods. The semiconductor substrate is coated with photoresist, exposed, developed, cured, and etched, and then placed in a vacuum. Following dehydration, the resist film is removable with ordinary solvents.

B70-10504
SOLUBLE HIGH MOLECULAR WEIGHT POLYIMIDE RESINS
JONES, R. J. /TRW SYSTEMS GROUP/ LUBOWITZ, H. R. DATE- OCT. 1970
LEWIS-11056
High molecular weight polyimide resins have greater than 20 percent /by weight/ solubility in polar organic solvents. They permit fabrication into films, fibers, coatings, reinforced composite, and adhesive product forms. Characterization properties for one typical polyimide resin are given.

B70-10506
EFFECTS OF CRYSTAL DEFECTS ON STRESS-CORROSION SUSCEPTIBILITY IN ALUMINUM ALLOY 7075
BENTLE, G. G. /N. AM. ROCKWELL CORP./ JACOBS, A. J. DATE- SEP. 1970 REAN- SEE ALSO B67-10533, B68-10153, B70-10527
M-FS-18794
Point defects were introduced into specimens of three heat-treated tempers of alloy 7075 by neutron irradiation. Continuous ultrasonic monitoring allowed crack growth to be observed. Effects on stress-corrosion susceptibility, elongation, hardness, and yield strength are noted and compared for the three tempers.

B70-10520
NONDESTRUCTIVE SPOT TESTS ALLOW RAPID IDENTIFICATION OF METALS
WILSON, M. L. DATE- SEP. 1970
LANGLEY-10539
Ordered qualitative test sequence, presented in flow chart form, permits identification of all common metallurgical elements and many high-temperature, stainless, high and low carbon, and tool steels within about 30 minutes. Identification is made from colors or specific reactions produced by the addition of standard chemical reagents.

B70-10527
THE MECHANISM OF STRESS-CORROSION CRACKING IN 7075 ALUMINUM ALLOY
JACOBS, A. J. /N. AM. ROCKWELL CORP./ DATE- OCT. 1970
M-FS-18614
Various aspects of stress-corrosion cracking in 7075 aluminum alloy are discussed. A model is proposed in which the continuous anodic path along which the metal is preferentially attacked consists of two phases which alternate as anodes.

B70-10531
ECONOMIC METHOD FOR MEASURING ULTRA-LOW FLOW RATES OF FLUIDS
BOGDANOVIC, J. A. /NORTHROP CORP./ KELLER, W. F. DATE- OCT. 1970
NPO-12064
Capillary tube flowmeter measures ultra-low flows of very corrosive fluids /such as chlorine trifluoride and liquid fluorine/ and other liquids with reasonable accuracy. Flowmeter utilizes differential pressure transducer and operates on the principle that for laminar flow in the tube, pressure drop is proportional to flow rate.

B70-10540
CHEMICAL TREATMENT MAKES AROMATIC POLYAMIDE FABRIC FIREPROOF IN OXYGEN ATMOSPHERE
CARDWELL, R. O. /MONSANTO RES. CORP./ HOLSTEN, J. R. RIVES, J. W. DATE- NOV. 1970
MSC-13571 MSC-13572
Organic fabric is reacted first with vapors of a phosphorus oxychloride, phosphorus oxybromide solution and then with bromine vapor, after neutralization it is flameproof in pure oxygen atmosphere. Soaking the fabric with mixture of ammonium polyphosphates increases flame resistance, but the polyphosphates are leached out during laundering.

B70-10546
NEW TYPE OF NONFLAMMABLE PAPER
ARMSTRONG, G. K. /DYNATECH CORP./ DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-101977
MSC-13432
Nonflammable paper is made from fibers of chrysotile asbestos, beta-glass fibers, glass microfibers, and a little nonflammable organic binder. It does not propagate flame in an atmosphere of 16.5-psig oxygen, and it is resistant to rot and mold, making it acceptable as wrapping material and for stored documents.

B70-10551
PREPARATION OF THIN POLYMER FILMS FOR INFRARED REACTION RATE STUDIES
GARRARD, G. G. /N. AM. ROCKWELL CORP./ HOUSTON, D. W. DATE- NOV. 1970
MSC-15893
Procedure for preparing thin films for infrared spectrophotometric analysis involves pressing of a neat mixture of reactants between nonreactive thin polymer films with noninterfering absorption bands. Pressing is done under a pressure that gives desirable thickness. Following this process, the film sandwich is cut to accommodate the laboratory instrument.

B70-10571
ELECTRON FRACTOGRAPHY USED TO EXAMINE NICKEL-BASE ALLOYS
JEWETT, R. P. /N. AM. ROCKWELL CORP./ DATE- NOV. 1970
M-FS-18649
Electron fractography establishes causes of metal fatigue and stress failures. Technique produces surface features at magnification as high as 9000X with excellent resolution. Method permits observation of features with dimensions of only 50 angstroms.

B70-10573
FILLED POLYMERS FOR BEARINGS AND SEALS USED IN LIQUID HYDROGEN
JOHNSON, R. L. WISANDER, D. W. DATE- OCT. 1970
REAN- SEE ALSO NASA-TN-D-5073
LEWIS-10887
Filled polytrifluorochloroethylene /PTFCE/ shows better thermal stability, less creep, and higher compressive moduli than filled polytetrafluoroethylene /PTFE/. Bearing and seal materials exhibiting the best characteristics

contain a high percentage of PTFCE.

B70-10574
PHOTOCHROMISM OF DIHYDROQUINOLINES
BECKER, R. S. /HOUSTON UNIV./ KOLC, J. DATE- DEC. 1970
HQ-10574
Reversible photochromic reactions, in which absorption spectrum of chemical compound may be shifted by application of visible or ultraviolet light, and then returned to original state by heating, are observed for certain members of 1,2-dihydroquinoline family. Structural formulas for colorless and colored states are given.

B70-10576
LOW-TEMPERATURE RADIATION-RESISTANT MATERIAL FOR BALL-BEARING RETAINERS
DESAU, P. O. /AEROJET-GEN. CORP./ EMMONS, W. F. DATE- NOV. 1970
MUC-10058
Radiation resistant material, made of polyimide polymers and S-glass cloth, is used in ball bearing retainers for extreme environments. Material displays satisfactory wear resistance, lubricity, and stability. Results of comparative tests with fluorocarbon materials are given.

B70-10578
LOW TEMPERATURE ABLATION MODELS MADE BY PRESSURE/VACUUM APPLICATION
FISCHER, M. C. HEIER, W. C. DATE- NOV. 1970
LANGLEY-10676
Method developed employs high pressure combined with strong vacuum force to compact ablation models into desired conical shape. Technique eliminates vapor hazard and results in high material density providing excellent structural integrity.

B70-10585
SILICON SOLAR CELLS IMPROVED BY LITHIUM DOPING
BERMAN, P. A. DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-106770
NPO-11390
Results of conference on characteristics of lithium-doped silicon solar cells and techniques required for fabrication indicate that output of cells has been improved to point where cells exhibit radiation resistance superior to those currently in use, and greater control and reproducibility of cell processing have been achieved.

B70-10588
DETERMINATION OF NITROGEN IN TITANIUM NITRIDE
PHILIPP, W. H. TETZLAFF, J. E. DATE- NOV. 1970
LEWIS-11046
Quantitative determination of nitrogen in titanium nitride involves dissolution of TiN in 10M hydrofluoric acid containing an oxidant. Released nitrogen is determined as ammonia. Best oxidizers are ferric chloride, potassium iodate, and potassium dichromate.

B70-10600
POTASSIUM SILICATE-ZINC OXIDE SOLUTION FOR METAL FINISHES
SCHUTT, J. B. DATE- DEC. 1970
GSFC-10361
Examples of zinc dust formulations, which are not subject to cracking or crazing, are fire retardant, and have high adhesive qualities, are listed. The potassium silicate in these formulations has mol ratios of dissolved silica potassium oxide in the range 4.8 to 1 - 5.3 to 1.

B70-10612
EVALUATION OF POLYMERIC PRODUCTS FOR USE IN THERMAL-VACUUM ENVIRONMENT
MURACA, R. F. /STANFORD RES. INST./ WHITTICK, J. S. DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-89557
NPO-11288
Of 350 materials screened for outgassing characteristics, 100 qualify within the limits of less than 1 percent weight loss and less than 0.1 percent VCM /volatile condensible material/ content. Infrared absorbence spectra of the VCM from 96 polymeric products and an interim list of recommended products are identified.

B70-10618
RESONANCE TUBE IGNITER
CONRAD, E. W. PAVLI, A. J. PHILLIPS, B. R. DATE- NOV. 1970 REAN- SEE ALSO NASA-TM-X-1460
LEWIS-11219
Reasonance induced in stoichiometric mixtures of gaseous hydrogen-oxygen produces temperatures /over 1100 deg F/ high enough to cause ignition. Resonance tube phenomenon occurs when high pressure gas is forced through sonic or supersonic nozzle into short cavity. Various applications for the phenomenon are discussed.

B70-10621
STAINLESS STEEL 301 AND INCONEL 718 HYDROGEN EMBRITTLEMENT
ALLGEIER, R. K. FORMAN, R. DATE- DEC. 1970
MSC-13557
Conditions and results of tensile tests of 26 Inconel 718 and four cryoformed stainless steel specimens are presented. Conclusions determine maximum safe hydrogen operating pressure for cryogenic pressure vessels and provide definitive information concerning flaw growth characteristics under the most severe temperature and pressure conditions

B70-10634
HIGH-TEMPERATURE OXIDATION AND EROSION-RESISTANT REFRACTORY COATINGS
PETERSON, D. A. WINTER, J. M. DATE- NOV. 1970
REAN- SEE ALSO NASA- NASA-TN-D-4964
LEWIS-11221
Various refractory coating systems were evaluated for rocket nozzle applications by actual rocket test firings. A reference is noted which identifies failure mechanisms and gives results of the firing tests for 18 coating systems. Iridium, iridium-rhenium, and hafnium oxide-zirconium oxide coatings show most promising results.

B70-10644
NONFLAMMABLE ORGANIC ADHESIVES EFFECTIVE OVER WIDE TEMPERATURE RANGE
MC LEOD, A. /WHITTAKER CORP./ DATE- DEC. 1970
REAN- SEE ALSO NASA-CR-102176
MSC-13586
Series of highly fluorinated polyurethanes have been prepared as basis for development of nonflammable structural adhesives for use over wide temperature range. Backbone of polyurethanes is polyether of perfluoropropylene oxide. Adhesive system is developed that exhibits adequate strength properties and is self-extinguishing in oxygen-rich atmospheres.

B70-10645
INHIBITED 1,1,1-TRICHLOROETHANE REPLACES TRICHLOROETHYLENE FOR DEGREASING
SCHULER, F. T. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970
M-FS-18844 M-FS-18845
In fight against air pollution inhibited TCE /1,1,1-trichloroethane/ is effective substitute for trichloroethylene in degreasing plants. This chemical has only slight photochemical activity and causes little eye irritation. TCE is less toxic than trichloroethylene and can withstand production loads and conditions, or long term storage, without degradation.

B70-10661
SPECTRAL EMISSION MEASUREMENT OF IGNEOUS ROCKS USING A SPECTRORADIOMETER
HUNTON, W. D. DATE- DEC. 1970
M-FS-20837
Spectroradiometer is used for either close or remote identification of rocks not heated to high temperatures. Instrument yields reproducible data spectra with excellent signal-to-noise ratios and readily identifiable spectral details, including differences in subclasses.

B70-10666
INEXPENSIVE, REMOVABLE COATING FOR PLASTER TOOLING

DIMINO, J. M. /N. AM. ROCKWELL CORP./ MARTIN, R. R. DATE- DEC. 1970
MSC-15819
Procedure for thinning and spaying a vinyl material provides strippable film for plaster surfaces. Coating is low-cost, effective seal against moisture and other sources of damage. Coating consists of a mixture of hot-spray vinyl material and 30 to 50 percent by volume of methyl ethyl ketone.

B70-10672
LOW-COST HIGH-TEMPERATURE BRAZING MATERIAL
REPAS, G. TULISIAK, G. DATE- DEC. 1970
LEWIS-11209
Commercially available nickel-copper wire containing 6 and 12 percent nickel is used in high temperature furnace brazing of rocket engine parts. Brazed joints have properties comparable to or better than those brazed with more expensive materials, and cost savings are substantial.

B70-10674
OXIDATION-RESISTANT COATINGS FOR REFRACTORY METALS USED IN INERT ATMOSPHERES
PHILLIPS, W. M. DATE- DEC. 1970 REAN- SEE ALSO N67-15683
NPO-11477
Test conditions and results are reported for various coatings on a 1 percent zirconium columbium alloy at a temperature of 2000 deg F. Molybdenum silicide over molybdenum is most effective coating, tin-aluminum coating is adequately protective, chromium-molybdenum silicides are not protective.

B70-10676
CRYSTAL GROWING BY ELECTRODEPOSITION FROM DENSE GASEOUS SOLUTIONS
NAIDITCH, S. /UNITED SCI. ASSOCIATES, INC./ WILLIAMS, R. A. DATE- DEC. 1970
NPO-10440
Single crystals and dendritic formations of silver are grown on platinum electrodes by electrodeposition from a dense gaseous solution of silver nitrate in ammonia. Process is modification of hydrothermal process, and also differs from standard electrodeposition by permitting single crystals to be grown from hydrogen-bonded solvents.

B71-10004
PREPARATION OF PERFLUOROPOLYETHER PREPOLYMERS
ROCHOW, S. E./PENINSULAR CHEMRES., INC./ STUMP, E. C., JR.
JAN. 1971 SEE ALSO B70-10353 B71-10005
NPO-10765
Fluorinated prepolymers are used to generate highly fluorinated polymers which possess most of the desirable properties of polytetrafluoroethylene, such as nonflammability and high corrosion resistance, while retaining good low temperature flexibility.

B71-10005
PREPARATION OF HIGHLY FLUORINATED POLYURETHANES
ROCHOW, S. E./PENINSULAR CHEMRES., INC./ STUMP, E. C., JR.
JAN. 1971 SEE ALSO B70-10353 B71-10004
NPO-10767
New polyurethanes, formed from a reaction of a prepolymer diol and a perfluorinated diisocyanate, are nonflammable and possess high corrosion resistance and good low temperature flexibility. Polymer hardness increases rapidly with increasing ratio of diisocaynate to diol, but its glass transition temperature is not adversely affected.

B71-10009
FAST PEAK SELECTOR FOR MASS SPECTROMETER
PASKO, R. M./GARRETT CORP./ SAWYER, G. M.
JAN. 1971
LANGLEY-10268
Analytical tool rapidly determines quantities of up to six preselected molecular species in a gaseous sample. Novel features include - /1/ ability to operate in two modes, /2/ stepping rate of two species per second, and /3/ capability for recording analysis results directly in volume percent.

B71-10010
NEW TANTALUM ALLOY HAS SUPERIOR CREEP RESISTANCE AND GOOD WORKABILITY
BUCKMAN, R. W., JR. JR.
JAN. 1971

B71-10027
REMOTE DETERMINATION OF SEA CONDITIONS BY ELECTROMAGNETIC BACKSCATTER MEASUREMENT
MALTZ, F. M./LOCKHEED PALO ALTO LABS./
JAN. 1971
M-FS-13777
Report is described which considers the effect that the ocean's surface shape has on near-vertical backscatter. Report covers the statistical character of the surface, the relation between these statistics and electric field, the characteristics of the wave system, and electromagnetic scattering.

B71-10034
ZERO-G SIMULATION SYSTEM FOR THERAPEUTIC APPLICATION
DANE, D. H.
MAR. 1971
M-FS-14671
System aids in therapeutic retraining of damaged muscles or functions as walking support during therapy. Articulated harness assembly contains patient, suspension system supports harness assembly in such a way as to counterbalance exertion of external forces on patient.

B71-10042
PRODUCING GRAPHITE WITH DESIRED PROPERTIES
DICKINSON, J. M./LOS ALAMOS SCI. LAB./ IMPRESCIA, R. J. REISWIG, R. D. SMITH, M. C.
FEB. 1971
NUC-11001
Isotropic or anisotropic graphite is synthesized with precise control of particle size, distribution, and shape. The isotropic graphites are nearly perfectly isotropic, with thermal expansion coefficients two or three times those of ordinary graphites. The anisotropic graphites approach the anisotropy of pyrolytic graphite.

B71-10055
AUTOMATIC BIO-SAMPLE BACTERIA DETECTION SYSTEM
CHAPPELLE, E. W. COLBURN, M. KELBAUGH, B. N. PICCIOLO, G. L.
APR. 1971
GSFC-11169
Electromechanical device analyzes urine specimens in 15 minutes and processes one sample per minute. Instrument utilizes bioluminescent reaction between luciferase-luciferin mixture and adenosine triphosphate (ATP) to determine number of bacteria present in the sample. Device has potential application to analysis of other body fluids.

B71-10058
LOW TEMPERATURE FLUID BLENDER
REPAS, G. A.
APR. 1971
LEWIS-11206
Blender supplies hydrogen at temperatures from 289 deg K to 367 deg K. Hydrogen temperature is controlled by using blender to combine flow from liquid hydrogen tank /276 deg K/ and gaseous hydrogen cylinder /550 deg K/. Blenders are applicable where flow of controlled low-temperature fluid is desired.

B71-10061
A CONCEPT FOR IMPROVING THE DIMENSIONAL STABILITY OF FILAMENTARY COMPOSITES IN ONE DIRECTION
DOW, N. F./GE/ ROSEN, B. W.
APR. 1971 SEE ALSO NASA-CR-1324
LANGLEY-10443
Investigation of filamentary composites having high strength and stiffness and a zero thermal coefficient of expansion in one direction shows that advanced filament materials, such as boron, have substantial advantages over conventional filamentary composites. Various other results are discussed, including guidelines and analysis methods for further evaluation.

B71-10077
NONFLAMMABLE ORGANIC-BASE PAINT FOR OXYGEN-RICH ATMOSPHERES
HAMWELL, R. J. KEY, C. F. KRUPNICK, A. C.
APR. 1971
M-FS-20486
New paint formulations, which combine aqueous latex paints with inorganic pigments and additives, produce coatings that are self-extinguishing in pure oxygen at pressures up to twice the partial pressure of atmospheric oxygen. A paint formulation in percent by weight is given and the properties of resultant coatings are discussed.

B71-10078
UPDATED, EXPANDED, FLUID PROPERTIES HANDBOOK
GERSHMAN, R./MCDONNELL DOUGLAS CORP./ OSUGI, J. T. SHERMAN, A. L.
APR. 1971
M-FS-21169
Revised handbook presents quantitative data, in the form of graphs and charts, pertaining to thermodynamic properties of specific cryogenic fluids and several metals. References to sources of data are cited.

B71-10079
RIGID OPEN-CELL POLYURETHANE FOAM FOR CRYOGENIC INSULATION
FADDOUL, J. R. LINDQUIST, C. R./UNION CARBIDE CORP./ NIENDORF, L. R. NIES, G. E. PERKINS, P. J.
MAY 1971 SEE ALSO NASA-TM-X-52332
LEWIS-11220
Lightweight polyurethane foam assembled in panels is effective spacer material for construction of self-evacuating multilayer insulation panels for cryogenic liquid tanks. Spacer material separates radiation shields with barrier that minimizes conductive and convective heat transfer between shields.

B71-10097
SALT STABILIZER FOR PREVENTING CHLORINE DEPLETION AND INCREASING SHELF-LIFE OF POTABLE WATER - A CONCEPT
COPELAND, E. J./N. AM. ROCKWELL CORP./ EDGERLEY, R. H.
MAY 1971
MSC-17153
Proposed concept, based on law of mass action uses addition of salt to increase chlorine ions produced in sodium hydrochlorite solutions, thereby increasing solution shelf-life. This technique is not costly. Usefulness will be determined by acceptability of salt in product undergoing long shelf-life.

B71-10099
ULTRASONIC METAL ETCHING FOR METALLOGRAPHIC ANALYSIS
YOUNG, S. G.
MAY 1971 SEE ALSO NASA-TN-D-6014
LEWIS-11230
Ultrasonic etching delineates microstructural features not discernible in specimens prepared for metallographic analysis by standard chemical etching procedures. Cavitation bubbles in ultrasonically excited water produce preferential damage /etching/ of metallurgical phases or grain boundaries, depending on hardness of metal specimens.

B71-10104
METAL ALLOY RESISTIVITY MEASUREMENTS AT VERY LOW TEMPERATURES
CHILDS, G. E./NBS/ CLARK, A. F. WALLACE, G. H.
MAY 1971
NUC-10557
High speed, automated system accurately measures to approximately one percent in three minutes. System identifies materials having constant thermal or electric conductivity, predicts new material properties, develops alloys in accordance with desired specifications, and develops nondestructive devices for measuring precipitation hardening.

B71-10105
THERMAL CONDUCTIVITY OF GASEOUS AND LIQUID HYDROGEN
DILLER, D. E./NBS/ RODER, H. M.
MAY 1971
NUC-10558
Normal and para-hydrogen conductivity measurements at temperatures from 200 to 17 deg K, at densities up to 2.6 times critical density, and at pressures to 15 MN/sq m are made. Using new calorimeter, data are analyzed as functions of density at fixed temperatures and of temperature at fixed densities

B71-10149
INEXPENSIVE ANTI-FOG COATING FOR WINDOWS
CARNIN, D. L., JR./BROWN AND ROOT-NORTHRUP/ MORRISON, H. D.
MAY 1971
MSC-13530
Coating applications include anti-fog protection for deep-sea diving equipment, fire protection helmets, and windows of vehicles used in hazardous environments. Basic coating composition includes liquid detergent, deionized water, and oxygen compatible fire-resistant oil. Composition prevents visor fogging under maximum metabolic load for 5 hours and longer.

B71-10154
SYNTHESIS OF FLUORINATED ORGANIC COMPOUNDS USING OXYGEN DIFLUORIDE
TOY, M. S./MCDONNELL DOUGLAS, INC./
JUN. 1971
NPO-12061
Oxygen difluoride synthesis is a much simpler, higher-yield procedure than reactions originally followed to synthesize various fluorinated organic compounds. Extreme care is taken in working with oxygen difluoride as its reactions present severe explosion hazard.

B71-10158
EFFECT OF SIZE ON CRACKING OF MATERIALS
GLUCKLICK, J.
JUN. 1971 SEE ALSO JPL-TR-32-1438
NPO-11602
Brittle behavior of large mild steel elements, glass plasticity, and fatigue specimen size sensitivity are manifestations of strain-energy size effect. Specimens physical size effect on material cracking initiation occurs according to flaw distribution statistics. Fracture size effect depends on stability or instability of crack propagation.

B71-10161
NEW UNDERSTANDING OF FIBER COMPOSITE MATERIALS
ZWEBEN, C.
JUN. 1971
NPO-11605
Statistical bounding approach to study of filamentary composites provides understanding of their fracture mechanics. Comparison shows that bounds are in good agreement with data from several fiber-matrix systems, and that they can be used to interpret strength data and provide fracture behavior information leading to improved strength.

B71-10165
AUTOMATIC AMINO ACID ANALYZER
BERDAHL, B. J. CARLE, G. C. OYAMA, V. I.
JUN. 1971
ARC-10215
Analyzer operates unattended or up to 15 hours. It has an automatic sample injection system and can be programmed. All fluid-flow valve switching is accomplished pneumatically from miniature three-way solenoid pilot valves.

B71-10172
PREPARATION OF HOMOGENEOUS VITREOUS MATERIALS FOR ELECTRONIC AND OPTICAL DEVICES
GATOS, H. C./MIT/ PLATAKIS, N. S. WITT, A. F.
JUN. 1971
HQ-10670
Vitreous material builds up as series of solidified layers on inside walls of sealed quartz ampoule containing molten constituents of material, and forms well defined shapes to close dimensional tolerances. Ampoules are made of material which does not react with melt and has lower thermal expansion coefficient than solidified layer.

B71-10184
POLYMER CONTAINING FUNCTIONAL END GROUPS IS BASE FOR NEW POLYMERS
HIRSHFIELD, S. M./M. AM. ROCKWELL CORP./
JUN. 1971
NPO-10998
Butadiene is polymerized with lithium-p-lithiophenoxide to produce linear polymer containing oxy-lithium group at one end and active carbon-lithium group at other end. Living polymers represent new approach to preparation of difunctional polymers in which structural features, molecular weight, type and number of end groups are controlled.

B71-10195
TEARDOWN ANALYSIS FOR DETECTING SHELF-LIFE DEGRADATION
ECKSTEIN, A. S.
JUN. 1971
M-FS-24017
Analysis is guideline in examining component materials, analytically determining physical properties and chemical compositions, and developing control data necessary for ascertaining effects of environments and their influence on deterioration and degradation mechanisms.

B71-10197
EROSION OF METALS BY MULTIPLE IMPACTS WITH WATER
RUDY, S. L./HYDRONAUTICS, INC./ THIRUVENGADAM, A.
JUN. 1971 SEE ALSO NASA-CR-1288
HQ-10591
Investigation determines - relation between impact velocity and minimum number of impacts producing visible erosion, relation between high frequency fatigue stresses and number of cycles to failure, water-hammer stresses relation to high frequency endurance limit, erosion rate as exposure time function, and correlates experimental data with recent theory.

B71-10198
IMPROVED FIRE-RESISTANT COATINGS
HUTT, J. B. STUART, J. W.
JUN. 1971
GSFC-10072
Water-base coatings containing potassium silicate show improvement in areas of quick air-drying, crack, craze, and abrasion resistance, adherence, and leach resistance. Coatings are useful as thermal-barrier layers in furnaces, and as general purpose fire resistant surfaces where vapor impermeability is not a requirement.

B71-10208
NONDESTRUCTIVE TESTING OF ADHESIVE BONDS BY NUCLEAR QUADRUPOLE RESONANCE METHOD
HEWITT, R. R./ARA, INC./
JUL. 1971 SEE ALSO NASA-CR-61988
M-FS-21160
Inert, strain sensitive tracer, cuprous oxide, added to polymeric adhesive ensures sufficiently large signal to noise ratio in NQR system output. Method is successful, provided that RF-transparent structural materials are used between modified adhesive and probe of NQR spectrometer.

B71-10209
SENSITIVE GASEOUS HYDROGEN DETECTION SYSTEM
MACINTYRE, J. R./GE/ NEPPEL, W. C.
JUL. 1971 SEE ALSO NASA-CR-10268
M-FS-21161
System utilizing new type hydrogen sensor has overall detection sensitivity and response speed higher than conventional hot-wire or hot-thermistor detectors. System measures concentrations of from 2 parts per million to 30 percent and is adaptable as leak detector and hazard alarm wherever hydrogen is used.

B71-10210
A NEW METALATION COMPLEX FOR ORGANIC SYNTHESIS AND POLYMERIZATION REACTIONS
HIRSHFIELD, S. M./N. AM. ROCKWELL CORP./
JUL. 1971
NPO-10313
Organometallic complex of N,N,N',N' tetramethyl ethylene diamine /TMEDA/ and lithium acts as metalation intermediate for controlled systhesis of aromatic organic compounds and polymer formation. Complex of TMEDA and lithium aids in preparation of various organic lithium compounds.

B71-10216
UNIQUE INTERMETALLIC COMPOUNDS PREPARED BY SHOCK WAVE SYNTHESIS
OTTO, G. REECE, O. Y. ROY, U./ALA. UNIV./
JUL. 1971
M-FS-20861
Technique compresses fine ground metallic powder mixture beyond crystal fusion point. Absence of vapor pressure voids and elimination of incongruous effects permit application of technique to large scale fabrication of intermetallic compounds with specific characteristics, e.g., semiconduction, superconduction, or magnetic properties.

B71-10217
PROMISING BORON/GRAPHITE/RESIN COMPOSITES
EVENSEN, H. A./WITTAKER CORP./
JUL. 1971 SEE ALSO NASA-CR-102944
M-FS-21126
Lightweight composite has high specific strength and stiffness and remains effective under extreme environmental conditions. Use as engineering material is feasible because it has excellent mechanical properties and is easily produced within small tolerances on constituent volume fractions. Main benefit of composite is its improved longitudinal strength and modulus.

B71-10225
STRAIN GAGE PERFORMANCE ABOVE 1033 K
NICHOLS, D. W./N. AM. ROCKWELL CORP./
JUL. 1971
M-FS-18831
Study provides compendium of test methods and results which may be used in evaluating high temperature environment gage behavior. Tests include resistance to ground and drift rate and gage factor variation as temperature function. Variation ranged from zero at room temperature (297 K) to 14.5 percent at 1053 K.

B71-10229
OXIDATION-RESISTANT SILICIDE COATING APPLIED TO COLUMBIUM ALLOY SCREEN
TORGERSON, R. T./BOEING CO./
JUL. 1971 SEE ALSO NASA-CR-73246
ARC-10186
Coated screens withstand temperature cycling in special transpiration-cooling systems and provide porous surface that is effective at temperatures well above those limiting superalloy screen efficiency. Thickness of coating depends on time, temperature and activator concentration. Coatings are uniform and resistant to thermal cycling.

B71-10245
EVALUATION OF OMNIWEAVE REINFORCEMENT FOR COMPOSITE FABRICATION
BELMAN, R./GE/ EDIGHOFFER, H. FENTON, R. LOWE, D. WEXLER, M.
JUL. 1971 SEE ALSO NASA-CR-102916
M-FS-20946
Molded composites made from type-2 Morganite and/or boron are suitable for structural skins. Layered-in-depth omniweave construction yields higher in-plane strength characteristics than fiber-pitch angle construction, and strength and moduli data vary with fiber orientation.

B71-10255
STATISTICAL CHARACTERIZATION OF PHENOLIC-NOVOLAK STRUCTURES
PARKER, J. A. WINKLER, E. L.
JUL. 1971
ARC-10393
Three statistical methods of general validity are valuable for characterizing any polymer which results from chain polymerization of multifunctional branching monomers linked through bifunctional monomers.

B71-10259
MODIFICATION OF PHYSICAL PROPERTIES OF FREEZE-DRIED RICE

HUBER, C. S./TECHNOL. INC./
JUL. 1971
MSC-13540
Freeze cycling process consists of alternately freezing and thawing precooked rice for two cycles, rice is then frozen and freeze-dehydrated in vacuum sufficient to remove water from rice by sublimitation. Process modifies rice grain structure and porosity, enabling complete rehydration in one minute in hot water.

B71-10261
IMPROVED EPOXY RESIN FOR CONSTRUCTING CRYOGENIC FILAMENT-WOUND PRESSURE VESSELS
MOLHO, R./AEROJET-GEN. CORP./ SOFFER, L. M.
JUL. 1971 SEE ALSO NASA-CR-72114
LEWIS-11261
Mechanical properties of new resin at cryogenic temperatures are substantially improved over similar composite structures utilizing conventional resins, while properties at ambient temperature are identical to conventional resin composites.

B71-10277
MODIFICATIONS TO A VACUUM ASSISTED FILTERING DEVICE TO MINIMIZE CONTAMINATION
GAUDIANO, S.
AUG. 1971
MSC-13733
High purity filter unit saves time and expense in laboratory operations and improves purity of liquids processed. Any but most viscous liquids are processed by modified unit equipped with appropriate filter medium. Unit's use eliminates much glassware cleaning tedium.

B71-10278
A SILVER ION WATER STERILIZATION SYSTEM
PARRY, E. P./N. AM. ROCKWELL CORP./
AUG. 1971
MSC-15734
Small amounts of silver are incorporated in mixture of ion exchange resins, and water passing through this mixture is thus exposed to silver ion concentration. System is useful in self-contained water systems except city water systems where residual chlorine level is stipulated.

B71-10289
IMPROVED INSULATING MATERIALS EFFECTIVE AT EXTREMELY HIGH TEMPERATURES
CARLSON, L. W./N. AM. ROCKWELL CORP./
AUG. 1971
NPO-12067
Wrapped molybdenum foil with silica fabric insulation and wrapped tantalum foil with carbon fabric insulation are usable to 1367 K and up to 2478 K, respectively, both offer marked space saving and efficiency in high temperature operations. Graph displays temperature profiles at end of firing period.

B71-10290
GRANULAR TWO-PHASE INSULATION SYSTEMS
CARPENTER, H. W./ROCKETDYNE/
AUG. 1971 SEE ALSO B71-10289
NPO-12068
Easily prepared system, consisting of matrix of hollow zirconia microspheres containing dispersed tungsten powder, produces minimum-cost, prototype test specimen. Combination represents basic concept of highly reflective dispersed phase in low density insulative matrix and is stable at 2200 K. Other combinations of materials are suggested.

B71-10291
POLYMERIZATION OF PERFLUOROBUTADIENE AT NEAR-AMBIENT CONDITIONS
TOY, M. S./MC DONNELL DOUGLAS CORP./
AUG. 1971
NPO-10447
Peroxide catalyst under mild conditions initiates homopolymerization of perfluoro butadiene to new linear perfluoro polyenes and vulcanizable fluoro elastomers. Resulting polyperfluoro butadiene serves as hard elastomer for good chemical resistance, as intermediate in graft polymerizations, and as crosslink for high molecular weight materials.

B71-10297
EXPERIMENTAL DETERMINATION OF DAMPING PARAMETERS OF VISCOELASTIC MATERIALS
HOWARD, R. T./IBM/ MACE, E. W.
AUG. 1971
M-FS-20534
Tuned-resonance method requires measurement of maximum transmissibility and frequency at that point to determine dynamic modules and loss modulus of elasticity.

B71-10300
SYNTHESIS OF A NEW CLASS OF HIGHLY FLUORINATED ALIPHATIC DIISOCYANATES
WARNER, D. A./PENINSULAR CHEMRES., INC./
AUG. 1971
M-FS-20883
Synthesis is basis for preparation of polyurethanes that are compatible with liquid oxygen. The two step process preparation from fluorocarbon diacid fluorides is explained in text.

B71-10303
COATINGS FROM COPOLYMERS OF TETRAPHENOXYSILANE AND P,P/1/-BIPHENOL
DUNNAVANT, W. R./BATTELLE MEM. INST./ MARKEL, R. A.
OCT. 1971 SEE ALSO NASA-CR-85820
M-FS-14947
Resultant resin from copolymers is highly crosslinked and completely aromatic. Procedure develops polyaryoxysilane structure in situ after the substrate has first been coated with a prepolymer. Resins are useful as protective coatings for metals, ceramics, glass, and other materials that accommodate relatively high curing temperatures.

B71-10310
INVESTIGATION TO IDENTIFY PAINT COATINGS RESISTIVE TO MICROORGANISM GROWTH
COOPER, C. W./BATTELLE MEM. INST./ KEMP, H. T.
AUG. 1971 SEE ALSO B69-10181, NASA-CR-111524
M-FS-20458
All selected coatings contain nutrients that support microbial growth and survival. Incorporation of microbiocidal agents into coatings more susceptible to attack is recommended for improved inhibition of microorganism growth and for increased protection against deterioration of coatings by microorganisms.

B71-10317
INSTANT ACTING ADHESIVE SYSTEM
DAVIS, T. R./NATL. CASH REGISTER CO./ HAINES, R. C.
AUG. 1971
MSC-13732
Adhesive developes 80 percent of minimum bond strength of 250 psi less than 30 sec after activation is required. Adhesive is stable, handles easily, is a low toxic hazard, and is useful in industrial and domestic prototype bonding and clamping operations.

B71-10319
ESTIMATING CARBON MONOXIDE EXPOSURE
EDGERLEY, R. H./N. AM. ROCKWELL CORP./
AUG. 1971
MSC-17211
Method predicts effects of carbon monoxide on astronauts confined in spacecraft cabin atmospheres. Information on need for low toxicity level also applies to confined spaces. Benefits are applicable to industry and public health.

B71-10320
RAPID METHOD FOR SAMPLING METALS FOR MATERIALS IDENTIFICATION
HIGGINS, L. E./N. AM. ROCKWELL CORP./
AUG. 1971
MSC-17332
Nondamaging process similar to electrochemical machining is useful in obtaining metal samples from places inaccessible to conventional sampling methods or where methods would be hazardous or contaminating to specimens. Process applies to

industries where metals or metal alloys play a vital role.

B71-10331
SOLVATION AGENT FOR DISULFIDE PRECIPITATES FROM INHIBITED GLYCOL-WATER SOLUTIONS
TAYLOR, M. F./BOEING CO./
DEC. 1971
MSC-13695
Small additions /0.01 percent or less/ of triethanoloamine sodium sulfite adduct to mercapto benzothiazole inhibited glycol water heat transfer solutions containing disulfide precipitate produce marked reduction in amount of precipitate. Adduct is useful as additive in glycol base antifreezes and coolants.

B71-10339
NEW MATERIALS FOR FIREPLACE LOGS
KIESELBACK, D. J./CONTINUING EDUC. PROJ./ SMOCK, A. W.
SEP. 1971
M-FS-21363
Fibrous insulation and refractory concrete are used for logs as well as fireproof walls, incinerator bricks, planters, and roof shingles. Insulation is lighter and more shock resistant than fireclay. Lightweight slag bonded with refractory concrete serves as aggregrate.

B71-10342
NASA-TRICOT - A LIGHTWEIGHT, RADAR REFLECTIVE, KNITTED FABRIC
MATHEWS, F. WHITE, E.
SEP. 1971
LANGLEY-10776
Fabric knitted on conventional knitting machines uses commercially available yarns, has high aerodynamic drag capability, and is relatively inexpensive. The two yarn components used are 15-denier nylon monofilament and aluminized Mylar tape.

B71-10356
EXPLOSIVE BONDED TZM-WIRE-REINFORCED C129Y COLUMBIUM COMPOSITES
REECE, O. Y.
SEP. 1971
M-FS-20925
Technique consists of positioning layers of TZM metal filaments between thin C129Y columbium sheets and joining multiple sheet stacks by single explosive joining operation. Metallurgical bonds are excellent, external heat is not required, process is relatively inexpensive, and resulting composites are considerably stronger than base alloy.

B71-10359
SIMPLIFIED PROCEDURE FOR EMISSION SPECTROCHEMICAL ANALYSIS
GORDON, W. A.
SEP. 1971 SEE ALSO B67-10404, NASA-TN-D-5532
LEWIS-10985
Procedure involves dissolution of samples to prepare them for analysis, and uses single set of experimental conditions to analyze wide variety of materials and compositions without compromising analysis accuracy. Automated spectrometer alloys per sample analysis time of four minutes after sample dissolution.

B71-10362
EFFECTS OF THE THERMAL STERILIZATION PROCEDURE ON POLYMERIC PRODUCTS
CAMPBELL, B. A. KALFAYAN, S. H.
SEP. 1971 SEE ALSO NASA-CR-80434
NPO-11688
Properties of samples are tested, after thermal exposure, and values are compared with unexposed samples. Thermal stability or compatibility ratings of formulated or compounded organic polymers using trade names are made and degree of change in measured properties is assessed. Products are rated compatible, marginal, or not compatible.

B71-10393
ANTIPOLLUTION SYSTEM TO REMOVE NITROGEN DIOXIDE GAS
METZLER, A. J. SLOUGH, J. W.
OCT. 1971
LEWIS-11297
Gas phase reaction system using anhydrous ammonia removes nitrogen dioxide. System consists of ammonia injection and mixing section, reaction section /reactor/, and scrubber section. All sections are contained in system ducting.

B71-10394
RESIN ADDITIVE IMPROVES PERFORMANCE OF HIGH-TEMPERATURE HYDROCARBON LUBRICANTS
JOHNSON, R. L. LOOMIS, W. R.
OCT. 1971 SEE ALSO NASA-CR-72615
LEWIS-11364
Paraffinic resins, in high temperature applications, improve strength of thin lubricant film in Hertzian contacts even though they do not increase bulk oil viscosity. Use of resin circumvents corrosivity and high volatility problems inherent with many chemical additives.

B71-10403
HIGH-STRENGTH LARGE-DIAMETER CARBON-BASE FIBERS
HOUGH, R. L./HOUGH LAB./
OCT. 1971 SEE ALSO NASA-CR-72770
LEWIS-11167
Material is applicable as reinforcement for metal matrix composites. Composites with large diameter, carbon base monofilaments offer advantages of superior strength at high temperatures and low density and for high temperature equipment where component weight must be minimized.

B71-10411
SCREENING METHOD IMPROVES PERFORMANCE OF NICKEL-CADMIUM BATTERIES
HALPERT, G.
NOV. 1971
GSFC-11260
Weight of single plate in batch is used as criterion for selecting those plates with uniform, high ampere hour capacity. When substrate and plaque weights are uniform, observed current capacity differences are dependent on quantity of active material in plaque.

B71-10434
SHIELDING METHOD FOR POLYCRYSTALLINE AND EPITAXY GROWTHS
BUE, J. L./TRW, INC./
NOV. 1971
M-FS-20162
Technique prevents silicon wafers from adhering to susceptor following silicon epitaxial deposition. Annular ring of refractory material goes around wafer during epitaxial deposit. Silicon is deposited on ring, susceptor, and portions of wafer. Ring breaks away from susceptor and wafer and no silicon undergrowth occurs.

B71-10437
EXTERNALLY PROGRAMMED VARIABLE TIMER
GULBIS, P. R./SPERRY RAND/
NOV. 1971
M-FS-20776
Device satisfies 1-sec, 5-sec, and 10-min timing requirements. Temperature and voltage range accuracy is plus or minus 3.9 percent with voltage variations of 24 to 31 Vdc over temperature range of minus 55 deg C to plus 125 deg C.

B71-10442
THERMALLY STABLE POLYIMIDES FROM SOLUTIONS OF MONOMERIC REACTANTS
DELVIGS, P. LIGHTSEY, G. R. SERAFINI, T. T.
NOV. 1971 SEE ALSO NASA-TM-X-67803
LEWIS-11325
Monomer solutions have high solubility and low solution viscosity. Since monomers are shipped in powder form and reaction to polyimide-acid prepolymer is omitted, the cost is low and handling is easy.

B71-10443
INSOLUBILIZATION PROCESS INCREASES ENZYME STABILITY
BILLINGHAM, J. LYN, J./BATTELLE MEM. INST./
NOV. 1971 SEE ALSO NASA-CR-73354
ARC-10314

Enzymes complexed with polymeric matrices contain properties suggesting application to enzyme-controlled reactions. Stability of insolubilized enzyme derivatives is markedly greater than that of soluble enzymes and physical form of insolubilized enzymes is useful in column and batch processes.

B71-10474
GAS CHROMATOGRAPH SAMPLE-TRANSFER VALVE
WANG, W. S.-S./TRW. INC./ WRIGHT, H. W., JR.
DEC. 1971
ARC-10427
Slide-type gate valve incorporates sampling volume and transfer passageway for guiding a metered quantity of gas from pressurized test cell to gas chromatograph. Gate is moved by pneumatic bellows-type actuator.

B71-10482
GRAPHITE-REINFORCED ALUMINUM COMPOSITE
LALACONA, F. P.
DEC. 1971
M-FS-21077
Metallic composite prepared for utilization which remains intact without aluminum/carbon reactions, is less expensive than other structural materials, and yields a flexible composite material.

B71-10483
DEVELOPMENT OF CONFORMAL COATING MATERIALS
GLICKMAN, S. A./THIOKOL CHEM. CORP./ SONENSTEIN, G. G.
DEC. 1971 SEE ALSO NASA-CR-102743
M-FS-21393
New polymeric compositions appear useful as coatings on electronic circuitry operating in rigorous environments. Formulation of their compositions is based on nitrosofluorocarbon polymers having active cure sites.

B71-10488
NEW PRIMERS FOR ADHESIVE BONDING OF ALUMINUM ALLOYS
BURRELL, B. W./AVCO CORP./ PORT, W. S.
DEC. 1971 SEE ALSO NASA-CR-102846
M-FS-21387
Synthetic polypeptide adhesive primers are effective, with high temperature epoxy resins, at temperatures from 100 deg to 300 deg C. Lap-shear failure loads and lap-shear strength of both primers are discussed.

B71-10489
HIGH-TEMPERATURE STRENGTH OF PREALLOYED-POWDER PRODUCTS INCREASED BY HEAT/PRESSURE TREATMENT
ASHBROOK, R. L. FRECHE, J. C. WATERS, W. J.
DEC. 1971 SEE ALSO B69-10293, NASA-TN-D-6072
LEWIS-11229
Heat treatment process involves heating products to a temperature above the solidus, and subsequently applying pressure at a temperature below the solidus. Technique can be modified to one step process involving simultaneous application if both high pressure and heat. Process is not limited to cobalt-base alloys.

B72-10002
SMALL-SCALE EXPLOSIVE WELDING OF ALUMINUM
L. J. Bement
1972
LANGLEY-10941
Welding technique uses very small quantities of explosive ribbon to accomplish small-scale lap-welding of aluminum plates. Technique can perform small controlled welding with no length limitations and requires minimal protective shielding.

B72-10005
FLAME RESISTANT ELASTIC ELASTOMERIC FIBERS
J. T. Howarth (Little /Arthur D./, Inc.) and A. A. Massucco (Little /Arthur D./, Inc.)
Sep. 1972 See also NASA-CR-115227
MSC-13923-4
Development of materials to improve flame resistance of elastic elastomeric fibers is discussed. Two approaches, synthesis of polyether based urethanes and modification of synthesized urethanes with flame ratardant additives, are described. Specific applications of both techniques are presented.

B72-10019
EXPERIMENTAL STUDY OF SURFACE CRACKS
Innovator not given (Southwest Res. Inst.) 1972 See also NASA-CR-114934
MSC-14032
Analysis of plastic zones surrounding surface cracks in stressed steel and titanium plates subjected to tensile loading shows that back surface dimpling develops at stress levels considerably lower than those predicted by theoretical models of yield zone penetration into back surface.

B72-10027
IMPROVED ELASTOMER FOR USE WITH OXYGEN DIFLUORIDE
J. W. Martin (TRW Systems Group) and J. L. Bell (TRW Systems Group)
1972 See also NASA-CR-115902
ARC-10528
Method improves resistance of CIS-1,4-poly(butadiene) elastomers to attack by oxygen difluoride at low temperatures by replacing silica reinforcement with less reactive substances. Improved elastomeric compound is utilized in bladders, diaphragms, valves, O-rings and seals.

B72-10028
SPECIMEN FOR HIGH-TEMPERATURE TENSILE TESTS
C. D. Coulbert (Marquardt Co.)
1972
ARC-10531
Split nut with internal taper to hold specially formed specimen composed of filaments of refractory material provides means for holding at high temperature and under tension so that performance evaluations may be made.

B72-10029
ISOTROPIC PYROLYTIC CARBONS
H. Shimizu (Marquardt Co.)
1972
ARC-10532
Depositing carbon on high-temperature substrate that is kept in motion by vibration produces isotropic pyrolytic graphite or carbon without using fluidized beds.

B72-10038
USE OF THIN PLASTIC FILMS AT CRYOGENIC TEMPERATURES
R. F. Lark, J. T. Hoggatt (Boeing Co.), K. E. Wiedekamp (Boeing Co.), and J. G. Shdo (Boeing Co.)
1972 See also NASA-CR-54433; NASA-CR-72115; NASA-CR-72134; ; NASA-CR-72418;; NASA-CR-72432; NASA-CR-72502; NASA-TM-X-1555
LEWIS-11047
Commercially available plastic film materials that remain flexible at cryogenic temperatures and resist failures caused by folds and wrinkles created during expulsion were investigated for use in expulsion bladders for liquefied gases. Compatible adhesive systems, fabrication techniques, and results of impact and dynamic loading tests are summarized.

B72-10044
A METHOD OF ISOLATING ORGANIC COMPOUNDS PRESENT IN WATER
G. V. Calder, J. Fritz, and G. A. Junk
1972
AEC-10010
Water sample is passed through a column containing macroreticular resin, which absorbs only nonionic organic compounds. These compounds are selectively separated using aqueous eluents of varying pH, or completely exuded with small amount of an organic eluent.

B72-10063
OPTICAL BONDING AGENTS FOR SEVERE ENVIRONMENTS
S. F. Pellicori (Santa Barbara Res. Center)
1972
ARC-10459

Test results and applications of elastors (General Electric RTV 665, Dow Corning (DC) XR-63-488, DC 93-500, DC 182, and DC 184) considered for use as optical bonding agents in aerospace environments are presented.

B72-10090
SHEET PLASTIC FILTERS FOR SOLAR CELLS
R. J. Wizenick (Electro-Opt. Systems)
1972
NPO-11464

Poly(vinylidene fluoride) (PVF) film protects solar cells on Mars surface from radiation and prevents degradation of solar cell surfaces by Martian dust storms. PVF films may replace glass or quartz windows on solar cell arrays used to generate power on earth.

B72-10115
PROMOTION OF DROPWISE CONDENSATION OF ETHYL ALCOHOL, METHYL ALCOHOL, AND ACETONE BY POLYTETRAFLUOROETHYLENE
C. E. Kirby
1972
LANGLEY-10940

Coating condensing surfaces with thin layer of nonpolar Teflon results in dropwise condensation of polar organic vapor. Greater heat transfer coefficients are produced increasing effectiveness of condensing system. Investigation shows that vapors with strong dipole moment tend to condense dropwise.

B72-10129
PREVENTING OIL MIGRATION IN VACUUM SYSTEMS
M. Cridlin
May 1972
GSFC-11253

Method which uses a disposable metal gasket that is removed when system is deactivated eliminates oil migration from mechanical pump to other areas of the system.

B72-10136
LUBRICANT SELECTION FOR GEAR DESIGNERS
D. P. Townsend
1972 See also NASA-TM-X-52942
LEWIS-11483

Guide for gear designers, consisting of theory, calculations, charts, curves and references, explains lubrication requirements for gears to insure maximum performance. Mechanical and service variables are considered in order to obtain optimum gear performance under severe operating conditions.

B72-10137
CARBON MONOXIDE OXIDATION RATES COMPUTED FOR AUTOMOBILE THERMAL REACTOR CONDITIONS
R. S. Brokaw and D. A. Bittker
May 1972 See also NASA-TN-D-7024
LEWIS-11638

Carbon monoxide oxidation rates in thermal reactors for exhaust manifolds are computed by integrating differential equations for system of twenty-nine reversible chemical reactions. Reactors are noncatalytic replacements for conventional exhaust manifolds and are a system for reducing carbon monoxide and hydrocarbons in automobile exhausts.

B72-10144
AN EMPIRICAL RELATIONSHIP FOR THE PENETRATION OF 1 TO 3 MeV ELECTRONS
F. R. Stevenson
May 1972
LEWIS-11495

Empirical correlation of high energy electrons into materials allows predictions of practical ranges (measure of electron penetration) for different elements and alloys.

B72-10150
ADVANCED PROTECTIVE COATING FOR SUPERALLOYS
R. C. Elam (Pratt and Whitney), F. P. Talboom (Pratt and Whitney), and L. W. Wilson (Pratt and Whitney)
Dec. 1972 See also NASA-CR-72813
LEWIS-11473

Superior oxidation protection for nickel-base alloys at temperatures up to 1367 K was obtained with cobalt-base alloy coating. Coating had 25 Cr, 14 Al, and 0.5 Y weight percent composition. Coating was applied by electron beam vapor deposition to thickness of 76 to 127 microns.

B72-10157
NONDESTRUCTIVE-TEST STANDARDS FOR EVALUATION OF FIBER-REINFORCED COMPOSITES
W. M. Pless (Lockheed-Ga. Co.), B. L. Weil (Lockheed-Ga. Co.), W. H. Lewis (Lockheed-Ga. Co.), and G. W. Burton (Lockheed-Ga. Co.)
May 1972
M-FS-21288

Advanced composite standards, representing potential variations occurring when composites are processed into finished structures, were designed, fabricated and tested. Testing methods utilized were ultrasonic C-scan, radiography, and infrared.

B72-10161
HALOGENATION OF MICROCAPSULE WALLS
T. R. Davis (Natl. Cash Register Co.), C. K. Schaab (Natl. Cash Register Co.), and J. C. Scott (Natl. Cash Register Co.)
1972
ARC-10410

Procedure for halogenation of confining walls of both gelatin and gelatin-phenolic resin capsules is similar to that used for microencapsulation. Ten percent halogen content renders capsule wall nonburning; any higher content enhances flame-retardant properties of selected internal phase material. Halogenation decreases permeability of wall material to encapsulated materials.

B72-10172
IMPROVED SYNTHESIS OF INTERMETAL COMPOUNDS
J. S. Haggerty (Little /Arthur D./, Inc.) and J. Wenckus (Little /Arthur D./, Inc.)
May 1972
HQ-10690

Method in crystal growth using liquid encapsulation techniques permits GaAs synthesis of materials from constituent elements whose vapor pressures are high at temperature at which they react spontaneously. Techniques may be useful for synthesis of GaP.

B72-10175
NEW POLYIMIDE POLYMER HAS EXCELLENT PROCESSING CHARACTERISITCS WITH IMPROVED THERMO-OXIDATIVE AND HYDROLYTIC STABILITIES
R. J. Jones (TRW, Inc.), R. W. Vaughan (TRW, Inc.), and W. P. Kendrick (TRW, Inc.)
May 1972 See also B69-10118; B70-10300; B70-10330; NASA-CR-72633
LEWIS-11323

Polyimide P10P and its processing technique apply to most high temperature plastic products, devices and castings. Prepolymer, when used as varnish, impregnates fibers directly and is able to be processed into advanced composities. Material may also be used as molding powder and adhesive.

B72-10187
SUPERIOR CRYOGENIC INSULATION DEVELOPED
D. V. Hale (Lockheed Missiles and Space Co.), M. J. ONeill (Lockheed Missiles and Space Co.), and A. J. McDanal (Lockheed Missiles and Space Co.)
May 1972
M-FS-21560

Multilayer composite consisting of alternate spunbond nylon layers and doubly aluminized mylar layers is used primarily in cryogenic thermal protection systems.

B72-10199
HIGH-TEMPERATURE CERAMIC-TO-CERAMIC SEALS
W. Smart (Appl. Electrochem., Inc.)
May 1972 See also NASA-CR-73464
ARC-10319

Noble-metal braze applied to appropriately prepared zirconia parts produces a gas-tight, durable seal that can withstand temperature of 825 C for over 2000 hours without deterioration.

B72-10201
COMPARISON OF CATALYST ACTIVITY
T. J. Jennings (Shell Develop. Co.) and H. H. Voge (Shell Develop. Co.)
May 1972
ARC-10493

Reactions of highly active catalysts are compared by allowing temperature of catalyst bed, initially at 77 K, to increase slowly; marked deviation in smooth warming curve denotes temperature at which detectable reaction occurs. The lower the temperature at which reaction commences, the more active the catalyst.

B72-10215
CONVOLUTED FABRIC FOR FULL-PRESSURE GLOVES
W. Elkins (Space Age Control, Inc.), C. Breslin (Space Age Control, Inc.), and H. Price (Space Age Control, Inc.)
May 1972 See also NASA-CR-114365
ARC-10529

Fabric, made of nylon ripstop coated with Neoprene, provides expansive and contractive mobility along posterior surface of glove fingers allowing maximum digital dexterity and tactility.

B72-10223
INITIATION OF POLYMERIZATION BY TETRABUTYLAMMONIUM p-LITHIOPHENOXIDE
S. M. Hirshfield (Rocketdyne)
1972 See also B72-10184
ARC-10553

Compound is an efficient initiator capable of producing a polymer with a phenol group at the initiating end of the chain. Derivative may be used as a polymerization initiator to produce large quantities of phenol-terminated polymers.

B72-10230
WATER PURIFICATION BY REVERSE OSMOSIS USING HETEROCYCLIC POLYMER MEMBRANES
H. Scott (Franklin Inst. Res. Labs.)
May 1972 See also NASA-CR-1648
LANGLEY-10514

Pyrrone (polyimidazopyrrolone) polymers are a new class of thermally stable, radiation and chemical resistant aromatic-heterocyclic polymers featuring a greater chemical and mechanical durability than cellulose acetate.

B72-10231
ADHESION THEORY REVIEW
N. J. DeLollis
May 1972 See also SC-RR-70-915
AEC-10083

Bonding theories reviewed include physical adsorption, hydrogen bonding, chemisorption and surface energy; bond failure mechanisms include phase discontinuity, swelling and corrosion. Concept of bond failure by water desorption is introduced and discussed.

B72-10234
IMPROVED METHOD FOR PRODUCING METAL-REINFORCED CERAMICS
R. L. Landingham
May 1972
AEC-10070

Vacuum impregnation process produces metal-reinforced ceramics with only 3 percent void space volumes. Method may be used to produce metal-reinforced ceramics for high temperature or structural applications such as furnace supports and armor.

B72-10235
HIGH STRENGTH, MEDIUM DENSITY MOLDED FOAM
J. R. Fender (Bendix Corp.)
May 1972
AEC-10053

Toluene diisocyanate-based polyurethane produces molded-to-size foam products. Formulation techniques optimize dimension stability, strength and moldability.

B72-10247
INSOLUBILIZED ENZYMES FOR FOOD SYNTHESIS
D. L. Marshall (Battelle Mem. Inst.)
Sep. 1972
ARC-10568

Cellulose matrix with numerous enzyme-coated silica particles of colloidal size permanently bound at various sites within matrix was produced that has high activity and possesses requisite physical characteristics for filtration or column operations. Product also allows coupling step in synthesis of edible food to proceed under mild conditions.

B72-10249
OXYGEN CARRIER FOR GAS CHROMATOGRAPHIC ANALYSIS OF INERT GASES IN PROPELLANTS
W. A. Cannon (McDonnell-Douglas Corp.)
Sep. 1972 See also NASA-CR-97860
ARC-10574

Gas chromatographic determination of small quantities of inert gases in reactive propellants is discussed. Operating conditions used for specific analyses of helium in diborane and nitrogen in oxygen difluoride are presented in tabular form.

B72-10256
A PROTECTIVE COATING FOR STAINLESS STEEL
S. J. Grisaffe and E. W. Klechka
May 1972 See also NASA-TM-X-2201
LEWIS-11267

Comparative furnace oxidation tests prove that coating provides high temperature oxidation and erosion resistance.

B72-10257
POLYMERIC COATINGS USING ELECTRONIC EXCITATION
S. M. Lee (N. Am. Rockwell Corp.)
Jun. 1972
HQ-10698

Process has been developed for glow discharge polymerization which is accomplished in inert atmosphere by using vacuum chamber. Polymeric coating, in this type of environment, produces high molecular weight coating polymers that have good stability and are resistant to abrasions and solvents.

B72-10262
DEVELOPMENT OF A POLYIMIDE FOR USE AS A TEMPERATURE AND SOLVENT RESISTANT SEALANT
J. S. Roscoe (Quantum, Inc.) and B. F. Clark (Quantum, Inc.)
Jul. 1972
M-FS-21325

Polyimide developed by the interaction of benzophenone tetracarboxylic dianhydride, polyoxypropylene diamine, and oxydianiline is used for fuel tanks that are exposed to extreme temperatures.

B72-10266
COMPOSITE CASTING DEMONSTRATION
Innovator not given (Little /Arthur D./, Inc.) Jun. 1972
M-FS-21668

Demonstration was performed to experimentally assess the potential advantages in the processing of materials in space, and specifically, to determine the effects of lack of density segregation and heat convection in the weightless environment of space.

B72-10269
FIRE RETARDANT POLYISOCYANURATE FOAM
S. R. Riccitiello and J. A. Parker
1972
ARC-10280

Fire retardant properties of low density polymer foam are increased. Foam has pendant nitrile groups which form thermally-stable heterocyclic structures at temperature below degradation temperature of urethane linkages.

B72-10280
DEVOLATILIZATION OF POLYMER RESINS
B. Seidenberg, J. Park, and C. Clatterbuck
Jun. 1972
GSFC-11358

Commercial silicon resin was devolatilized by vacuum distillation, cured at room temperature and tested favorably for outgassing criteria. Applications of the devolatilized resin are potting compounds and conformal coatings.

B72-10282
NEW TWISTED INTERMETALLIC COMPOUND SUPERCONDUCTOR: A CONCEPT
W. D. Coles, G. V. Brown, and J. C. Laurence
Jun. 1972
LEWIS-11015

Method for processing Nb3Sn and other intermetallic compound superconductors produces a twisted, stabilized wire or tube which can be used to wind electromagnetics, armatures, rotors, and field windings for motors and generators as well as other magnetic devices.

B72-10284
A NEW VIBRATION DAMPENING ADHESIVE
S. Y. Yoshino (N. Am. Rockwell Corp.)
Jul. 1972
MSC-17668

Formulation of polymers has been devised that, when vibrated, adhesive becomes more fluid (thixotropic) to better absorb shock and, when warmed, will actually hold its shape better (thermosetting) rather than deform.

B72-10290
HIGH VOLTAGE ELECTRICAL INSULATION COATING FOR REFRACTORY MATERIALS
W. E. Lent (Hughes Aircraft Co.)
Jun. 1972 See also NASA-CR-72677
LEWIS-11479

Formula and process have been developed for coating refractory metal surfaces with high voltage electrical insulation for use at temperatures to 600 C. Coatings were specifically developed as an insulation for the surface of a perforated, molybdenum, ion-accelerator grid, but are not limited to this application.

B72-10291
IMPROVED THERMALLY CONDUCTING ELECTRON TRANSFER POLYMERS
R. K. Jenkins (McDonnell-Douglas Corp.), N. R. Byrd (McDonnell-Douglas Corp.), and J. L. Lister (McDonnell-Douglas Corp.)
Jun. 1972
GSFC-11304

Development of polymers with improved heat transfer coefficients for use in encapsulating electronic modules is discussed. Chemical reactions for synthesizing the polymers are described and thermodynamic and physical properties are analyzed.

B72-10294
GRAPHITE AND BORON-REINFORCED COMPOSITE MATERIALS DATA SUMMARY
Innovator not given (Gen. Dyn. Corp.) Jun. 1972
M-FS-21691

Data summary is collection of information on typical processing techniques. Mechanical properties, and physical properties of advanced composite materials which are being considered for structural applications on advanced space vehicles.

B72-10300
POLYIMIDE FOAMS PROVIDE THERMAL INSULATION AND FIRE PROTECTION
R. W. Rosser
Sep. 1972
ARC-10464

Chemical reactions to produce polyimide foams for application as thermal insulation and fire prevention materials are discussed. Thermal and physical properties of the polyimides are described. Methods for improving basic formulations to produce desired qualitites are included.

B72-10305
CATALYST FOR SODIUM CHLORATE DECOMPOSITION
T. J. Wydeven
Sep. 1972
ARC-10584

Production of oxygen by rapid decomposition of cobalt oxide and sodium chlorate mixture is discussed. Cobalt oxide serves as catalyst to accelerate reaction. Temperature conditions and chemical processes involved are described.

B72-10306
MICROMINIATURE GAS CHROMATOGRAPHIC COLUMN
R. W. Donaldson, Jr.
Sep. 1972
ARC-10594

Techniques commonly used for fabrication of integrated circuits are utilized to produce long capillary tubes for microminiature chromatographs. Method involves bonding of flat silicon plate to top of spirally grooved silicon chip to close groove and form capillary column.

B72-10309
STABILIZATION OF POROUS GLASS REVERSE-OSMOSIS MEMBRANES
E. V. Ballou, M. I. Leban, and T. Wydeven
Sep. 1972
ARC-10646

Application of porous glass in form of capillary tubes for low capacity ion exchange in hyperfiltration experiments is discussed. Efficiency of desalination by process of reverse osmosis is described. Stabilization of porous glass membrane by presence of aluminum chloride is analyzed.

B72-10313
INORGANIC GLASS CERAMIC SLIP RINGS
E. W. Glossbrenner (Litton Precision Products, Inc.) and S. R. Cole (Litton Precision Products, Inc.)
Jun. 1972
M-FS-20711

Prototypes of slip rings have been fabricated from ceramic glass, a material which is highly resistant to deterioration due to high temperature. Slip ring assemblies were not structurally damaged by mechanical tests and performed statisfactorily for 200 hours.

B72-10318
MAGNETIC-DOPED ALLOYS WITH VERY LARGE SEEBECK COEFFICIENTS
D. J. Sellmeyer (MIT) and J. Zagarins (MIT)
Jul. 1972
M-FS-21410

Preliminary results of this study show that, based on selection of magnetic solute and nonmagnetic solvent from periodic table, alloys having Seebeck coefficients approaching 100 micron V/K can be obtained.

B72-10320
PLASMA CALCINING OF PIGMENT PARTICLES FOR THERMAL CONTROL COATINGS
E. P. Farley (Stanford Res. Inst.)
Jul. 1972
M-FS-21267

Method utilizes an RF excited plasma to surface deactivate thermally stable powders at high temperatures. Utilization of this plasma heat treatment at high temperatures can be carried out without grain growth, calcination, or agglomeration.

B72-10321
TITANIUM ALLOY STRESS CORROSION CRACKING IN PRESENCE OF DINITROGEN TETROXIDE
A. Z. Conner (Hercules, Inc.), J. F. G. Clarke, Jr. (Hercules, Inc.), J. A. Gailey (Hercules, Inc.), and A. A. Orr (Hercules, Inc.)
Jul. 1972
M-FS-21113

Study resulting in a satisfactory stress corrosion cracking test with extremely consistent results produced six new analytical methods. Methods detect and determine differences in the minor constituent composition of different types of dinitrogen tetroxide.

B72-10328
TRACE CONTAMINANT ADSORPTION AND SORBENT REGENERATION IN CLOSED ECOLOGICAL SYSTEMS
C. R. Arnold (Lockheed Missiles and Space Co.), G. J. Kersels (Lockheed Missiles and Space Co.), R. P. Merrill (Lockheed Missiles and Space Co.), A. J. Robell (Lockheed Missiles and Space Co.), and A. Wheeler (Lockheed Missiles and Space Co.)
Dec. 1972 See also NASA-CR-1582
LANGLEY-10681

Correlation was obtained for determining sorptive capacity of carbon for pure and mixed contaminants under dry and humid conditions at various temperatures. Vacuum desorption rates were investigated for single particles and for sorbent beds. For sorbent beds, rate-determining step is Knudsen diffusion through interparticle voids.

B72-10333
ANALYSIS OF THERMAL STRESS AND METAL MOVEMENT DURING WELDING
J. B. Andrews (MIT) and K. Masubuchi (MIT)
Jul. 1972
M-FS-20984

Objectives of study were: investigation of temperature changes caused by welding arc with analysis of temperature distribution; development of system of mathematical statements describing thermal stresses and plastic strains during welding; and development of system of mathematical solutions and computer programs for one-dimensional analysis.

B72-10336
STUDY OF IN-SITU DEGRADATION OF THERMAL CONTROL SURFACES
J. E. Gilligan (IIT Res. Inst.) and G. A. Zerlaut (IIT Res. Inst.)
Jul. 1972
M-FS-20892

Experimental technique used in study of damage mechanism to semiconductor pigments exposed to ultraviolet radiation can be adapted for investigations of surface chemistry and may be used analytically to determine contamination.

B72-10337
NONFLAMMABLE POTTING, ENCAPSULATING AND/OR CONFORMAL COATING COMPOUND
H. F. Kline and F. Dawn
Jul. 1972
MSC-13499

Compound formed from dimethylpolysiloxane, ammonium phosphate, and ground glass is nonflammable in air environment and self-extingushing in atmosphere of 60 percent oxygen and 40 percent nitrogen. Material may have applications for reducing industrial fire hazards and should interest aircraft industry, machinery manufacturers, and automotive industry.

B72-10339
STRAIN GAGE ATTACHMENT BY SPOT WELDING REDUCES THE FATIGUE STRENGTH OF Ti-6Al-4V, RENE 41, AND INCONEL X
L. A. Imig
Jul. 1972
LANGLEY-10930

Fatigue tests were conducted with constant-amplitude axial stresses in the ratio of minimum to maximum stress of 0.05 (R=0.05). Specimens with and without strain gages were tested at 21 C, and superalloy specimens with and without strain gages were tested at 21 C and 815 C.

B72-10340
FABRICATION OF UNIAXIAL FILAMENT-REINFORCED EPOXY TUBES FOR STRUCTURAL APPLICATION
J. G. Davis, Jr.
Jul. 1972
LANGLEY-10203

Filament reinforced composite materials have high strength, high stiffness and low density. Tubes fabricated from process described have advantages of having smooth inner and outer surfaces, lower dimensional variation than tolerances set for extruded aluminum tubing and void free composites.

B72-10342
SYNTHESIS OF TEMPERATURE AND SOLVENT-RESISTANT POLYMERS
J. A. Webster (Monsanto Res. Corp.), W. J. Patterson, R. L. Moffett, and D. E. Morris
Jul. 1972
M-FS-20848; M-FS-20979; M-FS-21039

Development of silicone polymers, polyimides, and polyisocyanurates for use as insulation, coatings, or adhesives under adverse environmental conditions is discussed. Chemical structure of the organic compounds is presented. Physical and mechanical properties of the compounds are analyzed.

B72-10343
A PERMEABLE ROTATING-WHEEL SOLVENT EXTRACTOR
D. R. Kahn and L. A. Nady
Dec. 1972
LRL-10033

Column-type device reported employs circular permeable structures of wire mesh screen for extracting solvents from systems with low density differences and low interfacial tensions. Rotating screen wheels of structure fasten to shaft; stationary screen structures are supported by circular bands connected by radial metal arms.

B72-10344
HIGH STRENGTH ALLOY FOR IMMEDIATE TEMPERATURE, 24 TO 704 C (75 TO 1300 F), APPLICATIONS
J. C. Freche, R. L. Ashbrook, and W. J. Waters
Jul. 1972 See also NASA-TN-D-6560
LEWIS-11634

Application of prealloyed powder technology to the NASA-TRW-VI-A alloy shows the potential of highly alloyed normally cast superalloys for achieving superior properties at intermediate temperatures.

B72-10346
ADHESIVE FOR ALUMINUM WITHSTANDS CRYOGENIC TEMPERATURES
W. L. Hill (N. Am. Rockwell Corp.), T. Matsuoka (Hj Am. Rockwell Corp.), and J. C. Helf (N. Am. Rockwell Corp.)
Jul. 1972
M-FS-16848

Polyurethane adhesive mixed to various proportions with milled glass fibers match the thermal characteristics of 2014-T6 aluminum at cryogenic temperatures.

B72-10353
TITANIUM REINFORCED BORON POLYIMIDE COMPOSITE
G. A. Clark (N. Am. Rockwell Corp.)
Jul. 1972
M-FS-21916

Program involves development of process technique for boron-polyimide prepeg, lay-up and curing procedures for prepegs when processed under vacuum bag pressure, and development and evaluation of titanium hard points for smooth transition of loads from titanium attach points into boron reinforced body of structure.

B72-10358
THERMALLY RESISTANT POLYMERS FOR FUEL TANK SEALANTS
J. A. Webster (Monsanto Res. Corp.)
Jul. 1972
M-FS-21232

Conversion of fluorocarbon dicarboxylic acid to intermediates whose terminal functional groups permit polymerization is discussed. Resulting polymers are used as fuel tank sealers for jet fuels at elevated temperatures. Stability and fuel resistance of the prototype polymers is explained.

B72-10364
FAILURE IN GLASS
S. C. Keeton
Jun. 1972 See also SCL-RR-710010
AEC-10088

Review of state of the art concerning glass failure mechanisms and fatigue theories discusses brittle fracture in glass, fatigue mechanisms, fatigue behavior, environmental effects on failure rate, and aging.

B72-10365
EVALUATING FOAM HETEROGENEITY
D. W. Liou (Dow Chem. Co.) and W. M. Lee (Dow Chem. Co.)
Jun. 1972 See also BDX-613-229
AEC-10046

New analytical tool is available to calculate the degree of foam heterogeneity based on the measurement of gas diffusivity values. Diffusion characteristics of plastic foam are described by a system of differential equations based on conventional diffusion theory. This approach saves research and computation time in studying mass or heat diffusion problems.

B72-10366
POLYMERIC BINDER FOR EXPLOSIVES
E. R. Bissell
Jun. 1972
AEC-10062

Chemical reaction for producing a polymer which can be mixed with explosives to produce a rigid material is discussed. Physical and chemical properties of polymers are described and chemical structure of the polymer is illustrated.

B72-10367
BONDABILITY OF RTV SILICON RUBBER
N. J. Delollis and O. Montoya
Jun. 1972
AEC-10026

Glow discharge method for producing a bondable Room Temperature Vulcanizing (RTV) silicone is described. Mechanical and chemical properties of silicone specimens are described. Theory concerning the relationship between surface characteristics and bondability is examined with respect to the polymer specimen.

B72-10378
DISPERSION-STRENGTHENED CHROMIUM ALLOY
J. M. Blocker, Jr. (Battelle Mem. Inst.) and N. D. Veigel (Battelle Mem. Inst.)
Dec. 1972 See also NASA-CR-72404; NASA-CR-72901
LEWIS-10982

Finely divided powder mixture produced by vapor deposition of CR on small ThO2 particles was hot pressed or pressure bonded. Resulting alloy has lower ductile-to-brittle transition temperature than pure chromium, and high strength and oxidation resistance at elevated temperatures, both in as-rolled condition and after annealing.

B72-10382
COMMON BEARING MATERIAL HAS HIGHEST FATIGUE LIFE AT MODERATE TEMPERATURE
R. J. Parker, E. V. Zaretsky, and M. W. Dietrich
Jul. 1972 See also NASA-TN-D-6179; NASA-TN-D-7033
LEWIS-11592

AISI 52100, a high carbon chromium steel, has the longest fatigue life of eight bearing materials tested. Fatigue lives of the other materials ranged from 7 to 78 percent of the fatigue life of AISI 52100 at a temperature of 340 K (150 F).

B72-10386
BORON ALUMINUM COMPOSITE STRUCTURES
R. E. Jackson (McDonnell-Douglas Corp.)
Jul. 1972
M-FS-21571

Design, analysis and fabrication techniques have been developed for boron-aluminum composite structure technology and were compared with those of conventional metal structure technology to evaluate relative performance.

B72-10396
METHOD TO DETERMINE VENTED ELECTROCHEMICAL CELL QUALITY
J. T. Stemmle
Jul. 1972
GSFC-11216

Cell mass is measured periodically or monitored continuously by balances and clocks to determine water loss and rate of mass loss during trickle charge period.

B72-10397
ION PLATING SEALS MICROCRACKS OR POROUS METAL COMPONENTS
T. Spalvins, D. H. Buckley, and W. A. Brainard
Jul. 1972 See also B67-10006
LEWIS-11657

Description of ion plating process is given. Advantage of this process is that any plating metal or alloy can be selected, whereas, for conventional welding, material selection is limited by compatability.

B72-10401
DEFLECTION RESISTANCE INDICATOR
H. S. Massey (N. Am. Rockwell Corp.), H. L. Pontious (N. Am. Rockwell Corp.), and W. M. Zinsley (N. Am. Rockwell Corp.)
Dec. 1972
M-FS-24010

Instrument for nondestructively measuring compression resistance of spray foam used as thermal insulation was developed. Cylindrical indicator has probe with coil spring to provide force and indicating dial. Probe is manually pressed against area to be tested until complete foot area contacts foam surfaces.

B72-10406
INSULATING EFFECTIVENESS OF SELF-SPACING DIMPLED FOIL
J. A. Bond (GE)
Dec. 1972
LEWIS-10941

Experimental data are graphed for determining conductive heat losses of multilayer insulation as function of number of foil layers. Foil was 0.0051 cm thick Nb, 1% Zr refractory alloy, dimpled to 0.0254 cm with approximately 28 dimples/sq cm. Heat losses were determined at 0.1 microtorr between 700 and 1089 K.

B72-10412
PURIFICATION OF CONTAMINATED WATER BY FILTRATION THROUGH POROUS GLASS
T. Wydeven and M. I. Leban
Sep. 1972
ARC-10655

Method for purifying water that is contaminated with mineral salts and soluble organic compounds is described. Method consists of high pressure filtration of contaminated water through stabilized porous glass membranes. Procedure for conducting filtration is described. Types of materials by percentage amounts removed from the water are identified.

B72-10413
RAPID EVALUATION OF REVERSE-OSMOSIS MEMBRANES
J. R. Hollahan and T. Wydeven
Sep. 1972
ARC-10659

Simultaneous reverse-osmosis tests conducted with centrifuges having multiple compartment heads are discussed. Equipment for retaining reverse-osmosis membrane is illustrated. Method of conducting tests is described.

B72-10416
ELECTROMAGNETIC RHEOMETER
R. H. Globus (Aerojet Liquid Rocket Co.) and J. A. Cabeal (Aerojet Liquid Rocket Co.)
Aug. 1972 See also B72-10026
ARC-10525

Force required to pull free a small circular plate imbedded in gel liquid is determined. Procedure for measuring the structure of a gel is given.

B72-10418
TECHNIQUE FOR INCREASING YIELD OF TRIFLUORONITROSOMETHANE-TETRAFLUOROETHYLENE COPOLYMER

S. A. Glickman (Thiokol Chem. Corp.)
Aug. 1972
ARC-10566

Polymerization technique using equimolar amounts of trifluoronitrosomethane and tetrafluoroethylene to increase yield of copolymer is described. Yields were increased by ninety percent and final product displayed better physical properties. Test equipment and chemical reactions for process are described.

B72-10419
FREE-RADICAL SOLUTION-POLYMERIZATION OF TRIFLUORONITROSOMETHANE WITH TETRAFLUOROETHYLENE
S. A. Glickman (Thiokol Chem. Corp.)
Aug. 1972
ARC-10567

Heavy-walled glass reactor, equipped with aerosol-compatible couplings and needle valve and charged with solvent and initiator, is utilized for polymerization. Polymer conversions and reactor/vessel operation are discussed.

B72-10420
REGENERABLE METALLIC OXIDE SYSTEMS FOR REMOVAL OF CARBON DIOXIDE: A CONCEPT
J. G. Sutton (Hamilton Std.), P. F. Heimlich (Hamilton Std.), and E. H. Tepper (Hamilton Std.)
Aug. 1972
ARC-10570

Design concepts for portable canisters for removal of carbon dioxide are described. One is screen pack configuration consisting of brazed rectangular canister with four metal oxide packs inserted. Other is radial flow canister with perforated central tube. Methods of production and operating principles are presented.

B72-10421
SOLID AMINE COMPOUNDS AS SORBENTS FOR CARBON DIOXIDE: A CONCEPT
J. G. Sutton (Hamilton Std.), P. F. Heimlich (Hamilton Std.), and E. H. Tepper (Hamilton Std.)
Aug. 1972
ARC-10571

Solid amine compounds were examined as possible absorbents for removal of carbon dioxide in life support systems of type which may be employed in high altitude aircraft, spacecraft, or submarines. Many solid amine compounds release absorbed carbon dioxide when heated in vacuum, therefore, when properly packaged spent amine compounds can be readily regenerated and put back into service.

B72-10422
PHOSPHONIUM CHLORIDE FOR THERMAL STORAGE
J. G. Sutton (Hamilton Std.), P. F. Heimlich (Hamilton Std.), and E. H. Tepper (Hamilton Std.)
Aug. 1972
ARC-10572

Development of systems for storage of thermal energy is discussed. Application of phosphonium chloride for heat storage through reversible dissociation is described. Chemical, physical, and thermodynamic properties of phosphonium chloride are analyzed and dangers in using phosphonium chloride are explained.

B72-10423
FABRICATION OF CARBON FILM COMPOSITES FOR HIGH-STRENGTH STRUCTURES
P. R. Preiswerk (Astro Res. Corp.) and M. Lippman (Astro Res. Corp.)
Aug. 1972 See also NASA-CR-1972
ARC-10613

Physical and mechanical properties of fiber composite materials consisting of carbon films are described. Application of carbon film structural composites for constructing microwave filters or optical instruments is proposed. Applications in aerospace and architectural structures for high strength and low density properties are discussed.

B72-10424
IMPROVED MAGNESIA FOR THERMAL CONTROL COATINGS
H. Levin (Hughes Aircraft Co.), C. C. Berggren (Hughes Aircraft Co.), and W. M. Peffley (Hughes Aircraft Co.)
Aug. 1972 See also NASA-CR-73337
ARC-10677

Formation of radiation-generated color centers using single crystals of magnesium oxide is discussed. Crystal structure of magnesium oxide is described. Chemical processes used to produce magnesium oxide with desired color center kinetics are presented. Proton irradiation of magnesium oxide crystals was conducted to determine lattice defects.

B72-10425
ALUMINUM NITRIDE INSULATING FILMS FOR MOSFET DEVICES
G. W. Lewicki and J. Maserjian
Aug. 1972
NPO-11859

Application of aluminum nitrides as electrical insulator for electric capacitors is discussed. Electrical properties of aluminum nitrides are analyzed and specific use with field effect transistors is defined. Operational limits of field effect transistors are developed.

B72-10430
STRENGTHENING LIGHTWEIGHT CONCRETE
A. Auskern
Jul. 1972
AEC-10017

Polymer absorption by lightweight concretes to improve bonding between cement and aggregate and to increase strength of cement is discussed. Compressive strength of treated cement is compared with strength of untreated product. Process for producing polymers is described.

B72-10431
FLUIDIZED-BED COMBUSTION REDUCES ATMOSPHERIC POLLUTANTS
A. A. Jonke
Dec. 1972
AEC-10085

Method of reducing sulfur and nitrogen oxides released during combustion of fossil fuels is described. Fuel is burned in fluidized bed of solids with simultaneous feeding of crushed or pulverized limestone to control emission. Process also offers high heat transfer rates and efficient contacting for gas-solid reactions.

B72-10438
PROPOSED SEMICONDUCTOR FILM IMPROVEMENT
H. M. Manasevit (N. Am. Aviation, Inc.)
Jul. 1972
HQ-10685

Film grown in inert carriers (A, He, or N) displays low impurity, high mobility, and improved crystal structure. Annealing steps used in growing process improves film quality and allows utilization of film for Gunn and LSA devices.

B72-10439
ELECTRON BEAM CHEMISTRY PRODUCES HIGH PURITY METALS
W. H. Philipp, C. E. May, S. J. Marsik, and R. A. Lad
Jul. 1972 See also NASA-TM-X-67982
LEWIS-11639

Application of radiation chemistry for deposition of metals by irradiation of aqueous solutions with high energy electrons is presented. Design of reaction vessel for irradiation of solution is illustrated. Features of radiochemical technique and procedures followed are described.

B72-10449
LEACHING OF NITROSO RUBBER MATERIAL REMOVES UNCURED POLYMER
W. A. Bratfisch (N. Am. Rockwell Corp.) and R. Gonzalez (N. Am. Rockwell Corp.)
Aug. 1972

MSC-17185

New leaching process removes uncured polymer from nitroso rubber, elastomer used in presence of nitrogen tetroxide. Uncured portion is removed by controlled soaking of polymer slab in Freon TF. Leaching with Freon TF prevents nitroso rubber from adhering to adjoining surfaces and limiting its usefulness in either static or dynamic applications.

B72-10451

CHEMICAL MODIFICATION OF POLY(p-PHENYLENE) FOR USE IN ABLATIVE COMPOSITIONS

J. A. Parker, A. H. Heimbuch, D. N. Vincent (N. Am. Rockwell Corp.), and C. L. Hammermesh (N. Am. Rockwell Corp.)

Aug. 1972

ARC-10135

Development of ablative materials based on modification of polyphenylene compounds is discussed. Chemical and physical properties are analyzed for application as heat resistant materials. Synthesis of linear polyphenylenes is described. Effects of exposure to oxyacetylene flame and composition of resultant char layer are presented.

B72-10454

NONMETALLIC IMPURITIES IMPROVE MECHANICAL PROPERTIES OF VAPOR-DEPOSITED TUNGSTEN

J. Chin (Gulf Gen. Atomic), A. F. Weinberg (Gulf Gen. Atomic), and J. R. Lindgren (Gulf Gen. Atomic)

Aug. 1972 See also B67-10232; B71-10212

LEWIS-10800

Mechanical properties of vapor deposited tungsten are improved by selective incorporation of various nonmetallic impurities. Addition of trace quantities of carbon, nitrogen, or oxygen can significantly increase both low and high temperature yield strength without greatly affecting ductile-to-brittle transition temperature.

B72-10456

RADIATION-INDUCED NICKEL DEPOSITS

S. J. Marsik and W. H. Philipp

Dec. 1972 See also NASA-SP-227

LEWIS-10965

Low cost, photographic process uses surface coating of nickel hypophosphite sensitive to X-rays and electron radiation. Exposed coated surface can be amplified to produce permanent visible image of wide tonal gradation in grays. Coating may be sodium, ammonium, or lithium hypophosphite or sodium phosphite, with nickel supplied in developer.

B72-10464

PHASE-CHANGE MATERIALS HANDBOOK

D. V. Hale (Lockheed Missiles and Space Co.), M. J. Hoover (Lockheed Missiles and Space Co.), and M. J. ONeill (Lockheed Missiles and Space Co.)

Aug. 1972

M-FS-22064

Handbook describes relationship between phase-change materials and more conventional thermal control techniques and discusses materials' space and terrestrial applications. Material properties of most promising phase-change materials and purposes and uses of metallic filler materials in phase-change material composites are provided.

B72-10469

RESEARCH ON BEARING LUBRICANTS FOR USE IN A HIGH VACUUM

M. E. Campbell (Midwest Res. Inst.) and H. Hass (Midwest Res. Inst.)

Aug. 1972

M-FS-22119

Work, during the research program, was concentrated on lubricant development, gear lubrication and evaluation, providing coated test specimens, advising NASA contractors about solid lubrication specific applications, and investigation of new method of attaching lubricating solids to bearing surfaces by sputtering technique.

B72-10473

PROCESS FOR SYNTHESIZING AND FORMULATING CONDENSED RING POLYMERS

C. T. Hughes (Avco Corp.) and R. J. McHenry (Avco Corp.)

Aug. 1972 See also NASA-CR-1633

LANGLEY-10423

Chemical process for forming low molecular weight, fully cyclized heteroaromatic prepolymers under conditions which limit chain extension or branching is described. Exact procedures used in conducting chemical reaction are defined. Advantages of process over conventional methods are presented.

B72-10491

FLOATING ZONE PROCESS FOR DRAWING SMALL DIAMETER FIBERS OF REFRACTORY MATERIALS

L. J. Westfall (Little /Arthur D./, Inc.), J. Haggerty, W. P. Menashi (Little /Arthur D./, Inc.), and J. F. Wenckus (Little /Arthur D./, Inc.)

Aug. 1972 See also NASA-CR-72811

LEWIS-11380

New process produces controlled purity, very high strength, single crystal fibers of materials with melting points to 4000 C. Process has been used to make single crystal fibers of highly refractory ceramics such as aluminum oxide, titanium carbide and yttrium oxide.

B72-10493

FUNCTIONALLY TERMINATED LIQUID NITROSO FLUOROCARBON TERPOLYMERS

N. Mayes (Thiokol Chem. Corp.) and A. Marcellis (Thiokol Chem. Corp.)

Aug. 1972

M-FS-21539

Properties of polymer for conformal coating for electronic circuitry are described. Nitroso fluorocarbon polymers were selected for application. Chemical reactions for production of polymers are discussed. Technique allows regulation of crosslink densities, molecular weight, and viscosity.

B72-10503

EQUATIONS TO ASSESS THE IMPACT RESISTANCE OF FIBER COMPOSITES

C. C. Chamis, M. P. Hanson, and T. T. Serafini

Aug. 1972 See also NASA-TM-X-67802; NASA-TN-D-64643

LEWIS-11486

Numerical analysis of impact resistance of composite materials containing fibers is discussed. Mathematical model of longitudinal impact resistance is presented. Potential impact resistance of various fiber composites as obtained by numerical analysis is presented as plotted curve.

B72-10511

IMPROVED METHOD FOR RECLAIMING VACUUM DIFFUSION PUMP OIL

A. E. Buggele and R. K. Lohwater (Bendix Corp.)

Aug. 1972

LEWIS-11647

High vacuum centrifugal molecular distillation system rapidly reclaims contaminated diffusion pump oil in continuous operation and restores it to high level of purity.

B72-10514

ADVANCED ALLOY DESIGN TECHNIQUE: HIGH TEMPERATURE COBALT BASE SUPERALLOY

R. L. Dreshfield, J. C. Freche, and G. D. Sandrock

Aug. 1972 See also NASA-TN-D-6147

LEWIS-10436

Advanced alloy design technique was developed for treating alloys that will have extended life in service at high temperature and intermediate temperatures. Process stabilizes microstructure of the alloy by designing it so that compound identified with embrittlement is eliminated or minimized. Design process is being used to develop both nickel and cobalt-base superalloys.

B72-10515
THERMOCOUPLE TAPE
G. A. Mazaris, Jr. and R. D. Thomas
Dec. 1972 See also N71-31123
LEWIS-11072

Preformed, low cost, thin film thermocouples on adhesive tapes were fabricated. Metal strips of two dissimilar metals were laid on opposite edges of plastic substrate so that they overlap in center portion, forming thermocouple junction. Useful temperature range for polyimide films was 4 to 673 K.

B72-10517
HUMIDITY RESISTANT SOLAR CELL CONTACTS
C. J. Bishop (Boeing Co.)
Aug. 1972
HQ-10674

Gold-platinum solar cell contact is developed which does not exhibit chemical reactivity of titanium or porosity of silver. This contact offers excellent ohmic characteristics and stability in humid air.

B72-10519
SINTERED DIAMOND COMPACTS USING METALLIC COBALT BINDERS
W. F. Libby (Calif. Univ.) and H. Katzman (Calif. Univ.)
Aug. 1972
HQ-10706

Method is developed for sintering diamond powder which uses metallic cobalt as binder. Present samples show maximum microhardness of over 3000 kg/sq mm on Knoop scale. Material may be used as hard surface coating or may compete with cubic boron nitride as abrasive grain.

B72-10529
PREPARATION OF STABLE COLLOIDAL DISPERSIONS IN FLUORINATED LIQUIDS
R. Kaiser (Avco Corp.)
Aug. 1972
HQ-10580

Chemical method for separating oil from water by liquid barrier which can be positioned magnetically is described. Fluorocarbon liquids containing colloidal suspension of magnetite is proposed. Chemical composition of magnetite and fluorinated ether polymer are presented.

B72-10544
AN IMPROVED GAS EXTRACTION FURNACE
R. B. Wilkin (Brown and Root/Northrop)
Sep. 1972
MSC-14138

Design of glass furnace for analysis of rocks to determine nature and amount of trapped gas is described. Furnace heats specimen in vacuum conditions by radio frequency induction. Diagram of apparatus to show construction and operation is provided.

B72-10550
IMMOBILIZED PHOSPHORYLASE FOR SYNTHESIS OF POLYSACCHARIDES FROM GLUCOSE
D. L. Marshall (Battelle Mem. Inst.)
Sep. 1972
ARC-10680

Continuous processes for enzymatic production of carbohydrates from glucose are discussed. Key reactant in process is identified as phosphorylase which catalyzes reversible formation or degradation of polysaccharide. Chemical compounds and reactions to synthesize polysaccharides are analyzed.

B72-10551
PTFE FILMS WITH IMPROVED FLEXIBILITY
R. F. Muraca (Stanford Res. Inst.) and A. A. Koch (Stanford Res. Inst.)
Oct. 1972 See also B72-10552
NPO-12028

Development and application of flexible polytetrafluroethylene films for expulsion bladders in spacecraft propellant tanks are described. Flexibility of material is obtained by reducing crystallinity through annealing and quenching in water. Physical and mechanical properties of material are presented.

B72-10553
NEW TYPE OF TRIFUNCTIONAL ALCOHOL
H. E. Marsh, Jr. and J. J. Hutchison
Sep. 1972
NPO-10714

New type of trifunctional alcohol was synthesized from commercially available trimer acid. Trifunctional alcohol is hydrocarbon with widely separated terminal hydroxyl groups, and was expressly developed as crosslinking agent for preparation of polyurethane propellants, binders and case liners.

B72-10560
SUPPRESSANTS FOR LOWERING PROPELLANT BINDER BURNING RATE
W. W. Thompson (Rocketdyne)
Sep. 1972
ARC-10563

Addition of boron compound to lower burning rate of solid propellant binder is reported. Chemical reactions involved in propellant binder modification are described. Advantages of method for lowering burning rate are analyzed.

B72-10565
ANALYSIS OF MICROSIZE PARTICULATES
M. B. Blanchard, N. H. Farlow, and G. V. Ferry
Sep. 1972 See also AIAA-PAPER-71-1104
ARC-10647

Unique methods for analyzing individual particles ranging in size from 0.01 to 1000 micrometers have been developed for investigation of nature of cosmic dust. Methods are applicable to particulate aerosols and contaminants characteristically encountered in studies of air pollution and in experiments designed to abate pollution.

B72-10566
ASSESSMENT OF WATER POLLUTION BY AIRBORNE MEASUREMENT OF CHLOROPHYLL
J. C. Arvesen, E. C. Weaver, and J. P. Milland
Oct. 1972
ARC-10648

Remote measurement of chlorophyll concentrations to determine extent of water pollution is discussed. Construction and operation of radiometer to provide measurement capability are explained. Diagram of equipment is provided.

B72-10570
OXYGEN PLASMAS USED TO SYNTHESIZE SUPEROXIDES
J. R. Hollahan and T. Wydeven
Sep. 1972
ARC-10686

Production of alkali metal superoxides by interaction of molecular oxygen with alkali metals or their salts is discussed. Diagram of reactor to show components and operating principles is provided. Analysis of chemical reactions involved is developed.

B72-10580
CHEMICAL KINETICS COMPUTER PROGRAM FOR STATIC AND FLOW REACTIONS
D. A. Bittker and V. J. Scullin
Sep. 1972
LEWIS-11467

General chemical kinetics computer program for complex gas mixtures has been developed. Program can be used for any homogeneous reaction in either one dimensional flow or static system. It is flexible, accurate, and easy to use. It can be used for any chemical system for which species thermodynamic data and reaction rate constant data are known.

B72-10583
STUDY OF HOT HARDNESS CHARACTERISTICS OF TOOL STEELS
J. L. Chevalier (Army Air Mobility R and D Lab.), M. W. Dietrich, and E. V. Zaretsky

Sep. 1972 See also NASA-TN-D-6632
LEWIS-11785

Hardness measurements of tool steel materials in electric furnace at elevated temperatures and low oxygen environment are discussed. Development of equation to predict short term hardness as function of intial room temperature hardness of steel is reported. Types of steel involved in the process are identified.

B72-10587
THERMAL CONDUCTIVITY AND ELECTRICAL RESISTIVITY OF POROUS MATERIALS
J. C. Y. Koh (Boeing Co.) and A. Fortini
Oct. 1972 See also NASA-CR-120854
LEWIS-11754

Process for determining thermal conductivity and electrical resistivity of porous materials is described. Characteristics of materials are identified and used in development of mathematical models. Limitations of method are examined.

B72-10592
HIGH STRENGTH HIGH MODULUS CERAMIC FIBER
R. N. Fetterolf (Babcock and Wilcox Co.)
Sep. 1972
M-FS-21266

Low cost method was developed for producing high strength, high modulus, continuous ceramic oxide fibers. Process transforms inexpensive metallic salts into syrup-like liquids that can be fiberized at room temperatures. Resulting salt fibers are then converted to oxides by calcination at relatively low temperatures.

B72-10594
SPARK ULTRASONIC TRANSDUCER
J. M. Hoop
Dec. 1972
M-FS-21233

Nondestructive testing by spark transducer induces ultrasonic pulses in materials without physical contact. High power pulse generator connected to step up transformer produces sparking between two tungsten rods and ultrasonic energy pulses in test samples placed between rods.

B72-10596
INVESTIGATION OF ENVIRONMENTAL EFFECTS ON COATINGS FOR THERMAL CONTROL
N. A. Ashford (IIT Res. Inst.), J. E. Gilligan (IIT Res. Inst.), and G. A. Zerlaut (IIT Res. Inst.)
Dec. 1972
M-FS-21932

Accomplishments made during study of coatings are reported. Development of structure/property theory for selecting most appropriate pigments for space vehicle paints is discussed along with improvements made in zinc-oxide pigmented potassium silicate paint.

B72-10612
FLEXIBLE THERMAL DEVICE
S. D. Wallace (McDonnell-Douglas Corp.) and D. H. Elliott (McDonnell-Douglas Corp.)
Oct. 1972
M-FS-21630

Fabrication of expansion joint, vibration isolator device with sufficient cross sectional area for high thermal conductivity is discussed. Device consists of multiple layers of metal foil which may be designed to meet specific applications. Thermodynamic properties of the device and illustration of construction are provided.

B72-10627
DESIGN CRITERIA MONOGRAPH FOR HIGH-LOAD HIGH-SPEED ROLLING-CONTACT BEARINGS
Innovator not given (Lewis Res. Center) Nov. 1972 See also NASA-SP-8048
LEWIS-11823

Monograph was published which summarizes and systematically orders large body of successful techniques and practices developed for design of liquid rocket engine turbopump bearings. Document was written to organize and present significant experience and knowledge accumulated by NASA in development and operational programs.

B72-10628
POLYIMIDE BONDED GRAPHITE FLUORIDE: A NEW LONG LIFE SOLID LUBRICANT COATING
R. L. Fusaro and H. E. Sliney
Nov. 1972 See also NASA.TN-D-6714
LEWIS-11864

Solid lubricant film consisting of polyimide varnish as binder and graphite fluoride as lubricant is described. Comparative wear tests with other solid lubricants were conducted and results are shown in graph form. Test equipment used in conducting wear tests is reported.

B72-10633
DESIGN CRITERIA MONOGRAPH FOR PRESSURIZED METAL CASES
Innovator not given (Lewis Res. Center) 1972 See also NASA-SP-8025
LEWIS-11835

Organiation and presentation of data pertaining to design of solid propellant rocket engine cases are discussed. Design criteria are presented in form of monograph based on accumulated experience and knowledge. Improvements in reliability, cost effectiveness, and engine efficiency are stressed.

B72-10666
AUTOMATION OF BOSCH REACTION FOR CO2 REDUCTION
R. F. Holmes (Gen. Dyn. Corp.)
Dec. 1972
M-FS-21674

System for collecting excess carbon dioxide in space cabin is described. System collects carbon dioxide exhaled by human inhabitants and decomposes gas into carbon and water by reaction with hydrogen in presence of catalyst. Diagram of equipment involved in reaction is included.

B72-10684
TUNGSTEN-REINFORCED TANTALUM
R. J. Bacigalupi and R. Breitwieser
Dec. 1972
LEWIS-11750

Method is described for producing tungsten-reinforced tantalum, a material possessing the high temperature strength of tungsten and room temperature ductility and weldability of tantalum. This material is produced by bonding together and overlaying structure of tungsten wires with chemical vapor deposited tantalum.

B72-10709
ULTRAVIOLET AND THERMALLY STABLE POLYMER COMPOSITIONS
M. J. Adamson, H. R. Gloria, R. E. Goldsberry, and R. F. Reinisch
Dec. 1972
ARC-10592

Copolymers produced from aromatic substituted aromatic azine-siloxane compositions are thermally stable, solar ultraviolet light non-degradable by wavelengths shorter than those reaching earth surface.

B72-10710
REVERSE-OSMOSIS MEMBRANES BY PLASMA POLYMERIZATION
J. R. Hollahan and T. Wydeven
Dec. 1972
ARC-10696

Thin allyl amine polymer films were developed using plasma polymerization. Resulting dry composite membranes effectively reject sodium chloride during reverse osmosis. Films are 98% sodium chloride rejective, and 46% urea rejective.

B72-10711
IMPROVED ZINC OXIDE THERMAL CONTROL COATINGS
T. Freund (Stanford Res. Inst.) and S. R. Morrison (Stanford Res. Inst.)
Dec. 1972
NPO-11139

Ferricyanide/ferrocyanide couple prevents zinc oxide pigment degradation in thermal control coatings. Chemical couple retards physical optical property changes.

B72-10717
IMPROVED TRANSMITTANCE MEASUREMENT WITH A MAGNESIUM OXIDE COATED INTEGRATING SPHERE
R. L. Bowman and E. W. Spisz
Dec. 1972 See also NASA-TM-X-2395
LEWIS-11840

Simple and convenient technique has been found for extending transmittance measurement capability of conventional magnesium oxide coated integrating sphere system at low (near ultraviolet) wavelengths. Technique can be used to determine effect of contaminants on window materials and can also be used for measurements on thermal control coatings and telescope mirrors.

B72-10725
HIGH FIELD CdS DETECTOR FOR INFRARED RADIATION
R. C. Tyagi (Natl. Res. Council), K. W. Boer (Del. Univ.), H. C. Hadley (Del. Univ.), and J. B. Robertson
Dec. 1972
LANGLEY-11027

New and highly sensitive method of detecting infrared irradiation makes possible solid state infrared detector which is more sensitive near room temperature than usual photoconductive low band gap semiconductor devices. Reconfiguration of high field domains in cadmium sulphide crystals provides basis for discovery.

B72-10728
LOW-VOID POLYIMIDE RESINS FOR AUTOCLAVE PROCESSING
R. J. Jones (TRW Systems) and R. W. Vaughan (TRW Systems)
Dec. 1972 See also B69-10118; B70-10300; B70-10330; B70-10504; B71-10442; B72-10175; NASA-CR-72984
LEWIS-11665

Development of an advanced A-type polyimide, which can be used to produce autoclave molded, low-void content composites suitable for use at temperatures up to 316 C is reported. It consists of a mixture of methyl nadic anhydride, an 80:20 molar ratio of methylene dianaline and thiodianilene, and pyromellitic dianhydride.

B72-10740
BORON-10 LOADED INORGANIC SHIELDING MATERIAL
S. I. Baker (IIT Res. Inst.) and R. S. Ryskiewicz (IIT Res. Inst.)
Dec. 1972
M-FS-22280

Shielding material containing Boron 10 and gadolinium for neutron absorption has been developed to reduce interference from low energy neutrons in measurement of fission neutron spectrum using Li-6 fast neutron spectrometer.

B72-10742
HEAT TRANSFER CORRELATIONS FOR KEROSENE FUELS AND MIXTURES AND PHYSICAL PROPERTIES FOR JET A FUEL
G. H. Ackerman (Shell Oil Co.) and L. E. Faith (Shell Oil Co.)
Dec. 1972 See also LEWIS-11653; NASA-CR-72951
LEWIS-11652

Heat transfer correlations are reported for conventional Jet A fuel for both laminar and turbulent flow in circular tubes. Correlations were developed for cooling in turbine engines, but have broader applications in petroleum and chemical processing, and other industrial applications.

B72-10746
A STABLE LIQUID CRYSTAL FOR ELECTRO-OPTICAL DISPLAYS
M. M. Lakes (Temple Univ.)
Dec. 1972
HQ-10714

Method is reported for substitution of hydroxy (OH) group ortho to anil linkage to stabilize anil-type liquid crystal for use in electro-optical devices.

B73-10002
GETTERING CAPSULE FOR REMOVING OXYGEN FROM LIQUID LITHIUM SYSTEMS
L. K. Tower and R. Breitwieser
Mar. 1973
LEWIS-11509

Capsule consisting of tantalum shell lined with tantalum screen and partially filled with lithium and pieces of yttrium is immersed in hot lithium stream. Oxygen is removed from stream by being absorbed by gettering capsule. Oxygen passes through capsule wall and into lithium inside capsule where it reacts with yttrium to form Y_2O_3.

B73-10007
FIBER COMPOSITE MATERIALS: A SURVEY OF FIBER MATRIX INTERFACE MECHANICS
C. C. Chamis
Mar. 1973 See also NASA-TN-D-6588
LEWIS-11924

Report is described which discusses mechanism of load transfer from matrix to fiber through interface and effects of interface on composite structural integrity. Theoretical considerations are supplemented with experimental data. General trends and significant points are illustrated graphically.

B73-10014
TECHNIQUE FOR THE POLYMERIZATION OF MONOMERS FOR PPQ/GRAPHITE FIBER COMPOSITES
T. T. Serafini, P. Delvigs, and R. D. Vannucci
Mar. 1973 See also B71-10442
LEWIS-11879

Impregnation of fiber prior to appreciable polymerization completely eliminates impregnation problems encountered with use of high viscosity high molecular weight polyphenylquinoxalines (PPQ) solutions. Major part of polymerization of reactant mixture is conducted on fiber during solvent removal and final curing stages.

B73-10019
RUBBER COMPOSITION COMPATIBLE WITH HYDRAZINE
J. Repar (Accessory Products Co.)
Jan. 1973
NPO-11440

Formulation improves compatibility of butyl rubbers with hydrazine while reducing permeation to low levels necessary for prolonged storage in space. This is accomplished by replacing carbon-black filler with inert materials such as hydrated silica or clay. Pressure increases suggest that hydrazine is decomposed only slightly by new type of rubber.

B73-10020
EVALUATION OF THERMAL INSULATION MATERIALS
O. J. Wilbers (McDonnell Douglas Corp.), J. C. Conti (McDonnell Douglas Corp.), J. V. McGee (McDonnell Douglas Corp.), and J. I. McPherson (McDonnell Douglas Corp.)
Jan. 1973 See Also NASA-CR-109612
NPO-11586

Data was obtained on silicone-bonded fiberglass, isocyanurate foam, and two dozen other insulators. Materials were selected to withstand heat sterilization, outer space, and the Martian atmosphere. Significant environmental parameters were vibration, landing shock, and launch venting.

B73-10021
INCREASING THE SENSITIVITY OF THE JAFFE REACTION FOR CREATININE
H. Y. Tom
Jan. 1973
NPO-11587

Study of analytical procedure has revealed that linearity of creatinine calibration curve can be extended by using 0.03 molar

picric acid solution made up in 70 percent ethanol instead of water. Three to five times more creatinine concentration can be encompassed within linear portion of calibration curve.

B73-10022
METHOD FOR ESTIMATING SOLUBILITY PARAMETER
D. D. Lawson and J. D. Ingham
Jan. 1973
NPO-11647

Semiempirical correlations have been developed between solubility parameters and refractive indices for series of model hydrocarbon compounds and organic polymers. Measurement of intermolecular forces is useful for assessment of material compatibility, glass-transition temperature, and transport properties.

B73-10024
STABLE PALLADIUM ALLOYS FOR DIFFUSION OF HYDROGEN
M. Patapoff
Jan. 1973
NPO-11747

Literature search on hydrogen absorption effect on palladium alloys revealed existence of alloy compositions in which alpha beta transition does not take place. Survey conclusions: 40% gold alloy of palladium should be used in place of palladium; alloy must be free of interstitial impurities; and metallic surfaces of tube must be clean.

B73-10030
AUTOMATED METHOD FOR STUDY OF DRUG METABOLISM
R. L. Furner and D. D. Feller
Feb. 1973
ARC-10469

Commercially available equipment can be modified to provide automated system for assaying drug metabolism by continuous flow-through. System includes steps and devices for mixing drug with enzyme and cofactor in the presence of pure oxygen, dialyzing resulting metabolite against buffer, and determining amount of metabolite by colorimetric method.

B73-10036
GLASS TRANSITION TEMPERATURES OF LIQUID PREPOLYMERS OBTAINED BY THERMAL PENETROMETRY
J. E. Potts, Jr. (Union Carbide Corp.) and A. C. Ashcraft (Union Carbide Corp.)
Feb. 1973
NPO-11730

Thermal penetrometry is experimental technique for detecting temperature at which frozen prepolymer becomes soft enough to be pierced by weighted penetrometer needle; temperature at which this occurs is called penetration temperature. Apparatus used to obtain penetration temperatures can be set up largely from standard parts.

B73-10037
TLC DETERMINATION OF FUNCTIONALITY IN PREPOLYMERS
J. E. Potts, Jr. (Union Carbide Corp.) and A. C. Ashcraft (Union Carbide Corp.)
Feb. 1973
NPO-11731

Application of thin-layer chromatographics provides rapid qualitative determination of functional distribution in experimental prepolymer. Functionality distribution is of fundamental importance for it determines; (1) manner in which given carboxyl-terminated prepolymer will cure and (2) physical properties of resulting product.

B73-10039
AN INEXPENSIVE AND EFFECTIVE METHOD FOR CALCULATING THE STRENGTH OF RANDOMLY REINFORCED FIBER COMPOSITES
C. C. Chamis
Mar. 1973 See also NASA-TN-D-6696
LEWIS-11985

Planar randomly reinforced fiber composites (PRRFC) is pseudoisotropic laminate with large number of ply orientation combinations where strength is function of these ply orientation combinations. Laminate theory can be applied to determine strength of PRRFC, and in conjunction with composite micro- and macromechanics can predict mechanical properties of PRRFC's with any fiber/matrix combination.

B73-10044
A SPIRALED NIOBIUM TIN SUPERCONDUCTIVE RIBBON
W. D. Coles
Feb. 1973 See also NASA-TM-X-68124
LEWIS-11726

Copper film is vapor-deposited on clean ribbon and sprayed with photosensitive etch-resistant material. Photographic film masks are placed on ribbon and exposed to ultraviolet light. Etchant removes copper and exposure to oxidizing atmosphere forms niobium oxide. Photosensitive material is removed and ribbon is immersed in molten temperatures.

B73-10056
VAPOR PHASE GROWTH OF GROUP 3, 4, AND 5 COMPOUNDS BY HCl TRANSPORT OF ELEMENTS
R. C. Tyagi (NCR Res. Associate), W. J. Debnam, Jr., M. F. McNear, R. K. Crouch, and R. A. Breckenridge
Feb. 1973
LANGLEY-11144

Technique has been devised for vapor-phase epitaxial growth of group 3, 4, and 5 binary, ternary, or quaternary compounds by HCl transport of the constituent elements or dopants. Technique uses all the constituents of the alloy system in their elemental form. Transport of these elements by an HCl + H2 carrier gas facilitates their transport as subchlorides.

B73-10060
VACUUM-STRIPPED SILICONE BINDER FOR THERMAL-CONTROL PAINT
J. E. Gilligan (IIT Res. Inst.) and F. O. Rogers (IIT Res. Inst.)

Feb. 1973
M-FS-21397

Silicone elastomer is placed in evacuating system, heated to 160 C and held at this temperature for 24 hours. Elastomer is then cooled to room temperature in vacuum, producing upgraded, low outgassing polymer of increased molecular weight.

B73-10062
LUBRICATION HANDBOOK
M. E. Campbell and M. B. Thompson
Feb. 1973
M-FS-22326

Information on lubricants from government reports, military specifications, qualified parts lists, and suppliers of commercial lubricants has been consolidated in one source. Handbook includes data on chemical and physical properties of solid, bonded solid, and liquid lubricants; dispersions and composites; and greases, oils, and hydraulic fluids.

B73-10063
RESIDUAL STRESS EFFECTS ON THE IMPACT RESISTANCE AND STRENGTH OF FIBER COMPOSITES
C. C. Chamis
Apr. 1973 See also NASA-TM-X-52881; NASA-TN-D-6146; NASA-TN-D-6464
LEWIS-11984

Equations have been derived to predict degradation effects of microresidual stresses on impact resistance of unidirectional fiber composites. Equations also predict lamination residual stresses in multilayered angle ply composites.

B73-10068
METAL-METAL REINFORCED LAMINAR COMPOSITES
J. W. Weeton and C. A. Hoffman
Feb. 1973

LEWIS-11790

Two prototype laminar composites have shown potential for high strength and high temperature applications. These composites might be made with less in-place anisotropy and be less expensive than comparable fiber composites.

B73-10069
PRODUCTION OF CIRCULAR POLYMER-GLASS FABRIC COMPOSITES
E. E. Hardesty (Goldsworthy Engineering, Inc.)
Feb. 1973
M-FS-22125

Potentially automated pultrusion technique has been provided for production of curved, glass-reinforced polyimide, epoxy, and graphite reinforced structures. Specially designed apparatus has been manufactured for production of curved structures.

B73-10071
SEMI-ORGANIC STRUCTURAL ADHESIVE FOR ALUMINUM
S. C. Kwan (Monsanto Corp.), M. T. Lehman (Monsanto Corp.), E. A. McElhill (Monsanto Corp.), J. J. OConnell (Monsanto Corp.), R. C. Steeves (Monsanto Corp.), and G. Tsigdinos (Monsanto Corp.)
Feb. 1973
M-FS-21328

Structural adhesive consists of titanium chelate polymer, reactive plasticizer, and cure accelerator (phenylsilanetriol). Mixture polymerizes in situ in 65 hours at 170 C.

B73-10077
OXIDATION RESISTANT, THORIA-DISPERSED NICKEL-CHROMIUM-ALUMINUM ALLOY
S. Baranow (Fansteel, Inc.) and L. J. Klingler (Fansteel, Inc.)
Mar. 1973 See also NASA-CR-120796
LEWIS-11541

Modified thoria-dispersed nickel-chromium alloy has been developed that exhibits greatly improved resistance to high-temperature oxidation. Additions of aluminum have been made to change nature of protective oxide scale entirely and to essentially inhibit oxidation at temperatures up to 1260 C.

B73-10079
FATIGUE OF BORON-ALUMINUM COMPOSITES BONDS AND JOINTS
M. S. Hersh (Gen. Dynamics Corp.)
Mar. 1973
M-FS-22325

Study examines effects of boron filament diameter on bonds and joints in boron-aluminum composite. Data include static strength, fatigue, and dynamic moduli of elasticity. Manson-Coffin analyses and metallurgical and fracture surface evaluation were also performed.

B73-10080
A NEW INTERMEDIATE FOR THE PRODUCTION OF FLEXIBLE STABLE POLYMERS
J. A. Webster (Monsanto Corp.)
Mar. 1973
M-FS-22355

Method of incorporating ether linkages into perfluoroalkylene segment of a dianydride intermediate yields intermediate that may be used in synthesis of flexible, stable polyimides for use as high-temperature, solvent-resistant sealants.

B73-10081
METALLIC COMPOSITES AS HIGH-TEMPERATURE FASTENERS
F. D. George (United Aircraft Corp.)
Mar. 1973
M-FS-22438

Metallic composities can be fabricated in one-step process in which mixture is directionally solidified. Phase-reinforced eutectic alloys have superior high-temperature mechanical properties.

B73-10084
PREPARATION OF PREPREG GRAPHITE TAPE WITH INSOLUBLE POLYMER
C. I. Yates (Rockwell Intern. Corp.)
Mar. 1973 See also NASA-CR-115713
JSC-14313

Powdered polymer is finely ground. Second polymer, soluble, is mixed with appropriate solvent. Milled polymer and graphite filaments are added to soluble polymer-solvent solution to create slurry. Slurry is dried, and when ready for processing, the soluble, binder-polymer is removed by heat during precure or cure cycle.

B73-10085
FIRE RETARDANT CELLULOSIC FOAM
M. Luttinger (Battelle Mem. Inst.)
Mar. 1973
JSC-14336

Method mixture of cyanamide, phosphoric acid, and monobasic ammonium phosphates for preliminary treatment of paper. Papier-mache, in second step, is pulped in water and latex is added. Urea formaldehyde solution mixed to maximize foaming and resin dispersion is added. Mixture is then cast within 30 to 60 seconds and dried twice.

B73-10090
SELF-STERILIZING POLYMERS
J. J. Tulis (Becton, Dickinson and Co.), D. J. Daley (Becton, Dickinson and Co.), and G. B. Phillips (Becton, Dickinson and Co.)
Feb. 1973
M-FS-22054

Addition of approximately 1% paraformaldehyde to room-temperature-vulcanizing potting polymer results in effective, controllable germicide. When heated above ambient temperatures, paraformaldehyde releases dry formaldehyde, which can penetrate enclosed areas and packages, will not damage material, and leaves no permanent residue.

B73-10102
NONFLAMMABLE POTTING-ENCAPSULATING AND CONFORMAL COATING COMPOUNDS
S. L. Lieberman (Furane Plastics, Inc.)
Mar. 1973 See also NASA-CR-115364
JSC-14164; JSC-14166

Two fluorosilicone rubber formulations have been produced which are nonflammable or self-extinguishing. Extensive report was prepared which includes information on testing and describes many alternate formulations.

B73-10103
OXYGEN SENSITIVE PAPER
J. F. Whidby (GE)
Mar. 1973
M-FS-22354

Paper is impregnated with mixture of methylene blue and ethylenediaminetetraacetic acid. Methylene blue is photo-reduced to leuco-form. Paper is kept isolated from oxygen until ready for use. Paper can be reused by photo-reduction after oxygen exposure.

B73-10108
HOLOGRAPHIC NONDESTRUCTIVE TESTING OF LAMINATES
F. H. Stuckenberg (Rockwell Intern. Corp.)
May 1973
JSC-19107

Very small differences in laminate thickness result in interference fringes in holograph image. These indicate presence of unbonded area. Theoretical knowledge of membrane deflection may be used in conjunction with reduced number of pretest experiments to determine number of optical fringes that should appear for given laminate.

B73-10113
AUTOIGNITION TEST CELL WITH FLEXIBLE ATMOSPHERE CONTROL
D. Evans, C. L. Springfield, and C. Bryan (Southern Res. Inst.)

Jun. 1973
KSC-10198

Spontaneous combustion temperatures are usually found by simply beating material until it bursts into flames. Test cell allows control of test atmosphere and composition. Reusable device permits periodic sampling of decomposition products in test atmosphere. With modifications, cell could be used to determine melting points and reactivites of wide variety of substances.

B73-10121
LIGHTWEIGHT GRAPHITE/POLYIMIDE PANELS
J. G. Poesch (Hercules, Inc.) and J. B. Merlette (Hercules, Inc.)
May 1973 See also NASA-CR-115421; NASA-CR-115637; NASA-CR-128610
JSC-14375

Panels are constructed of honeycombed polyimide/graphite core covered with thin face sheet of same material. Fabrication is based on extension of thin-gage graphite technology and modification of glass filament polyimide honeycomb techniques.

B73-10142
DESIGN AND MATERIAL SELECTION FOR INVERTER TRANSFORMER CORES
W. T. McLyman
Mar. 1973
NPO-11726

Report is announced which studied magnetic properties of candidate materials for use in spacecraft transformers, static inverters, converters, and transformer-rectifier power supplies. Included are material characteristics for available alloy compositions in tabular form, including: trade names, saturated flux density, dc coercive force, loop squareness, material density, and watts per pound at 3 KHz.

B73-10147
CALIBRATION OF DISSOLVED OXYGEN STANDARD FOR ANALYSIS WITH METHYLENE BLUE
J. F. Whidby (GE)
May 1973
M-FS-22353

Accurate standard solutions of oxygen can be prepared with this apparatus. Sample may be used as a dissolved oxygen standard with methylene blue or with other techniques such as gas chromatography.

B73-10148
A NEW CONCEPT FOR JOINING DISSIMILAR COMPOSITES
K. C. Dullea (Rockwell Intern. Corp.) and J. A. Evangelista (Rockwell Intern. Corp.)
May 1973
M-FS-24307

Bi-composite joint serves as interface between two dissimilar materials by interleaving plies of one composite with plies of another. This interleaving forms transition area between composites. Voids are filled in with epoxy resin to form strong, smooth transition between two materials.

B73-10149
AN IMPROVED TECHNIQUE FOR THE USE OF ZINC-RICH COATINGS
W. J. Paton
May 1973
KSC-10766

Blistering and peeling of topcoats used over ethyl silicate, inorganic, zinc-rich protective coatings are virtually eliminated when primer is allowed to cure outdoors for extended period of time and is moistened during process.

B73-10151
ION-TRACER ANEMOMETER
R. L. Bass (Southwest Res. Inst.), T. E. Owen (Southwest Res. Inst.), C. R. Gerlach (Southwest Res. Inst.), and S. A. Suhler (Southwest Res. Inst.)
Mar. 1973
M-FS-21399

Gas velocity measuring instrument measures transport time of ion-trace traveling fixed distance between ionization probe and detector probe. Electric field superimposes drift velocity onto flow velocity so travel times can be reduced to minimize ion diffusion effects.

B73-10153
THIN FILM THERMOELECTRIC DEVICES AS THERMAL CONTROL COATINGS: A STUDY
J. M. Clemons and A. C. Krupnick
May 1973 See also NASA-TM-X-64570
M-FS-21384

Peltier effect, Thomson effect, and Seeback effect are utilized in design of thermal control coating that serves as versatile means for controlling heat absorbed and radiated by surface. Coatings may be useful in extreme temperature environment enclosures or as heat shields.

B73-10168
HYDROGEN-ENVIRONMENT EMBRITTLEMENT OF METALS: A STUDY
W. T. Chandler (Rockwell Intern. Corp.), R. P. Frohmber (Rockwell Intern. Corp.), R. P. Lewett (Rockwell Intern. Corp.), W. B. McPherson (Rockwell Intern. Corp.), and R. J. Walter (Rockwell Intern. Corp.)
Jun. 1973
M-FS-22540

Study includes extensive tests examining effects of hydrogen environment on different high-strength metals and alloys. Recommendations for preventing metal failure include use of hydrogen-resistant coatings and inhibitors. Study includes references to related investigations and discussion of work in progress.

B73-10172
AUTOCLAVE HEAT TREATMENT FOR PREALLOYED POWDER PRODUCTS
J. C. Freche and R. L. Ashbrook
May 1973 See also NASA TN-D-7117
LEWIS-11953

Technique could be applied directly to loose powders as part of hot pressing process of forming them to any required shapes. This would eliminate initial extrusion step commonly applied to prealloyed powders, substantially reduce cost of forming operation, and result in optimum properties.

B73-10180
NEW EXPLOSIVE SEAM WELDING CONCEPTS
L. J. Bement
Jun. 1973 See also B72-10002
LANGLEY-11211

Recently developed techniques provide totally-confined linear explosive seam welding and produce scarf joint with linear explosive seam welding. Linear ribbon explosives are utilized in making narrow, continuous, airtight joints in variety of aluminum alloys, titanium, copper, brass, and stainless steel.

B73-10187
HANDBOOK ON THERMOPHYSICAL PROPERTIES OF OXYGEN
H. M. Roder (NBS), L. A. Weber (NBS), P. M. Ordin, and G. Mandel
Jun. 1973 See also NASA-SP-3071; NASA-SP-3072
LEWIS-11962

Handbook has been compiled by Cryogenic Data Center of National Bureau of Standards. It covers thermodynamic functions, physical properties, and heat transfer data for oxygen. Handbook addresses primarily low temperature regime, but also includes some data above room temperature.

B73-10188
HANDBOOK OF CLEANING REQUIREMENTS, PROCEDURES, AND VERIFICATION TECHNIQUES FOR OXYGEN SYSTEMS
H. Bankaitis and C. F. Schueller
Jun. 1973 See also NASA-SP-3071; NASA-SP-3072
LEWIS-11963

Oxygen system cleaning specifications have been drawn from

twenty-three government and industrial sources. Cleaning processes for meeting these specifications and recommended postcleaning inspection procedures are compiled in handbook. Microfiche supplement of pertinent pages of listed references is included.

B73-10194
REDUCTIVE CLEAVAGE OF THE PEPTIDE BOND
J. Holian and W. M. Garrison
Jun. 1973
LRL-10026

In many biological research efforts, long chain organic molecules are studied by breaking large molecules into smaller components. Cleavage technique of recent interest is the use of solvated electrons. These are formed when aqueous solutions are bombarded with gamma radiation. Solvated electron is very reactive and can reduce most any species present, even to form free radicals.

B73-10208
THERMALLY RESPONSIVE MECHANICAL ACTUATOR
J. M. Madey
Aug. 1973
GSFC-11697

Device built for use in heat control, heat measurement, and mechanical actuation by heat include thermometers, thermostats, safety switches, circuit breakers, and mechanical actuators. Silicon rubber has highest coefficient of expansion of any known material and seems suitable for most of these devices.

B73-10213
EFFECTS OF ENVIRONMENTAL EXPOSURE ON CRYOGENIC THERMAL INSULATION MATERIALS
R.T. Parmley (Lockheed Missiles & Space Co.), F. J. Smith (Lockheed Missiles & Space Co.), A. P. Glassford (Lockheed Missiles & Space Co.), J. Coleman (Lockheed Missiles & Space Co.), and D. R. Stevenson (Lockheed Missiles & Space Co.)

Nov. 1973 See also NASA-CR-120978; NASA-CR-120979
LEWIS-12007

Investigation was made to optimize selection of insulation materials for reusable space vehicles which will be repeatedly operated over periods of up to ten years. Results of study are summarized in two reports. Volume I describes tests and significant findings. In Volume II, extensive test data obtained are organized in handbook form.

B73-10215
REFRACTORY PORCELAIN ENAMEL PASSIVE-THERMAL-CONTROL COATING FOR HIGH-TEMPERATURE SUPERALLOYS
H. Levin (Hughes Aircraft Co.), B. H. Auker (Hughes Aircraft Co.), and M. N. Gardos (Hughes Aircraft Co.)
Aug. 1973
M-FS-22324

Study was conducted to match thermal expansion coefficients thereby preventing enamels from cracking. Report discusses various enamel coatings that are applied to two different high-temperature superalloys. Study may be of interest to manufacturers of chemical equipment, furnaces, and metal components intended for high-temperature applications.

B73-10224
CHEMICAL PRETREATMENT FOR THE DISTILLATION OF URINE
T. L. Hurley (Chemtric Inc.)
Aug. 1973 See also NASA-CR-128878
JSC-14225

Pretreatment of urine prevents micro-organism growth in boiler and kills micro-organisms in condenser. Chemicals also clean evaporation surface, fix ammonia in boiling chamber, and suppress foaming.

B73-10228
FORMALDEHYDE MONITOR FOR AUTOMOBILE EXHAUSTS
W. C. Easley
Aug. 1973
LANGLEY-11352

Device makes use of microwave spectral absorption in low-Q resonant Stark cell, and indications are that ultimate sensitivity of instrument is within 100 parts per billion of formaldehyde. Microwave source is very small and requires only six-volt dc bias for operation. Coarse tuning is accomplished mechanically and fine tuning by adjusting dc-bias voltage.

B73-10238
APPLYING HIGH-EMITTANCE AND SOLAR-ABSORPTANCE COATING TO ALUMINUM
D. J. Progar
Aug. 1973
LANGLEY-10151

Coated surface withstands space environment with negilgible change in radiation characteristics and physical properties. Process can be used with any porous substance, as long as pores are large enough to allow molecules of reacting solutions to enter and yet not so large as to allow nickel sulfide to be leached out of pores before sealing.

B73-10253
AUTOMATIC DEVICE FOR SHELL FREEZING OF LIQUIDS
B. Kelbaugh, C. Owen, and G. L. Picciolo
Oct. 1973
GSFC-11737

Unit is insulated enclosure designed to contain liquid nitrogen. It also includes set of stainless steel rotating rods for holding vessels containing liquids to be frozen, and electric drive mechanism for rotating these rods. Present device will accept 10 vessels at a time.

B73-10254
GRAPHITE/POLYIMIDE LAMINATES WITH NEAR-ZERO THERMAL EXPANSION
W. N. Reynolds (Rockwell Intern. Corp.) and A. H. Striepens (Rockwell Intern. Corp.)
Aug. 1973
JSC-17662; JSC-17928

Composite structures can be laminated to have very low coefficients of thermal expansion. Such structures are light and strong and have many uses where expansion or contraction with temperature change is undesirable. One application is with instruments that measure thermal expansion.

B73-10260
ZETA POTENTIAL CONTROL FOR ELECTROPHORESIS CELLS
G. L. Fogal (GE)
Aug. 1973
M-FS-22333

Zeta potential arises from fact that ions tend to be adsorbed on surface of cell walls. This potential interfaces with electric field sensed by migrating particles and degrades resolution of separation. By regulating sign and magnitude of applied potential induced charge can be used to increase or decrease effective wall zeta potential.

B73-10269
FABRICATION TECHNIQUES FOR POLYBENZIMIDAZOLE COMPOSITES
J. A. Parker, E. L. Winkler, D. Kourtides, and B. S. Marks (Lockheed Missiles & Space Co.)
Jul. 1973 See also NASA-CR-1723
ARC-10724

Performance of polybenzimidazole composites as ablation shields can be substantially improved by thermal crosslinking. Program was designed to develop new processing methods and techniques for fabrication of polybenzimidazole composites. Report, which describes fabrication in detail, also includes specification and manufacturing standards.

B73-10271
'DRY-COLUMN' CHROMATOGRAPHY OF PLANT PIGMENTS

F. H. Woeller, M. F. Lehwalt, and V. I. Oyama
Jul. 1973
ARC-10780

Separation of plant pigments which can be accomplished on thin-layer silica plates with mixture of petroleum ether, halocarbon, acetone, and polar solvent can be readily translated into dry-column technique that yields reproducible chromatograms after elution in fashion of liquid chromatography with fluorimeter as detector. Best solvent system was found to be mixture of petroleum ether, dichloromethane, acetone, and ethyl acetate.

B73-10310
LIQUID AND GASEOUS OXYGEN SAFETY REVIEW
A. Lapin (Air Products & Chemicals, Inc.)
Dec. 1973 See also NASA-CR-120922; SP-3071; SP-3072
LEWIS-12041

Materials used in oxygen systems and allowable oxygen environments are specified for each material. Design criteria, cleaning procedures and quality control methods are covered. Guidelines for protection against hazards involved with production, transportation, storage and use of oxygen are presented. Study also lists extensive references.

B73-10314
CREEP-FATIGUE ANALYSIS BY STRAINRANGE PARTITIONING
S. S. Manson, G. R. Halford, and M. H. Hirschbere
Dec. 1973 See also NASA-TM-X-67838; NASA-TM-X-68023; NASA-TM-X-68171
LEWIS-12072

Strainrange Partitioning provides unifying framework for characterizing high-temperature, low-cycle, creep-fatigue properties of metals and alloys. Method offers distinct advantage to designers of immediately providing reliable upper and lower bounds on cyclic life for any type of inelastic strain cycle that may be encountered in service.

B73-10315
RESISTANCE SPOT WELDING OF DISPERSION-STRENGTHENED NICKEL ALLOYS
T. J. Moore
Dec. 1973 See also NASA-TN-D-7256
LEWIS-12075

To develop easily-applied production method for resistance spot welding use unrecrystallized sheet material, develop welding schedule that will produce a solid-state spot weld without recrystallizing sheet, and postheat to produce grain growth across weld line during recrystallization of sheet material.

B73-10316
SINGLE CRYSTAL TUBES OF BETA ALUMINA
R. W. Stormont (Tyco Lab., Inc.), F. H. Cocks (Tyco Lab., Inc.), and J. D. Giner (Tyco Lab., Inc.)
Dec. 1973 See also NASA-CR-121033
LEWIS-11844

Edge-defined, film-fed growth process allows both tubular shapes and single crystallinity to be achieved. Beta alumina in single crystal form makes possible membranes with improved conductivities. Single crystal membranes also eliminate problems associated with electrical short circuiting of membrane due to possible sodium metal diffusion.

B73-10319
PREPARING THERMOPLASTIC AROMATIC POLYIMIDES
V. L. Bell
Sep. 1973
LANGLEY-11372

Method prepares aromatic polyimides with significantly reduced glass-transition temperatures and without accompanying loss of high-level thermo-oxidative stability which has been typical. This has been made possible by use of diamine monomers with specific stereoisomeric features.

B73-10328
ELECTROPHORESIS SEPARATOR COMBINING CENTRIFUGAL SEPARATION
H. W. Semon (GE)
Oct. 1973
M-FS-21396

Centrifugal force causes buffer, chosen to be denser than particles, to move outward and particles to move inward. Electrophones force can be made to equal centrifugal force. System tends not to be affected by convection and other disturbances that are so troublesome in conventional electrophoresis systems.

B73-10338
IMPROVED MOLD RELEASE FOR FILLED-SILICONE COMPOUNDS
O. E. Accountius (Rockwell Intern. Corp.)
Sep. 1973
JSC-19300

Ceramic and filled-plastic materials used for fabrication of tiles are relatively brittle and easily break as they are being removed from molds. Dusting mold surfaces with commercially available glass microspheres provides mold release superior to existing spray releases. Glass-microsphere dusting also permits removal of uncured tile which has very little strength.

B73-10339
DYNAMIC TECHNIQUE FOR MEASURING ADSORPTION IN A GAS CHROMATOGRAPH
C. L. Deuel (Analytical Res. Labs. Inc.), N. W. Hultgren (Analytical Res. Labs. Inc.), and M. L. Mobert (Analytical Res. Labs. Inc.)
Oct. 1973 See also NASA-CR-115202
JSC-14083

Gas-chromatographic procedure, together with mathematical analysis of adsorption isotherm, allows relative surface areas and adsorptive powers for trace concentrations to be determined in a few minutes. Technique may be used to evaluate relative surface areas of different adsorbates, expressed as volume of adsorbent/gram of adsorbate, and to evaluate their relative adsorptive power.

B73-10341
TRANSPARENT POLYMERIC LAMINATES
J. A. Parker, G. M. Fohlen, and P. M. Sawko
Aug. 1973
ARC-10783

Laminate prepared from epoxy-boroxine and phenolphthalein polycarbonate has high mechanical strength at elevated temperature and is resistant to impact, fire, and high-energy thermal radiation. Polycarbonate is prepared by reaction of phenolphthalein with phosgene in presence of amine catalyst and immiscible organic solvent phase.

B73-10349
LOW-RESISTIVITY HOMOGENEOUS ELASTOMERS
R. B. Somoano, Si.-P. S. Yen, and A. Rembaum
Aug. 1973
NPO-11881

Mixture of polyurethane polyelectrolyte and soluble, conducting organic compound produces homogeneous elastomer which has resistivity several orders of magnitude less than polyelectrolyte alone. Elastomeric material has novel resistivity dependence on temperature, that is, resistivity changes dramatically over narrow temperature range in vicinity of glass transition temperature.

B73-10357
PARTICULATE AND AEROSOL DETECTOR
W. H. Kinard, R. L. O'Neal, J. J. Wortman (Res. Triangle Inst.), R. P. Donovan (Res. Triangle Inst.), A. D. Brooks (Res. Triangle Inst.), and L. K. Monteith (Res. Triangle Inst.)
Oct. 1973
LANGLEY-11434

Particulate detector which monitors emissions from solid propellant fuels can monitor air quality. High signal-to-noise ratio detector can count aerosols and particles efficiently. Detector can distinguish one particle from another with respect to both time and energy of impact. Detector consists of accelerator, capacitor sensor, and readout recording equipment.

B73-10371
THREE-DIMENSIONAL GAS TURBULENCE MEASUREMENT WITH A LASER-DOPPLER VELOCIMETER SYSTEM
C. E. Fuller (Remtech, Inc.)

Oct. 1973
M-FS-22713

Laser-Doppler system records gas-velocity data over wide dynamic range in three-dimensional space without physical probe. System detects shift in laser beam scattered by flowing particles and uses this frequency to calculate particle velocities. Technique is based on principle that laser beam scattered by flowing particles is shifted in frequency by amount proportional to laser frequency.

B73-10372
MATERIALS DATA HANDBOOK ON TITANIUM 6Al-4V
R. F. Muraca (Western Appl. Res. and Develop., Inc.) and J. S. Whittick (Western Appl. Res. and Develop., Inc.)
Oct. 1973
M-FS-22796

Handbook has been prepared which describes latest property information on titanium 6Al-4V. Scope of information presented includes physical- and mechanical-property data at cryogenic, ambient, and elevated temperatures, supplemented with useful information in such areas as material procurement,metallurgy of alloy, corrosion, environmental effects, fabrication, and joining technology.

B73-10373
MATERIALS DATA HANDBOOKS ON ALUMINUM ALLOYS
R. F. Muraca (Western Appl. Res. and Develop., Inc.) and J. S. Whittick (Western Appl. Res. and Develop., Inc.)
Oct. 1973
M-FS-22798

Five handbooks have been prepared which describe up-to-date properties of the following wrought-aluminum alloys: 2014, 2219, 5456, 6061, and 7075. Each handbook is divided into twelve chapters. Scope of information presented includes physical- and mechanical-property data at cryogenic, ambient, and elevated temperatures.

B73-10376
CATALYTIC REACTOR WITH DISPOSABLE CARTRIDGE
C. M. McCullough (Appl. Electrochemistry, Inc.)
Sep. 1973
ARC-10747

Catalytic reactor, disposable cartridge enclosing iron catalyst, acts as container for solid carbon formed by decomposition of carbon monoxide. Deposition of carbon in other parts of oxygen recovery system does not occur because of lack of catalytic activity; filters trap carbon particles and prevent their being transported outside reaction zone.

B73-10385
LONG-TERM MATERIAL COMPATIBILITY TESTING SYSTEM
L. R. Toth, R. S. Weiner, D. C. Griffin, Jr., and R. W. Porter
Sep. 1973
NPO-11776

System includes procedure for hermetically sealing solid materials and fluids in glass ampoule and use of temperature-controlled facility containing sample holder, which permits sample containers to be retrieved safely and conveniently. Solid material and fluid are sealed within chemically-clean glass ampoule according to highly detailed procedure.

B73-10388
BALSA WOOD AS AN ENERGY DISSIPATOR
A. C. Knoell
Sep. 1973
NPO-11839

Studies have been undertaken to determine response of balsa wood in variety of environmental conditions. Response is dependent upon state of balsa wood as well as environment to which it is exposed, but certain combinations of conditions serve to increase significantly energy-dissipating capacity of wood relative to its normal capacity.

B73-10394
AN EQUATION OF STATE FOR OXYGEN AND NITROGEN
R. T. Jacobsen (Idaho Univ.), A. F. Myers (Idaho Univ.), and R. B. Stewart (Idaho Univ.)
Oct. 1973 See also NASA-CR-128525; NASA-CR-128527; NASA-CR-128528
JSC-14465

Recent measurements of thermodynamic properties of oxygen and nitrogen have provided data necessary for development of a single equation of state for both fluids. Data are available in summary report and two-part detailed study on thermodynamic properties of oxygen and nitrogen. Same data are used to develop vapor-pressure equation and heat-capacity equation.

B73-10396
MATERIALS DATA HANDBOOK ON INCONEL ALLOY 718
R. F. Muraca (Western Appl. Res. and Develop., Inc.) and J. S. Whittick (Western Appl. Res. and Develop., Inc.)
Oct. 1973
M-FS-22793

Handbook is divided into twelve chapters. Scope of information presented includes physical- and mechanical-property data at cryogenic, ambient, and elevated temperatures. This is supplemented with useful information in such areas as material procurement, metallurgy of alloy, corrosion, environmental effect, fabrication, and joining techniques. Design data are presented, as available.

B73-10397
MATERIALS DATA HANDBOOKS ON STAINLESS STEELS
R. F. Muraca (Western Appl. Res. and Develop., Inc.) and J. S. Whittick (Western Appl. Res. and Develop., Inc.)
Oct. 1973
M-FS-22797

Two handbooks which summarize latest available data have been published. Two types of stainless steels, alloy A-286 and Type 301, are described. Each handbook is divided into twelve chapters. Scope of information presented includes physical- and mechanical-property data at cryogenic, ambient, and elevated temperatures.

B73-10400
LIGHTWEIGHT INFLATABLE MATERIAL WITH LOW PERMEABILITY
E. C. White and F. R. Matthews
Oct. 1973
LANGLEY-10928

Material features combination of Mylar, for strength, and Saran, for impermeable qualities. Second lamination of Mylar prevents blocking, adds strength, and increases barrier rating. Different combinations of laminations produce variety of thicknesses and barrier ratings. Material can be metallized for increased barrier reliability and radar reflectivity, and can be treated with a heat-resistant coating.

B73-10402
DESIGN OF A UNIT TO PRODUCE HOT DISTILLED WATER FOR THE SAME POWER CONSUMPTION AS A WATER HEATER
R. A. Bambenek (Chemtric Inc.) and P. P. Nuccio (Chemtric Inc.)
Nov. 1973 See also NASA-CR-128878
JSC-14224

Unit recovers 97% of water contained in pretreated waste water. Some factors are: cleansing agent prevents fouling of heat transfer surface by highly concentrated waste; absence of dynamic seals reduces required purge gas flow rate; and recycle loop maintains constant flushing process to carry cleansing agent across evaporation surface.

B73-10403
INTEGRATING-SPHERE COATING
J. W. Stuart
Nov. 1973
GSFC-11214

Sodium chloride, used with proper solvent-dispersant combination, forms very durable reflective coatings. Several other inorganic salts, such as barium sulfate, barium carbonate, sodium

fluoride, potassium chloride, sodium hexafluorosilicate, and aluminum oxide, are also suitable. Sodium chloride may also be used with other formulations to produce same type of coating.

B73-10406
GAS CHROMOTOGRAPHY OF VOLATILE ORGANIC COMPOUNDS
A. Zlatkis (Houston Univ.)
Dec. 1973
JSC-14428

System has been used for problems such as analysis of volatile metabolities in human blood and urine, analysis of air pollutants, and in tobacco smoke chemistry. Since adsorbent is reusable after proper reconditioning, method is both convenient and economical. System could be used for large scale on-site sampling programs in which sample is shipped to central location for analysis.

B73-10407
RADIOCHEMICAL SYNTHESIS OF PURE ANHYDROUS METAL HALIDES
W. H. Philipp, S. J. Marsik, and C. E. May
Dec. 1973 See also B72-10439
LEWIS-11860

Method uses radiation chemistry as practical tool for inorganic preparations and in particular deposition of metals by irradiation of their aqueous metal salt solutions with high energy electrons. Higher valence metal halide is dissolved in organic liquid and exposed to high energy electrons. This causes metal halide to be reduced to a lower valence metal halide.

B73-10424
ESTIMATING SORBER CAPACITY FOR MULTIPLE CONTAMINANTS
T. M. Olcott (Lockheed Missiles & Space Co.) and R. A. Lamparter
Dec. 1973 See also NASA-CR-2027
LANGLEY-11056

Computer program estimates quantity of activated charcoal required to control multiple contaminants. Program scans all contaminants by potential parameter value and then orders them from lowest to highest values. It calculates quantity of sorbent required to remove most strongly adsorbed material; and then, using potential plot data, capacity of other materials is calculated on basis of corrected capacity.

B73-10437
AN AUTOMATED REMOTE MARSHLAND WATER-SAMPLING STATION
D. F. Thomas
Feb. 1974
LANGLEY-11503

Station may be made to turn on and off remotely in response to radio, audio, photo, or other suitable signals, as well as by hard-wire switching. Station will remain operational under conditions of 4-foot tidal variations, along with 4-foot wave action, and will withstand hurricane-force winds without toppling over.

B73-10447
NEW METHOD FOR DETERMINING THERMOPHYSICAL PROPERTIES OF TEST SPECIMENS
R. A. Jones
Feb. 1974
LANGLEY-11053

Model can be tested directly, which eliminates costly, time-consuming, and inaccurate method of making test models solely for purpose of determining thermophysical properties. Method is adaptable to numerous modifications and variations.

B73-10453
PROBABILITY OF STRESS-CORROSION FRACTURE UNDER RANDOM LOADING
J. -N. Yang
Jan. 1974
NPO-13113

Mathematical formulation is based on cumulative-damage hypothesis and experimentally-determined stress-corrosion characteristics. Under both stationary random loadings, mean value and variance of cumulative damage are obtained. Probability of stress-corrosion fracture is then evaluated, using principle of maximum entropy.

B73-10457
HIGH-TEMPERATURE GAS/LIQUID STRESS RELAXOMETERS
S. H. Kalfayan and R. H. Silver
Mar. 1974
NPO-13168

Two relaxometers allow testing of elastomers in various fluids. First relaxometer uses fork-like loading spacer interposed between loading lever and support ring, so that sample is stretched predetermined amount. In second relaxometer, degree of initial elongation is set by means of adjustable collar, which, when locked in place on piston rod, enables sample to be stretched predetermined length.

B73-10469
ULTRAVIOLET REFLECTIVE COATING
J. B. Schutt
Mar. 1974
GSFC-11786

Composition consists of dispersion of barium sulphate in aqueous solution of water-soluble inorganic binder. Binder is selected from group consisting of alkali metal sulphates. Coating exhibits high reflectance of ultraviolet light to wavelengths of approximately 200.0 nm, which compares favorably with high reflectance of virgin barium sulphate power.

B73-10475
VAPOR-DEPOSITED PLATINUM AS A FUEL-CELL CATALYST
W. J. Asher (Exxon Corp.) and J. S. Batzold (Exxon Corp.)
Mar. 1974 See also B73-10472; B73-10473; B73-10489
M-FS-21317

Electrodes are prepared by vacuum deposition of platinum on nickel substrate with conventional vapor-deposition apparatus. Amount of platinum loaded on substrate can be veried by changing exposure time during deposition. These electrodes are significantly more effective than conventional oxygen electrodes.

B73-10481
WELDING HIGH-STRENGTH ALUMINUM ALLOYS
P. G. Parks, R. V. Hoppes, E. A. Hasemeyer, and K. Masubuchi (MIT)
Mar. 1974
M-FS-22918

Handbook has been published which integrates results of 19 research programs involving welding of high-strength aluminum alloys. Book introduces metallurgy and properties of aluminum alloys by discussing commercial alloys and heat treatments. Several current welding processes are reviewed such as gas tungsten-arc welding and gas metal-arc welding.

B73-10483
TRANSFER OF GASEOUS OXYGEN FROM HIGH-PRESSURE CONTAINERS AND THE JOULE-THOMSON INVERSION
E. R. Schumann (Bendix Corp.)
Mar. 1974
KSC-10721

From the experiments performed in study, it was determined that oxygen transferred at ambient temperature and pressures up to 10,000 psig consistently dropped in temperature. All results therefore indicate that gaseous oxygen transferred at ambient temperature does not exhibit Joule-Thomson inversion below 10,000 psig.

B73-10503
SOIL MOISTURE BY EXTRACTION AND GAS CHROMATOGRAPHY
E. L. Merek and G. C. Carle
Dec. 1973
ARC-10748

To determine moisture content of soils rapidly and conveniently extract moisture with methanol and determine water content of methanol extract by gas chromatography. Moisture content of sample is calculated from weight of water and methanol in aliquot and weight of methanol added to sample.

B73-10504
REUSABLE SILICA SURFACE-INSULATION MATERIAL
H. E. Goldstein, M. Smith, and D. Leiser
Dec. 1973 *See Also NASA-TM-X-2719*
ARC-10721

Material was specifically developed for manufacture of insulating tiles, but it can be molded into other shapes as required. Basic raw materials are high-purity silica fiber, fumed-silica powder, and reagent-grade starch. Only purest materials are used, and care must be taken to avoid contamination during processing.

B73-10505
POLYIMIDE FIBER-GLASS COMPOSITE RESISTS HIGH TEMPERATURES
W. J. Gilwee, R. W. Rosser, and J. A. Parker
Dec. 1973
ARC-10782

Composites synthesized from bismaleimide have superior strength and oxidation resistance at elevated temperatures when compared with similar composites prepared with epoxy or silicon polymers of similar cost. Polyimide synthesis technique and processing method yield essentially void-free fiber-glass reinforced composites.

B73-10507
MOISTURE-RESISTANT COATINGS FOR OPTICAL COMPONENTS
J. R. Hollahan, T. Wydeven, and C. C. Johnson
Dec. 1973 See also B72-10710
ARC-10749

Plasma polymerization technique is used to apply thin, adherent, hydrophobic coatings from chlorotrifluoroethylene monomer. Apparently much of the chlorine contained in original monomer is lost during polymerization, and characteristic C-Cl absorption in infrared region is essentially absent.

B73-10522
SILICON ON SAPPHIRE FOR ION IMPLANTATION STUDIES
B. P. Pisciotta
Mar. 1974
LANGLEY-11415

Van der Pauw or bridge samples are ultrasonically cut from silicon on sapphire wafers. Contact pad regions are implanted with moderately heavy dose of ions. Ion of interest is implanted into sample; and, before being annealed in vacuum, sample is sealed with sputtered layer of silicon dioxide. Nickel or aluminum is sputtered onto contact pad areas and is sintered in nitrogen atmosphere.

B73-10527
SELECTIVE COATING FOR COLLECTING SOLAR ENERGY ON ALUMINUM
J. R. Lowery
Mar. 1974
M-FS-22562

Presently used coatings, which were originally developed for brass, copper, and steel substrates, yield relatively low absorptance/emittance ratios when applied to aluminum. Efficient, black-nickel plating applied to aluminum substrate enhances solar absorptance to 93% and reduces emittance to 6%.

B74-10002
A NEW NICKEL-BASE WROUGHT SUPERALLOY FOR APPLICATIONS UP TO 1033 K (1400 F)
W. B. Kent (Universal-Cyclops Corp.), H. L. Black (Universal-Cyclops Corp.), F. H. Harf, and S. G. Young
Mar. 1974 See also B74-10003; NASA-CR-120934
LEWIS-11827

Alloy was melted from high purity raw materials and cast ingots extruded at 1422 K. Material was hot rolled to 0.013 m diameter bar stock. Partial solution heat-treatment followed by aging produced structure of fine gamma prime precipitate reinforcing gamma matrix containing coarser blocky gamma prime particles. Alloy can be processed by powder metallurgy.

B74-10003
NEW NICKEL-BASE WROUGHT SUPERALLOY WITH APPLICATIONS UP TO 1253 K (1800 F)
W. B. Kent (Universal-Cyclops Corp.), H. L. Black (Universal-Cyclops Corp.), R. V. Miner, Jr., F. H. Harf, and S. G. Young
Mar. 1974 See also B74-10002; NASA-CR-120934
LEWIS-11828

Alloy possesses combination of high tensile strength at low and intermediate temperatures to 1033 K with good rupture strength at high temperatures to 1255 K. Alloy has promise for turbine disk application in future gas turbine engines and for wrought integrally bladed turbine wheel; thickness and weight of disk portion of wheel could be reduced.

B74-10005
CRITERIA FOR SELECTING RESIN MATRICES FOR IMPROVED COMPOSITE STRENGTH
C. C. Chamis, M. P. Hanson, and T. T. Serafini
Mar. 1974 See also NASA-TM-X-68166
LEWIS-12057

Area under matrix of typical stress-strain diagram bounded by one percent strain is good index for priority assessment of matrix contribution to composite strength. Initial tangent modulus to stress-strain curve is useful parameter in translating matrix properties to composite properties.

B74-10007
ADDITION OF SILICON IMPROVES OXIDATION RESISTANCE OF NICKEL BASED SUPERALLOYS
C. E. Lowell and R. V. Miner, Jr.
Mar. 1974 See also NASA-TM-X-68191; NASA-TN-D-6838
LEWIS-12138

Specific weight changes of nickel-base superalloy B-1900 and B-1900 + 1% Si specimens were tested at 1273 K. B-1900 was losing weight at an increasing rate due to spalling of oxide scale while B-1900 + 1% Si was still gaining weight at low, nearly constant rate. Similar comparison in weight change was observed for specimens tested at 1373 K.

B74-10011
CASTING COPPER TO TUNGSTEN FOR HIGH-POWER ARC LAMP CATHODES
H. A. Will
Apr. 1974 See also NASA-TM-X-2865
LEWIS-12169

Voids forming at interface when copper is cast onto tungsten can be eliminated by adding wetting agent during casting process. Small amount of copper and nickel are cast onto thoriated tungsten insert, insert is recast with more copper to form electrode. Good thermal conductance results in long-lived cathode.

B74-10016
PLASMA-SPRAYED METAL-GLASS FLUORIDE COATINGS FOR LUBRICATION TO 1170 K (1650 F)
H. E. Sliney
Jun. 1974 See also NASA-TN-D-7556
LEWIS-11930

Plasma spray of Nichrome matrix composite contains dispersed glass for oxidation protection and calcium fluoride for lubrication. Coatings can be applied to bearing journals and bearing bores. Coating was easily machinable and had excellent bond strength on substrate metal.

B74-10017
IMPROVED EPITAXIAL PROCESS FOR FABRICATING SILICON CARBIDE SEMICONDUCTOR DEVICES
H. A. Will and J. A. Powell
Jun. 1974 See also NASA-TN-D-7558
LEWIS-12094

Process of growing expitaxial silicon carbide (SiC) layers on SiC substrates so that epitaxial growth is perpendicular to c-axis

by chemical vapor deposition process at temperatures of 1590 to 1660 K minimizes variations in stacking sequence and problems associated with high temperatures.

B74-10027
GLASS FIBER ADDITION STRENGTHENS LOW-DENSITY ABLATIVE COMPOSITIONS
H. H. Chandler (Martin Marietta Corp.)
Apr. 1974
LANGLEY-11288

Approximately 15% of E-glass fibers was added to compositions under test and greatly improved char stability. Use of these fibers also reduced thermal strains which, in turn, minimized char shrinkage and associated cracks, subsurface voids, and disbonds. Increased strength allows honeycomb core reinforcement to be replaced by equivalent amount of glass fibers.

B74-10032
METHODS FOR IMPROVED RESOLUTION OF FLOW ELECTROPHORESIS CELLS
L. R. McCreight (GE) and G. L. Fogal (GE)
May 1974
M-FS-22223

First method involves remote adjusting of zeta potential. Second approach sandwiches two conducting metal plates between opposite cell walls and thin insulating layer. Third method forces buffer to flow in direction opposite particle streams.

B74-10036
COMBUSTION PRODUCTS GENERATING AND METERING DEVICE
R. E. Wiberg and J. A. Klisch
Jul. 1974
GSFC-11095

Device simulates incipient fire conditions in closely-controlled adjustable manner, to give predetermined degree of intensity at selected locations throughout area, and to verify that detection system will respond. Device can be used with and for cross calibration and experimentation in conjunction with commercially available products of combustion analyzing meters.

B74-10052
ECONOMICAL TECHNIQUE FOR FRAGMENTATION TESTING
T. H. Smith, III (TRW Systems Group, TRW, Inc.) and B. A. Snoke (TRW Systems Group, TRW, Inc.)
May 1974
ARC-10792

Automatic rifle was modified for remote, single-shot use. To simulate statistically--determined fragment size from rocket-motor casing blunt-nosed bullet was made of same alloy. Cartridge was loaded with enough powder to make bullet reach target at same estimated velocity as shrapnel from rocket casing.

B74-10053
SILVER OXIDE SORBENT FOR CARBON DIOXIDE
G. V. Colombo (McDonnell-Douglas Corp.)
May 1974 See also NASA-CR-114632
ARC-10797

Material can be regenerated at least 20 times by heating at 250 C. Sorbent is compatible with environment of high humidity; up to 20% by weight of carbon dioxide can be absorbed. Material is prepared from silver carbonate, potassium hydroxide or carbonate, and sodium silicate.

B74-10057
ENZYMATIC REGENERATION OF ADENOSINE TRIPHOSPHATE COFACTOR
D. L. Marshall (Battelle Mem. Inst.-Columbus Labs.)
May 1974
ARC-10837

Regenerating adenosine triphosphate (ATP) from adenosine diphosphate (ADP) by enzymatic process which utilizes carbamyl phosphate as phosphoryl donor is technique used to regenerate expensive cofactors. Process allows complex enzymatic reactions to be considered as candidates for large-scale continuous processes.

B74-10073
CUSHION MODULE FOR STOWING ELECTRONIC EQUIPMENT
J. R. Rogers and R. M. Elam, Jr.
Jun. 1974
ARC-10779

To provide vibration-resistance composition adjust processing techniques, which produces essentially void-free materials and provides for clean removal of finished material from mold. Microsphere filler imparts strength to polymer and sodium carbonate imparts flame-resistance.

B74-10074
VOLUME-REFLECTING DIELECTRIC HEAT SHIELD
P. R. Nachtsheim, D. L. Peterson, and J. T. Howe
Jun. 1974
ARC-10803

White, volume-reflecting dielectric material absorbs essentially none of the incident radiant energy, and continues to reflect even though in severe environment its surface is melted and is being vaporized. Process of overall reflectance in dielectric material, involving internal refractions and reflections, is similar to process of reflection in paints.

B74-10077
NEW POLYMER SYSTEMS: CHAIN EXTENSION BY DIANHYDRIDES
R. A. Rhein and J. D. Ingham
Jul. 1974
NPO-13046

Three anhydrides provide effective chain extension of hydroxy-terminated polyalkylene oxides and polybutadienes. Novel feature of these anhydride reactants is that they are difunctional as anhydrides, but they are tetrafunctional if conditions are selected that lead to total esterification or reaction of all carboxyl groups.

B74-10082
HIGH STRENGTH NICKEL BASE ALLOY, WAZ-16, FOR APPLICATIONS UP TO 2200 F
W. J. Waters and J. C. Freche
Aug. 1974 See also NASA-TN-D-7648
LEWIS-12270

Alloy product is high strength, high temperature nickel base material with higher incipient melting temperature than all known nickel base alloys. It is microstructurally stable and has high impact resistance both before and after prolonged thermal exposure. It contains relatively few alloying constitutents and low content of expensive and rare metals.

B74-10085
RAPID METHOD FOR DETERMINING NITROGEN IN TANTALUM AND NIOBIUM ALLOYS
E. J. Merkle, J. W. Graab, and W. F. Davis
Sep. 1974 See also NASA-TM-X-3067
LEWIS-12237

Adaptation of commercial instrument which measures nitrogen and oxygen in steel gave results in less than four minutes. Sample is heated in helium atmosphere in single-use graphite crucible. Platinum flux facilitates melting of sample. Released gases are separated chromatographically and measured in thermal-conductivity cell.

B74-10095
DETECTION OF CRACKS IN SURFACE INSULATION
L. J. Leger
Aug. 1974
MSC-14187

Volatile organic liquid surface penetrants used with appropriate detector paper leave tested surfaces uncontaminated. Method can be used to detect minute cracks in materials such as metal, glass, plastics, ceramics, etc.

B74-10096
IN-PROCESS OXIDATION PROTECTION IN FLUXLESS BRAZING OR DIFFUSION BONDING OF ALUMINUM ALLOYS

K. P. O'Kelly (LTV Aerospace Corp.) and A. B. Featherston (LTV Aerospace Corp.)
Aug. 1974 See also NASA-CR-128805
MSC-14435

Aluminum is cleaned of its oxide coating and is sealed immediately with polymeric material which makes it suitable for fluxless brazing or diffusion bonding. Time involved between cleaning and brazing is no longer critical factor.

B74-10111
ACCURATE THICKNESS MEASUREMENT OF EASILY COMPRESSED MATERIALS
L. W. Carlson (Rocketdyne/N. Am. Rockwell Corp.)
Aug. 1974
ARC-10551

Sheet of material is placed between two thin, uniform, and flat sheets of glass of known thickness; light pressure is applied by means of weights. Micrometer aids thickness measurement of sandwich. Thickness of two sheets of glass is then subtracted.

B74-10121
COMMERCIALLY AVAILABLE BLACK CHROME IS AN EFFECTIVE SOLAR COLLECTOR COATING
G. E. McDonald
Sep. 1974 See also NASA-TM-X-71596
LEWIS-12159

Black chrome, electroplated decorative finish, which absorbs and retains solar energy is readily available, easily applied, and low cost. It is indistinguishable from black nickel and is equally feasible on aluminum or steel.

B74-10122
GUIDEBOOK OF NONDESTRUCTIVE EVALUATION TECHNIQUES FOR MATERIALS AND STRUCTURES
A. Vary
Nov. 1974 See also NASA-SP-3079
LEWIS-12272

Seventy nondestructive techniques for evaluating material and structures are described in guidebook. Standardized format facilitates comparison of their merits and limitations for solving various problems. Guide includes index of flaw types and tabulated guide to use of nondestructive evaluation techniques. Alternative technique names are cross-referenced.

B74-10124
FABRICATION OF COMPLEX STRUCTURES OR ASSEMBLIES BY HOT ISOSTATIC PRESSURE (HIP) WELDING
A. N. Ashurst (Battelle Mem. Inst.), M. Goldstein (Battelle Mem. Inst.), M. J. Ryan (Battelle Mem. Inst.), G. G. Lessmann (Westinghouse Astronucl. Lab.), and W. A. Bryant (Westinghouse Astronucl. Lab.)
Nov. 1974 See also NASA-CR-120923; NASA-CR-72795
LEWIS-11490

HIP welding is effective method for fabricating complex structures or assemblies such as alternator rotors, regeneratively-cooled rocket-motor thrust chambers, and jet engine turbine blades. It can be applied to fabrication of many assemblies which require that component parts be welded together along complex interfaces.

B74-10132
SOFT, THERMALLY CONDUCTIVE MATERIAL
A. J. Anderson (Martin Marietta Corp.)
Sep. 1974
LANGLEY-10850

Silicon rubber filled with high percentage of silver-plated copper microspheres provides soft, thermally conductive seat for thermal switch. Material also could be used in thin sheet form to prevent corrosion between dissimilar metals while maintaining good thermal communication. It could be used as thermal gasketing.

B74-10133
TWO-PHASE, PASSIVE SEPARATOR-AND-FILTER ASSEMBLY
A. C. Erickson (GE) and F. J. Porter, Jr. (GE)
Sep. 1974
LANGLEY-10976

Assembly separates liquid from gas by passive hydrophilic/hydrophobic material approach. Apparatus is comprised of porous glass hydrophilic tubes. Quantity, lateral size, and pore size of glass tubes are determined by particular design requirements with regard to water rate, water quality contamination level, application endurance life, and operating differential pressure level.

B74-10154
POLYMER COMPOSITIONS SUITABLE FOR USE IN ENRICHED OXYGEN ATMOSPHERES
E. C. Schule (Allied Chem. Corp.), P. P. Salatiello (Allied Chem. Corp.), and S. Chandrasekaran (Allied Chem. Corp.)
Sep. 1974 See also NASA-CR-134062
MSC-14618

Three organic polymer systems are based on copolymer of chlorotrifluoroethylene, ethylene, and tin-based flame retardants. Fourth system is copolymer of chlorotrifluorethylene and tetrafluoroethylene. This system contains no stabilizers of flame retardant additives.

B74-10157
FLAME RESISTANT ELASTIC ELASTOMERIC FIBER
J. T. Howarth (Little/Arthur D./Inc.), S. Sheth (Little/Arthur D./Inc.), A. A. Massucco (Little/Arthur D./Inc.), and K. R. Sidman (Little/Arthur D./Inc.)
Sep. 1974 See also NASA-CR-128505
MSC-14331

Compositions exhibit elastomeric properties and possess various degrees of flame resistance. First material polyurethane, incorporates halogen containing polyol and is flame resistant in air; second contains spandex elastomer with flame retardant additives; and third material is prepared from fluorelastomer composition of copolymer of vinylidene fluoride and hexafluoropropylene.

B74-10159
POLYELECTROLYTES WITH HIGH CHARGE DENSITY
A. Rembaum and S.-P. S. Yen
Sep. 1974
NPO-11918

Polymers can be used as flocculants to clarify residential and industrial water supplies and as bactericidal and fungicidal agents. They can be used in preparation of electroconductive photocopy papers, to improve living cell adhesion to glass or plastic, and as anticancer agents.

B74-10175
SEMIPERMANENT SEALING OF LEAKS IN HIGH VACUUM SYSTEMS
J. D. Christian and W. P. Gilbreath
Sep. 1974
ARC-10881

Silicone-rubber adhesive is applied externally to seal hairline cracks in sections of high vacuum system while system is partially evacuated. No pretreatment of surface is required since adhesive will be drawn into crack while diffusion or ion pump is off.

B74-10177
DOMESTIC WASH WATER RECLAMATION
J. B. Hall, Jr., C. E. Batten, and J. R. Wilkins
Oct. 1974 See also NASA-TN-D-7600
LANGLEY-11606

System consists of filtration unit, reverse-osmosis module, tanks, pumps, plumbing, and various gauges, meters, and valves. After water is used in washing machine or shower, it is collected in holding tank. Water is pumped through series of five particulate filters. Pressure tank supplies processed water to commode water closet.

B74-10201
APPARATUS FOR MONITORING LINEAR EXPLOSIVE PERFORMANCE
L. J. Bement
Nov. 1974

LANGLEY-10800

Techniques provide performance monitoring standard for acceptance, lot qualification, and comparison testing of devices. Exhibit high degree of simplicity, accuracy, and reproducibility. Apparatus simultaneously measures explosive pressure stimulus energy, explosive cutting, or rupturing, ability, and detonation propagation rate.

B74-10208
VISUALIZATION OF SMOKE STACK PLUME
R. J. Exton
Nov. 1974
LANGLEY-11675

System consists of ultraviolet vidicon tube, interference and color filters, ultraviolet telephoto lens, monitor, and waveform analyzer to extract information from video scene, stack plume viewed against sky. System will view SO2 and any other element which absorbs light at wavelength used.

B74-10218
METALLIZED POLYMERIC FOAM MATERIAL
B. A. Birnbaum (Hughes Aircraft Co.) and N. Bilow (Hughes Aircraft Co.)
Nov. 1974
ARC-10860

Open-celled polyurethane foams can be coated uniformly with thin film of metal by vapor deposition of aluminum or by sensitization of foam followed by electroless deposition of nickel or copper. Foam can be further processed to increase thickness of metal overcoat to impart rigidity or to provide inert surface with only modest increase in weight.

B74-10219
MOISTURE-RESISTANT BAFFLE MATERIAL FOR FUEL TANKS
N. Bilow (Hughes Aircraft Co.)
Nov. 1974
ARC-10861

Test results indicated superiority of certain polyether-based polyurethanes as protective coatings and suggested that baffle-materials with one of these coatings should have useful life approximately twice that of uncoated foams now in use.

B74-10222
EVALUATION OF TEST PROCEDURES FOR HYDROGEN ENVIRONMENT EMBRITTLEMENT
H. G. Nelson
Nov. 1974
ARC-10919

Report presents discussion of three common and primary influences on embrittlement process. Application of theoretical considerations to design of test coupons and methods is illustrated for both internal and external hydrogen embrittlement. Acceptable designs and methods are indicated.

B74-10244
HIGH-TEMPERATURE TENSILE TESTER FOR CERAMICS
M. Smith
Dec. 1974
ARC-10822

Apparatus measures tensile strength of rigid, low-density ceramic materials at temperatures up to 1375 K. Tensile grips mate with tensile specimen and form top and bottom of lightweight furnace. Apparatus can only be used with rigid materials and grips must be stronger than material under test.

B74-10247
ADVANCED FIBER-COMPOSITE HYBRIDS--A NEW STRUCTURAL MATERIAL
C. C. Chamis, R. F. Lark, and T. L. Sullivan
Dec. 1974 See also NASA-TM-X-71580
LEWIS-12118

Introduction of metal foil as part of matrix and fiber composite, or "sandwich", improves strength and stiffness for multidirectional loading, improves resistance to cyclic loading, and improves impact and erosion resistance of resultant fiber-composite hybrid structure.

B74-10248
ADVANCED TUNGSTEN FIBER-REINFORCED NICKEL SUPERALLOY
D. W. Petrasek and R. A. Signorelli
Dec. 1974 See also B66-10551; B73-10003; NASA-CR-120925; NASA-TN-D-6881; NASA-TN-D-7773
LEWIS-12394

Matrix composition, fabrication technique, and fiber diameter were selected to minimize fiber-matrix reaction and preserve composite strength. Composites may be used in place of superalloys where higher strength or greater strength-to-density ratios are advantageous, and will permit higher operating temperatures in particular applications.

B74-10264
CONTROLLED INTERMITTENT INTERFACIAL BOND CONCEPT FOR COMPOSITE MATERIALS
T. U. Marston (Univ. of Mich.) and A. G. Atkins (Univ. of Mich.)
Jan. 1975
LANGLEY-11628

Concept will enhance fracture resistance of high-strength filamentary composite without degrading its tensile strength or elastic modulus. Concept provides more economical composite systems, tailored for specific applications, and composite materials with mechanical properties, such as tensile strength, fracture strain, and fracture toughness, that can be optimized.

B74-10265
HIGH-STRENGTH ALLOY WITH RESISTANCE TO HYDROGEN-ENVIRONMENT EMBRITTLEMENT
T. G. McNamara (Rockwell Intern. Corp.)
Jan. 1975
M-FS-19234

Alloy is precipitation-hardened, high-strength, and low-thermal-expansion materials. It is iron-based and contains nickel and chromium at lower levels than high-strength alloys. It is readily welded and brazed and has good oxidation resistance. Tests indicated there was no reduction of notched or smooth strength.

B74-10268
CARBON MONOXIDE DETECTOR
J. L. Bradspies (Tyco Labs., Inc.), S. B. Brummer (Tyco Labs., Inc.), G. L. Holleck (Tyco Labs., Inc.), and L. L. Nelsen (Tyco Labs., Inc.)
Jan. 1975
M-FS-23090

Electrochemical sensor continuously monitors levels of carbon monoxide in air. Device is based on electrochemical oxidation of carbon monoxide in detector cell. Detector can operate on 115-Vac external power source, 28-Vdc external power source, or for 200 hours on internal 12-V NiCd batteries.

B75-10007
LIGHTWEIGHT PROTECTIVE CLOTHING FOR THE SAFE HANDLING OF HIGH-INTENSITY PRESSURIZED LAMPS
J. G. Ewashinka
Mar. 1975 See also NASA-TM-X-3147
LEWIS-12073

Five commercially available clothing materials, selected for their high cutting resistance, high strength, light weight and pliability, were tested by exposing them to exploding lamps located less than 60 cm (2 ft) away. Face shield material tested initially was commercial high-strength polycarbonate plastic.

B75-10016
THIN KAPTON POLYIMIDE FILMS VACUUM FORMED AT HIGH TEMPERATURE RETAIN THEIR SHAPE AT TEMPERATURES TO 450 K (350 F)
K. F. Burr (Union Carbide Corp.) and G. E. Nies (Union Carbide Corp.)
Apr. 1975 See also NASA-CR-121166
LEWIS-12412

Purpose of investigation was to identify candidate materials for self-evacuating multilayer insulation systems to be used on liquid hydrogen tanks on space shuttle, which would survive

re-entry temperatures and mechanical and thermal cycling of one hundred flights.

B75-10023
HIGH STRENGTH FORGEABLE TANTALUM BASE ALLOY
R. W. Buckman, Jr. (Westinghouse Elec. Corp.)
May 1975 See also B66-10558; B71-10010; NASA-CR-120818; NASA-CR-120931; NASA-CR-121096; NASA-CR-134606
LEWIS-11386
Increasing tungsten content of tantalum base alloy to 12-15% level will improve high temperature creep properties of existing tantalum base alloys while retaining their excellent fabrication and welding characteristics.

B75-10027
METHOD FOR EVALUATING EFFECTIVENESS OF DRY FIRE-EXTINGUISHING CHEMICALS
R. L. Altman
Feb. 1975
ARC-10869
Apparatus used in method is commercially available, powder-deposition type oxy-acetylene torch that has been modified to provide electronically timed operations and more uniform powder flow; usual torch tips are replaced by burner head with pilot flame.

B75-10038
CURABLE POLYPHOSPHAZENES
K. A. Reynard (Horizons Res., Inc.) and A. H. Gerber (Horizons Res., Inc.)
Apr. 1975
M-FS-23134
Class of polyphosphazene polymers can be cured at moderate temperatures by action of moisture. In addition, polymers maintain flexibility when exposed to low temperatures.

B75-10042
HIGH-TEMPERATURE, REUSABLE SURFACE INSULATION SYSTEM
Innovator not given (Lockheed Missiles and Space Co.) Apr. 1975 See also NASA-CR-115582; NASA-CR-115583; NASA-CR-115712; NASA-CR-134326; NASA-CR-134327
MSC-14688
System is capable of withstanding extreme temperature environments ranging from -250 to 2300 F (116 K to 1543 K). System includes impervious, high-density, high-thermal-emittance outer coating which has low coefficient of thermal expansion matching that of insulation.

B75-10056
LOW-DENSITY POLYBENZIMIDAZOLE FOAMS FOR THERMAL INSULATION AND FIRE PROTECTION
D. A. Kourtides, J. A. Parker, C. Deland (Whittaker Corp.), and R. Milligan (Whittaker Corp.)
Apr. 1975
ARC-10823
Fire-resistant and nonsmoking foam can be prepared in desirable density range of 24 to 50 kg/cu m by controlled thermal crosslinking of polybenzimidazole prepolymer. Reproducible foams of specific density can be produced by controlling volative content and melting temperature of prepolymer.

B75-10062
FIBER-MODIFIED POLYURETHANE FOAM FOR BALLISTIC PROTECTION
R. H. Fish, J. A. Parker, and R. W. Rosser
Apr. 1975
ARC-10714
Closed-cell, semirigid, fiber-loaded, self-extinguishing polyurethane foam material fills voids around fuel cells in aircraft. Material prevents leakage of fuel and spreading of fire in case of ballistic incendiary impact. It also protects fuel cell in case of exterior fire.

B75-10066
FABRICATION OF COMPOSITE FAN BLADES USING PMR A-TYPE POLYIMIDE RESIN AND GRAPHITE FIBER REINFORCEMENT
W. E. Winters (TRW Equipment) and P. J Cavano (TRW Equipment)
Jul. 1975 See also B71-10442; NASA-CR-134727
LEWIS-12366
PMR polyimides are safe, easy to handle, can be processed with relatively wide process controls, and offer excellent mechanical properties, with thermo-oxidative stability. Procedures, staging and cure schedules fully dense, crackfree, dimensionally controlled, complex structure: high tip speed fan blades 1.27 cm (0.5 in) thick.

B75-10067
SURVEY OF COATINGS FOR SOLAR COLLECTORS
G. E. McDonald
Jul. 1975 See also NASA-TM-X-3136; NASA-TM-X-71730
LEWIS-12510
Optimum solar selective properties of black chrome require some tailoring of current and time for plating solution being used. Black zinc is produced from high zinc electroplate by subsequent conversion with chromate dip. Measurements have also been made of reflectance of previously known solar selective coatings of black copper and electroplated black nickel.

B75-10072
FILM MOUNTING METHOD FOR THERMOMECHANICAL ANALYSIS
H. D. Burks
May 1975
LANGLEY-11330
Mounting clamps attach polymeric film sample to thermomechanical analyzer. Using this technique, temperature at which polymer passes from relatively nonflexible or glasslike state to rubbery condition where it exhibits marked increase in flow properties is readily determined.

B75-10076
THERMOELECTRICALLY-COOLED QUARTZ MICROBALANCE
D. McKeown (Faraday Labs., Inc.)
May 1975
M-FS-23101
Temperature of microbalance can be maintained at ambient temperature or held at some other desired temperature. Microbalance has tow-stage thermoelectric device that controls temperature of quartz crystal. Heat can be pumped to or from balance by Peltier effect.

B75-10084
DIELECTRIC FILMS IMPROVE LIFE OF POLYMERIC INSULATORS
M. Hudis and T. Wydeven
May 1975
ARC-10892
Degradation of polymeric insulators may be significantly reduced when polymer surfaces are coated with film having gradation of dielectric constants, larger where it is in contact with polymer and smaller at its exposed surface.

B75-10104
METHOD OF ATTACHING INSULATION TILES
L. J. Leger
Jun. 1975
MSC-12619
Felt pads attached underneath tiles add very little weight and retain flexibility at low temperatures. Very thin layer of room-temperature vulcanizing silicone adhesive is applied to tile. Then felt pad is attached to adhesive. Finally, tile-felt combination is attached to metal surface by means of similar adhesive layer.

B75-10113
PROCESSING FOR OBTAINING GOOD QUALITY WATER FROM SEWAGE
M. F. Humphrey
Jun. 1975
NPO-13224

Sewage treatment method incorporates aqueous slurry of activated carbon and ash. Process eliminates smell and greatly reduces amounts of solids requiring disposal. Solids consist only of sterile ash.

B75-10117
IMPROVED ION EXCHANGE MEMBRANE
A. Rembaum, S. P. S. Yen, and E. Klein
Jun. 1975
NPO-13309

Membrane, made from commercially-available hollow fibers, is used in reverse osmosis, or dialysis. Fiber has skin layers which pass only small molecules. Macromolecules cannot penetrate skin. Fibers can also be used to remove other undesirable anions, such as phosphate, sulfate, carbonate, and uranium in form of uranium-sulfate complex.

B75-10121
IONENE TREATMENT OF SURFACES STIMULATES CELL GROWTH
A. Rembaum, M. Ingram, A. S. Schmink, and D. E. Rounds (Pasadena Found. for Med. Res.)
Jun. 1975
NPO-13421

Number of cells adhering to walls of container can be increased by chemically pretreating walls. Polyelectrolyte, ionene, gives more effective pretreatment than any currently used chemicals.

B75-10137
TAILOR MAKING HIGH PERFORMANCE GRAPHITE FIBER REINFORCED PMR POLYIMIDES
T. T. Serafini and R. D. Vannucci
Jul. 1975 See also B71-10442; NASA-TM-X-71616; NASA-TN-D-6877
LEWIS-12416

Studies have demonstrated versatility of PMR approach for tailor making polyimide matrix resins with side range of flow characteristics. By simply adjusting molar ratio of reactants in monomer mixture, resins having flow values of as much as 20% can be achieved.

B75-10144
REFLECTING HEAT SHIELDS MADE OF MICROSTRUCTURED FUSED SILICA
W. M. Congdon (Martin Marietta Corp.)
Jul. 1975 See also NASA-CR-137574
ARC-10949

Heat sheidls constructed from selected monodisperse distributions of high-purity fused-silica particles are efficient reflectors of visible and near-UV radiation generated in shock-layer of space probe during atmospheric entry.

B75-10157
DETERMINATION OF WATER CONTENT USING MASS SPECTROMETRY
G. M. Wood, B. T. Upchurch (Old Dominion Coll.), and D. B. Hughes (E. I. du Pont de Nemours and Co.)
Aug. 1975
LANGLEY-11774

Mass spectrometer is used to measure small quantities of water present in different materials. System has been applied in measuring water and gases desorbed from microcircuitry insulation, can also be used with foods, polymeric materials, and organic solvents.

B75-10159
DYNAMIC DELTA METHOD FOR TRACE GAS ANALYSIS
G. M. Wood, B. T. Upchurch (Old Dominion Coll.), and D. B. Hughes (E. I. du Pont de Nemours and Co.)
Aug. 1975
LANGLEY-11800

Method has been developed in which measurements are made only over viscous flow range, eliminating fractionation before the molecular leak and problems due to surface elution.

B75-10163
FABRICATION OF POROUS PLUGS FOR CONTROL OF LIQUID HELIUM
L. B. Holdeman (Natl. Res. Council)
Aug. 1975
M-FS-23218

Method of producing porous copper plugs combines hydrogen annealing and oxygen annealing. Plugs have high thermal conductivity and small pore size.

B75-10174
NONGASSING NICD BATTERY CELL
G. L. Juvinall, E. M. Cohn, A. A. Uchiyama, and H. A. Frank
Aug. 1975
NPO-11853

Method of constructing nickel cadmium batteries prevents excessive gas buildup and allows hermetic sealing of battery for increased service life and reduced maintenance cost.

B75-10178
IMPROVED MULTIPLE-TARGET SPUTTERING EQUIPMENT
R. Shima
Aug. 1975
NPO-13345

Sputtering chamber has been developed with multiple target. Several film layers can be deposited without repeated evacuation and refilling. Contamination through exposure to air is eliminated.

B75-10193
RISK MANAGEMENT TECHNIQUE FOR LIQUEFIED NATURAL GAS FACILITIES
O. H. Fedor and W. N. Parsons (Boeing Co.)
Sep. 1975 See also NASA-CR-139183
KSC-11005

Checklists have been compiled for planning, design, construction, startup and debugging, and operation of liquefied natural gas facilities. Lists include references to pertinent safety regulations. Methods described are applicable to handling of other hazardous materials.

B75-10198
HANDBOOK FOR ESTIMATING TOXIC FUEL HAZARDS
R. K. Dumbauld (GCA Corp.), J. R. Jorkland (GCA Corp.), H. E. Cramer (GCA Corp.), and F. A. Record (GCA Corp.)
Sep. 1975
M-FS-21114

Computer program predicts, from readily available meteorological data, concentration and dosage fields downwind from ground-level and elevated sources of toxic fuel emissions. Mathematical model is applicable to hot plume rise from industrial stacks and should also be of interest to air pollution meteorologists.

B75-10200
ALUMINUM ALLOYS WITH IMPROVED STRENGTH
R. Deiasi (Grumman Aerospace Co.) and P. Adler (Grumman Aerospace Co.)
Sep. 1975
M-FS-23239

Mechanical strength and stress corrosion of new BAR and 7050 alloys that include Zn instead of Cr have been studied and compared with those of 7075 aluminum alloy. Added mechanical strength of new alloys is attributed to finer grain size of 5 to 8 micrometers, however, susceptibility to stress corrosion attack is increased.

B75-10207
LIQUID ETHYLENE-PROPYLENE COPOLYMERS
R. A. Rhein, J. D. Ingham, and M. F. Humphrey
Sep. 1975
NPO-13555

Oligomers are prepared by heating solid ethylene-propylene rubber in container that retains solid and permits liquid product to flow out as it is formed. Molecular weight and viscosity of liquids can be predetermined by process temperature. Copolymers have low viscosity for given molecular weight.

B75-10225
CHEMICAL EQUILIBRIUM OF ABLATION MATERIALS INCLUDING CONDENSED SPECIES
C. W. Stroud and K. L. Brinkley
Oct. 1975
LANGLEY-11801

Equilibrium is determined by finding chemical composition with minimum free energy. Method of steepest descent is applied to quadratic representation of free-energy surface. Solution is initiated by selecting arbitrary set of mole fractions, from which point on free-energy surface is computed.

B75-10231
SOLAR-CELL INTERCONNECTS
Innovator not given (EMR Aerospace Sciences) Oct. 1975
M-FS-23257

Study findings concluded that useful bonds can be formed with silver ribbon, silver-plated copper ribbon, and aluminum ribbon. Bonds were formed at from 300 C to 400 C and with enough contact pressure to produce some deformation of ribbon.

B75-10246
SUPERIOR HIGH TEMPERATURE PROPERTIES AVAILABLE IN DIRECTIONALLY SOLIDIFIED NICKEL-BASE EUTECTIC ALLOYS
F. D. Lemkey (United Technologies Corp.)
Nov. 1975 See also NASA-CR-2278
LEWIS-12562

Alloy has high temperature properties exceeding strength of all known superalloys. It exhibits inherent resistance to oxidation and high temperature hot corrosion.

B75-10271
INFLUENCE OF HEAT TREATMENT ON MECHANICAL PROPERTIES OF 300M STEEL
L. J. Youngblood and M. Raghavan (National Res. Council)
Oct. 1975
MSC-14792

Tests show that 300M steel should be austenitized at temperatures above 1,800 deg. F to yield best combination of strength and thickness. Tempering should be performed at temperatures between 400 and 600 deg. F

B75-10280
IMPROVED POLYELECTROLYTE FOR ION EXCHANGE FIBERS
A. Rembaum
Oct. 1975
NPO-13530

Technique increases ion exchange capacity of hollow-fiber-substrate ion exchange resins. Procedure increases number of quaternary sites on polyquaternary copolymer by 15 to 35 percent.

B75-10290
CERAMIC THERMAL PROTECTIVE COATING WITHSTANDS HOSTILE ENVIRONMENT OF ROTATING TURBINE BLADES
C. H. Liebert and S. Stecura
Dec. 1975
LEWIS-12554

Ceramic coatings have low thermal conductivity. They provide potential for increased engine performance, reduced fuel consumption, use of less costly materials or construction procedures, and increased life and durability.

B75-10293
LOW-COST THIN-LAYER SILICON SOLAR CELLS
L. T. Chu (Southern Methodist Univ.)
Dec. 1975
GSFC-12023

Two methods have been found to lower cost of polycrystalline silicon solar cells. Successive layers of polycrystalline silicon are deposited over supporting substrates of relatively inexpensive metallurgical-grade polycrystalline silicon, graphite, or steel.

B75-10308
CONTACT-EUTECTIC-LENS FABRICATION TECHNIQUE
G. F. Allen (California Univ.), S. A. Yue (California Univ.), and G. J. Yu (California Univ.)
Dec. 1975
M-FS-23275

Method enables use of crystal or semiconductor materials with selective spectral-response characteristics (ultraviolet, visible, or infrared wavelengths) in fabrication of contact lenses, reading glasses, and photographic processing equipment.

B75-10310
FLAMMABILITY STUDY OF MATERIALS IN OXYGEN ENVIRONMENTS
G. J. Austin, W. J. Bransford, and F. C. Key
Dec. 1975
M-FS-23306

Report presents flame-propagation rates and flammability ratings of 780 specimens of commercially available plastics, elastomers, coatings, fabrics, and other sheet materials. Test results are also given for over 1970 samples of most commonly used electrical harnesses, connectors, and potting compounds.

B75-10314
USING PERMEABLE MEMBRANES TO PRODUCE HYDROGEN AND OXYGEN FROM WATER
P. A. Sanders, J. R. Williams, R. W. Downs, and H. McBryar
Dec. 1975
MSC-12600

Concept may make it profitable to obtain hydrogen fuel from water. Laboratory tests have demonstrated that method enables decomposition of water several orders of magnitude beyond equilibrium state where only small amounts of free hydrogen are present.

B75-10320
A FLAME-RESISTANT MODIFIED POLYSTYRENE
W. D. Karle (Ultrasystems, Inc.), H. R. Kratze (Ultrasystems, Inc.), and L. K. Pacioren (Ultrasystems, Inc.)
Dec. 1975 See also NASA-CR-141932
MSC-14903

Several modified polystyrenes have been developed that are self-extinguishing in air. Information is included in report that also describes molding and fabrication properties, toxicology, and thermal behavior of the polymers.

B75-10321
REPAIR OF DAMAGED INSULATION TILES
D. Mui (Rockwell Intern. Corp.)
Dec. 1975 See also B75-10042; B75-10104
MSC-19549

High-temperature, reusable surface insulation tiles are repaired quickly and economically using prefabricated tile plugs.

B75-10327
COVALENT BONDING OF POLYCATIONS TO SMALL POLYMERIC PARTICLES
A. Rembaum
Dec. 1975 See also B75-10336
NPO-13487

Process produces small spherical polymeric particles which have polycations bound to them. In emulsion form, particles present large positively charged surface which is available to absorb polyanions. This properly can be used in removing heparin from blood or bile acids from the digestive tract. Other anions, such as DNA and RNA, can also be removed from aqueous solutions.

B75-10336
NEW UREA-ABSORBING POLYMERS FOR ARTIFICIAL KIDNEY MACHINES
W. A. Mueller, G. C. Hsu, and H. E. Marsh
Dec. 1975 See also B75-10327
NPO-13620

Etherified polymer is made from modified cellulose derivative which is reacted with periodate. It will absorb 2 grams of urea per 100 grams of polymer. Indications are that polymers could

be used to help remove uremic wastes in artificial kidneys, or they could be administered orally as therapy for uremia.

B75-10339
RECONSTITUTED ASBESTOS MATRIX FOR FUEL CELLS
H. McBryar
Dec. 1975
MSC-12568

Method is described for reprocessing commercially available asbestos matrix stock to yield greater porosity and bubble pressure (due to increased surface tension), improved homogeneity, and greater uniformity.

05 LIFE SCIENCES

B70-10001
IMPROVED APPARATUS FOR CONTINUOUS CULTURE OF HYDROGEN-FIXING BACTERIA
FOSTER, J. F. /BATTELLE MEM. INST./ LITCHFIELD, J. H. DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-1296, NASA-CR-90111
HQ-09000

Improved apparatus permits the continuous culture of Hydrogenomonas eutropha. System incorporates three essential subsystems - /1/ environmentally isolated culture vessel, /2/ analytical system with appropriate sensors and readout devices, /3/ control system with feedback responses to each analytical measurement.

B70-10006
A MATHEMATICAL MODEL OF THE EFFECT OF A PREDATOR ON SPECIES DIVERSITY
WESTON, C. R. YANG, J. N. DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-101669
NPO-11230

Mathematical model determines reaction between new predator and microbe competitor when the competitor is the predator*s sole nutrient resource. The model utilizes differential equations to describe the interactions with the specific growth rates, and analyzes these growth rates as they are affected by population density and nutrient concentration.

B70-10030
CONTOUROGRAPH DISPLAY SYSTEM FOR MONITORING ELECTROCARDIOGRAMS
GOLDEN, D. P., JR. MAUDLIN, D. G. WOLTHUIS, R. A. GOLDEN, D. P. J/TECHNOL. INC./ DATE- OCT. 1970
MSC-13407

Electrocardiogram is displayed as a contourogram on the cathode ray tube of a variable-persistence oscilloscope. Each cycle is stacked below its predecessors giving a three dimensional effect. A major change in the signal is apparent as a change in the contourogram pattern.

B70-10107
DETECTION AND LOCATION OF METAL FRAGMENTS IN THE HUMAN BODY
BROWN, R. L. NEUSCHAEFER, R. W. DATE- FEB. 1970
M-FS-14797

Portable electronic device, based on the design of an eddy current gage, detects ferrous and nonferrous metal fragments. Device is more easily transported than X-ray equipment and does not present a radiation hazard.

B70-10125
DESIGN AND DEVELOPMENT CRITERIA FOR METAL BELLOWS
GERLACH, C. R. /SOUTHWEST RES. INST./ SCHROEDER, E. C. DATE- SEP. 1970
M-FS-20640

Experimental research describes fluid flow and the fluid-elastic mechanism causing bellows flow excitation, and aids in design of conventional bellows liner which suppresses flow-induced vibrations. Analytical models facilitate prediction of flow excitation occurrence and estimation of severity of bellows vibrations.

B70-10201
PREDICTION OF GAS LEAKAGE OF ENVIRONMENTAL CONTROL SYSTEMS
JACKSON, J. K. /DOUGLAS AIRCRAFT CO./ THOMAS, E. C. DATE- APR. 1970 REAN- SEE ALSO NASA-CR-891
HQ-10270

Mathematical models of leakage configurations and various flow theories are presented with the substantive experimental test data to provide background material for future design and failure analysis. Normal-rate leakage and emergency, high-rate leakage are considered.

B70-10253
MICROFLORA IN SOILS OF DESERT REGIONS
CAMERON, R. E. DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-101127
NPO-11215

Desert soil samples, collected using aseptic techniques, are low in organic matter and cation exchange capacity. Aerobic and microaerophilic bacteria are most abundant, next are algae and molds. Chemical and physical properties are determined by standard procedures, including the Kjeldahl method and the use of Munsell soil color charts.

B70-10254
INFLATABLE STRETCHER TO TRANSPORT PATIENTS
CLARK, C. C. /MARTIN CO./ GORDON, F. T., JR. SCHMIDT, C. B. DATE- APR. 1970
HQ-10179

Inflatable plastic bag inside strong, inflexible outer bag facilitates emergency transport of seriously burned or disabled patients. When the bag is inflated the patient is completely immobilized and cushioned from external shock. Air for breathing, temperature controls and communications may be provided by appropriate plug-in connections.

B70-10255
BIOLOGICAL HANDBOOK FOR ENGINEERS
SPON- INNOVATOR NOT GIVEN /GE/ DATE- DEC. 1970
M-FS-20349

Microbiological background information is compiled in handbook for engineers and scientists working on bio-related projects. It is intended as aid in - /1/ evaluating effects of engineering procedures on microbial life, /2/ determining effects of decontamination and sterilization on performance of overall systems, and /3/ understanding language of microbiologists.

B70-10401
AUTOMATIC OPTOMETER OPERATES WITH INFRARED TEST PATTERN
CORNSWEET, T. N. /STANFORD RES. INST./ CRANE, H. D. DATE- NOV. 1970 REAN- SEE ALSO B70-10568
ARC-10095

Refractive strength of human eye is monitored by optometer that automatically and continuously images infrared test pattern onto the retina. Condition of focus of the eye at any instant is determined from optometer settings needed to maintain focus of the pattern on the retina.

B70-10420
ULTRA-FLEXIBLE BIOMEDICAL ELECTRODES AND WIRES
ROSITANO, S. A. DATE- SEP. 1970
ARC-10268

Soft, flexible electrode conforms to body contour during body motion. It is fabricated from an elastomer impregnated with a conductive powder which can be configured into any required shape, including a wire shape to connect the electrode directly to an electrical instrument or to a conventional metallic wire.

B70-10436
POST-OPERATIVE CRANIAL PRESSURE MONITORING SYSTEM
FAGER, C. A., JR. /LAHEY CLINIC/ LONG, L. E. TRENT, R. L. DATE- DEC. 1970
ERC-10336

System for monitoring of fluidic pressures in cranial cavity uses a miniaturized pressure sensing transducer, combined with suitable amplification means, a meter with scale calibrated in terms of pressures between minus 100 and plus

900 millimeters of water, and a miniaturized chart recorder covering similar range of pressures.

B70-10447
BIOMEDICAL SENSING AND DISPLAY CONCEPT IMPROVES BRAIN WAVE MONITORING
TRENT, R. L. DATE- DEC. 1970
ERC-10233
Concept for increasing effectiveness of biomedical sensing and display promises greater monitoring capability while lessening high skill requirements in operating personnel. New concept overcomes deficiencies of current system by employing increased number of probes and microelectronic preamplifiers.

B70-10456
ELIMINATION OF GASES AND CONTAMINATION FROM WATER
BUCK, A. P. /TWA, INC./ DATE- SEP. 1970
KSC-10502
Filtration system with membrane type hydrophilic and hydrophobic filters gives absolute filtration with automatic venting of freed gases, and prevents backward transmission of contamination with no bacterial growth through the filters. Filter aids in degassing industrial solutions and in removing oxygen from sea water.

B70-10469
CONTROL SYSTEM FOR AN ARTIFICIAL HEART
GEBBEN, V. D. WEBB, J. A., JR. DATE- OCT. 1970
REAN- SEE ALSO NASA-TM-X-1953
LEWIS-11057
Inexpensive industrial pneumatic components are combined to produce control system to drive sac-type heart-assistance blood pump with controlled pulsatile pressure that makes pump rate of flow sensitive to venous /atrial/ pressure, while stroke is centered about set operating point and pump is synchronized with natural heart.

B70-10525
SIMPLE CHAMBER FACILITATES CHEMILUMINESCENT DETECTION OF BACTERIA
MARTS, E. C. WILKINS, J. R. DATE- SEP. 1970
LANGLEY-10705
Test chamber enables rapid estimation of bacteria in a test sample through the reaction of luminol and an oxidant with the cytochrome C portion of certain species of bacteria. Intensity of the light emitted in the reaction is a function of the specific bacteria in the test sample.

B70-10528
TECHNIQUE FOR ANALYZING HUMAN RESPIRATORY PROCESS
LIU, F. F. /QUANTUM-DYN., INC./ DATE- OCT. 1970
MSC-13436
Electronic system /MIRACLE 2/ places frequency and gas flow rate of the respiratory process within a common frame of reference to render them comparable and compatible with **real clock time.** Numerous measurements are accomplished accurately on a strict one-minute half-minute, breath-by-breath, or other period basis.

B70-10529
MEDICAL VEST BROADENS TREATMENT CAPABILITY
JOHNSON, G. S. /TRANS WORLD AIRLINES, INC./
DATE- OCT. 1970
KSC-10577
Universal sized vest, with specially tailored pockets designed to hold medical supplies, provides first aid/first care medical teams with broadened on-site capability. Vest is made of nylon, tough fibrous materials, and polyvinyl chloride. Design facilitates rapid donning, doffing, and adjustment.

B70-10545
COMBINATION SYRINGE PROVIDES AIR-FREE BLOOD SAMPLES
POOL, S. L. DATE- NOV. 1970
MSC-12320
Standard syringe and spinal needle are combined in unique manner to secure air-free blood samples. Combination syringe obtains air free samples because air bubbles become insignificant when samples greater than 1 cc are drawn.

B70-10568
VISUAL FOCUS STIMULATOR AIDS IN STUDY OF THE EYE*S FOCUSING ACTION
CORNSWEET, T. N. /STANFORD RES. INST./ CRANE, H. D. DATE- NOV. 1970 REAN- SEE ALSO B70-10401
ARC-10049
Optical apparatus varies apparent distance of a target image from the eye by means of reflectors that are moved orthogonally to the optical axis between fixed lenses. Apparatus can be pointed at any object, test pattern, or other visual display.

B70-10619
HUMAN PERFORMANCE MEASURING DEVICE
MICHAEL, J. SCOW, J. DATE- DEC. 1970
LANGLEY-10679
Complex coordinator, consisting of operator control console, recorder, subject display panel, and limb controls, measures human performance by testing perceptual and motor skills. Device measures psychophysiological functions in drug and environmental studies, and is applicable to early detection of psychophysiological body changes.

B70-10697
BIOMEDICAL RECORDING SYSTEM
VICK, H. A. VIC, H. A. /NORTHROP CORP./
DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-101978
MSC-13653
System collects medical data directly from patients and permanently records and displays several parameters - electrocardiograph, electroencephalograph, heart rate, respiration rate, auscultatory blood pressure, leg circumference changes, body temperature, and time. Components and operation of the system are described.

B71-10024
HYDRAULICALLY OPERATED TILT TABLE
GAUSE, R. L. SPIER, R. A.
JAN. 1971
M-FS-21047
Table raises, lowers, or tilts test subject from vertical through an angle of 105 deg to a head-down position of 15 deg. Table is designed for medical center or laboratory use. Additional features are described.

B71-10047
RAPID ANALYTICAL DETERMINATION OF GLUTARALDEHYDE CONCENTRATIONS
FRIGERIO, N. A. SHAW, M. H.
MAR. 1971
ARG-10413
Technique utilizes the iodimetric procedure which adds unknown excess of bisulfite to glutaraldehyde /GA/ then titrates unreacted bisulfite with standard iodine isotope to determine GA concentrations. Technique may interest microscopists, food researchers, biochemical or medical laboratories, and drug manufacturers.

B71-10051
BACTERIAL ADENOSINE TRIPHOSPHATE AS A MEASURE OF URINARY TRACT INFECTION
CHAPPELLE, E. W. PICCIOLO, G. L.
MAR. 1971
GSFC-11092
Procedure detects and counts bacteria present in urine samples. Method also determines bacterial levels in other aqueous body fluids including lymph fluid, plasma, blood, spinal fluid, saliva and mucous.

B71-10059
MINATURE GRINDER FOR SOLID SPECIMENS
HOUSER, C. P./HAYES INTERN. CORP./ PESCH, W. A.
MAR. 1971
M-FS-20005
Machine grinds fines to appropriate micron sizes with the least biological trauma and greatest degree of reproducibility. Device controls destruction of material so that recovery of microorganisms is as great as possible and protects operation and grinding products from exogenous contamination.

B71-10063
IMPROVED WAX MOLD TECHNIQUE FORMS COMPLEX PASSAGES IN SOLID STRUCTURES
HELLBAUM, R. F. PAGE, A. D. PHILLIPS, A. R.
APR. 1971
XLA-07829
Low-cost fabricating technique produces minute, complex air passages in fluidic devices. Air jet interactions in these function as electronic and electromechanical control systems. Wax cores are fabricated without distortion by two-wax process using nonsoluble pattern-wax and water-soluble wax. Significant steps in fabrication process are discussed.

B71-10092
PRESSURIZED SUITS CAN BE FABRICATED WITH ADJUSTABLE DIMENSIONS
KORABOWSKI, J. J./HAMILTON STD./ MARRONI, M. A., JR.
MAY 1971
MSC-12398
Root cords sewn within tube-like channels form a fabric convolute. Cord length adjusts to individual wearer's dimensions.

B71-10096
IMPROVED METHOD OF USING PARAFORMALDEHYDE AS A DISINFECTANT
MILNER, J. F./N. AM. ROCKWELL CORP./
MAY 1971
MSC-15887
Paraformaldehyde decreases required enclosed compartment disinfectant time and temperature by vaporizing powdered material from water slurry. Fire and explosion hazard at lower temperature is reduced. Total mixture evaporation occurs at plate temperature of approximately 167 deg K below that required to vaporize powdered material.

B71-10107
MULTIMODE ERGOMETER SYSTEM
BYNUM, B. G. GAUSE, R. L. SPIER, R. A.
MAY 1971
M-FS-21044
System overcomes previous ergometer design and calibration problems including inaccurate measurements, large weight, size, and input power requirements, poor heat dissipation, high flammability, and inaccurate calibration. Device consists of lightweight, accurately controlled ergometer, restraint system, and calibration system.

B71-10124
EKG ISOLATOR
PALMER, E. RASQUIN, J. R. SMITH, H. E.
MAY 1971
M-FS-21236
Light beam transmits heartbeat signal from electrodes on patient to electrocardiograph without exposing patient to possible severe electrical shock. System provides complete isolation between patient and EKG instrumentation.

B71-10137
SPRAY MOMENTUM MEASURING SYSTEM
SHEFFIELD, E. W./TRW SYSTEMS GROUP/
MAY 1971
MSC-12305
Technique enables accurate prediction of erosion and cavitation produced by fluid spray. Method measures high velocity sprays produced by small orifices. Originally designed to determine oxidizer-injection patterns of liquid fueled rocket engines, technique is used with other liquids, or, with appropriate modification, with gases.

B71-10163
MINIATURE IMPLANTABLE INSTRUMENT MEASURES AND TRANSMITS HEART FUNCTION DATA
LEE, R. D.
JUN. 1971
ARC-10201
Heart diameter is derived from measured transit time of 2.25 MHz ultrasonic pulse between two piezoelectric crystals attached to diametrically opposite heart surfaces. Miniature instrument implanted in chest telemeters information to external receiver-converter. System permits continual dimensional data recording taken from awake animals during long-term experiments.

B71-10167
STABLE, INFLATABLE LIFE RAFT FOR HIGH SEAS RESCUE OPERATIONS
BARNETT, J. H., JR. HARRISON, F. MARAK, R. RADNOFSKY, M. I.
JUN. 1971
MSC-12393
Raft is easily deployed and highly maneuverable in water. It has false bottom of water ballast containers attached to underside, making it exceptionally stable platform from which swimmers can operate. Raft is attachable to external moorings.

B71-10192
ANALYTICAL METHODS FOR BACTERIAL KINETICS STUDIES
EDWARDS, V. E. WILKE, C. R.
JUN. 1971 SEE ALSO UCRL-16398
LRL-10011
Methods utilize mathematical equations and models and specialized computer techniques. Techniques apply to food production, complex chemicals production, and polluted water purification.

B71-10200
INERTIA DIAPHRAGM PRESSURE TRANSDUCER
SEEGMILLER, H. L. B.
JUN. 1971
XAC-2981
Transducer measures gas pressure profiles in high temperature, short duration, gas flows usually found in devices where pressure pulses may have durations of few microseconds to several milliseconds. Assembly includes fluid delay line, delay chamber, and flow restrictor for equalizing steady state pressure on diaphragm's sides

B71-10202
ATTITUDE CONTROLS FOR VTOL AIRCRAFT
PAULI, F. A.
JUN. 1971 SEE ALSO NASA-TN-D-5715
XAC-8972
Systems consist of single duct system with two sets of reaction control nozzles, one linked mechanically to pilot's controls, and other set driven by electric servomotors commanded by preselected combinations of electrical signals.

B71-10241
TILT TABLE FOR ERGOMETERS AND OTHER BIOMEDICAL DEVICES
GAUSE, R. L. SPIER, R. A.
JUL. 1971
M-FS-21010
Table adjusts to any position between horizontal and vertical. Apparatus includes - floor plate, plate hinged to floor plate, for carrying ergometer, hydraulic cylinder and piston on plate sides, linking them, hydraulic system, positive stops, padded backrest and headrest, one hand controls, and constraint system.

B71-10312
INSTRUMENT DETECTS BACTERIAL LIFE FORMS
PLAKAS, C./BIOSPHERICS RES., INC./
AUG. 1971
GSFC-10972
Instrument assays enzymatic bioluminescent reaction that occurs when adenosine triphosphate /ATP/ combines with lucifrase and luciferin. Module assembly minimizes need for hardware associated with reaction fluid and waste transfer. System is applicable in marine biology and aerospace and medical fields.

B71-10316
VISCOELASTIC CUSHION FOR PATIENT SUPPORT
SAUERS, D. G.
AUG. 1971
MSC-12447
Flexible container, filled with liquid, provides supportive device which conforms to patient's anatomy. Uniform cushion pressure prevents formation of decubitus ulcers, while the porous sponge substructure damps fluid movement through cushion response so that patient is not dumped when his weight shifts.

B71-10329
A SYSTEM FOR THE AUTOMATIC MEASUREMENT AND DIGITAL DISPLAY OF SYSTOLIC AND DIASTOLIC BLOOD PRESSURES
SCHULZE, A. E./TEX. UNIV./
AUG. 1971
MSC-13227
Basic components of system are - occluding cuff with mounted cuff microscope, cuff pump deflator, pressure transducer, preamplifier unit, electrocardiograph machine, an analog to digital convertor unit, and digital display unit. System utilizes indirect auscultatory method, based on Korotkoff sounds, for measurement.

B71-10330
NEW METHOD SPEEDS BODY INERT GAS SATURATION AND UTILIZES SURFACE DECOMPRESSION
EDEL, P. O./J. AND J. MARINE DIVING CO., INC./
AUG. 1971
MSC-13543
Method reduces required saturation time from three days to six hours and also reduces required decompression time. Waiting time for planning underwater research is therefore reduced, and emergency surfacing is possible.

B71-10332
THE DETERIORATION OF INTERMEDIATE MOISTURE FOODS
LABRUZA, T. P./MIT/
AUG. 1971
MSC-13827
Deteriorative reactions are low and food quality high if intermediate moisture content of a food is held at a water activity of 0.6 to 0.75. Information is of interest to food processing and packaging industry.

B71-10355
CADMIUM PLATED STEEL CAPS SEAL ANODIZED ALUMINUM FITTINGS
PADDEN, J./CHRYSLER CORP./
SEP. 1971
M-FS-20137
Cadmium prevents fracturing of hard anodic coating under torquing to system specification requirements, prevents galvanic coupling, and eliminates need for crush washers, which, though commonly used in industry, do not correct leakage problem experienced when anodized aluminum fittings and anodized aluminum cap assemblies are joined.

B71-10387
TREATMENT OF BLUEBERRIES PRIOR TO FREEZE DEHYDRATION
LARSON, R. W./WHIRLPOOL CORP./
OCT. 1971
MSC-13573
Softening blueberry skin by treatment with weak solution of sodium hydroxide prior to freeze dehydration prevents tough, chewy skins upon rehydration.

B71-10466
METABOLIC BREATH ANALYZER
PERRY, C. L.
DEC. 1971
M-FS-21415
Instrument measures metabolic breathing rate and dynamics of human beings in atmospheres ranging from normal air to 100 percent oxygen at ambient pressures from 14.7 to 3.0 psia. Measurements are made at rest or performing tasks up to maximum physical capacity under either zero or normal gravity.

B71-10475
IMPROVED VACUUM PROBE COLLECTS SURFACE-CONTAMINATION SAMPLES
ZAHLAVA, B. A./BECKTON, DICKENSON, AND CO./
DEC. 1971 SEE ALSO B68-10231 NASA-CR-111796
LANGLEY-10623
Redesigned vacuum-probe surface sampler, consisting of wand with disposable probe and filter assembly, collects specimens of fallout and handling contamination.

B71-10476
EYE POINT-OF-REGARD SYSTEM
JEX, H. R./SYSTEMS TECHNOL., INC./
DEC. 1971
ARC-10360
System measures intersection of line of sight and eye point of regard /EPR/ for a human operator in visual scanning system. Device measures two head to reference angles with EPR system and adds them with eye to head angles, yielding a dc signal proportional to picture plane coordinates.

B71-10477
MINIATURE BATTERY-OPERATED ELECTROMAGNETIC SYSTEM FOR BLOOD FLOW MEASUREMENTS
FRYER, T. B.
DEC. 1971
ARC-10362
System consisting of solid state electronics package and a pair of standard flow-transducer cuffs is useful in cardiovascular studies. Device shows good zero stability and calibrations, and low noise levels.

B71-10485
IMPROVED ORTHOPEDIC ARM JOINT
DANE, D. H.
DEC. 1971
M-FS-21611
Joint permits smooth and easy movement of disabled arm and is smaller, lighter and less expensive than previous models. Device is interchangeable and may be used on either arm at the shoulder or at the elbow.

B71-10487
MICROORGANISM SAMPLE DEVICE
REED, L. L./LOCKHEED MISSILES AND SPACE CO./ SMITH, J. M.
DEC. 1971 SEE ALSO B69-10223
LANGLEY-10258
Device, based on gel-impingement technique, collects microorganism specimens from circulating air streams. Device is useful to air pollution studies involving the collection of airborne microbial specimens.

B71-10495
REUSABLE ANAEROBIC SYSTEM FOR MICROBIOLOGICAL STUDIES - A CONCEPT
MURAWCZYK, C./MARTIN MARIETTA CORP./
DEC. 1971
MSC-13920
Simple, low cost system consists of semirigid incubation chamber with clear Teflon window, airtight zipper and internal compartments for petri dishes or microbial plates. Device interests schools, medical laboratories, and manufacturers of biological and pharmaceutical supplies.

B71-10521
DEVELOPMENT OF NON-SWEET, FLAVORED FOOD CUBES
LARSON, R. W./WHIRLPOOL CORP./
DEC. 1971
MSC-14002
Food cubes exhibit flavor and quality stability for periods of four weeks in 100 deg F environment. They are suitable for field rations, emergency rations or snacks and should interest the food processing industry.

B72-10006
COVALENT BONDING OF ANTIBODIES OF POLYSTYRENE LATEX BEADS: A CONCEPT
H. J. Tenoso (Aerojet-Gen.) and D. G. Smith (Aerojet-Gen.)
1972
MSC-13906
Technique facilitates purification of vaccines and production of immunoadsorption columns exhibiting relatively long stability. Information interests biochemists, medical researchers, and pharmaceutical manufacturers.

B72-10017
QUICK, EASY TO PREPARE FREEZE-DRIED SOUPS
R. V. Ramirez (Whirlpool Corp.) and R. W. Larson (Whirlpool Corp.)
1972
MSC-14003

Major advantages of soups are that they totally rehydrate in less than five minutes in water at approximately 150 deg F, maintain flavor and quality stability for two weeks in a 100 F environment, and remain stable for considerably longer at ambient temperatures. They are suitable for either household or field use.

B72-10031
NEW REACTION TESTER ACCURATE WITHIN 56 MICRO-SECONDS
H. Brown (GE)
1972
MSC-13604

Testing device measures simple and disjunctive reaction time of human subject to light stimuli. Tester consists of reaction key, logic card, panel mounted neon indicators, and interconnecting wiring. Device is used for determining reaction times of patients undergoing postoperative neurological therapy.

B72-10032
AN IMPROVED AESTHESIOMETER
D. Wright (GE) and R. Richardson (GE)
1972
MSC-13609

Biomedical tool measures cutaneous sensory perception by allowing consistent application of regular and determinable pressure to skin of the individual. Device is of relatively simple construction, inexpensive to manufacture, and easy to operate.

B72-10035
IMPLANTED TELEMETER FOR ELECTROCARDIOGRAM AND BODY TEMPERATURE
W. F. Barrows
1972
XAC-08505

Measuring system requiring one blocking oscillator to generate modulated pulse repetition rate is implantable in the bodies of small animals. Device has life of two years and transmission range of about three feet. EKG sensing unit also is used to sense electromyogram or electrooculogram of laboratory animals.

B72-10046
WEIGHT SIMULATOR
W. H. Howard and D. R. Young
1972
ARC-10100

Device applies compressive force to bone to minimize loss of bone calcium during weightlessness or bedrest. Force is applied through weights, or hydraulic, pneumatic or electrically actuated devices. Device is lightweight and easy to maintain and operate.

B72-10061
A DIFFERENTIAL ECG AMPLIFIER WITH SINGLE-ENDED OUTPUT
L. Katchis (Radionics, Inc.)
1972
ARC-10411

Three-stage amplifier is used for ECG measurements which require conversion of differential input to single-ended output. Circuit may be useful in biological telemetry for amplification of signals from specimen-implanted sensors.

B72-10062
STABILIZATION OF LACTATE DEHYDROGENASE
O. M. Friedman (Collaborative Res., Inc.)
1972 See also NASA-CR-73460
ARC-10415

Addition of substances such as dimethylsulfoxide, glycerol, and gelatin to aqueous solutions of lactate dehydrogenase maintains enzymes in stable and fully active form when stored at 2 - 6 C.

B72-10125
TIME-LAPSE CAMERA FOR MICROSCOPY
J. E. Cook (Tex. Univ.)
1972
ARC-10423

Compact, lightweight camera which advances film frames without use of conventional sprockets and slip clutches obtains time lapse photomicrographs of human cell growth in a zero-G environment over a period of about a month.

B72-10126
PROGRAMMED PHYSIOLOGICAL INFUSION SYSTEM
W. H. Howard, D. R. Young, and R. R. Adachi
1972
ARC-10447

Infusion system delivers incremental volumes from a reservoir with a piston pump at a rate that varies in time and follows the envelope of a preprogrammed curve.

B72-10168
SPACE-SUIT CARBON DIOXIDE ABSORPTION SYSTEM: A CONCEPT
R. J. Copeland (Vought Missiles and Space Co.) and B. W. Webbon (Vought Missiles and Space Co.)
1972 See also NASA-CR-114321
ARC-10546

Partial pressure of carbon dioxide within a space suit is maintained at safe levels by regenerating carbon dioxide with potassium hydroxide solution on board spacecraft or by portable units.

B72-10189
CINE RECORDING OPHTHALMOSCOPE
J. W. Fitzgerald
May 1972
ARC-10399

Camera system provides accurate photographic recording during acceleration of centrifuge and permits immediate observation of dynamic changes in retinal circulation by a closed-circuit television loop. System consists of main camera, remote control unit, and strobe power supply unit, and is used for fluorescein studies and dynamometry sequences.

B72-10193
PROJECTIONS OF SCAN PATTERNS ON HUMAN RETINA
D. H. Kelly (Stanford Res. Inst.) and H. D. Crane (Stanford Res. Inst.)
May 1972 See also NASA-CR-1121
ARC-10181

Fundus camera tracks eye movements by using camera optics with the aid of an inverted system. Camera provides a flying-spot circular scanning light source in the normal film plane and a broadband photodetector in position normally occupied by light source.

B72-10194
CARBON DIOXIDE CONCENTRATOR
C. F. Williams (TRW, Inc.) and R. G. Huebscher (TRW, Inc.)
May 1972 See also NASA-CR-73397
ARC-10245

Device passed exhaled air through electrochemical cell containing alkali metal carbonate aqueous solution, and utilized platinized electrodes causing reaction of oxygen at cathode with water in electrolyte, producing hydroxyl ions which react with carbon dioxide to form carbonate ions.

B72-10195
AIRCREW OXYGEN SYSTEM
A. D. Babinsky (TRW, Inc.), R. J. Kiraly (TRW, Inc.), and R. A. Wynveen (TRW, Inc.)
May 1972
ARC-10247

Closed-loop rebreather system which includes pilot provides oxygen for use in aircraft by safe, reliable method of low weight and size and reduces expense of ground equipment. Water electrolysis generated oxygen is fed into rebreather loop which allows nitrogen elimination and water and carbon dioxide removal.

B72-10200
HEART CATHETER CABLE AND CONNECTOR
D. R. Harrison, F. L. Cota, and H. Sandler
May 1972
ARC-10406

Ultraminiature catheter cables that are stiff enough for intravenous insertion yet flexible at the tip, sterilizable, and economical are fabricated entirely from commercially available parts. Assembly includes air passageway for reference pressures and coaxial cable for transmission of signals from the tip of catheter.

B72-10203
VISUAL SENSITIVITY TESTER
R. F. Haines, J. W. Fitzgerald, and S. A. Rositano
May 1972 See also NASA-TN-D-6190
ARC-10329

Testing device uses closed loop film cassettes to project programmed visual stimuli on screen which the observer views through a lens making the stimuli appear to be at optical infinity. Tester is useful for determining changes in glautomatous visual field sensitivity.

B72-10205
A DUAL-BEAM ACTINIC LIGHT SOURCE FOR PHOTOSYNTHESIS RESEARCH
A. P. Margozzi and M. E. Henderson
May 1972
ARC-10351

Simulation of photosynthetic process in plants is accomplished by using two separate and identical optical channels that provide independently adjustable wavelengths (filters), shutter sequencing, and control intensity of illumination. In addition to experiments using electron paramagnetic resonance spectroscopy, system may be applicable to other types of research in photosynthetic field.

B72-10219
COUNTER LUNG
A. D. Babinsky (TRW, Inc.) and R. J. Kiraly (TRW, Inc.)
1972 See also NASA-CR-73396
ARC-10248

Counter lung, incorporated in closed-loop rebreathing system, accommodates user's breathing tidal volume so that the loop pressure is relatively constant during breathing cycles.

B72-10220
SCANNING TECHNIQUE FOR TRACKING SMALL EYE-MOVEMENTS
D. H. Kelly (Stanford Res. Inst.) and H. D. Crane (Stanford Res. Inst.)
1972 See also NASA-CR-114307
ARC-10488

Scanning technique images spot of blue light on fundus, measures variations in reflectance of spot and compares reflectance pattern with a stored reference pattern. Method then converts the difference from stored pattern into infrared eye motion.

B72-10224
EAR OXIMETER-TRANSDUCER MONITORS FOUR PHYSIOLOGICAL RESPONSES
J. R. Smith, Jr.
1972
XAC-05422

Device monitors blood oxygen saturation, blood pressure, pulse rate, and pulse-pressure curve during conditions of high stress in simulated space flight.

B72-10229
CONTINUOUS MONITOR FOR GAS RATIOS IN A MIXTURE
S. H. Gorland and M. J. Leroy, Jr.
May 1972 See also B67-10063; NASA-TM-X-1939
LEWIS-11095

Fluidic oscillator, incorporating piezoelectric transducer to sense molecular weight of gas mixture, is used to continuously monitor ratio of a mixture of two gases in a flowing system. Device is lightweight, compact, reliable, easy to install, and also produces a simple output signal for controller. Frequency of oscillation is measured and signal converted to ac output.

B72-10233
MERCURY IN THE ENVIRONMENT
W. Fulkerson, W. S. Lyon, W. D. Shults, and R. A. Wallace
Dec. 1972 See also ORNL-NSF-EP-1
AEC-10048

Problems in assessing mercury concentrations in environmental materials are discussed. Data for situations involving air, water, rocks, soils, sediments, sludges, fossil fuels, plants, animals, foods, and man are drawn together and briefly evaluated. Details are provided regarding the toxicity of mercury along with tentative standards and guidelines for mercury in air, drinking water, and food.

B72-10243
QUARTZ CRYSTAL MICROBALANCE USE IN BIOLOGICAL STUDIES
R. H. Green, J. F. Godfrey, E. G. Laue, T. M. Laue, W. W. Paik, and M. D. Wardle
Aug. 1972
NPO-11346

Design, development, and applications of quartz crystal microbalance are discussed. Two types of crystals are used. One serves as reference and other senses changes in mass. Specific application to study of bacterial spores is described.

B72-10279
BALANCED-BELLOWS SPIROMETER
G. G. Holden and J. R. Smith, Jr.
Sep. 1972
XAC-01547

Compact balanced-bellows dry type spirometer was designed to be insensitive to acceleration fields along any or all coordinate axes. It provides true indication of respiratory action of test subject without need for calibration in acceleration fields.

B72-10281
IMPROVED TEMPERATURE CONTROL OF LIQUID COOLING GARMENTS
C. W. G. Flucher (GE)
Jun. 1972 See also NASA-CR-115122
MSC-13917

Skin and auditory meatus temperature readings supply control signal for temperature control valve in fluid temperature control system which provides increased subject comfort and responds to directly measured physiological cooling needs. System applications include medical care and thermal protection garment manufacturing.

B72-10297
SPACE SUIT MAY HAVE ORTHOTIC APPLICATIONS
H. C. Vykukal
Sep. 1972
ARC-10275

Application of movable joints for spacesuits to orthotic and prosthetic devices is discussed. Specifications of the joints, degrees of movement, and details of construction are described. Illustrations of the equipment are provided.

B72-10298
REAL-TIME PAIR-FEEDING OF ANIMALS
H. A. Leon, J. P. Connolly, M. J. Hitchman, and J. E. Humbert
Sep. 1972
ARC-10302

Automatic pair-feeding system was developed which immediately dispenses same amount of food to control animal as has been consumed by experimental animal that has free access to food. System consists of: master feeding system; slave feeding station; and control mechanism. Technique performs real time pair-feeding without attendant time lag.

B72-10301
PROTECTIVE ENCAPSULATION OF IMPLANTABLE BIOTELEMETRY UNITS
N. C. Tombs and J. M. Pope
Sep. 1972
ARC-10514

Development of materials for encapsulating electronic devices used in biotelemetry is discussed. Chemical resistance of materials to effects of animal fluids is described. Silicone rubber is

recommended as basic material with polymers applied to outer surface for protective coating.

B72-10303
CUTTING THIN SECTIONS OF BONE
W. W. Ashley
Sep. 1972
ARC-10555

Medical equipment for obtaining repetitive planoparallel sections of bone to study healing of bone structure under high gravity stress is described. Device consists of modified saw with diamond cutting edges. Construction of device and manner of use are explained.

B72-10334
BLOOD PRESSURE MEASUREMENT AND DISPLAY SYSTEM
A. J. Farkas
Dec. 1972
MSC-13036

System is described that employs solid state circuitry to transmit visual display of patient's blood pressure. Response of sphygmomanometer cuff and microphone provides input signals. Signals and their amplitudes, from turn-on time to turn-off time, are continuously fed to data transmitter which transmits to display device.

B72-10371
SMALL, LOW COST, ARTIFICIAL KIDNEY
A. R. Lavender and F. W. Markley
Dec. 1972
AEC-10011

Disposable hemodialyzer is described that can be used at home by non-medically trained personnel. Short lengths of semipermeable membrane tubes are arranged in parallel, supported by plastic mesh and encased in epoxy at ends. Tubes are connected to input and output blood manifolds which are separated by dialysate chamber. Daily dialysis requires only two hours or less.

B72-10391
COMPRESSION AND R-WAVE DETECTION OF ECG/VCG DATA
W. L. Hayden (TRW Systems Group), M. F. Conover (TRW Systems Group), and W. P. Bennett (TRW Systems Group)
Jul. 1972 See also NASA-CR-115177
MSC-14126; MSC-14127

Application of information theory to eliminate redundant part of electrocardiogram or vectorcardiogram is described. Operation of medical equipment to obtain three dimensional study of patient is discussed. Use of fast Fourier transform to accomplish data compression is explained.

B72-10395
MICROBIOLOGICAL SURFACE SAMPLING CART
J. R. Wilkins and S. M. Mills
Jul. 1972
LANGLEY-11069

Mobile sampling cart automatically swabs surfaces for the recovery of microorganisms. Unit operates without human involvement and provides for control of swabbing speed, rotation of cotton swab, and the pressure and angle applied to swab. Capability of reverse direction is also available. Sampling cart use is limited to flat surfaces.

B72-10402
A CONTINUOUS PHYSIOLOGICAL DATA COLLECTOR
J. C. Bush
Jul. 1972
M-FS-20835

COP-DAC system utilizes oxygen and carbon dioxide analyzers, gas-flow meter, gas breathe-through system, analog computer, and data storage system to provide actual rather than average measurements of physiological and metabolic functions.

B72-10415
SILVER STAIN FOR ELECTRON MICROSCOPY
R. L. Corbett
Sep. 1972
ARC-10661

Ammoniacal silver stain used for light microscopy was adapted advantageously for use with very thin biological sections required for electron microscopy. Silver stain can be performed in short time, has more contrast, and is especially useful for low power electron microscopy.

B72-10429
PHOSPHORUS IN LAND-WATER SYSTEMS
W. B. Bonner and T. Tamura
Dec. 1972
AEC-10049

Analyses were made to obtain information on distribution of different forms of phosphate in different environmental media, including soils, eroding material, and bottom sediment. Major emphasis was placed on determining several forms of inorganic phosphate in each medium. Results show that eroding material can transport significant quantities of phosphates from soils.

B72-10450
ULTRASONIC BONE DENSITOMETER
J. M. Hoop
Aug. 1972
M-FS-20994

Human bone density changes can be determined by a device originally developed for in-flight testing of astronauts' bones during extended space missions. Device is comparable in size, weight and power consumption to portable television set.

B72-10461
INTRAVENOUS FLUID FLOW METER CONCEPT FOR ZERO GRAVITY ENVIRONMENT
C. G. Miller (Serv. Technol. Corp.)
Aug. 1972
MSC-14123

Measuring chamber, included in infusion-set tubing, and peristaltic flow meter concept can be incorporated into flow meter that measures fluid flow rates between 100 and 600 cu cm per hour and at the same time maintains sterilization.

B72-10482
A MAGNETIC MOUSE ACTIVITY METER
J. Henry (Univ. of Southern Calif.), R. P. Rader (Univ. of Southern Calif.), and J. P. Henry
Aug. 1972
HQ-10664

Activity meter has been developed using Hall effect devices that record passage of selected groups of magnetically tagged mice. Two small permanent magnets are implanted in belly and back of selected mice and electronic circuits are activated as mice move between cages. System has advantage over tagging, detecting, and identification methods currently used.

B72-10512
ELECTRONIC CIRCUIT DETECTS LEFT VENTRICULAR EJECTION EVENTS IN CARDIOVASCULAR SYSTEM
V. D. Gebben and J. A. Webb, Jr.
Aug. 1972
LEWIS-11581

Electronic circuit processes arterial blood pressure waveform to produce discrete signals that coincide with beginning and end of left ventricular ejection. Output signals provide timing signals for computers that monitor cardiovascular systems. Circuit operates reliably for heart rates between 50 and 200 beats per minute.

B72-10522
AN EFFICIENT, SIMPLE DIALYZER
S. A. Miller (Emory Univ.)
Dec. 1972
HQ-10741

Easily assembled, efficient, countercurrent, sandwich-type barrier dialyzer was developed. Dialyzer contains six blood

chambers that provide 500 sq cm membrane area. Design membranes are cuprammonium cellulose film. Unit performance was compared with thirteen other dialyzers.

B72-10525
A REUSABLE PREPOSITIONED ATP REACTION CHAMBER
D. G. Hoffman (Bisopherics, Inc.)
Aug. 1972
HQ-10660

Luminescence biometer detects presence of life by means of light-emitting chemical reaction of luciferin and luciferase with adenosine triphosphate (ATP) that occurs in all living cells. Amount of light in reaction chamber is measured to determine presence and extent of life.

B72-10526
CARBON DIOXIDE CONCENTRATION INDICATOR
P. H. King (GE)
Aug. 1972
HQ-10582

Device will provide visual indication of concentration of carbon dioxide. It consists of small amounts of absorbent material contained in semipermeable membrane and device to detect color changes. Material will absorb quantity of carbon dioxide proportional to carbon dioxide concentration in atmosphere. Amount of absorption is indicated by color change.

B72-10531
SENSOR CAPSULE FOR DIAGNOSIS OF GASTRIC DISORDERS
J. T. Holen (McDonnell-Douglas Corp.)
Aug. 1972
HQ-10767

Motility and pH sensor capsule is developed to monitor gastric acidity, pressure, and temperature. Capsule does not interfere with digestion. Sensor is capsule which includes pH electrode, Pitran pressure transducer, and thermistor temperature sensor all potted in epoxy and enclosed in high density polyethylene sheath.

B72-10533
PATIENT'S BREATH CONTROLS COMFORT DEVICES
M. Schrader (Southwest Res. Inst.), B. Carpenter (Southwest Res. Inst.), and C. D. Nichols
Sep. 1972
LANGLEY-11138

Patient assist system for totally disabled persons was developed which permits a person, so paralyzed as to be unable to move, to activate by breathing, a call system to summon assistance, turn the page of a book, adjust his bed, or do any one of a number of other things. System consists of patient assist control and breath actuated switch.

B72-10547
STERILE CHAMBER OPERATION WITH BIO-ISOLATOR SUIT SYSTEM
R. M. Hueschen
Sep. 1972
LANGLEY-11054

Development and characteristics of protective suit to permit man to operate in biologically sterile environment are described. Construction of tunnel, flexible seals, and cooling system are analyzed. Illustration of isolation suit is provided.

B72-10557
METERED OXYGEN SUPPLY AIDS TREATMENT OF DOMESTIC SEWAGE
N. Weliky (TRW Systems Group), T. J. Hooper (TRW Systems Group), and H. P. Silverman (TRW Systems Group)
Sep. 1972 see also NASA-CR-73033
ARC-10024

Microbiological fixed-bed process was developed in which supplementary oxygen required by microbial species is supplied by electrochemical device. Rate of addition of oxygen to waste treatment process is controlled to maintain aerobic metabolism and prevent anaerobic metabolisms which produce odorous or toxic products.

B72-10559
A THERMOCOUPLE THERMODE FOR SMALL ANIMALS
B. A. Williams
Sep. 1972
ARC-10550

Thermode composed of two thin-walled stainless steel hypodermic needles and copper-constantan thermocouple or small thermistor to indicate temperature at point of perfusion is used to measure brain temperature in animals. Because of relatively small size of thermode, structural damage to brain is minimized.

B72-10579
LOUDNESS (ANNOYANCE) PREDICTION PROCEDURE FOR STEADY SOUNDS
W. L. Howes and E. A. LaSalvia
Oct. 1972 See also NASA-TM-X-2300
LEWIS-11761

Method has been devised to predict loudness level of any steady sound solely from its measured power spectrum level. Method is based on assumption that, with respect to loudness sensation, the human auditory system acts as open-loop transmission system with transmittance function determined from measured tone curves.

B72-10588
TECHNICAL MANAGEMENT TECHNIQUES FOR IDENTIFICATION AND CONTROL OF INDUSTRIAL SAFETY AND POLLUTION HAZARDS
R. Campbell, M. K. Dyer, E. G. Hoard, D. G. Little, and A. C. Taylor
Dec. 1972 See also NASA-TM-X-2567
M-FS-21883

Constructive recommendations are suggested for pollution problems from offshore energy resources industries on outer continental shelf. Technical management techniques for pollution identification and control offer possible applications to space engineering and management.

B72-10617
Dc MOTOR PROPORTIONAL CONTROL SYSTEM FOR ORTHOTIC DEVICES
H. T. Blaise and J. R. Allen (Rancho Los Amigos Hosp.)
Oct. 1972
M-FS-21573

Multi-channel proportional control system for operation of dc motors for use with externally-powered orthotic arm braces is described. Components of circuitry and principles of operation are described. Schematic diagram of control circuit is provided.

B72-10630
TISSUE HOLDER FOR EXPERIMENTAL AND DEMONSTRATION SURGERY
F. J. Kuchta, J. B. Pavlik, D. J. Vargo, and G. R. Winters
Nov. 1972
LEWIS-11755

Development of device for holding anatomical tissues during operations is discussed. Device consists of plastic dish with hemispherical recess in center to hold excised eyes. Low vacuum applied to underside of recess insures holding of part.

B72-10632
A SYSTEM FOR AUTOMATIC ANALYSIS OF BLOOD PRESSURE DATA FOR DIGITAL COMPUTER ENTRY
R. L. Miller
Nov. 1972 See also NASA-TM-X-2519
LEWIS-11751

Operation of automatic blood pressure data system is described. Analog blood pressure signal is analyzed by three separate circuits, systolic, diastolic, and cycle defect. Digital computer output is displayed on teletype paper tape punch and video screen. Illustration of system is included.

B72-10637
AUTOMATIC AGAR TRAY INOCULATION DEVICE
J. R. Wilkins and S. M. Mills
Oct. 1972
LANGLEY-11074

Automatic agar tray inoculation device is simple in design and foolproof in operation. It employs either conventional inoculating loop or cotton swab for uniform inoculation of agar media, and it allows technician to carry on with other activities while tray is being inoculated.

B72-10641
QUICK-DONNING BACKPACK HARNESS
D. F. Thomas, Jr.
Dec. 1972
LANGLEY-10102

Harness device permits user to quickly put on or take off load carried in backpack arrangement. It can be attached with one hand; has controlled deformation belt that automatically encircles user upon application of pressure; has rigid shoulder harness elements which move automatically into place; and primary attachment components that cannot be displaced while harness is in place.

B72-10642
IMPROVED BIOMEDICAL ELECTRODE
J. D. Frost, Jr. (Baylor Univ.)
Oct. 1972
MSC-13648

Newly designed electrode is prefilled, disposable, electrolyte-saturated sponge. New design permits long periods of storage without deterioration, and readiness in matter of seconds. Electrodes supply signals for electroencephalogram, electro-oculogram, and electrocardiogram.

B72-10652
SPEECH THERAPY AND VOICE RECOGNITION INSTRUMENT
J. Cohen (Ill. Univ.) and M. L. Babcock (Ill. Univ.)
Oct. 1972
HQ-10628

Characteristics of electronic circuit for examining variations in vocal excitation for diagnostic purposes and in speech recognition for determining voice patterns and pitch changes are described. Operation of the circuit is discussed and circuit diagram is provided.

B72-10653
A PROCESS YIELDS LARGE QUANTITIES OF PURE RIBOSOME SUBUNITS
M. Friedman (MIT), P. Lu (MIT), and A. Rich (MIT)
Oct. 1972
HQ-10662

Development of process for in-vitro protein synthesis from living cells followed by dissociation of ribosomes into subunits is discussed. Process depends on dialysis or use of chelating agents. Operation of process and advantages over previous methods are outlined.

B72-10657
BREATHING-METABOLIC SIMULATOR
R. G. Bartlett (IBM), C. M. Hendricks (IBM), and W. B. Morison (IBM)
Oct. 1972 See also B72-10658; B72-10659; B72-10660; B72-10661
HQ-10766

Breathing-metabolic simulator was developed to be used for evaluation of life support equipment. Apparatus simulates human breathing rate and controls temperature and humidity of exhaled air as well as its chemical composition. All functions are designed to correspond to various degrees of human response.

B72-10658
METABOLIC SIMULATION CHAMBER
R. G. Bartlett (IBM) and C. M. Hendricks (IBM)
Oct. 1972 See also B72-10657; B72-10659; B72-10660; B72-10661
HQ-10776

Metabolic simulation combustion chamber was developed as subsystem for breathing metabolic simulator. Entire system is used for evaluation of life support and resuscitation equipment. Metabolism subsystem simulates a human by consuming oxygen and producing carbon dioxide. Basic function is to simulate human metabolic range from rest to hard work.

B72-10659
DRIVE MECHANISM FOR PRODUCTION OF SIMULATED HUMAN BREATH
R. G. Bartlett (IBM), C. M. Hendricks (IBM), J. W. Lambert (IBM), and W. B. Morison (IBM)
Dec. 1972 See also B72-10657; B72-10658; B72-10660; B72-10661
HQ-10777

Simulated breath drive mechanism was developed as subsystem to breathing metabolic simulator. Mechanism reproduces complete range of human breath rate, breath depth, and breath waveform, as well as independently controlled functional residual capacity. Mechanism was found capable of simulating various individual human breathing characteristics without any changes of parts.

B72-10660
TEMPERATURE AND HUMIDITY CONTROL OF SIMULATED HUMAN BREATH
R. G. Bartlett (IBM) and C. M. Hendricks (IBM)
Dec. 1972 See also B72-10657; B72-10658; B72-10659; B72-10661
HQ-10778

Subsystem was developed for breathing metabolic simulator which adjusts temperature and humidity of air to levels of human exhaled breath. Temperature-humidity subsystem is described, consisting of aluminum enclosure with 400 watt heat sheet glued to bottom, vertical separators, inlet connection, and check valve.

B72-10661
SIMULATED BREATH WAVEFORM CONTROL
R. G. Bartlett (IBM), C. M. Hendricks (IBM), and W. B. Morison (IBM)
Dec. 1972 See also B72-10657; B72-10658; B72-10659; B72-10660
HQ-10779

Subsystem was developed which provides twelve waveform controls to breath drive mechanism. Twelve position, magnetically actuated rotary switch is connected to one end of crankshaft drive, such that it makes one complete revolution for each simulated breath. Connections with common wired point are included in modifications made to standard motor speed controller.

B72-10690
AN EFFICIENT PREBREATHING APPARATUS FOR HUMANS DURING DECOMPRESSION
J. R. Jaax and G. P. Mills (United Aircraft Corp.)
Dec. 1972
MSC-14151

Portable prebreathing system was developed which recirculates and reconditions respiratorily exhaled oxygen. Apparatus reduces fire hazards, simplifies prebreathing procedures, and does not require extensive enclosure venting system usage.

B72-10695
IMPROVED ULTRASONIC BIOMEDICAL MEASURING APPARATUS
R. D. Lee
Dec. 1972
ARC-10597

Device for making measurements of organs in living specimens and recording movements of organs is described. System uses series of ultrasonic pulses beamed into body of animal. Reflected echo pulses are picked up by transducers and recorded. Diagram of equipment required and method of application is included.

B72-10698
IMPROVED ELECTRODES FOR SKIN CONTACTS
J. G. Castle (Ala. Univ.) and R. R. Lattanzi (Ala. Univ.)
Dec. 1972
M-FS-21926

Design is described of thick, flexible electrodes with appropriate metal surfaces which prevent unnecessary skin motion. Electrodes provide sufficient radial pressure directed toward body surface to depress skin a noticeable portion of its normal resilient thickness.

B72-10708
IMPLANTABLE DRUG THERAPY DEVICE: A CONCEPT
C. Feldstein
Dec. 1972
NPO-11934

Design is described of small, rechargeable, implantable infusor which contains fluid medicament stored under pressure and which dispenses fluid continuously through catheter. Body of infusor is covered by pliable silicone rubber sheath attached to suture pad for securing device.

B72-10730
IMPROVED MEASUREMENT OF DEPTH PERCEPTION
R. C. Fitch and D. D. Miller (Technol. Inc.)
Dec. 1972
M-FS-14133

Electromechanical system for Howard-Dolman device was developed. System is used for human depth perception measurements without tactual stimuli.

B72-10732
EFFECT OF THE METHOD OF PROCESS ON THE CONTROL OF MICROBIAL GROWTH BY WATER ACTIVITY IN FOODS
T. P. Labuzu (MIT)
Dec. 1972
MSC-14234

Two methods for preparation of intermediate moisture foods (IMF) were investigated: water absorption and water desorption technique. Results indicate that shelf stability of IMP systems might be enhanced by preparing foods by rehumidifying dehydrated foods to optimum water activity rather than drying food to reduce the water activity.

B72-10756
AUTOMATED ANALYSIS OF BLOOD PRESSURE MEASUREMENTS (KOROTKOV SOUND)
D. P. Golden (Technol., Inc.), G. W. Hoffler, and R. A. Wolthuis (Technol., Inc.)
Dec. 1972
MSC-13999

Automatic system for noninvasive measurements of arterial blood pressure is described. System uses Korotkov sound processor logic ratios to identify Korotkov sounds. Schematic diagram of system is provided to show components and method of operation.

B73-10033
MATHEMATICAL MODEL FOR PREDICTING HUMAN VERTEBRAL FRACTURE
J. V. Benedict (Technol. Inc.)
Feb. 1973 See also NASA-CR-114452
ARC-10691

Mathematical model has been constructed to predict dynamic response of tapered, curved beam columns in as much as human spine closely resembles this form. Model takes into consideration effects of impact force, mass distribution, and material properties. Solutions were verified by dynamic tests on curved, tapered, elastic polyethylene beam.

B73-10045
RAPID DETECTION OF BACTERIA IN FOODS AND BIOLOGICAL FLUIDS
R. D. Fealey and W. Renner
Feb. 1973
GSFC-11738

Simple and inexpensive apparatus, called 'redox monitoring cell,' rapidly detects presence of bacteria. Bacteria is detected by measuring drop in oxygen content in test solution. Apparatus consists of vial with two specially designed electrodes connected to sensitive voltmeter.

B73-10046
AN ECONOMICAL ARTERIAL-PULSE-WAVE TRANSDUCER
C. Kim, D. Gorelick, and W. Chen
Feb. 1973
GSFC-11531

Transducer records arterial pulses externally. Device uses thin plastic membrane which is fluid coupled to pressure sensitive transistor. Transistor is connected to amplifier which, in turn, is connected to recorder. End section is threaded to accept suitable holder and contains pressure relief vent allowing transistor to sense only pressure levels greater than atmospheric.

B73-10048
FLEXIBLE ELECTROENCEPHALOGRAM (EEG) HEADBAND
L. J. Raggio (N. Am. Rockwell Corp.)
Feb. 1973
LANGLEY-10927

Headband incorporates sensors which are embedded in sponges and are exposed only on surface that touches skin. Electrode sponge system is continually fed electrolyte through forced feed vacuum system. Headband may be used for EEG testing in hospitals, clinical laboratories, rest homes, and law enforcement agencies.

B73-10078
LIMITED TACTILE STIMULUS FOR PROSTHETIC HANDS
W. L. Scott (Rockwell Intern. Corp.)
Mar. 1973
M-FS-16570

Heat and pressure transducers mounted in prosthetic hand permit wearer to sense temperature and pressure to which hand is subjected.

B73-10089
ARTIFICIAL ATMOSPHERE CONTROL SYSTEM
D. R. Rebert (McDonnell Douglas Corp.), M. E. Peeples (McDonnell Douglas Corp.) J. D. Fuller and (McDonnell Douglas Corp.),
Feb. 1973
M-FS-22159

Two-gas control system has been developed which uses existing hardware. Three systems are used for control, monitoring, and safety backup. Pure oxygen will be supplied to maintain safe pressure level should something go wrong.

B73-10092
PRESERVATION OF FLAVOR IN FREEZE DRIED GREEN BEANS
C. S. Huber (Technol. Inc.), N. D. Heidelbaugh (Technol. Inc.), and D. Davis (Technol. Inc.)
Mar. 1973
JSC-14149

Before freeze drying, green beans are heated to point at which their cell structure is altered. Beans freeze dried with altered cell structure have improved rehydration properties and retain color, flavor, and texture.

B73-10099
PORTABLE LIGHT DETECTION SYSTEM FOR THE BLIND
R. L. Wilber (Southwest Res. Inst.) and B. L. Carpenter (Southwest Res. Inst.)
Feb. 1973
M-FS-22403

System can be used to detect 'ready' light on automatic cooking device, to tell if lights are on for visitors, or to tell whether it is daylight or dark outside. Device is actuated like flashlight. Light impinging on photo cell activates transistor which energizes buzzer to indicate presence of light.

B73-10156
A PRACTICAL SOLAR ENERGY HEATING AND COOLING SYSTEM
M. J. ONeill (Lockheed Aircraft Corp.), A. J. McDanal (Lockheed Aircraft Corp.), and W. H. Sims (Lockheed Aircraft Corp.)
May 1973
M-FS-22563

Recent study has concluded that solar-powered residential heating and cooling system is non technically and economically feasible. Proposed system provides space heating, air conditioning, and hot water. Installation costs will be greater than for conventional heating systems, but this difference will eventually be defrayed by very low operating costs.

B73-10177
POTASSIUM FOOD SUPPLEMENT

C. T. Bourland (Technol. Inc.), C. S. Huber (Technol. Inc.), C. Rambaut, and N. D. Heidelbaugh
Jun. 1973
JSC-14391

Potassium gluconate is considered best supplementary source for potassium. Gluconate consistently received highest taste rating and was indistinguishable from nonsupplemented samples. No unfavorable side effects were found during use, and none are reported in literature. Gluconate is normal intermediary metabolite that is readily adsorbed and produces no evidence of gastrointestinal ulcerations.

B73-10198
REPRODUCTIVE CELL SEPARATION: A CONCEPT
A. J. Cutaia (Battelle Mem. Inst.)
Aug. 1973
M-FS-22627

Attempt has been made to separate mammalian male (Y) bearing sperm from female (X) bearing sperm. Both types of sperm are very dependent on gravity for their direction of movement. Proposed concept suggests electrophoretic force of suitable magnitude and direction may be effective means of separating X and Y sperm under zero gravity.

B73-10220
INSULATED ECG ELECTRODES
W. M. Portnoy (Tex. Technol. Univ.) and R. M. David (Tex. Technol. Univ.)
Jun. 1973 See also NASA-CR-115530
JSC-14339

Insulated, capacitively coupled electrode does not require electrolyte paste for attachment. Other features of electrode include wide range of nontoxic material that may be employed for dielectric because of sputtering technique used. Also, electrode size is reduced because there is no need for external compensating networks with FET operational amplifier.

B73-10222
BACTERIAL CONTAMINATION MONITOR
E. Rich and N. H. MacLeod
Aug. 1973
GSFC-10879

Economical, simple, and fast method uses apparatus which detects bacteria by photography. Apparatus contains camera, film assembly, calibrated light bulb, opaque plastic plate with built-in reflecting surface and transparent window section, opaque slide, plate with chemical packages, and cover containing roller attached to handle.

B73-10229
AUTOMATIC MICROBIAL TRANSFER
J. R. Wilkins and S. M. Mills
Aug. 1973
LANGLEY-11354

Device can transfer metabolites or inhibitory agents to broth cultures of bacteria, in various stages of growth, for study. It also has application in transfer of other micro-organisms, such as yeasts, and could be useful in clinical and research laboratories. Device has been used for wide variety of purposes in experimental situations.

B73-10241
MEASURING MICRO-ORGANISM GAS PRODUCTION
J. R. Wilkins, A. O. Pearson, and S. M. Mills
Aug. 1973
LANGLEY-11326

Transducer, which senses pressure buildup, is easy to assemble and use, and rate of gas produced can be measured automatically and accurately. Method can be used in research, in clinical laboratories, and for environmental pollution studies because of its ability to detect and quantify rapidly the number of gas-producing microorganisms in water, beverages, and clinical samples.

B73-10270
IMPROVED FORMAT FOR RADIOCARDIOGRAPHIC DATA
J. Dimeff and G. Sevelius
Jul. 1973
ARC-10742

Technique involves introduction of radioactive sample into antecubital vein. Scintillation crystal mounted in collimating housing views portion of right and left hearts. As radioactive sample passes through heart, counting rate is measured by crystal and recorded on strip chart. Data is insensitive to geometric effects and other parameters.

B73-10272
NEW SYSTEM FOR BATHING BEDRIDDEN PATIENTS
J. E. Greenleaf, R. A. Staley, and P. A. Payne
Aug. 1973
ARC-10745

Multihead shower facility can be used with minimal patient handling. Waterproof curtain allows patient to bathe with his head out of shower. He can move completely inside shower to wash his face and hair. Main advantage of shower system is time saved in giving bath.

B73-10320
EIGHT-CHANNEL TELEPHONE TELEMETRY SYSTEM
R. Smith (SCI Systems, Inc.) and T. Carr (SCI Systems, Inc.)
Sep. 1973 See also NASA-CR-128877
JSC-14452

Portable telemetry system uses conventional telephone link which eliminates mailing or messenger service between physician and analyst. Transmitter is used by physician; receiver is used by analyst. Each unit is inductively coupled to its respective telephone set, transmitter converting EEG into audio frequency and receiver converting this frequency back to EEG.

B73-10359
DYE LASER REMOTE SENSING OF MARINE PLANKTON
P. B. Mumola, O. Jarrett, Jr., and C. A. Brown, Jr.
Oct. 1973
LANGLEY-11382

Dye laser, emitting four wavelengths sequentially in time, has been incorporated into helicopter-borne lidar flight package, for performing studies of laser-induced fluorescence of chlorophyll A in algae. Data obtained by multicolor lidar technique can provide water-resource management with rapid-access wide-area coverage of the impact of various environmental factors for any body of water.

B73-10377
UNIFIED LIFE DETECTION SYSTEM: A CONCEPT
J. P. Martin (Martin Marietta Corp.) and M. E. Crissey (Martin Marietta Corp.)
Sep. 1973
ARC-10769

Systematic investigation of techniques and hardware which could be utilized in life detection system has resulted in identification of group of candidate concepts and selection of 'unified system'. Theme of concept permits greatest flexibility in procedural details for experiments which can be performed in individual ampules.

B73-10404
APPLICATION OF BIOLOGICAL FILTERS IN WATER TREATMENT SYSTEMS
T. L. Hurley (Chemtric Inc.) and R. A. Bambenek (Chemtric Inc.)
Nov. 1973 See also NASA-CR-128878
JSC-14226

Silver chloride placed on or close to barrier kills bacteria as they arrive. Dead bacteria accumulate linearly, whereas previously, live bacteria accumulated exponentially. During continuous 30-day tests, no bacteriological contamination was found downstream of filters with silver chloride added.

B73-10428
DESIGN FOR WASTE-MANAGEMENT SYSTEM
C. A. Guarneri (Grumman Aerospace Corp.), A. Reed (Grumman Aerospace Corp.), and R. Renman (Grumman Aerospace Corp.)
Dec. 1973 See also NASA-CR-128857; NASA-CR-128858
JSC-14486

Study was made and system defined for water-recovery and solid-waste processing for low rise apartment complexes. System can be modified to conform with unique requirements of community, including hydrology, geology, and climate. Reclamation is accomplished by treatment process that features reverse-osmosis membranes.

B73-10436
SYSTEM FOR MEASURING PASSENGER REACTION TO TRANSPORTATION-VEHICLE VIBRATION
S. A. Clevenson, A. C. Dibble, T. K. Lusby, Jr., H. F. Scholl, and D. G. Stephens
Feb. 1974
LANGLEY-11353

Equipment is capable of measuring frequencies from 0 to 50 Hz and is portable, light, inexpensive, and easily adaptable to field operations. System could be used in situations where it is necessary to record simultaneously subject response to other types of physical measurement or stimuli, such as temperature, noise, or pressure.

B73-10448
MOTIVATION TECHNIQUES FOR SUPERVISION
N. D. Gray (Rockwell Intern. Corp.)
Feb. 1974
JSC-19187

Guide has been published which deals with various aspects of employee motivation. Training methods are designed to improve communication between supervisors and subordinates, to create feeling of achievement and recognition for every employee, and to retain personnel confidence in spite of some negative motivators. End result of training is reduction or prevention of errors.

B73-10474
BIODETECTION GRINDER
F. J. Beyerle
Mar. 1974
M-FS-22833

Grinder, which employs shearing action with minimum energy input, obtains desired particle sizes in materials ranging from soft plastics to hard rocks. Modified version of this grinder might be used in hospitals and biological laboratories involved with bacteriological research and testing.

B73-10477
CARDIOTACHOMETER DISPLAYS HEART RATE ON A BEAT-TO-BEAT BASIS
J. R. Rasquin, H. E. Smith, and R. A. Taylor
Mar. 1974
M-FS-20284

Electronics for this system may be chosen so that complete calculation and display may be accomplished in a few milliseconds, far less than even the fastest heartbeat interval. Accuracy may be increased, if desired, by using higher-frequency timing oscillator, although this will require large capacity registers at increased cost.

B73-10492
MINIATURIZED HAPLOSCOPE FOR TESTING BINOCULAR VISION
T. A. Decker (Baylor Coll. of Med.)
Dec. 1973
ARC-10759

Device can reproduce virtually all binocular stimulus conditions (target configuration, vergence angle, and accommodative distance) used to test binocular performance. All subsystems of electronic controls are open-loop and solid-state-controlled and, with the exception of vergence angle drive, utilize dc stepping motors as prime movers. Arrangement is also made for readouts of each variable.

B73-10494
COMPUTER SYSTEM FOR MONITORING RADIORESPIROMETRY DATA
D. D. Feller, E. D. Neville, and A. O. Cole
Dec. 1973
ARC-10784

System monitors expired breath patterns simultaneously from four small animals after they have been injected with carbon-14 substrates. It has revealed significant quantitative differences in oxidation patterns of glucose following such mild treatments of rats as a change in diet or environment.

B73-10495
INTEGRAL AIRCRAFT PASSENGER SEAT
C. C. Kubokawa
Dec. 1973 See also B72-10692
ARC-10799

Human-engineering approach was used to design integral seat which provides all the safety, comfort, and protective features that can possibly be afforded airline passengers. Results of dynamic impact testing indicated that seat can withstand and attenuate gravity loads of 21-g horizontal and 45-g vertical; by design, seat will withstand lateral g's as well.

B73-10498
FLEXIBLE TEMPERATURE PROBE FOR BIOLOGICAL SYSTEMS
P. J. Haro, C. Winget, and J. R. Beljan (Calif. Univ., Davis)
Dec. 1973
ARC-10796

Probe is sufficiently flexible so that it can be worn comfortably for long periods of time, but relatively rigid to permit easy insertion. Body and electrical leads of small thermistor are imbedded in flexible fluorosilicone matrix contained in vinyl plastic tubing.

B73-10523
DETECTING AND MEASURING METABOLIC BYPRODUCTS BY ELECTROCHEMICAL SENSING
J. R. Wilkins and G. E. Stoner (Virginia Univ.)
Mar. 1974
LANGLEY-11525

Method of detecting certain groups of bacteria is based on sensing buildup in molecular hydrogen. Apparatus is easy to assemble and use, and it has added advantage that hydrogen evolution by test micro-organisms can be measured automatically and accurately. System has been used to detect and enumerate variety of gram-negative bacteria of enterobacteriaceae group.

B74-10029
AUTOMATED MONITORING OF RECOVERED WATER QUALITY
J. E. Misselhorn (Aerojet Med. And Biol. Systems), W. H. Hartung (Aerojet Med. and Biol. Systems), and S. W. Witz (Aerojet Med. and Biol. Systems)
May 1974
LANGLEY-11203

Laboratory prototype water quality monitoring system provides automatic system for online monitoring of chemical, physical, and bacteriological properties of recovered water and for signaling malfunction in water recovery system. Monitor incorporates whenever possible commercially available sensors suitably modified.

B74-10075
PROGRAMMED-PRESSURE AIR SUPPLY FOR POSITIVE-PRESSURE BREATHING SYSTEM
S. J. Troutman, Jr. (Webb Associates) and J. F. Annis (Webb Associates)
Jun. 1974
ARC-10845

Motor-driven cam varies height of mercury column connected to loading diaphragm of pressure-regulating valve. Air supplied to open-loop, positive pressure breathing system is controlled so repetitive pressure--time profiles can be obtained during every insufflation--exhaust cycle.

B74-10080
IMPROVED HIGH VOLUME AIR SAMPLER
R. B. King
Aug. 1974
LEWIS-11644

Sampler permits size separations of particles by directing sampled air through cross-sectional area sufficiently large that air velocity is reduced to point where particles or larger size will settle out. Sampler conducts air downward and through slots around periphery of unit into relatively open interior of house.

B74-10103
COMPACT TELEMETRY PACKAGE FOR REMOTE MONITORING OF NEUTRON RESPONSES IN ANIMALS
C. D. Baker
Aug. 1974
NPO-11887

Battery-powered telemeter includes FM transmitter and is light enough to be mounted on animal's head. Animal has complete freedom of movement while its neuron responses are transmitted to receiver in laboratory. Construction may also be applied to monitor blood pressure, body temperature, and different muscular signals.

B74-10119
THERMISTOR HOLDER FOR SKIN-TEMPERATURE MEASUREMENTS
J. E. Greenleaf and B. A. Williams
Aug. 1974
ARC-10855

Sensing head of thermistor probe is supported in center area of plastic ring which has tabs so that it can be anchored in place by rubber bands or adhesive tapes. Device attaches probes to human subjects practically, reliably, and without affecting characteristics of skin segment being measured.

B74-10140
THERAPEUTIC HAND-EXERCISING DEVICE WITH CYCLING PRESSURE VALUE
D. E. Barthlome
Sep. 1974
LANGLEY-11579; LANGLEY-11595

Device exercises hands of persons whose fingers are generally straight and need to be flexed inward toward palms of hands. Device is extremely simple in design, which reduces costs, and fits all hand sizes. Patient can instantly free hand from device by pulling flap free from wrist of straps.

B74-10153
IODINE GENERATOR FOR DISINFECTING RECLAIMED WATER
R. A. Wynveen (Life Systems, Inc.), J. D. Powell (Life Systems, Inc.), and F. H. Schubert (Life Systems, Inc.)
Sep. 1974 See also NASA-CR-134219
MSC-14632

System dispenses iodine into water tank automatically in quantities varying from 0.5 to 20 ppm. It stores 180-day supply of iodine crystals, sufficient to support six people consuming water at rate of 4.5 to 13.6 kg per person per day.

B74-10155
INEXPENSIVE LIGHTWEIGHT MIRROR
G. D. Badhwar and L. G. Fehrenkamp
Sep. 1974
MSC-14615

Aluminized Mylar film is bonded to polyurethane foam mold; Mylar is then removed, leaving highly reflective coating of aluminum on foam. Mold may be used repeatedly to make mirrors for several optical instruments. Large mirrors of almost any shape may be made singularly or in quantity.

B74-10172
FINGER RECORDING ELECTRODE SYSTEM FOR ELECTRICAL IMPEDANCE PLETHYSMOGRAPH
L. D. Montgomery and D. L. Moody, Jr.
Sep. 1974
ARC-10816

System facilitates location of recording electrodes of impedance plethysmograph that is used for measuring flow of blood in finger segment; electrodes can be relocated accurately and volume of finger segment under study can be determined precisely. System minimizes movement artifacts in plethysmograph trace because finger segment is held firmly.

B74-10183
ARTIFICIAL LIMB CONNECTION
L. J. Owens
Nov. 1974
KSC-10833

Connection simplifies and eases donning and removing artificial limb; eliminates harnesses and clamps; and reduces skin pressures by allowing bone to carry all tensile and part of compressive loads between prosthesis and stump. Because connection is modular, it is easily modified to suit individual needs.

B74-10188
AUTOMATED SINGLE-SLIDE STAINING SYSTEM
S. M. Mills and J. R. Wilkins
Nov. 1974
LANGLEY-11649

Apparatus developed to Gram-stain single slides automatically is flexible enough to accommodate other types of staining procedures. Method frees operator and eliminates necessity for subjective evaluations as to length of staining or decolorizing time.

B74-10199
NEW TOOTH ENAMEL FROM BRUSHITE CRYSTALS
B. Rubin and J. D. Childress
Nov. 1974
ERC-10338

Appropriate nutrient gel solution could be used to precipitate brushite, which becomes hydroxyapatite, mineral found in bones and teeth. Gel can be made from sodium metasilicate and phosphoric acid, or gelatin, or other organic materials that polymerize in presence of acid to get gelantinous medium.

B74-10210
POLYMERS USED TO ABSORB FATS AND OILS: A CONCEPT
H. E. Marsh, Jr.
Nov. 1974
NPO-11609

One approach to problem of excessive oils and fats is to develop method by which oil is absorbed into solid mixture for elimination as solid waste. Materials proposed for these purposes are cross-linked (network) polymers that have high affinity for aliphatic substances, i. e., petroleum, animal, and vegetable oils.

B74-10213
AUTOMATED DRUG IDENTIFICATION SYSTEM
C. F. Campen, Jr.
Nov. 1974
NPO-13063

System speeds up analysis of blood and urine and is capable of identifying 100 commonly abused drugs. System includes computer that controls entire analytical process by ordering various steps in specific sequences. Computer processes data output and has readout of identified drugs.

B74-10220
SPACECRAFT OXYGEN RECOVERY SYSTEM
P. D. Quattrone
Nov. 1974 See also B71-10203; B72-10051; B72-10074; B72-10194; B72-10195; B72-10219; B72-10246
ARC-10868

Recovery system is comprised of three integrated subsystems: electrochemical carbon dioxide concentrator which removes carbon dioxide from atmosphere, Sabatier reactor in which carbon dioxide is reduced with hydrogen to form methane and water, and static-feed water electrolysis cell to recover oxygen from water.

B74-10226
EMERGENCY DESCENT DEVICE
R. R. Belew
Nov. 1974 See also B73-10369

DESIGN CRITERIA MONOGRAPH FOR VALVE COMPONENTS
Innovator not given Sep. 1974 See also NASA-SP-8094
LEWIS-12327
Monograph treats valve design technology problems as they were solved in successful development of flightweight operational valves for liquid rocket systems. General practices for cleaning and contamination prevention are summarized. Balance of information is arranged by topic, since detail design requirements apply to most types of valves.

B74-10231
IMPROVED METHODS FOR COUNTING BACTERIA IN PHYSIOLOGICAL FLUIDS
G. L. Picciolo
Dec. 1974 See also B71-10051
GSFC-11917
Bacterial population detection is based on detection of adenosine triphosphate (ATP), chemical present in all living matter. Amount of ATP in sample, after chemically removing all nonbacterial ATP, is directly related to bacterial population. Sensitivity is improved by concentration step; specificity is improved by lowering pH of solution.

B74-10245
IN VIVO MEASUREMENT OF MECHANICAL IMPEDANCE OF BONE
D. R. Young and G. Thompson (M. B. Associates)
Dec. 1974
ARC-10857
System of measurement provides indications of ulnar properties independent of characteristics of surrounding soft tissue and other bones. Mechanical modal approximated ulnar response so average bending rigidity could be determined to provide direct index of bone resistance to bending loading.

B74-10249
LIQUID-COOLED LINER FOR HELMETS
B. A. Williams and W. Elkins (Aerotherm Corp.)
Dec. 1974
ARC-10534
Liner acts as coolant tubing, manifold, and supporting structures. Fabric of waffle-design is made of several integrated channels (or capillaries) through which coolant liquid can flow. Thin and light-weight liner can be incorporated into any type of helmet or head gear.

B74-10278
LIQUID SAMPLE PROCESSOR
V. J. Jahnsen and C. F. Campen, Jr.
Jan. 1975 See also B74-10213
NPO-13136
Processor is automatic and includes series of extraction tubes packed with fibrous absorbent material of large surface area. When introduced into these tubes, liquid test samples become completely absorbed by packing material as thin film.

B74-10289
MICRO-ORGANISM DISTRIBUTION SAMPLING FOR BIOASSAYS
B. A. Nelson (Martin Marietta Corp.)
Feb. 1975
LANGLEY-10789
Purpose of sampling distribution is to characterize sample-to-sample variation so statistical tests may be applied, to estimate error due to sampling (confidence limits) and to evaluate observed differences between samples. Distribution could be used for bioassays taken in hospitals, breweries, food-processing plants, and pharmaceutical plants.

B75-10030
ACCELERATION OF THE AGING PROCESS BY OXYGEN
J. Miquel, R. P. Lunderen, and G. K. Bensch (Stanford Univ.)
Feb. 1975
ARC-10928
Tissue changes induced by hyperoxia have been compared with those of normal aging. Results of investigations using male flies prompt conclusion that normal aging, radiation syndrome, and hyperoxic injury share at least one common feature--lipid peroxidation damage to all mambranes resulting in accumulation of age pigment.

B75-10041
PORTABLE AUTOMATIC BLOOD ANALYZER
L. P. Coleman (Orion Res., Inc.)
Apr. 1975 See also NASA-CR-134373
MSC-14627
Analyzer employs chemical-sensing electrodes for determination of blood, gas, and ion concentrations. It is rugged, easily serviced, and comparatively simple to operate. System can analyze up to eight parameters and can be modified to measure other blood constituents including nonionic species, such as urea, glucose, and oxygen.

B75-10045
IMPROVED EXTRACTION TECHNIQUE FOR BIOLOGICAL FLUIDS
V. J. Jahnsen
Apr. 1975 See also B74-10213
NPO-13084
Liquid-liquid extraction technique speeds up separation of biological fluids into number of compounds. This eliminates agitation, emulsion formation, centrifugation, mechanical separation of phases, filtration, and other steps that have been used previously. Extraction efficiencies are equal or better than current manual liquid-liquid extraction techniques.

B75-10051
SUBMINIATURE TRANSDUCERS FOR MEASURING FORCES AND DEFORMATION OF HEART MUSCLE
C. Feldstein, V. J. Osher, W. G. Lewis, H. R. Silver, and N. E. Duran
Apr. 1975
NPO-13423; NPO-13519
Two subminiature transducers, one measuring muscle forces and one measuring muscle displacement, can be inserted into heart muscle without interfering with it. Probe, approximately 1 mm (0.04 in), causes no damage to heart muscle. Probe can be rotated to different positions to measure muscle forces from various directions.

B75-10057
HAND TREMOR AND ACTIVITY SENSOR
E. Konigsberg (Konigsberg Instruments, Inc.)
Apr. 1975
ARC-10849
System detects hand tremor and activity and transmitting signals over distance of at least 3 meters to receiver system. Designed for use in studies of effect of fatigue on individual's judgement or reaction time, sensor is installed within mounting of finger-ring; no external wiring or power source is needed.

B75-10061
ULTRASTRUCTURAL ALTERATION OF MOUSE LUNG BY PROLONGED EXPOSURE TO MIXTURES OF HELIUM AND OXYGEN
A. G. Harrison and D. J. Solomon (Union Carbide Corp.)
Apr. 1975
ARC-10929
Observed changes consist mainly of blebbing of capillary endothelium and alveolar epithelium, which is quite possibly indicative of cellular edema; also, there can be observed highly-convoluted basement membrane, alveolar debris, and increased numbers of platelets.

B75-10077
MOBILE AUTOMATIC METABOLIC ANALYZER
G. B. Bynum and R. J. Currie
May 1975
M-FS-23143
Two flexible pipes, attached to face mask, are connected to spirometers in mobile cart. Inhaled air volume is measured as it is drawn from one spirometer, and exhaled air volume is measured

as it is breathed into second spirometer. Sensor is used to monitor heartbeat rate.

B75-10079
OXYGEN COCOON FOR PATIENTS UNDER INTENSIVE CARE
W. J. Maas
May 1975
MSC-12663

Cocoon is made from Teflon film. It includes full-length, pressure zipper on top side and bottom part is rigid pad constructed of burn-resistant material. Cocoon includes oxygen supply port with exhaust port at opposite end.

B75-10083
REGULATOR FOR INTRAVENOUS FEEDING
J. Dimeff
May 1975
ARC-10758

Float valve maintains constant level of solution, providing constant drop rate as long as solution can flow into patient's vein. Second float valve allows solution to enter vein, but prevents entry of air.

B75-10148
HIP-JOINT SIMULATOR ACCURATELY DUPLICATES HUMAN WALKING PATTERN
L. B. Johnson and A. M. Swikert
Oct. 1975
LEWIS-12515

Device simulates all three motions of walking and provides realistic variable loading during each step. Simulator will enable laboratory evaluation of all known types of total hip prostheses.

B75-10166
HIGHLY-VISIBLE AIR-SEA RESCUE MARKER
I. M. Radnofsky and J. Naimer
Aug. 1975
MSC-12564

Sea marker is made from sheets of polyolefin material. Material, attached to inflatable polyethylene tube, is coated with bright dye and is effective even in choppy water.

B75-10167
MICROBIAL LOAD MONITOR
W. P. Jones (McDonnell Aircraft Co.), C. Aldridge, Jr. (McDonnell Aircraft Co.), T. J. Holen (McDonnell Aircraft Co.), D. R. Vannest (McDonnell Aircraft Co.), and F. S. Gibson
Aug. 1975 See also NASA-CR-114922
MSC-14062

Device can detect and identify a number of medically important microorganisms in an average of approximately 8 hours. Monitor consists of cartridges containing special selective media and solid state electro-optical detectors.

B75-10168
DETERMINATION OF BONE MINERAL MASS IN VIVO
R. J. Cameron (Wisconsin Univ.) and F. P. Judy (Wisconsin Univ.)
Aug. 1975
MSC-14276

Radiographic equipment incorporates two radiation sources, generating high-energy and low-energy beams. Recording equipment measures amount of radiation that has penetrated limb. Data are fed into computer that determines mass of the examined bone.

B75-10170
CONTINUOUS DETECTION OF VIABLE MICROORGANISMS BY CHEMILUMINESCENCE
S. Witz (AMB Co.), C. Linnecke (AMB Co.), and W. Hartung (AMB Co.)
Aug. 1975
MSC-10170

System monitors quality of reclaimed water continuously and automatically. Incubated samples are compared with unincubated ones by measuring their respective chemiluminescence.

B75-10177
IMPLANTABLE PROSTHETIC PUMP BOOSTS BLOOD PRESSURE: A CONCEPT
W. J. Fish
Aug. 1975
NPO-13626

Prosthetic pump is proposed which can improve liver blood supply by boosting blood pressure locally to the organ. Device has potential use in treatment of cirrhosis of the liver.

B75-10211
CATHETER-TIP FORCE TRANSDUCER FOR CARDIOVASCULAR RESEARCH
C. Feldstein, W. G. Lewis, H. R. Silver, and H. V. Culler
Sep. 1975
NPO-13643

Sensor can be installed in left ventricle by means of procedures available for inserting catheter into an artery at body's extremities and manipulating it through vessel and past aortic valve. Metallic tines of device can be used as internal electrode for electrocardiogram.

B75-10253
RAPID METHOD FOR DETERMINATION OF ANTIMICROBIAL SUSCEPTIBILITIES PATTERN OF URINARY BACTERIA
L. G. Picciolo, W. L. Chapelle, J. M. Barza (New England Medical Center), L. Weinstein (New England Medical Center), A. S. Tuttle (New England Medical Center), and H. Vellend (New England Medical Center)
Oct. 1975
GSFC-12039

Method determines bacterial sensitivity to antimicrobial agents by measuring level of adenosine triphosphate remaining in the bacteria. Light emitted during reaction of sample with a mixture of luciferase and luciferin is measured.

B75-10269
ELECTROCARDIOGRAM SIGNAL ANALYZER
M. W. Portnoy (Texas Technological Univ.), H. Dirilten (Texas Technological Univ.), and E. C. Burton (Southwest Res. Institute)
Oct. 1975
MSC-12710

Algorithm based on Taylor series expansion of Fourier transform has been developed and used for detection of cardiac arrhythmias in real-time electrocardiogram signal.

B75-10303
LIGHTWEIGHT ORTHOTIC BRACES
M. R. Baucom, E. H. Johns, and C. R. Evans
Dec. 1975
LANGLEY-11894

Leg brace is constructed of fiber-reinforced polymer material. Composite material is stiffer, stronger, and lighter than most metals.

B75-10317
CONTROL OF NONENZYMATIC BROWNING IN INTERMEDIATE-MOISTURE FOODS
A. K. Buckle (Minnesota Univ.), P. T. Iabuza (Minnesota Univ.), and C. H. Warmbier (Minnesota Univ.)
Dec. 1975
MSC-14835

Series of compounds called humectants were found to decrease rate of browning when added to intermediate-moisture foods. Twenty percent level of humectant can increase shelf life of foods by factor of 5 or 6.

B75-10331
AUTOMATED MASS SPECTROMETER/ANALYSIS SYSTEM: A CONCEPT
G. H. Boettger, E. C. Giffin, J. W. Dreyer, and A. Kuppermann
Dec. 1975
NPO-13572

System performs rapid multiple analyses of entire compound classes or individual compounds on small amounts of sample

and reagent. Method will allow screening of large populations for metabolic disorders and establishment of effective-but-safe levels of therapeutic drugs in body fluids and tissues.

06 MECHANICS

B70-10012
SONIC IMPEDANCE TECHNIQUE DETECTS FLAWS IN POLYURETHANE FOAM SPRAY-ON INSULATION
HARALSON, H. S. /SPACO, INC./ HAYNES, J. L.
DATE- AUG. 1970 REAN- SEE ALSO NASA-TM-X-53852
M-FS-20561
Sonic impedance testing detects voids and unbonded regions as small as 1 inch in diameter by 0.03 inch thick. Measurements are made manually or by automatic scanning and the readout is made by meter or recorder.

B70-10062
DISCHARGE COEFFICIENTS FOR THICK-PLATE ORIFICES
METGER, G. W. RHODE, J. E. RICHARDS, H. T.
DATE- APR. 1970 REAN- SEE ALSO NASA-TN-D-5467
LEWIS-11067
Investigation enables more accurate prediction of coolant flows within internally cooled turbine blades and vanes. The data is applicable for predicting flows in complex flow passages.

B70-10093
CALCULATION OF INCOMPRESSIBLE FLUID FLOW THROUGH CAMBERED BLADES
HSU, C. C. /HYDRONAUTICS, INC./ DATE- SEP. 1970
REAN- SEE ALSO NASA-CR-100773, NASA-CR-102416
M-FS-20503
Conformal mapping technique yields linear, approximate solutions for calculating flow of an incompressible fluid through staggered array of cambered blades for the cases of flow with partial cavitation and supercavitation. Lift and drag coefficients, cavitation number, cavity shape, and exit flow conditions can be determined.

B70-10116
PREDICTION OF FAULTS IN COMPONENTS OF MACHINERY IN MOTION
TATGE, R. B. /GE/ DATE- FEB. 1970 REAN- SEE ALSO NASA-CR-99189
GSFC-10801
Mechanical vibrations of individual moving parts are sensed with piezoelectric accelerometers and measured electronically from outside the working machine.

B70-10124
METHOD OF CALCULATING BLADE-TO-BLADE PLANE FLOW IN CENTRIFUGAL PUMP
JACKSON, E. D. /N. AM. ROCKWELL CORP./ DATE-JUN. 1970 REAN- SEE ALSO NASA-CR-80153
M-FS-18087
Steam filament solution determines velocity distribution due to potential flow in the blade-to-blade plane of the radial impeller. This is used to determine the mass-averaged relative fluid angle, which is in turn used in an axisymmetric program to obtain steam surfaces of the assumed axisymmetric flow.

B70-10156
VOLUMETRIC CALIBRATION OF A PROPELLANT UTILIZATION SYSTEM
LENNING, J. J. /MCDONNELL-DOUGLAS CO./ SIMKO, T.
DATE- APR. 1970
M-FS-14943
Method of calibrating capacitance-type propellant mass sensors provides meaningful mass units accurate to within one percent of the total load. Neither special propellant loading nor test firing is required. Recalibration of the system is possible without special propellant loading. This method provides increased flexibility for vehicle operation.

B70-10166
TWO-DIRECTIONAL-FLOW, AXIAL-MOTION-JOINT FLOW LINER
BISSING, L. L. /N. AM. ROCKWELL CORP./ INNES, G. M. DATE- APR. 1970
M-FS-16215
Flow liner eliminates high-cycle fatigue in ducts carrying cryogenic fluids. It is capable of handling two-directional, high-velocity cryogeni liquid flow with a 3-inch axial motion without binding within a 25-inch length.

B70-10225
SIMPLIFIED COMPUTATION OF COMPRESSIBLE FLUID FLOW PARAMETERS
BEIMGRABEN, H. W. /BOEING CO./ DATE- SEP. 1970
KSC-10400
Mathematical techniques analyze fluid flow through circular duct, enlarged or constricted circular duct, and across an orifice or nozzle. Using subsonic Mach number as basic flow parameter, a series of working graphs displays the variation various physical parameters in each of the flow conditions.

B70-10227
REMOVAL OF FLOWMETER BEARINGS FROM BLIND CAVITIES
LINDQUIST, J. J. /N. AM. ROCKWELL CORP./ DATE-APR. 1970
M-FS-18713
Bearings are removed by the application of a simple hydraulic principle using beeswax in plac of a liquid.

B70-10236
STABILITY OF STRUCTURAL RINGS UNDER UNIFORMLY DISTRIBUTED RADIAL LOADS
WILLIAMS, H. E. DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-107848
NPO-11396
Energy method analysis establishes parameters governing stability of circular rings acted upon by constant, uniformly distributed loads. Energy method is used so that nonlinear behavior of structure before buckling can be accounted for. Method affords conceptually superior basis for analyzing the axisymmetric deviation mode.

B70-10252
HEAT-RESISTANT PRESSURE PROBE WITH HIGH-FREQUENCY RESPONSE
ROGERO, R. S. DATE- OCT. 1970
NPO-11292
Probe, having a sensor at its inner tip in intimate contact with pressure transients, measures pressure wave fluctuations through an engine*s combustion chamber. A film of flexible opaque material on the face of the sensor preven high radiation fluxes from heating the quartz crystal and thus changing the electrical characteristics.

B70-10274
THE USE OF THE CHATTER MODE IN SELF-ADAPTIVE SYSTEMS
YASUI, S. /MIT/ DATE- APR. 1970 REAN- SEE ALSO NASA-CR-88700
HQ-10159
Chatter mode is used advantageously if the ideal model dynamics is described by a switching function, the chatter mode is reached quickly ar then sustained, the chatter frequency is reduced and any zero in the plant transfer function is cancelled.

B70-10288
CRITICAL SPEED ANALYSIS OF ROTORS
CAVICCHI, R. H. DATE- MAY 1970 REAN- SEE ALSO NASA-TN-D-4858
LEWIS-11061
General frequency equation is developed for both forward and backward precession of rigid rotors undamped bearings on flexible foundations. As well as major critical speeds, nonsynchronous critical speeds that may result from bearing defects can be located.

B70-10293
NEW MODEL PERFORMANCE INDEX FOR ENGINEERING DESIGN OF CONTROL SYSTEMS
SPON- INNOVATOR NOT GIVEN /MIT/ DATE- MAY 1970
HQ-10520
Performance index includes a model representing linear control-system design specifications. Based on a geometric criterion for approximation of the model by the actual system, the index can be interpreted directly in terms of the desired system response model without actually having the model*s time response.

B70-10301
TECHNIQUE FOR IMPROVING HYDRODYNAMIC GYRO BEARINGS
BROUSSARD, P., JR. BURCH, J. DATE- JUN. 1970
M-FS-20764
Conical or spherical, spirally grooved grease bearings have an inclined surface which is machined inboard of the grooved surface. The indentation and inclined surface provide a reservoir for forced out lubricant, and when rotation begins, centrifugal force returns the lubricant to the grooved area.

B70-10307
FLUID INJECTION DEVICE FOR HIGH-PRESSURE SYSTEMS
COPELAND, E. J. /N. AM. ROCKWELL CORP./ WARD, J. B. DATE- JUN. 1970
MSC-15635
Screw activated device, consisting of a compressor, shielded replaceable ampules, a multiple-element rubber gland, and a specially constructed fluid line fitting, injects measured amounts of fluids into a pressurized system. It is sturdy and easily manipulated.

B70-10309
THEORY AND APPLICATION OF KALMAN FILTERING
TENG, L. /SPERRY RAND CORP./ DATE- AUG. 1970
M-FS-20491
As a unified extension of a group of related mathematical procedures, Kalman filtering is of assistance in the design of aircraft- and ground-based guidance and navigation data reduction and display systems.

B70-10350
FLEXIBLE PROTECTION FOR METAL BELLOWS
KIMBLE, K. G. /AMETEK/STRAZA/ DATE- SEP. 1970
KSC-10520
RTV silicone is used with a braided wire sheath surrounding the metal bellows in fluid transfer systems. It demonstrated best overall performance in flexibility and shock absorbing tests, high temperature, low temperature, and salt spray.

B70-10352
SINUSOIDAL-PRESSURE GENERATOR FOR TESTING DYNAMIC PRESSURE PROBES
ENGLUND, R., JR. GEBBEN, V. D. MYLAND, T. W.
DATE- AUG. 1970 REAN- SEE ALSO NASA-TM-X-1981
LEWIS-11094
Generator can produce sinusoidal pressures at frequencies from 300 to 5000 Hz and peak-to-peak amplitudes up to 5.6 lbs/sq in. Amplitude and phase-angle measurements made at various frequencies are compared with measurements from a piezoelectric transducer mounted flush with the resonant tube wall.

B70-10388
EFFECT OF WALL ROUGHNESS ON LIQUID OSCILLATIONS DAMPING IN RECTANGULAR TANKS
BUGG, F. M. DATE- OCT. 1970
M-FS-20799
Tests were conducted in two rectangular glass tanks using silicon carbide grit bonded to walls to determine effect of wall roughness for damping liquid oscillations. Tests included effects of roughness height, roughness location, roughness at various values, amplitude decay, Reynolds number, and boundary layer thickness.

B70-10394
HOOP RESTRAINT ON BEAM-COLUMN BEHAVIOR IN A STIFFENED CYLINDRICAL SHELL
KINSEY, J. C. KINSEY, J. C., /N. AM. ROCKWELL CORP./ DATE- OCT. 1970
M-FS-16172
Skin*s hoop restraint is determined by treating each stringer as an independent column on an elastic foundation. The equivalent radial support is simulated by elastic supports on a beam column. The formula is given for determination of the spring rates of these supports.

B70-10395
COMPARISON OF RELEASE TORQUES OF TIGHTENED BOLTS IN VACUUM AND AIR
DEMORSS, K. E. DATE- SEP. 1970 REAN- SEE ALSO NASA-TM-X-53936
M-FS-20773
Various combinations of stainless steel, mild steel, and aluminum bolt-nut couples are tightened to 60 lb-ft in partial vacuum and in air. Results are given for tests with and without two lubricants /a fluorosilicone and a sodium silicate bonded dry-film/.

B70-10398
JETTISONING SYSTEM FOR A PARACHUTE*S CANISTER
LONBORG, J. O. MACK, T. H. DATE- SEP. 1970
NPO-11236
Three-point automatically released suspension and jettisoning system operates independently of lander*s power system and releases parachute on touchdown. The system is based on a ball-lock device operated by the shock of the parachute*s opening and by the subsequent decay in the load on the main cord.

B70-10399
OPTIMUM STRUCTURAL DESIGN BASED ON RELIABILITY ANALYSIS
HEER, E. SHINOZUKA, M. YANG, J. N. DATE- OCT. 1970
NPO-11261
Proof-load test improves statistical confidence in the estimate of reliability, numerical examples indicate a definite advantage of the proof-load approach in terms of savings in structural weight. The cost of establishing the statistical distribution of strength of the structural material is also introduced into the cost formulation

B70-10406
EXPERIMENTAL INVESTIGATION AND ANALYSIS OF TWO SOURCES OF NOZZLE-THRUST MISALIGNMENT
DOWDY, M. W. STRAND, L. D. DATE- SEP. 1970
REAN- SEE ALSO NASA-CR-105905
NPO-11355
Asymmetry of nozzle*s throat produces oscillatory type net side-force axial profile. Using mean values of localized static pressure and Mach number, scaling laws for flat-plate supersonic flow over protrusion are applied to nozzle expansion cone irregularities to give approximate indication of perturbed-pressure profiles and induced side forces.

B70-10408
NEW STRUCTURAL APPROACH FOR DETERMINING LOAD CARRYING CAPABILITY OF FILAMENT WOUND COMPOSITE MATERIALS
ARMSTRONG, W. H. /BOEING CO./ YANG, P. B. DATE- SEP. 1970
M-FS-15121
Metal lined boron and graphite composites exhibit high strength and minimum weight, making them superior to aluminum cylindrical shell structures and to steel or aluminum constructed pressure vessels. S glass filament-epoxy resin matrix with aluminum liner is suitable for cryogenic tanks.

B70-10411
VEE-NOTCH TOOL CUTS SPECIMENS
SPIER, R. A. DATE- OCT. 1970
M-FS-20730
Triangular cutting tool uses carbide tips for notching heat-treated or abrasive materials, and alloys subjected to high structural stresses. The

tool is rigidly mounted in a slot of mating contour to prevent deflection during cutting of tensile specimens. No other expensive machine equipment is required.

B70-10427
METHOD OF STATISTICAL FILTERING
BATTIN, R. H. /MIT/ DECKERT, J. C. FRASER, D. C. POTTER, J. E. DATE- SEP. 1970
MSC-13493
Minimal formula for bounding the cross correlation between a random forcing function and the state error when this correlation is unknown is used in optimal linear filter theory applications. Use of the bound results in overestimation of the estimation-error covariance.

B70-10431
ELIMINATION OF REDUNDANCY IN TELEMETERED DATA
VU-SON, C. /BELL TELEPHONE LABS./ DATE- SEP. 1970
HQ-10585
Procedure for estimating the intensity of a Poisson process can be readily programmed for a digital computer, and does not require an a priori probability space. Reduction of the sampling rate is possible without sacrificing significant information.

B70-10433
DYNAMIC BALANCING OF HIGH-SPEED ROTARY MACHINERY
BODENSIECK, E. J. /N. AM. ROCKWELL CORP./ PRONASKO, S. DATE- OCT. 1970
HQ-10486
Rotary dynamics test facility investigates and corrects imbalances in rotary components at speeds up to 60,000 rpm. Use of a vacuum chamber eliminates the effect of windage and facilitates the chilling of test pieces.

B70-10449
SORPTION VACUUM TRAP
BARRINGTON, A. E. CARUSO, A. J. DATE- NOV. 1970
ERC-90051
Modified sorption trap for use in high vacuum systems contains provisions for online regeneration of sorbent material. Trap is so constructed that it has a number of encapsulated resistance heaters and a valving and pumping device for removing gases from heated sorbing material. Excessive downtime is eliminated with this trap.

B70-10503
NEW DATA ACQUISITION SYSTEM RECORDS BEARING MEASUREMENTS DIRECTLY
ROSSBACH, R. J. /GE/ DATE- OCT. 1970
LEWIS-10510
Digital data acquisition system records steady state and dynamic data of bearing and shaft displacement. Elliptical orbits formed can be reconstructed and the data reduced automatically. System also reads pressures, temperatures, flows, and torque during any one data scan.

B70-10582
ANALYTICAL PREDICTION OF REVERSE BUCKLING PRESSURE FOR THIN SHELLS
MARTINDALE, D. L. /AMETEK/STRAZA/ URBANAC, C. DATE- DEC. 1970 REAN- SEE ALSO NASA-TN-3212
KSC-10515
Analytical technique is developed for prediction of reverse buckling in thin curved shells. Test data indicate technique predicts actual reverse buckling pressure within 10 percent, and should be useful for analytical prediction of reversed condition failure for problems such as explosive decomposition through vacuum failure.

B70-10598
INTERACTION OF CRIPPLING AND TORSIONAL-FLEXURAL INSTABILITIES FOR CENTRALLY LOADED COLUMNS
WALLS, J. C. /BROWN ENG. CO., INC./ DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-61287
M-FS-20556
Empirical technique predicts failure loads for centrally loaded columns with thin-walled, open cross sections. Interaction of two failure modes is predicted by modification of the Johnson-Euler equation.

B70-10623
OPTIMUM MULTI-IMPULSE RENDEZVOUS PROGRAM
GLANDORF, D. R. /LOCKHEED ELECTRON, CO./ ONLEY, A. G. ROZENDAAL, H. L. DATE- DEC. 1970
MSC-13139
OMIRPROGRAM determines optimal n-impulse rendezvous trajectories under the restrictions of two-body motion in free space. Lawden*s primer vector theory is applied to determine optimum number of midcourse impulse applications. Global optimality is not guaranteed.

B70-10626
TECHNIQUE FOR EVALUATING MULTIPLE PROBABILITY OCCURRENCES /TEMPO/
MEZZACAPPA, M. A. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970
M-FS-14333
Technique is described for adjustment of engineering response information by broadening the application of statistical subjective stimuli theory. The study is specifically concerned with a mathematical evaluation of the expected probability of relative occurrence which can be identified by comparison rating techniques.

B70-10627
SIMPLE DATA-SMOOTHING AND NOISE-SUPPRESSION TECHNIQUE
DUTY, R. L. /IBM/ DATE- NOV. 1970
M-FS-20803
Algorithm, based on the Borel method of summing divergent sequences, is used for smoothing noisy data where knowledge of frequency content is not required. Technique*s effectiveness is demonstrated by a series of graphs.

B70-10647
SYSTEMS APPROACH PROVIDES MANAGEMENT CONTROL OF COMPLEX PROGRAMS
DUDEK, E. F., JR. /N. AM. ROCKWELL CORP./ MCCARTHY, J. F., JR. DATE- DEC. 1970
M-FS-20791
Integrated program management process provides management visual assistance through three interrelated charts - system model that identifies each function to be performed, matrix that identifies personnel responsibilities for these functions, process chart that breaks down the functions into discrete tasks.

B70-10657
AUTOMATIC, COMPUTERIZED TESTING OF BOLTS
CARLUCCI, J., JR. LOBB, V. B. STOLLER, F. W. DATE- DEC. 1970
NPO-11090
System for testing bolts with various platings, lubricants, nuts, and tightening procedures tests 200 fasteners, and processes and summarizes the results, within one month. System measures input torque, nut rotation, bolt clamping force, bolt shank twist, and bolt elongation, data is printed in report form. Test apparatus is described.

B70-10695
HYPERBOLA-GENERATOR FOR LOCATION OF APERIODIC EVENTS
PAUCKER, H. R. SPITZER, C. R. VANN, D. S. DATE- DEC. 1970
LANGLEY-10312
Plotting device, when used in conjunction with three or more detectors and local receiver and recorder, can quickly pinpoint location of any aperiodic event. Operation requires minimal training and is readily adapted to the field. Mechanical error in device prototype is less than or equal to 3 percent.

B70-10710
A REPORT OF ADVANCEMENTS IN STRUCTURAL DYNAMIC TECHNOLOGY RESULTING FROM SATURN 5 PROGRAMS
SPON- INNOVATOR NOT GIVEN /BOEING CO./ DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-1539, NASA-CR-1540
LANGLEY-10684

Two volume report on practical aspects of structural dynamic analysis in Saturn 5 program is described. Volume 1 is oriented toward program managers of future structural dynamic programs. Volume 2, oriented toward technical leaders of programs, discusses methods and procedures used in Saturn 5 program.

B70-10712
A NEW METHOD FOR MEASURING SLIPPERINESS OF AIRPORT RUNWAYS AND OTHER PAVED SURFACES
HORNE, W. B. YAGER, T. J. DATE- DEC. 1970
LANGLEY-10795
Aircraft stopping distances on wet runways are accurately predicted by measurements taken with a conventional automobile equipped with diagonal braking system and simple instrumentation for recording stopping distances.

B70-10715
STRAIN GAGE INSTALLATION MANUAL
NICHOLS, D. W. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970
M-FS-18822
Detailed specifications for installing laboratory strain gages are compiled into handy reference manual that provides laboratory technicians with ready source of instructions on techniques and procedures for cementing a wide variety of strain gages onto most of the commonly encountered engineering materials.

B70-10725
A STUDY OF NACA AND NASA PUBLISHED INFORMATION OF PERTINENCE IN THE DESIGN OF LIGHT AIRCRAFT
SPON- INNOVATOR NOT GIVEN /N. C. STATE UNIV./
DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-1484, NASA-CR-1485, NASA-CR-1486
LANGLEY-10778
Three volume report contains NACA/NASA generated literature pertinent to the design of light aircraft. Information covers structural design, propulsion subsystems, landing gear loads, flutter, performance calculation procedures, and high horsepower propellers. Major emphasis is on reports produced prior to 1962.

B71-10044
PREVENTION OF DAMAGE TO DELICATE CONNECTORS DURING MOUNTING OF HEAVY ENGINES FOR TESTING
HENDRICKSON, R. J./AEROJET-GEN. CORP./
MAR. 1971
NUC-10322
Air-bearing-pad principle, combined with monitoring system of the air-bearing force, prevents damage between electrical and mechanical connectors joining a large engine system to the test stand during remote mating. Pad provides a cushion between engine and test stand.

B71-10074
PREDICTION OF WINDAGE POWER LOSS IN ALTERNATORS
VRANCIK, J. E.
APR. 1971 SEE ALSO NASA-TN-D-4849
LEWIS-10939
Simplified equations and constants, based on laminar and turbulent flow theory between parallel plates, estimate windage loss in rotating electrical machinery. Comparison of calculated results and experimental data for smooth cylindrical rotor and slotted alternator yields 7 percent maximum variation between calculated and experimental data.

B71-10093
PIPE INSTALLATION TECHNIQUE AVOIDS DISTURBING WORK AREAS
MALYSZ, E. F./N. AM. ROCKWELL CORP./
MAY 1971
MSC-15581
Pipe supports for 0.305 m diameter pipes are pre-hung and an opening is cut in exterior wall of the building. Pipes are welded outside the building and then rolled through the opening into the final location. Technique affords cost and time savings.

B71-10094
DETERMINATION OF GAS VOLUME TRAPPED IN A CLOSED FLUID SYSTEM
HUNTER, W. F./N. AM. ROCKWELL CORP./ JOLLEY, J. E.
MAY 1971
MSC-15685
Technique involves extracting known volume of fluid and measuring system before and after extraction, volume of entrapped gas is then computed. Formula derived from ideal gas laws is basis of this method. Technique is applicable to thermodynamic cycles and hydraulic systems.

B71-10095
UNIFIED HATCH SYSTEM
HART, R. J./N. AM. ROCKWELL CORP./ WALKOVER, L. J.
ZOSKY, E. W.
MAY 1971
MSC-15813
Special hatch sealing mechanism design increases safety, reliability, and convenience. Adaptations are possible for oceanographic and high-speed aircraft design, or for any system where quick-opening pressure hatch is required. In normal mode, hatching mechanism is manually operated from either side.

B71-10103
METHYL ALCOHOL USED AS PENETRANT INSPECTION MEDIUM FOR POROUS MATERIALS
HENDRON, J. A./AEROJET-GEN. CORP./
MAY 1971
NUC-10419
Porous material thoroughly wetted with alcohol shows persistent wet line or area at locations of cracks or porosity. Inspection is qualitative and repeatable, but is used quantitatively with select samples to grade density variations in graphite blocks. Photography is employed to achieve permanent record of results.

B71-10109
THE HEAT PIPE - A SIMPLE, VERSATILE, EFFICIENT HEAT TRANSFER TOOL
SCHWARTZ, J.
MAY 1971
NPO-11598
Heat pipe transports large quantities of heat from source to sink with only small temperature drop. Thermal energy is transferred to and from heat pipe by any combination of conduction, convection, or radiation heat transfer. Pipes transport energy from open flames, nuclear sources, and electronic equipment.

B71-10129
LOCATING TUBE BLOCKAGE THAT X-RAY CANNOT DETECT
HENDRON, J. A./AEROJET-GEN. CORP./
MAY 1971
NUC-10386
Alternate choices to X-ray use in detecting foreign materials in metal assemblies are available, including negative radiography, neutron radiography, liquid-crystal inspection and ultrasonics. Advantages and disadvantages of each method are given. Report is valuable in testings and inspections, including heat exchangers and piping systems.

B71-10150
PREDICTING VIBRATIONAL FAILURE OF FLEXIBLE DUCTING
HENRY, R. H./N. AM. ROCKWELL CORP./
JUN. 1971
M-FS-16750
Technique applies to liquid or gas transfer through flexible ducting and proves valuable in high velocity fluid flow cases. Fluid mechanism responsible for free bellows vibrational excitation also causes flexible hose oscillation. Static pressure stress influences flexible ducting fatigue life and is considered separately.

B71-10156
INSTRUCTION MANUALS FOR RADIOGRAPHIC NONDESTRUCTIVE TESTING
INNOVATOR NOT GIVEN /GEN. DYN./CONVAIR/ JUN. 1971
SEE ALSO B67-10374, B68-10391, B69-10108, B69-10278, NASA-CR-61212, NASA-CR-61213, NASA-CR-61214, NASA-CR-61215, NASA-CR-61216, NASA-CR-61231
M-FS-21350
Six new handbooks on the fundamentals of nondestructive test techniques supply recent information for instructing inspectors and

technicians, and can be used effectively in shops or laboratories, technical schools, or home study programs.

B71-10183
GENERALIZED SAFETY EQUATION - A CONCEPT
HANO, G./IBM CORP./
JUN. 1971
M-FS-20522
Concept provides definition of relationship between safety and reliability, personnel safety measurement, and equipment safety evaluation. Safety systems cope with single or combined risks. Cost and effectiveness of alternate hypothetical safety systems are estimated and used as basis for final system design.

B71-10187
PATTERN RECOGNITION TECHNIQUE
HONG, J. P.
JUN. 1971
NPO-11337
Technique operates regardless of pattern rotation, translation or magnification and successfully detects out-of-register patterns. It improves accuracy and reduces cost of various optical character recognition devices and page readers and provides data input to computer.

B71-10188
PEAK STRUCTURAL RESPONSE TO NONSTATIONARY RANDOM EXCITATIONS
SHINOZUKA, M. YANG, J.-N.
JUN. 1971
NPO-11617
Study establishes distribution function of peak response values, based on frequency interpretation. Excitations considered include impact loading on landing gears and aircraft gust loading. Because of relative severity of excitations, prediction of fatigue and maximum response characteristics is important part of task of structural analysis and design.

B71-10189
ANALYTICAL PROCEDURE FOR ESTIMATING RELIABILITY OF RANDOMLY EXCITED STRUCTURES
HEER, E. YANG, J.-N.
JUN. 1971
NPO-11618
Analysis considers statistical variation of material strength and interactions between catastrophic and failure fatigue modes. Procedure employs concepts of fracture mechanics and extreme point processes associated with stationary narrow-band random vibrations.

B71-10194
PREDICTING SERVICE LIFE MARGINS
EGAN, G. F./N. AM. ROCKWELL CORP./
JUN. 1971
M-FS-24015
Margins are developed for equipment susceptible to malfunction due to excessive time or operation cycles, and for identifying limited life equipment so monitoring and replacing is accomplished before hardware failure. Method applies to hardware where design service is established and where reasonable expected usage prediction is made.

B71-10196
LIMITED LIFE ITEM MANAGEMENT
EAGLEN, R. L./N. AM. ROCKWELL CORP./
JUN. 1971
M-FS-24020
Plans are available for age-sensitive hardware management. Control plan identifies shelf life or age control requirements for materials considered age sensitive, use sensitive, or time service or shelf life controlled items, and describes methods of arriving at age controls through adherence to detailed specifications.

B71-10227
ULTRASONIC SCANNING SYSTEM FOR IN-PLACE INSPECTION OF BRAZED-TUBE JOINTS
HARALSON, H. S./SPACO, INC./ HAYNES, J. L. WAGES, C. G.
JUL. 1971 SEE ALSO NASA-TM-X-64558
M-FS-21166
System detects defects of .051 cm in diameter and larger. System incorporates scanning head assembly including boot enclosed transducer, slip ring assembly, drive mechanism, and servotransmitter. Ultrasonic flaw detector, prototype recorder, and special recorder complete system.

B71-10254
WIND TUNNEL INVESTIGATIONS AT TRANSONIC MACH NUMBERS
ROBERTSON, J. E./WYLE LABS./
JUL. 1971
M-FS-20895
Investigation utilizes static and fluctuating pressure measurements and oil flow visualization techniques to analyze perturbed flow environments of three-dimensional protuberances and the surrounding structure. Significant findings are given.

B71-10266
CRITERIA FOR VIBRATION TESTING
CRONIN, D. L./TRW SYSTEMS GROUP/
AUG. 1971
GSFC-10737
Systematic application of response spectral analysis and other analyses determine damping sensitivity of flight environment and candidate laboratory tests. Computerized comparison is made between response spectrum for flight environment, or enveloping spectra for collection of flight events, and response spectrum for candidate laboratory test.

B71-10270
METHOD FOR DETERMINING FAILURE POTENTIAL OF PRESSURE VESSELS
RAWE, R. A./MCDONNELL DOUGLAS CORP./ SCHWAB, D. E.
AUG. 1971
M-FS-20564
Method provides quantitative estimation of critical vessel wall and crack parameters that must not be exceeded to ensure against failure of pressurized vessels.

B71-10271
QUALIFICATIONS AND CERTIFICATION OF NONDESTRUCTIVE TESTING PERSONNEL
KIRK, M. K.
AUG. 1971 SEE ALSO B67-10374, B68-10391, B69-10108, B69-10278
M-FS-20850
Personnel handbook states criteria for test methods including radiation, ultrasonics, eddy current, liquid penetrant, and magnetic particle. Subject categories are thoroughly defined and substructured.

B71-10281
INFORMATION QUALITY-CONTROL MODEL
VINCENT, D. A.
AUG. 1971
NPO-11431
Model serves as graphic tool for estimating complete product objectives from limited input information, and is applied to cost estimations, product-quality evaluations, and effectiveness measurements for manpower resources allocation. Six product quality levels are defined.

B71-10327
STRUCTURAL BEHAVIOR OF TAPERED INFLATED FABRIC CYLINDERS UNDER VARIOUS LOADING CONDITIONS
KOVALEVSKY, L./N. AM. ROCKWELL CORP./ RISK, F. L.
AUG. 1971
MSC-15317
Method analyzes inflatable structures and considers axial loads, torsional moment, and internal pressure. Behavior depends on anistropic nature and large deflection stress-strain characteristics of fabric material. Behavior equations for pressurized cylinder loaded in torsion are developed.

B71-10337
IMPROVED SMOKE GENERATOR FOR LOW-SPEED WIND TUNNELS
TURNER, T. R.
SEP. 1971
LANGLEY-10885

Device incorporates kerosene vaporization concept by electrically heating tubes that carry kerosene down the probe, smoke is emitted from orifices at probe's end. Neither the low concentration of kerosene vapor nor the 50 Vdc power supply constitutes a safety hazard.

B71-10348
ACCELERATED BATTERY-LIFE TESTING - A CONCEPT
MC CALLUM, J./BATTELLE MEM. INST./ THOMAS, R. E.
SEP. 1971 SEE ALSO NASA-CR-97935, NASA-CR-107114
GSFC-11085
Test program, employing empirical, statistical and physical methods, determines service life and failure probabilities of electrochemical cells and batteries, and is applicable to testing mechanical, electrical, and chemical devices. Data obtained aids long-term performance prediction of battery or cell.

B71-10397
EQUIPMENT AND PROCEDURE FOR DETERMINING THE ELASTIC MODULUS OF CARBON-EPOXY COMPOSITES
BROWN, W. L./MARTIN MARIETTA CORP./ FELDMAN, A.
PENNING, F. A. STANG, D. A.
OCT. 1971
LEWIS-11116
Method includes test device design and fabrication and standard Naval Ordnance Laboratory /NOL/ test ring as the test specimen. Technique provides accurate measurement of NOL ring elastic modulus, and adapts for use with fiber glass epoxy/rings.

B71-10405
COMBINED HIGH VACUUM/HIGH FREQUENCY FATIGUE TESTER
HONEYCUTT, C. R./TRW, INC./ MARTIN, T. F.
OCT. 1971 SEE ALSO NASA-CR-72241
LEWIS-11210
Apparatus permits application of significantly greater number of cycles or equivalent number of cycles in shorter time than conventional fatigue test machines. Environment eliminates problems associated with high temperature oxidation and with sensitivity of refractory alloy behavior to atmospheric contamination.

B71-10407
LOW COST, LOGARITHMIC MASS FLOW COMPUTER
DOLCE, J. L. GABY, J. D., JR. NOGA, D. F. WATSON, J. E.
NOV. 1971
LEWIS-11001
Computer solves the equation relating gas flow through a nozzle, venturi, or orifice to the absolute temperature, absolute pressure, and differential pressure of the fluid. Inexpensive method has high frequency response and provides true analog output.

B71-10409
SIMPLE TWO-SPEED TAPE TRANSPORT DRIVE
CLURMAN, S. P./RCA/ STITLEY, G. L.
NOV. 1971 SEE ALSO NASA-CR-112400
GSFC-10981
High data rate storage system B tape transport fits to existing hysteresis motor thus reducing flutter, lowering assembly cost, simplifying assembly process and increasing reliability. Motor may be used on any tape recorder or similar device having two speed ratio of up to 32 to 1.

B71-10430
SERVO-CONTROLLED DECOUPLER ELIMINATES OSCILLATIONS IN FLUID FLOW - A CONCEPT
FENWICK, J. R./N. AM. ROCKWELL CORP./
NOV. 1971
M-FS-18793
Active control technique, using accelerometer-controlled servovalve to operate a compensating piston, effectively eliminates pressure fluctuations due to longitudinal structural vibration within a relatively long bandwith.

B71-10446
AXISYMMETRIC AND CYLINDRICAL ISOSTABLE STRUCTURES - A CONCEPT
HEDGEPETH, J. M./ASTRO RES. CORP./ PREISWERK, P.
SCHEURCH, H. U.
NOV. 1971
NPO-12049
Mathematical formulation, suitable for analytical design of structural networks with uniform local stability, yields idealized solutions for specific two-family networks.

B71-10507
NONDESTRUCTIVE TESTING OF BOND INTEGRITY IN FOAM INSULATION/ALUMINUM COMPOSITES
BANKSTON, B. F. CLOTFELTER, W. M. DUREN, P. C.
DEC. 1971 SEE ALSO NASA-TM-X-53940
M-FS-20786
Nondestructive test methods are used for evaluating bond integrity of low-density polyurethane spray-on foam used as cryogenic insulation on aluminum alloy surfaces.

B71-10513
OPTICAL INSPECTION TOOL FOR INTERIOR SURFACES OF FLUID LINES
MITCHELL, D. K.
DEC. 1971
M-FS-15162
Specialized tool enables visual inspection of interior bore surfaces of pipe lines having sharp bends and blind runs. Adjustable, hinged optical head permits viewing of bore surfaces at angles from 0 deg to 115 deg to the principal axis of the sight tube.

B71-10514
METHOD FOR CALCULATING THE STRESSES IN PRESSURE VESSELS
SKOGH, J./LOCKHEED MISSILES AND SPACE CO./
DEC. 1971
MSC-13515
Calculation of elastic and plastic stresses at axisymmetric discontinuities is based on nonlinear elastic theory incorporating pressure coupling effects.

B71-10528
SPLIT STATOR VANE ROW FOR FANS AND COMPRESSORS
VOLK, L. J./GE/
DEC. 1971 SEE ALSO NASA-CR-1493
ARC-10288
Operating noise of fans is reduced by adding part span vanes to vane row of stator, reducing the number of full span vanes and maintaining a vane-to-blade ratio of about 2 to 1.

B72-10009
ELECTRODYNAMIC ACTUATORS FOR ROCKET ENGINE VALVES
O. Fiet (TRW Systems Group) and D. Doshi (TRW Systems Group)
1972
ARC-10486
Actuators, employed in acoustic loudspeakers, operate liquid rocket engine valves by replacing light paper cones with flexible metal diaphragms. Comparative analysis indicates better response time than solenoid actuators, and improved service life and reliability.

B72-10010
GYRO SPRING AUGMENTATION SYSTEM
H. D. Danielson (Lockheed-Calif. Co.) and A. W. Brandstetter (Lockheed-Calif. Co.)
1972
ARC-10496
Spring-loaded piston with provision for hydraulic control of spring action varies the stiffness of hydraulic control systems.

B72-10011
FERROMAGNETIC-FLUID LOGIC DEVICES
M. J. Makowski (TRW Systems Group) and C. Mangion (TRW Systems Group)
1972
ARC-10503
Logic element switches flows of low pressure process control fluid in fluidics assemblies. Device operates both electrically and fluidically and is controlled by passing permanent magnet or electromagnet over elements, thus providing proximity switching functions.

B72-10012
CAVITATING VENTURI SUMP
C. Mangion (TRW Systems Group)
1972 See also NASA-CR-86435
ARC-10504
By ducting spent fluid into a cavitating Venturi sump formed in a main stream of propellant, hazardous working fluid of fluidic systems on board spacecraft or rockets is vented harmlessly.

B72-10013
HERMETIC ISOLATION VALVES
M. J. Makowski (TRW Systems Group) and C. Mangion (TRW Systems Group)
1972
ARC-10505
Mechanism consists of thermal actuator, which expands when flow is desired, forcing cutter poppet through a diaphragm seal. Design concept is useful in systems that are stored for long periods of time before operation.

B72-10022
WIND TUNNEL BUFFET LOAD MEASURING TECHNIQUE
C. S. Chang (Lockheed Missiles and Space Co.) and A. M. Ellison (Lockheed Missiles and Space Co.)
1972
ARC-10495
Indirect force measurement technique estimates unsteady forces acting on elastic model during wind tunnel tests. Measurement of forces is practically insensitive to errors in aeroelastic scaling between model and full-scale structure, simplifying design, fabrication and dynamic calibration.

B72-10024
ZERO-LEAKAGE VALVES
R. J. Salvinski (TRW Systems Group)
1972
ARC-10506
Valve action confines polymeric material in a metal groove effecting seal by compressive reaction of the polymer. As cold flow does not occur, sealing material resiliency is preserved over numerous operations.

B72-10037
SOLENOID-OPERATED SWING-CHECK VALVE
P. D. Quattrone and R. H. Meacham
1972
XAC-10048
Modification of spring-loaded swing-check valve for solenoid operation provides low-vacuum swing-check valve which can be operated remotely.

B72-10040
REDUCTION OF FAN NOISE: A CONCEPT
M. R. Simonson (GE)
1972
ARC-10312
Acoustic materials strategically located within or near noise sources are effective for noise abatement on wing mounted lift fans, nozzles, engines and other noise sources. Panels are straightforward and easily adaptable to situations outside of aircraft technology.

B72-10049
PRESSURE SENSITIVE GAS FLOW METER
C. E. Hallum (Philco-Ford Corp.)
1972 See also NASA-CR-73231
ARC-10219
Regulator, which increases flow area in discrete steps as upstream pressure falls, maintains steady flow rate of gas as the supply pressure from storage system decreases.

B72-10075
GRAPH FOR LOCKED ROTOR CURRENT
R. R. Peck (N. Am. Rockwell Corp.)
1972
MSC-15703
Graph determines effect of stalled motor on a distribution system and eliminates hand calculation of amperage in emergencies. Graph is useful to any manufacturer, contractor, or maintenance department involved in electrical technology.

B72-10078
CONTINUOUS-FLOW VARIABLE-DENSITY WIND TUNNEL FACILITIES
J. G. Herrera
1972
NPO-11287
Unique features of wind tunnel facilities at Jet Propulsion Laboratory permit variety of conventional and novel tests to be performed at supersonic and hypersonic speeds. Facilities and operations are described.

B72-10084
OPTIMIZED BRAKING OF LANDING VEHICLES WITH ATMOSPHERIC DRAG
A. K. Bejczy
1972
NPO-11402
Decelerating effect of atmospheric drag assures minimum fuel consumption and time expenditure during braking for soft landing.

B72-10093
COMPENSATING SUBREFLECTOR FOR TWO-REFLECTOR ANTENNAS: A CONCEPT
D. A. Bathker, M. S. Katow, and P. D. Potter
1972
NPO-11503
Segmented subreflector surface of Cassegrainian antenna is distorted and shaped by mechanical means to compensate for loss of figure in main reflector. Number of segments necessary is determined by gravity distortion pattern of main reflector at zenith and at horizon.

B72-10097
SQUIB-ACTUATED DISCONNECT DEVICE
D. P. Davis
1972
NPO-11544
Piston-operated device retains gases released by explosive squibs during stage separation of a spacecraft.

B72-10104
REMOVAL OF FILLER MATERIAL FROM LARGE HIGH ENERGY FORMED PARTS
D. E. Krantz (N. Am. Rockwell Corp.), G. W. Wine (N. Am. Rockwell Corp.), and J. S. Corral (N. Am. Rockwell Corp.)
1972
M-FS-16326
Filler material is removed by applying steam heat at 88.99 C to underside of workpiece and allowing filler to melt and drain from the waffle grids.

B72-10105
MICRORESONATOR FOR DAMPING FLOW OSCILLATIONS
E. Bramblett (Rocketdyne)
May 1972
M-FS-18401
Resonant spring-mass system detunes flow oscillations of pump's inlet line to prevent structural damage in fluidic system.

B72-10121
MICRO REGULATING BALL VALVE
J. W. Hawkins
1972
ARC-10295
Ball valve of simple, rugged configuration overcomes leakage because there are no critical wear areas. Design has stable and precise calibration. Device can be assembled or disassembled in seconds and needs no lubrication.

Graph determines effect of stalled motor on a distribution system and eliminates hand calculation of amperage in emergen-

cies. Graph is useful to any manufacturer, contractor, or maintenance department involved in electrical technology.

B72-10133
POSITIVE FAST SEALING UNION CONNECTIONS
C. M. Kleber
Dec. 1972
LEWIS-11290

Union connections are designed for connecting high pressure flexible hoses from gas storage manifolds to gas transport trailers. Connection uses O ring seals which can be quickly assembled and disassembled without use of wrenches, and which do not twist hose. Worn or damaged O rings are easily replaced.

B72-10135
BOILER FOR GENERATING HIGH QUALITY VAPOR
V. H. Gray, P. J. Marto, and A. W. Joslyn
May 1972 See also NASA-TN-D-4136; NASA-TN-D-6307
LEWIS-11345

Boiler supplies vapor for use in turbines by imparting a high angular velocity to the liquid annulus in heated rotating drum. Drum boiler provides a sharp interface between boiling liquid and vapor, thereby inhibiting the formation of unwanted liquid droplets.

B72-10158
FLUIDIC IGNITION DETECTION
C. S. Henry (Aerojet Liquid Rocket Co.)
Jul. 1952
M-FS-21498

Ignition sensor, utilizing fluidic oscillator device and its ability to react to flow system's molecular weight and temperature changes, detects propellant ignition. Commercial applications include fields of fire protection equipment and fluidics.

B72-10162
FLUIDIC PRESSURE REGULATORS
C. Mangion (TRW Systems Group) and W. Miller (TRW Systems Group)
1972
ARC-10474

Three basic areas for possible application of fluidic control to rocket engine subsystems were identified and six subsystem configurations were analyzed for study. Results provide indication of tradeoffs involved between conventional and fluidic regulators and should be of interest to control and applications engineers who need to make similar analyses.

B72-10163
CLOSED-CYCLE POWER SUPPLY FOR FLUIDIC CONTROL SYSTEMS
O. Fiet (TRW System Group) and C. Mangion (TRW Systems Group)
1972
ARC-10480

Power supply utilizes small quantities of two-phase fluid of suitable thermodynamic properties for circulation in a capillary-pumped heat transfer loop. Fluid is vaporized in evaporator, passed through fluidic system load, condensed, pumped by multistage capillary pump, and returned to the evaporator.

B72-10183
ANGULAR VELOCITY AND ACCELERATION METER
L. Melamed
May 1972
LEWIS-11466

Meter uses a liquid crystalline film which changes coloration due to shear-stresses produced by a rotating disk. Device is advantageous in that it is not subject to bearing failure or electrical burnouts as are conventional devices.

B72-10204
A PIEZOELECTRICALLY ACTUATED BALL VALVE
L. R. Erwin (Bendix Corp.), H. W. Schwartz (Bendix Corp.), and B. R. Teitelbaum (Bendix Corp.)
May 1972
ARC-10338

Bimorph strip composed of two layers of poled piezoelectric ceramic material closes and opens valve. Strip performs like capacitator, allowing initial inrush of current when valve is energized and then only small leakage current flows as valve remains energized.

B72-10210
TWO-STAGE COAXIAL GAS COMPRESSOR
W. S. Wang (TRW Systems Group), H. W. Wright, Jr. (TRW Systems Group), and S. Huniu (TRW Systems Group)
May 1972
ARC-10426

Compressor raises pressure of gases from low ambient supply during space experiments by a system of low weight, size, and power input. Dc rotary-torque motor and ball-screw drive shaft activate first and second stage of compressor, utilizing inertia forces to operate check valves.

B72-10213
INTEGRATED FLIGHT CONTROLLER FOR LIGHT AIRCRAFT
J. W. Olcott (Aeron. Res. Associates of Princeton, Inc.), D. R. Ellis (Aeron. Res. Associates of Princeton, Inc.), and E. Seckel (Aeron. Res. Associates of Princeton, Inc.)
May 1972
ARC-10456

Controller-throttle engages spoiler/dive brake system when throttle setting is below a fixed power setting and gradually increases effect of spoiler/dive brake as throttle is moved toward idle position; since action is automatically reversible, a sudden application of power abruptly terminates aerodynamic effects of spoiler/dive brake system.

B72-10228
SIMPLE, REPRODUCIBLE METHODS FOR THERMAL SHOCK TESTING OF BRITTLE MATERIALS
J. C. Rowley and C. R. King
May 1972
NUC-11020

Technique requires radio frequency induction power source, induction furnace and good vacuum system to induce brittle material thermal shock testing.

B72-10239
ENERGY ABSORBER USES EXPANDED COILED TUBE
E. F. Johnson
Dec. 1972
AEC-10044

Mechanical shock mitigating device, based on working material to its failure point, absorbs mechanical energy by bending or twisting tubing. It functions under axial or tangential loading, has no rebound, is area independent, and is easy and inexpensive to build.

B72-10241
FERROFLUIDIC SOLENOID WITH AXIAL AND RADIAL DISPLACEMENT
E. E. Sabelman
Aug. 1972
NPO-11738

New design is proposed for ferrofluidic solenoid with low magnetic flux leakage. Solenoid consists of a coil centered within a football-shaped elastomeric capsule filled with a ferromagnetic fluid. Fluid replaces the solid, movable core of conventional solenoids, and elastomeric capsule acts as return spring.

B72-10250
FLUIDIC SYSTEMS MAY IMPROVE COMBUSTION IN AUTOMOTIVE ENGINES
C. Mangion (TRW Systems Group)
Sep. 1972
ARC-10582

Application of fluidic devices to reduce generation of noxious exhausts from internal combustion engines is discussed. Operation of fluidic system to provide bypass of fuel air mixture into heated loop to provide more complete combustion is explained.

Advantage lies in no moving parts required for fluidic by-pass action.

B72-10258
REPEATABLE METHOD OF THERMAL STRESS FRACTURE TEST OF BRITTLE MATERIALS
J. C. Rowley, R. W. Andrae, and A. E. Carden
Jun. 1972
NUC-11019
Method heats specimens slowly and with sufficient control so that the critical temperature gradient in the specimens cannot occur before temperature equilibrium is reached.

B72-10289
FLOW EQUATION FOR POROUS PLUG AND CAPILLARY TUBE FLOW RESTRICTORS
W. S. Davis (Avco Corp.)
Jun. 1972
GSFC-11387
Development of flow measuring apparatus for determining low flow performance of resistojet thruster is discussed. Diagram of test equipment is presented. Operation of test equipment is described and numerical relationships are explained.

B72-10323
ISOGRID STRUCTURE
R. R. Meyer (McDonnell-Douglas Corp.)
Jul. 1972
M-FS-21567
Isotropic rib stiffened shell whose ribs intersect to form equilateral triangles has advantages of high twisting rigidity of construction and simplicity of triangular pattern.

B72-10330
LIQUID METHANE GELLED WITH METHANOL AND WATER REDUCES RATE OF NITROGEN ABSORPTION
E. M. Vanderwall (Aerojet Liquid Rocket Co.)
Jul. 1972 See also NASA-CR-72876
LEWIS-11574
Dilution of gelant vapor with inert carrier gas accomplishes gelation. Mixture is injected through heated tube and orifice into liquid methane for immediate condensation within bulk of liquid. Direct dispersion of particles in liquid avoids condensation on walls of vessel and eliminates additional mixing.

B72-10331
SMALL TURBINE-TYPE FLOWMETERS FOR LIQUID HYDROGEN
I. Warshawsky, H. F. Hobart, and H. L. Minkin
Jul. 1972 See also NASA-TM-X-52984
LEWIS-11535
Characteristics of turbine-type flowmeters in two sizes and with various types of bearings are presented. Calibration procedures of instruments are described. Accuracies obtainable under various conditions are analyzed.

B72-10338
PORTABLE ELECTRON BEAM WELD CHAMBER
J. R. Lewis (N. Am. Rockwell Corp.) and J. M. Dimino (N. Am. Rockwell Corp.)
Sep. 1972
MSC-17738
Development and characteristics of portable vacuum chamber for skate type electron beam welding are discussed. Construction and operational details of equipment are presented. Illustrations of equipment are provided.

B72-10380
EXPANDABLE COATING COCOON LEAK DETECTION SYSTEM
R. L. Hauser (Hauser Labs.) and M. C. Kochansky (Hauser Labs.)
Jul. 1972
M-FS-21848
Development of system and materials for detecting leaks in cocoon protective coatings is discussed. Method of applying materials for leak determination is presented. Pressurization of system following application of materials will cause formation of bubble if leak exists.

B72-10381
LEAK DECAY METHOD OF HELIUM BOMBARDMENT LEAK TESTING
W. P. Garton (N. Am. Rockwell Corp.)
Jul. 1972
M-FS-24109
Method for verifying hermetic seal quality of small components is described. Procedure for using helium bombardment and examination with mass spectrometer is described. Technique eliminates errors in seal quality determination and checks quality of seals without contaminating products.

B72-10399
IMPROVEMENTS OF ZEYDED METHOD FOR CALCULATING FLUTTER OF FLAT PANELS
J. E. Yates (Aeron. Res. Associates of Princeton, Inc.)
Jul. 1972
M-FS-20955
Method for calculating flutter boundaries and estimating stresses in infinite spanwise array of panels is presented. Numerical analyses are included for pinned edge panels, isotropic panel material, zero viscous damping, and no elastic foundation. Design flutter boundaries are presented for aluminum panels on Saturn spacecraft trajectory.

B72-10403
NONSTEADY FLOW-DIRECTION MEASUREMENT
L. N. Krause and R. L. Summers
Jul. 1972 See also NASA-TM-X-52962
LEWIS-11499
Nonsteady flow probe uses miniature pressure transducers mounted within probe support very close to tube inlets. Response speed depends on internal volume between tube inlet and pressure transducer location.

B72-10407
PREDICTION OF FLOW-INDUCED FAILURES OF BRAIDED FLEXIBLE HOSES AND BELLOWS
L. E. Sack (N. Am. Rockwell Corp.), R. L. Nelson (N. Am. Rockwell Corp.), D. R. Mason (N. Am. Rockwell Corp.), and R. A. Cooper (N. Am. Rockwell Corp.)
Jul. 1972
M-FS-19004
Analytical techniques were developed to evaluate braided hoses and bellows for possibility of flow induced resonance. These techniques determine likelihood of high cycle fatigue failure when such resonance exists.

B72-10408
TURBOPUMP THERMODYNAMIC COOLING
T. C. Patten (McDonnell-Douglas Corp.) and H. B. McKee (McDonnell-Douglas Corp.)
Jul. 1972
M-FS-21597
System for cooling turbopumps used in cryogenic fluid storage facilities is described. Technique uses thermodynamic propellant vent to intercept pump heat at desired conditions. Cooling system uses hydrogen from outside source or residual hydrogen from cryogenic storage tank.

B72-10436
RIGHT ANGLE MOUNTED COLD TRAP
R. J. Ugiansky
Jul. 1972
GSFC-11323
Vacuum system for calibrating, aligning, and evaluating solar research instruments is described. Equipment consists of right-angle mounted cold trap connected to side pumping vacuum system. Operation of test facility and conditions obtainable in test chamber are discussed.

B72-10437
INVESTIGATIONS OF A TURBULENT JET IN A CROSSFLOW
Y. Kamotani (Case Western Reserve Univ.) and I. Greber (Case Western Reserve Univ.)

Jul. 1972 See also NASA-CR-72893

LEWIS-11680

Analyses of flow field downstream of jet directed at right angles into crossflow for heated and unheated single jets are presented. Application of flow data to cooling system for gas turbine combustion chambers is discussed. Temperature distribution, velocity trajectory, and vortex motion are described.

B72-10441
MULTIPLE REACTION MASS AND ISOLATION SYSTEM
N. F. Jacobson (N. Am. Rockwell Corp.)
Jul. 1972
M-FS-24119

System allows measurement of damping and stiffness with the desired uncoupling of measurement fixture and permits testing of large structures without need for costly foundation or base. System is designed to permit horizontal loading to be conveniently superimposed on vibratory loads.

B72-10446
COMBINATION PRESSURE REGULATOR AND SAFETY VALVE: A CONCEPT
R. L. Acres (Serv. Technol. Corp.)
Jul. 1972
MSC-14088

Device for regulating high pressure liquefied gas to high pressure vapor generator using liquid oxygen is described. System includes pressure regulation and safety valve features. Construction of the equipment and method of operation are presented.

B72-10466
CONSTANT TENSION DEVICE FOR GRAVITY SIMULATION
W. F. Orlowski (Sperry Rand Corp.)
Aug. 1972
M-FS-21618

Mechanical device for simulating lunar gravitation is described. Details of construction are illustrated and example of application is provided. Device works opposite to effects of earth gravity and produces effects similar to lunar conditions by providing mechanical lifting forces.

B72-10476
IMPACT SENSITIVITY OF MATERIALS IN CONTACT WITH LIQUID AND GASEOUS OXYGEN AT HIGH PRESSURE
R. J. Schwinghamer
Dec. 1972
M-FS-21930

Tests run at high pressure indicate that various polymer materials used show inverse relationship between thickness and impact sensitivity. Several materials tested exhibited greater impact sensitivity in gaseous oxygen than in liquid oxygen. Materials tested in gaseous oxygen showed enhanced impact sensitivity with higher pressure.

B72-10488
ANALYTICAL FAILURE DETERMINATION OF FLOW-INDUCED FATIGUE IN BELLOWS
R. G. Cron (Rocketdyne)
Aug. 1972
M-FS-18178

Fatigue failure of bellows when subjected to passage of fluids at high speeds is discussed. It is assumed that flow through bellows generates sound in fluid and vibration caused by sound waves is principal contributor to failure. Effects of sound waves on bellows structure are analyzed.

B72-10489
IMPROVED HIGH-TEMPERATURE GIMBAL JOINT
J. R. Winemiller, S. T. Yee, and B. H. Neal
Aug. 1972
LEWIS-11705

Development and characteristics of bellows gimbal joint for reduction of thermal stress effects are discussed. Reactions of designed joint to changes in temperature are described. Illustrations of conventional gimbal joint and improved gimbal joint are provided.

B72-10490
AUTOMATIC AIR FLOW CONTROL IN AIR CONDITIONING DUCTS
H. D. Obler
Aug. 1972
GSFC-11445

Device is designed which automatically selects air flow coming from either of two directions and which can be adjusted to desired air volume on either side. Device uses one movable and two fixed scoops which control air flow and air volume.

B72-10494
A SYSTEM FOR EARLY WARNING OF BEARING FAILURE
J. J. Broderick (Mech. Technol., Inc.), R. F. Burchill (Mech. Technol., Inc.), and H. L. Clark (Mech. Technol., Inc.)
Aug. 1972
M-FS-21877

System for detecting incipient failure in ball bearings is described. Ultrasonic equipment detects bearing system resonance and provides warning signal through electronic circuitry. Detector can be used to evaluate performance of newly installed bearings. Schematic diagram is provided to show components.

B72-10496
DRY ICE PLUG FOR HYDRAULIC AND PNEUMATIC PIPE FLUSHING
L. Francino (Grumman Aerospace Corp.) and S. Rauch (Grumman Aerospace Corp.)
Aug. 1972
MSC-12548

Development of technique to clear blockages in hydraulic and pneumatic pipes is discussed. Technique consists of using dry ice plug to separate sensitive components from flushing fluid. Diagram of equipment and principles of operation are presented.

B72-10502
INTEGRATED MONOPROPELLANT THRUSTER
C. Mangion (TRW Systems Group)
Aug. 1972
NPO-12004

Application of vortex amplifier principles to throttling of monopropellant thrusters is described. Integration of flow control, catalyst bed, and thruster nozzle is accomplished by design of thruster. Diagrams of thrusters are provided to show details of construction and operation.

B72-10540
IMPROVED SAMPLING OF COMPRESSED GASES FOR CONDENSABLE HYDROCARBON CONTENT
M. H. Peterson (Bendix Corp.) and E. W. Fickey (Bendix Corp.)
Sep. 1972
KSC-10304

Sampling process was developed which uses commercially available high pressure filters and provides measurements in fraction of time required by older methods. Measurements show no significant difference in results between low pressure and high pressure samples. Filter method is slightly more accurate than scrubber technique.

B72-10543
A STAGNATION PRESSURE PROBE FOR USE IN SUPERSONIC FLOW
M. J. Goodyer
Sep. 1972
LANGLEY-11139

Probe was developed which is capable of recording true stagnation pressure in supersonic and subsonic flows. Static pressure orifices in the compression surface allow probe to be used as combined flow direction and stagnation pressure sensor.

B72-10546
PROBE MEASURES GAS AND LIQUID MASS FLUX IN HIGH MASS FLOW RATIO TWO-PHASE FLOWS
R. J. Burick (N. Am. Rockwell Corp.)
Sep. 1972 See also NASA-CR-120819

LEWIS-11270

Deceleration probe constructed of two concentric tubes with separator inlet operates successfully in flow fields where ratio of droplet flow rate to gas flow rate ranges from 1.0 to 20, and eliminates problems of local flow field disturbances and flooding. Probe is effective tool for characterization of liquid droplet/gas spray fields.

B72-10552
MICRO-SCALE CREASE-AND-FOLD APPARATUS
R. F. Muraca (Stanford Res. Inst.) and J. Neff (Stanford Res. Inst.)
Oct. 1972
NPO-12029

Crease and fold resistance of polymeric films and test equipment for determining mechanical properties is discussed. Components of equipment and method of operation are described. Illustration of test device is provided.

B72-10558
RESTRAINT AND LOCOMOTION AID
H. C. Vykukal
Sep. 1972
ARC-10153

Design of system to permit human performance in conditions where gravity and friction forces cannot act as counterforces is described. Application of system to performance of work in space is discussed. Diagram is provided to show construction and operation of equipment.

B72-10576
LEAK TEST SYSTEM
R. G. Morris (McDonnell-Douglas Corp.) and A. L. Rose (McDonnell-Douglas Corp.)
Sep. 1972
M-FS-21788

System for quantitative determination of leak rates in large pressurized compartments is described. Method uses pressure reference cylinder placed in thermal contact with internal environment of compartment. Construction of equipment and details of operational procedure are reported. Illustration of equipment is included.

B72-10581
IMPROVED SILVER-ZINC BATTERY-TERMINAL SEALS
W. E. Snider, D. W. Medwid, and W. J. Nagle
Sep. 1972 See also NASA-TM-X-68067
LEWIS-11615

Development of battery terminal seal for sealing electrolyte for periods of three to five years is discussed. Operating conditions of battery are defined. Components of electrolyte seal and method of production are reported. Schematic diagrams of device are included.

B72-10590
HIGH PRESSURE LIQUID GAS PUMP
R. L. Acres (Serv. Technol. Corp.)
Sep. 1972
MSC-14087

Design and development of two types of pumps for handling liquefied gases are discussed. One pump uses mechanical valve shift and other uses pneumatic valve shift. Illustrations of pumps are provided and detailed description of operation is included.

B72-10598
THERMAL INDUCED FLOW OSCILLATIONS IN HEAT EXCHANGERS FOR SUPERCRITICAL FLUIDS
J. C. Friedly (GE), J. L. Manganaro (GE), and P. G. Krueger (GE)
Sep. 1972
M-FS-21262

Analytical model has been developed to predict possible unstable behavior in supercritical heat exchangers. From complete model, greatly simplified stability criterion is derived. As result of this criterion, stability of heat exchanger system can be predicted in advance.

B72-10603
RESPONSE OF A PANEL STRUCTURE TO REVERBERANT ACOUSTIC EXCITATION
D. Cadin, Jr. (Lockheed Missiles and Space Co.)
Dec. 1972
M-FS-21774

Investigation was made of methods for predicting response of panel structures to acoustic excitation. Computer program was generated to calculate response of panel to reverberant acoustic field, using normal mode approach developed for low frequency response. Program can be modified to handle other types of acoustic fields by changing spatial correlation calculation.

B72-10613
A FOUR-PANEL ENCLOSURE PROTECTS FROM EXPLOSION
P. V. King (GE)
Oct. 1972
M-FS-21847

Development of multi-layered baffle as enclosure to protect personnel from effects of explosion during production of ammunition is discussed. Advantages of new system over previous systems are described. Illustration of typical panel structure is provided.

B72-10615
SOLAR POWERED ABSORPTION CYCLE HEAT PUMP USING PHASE CHANGE MATERIALS FOR ENERGY STORAGE
R. L. Middleton
Oct. 1972
M-FS-21927

Solar powered heating and cooling system with possible application to residential homes is described. Operating principles of system are defined and illustration of typical energy storage and exchange system is provided.

B72-10626
INTERNAL CAPILLARY INSULATION FOR CRYOGENIC TANKS
J. L. McGrew (Martin Marietta Corp.)
Nov. 1972
LEWIS-11234

Capillary-type insulation was devised for installation on inside of liquid methane fuel tanks for future aircraft. Insulation consists of honeycomb core of fiberglass cloth impregnated with polyimide resin which is bonded onto metal tank wall using polyimide adhesive. Capillary holes in each honeycomb cell admit methane which provides static pressure in cell.

B72-10631
USE OF SMALL TURBINE-TYPE FLOWMETERS TO MEASURE FLOW IN LARGE PIPES
H. L. Minkin and H. F. Hobart
Nov. 1972
LEWIS-11851

Measurement of mass flow in large pipes using small turbine-type flowmeters is discussed. Experiments for determining accuracy of flowmeter and applicability to various types of flow measurement are reported. Illustration of turbine flowmeter and calibration curve are included.

B72-10636
LINEAR ACCELERATOR: A CONCEPT
J. Mutzberg (Boeing Co.)
Oct. 1972
KSC-10618

Design is proposed for inexpensive accelerometer which would work by applying pressure to fluid during acceleration. Pressure is used to move shuttle, and shuttle movement is sensed and calibrated to give acceleration readings.

B72-10651
FREON 21 BEARING LUBRICATION AND COOLANT SYSTEM
E. J. Bodensieck (N. Am. Rockwell Corp.) and M. J. Gustafson

(N. Am. Rockwell Corp.)
Dec. 1972
HQ-10302

Lubrication and cooling of turbopump rotor bearings by liquid Freon 21 is reported. Freon expands in rotor bearing and acts as heat sink by removing heat during warming and evaporation. Gaseous Freon is removed by vacuum pump controlling rotor chamber operation.

B72-10663
AUTOMATIC WATER INVENTORY, COLLECTING, AND DISPENSING UNIT
J. B. Hall, Jr. and E. F. Williams
Dec. 1972
LANGLEY-11071

Two cylindrical tanks with piston bladders and associated components for automatic filling and emptying use liquid inventory readout devices in control of water flow. Unit provides for adaptive water collection, storage, and dispensation in weightless environment.

B72-10669
SPRAG SOLENOID BRAKE
P. H. Dane
Oct. 1972
M-FS-21846

Operation of solenoid braking mechanism is discussed. Illustrations of construction of the brake are provided. Device is used for braking low or medium speed shaft rotations and produces approximately ten times braking torque of similar solenoid brakes.

B72-10677
PROPELLANT FEED SYSTEMS TRANSIENTS
R. A. Shumway (N. Am. Rockwell Corp.) and G. R. Cox (N. Am. Rockwell Corp.)
Dec. 1972
MSC-17848

Program was written to assist in analysis of fluid feed line transients initiated by operation of valves. Program output consists of printout of transient pressures and velocities through feed system as function of time. Optional CRT plot output provides for display of transient pressures and velocities as function of time at any desired location in feed system.

B72-10679
A MONOSTRAIN TEST APPARATUS
J. C. Helf (N. Am. Rockwell Corp.), W. L. Hill (N. Am. Rockwell Corp.), and H. L. Pontius (N. Am. Rockwell Corp.)
Dec. 1972
M-FS-24221

Test apparatus is designed for determining tensile strength, modulus of elasticity, elongation, and thermal coefficient of contraction or expansion of uniformly shaped plastics, adhesives, and foam materials over temperature range of 700 to 90 K (800 to -300). Tests may be used in design quality control, and in evaluation of new adhesives and plastic materials.

B72-10686
AN OPTICAL QUALITY METER SUITABLE FOR CRYOGENIC LIQUIDS
H. F. Hobart and H. L. Minkin
Oct. 1972 See also B66-10394
LEWIS-11814

Construction of instrument to measure ratio of liquid to gas of flowing transparent cryogenic fluid is described. Instrument consists of collimated light source and photoconductive cell. Operation of instrument is described and illustration of equipment is provided.

B72-10689
NEW DETECTION METHOD FOR ROLLING ELEMENT AND BEARING DEFECTS
R. F. Burchill (Mech. Technol., Inc.) and J. L. Frarey (Mech. Technol., Inc.)
Oct. 1972
M-FS-21911

Instrument for detecting defects in rolling elements of bearings is described. Detection depends on rate at which rolling elements impact defect and establish envelope amplitude of ball resonant frequency. Block diagram of instrument is provided and results obtained in conducting tests are reported.

B72-10692
SEAT BELT RESTRAINT SYSTEM
A. Garavaglia and D. Matsuhiro
Oct. 1972
ARC-10519

Shoulder-harness and lap-belt restraint system was designed to be worn by individuals of widely different sizes and to permit normal body motion except under sudden deceleration. System is divided into two basic assemblies, lap belt and torso or shoulder harness. Inertia-activated reels immediately lock when seat experiences sudden deceleration.

B72-10693
EJECTOR NOZZLE WITH MASSIVE BLOWING
H. C. True (Boeing Co.)
Oct. 1972
ARC-10621

Jet-flap, wing-blowing system for use in short takeoff and landing aircraft is described. System depends on ejector nozzle with large blowing capacity to direct ducted air against deflected flap. Operation of equipment during takeoff and cruise conditions is discussed. Diagrams of equipment are provided.

B72-10704
CONCENTRIC-SEATING POPPET
W. F. MacGlashan, Jr.
Oct. 1972
NPO-11658

Configuration of poppet valve with zero clearance sudden initial contact is described. Detailed description of valve operation is presented and diagram of components is illustrated.

B72-10712
ENERGY ABSORBING SYSTEM FOR MECHANICAL IMPACTS
E. R. Collins, Jr.
Dec. 1972
NPO-10671

System is described based on use of arrangement of crushable hollow spheres bonded together in layers of progressively different diameter, with largest diameter spheres positioned to receive impact forces initially. System is particularly useful for delivery of payloads by air-drop techniques.

B72-10713
SQUIB-OPERATED DISCONNECT
P. Alexander, Jr. and A. R. McDougal
Dec. 1972
NPO-11330

Disconnect device is described, which consists of stud with enlarged end held in collet locked by pins, which are held in place by piston. When squib is fired, trapped combustion products force piston to release pins.

B72-10714
TRIANGULAR WHEEL LOCOMOTION MECHANISM
E. Hryniewiecki (Comprehensive Designers, Inc.)
Dec. 1972
NPO-11366

Triangular wheel and suspension vehicle is described which can scale obstacle higher than its own length.

B72-10715
DESIGN CRITERIA MONOGRAPH ON SOLID ROCKET MOTOR IGNITERS
Innovator not given (Lewis Res. Center) Dec. 1972 See also NASA-SP-8051
LEWIS-11826

Summary of large and loosely organized body of existing successful design techniques and practices for solid rocket motor igniters is presented.

B72-10716
A MULTIELEMENT PROBE FOR COINCIDENT TEMPERATURE AND PRESSURE MEASUREMENTS
G. E. Glawe, T. J. Dudzinski, and L. N. Krause
Dec. 1972 See also NASA-TM-X-2577
LEWIS-11775

Small, multielement probes are described which measure total pressure and temperature coincidentally at one or several points in gas stream.

B72-10722
OPTIMIZATION OF FLUID LINE SIZES WITH PUMPING POWER PENALTY IBM-360 COMPUTER PROGRAM
D. Jelinek (N. Am. Rockwell Corp.)
Dec. 1972
MSC-17930

Computer program has been developed to calculate and total weights for tubing, fluid in tubing, and weight of fuel cell power source necessary to power pump based on flow rate and pressure drop. Program can be used for fluid systems used in any type of aircraft, spacecraft, trucks, ships, refineries, and chemical processing plants.

B72-10723
THERMAL-POWERED RECIPROCATING PUMP
E. E. Sabelman
Dec. 1972
NPO-11417

Waste heat from radioisotope thermal generators in spacecraft is transported to keep instruments warm by two-cylinder reciprocating pump powered by energy from warm heat exchange fluid. Each cylinder has thermally nonconductive piston, heat exchange coil, and heat sink surface.

B72-10733
A PROPOSED REMOTE MANIPULATOR SYSTEM: A CONCEPT
S. Brodie (Martin Marietta Corp.), C. Flatau (Martin Marietta Corp.), and F. Greeb (Martin Marietta Corp.)
Dec. 1972
MSC-14245

System is described with variable ratio, mixed mode, bilateral, master-slave control. Manipulator arms consist of shoulder and elbow with two degrees of freedom, a wrist with three degrees of freedom, and terminal grasping device. Feedback is provided by TV cameras attached near shoulder, grasping device, and at end of shuttle opposite arm.

B72-10738
EXPERIMENTAL STUDY OF FLOW DISTRIBUTION WITH CIRCUMFERENTIAL MANIFOLDS
R. T. Dittrich
Dec. 1972 See also NASA-TN-D-6697
LEWIS-11649

Water flow test results on fluid flow distribution and pressure loss in curved manifolds with tangential or radial entry are reported. Manifolds were studied both as inlet and outlet manifolds. Manifolds can be used for boilers and/or heat exchangers for advanced space electric power plants.

B72-10743
REDUCTION OF NOISE IN GYRO OUTPUTS
G. M. Kraus (Honeywell, Inc.) and J. G. Rupert (Honeywell, Inc.)
Dec. 1972
NPO-11603

Technique is described to reduce extraneous gyro output signals by using relatively inexpensive shrouds which do not increase power consumption. Shrouds reduce noise by minimizing mass of gas spinning with rotor, reducing Reynolds number near rotor, and inducing laminar flow.

B72-10748
FINAL REPORT ON A STUDY OF LOW-DENSITY NOZZLE FLOWS, WITH APPLICATION TO MICROTHRUST ROCKETS
Innovator not given (Cornell Aeron. Lab., Inc.) Dec. 1972
HQ-10761

Method for predicting nozzle performance of microthrust rockets is discussed. Method is numerical and uses simplified computer program on IBM 360/65 computer. Analysis is based on slender channel equations with slip boundary conditions at walls. Implicit finite difference scheme is used to calculate pressure and velocity profiles along channel.

B72-10749
EFFECTS OF NONUNIFORM SWASH-PLATE STIFFNESS ON COUPLED BLADE-CONTROL SYSTEM DYNAMICS AND STABILITY
V. J. Piarulli (Rochester Appl. Sci. Associates, Inc.)
Dec. 1972
LANGLEY-11068

Program has been developed that analytically determines effects of nonuniform swash-plate support stiffness, swash-plate flexibility, and out-of-blade track on vibratory mechanical stability characteristics of helicopter rotor systems. Analysis is based on combined Laplace transform and associated matrix approach.

B73-10023
SATELLITE AUXILIARY PROPULSION SYSTEMS
L. B. Holcomb
Jan. 1973 See also JPL-TR-32-1505
NPO-11744

Report is announced which describes techniques for selecting optimum system for specific satellite mission. Descriptions of propulsion systems are presented along with illustrations and diagrams. Report contains references, cost-effectiveness techniques, and reliability measurements and estimates.

B73-10026
MAGNETIC LATCHING VALVE
J. M. Conley
Jan. 1973
NPO-11790

Latching, fast-acting 2-port poppet valve has been developed for use in gas chromatograph - mass spectrometer combinations. Requisites included positive actuation time, few hundredths of a second, and static force holding valve in position at all times.

B73-10028
FLUID INSULATION TO PREVENT ICE FORMATION IN HEAT EXCHANGERS
G. A. Coffinberry (GE)
Mar. 1973
LEWIS-11959

Heat transfer surfaces were insulated to maintain air side surface temperature above freezing. Double wall tubes, with annular space between tubes, were filled with static liquid hydrogen. Low thermal conductivity of this hydrogen provided thermal resistance.

B73-10029
BIMETALLIC DEVICES FOR STIRRING FLUIDS
T. N. Canning
Feb. 1973
ARC-10441

Device consists of helical heating coil inside cylinder and affixed at one end. Piston is fastened at other end and is free to move axially through cylinder. Electrical power extends coil when applied to conductors. Bimetallic stirrer may also be made in vane form.

B73-10034
MECHANICAL POSITIONING DEVICE FOR LANGMUIR PROBE

C. W. Perkins
Feb. 1973
NPO-11626

Lightweight, portable device has been developed to permit probe movement in two planes. It also provides accurate information about location of probe tip in a closed chamber.

B73-10041
MAGNETIC PARTICLE CLUTCH CONTROLS SERVO SYSTEM
P. B. Fow (Rockwell Intern. Corp.)
Mar. 1973
JSC-17136

Magnetic clutches provide alternative means of driving low-power rate or positioning servo systems. They may be used over wide variety of input speed ranges and weigh comparatively little. Power drain is good with overall motor/clutch efficiency greater than 50%, and gain of clutch is close to linear, following hysteresis curve of core and rotor material.

B73-10042
TRAVELING DIGITAL COUNTERS FOR MICROMETERS
C. T. Haley and J. M. Moore
Feb. 1973
LANGLEY-11258

Five digit micrometer readings are made directly and quickly with no loss of precision. It is virtually impossible for micrometer to be misread. Digitized micrometer can also be used for reptitive measurements.

B73-10057
DYNAMIC TESTING OF COMPLEX STRUCTURES
C. Birs (Grumman Aerospace Corp.) and P. Anderson (Grumman Aerospace Corp.)
Mar. 1973
JSC-12569

Response of structure is determined under impulses large enough to create severe strains. Electrodynamic shaker can provide impulses to nearly any point on structure and can deliver repeated pulses of varying force and duration.

B73-10059
MECHANICAL IMPEDANCE AND ACOUSTIC MOBILITY MEASUREMENT TECHNIQUES OF SPECIFYING VIBRATION ENVIRONMENTS
G. C. Kao (Wyle Labs.)
Feb. 1973
M-FS-22016

Method has been developed for predicting interaction between components and corresponding support structures subjected to acoustic excitations. Force environments determined in spectral form are called force spectra. Force-spectra equation is determined based on one-dimensional structural impedance model.

B73-10061
MEASUREMENT OF DIMENSIONS AND ALIGNMENT WITH OPTICAL INSTRUMENTS
W. F. Dendy
Feb. 1973
M-FS-22168

Course, as contained in manual, encompasses principles involved in determining and applying proper optical tooling devices to fulfill precise measuring requirements.

B73-10076
THERMAL-DYNAMIC MODELING STUDY
I. U. Ojalvo (Grumman Aerospace Corp.)
Mar. 1973 See also NASA-CR-2125
LANGLEY-11309

Study provides basic information for designing models and conducting thermal-dynamic structural tests. Factors considered are development and interpretation of thermal-dynamic structural scaling laws; identification of major problem areas; and presentation of model fabrication, instrumentation, and test procedures.

B73-10111
A VERSATILE FLAMMABILITY TEST CHAMBER
C. L. Springfield, W. J. Paton, and J. D. Jeter
May 1973
KSC-10126

Relatively inexpensive test chamber safely tests flammability of most materials while allowing constant observation of test. Chamber can be used at various pressures, under controlled atmosphere, and is equipped with probes to vary distance from heat source to test object or to move it for observation from several different angles.

B73-10117
PARTICLE-FLUID INTERACTIONS FOR FLOW MEASUREMENTS
N. S. Berman (Arizona State Univ.)
Mar. 1973
M-FS-21727

Study has been made of the motion of single particle and of group of particles, emphasizing solid particles in gaseous fluid. Velocities of fluid and particle are compared for several conditions of physical interest. Mean velocity and velocity fluctuations are calculated for single particle, and some consideration is given to multiparticle systems.

B73-10128
DETECTOR FOR INSPECTION OF FIRE ALARMS
G. T. Clawson
Mar. 1973
GSFC-11600

Portable detector tests rate-of-rise temperature devices. Incandescent light bulb is calibrated to produce rate of temperature rise necessary to activate properly functioning alarm.

B73-10150
A SIMPLE, ACCURATE DEPTH CHECK GUAGE
E. P. Rauch (Rockwell Intern. Corp.)
May 1973
JSC-17166

Easily made, pen-light battery operated production check gauge has probe-activated switch with fail-safe features to insure proper operation. Parts can be reliably and quickly checked. Gauge is equipped with tolerance band adjustment and can use interchangeable probes for different applications. Accompanying tester permits frequent check of calibration.

B73-10183
THEORETICAL PREDICTION OF INTERFERENCE LOADING ON AIRCRAFT STORES: PART II -- SUPERSONIC SPEEDS
C. H. Fox, Jr. and F. Fernandes (Gen. Dynamics Corp.)
Jun. 1973 See also B73-10184
LANGLEY-11250

Linear theory is used, without two dimensional or slender body assumptions, to predict flow field produced by aircraft wing, nose, inlet, and pylons. Aircraft shock wave locations are predicted, and their effect on flow field is included through transformation of aircraft geometry. Program was written in FORTRAN IV for CDC 6400 computer.

B73-10184
THEORETICAL PREDICTION OF INTERFERENCE LOADING ON AIRCRAFT STORES: PART I - SUBSONIC SPEEDS
C. H. Fox, Jr. and F. Fernandes (Gen. Dynamics Corp.)
Jun. 1973 See also B73-10183
LANGLEY-11249

Computer program is developed for theoretically predicting loading on pylon-mounted stores in subsonic compressible flow. Linear theory predicts flow field produced by aircraft wing, nose, inlet, and pylons. Program was written in FORTRAN IV for CDC 6000 computer.

B73-10200
AIR-ATOMIZING SPLASH-CONE FUEL NOZZLE REDUCES POLLUTANT EMISSIONS FROM TURBOJET ENGINES
R. D. Ingebo and C. T. Norgren
Nov. 1973 See also NASA-TN-D-7154
LEWIS-11918

Advantages of fuel nozzle over conventional pressure-atomizing fuel nozzles: simplicity of construction, ability to distribute fuel-air mixture uniformly across full height of combustor without using auxiliary air supply, reliability when using contaminated fuels, and durability of nozzle at high operating temperatures.

B73-10201
A SELF-SUPPORTING STRAIN TRANSDUCER
I. S. Hoffman
Jun. 1973
LANGLEY-11263

Self-contained mechanical measuring system is handmounted by simply compressing installation spring and inserting device into hole of matching size. It is self-aligning as each contact pin maintains constant contact with surface being measured. Strain level is controlled by design to provide for measurements over almost unlimited number of load cycles.

B73-10205
BRAZE ALLOYS FOR HIGH TEMPERATURE SERVICE
R. A. Lindberg, R. L. McKisson (Rockwell Intern. Corp.), and G. Erwin, Jr. (Rockwell Intern. Corp.)
Jun. 1973 See also NASA-CR-1591; NASA-CR-1592; NASA-CR-54093; NASA-CR-72850; NASA-CR-120831
LEWIS-11374

Two groups of refractory metal compositions have been developed that are very useful as high temperature brazing alloys for sealing between ceramic and metal parts. Each group consists of various compositions of three selected refractory metals which, when combined, have characteristics required of good braze alloys.

B73-10207
MASS FLOW CONTROLLER FOR GASEOUS PROPELLANTS
Innovator not given (Parker Hannifin Corp.) Jun. 1973 See also NASA-CR-128639
JSC-14221

Gaseous propellants exhibit large variations in pressure and temperature and hence in fuel delivery. All-mechanical, mass flow controller which compensates for these variations has been developed to maintain constant fuel rate of gas. Further work is necessary to ease inlet pressure limitation.

B73-10230
FLUIDIC DEVICE FOR MEASURING CONSTITUENT MASSES OF A FLOWING BINARY GAS MIXTURE
P. R. Prokopius
Nov. 1973 See also NASA-TM-X-1269; NASA-TM-X-2741
LEWIS-11995

Device consists of fluidic humidity sensor and specially designed flow calorimeter. Calorimeter provides readings of gas stream temperature rise produced by measured amount of heat that is dissipated into gas stream, and humidity sensor is used to obtain continuous calculation of specific heat capacity of gas mixture.

B73-10234
HIGH-FRICTION MECHANICAL GRIPS
E. G. Stevens (Rockwell Intern. Corp.)
Aug. 1973
JSC-19260

Plasma-arc spraying offers method of preparing required surface at greatly reduced cost. Coarse-grained, tungsten carbide bonded-nickel coating is applied by spraying. Coating has been used successfully on wedge-shaped mechanical test grips.

B73-10239
METHOD FOR PREDICTING ROTOR FREE-WAKE POSITIONS AND THE RESULTING ROTOR BLADE AIRLOADS
D. Deen, W. R. Mantay, and S. G. Sadler (Rochester Appl. Res. Assoc., Inc.)
Aug. 1973
LANGLEY-10674

Computer program has been designed and written to predict rotor free-wake positions and resulting rotor blade airloads without requiring time-consuming and tedious calculations. This program was written in FORTRAN IV for use on an IBM-360 computer.

B73-10240
BONDED PANEL, FLAW DETECTION STANDARDS
R. J. Platt, Jr., L. B. Thurston, Jr., and R. M. Baucom
Aug. 1973
LANGLEY-11399

With optical holography or ultrasonic equipment, process prepares standards for use in detection of flaws in bonded panels. Metal-to-metal, composite-to-metal, and composite-to-composite flaw standards have been produced by this process, and all have been used and tested successfully.

B73-10276
OPTIMIZATION OF STRUCTURES ON THE BASIS OF FRACTURE MECHANICS AND RELIABILITY CRITERIA
E. Heer and J. -N. Yang
Jun. 1973 See also NASA-CR-116827
NPO-11645

Systematic summary of factors which are involved in optimization of given structural configuration is part of report resulting from study of analysis of objective function. Predicted reliability of performance of finished structure is sharply dependent upon results of coupon tests. Optimization analysis developed by study also involves expected cost of proof testing.

B73-10325
ACOUSTIC-EMISSION SIGNAL-PROCESSING ANALOG UNIT FOR LOCATING FLAWS IN LARGE TANKS
F. J. Moskal (Rockwell Intern. Corp.) and J. D. Fageol (Rockwell Intern. Corp.)
Sep. 1973
M-FS-24424

Technique monitors structural flaws in 105-in. diameter tanks. Tank surface is divided into many areas and each area is sectioned into 20 equilateral triangles that form icosahedron. Twelve transducers are equally positioned on tank surface at vertex of each triangle. Transducers monitor area for flaws by detecting any increase in acoustical activity.

B73-10326
ARTICULATED ELASTIC-LOOP ROVING VEHICLES
C. J. Chang (Lockheed Corp.) and W. Trautwein
Oct. 1973
M-FS-22691

Prototype vehicle features exceptional obstacle-negotiating and slope-climbing capabilities plus high propulsive efficiency. Concept should interest designers of polar or ocean-bottom research vehicles. Also, its large footprint and low ground pressure will minimize ecological damage on terrain with low bearing strength, as in off-the-road application.

B73-10332
A MULTIDEGREE-OF-FREEDOM VIBRATIONAL APPARATUS
J. J. Kerley, Jr. and N. C. Schaller
Sep. 1973
GSFC-11302

Apparatus uses prestressed cables to support vibrational table. Cables are durable, do not require frequent servicing, and provide increased safety. Because much weight rests on these cables, vibration actuating pistons can provide longer service. In event of structural failure of other supporting components, they will support entire weight of vibrational table.

B73-10347
THERMALLY ACTUATED VALVE
R. H. Silver
Aug. 1973
NPO-11846

Effective seal in one-shot valve is made by shrink-fitting ball within cylinder; thermal expansion of cylinder, caused by contiguous source of heat, will release ball and open valve. Valve can also be adapted for repeated operation and made capable of being opened without pressurized fluid.

B73-10348
HEATED BIMETAL STRIP PREVENTS DAMAGE OF BEARINGS BY VIBRATION

L. J. Derr
Aug. 1973
NPO-11870

Strip of bimetal is shaped as split ring; when properly fabricated from thin sheet, width of strip increases when it is heated. When width of strip increases, outer races are forced apart, thus pressing balls tightly against inner races. Strip applies axial load to bearing, amount of load being function of temperature to which strip is heated.

B73-10364
STRUCTURAL HEAT PIPE
S. Ollendorf
Oct. 1973
GSFC-11619

When solar heat is absorbed through the structural support member it is fed directly to a heat pipe. Energy is transferred by heat pipe around to a cooler spot before it can find its way to the structure. This prevents local hot spots from occurring on the sun side and excessive heat leaks on the dark side.

B73-10380
LOW-CLOSING-FORCE SEAL
L. E. Bergquist (Martin Marietta Corp.)
Sep. 1973
ARC-10775

Compress soft, inert metal gasket between cone and corresponding socket to attach tubes to vessels containing gas samples. Technique effects seals with minimum of applied force and does not contaminate contents. Seal is formed when port connector is pushed firmly into its socket. Gold washer is deformed and forced to flow into imperfections in surfaces.

B73-10395
ISOGRID DESIGN HANDBOOK
R. R. Meyer (McDonnell Douglas Corp.), O. P. Harwood (McDonnell Douglas Corp.), M. B. Harmon (McDonnell Douglas Corp.), and J. I. Orlando (McDonnell Douglas Corp.)
Oct. 1973
M-FS-22686

Handbook has been published which presents information needed for design of isogrid triangular integral-stiffened structures. It develops equations, methods, and graphs to handle wide variety of loadings, materials, and geometry. Handbook is divided into seven sections. Handbook may be used by marine and civil engineers and by students and designers without access to computers.

B73-10398
INDUSTRIAL FILTER BAGS CLEANED BY HIGH-FREQUENCY VIBRATION: A CONCEPT
A. V. Kooy (Rockwell Intern. Corp.)
Nov. 1973
M-FS-24445

System holds filter bag around fine-mesh metal screen and vibrates screen at its resonant frequency. This removes deposited byproducts and protects bag fibers from damaging forces. Because filter bags represent 20 to 40% of any industrial filtering investment, this method of extending bag life should be of interest to those responsible for plant maintenance.

B73-10405
BACKFLUSHING SYSTEM RAPIDLY CLEANS FLUID FILTERS
V. A. DesCamp (Martin Marietta Corp.), M. W. Boex (Martin Marietta Corp.), M. W. Hussey (Martin Marietta Corp.), and T. P. Larson (Martin Marietta Corp.)
Nov. 1973 See also NASA-CR-115505
JSC-14273

Self contained unit can backflush filter elements in fraction of the time expended by presently used equipment. This innovation may be of interest to manufacturers of hydraulic and pneumatic systems as well as to chemical, food, processing, and filter manufacturing industries.

B73-10414
SMOKE GENERATOR
K. L. Parrish
Dec. 1973
LANGLEY-11433

Generator is simple in construction, efficient, and extremely easy to start and regulate. It can be of such small size and weight that it can be installed easily inside a model. Size can be changed to suit needs, as long as operating temperatures can be attained and identified controls are utilized.

B73-10419
ACCELEROMETER-CONTROLLED AUTOMATIC BRAKING SYSTEM
R. C. Dreher, R. K. Sleeper, and J. R. Nayadley, Sr.
Dec. 1973 See also NASA-TN-D-6953
LANGLEY-11383

Braking system, which employs angular accelerometer to control wheel braking and results in low level of tire slip, has been developed and tested. Tests indicate that system is feasible for operations on surfaces of different slipperinesses. System restricts tire slip and is capable of adapting to rapidly-changing surface conditions.

B73-10429
CONDENSATE-REMOVAL DEVICE FOR HEAT EXCHANGERS
R. B. Trusch (United Aircraft Corp.) and E. W. OConnor (United Aircraft Corp.)
Dec. 1973
JSC-14143

Device comprises array of perforated tubes manifolded together and connected to a vacuum suction device. Vacuum applied to these tubes pulls mixture of condensate and effluent gas through perforations and along length of tubes to discharge device. Discharge device may be a separator which separates water vapor from effluent air and allows recirculation of both of them.

B73-10430
SEQUENTIAL-STRIP AND SEQUENTIAL-DISK FILTERS
J. P. Winzen (Brunswick Corp.)
Dec. 1973
JSC-14592

Filter senses increasing pressure drop and uses this to compress bellows. Compression of bellows stores energy in spring until predetermined pressure-drop level is reached. At this point, bellows and spring are released. Relaxation of spring is used to move a clean area of screen into position across fluid stream.

B73-10455
INSTRUMENT FOR MEASURING THIN-FILM BELT LENGTHS
T. A. Casad, H. Piggott, and J. K. Hoffman
Mar. 1974
NPO-13149

Instrument consists of base, vernier height gauge, sliding block, and balance-beam assembly with tension weight. Pulley bracket is provided with three pulley mounting holes, 4 inches apart, to accommodate widely different belt lengths. Instrument is accurate to within 0.001 inch and is suitable for commercial production.

B73-10456
LINEAR KINEMATIC AIR BEARING
S. D. Mayall
Mar. 1974
NPO-13151

Bearing provides continuous, smooth movement of the cat's-eye mirror, eliminating wear and deterioration of bearing surface and resulting oscillation effects in servo system. Design features self-aligning configuration; single-point, pivotal pad mounting, having air passage through it; and design of pads that allows for precise control of discharge path of air from pads.

B73-10464
NONDESTRUCTIVE LEAK TESTING
T. K. Lusby, Jr. and F. Lawrence
Mar. 1974
LANGLEY-11561

Method provides opportunity to effect repairs without compromising integrity of enclosed circuitry or mechanism by loss of atmosphere or by ingestion of foreign matter or gas. It is possible to detect leaks in modules which are sealed while fully evacuated, partially evacuated, or containing some form of gas.

B73-10465
STRAIN ARRESTOR PLATE FOR MOUNTING RIGID INSULATING TILES
M. H. Kural (Lockheed Missiles & Space Co.)
Mar. 1974
JSC-14182

Plate is made of material having coefficient to thermal expansion similar to that of insulating material. Although plate may be formed from appropriate alloy, it has been found that a combination of graphite fibers in epoxy resin is satisfactory and much lighter in weight.

B73-10466
SOLID-STATE CONTROLLER
C. L. Bailey
Mar. 1974
JSC-12394

Attitude controllers are used to guide roll, pitch, and yaw of vehicle in flight. Controllers enclose multitude of switches, gears, cams, and other hardware needed to transmit pilot's commands to attitude control systems. New design, using magnetic coupled transducers, eliminates many mechanical parts, improving reliability and reducing maintenance.

B73-10470
IMPROVED METHOD FOR AERODYNAMIC ANALYSIS OF WING-BODY-TAIL CONFIGURATIONS IN SUBSONIC AND SUPERSONIC FLOW
C. H. Jr. Fox and F. A. Woodward (Analytical Methods, Inc.)
Mar. 1974
LANGLEY-11305

Method permits analysis of noncircular bodies and calculation of wing-body interference effects in presence of body closure, two features not previously available. In addition, use of vortex distribution, having linear variation in streamwise direction, results in improved chordwise pressure distributions on wing and tail surfaces.

B73-10478
IMPROVED SYNCOM-TYPE FLUID DAMPER
J. Evans
Mar. 1974
GSFC-11205

Two efficient types of fluid nutation dampers that are simple, reliable, and inexpensive have been developed. In use, either damper may be mounted on a spinning body, parallel to the spin axis of the body and radially displaced from it, to eliminate nutation.

B73-10484
SOLAR-ENERGY ABSORBER: ACTIVE INFRARED (IR) TRAP
L. W. Brantley, Jr.
Mar. 1974
M-FS-22743

Efficiency of solar-energy absorbers may be improved to 95% by actively cooling their intermediate glass plates. This approach may be of interest to manufacturers of solar absorbers and to engineers and scientists developing new sources of energy.

B73-10485
SOLAR-ENERGY ABSORBER: ACTIVE INFRARED (IR) TRAP WITHOUT GLASS
L. W. Brantley, Jr.
Mar. 1974
M-FS-22744

Absorber efficiency can be improved to 90% by removing glass plates and using infrared traps. Absorber configuration may be of interest to manufacturers of solar absorbers and to engineers and scientists developing new sources of energy.

B73-10496
MASTER/SLAVE MANIPULATOR SYSTEM
H. C. Vykukal, R. F. King, and W. C. Vallotton
Dec. 1973 See also B72-10297
ARC-10756

System capabilities are equivalent to mobility, dexterity, and strength of human arm. Arrangement of torque motor, harmonic drive, and potentiometer combination allows all power and control leads to pass through center of slave with position-transducer arrangement of master, and 'stovepipe joint' is incorporated for manipulator applications.

B73-10497
MECHANICAL PLANETARY COMPENSATING DRIVE SYSTEM
R. J. Zeiger and J. C. Gerdts, Jr.
Dec. 1973
ARC-10462

Drive enables two concentric output shafts to be controlled independently or rotated as a unit. Possible uses are pointing and tracking devices, rotary camera shutters with variable light control, gimbal systems with yaw and pitch movement, spectrometer mirror scanning devices, etc.

B73-10502
FLEX FLAP
N. S. Currey (Lockheed-Georgia Co.) and J. T. Perry (Lockheed-Georgia Co.)
Dec. 1973
ARC-10771

To provide flap with large upper surface radius as required for airplanes with over-the-wing blowing, distort upper surface of flap by actuator. Flap can be used as control surface at leading as well as trailing edges and, with minor modification, as variant of Jacobs-Hurkamp air flap.

B73-10518
NONCONTACTING DEVICES TO INDICATE DEFLECTION AND VIBRATION OF TURBOPUMP INTERNAL ROTATING PARTS
D. B. Hamilton (Battelle Mem. Inst.), D. Ensminger (Battelle Mem. Inst.), D. R. Grieser (Battelle Mem. Inst.), A. M. Plummer (Battelle Mem. Inst.), E. J. Saccocio (Battelle Mem. Inst.), and J. W. Kissel (Battelle Mem. Inst.)
Mar. 1974
M-FS-22678

Published report discusses feasibility of ultrasonic techniques; neutron techniques; X-radiography; optical devices; gamma ray devices; and conventional displacement sensors. Use of signal transmitters in place of slip rings indicated possible improvement and will be subject of futher study.

B73-10524
SOLAR-ENERGY CONVERSION SYSTEM PROVIDES ELECTRICAL POWER AND THERMAL CONTROL FOR LIFE-SUPPORT SYSTEMS
B. K. Davis
Mar. 1974
M-FS-21628

System utilizes Freon cycle and includes boiler turbogenerator with heat exchanger, regenerator and thermal-control heat exchangers, low-pressure and boiler-feed pumps, and condenser. Exchanger may be of interest to engineers and scientists investigating new energy sources.

B74-10001
MECHANICAL COUPLING FOR HIGH CYCLIC LOADING
M. O. Dustin and O. Mehmed
Mar. 1974 See also NASA-TM-X-2812
LEWIS-11690

One-piece cylindrical coupling with "necked-down" regions at each end form flexures allowing small misalignments between

actuator and load. Coupling has zero backlash, low mass, close spacing between actuator and load, high stiffness in direction of motion, and allowance for misalignments and deflections without causing high side loading on components.

B74-10013
LIGHTWEIGHT, HIGH SPEED BEARING BALLS: A CONCEPT
R. J. Parker
Apr. 1974 See also B70-10331
LEWIS-11087

Low mass bearing balls with hardened iron-plated surfaces can eliminate problems of low fatigue strength and flexure fatigue, and lead to increased life and reliability of high speed ball bearings. Low mass balls exert lower centrifugal forces on outer race of bearing thus eliminating detrimental effect of high speed operation.

B74-10028
WIRELESS TELEMETRY SYSTEM FOR FLOATING BODIES
L. T. Fain and H. E. Cribb
Jul. 1974
KSC-10855

Unit includes rugged waterproof cables and equipment containers, low power, sturdy antenna construction, and easy equipment setup and serviceability. Accuracy and reliability of entire measurement system were not sacrificed.

B74-10030
IMPROVED GENEVA MECHANISM
C. H. Debenham (TRW, Inc.)
May 1974
LANGLEY-11443

Locking disk (flange) is stepped and lug is added to each arm of star wheel. These changes allow much longer cutout in star wheel stations, essentially eliminating chatter and wear. Jamming problem can be solved by extending star wheel arms and flaring slots.

B74-10045
BRAKE FOR ROLLABLE PLATFORM
A. L. Morris
May 1974
ARC-10512

Frame-mounted brake is independent of wheels and consists of simple lever-actuated foot. Brake makes good contact with surface even though foot pad is at higher or lower level than wheels, this is particularly important when a rollable platform is used on irregular surface.

B74-10046
REVERSED COWL-FLAP THRUST AUGMENTOR
D. Y. Cheng
May 1974
ARC-10754

Inlet mouthpiece with variable geometry improves low-speed performance of inlet (or ejector) of jet engines by use of reversed cowl-flap mechanism. Flaps can be adjusted mechanically or system can be operated with pressure taps set so pressure on inlet face is always smaller than pressure on back of inlet.

B74-10048
SOLAR ARRAY DEPLOYMENT FROM A SPINNING SPACECRAFT
A. H. Carlin (TRW Systems Group, TRW, Inc.), J. B. Gardner (TRW Systems Group, TRW, Inc.), and H. A. Lassen (TRW Systems Group, TRW, Inc.)
May 1974
ARC-10787

Cylindrical drum, wrapped with flexible solar array of solar cells mounted on Mylar sheet, is held by two end-fittings with cable (under tension) passing through axel of drum. Drum is held to end-fittings by axial cable through drum axel; drum is released for deployment when cable is cut at each end and end-fittings spring outward.

B74-10049
THRUST VECTOR CONTROL FOR V/STOL AIRCRAFT
E. W. Toney (McDonnell-Douglas Corp.)
May 1974
ARC-10788

To deflect exhaust of V/STOL aircraft fan deploy set of rectangular flaps so exhaust stream can be turned as required, and then directed through exit nozzles which generate thrust in appropriate direction; lateral deflection of exhaust is provided by yaw vanes.

B74-10058
VENTED VECTORING-NOZZLE FOR STOL AND V/STOL AIRCRAFT
D. W. Esker (McDonnell-Douglas Corp.)
May 1974
ARC-10839

Vented vectoring-nozzle has superior thrust coefficient and is lighter in weight because it does not require completely enclosed elbow duct ordinarily used to deflect nozzle flow. Improved nozzle has primary nozzle and three-sided elbow deflector.

B74-10059
PROPELLANT ACQUISITION DEVICE FOR USE WITH A SPINNING TOROIDAL TANK
J. E. Anderson (Martin Marietta Corp.)
May 1974
ARC-10840

System consists of four radially disposed communication channels attached to propellant-retaining ring situated at bottom of toroidal tank. Ring-and-channel acquisition system design provides uniform propellant distribution within spinning tank during all mission phases.

B74-10061
DESIGN CRITERIA MONOGRAPH FOR ACTUATORS AND OPERATORS
Innovator not given Jul. 1974 See also NASA-SP-8090
LEWIS-12264

Instrumentation for actuators and operators includes electrical position-indicating switches, potentiometers, and transducers and pressure-indicating switches and transducers. Monograph is based on critical evaluation of experiences and practices in design, test, and use of these control devices and instruments in operational space vehicles.

B74-10070
SUPPRESSION OF BENDING MOTION IN ELASTIC BODIES
J. C. Howard
Jun. 1974
XAC-05632

Sensor may be located on aircraft at such point that there can be extracted output signal which is function of aircraft acceleration. Signals are supplied to summing device where they are combined to produce output signal which controls application of suppression forces.

B74-10076
DYNAMIC TRANSFORMATION METHOD
J. R. Admire, E. J. Kuhar, Jr. (GE), and C. V. Stahle, Jr. (GE)
Jul. 1974
M-FS-22848

Eigenvalue problem associated with modal-synthesis vibration analysis of complex structures requires simplifying assumptions for solution. Computer program, Dynamic-transformation Adapted to Modal-synthesis Using Stiffness-coupling, improves computational economy for vibration analysis of complex structures while still considering substructure modes.

B74-10087
DESIGN CRITERIA MONOGRAPH FOR VALVE COMPONENTS
Innovator not given Sep. 1974 See also NASA-SP-8094
LEWIS-12327

Monograph treats valve design technology problems as they were solved in successful development of flightweight operational

valves for liquid rocket systems. General practices for cleaning and contamination prevention are summarized. Balance of information is arranged by topic, since detail design requirements apply to most types of valves.

B74-10091
PREDICTION OF UNSTEADY AERODYNAMIC LOADINGS CAUSED BY TRAILING-EDGE CONTROL-SURFACE MOTIONS IN SUBSONIC COMPRESSIBLE FLOW
M. C. Redman (Boeing Co.), W. S. Rowe (Boeing Co.), and B. A. Winther (Boeing Co.)
Aug. 1974
LANGLEY-11175
Program determines direct surface loadings, using pressure terms that correctly represent known singularity functions around boundaries or wing with control surface. Program provides numerical prediction of unsteady loadings caused by control-surface motions.

B74-10092
HEAT-TRANSFER THERMAL SWITCH
M. V. Friedell (Martin Marietta Corp.) and A. J. Anderson (Martin Marietta Corp.)
Aug. 1974
LANGLEY-11232
Thermal switch maintains temperature of planetary lander, within definite range, by transferring heat. Switch produces relatively large stroke and force, uses minimum electrical power, is lightweight, is vapor pressure actuated, and withstands sterilization temperatures without damage.

B74-10131
MAGNETIC BEARINGS WITH COMBINED RADIAL AND AXIAL CONTROL
L. Veillette
Sep. 1974
GSFC-11551
Bearings reduce friction by allowing air of vacuum gaps between rotating members through properly-applied magnetic fields. Advantages: There is no physical contact between rotor and support structure; bearings operate directly in vacuum environment without lubrication; and there is unlimited operating lifetime, independent of speed.

B74-10135
THERMALLY-STABLE, SYNTACTIC PYRRONE FOAMS
B. G. Kimmel (Hughes Aircraft Co.)
Sep. 1974 See also NASA-CR-2222
LANGLEY-11325
Foam formulations may be readily emplaced in honeycomb structures after heating to soft, doughlike consistency and forcing heated mixture into honeycomb cells. Final cure can be accomplished by simple oven cure, with no need for containment or restriction of foam formulation during cure.

B74-10138
CONTROL VANE FOR ENGINE EXHAUST FLOW
C. S. Shaw (USAAMRDL-Langley Directorate) and J. C. Wilson (USAAMRDL-Langley Directorate)
Sep. 1974 See also NASA-TM-X-3016
LANGLEY-11570
Vane solves problem of hot-gas exhaust impingement on curved-duct exteriors, shielding, and other nearby structure components. To eliminate secondary egress of exhaust, curved vane is placed upstream of engine exhaust duct and in close proximity to exhaust exit to induce free-stream flow more in line with exit.

B74-10144
SELF-LEVELING LOAD TABLE
J. L. Burch
Sep. 1974
M-FS-22039
Table floats in tank of water and has air compartments underneath. Table height and level are controlled by automatic adjustment or air pressure within these compartments.

B74-10146
ANTISKID BRAKING SYSTEM
J. S. Pazdera (Univ. of Mo.)
Sep. 1974
M-FS-22807
Published report describes analytical development and simulation of braking system. System prevents wheels from skidding when brakes are applied, significantly reducing stopping distance. Report also presents computer simulation study on system as applied to aircraft.

B74-10151
SEPARATION DYNAMICS OF S-II DERIVATIVE LAUNCH VEHICLE
L. A. Schmidt (Rockwell Intern. Corp.) and W. D. Vinson, Jr. (Rockwell Intern. Corp.)
Sep. 1974
M-FS-24325
Computer program analyzes separation dynamics between two vehicles from time prior to separation to later time when separation may be considered complete. Program also may be used in evaluating various separation schemes and synthesizing separation systems by manipulation of data and various program options.

B74-10156
HOLOGRAPHIC EVALUATION OF FATIGUE CRACKS BY A COMPRESSIVE STRESS (HYSTERESIS) TECHNIQUE
S. A. Freska (Martin Marietta Corp.) and W. D. Rummel (Martin Marietta Corp.)
Sep. 1974 See also NASA-CR-2369
MSC-14555
Holographic interferometry compares unknown field of optical waves with known one. Differences are displayed as interference bands or fringes. Technique was evaluated on fatigue-cracked 2219-T87 aluminum-alloy panels. Small cracks were detected when specimen was incrementally unloaded.

B74-10174
SWASHPLATE FEEDBACK CONTROL FOR TILT-ROTOR AIRCRAFT
H. R. Alexander (Boeing Vertol Co.), J. P. Magee (Boeing Vertol Co.), and J. J. Morris (Boeing Vertol Co.)
Sep. 1974 See also NASA-CR-114600; NASA-CR-114664
ARC-10854
Changes in angle of attack in system were sensed indirectly by gages which responded to strains induced in wing structure. Output signals were amplified, filtered, and used to activate swashplate actuators. System provided significant reduction in blade loads and desirable changes in hub forces and moments.

B74-10179
PULSE-WIDTH-MODULATED SERVO VALVE FOR AUTO-PILOT SYSTEM
H. D. Garner
Oct. 1974
LANGLEY-11643
Valve was developed for autopilot wing-lever system and is to be used in light, single-engine aircraft. Valve is controlled by electronic circuit which feeds pulse-width-modulated correction signals to two solenoids. Valve housing is cast from plastic, making it very economical to fabricate.

B74-10193
AUTOMATIC SOLDERING MACHINE
J. A. Stein (Rockwell Intern. Corp.)
Nov. 1974
MSC-19401
Fully-automatic tube-joint soldering machine can be used to make leakproof joints in aluminum tubes of 3/16 to 2 in. in diameter. Machine consists of temperature-control unit, heater transformer and heater head, vibrator, and associated circuitry controls, and indicators.

B74-10227
DESIGN CRITERIA MONOGRAPH FOR VALVE ASSEMBLIES

Innovator not given Dec. 1974 See also NASA-SP-8097
LEWIS-12332

Monograph is limited to valve selection factors for trade-off studies, configuration analyses, actuator selection, and integration of components. Material is organized along lines of valve design sequence.

B74-10228
DESIGN CRITERIA MONOGRAPH ON CENTRIFUGAL FLOW TURBOPUMPS
Innovator not given Dec. 1974 See also NASA-SP-8109
LEWIS-12346

Monograph reviews and assesses current design practices, and from them establishes firm guidance for achieving greater consistency in design, increased reliability in end product, and greater efficiency in design effort. Review should be of interest to manufacturers and users of pumps, power drives, turbine drives, and rotary equipment in general.

B74-10233
LAMINATING CORED, STRESSED-FACE, SANDWICH STRUCTURES
W. C. Heier
Dec. 1974
XLA-11028

Structure assemblies of fragile and flexible components are rigidly supported from aggregate exterior during bonding operation. Support assures conformance to desired profiles and duplication of assembly results. It minimizes exterior surface identification with core character, improving structure rigidity while adding desirable aerodynamic qualities and finished appearance.

B74-10235
ENVIRONMENTAL CONTROL AND WASTE MANAGEMENT SYSTEM DESIGN CONCEPT
A. R. Gandy
Dec. 1974
LANGLEY-11588

Passive device contains both solid and liquid animal waste matter for extended period without being cleaned and without contaminating animal. Constant airflow dries solid waste and evaporates liquid matter. Technique will maintain controlled atmospheric conditions and cage cleanliness during periods of 6 months to 1 year.

B74-10238
NONDESTRUCTIVE TESTING OF RAILROAD WHEELS AND RAILS BY ULTRASONICS
W. N. Clotfelter and E. R. Risch
Dec. 1974
M-FS-23086

Quality control of wheels and rails can be improved by using ultrasonic technique developed for measuring stresses in metallic materials. In addition, parts already in use can be tested and replaced if they are found to be unsafe. Test equipment includes two transducers.

B74-10241
IMPLEMENTATION OF A SELF-CONTROLLING HEATER: A CONCEPT
M. G. Strange
Dec. 1974 See also NASA-TN-D-7248
GSFC-11752

Proposed heater uses its own temperature coefficient for sensing function. Heating power is supplied from current source, heater voltage containing temperature information. Dynamic stability is very high since there is no thermal lag as would exist with separate heater and sensor.

B74-10252
EXPANDABLE SPACE FRAMES
A. H. Schoen
Jan. 1975
ERC-10365

Frame consists of struts connected by hinge joint assemblies. Because struts are hinged, entire frame can be collapsed during transportation and expanded at construction site. Frame has two types of hinge joint assemblies; one for three-dimensional space frame expansion and another for two-dimensional expansion.

B74-10267
LEAD-OXYGEN CLOSED-LOOP BATTERY SYSTEM
W. J. Britz, W. A. Boshers, and J. J. Kaufmann
Jan. 1975
M-FS-23059

Calculations show that battery can deliver up to 35 watt-hours per pound, conventional lead-acid batteries deliver 10 to 15 watt-hours per pound. Weight reduction is due to replacement of solid lead-peroxide electrodes with metal current-collector screen, catalyst, and Teflon membrane.

B74-10273
FLANGE DESIGN FOR LARGE-SCALE MODULAR ASSEMBLY JIGS
M. M. Gilman (Rockwell Intern. Corp.)
Jan. 1975
MSC-19372

Technique incorporates weld-free method for securing flanges to projecting ends of unmachined box-beam framework so flanged structure may be reused without modification. One such framework may be readily assembled to another by simply matching flanges together and passing connecting members between preformed holes in structures.

B75-10003
LOW-COST, PORTABLE FIRE HOSE TESTER
F. P. Jocke and E. R. Miller
Mar. 1975
LEWIS-12365

Availability of pumping unit permits scheduling and performing required periodic hose tests in proper manner while retaining full fire equipment readiness. Use of pumping unit preserves operating life and capability of pumper truck.

B75-10009
DESIGN CRITERIA MONOGRAPH ON AXIAL FLOW TURBINES
Apr. 1975 See also NASA-SP-8110
LEWIS-12376

Monograph provides guidelines for predicting turbine performance, sizing gas-path elements, and avoiding problems associated with mechanical design and development. Material in monograph is organized along lines of design and development effort necessary to produce turbine that satisfies requirements imposed on it.

B75-10010
DESIGN CRITERIA MONOGRAPH ON TURBOPUMP GEARS
Apr. 1975 See also NASA-SP-8100
LEWIS-12377

Turbopump power gears were brought to acceptable levels of usefulness and reliability through refinements in interdependent areas of design, materials, processing, and quality control combined with extensive development testing that explored problem areas and evaluated potential solutions.

B75-10013
DESIGN CRITERIA MONOGRAPH FOR METAL TANKS AND TANK COMPONENTS
Apr. 1975 See also NASA-SP-8088
LEWIS-12434

Significant elements in detail tank design are wall and end structures, weld joints at bulkhead and attachment junctures, and ports and access openings. Additional design considerations are influence and effect of fabrication processes on tank component design, and finally, testing and inspection that are required to establish confidence in tank design.

B75-10022
LONG LIFE, HIGH SPEED, THRUST-LOAD BALL BEARINGS
H. Signer (Ind. Tectonics, Inc.), N. E. Bamberger (GE), and V. E. Zaretsky
May 1975 See also NASA-TM-X-68264; NASA-TN-D-7837
LEWIS-12269

Long-term bearing operation at three million DN can be achieved with high degree of reliability using full combination of sophisticated but currently available state-of-the-art bearing materials and designs, lubricants, and lubricating techniques.

B75-10044
HIGH-STRENGTH RIVET DOES NOT REQUIRE AGING
F. J. Charles (Rockwell Intern. Corp.)
Apr. 1975
MSC-19301

Aluminum rivet is simpler to handle. It does not need aging and provides better high-temperature and shear properties than conventional rivets. Tests at upset height of up to 1.7 diameters have shown rivets to have exceptionally good crack resistance.

B75-10052
GAS BEARING OPERATES IN VACUUM
S. G. Perkins
Apr. 1975
NPO-13425

Bearing has restrictions to reduce air leaks and is connected to external pumpout facility which removes exhausted air. Token amount of air which is lost to vacuum is easily removed by conventional vacuum pump.

B75-10055
LOW-PROFILE LANDING-GEAR ASSEMBLY
M. P. Harper (Boeing Co.) and D. F. Neumann (Boeing Co.)
Apr. 1975
ARC-10786

Assembly of cylinders, links, actuators, and gears permits landing-gear unit to be retracted into shadow of main engine intake ducts of supersonic transport aircraft. This is accomplished without adding to frontal area of aircraft or appreciably increasing total aircraft drag.

B75-10058
MOTOR-DRIVEN RACK-POSITIONING DEVICE
E. M. Crissey (Martin Marietta Corp.)
Apr. 1975
ARC-10864

Ramped clutch plate prevents damage to gear traing and provides ample linear motion for actuation of microswitch. Operation of device is not affected by number of revolutions which pinion shaft must make to produce required translations. Since ramps in spur gear are conical, device will actuate identically at each mechanical stop.

B75-10063
DESIGN CURVES FOR OPTIMIZING STABILITY OF HERRINGBONE-GROOVED JOURNAL BEARINGS
P. D. Fleming and J. B. Hamrock
May 1973 See also NASA-TN-D-7803
LEWIS-12442

Curves span wide range of operating conditions, including: lubricant compressibility numbers from 0 to 80, bearing length-to-diameter ratios from 1/4 to 2, and either rotating or stationary grooved members.

B75-10064
SCANNING-ELECTRON-MICROSCOPE USED IN REAL-TIME STUDY OF FRICTION AND WEAR
A. W. Brainard and D. H. Buckley
Jun. 1975 See also NASA-TN-D-7700
LEWIS-12448

Small friction and wear apparatus built directly into scanning-electron-microscope provides both dynamic observation and microscopic view of wear process. Friction and wear tests conducted using this system have indicated that considerable information can readily be gained.

B75-10065
DIFFUSION PUMP MODIFICATION PROMOTES SELF-CLEANSING AND HIGH EFFICIENCY
A. E. Buggele
Jul. 1975 See also NASA-TM-X-2932
LEWIS-12323

Modifications eliminate contaminant substances from pump fluid during operation, which are principal causes of torpidity on evaporative surface. Diffusion pump is also acting as still. Resulting 100 percent vigorous working surface provides much greater molecular throughput and greatly improved efficiency.

B75-10074
AIRFOIL DISPERSES SMOKESTACK EFFLUENTS UPWARD
R. C. Costen
May 1975
LANGLEY-11669

System consists of negative-lift airfoil mounted at or near top of smokestack without obstructing flow of effluents from stack. Controls adjust negative lift and drag of airfoil, for changing orientation of airfoil to maintain proper airflow over foil and for adjusting its vertical location with respect to top of smokestack.

B75-10085
TORQUE CONTROL SYSTEM
D. K. Studenick, A. L. Tyler, and W. Squillari
Jun. 1975
GSFC-11077

System stabilizes aximuth of gondolas which are carried by high-altitude balloons as platforms for tracking telescopes. When telescopes must be constantly aimed at specific targets, control system stabilizes gondola to within 5 arc-seconds.

B75-10095
SIMPLE AND EFFECTIVE METHOD TO LOCK BUOY POSITION TO OCEAN CURRENTS
W. A. Vachon (Charles Stark Draper Lab., Inc.) and J. M. Dahlen (Charles Stark Draper Lab., Inc.)
Jun. 1975
M-FS-23140

Window-shade drogue, used with drifting buoys to keep them moving with current at speed as close to that of current as possible, has drag coefficient of 1.93 compared to maximum of 1.52 for previous drogues. It is remarkably simple to construct, use, and store.

B75-10110
CRYOGENIC LINE INSULATION MADE FROM PREFABRICATED POLYURETHANE SHELLS
G. Lerma (Rockwell Intern. Corp.)
Jun. 1975
MSC-19523

Prefabricated polyurethane foam insulation is inexpensive and easily installed on cryogenic lines. Insulation sections are semicircular half shells. Pair of half shells is placed to surround cryogenic line. Cylindrically-shaped knit sock is pulled over insulation then covered with polyurethane resin to seal system.

B75-10111
POWERED FIRE NOZZLE FOR FAST PENETRATION OF STRUCTURES: A CONCEPT
J. F. Parker (Rockwell Intern. Corp.) and R. L. Robbins (Rockwell Intern. Corp.)
Jun. 1975
MSC-19528

Nozzle has been proposed with tip that will punch through wall very quickly. It would allow extinguishing agent to be delivered inside closed structure in minimum amount of time. Two versions of nozzle have been conceived: one operated from hydraulic pressure source and one activated by explosive charge.

B75-10131
MINIMIZATION OF JET AND CORE NOISE BY ROTATION OF FLOW
I. R. Schwartz
Jun. 1975
ARC-10712

Jet and core noise can be reduced and flame lengths may be significantly decreased when exhaust gases are caused to rotate or swirl about longitudinal axis of exhaust. Combustion in

rotating flows is steady and quiet, and is not accompanied by pulsations or violent fluctuations.

B75-10132
NEW DESIGN OF HINGELESS HELICOPTER ROTOR IMPROVES STABILITY
R. A. Ormiston (USAAMRDL), W. G. Bousman (USAAMRDL), D. H. Hodges (USAAMRDL), and D. A. Peters (USAAMRDL)
Jun. 1975
ARC-10807
Cantilever blades are attached directly to rotor hub, thereby substantially reducing cost and complexity and increasing reliability of helicopter rotor. Combination of structural flap-lag coupling and pitch-lag coupling provides damping of 6 to 10%, depending on magnitude of coupling parameters.

B75-10134
SILICON NITRIDE USED AS A ROLLING-ELEMENT BEARING MATERIAL
R. J. Parker and E. V. Zaretsky
Jul. 1975 See also NASA-TN-D-7794
LEWIS-12447
Rolling-element fatigue tests were conducted with hot-pressed silicon nitride to determine its ability to withstand concentrated contacts in rolling-element bearings. If hot-pressed silicon nitride is used for both balls and races, attention must be paid to fitting both shaft and bearing housing.

B75-10135
DESIGN CRITERIA MONOGRAPH ON TURBOPUMP SYSTEMS
Jul. 1975 See also NASA-SP-8107
LEWIS-12499
Turbopump assembly for modern liquid propellant rocket engine is complete system in itself. It consists of many components, some of which are themselves subsystems. Monograph deals with turbopump as system, covering selection of proper system type for each application and integration of components into working system.

B75-10151
GRAPHITE FIBER-POLYIMIDE COMPOSITE ROD END BEARINGS FOR HIGH-TEMPERATURE HIGH-LOAD APPLICATIONS
H. E. Sliney and T. P. Jacobson
Oct. 1975 See also NASA-TN-D-7880
LEWIS-12514
Self-aligning plain spherical and plain cylindical oscillating bearings with self-lubricating elements are composed of 50 weight-percent chopped graphite fibers and 50 weight-percent polyimide.

B75-10165
SOLAR RESIDENTIAL HEATING AND COOLING SYSTEM
D. E. Melton and W. R. Humphries
Aug. 1975
M-FS-23260
System has been placed in operation to verify technical feasibility of using solar energy to provide residential heating and cooling. Complete system analysis was performed,to provide design information.

B75-10173
LIGHTWEIGHT DUCTS FABRICATED FROM REINFORCED PLASTICS AND ELASTOMERS
F. S. Dawn, T. J. Ballentine, R. E. Bishop (Rockwell Intern. Corp.), and C. R. Roussean (Rockwell Intern. Corp.)
Aug. 1975
MSC-19482
Method has been developed for fabrication of lightweight ducts that are three times stronger than aluminum ducts. Method can be used to produce either flexible or rigid ducts.

B75-10190
IMPROVED AIR ATOMIZING SPLASH-GROOVE FUEL INJECTOR REDUCES POLLUTANT EMISSIONS FROM TURBOJET ENGINES
R. D. Ingebo and C. T. Norgren
Oct. 1975 See also NASA-TM-X-3255
LEWIS-12417
Device produces finely atomized sprays which improve performance characteristics and reduce pollutant emissions of advanced high-pressure and high-temperature turbojet engines.

B75-10199
MARSHALL VEHICLE-ENGINEERING SIMULATION SYSTEM (MARVES)
W. E. Keenum (Computer Sci. Corp.)
Sep. 1975
M-FS-21701
Computer language was developed to furnish programmers with standardized system for handling digital computer simulation of trajectories. System contains collection of models which represent problem to be solved and description of one or more events peculiar to the problem.

B75-10201
ULTRASONIC DETECTION OF FLAWS IN LARGE STRUCTURAL AREAS
F. E. Sugs (Rockwell, Intern. Corp.) and C. C. Kammerer (Rockwell Intern. Corp.)
Sep. 1975
MSC-19499
System's transducer consists of three piezoelectric elements that produce relatively-wide ultrasonic beam which covers significantly larger area and can monitor from a fixed point.

B75-10203
GAS GENERATORS PRODUCE HYDROGEN-RICH FUEL
J. Houseman, R. Kushida, and J. H. Rupe
Sep. 1975 See also B75-10208
NPO-13342; NPO-13464
Resulting fuel, which is produced from gasoline and water, can be burned by gasoline engines with significantly reduced pollution and improved fuel economy.

B75-10208
HYDROGEN-RICH GAS GENERATORS TO REDUCE AIR POLLUTION AND IMPROVE GASOLINE ECONOMY
J. Houseman and D. Cerini
Sep. 1975 See also B75-10203
NPO-13560; NPO-13561
Thermal generator, consisting of burner, reaction chamber, and heat exchanger, produces gas from gasoline/air mixture. Units can be utilized with spark ignition engine.

B75-10209
LOW-COST SOLAR TRACKING SYSTEM
C. G. Miller and J. B. Stephens
Sep. 1975 See also B75-10210
NPO-13579
Smaller heat-collector is moved to stay in focus with the sun, instead of moving reflector. Tracking can be controlled by storing data of predicted solar positions or by applying conventional sun-sensing devices to follow solar movement.

B75-10214
APPARATUS FOR MEASURING STATIC COEFFICIENT OF FRICTION UNDER COMPRESSIVE LOADS
C. L. Haehner and J. L. Tarpley
Oct. 1975
GSFC-11893
Device includes load cell attached to rigid structure. Crosshead directly beneath cell is connected to constant-speed electrical motor. Crossarm supported by crosshead serves as platform on which bodies are tested. Test data are recorded on X-Y recorder which is connected to load cell and motor.

B75-10234
MULTIPLE-COMPARTMENT VENTING PROGRAM
L. P. LeBlanc (Rockwell Intern. Corp.)
Oct. 1975
MSC-19428

Computer program solves time-dependent energy and state equations for gas reservoirs, using the solutions of conductor conservation equations as mass and energy rate changes to reservoirs.

B75-10251
SINGLE RADIAL MAGNETIC BEARING: A CONCEPT
P. A. Studer
Oct. 1975
GSFC-11978
Proposed bearing has increased stability. Magnetic structure keeps inner and outer bearing halves aligned. Electronic feedback circuit keeps bearing radially centered.

B75-10258
REDUCING FLOW REQUIREMENTS OF FLUID ACTUATORS
M. J. Long and S. C. Irick
Oct. 1975
LANGLEY-11540
Method reduces volumetric rate of hydraulic fluid or air to drive actuator at high speed. Method can be used with any positive displacement actuator with multiple chambers.

B75-10259
TWO-DIRECTIONAL ACTIVE DAMPER
C. S. Chang (New Technology, Inc.)
Oct. 1975 See also NASA-CR-132550
LANGLEY-11815
Damper system to be used in studies of payload isolation technology is suitable as a laboratory apparatus. It provides easily adjustable damping and acts as multichannel shaker system.

B75-10264
BRAKING ACTION OF WHEELED VEHICLES IS CONTROLLED AUTOMATICALLY DURING MINIMUM-DISTANCE STOPS
D. E. Barthlome
Oct. 1975 See also NASA-TM-X-72665
LANGLEY-11897
System prevents tire skid during panic stops. Two mutually dependent accelerometers directly control solenoid valve which regulates braking pressure.

B75-10270
SUSPENSION SYSTEM FOR LIGHTWEIGHT CRYOGENIC TANK
J. Lester (Beech Aircraft Corp.) and D. A. Wendling (Beech Aircraft Corp.)
Oct. 1975
MSC-14080
System is composed of three interwoven fiberglass bands that encircle tank surface in basketweave configuration. Fiberglass support is lightweight with low thermal conductivity.

B75-10282
REMOVAL OF ICE AND MARINE GROWTH FROM SHIP SURFACES: A CONCEPT
A. J. Bauman
Oct. 1975
NPO-13658
Proposed surface is structured from sections of low-melting-point alloy. Sections are separated by network of passages for compressed air. Ice or barnacles are removed by passing electrical current through alloy and bursts of compressed air through passages.

B75-10284
IMPROVED AIRCRAFT REACTION NOZZLES
J. R. Rogers
Nov. 1975
ARC-10906
Reaction control nozzle requires low operating forces and has linear and predictable jet thrust vs nozzle exit area and position. Nozzle thrust vector is controllable by single rotary motion.

B75-10287
TURBINE DESIGN REVIEW TEXT
Innovator not given Dec. 1975 See also NASA SP-290, Vols I, II, III
LEWIS-12560
Three-volume publication covers theoretical, design, and performance aspects of turbines. Volumes cover thermodynamic and fluid-dynamic concepts, velocity diagram design, turbine blade aerodynamic design, turbine energy losses, supersonic turbines, radial-inflow turbines, turbine cooling, and aerodynamic performance testing.

B75-10298
STATIC AEROELASTIC PROGRAM
J. Roskam (Kansas Univ.)
Dec. 1975
LANGLEY-11602
Set of programs computes geometric, mass, aerodynamic, and structural effects on fighter and transport type aircraft at subsonic and supersonic speeds.

B75-10300
AMPLIFYING RIBBON EXTENSOMETER
V. L. Alley, Jr. and A. D. McHatton
Dec. 1975
LANGLEY-11825
Device provides accurate measurement of strain on flexible membranes and fabrics. It is compact and lightweight, has strain-amplification capability up to five, and has an accuracy better than one percent.

B75-10313
COMPOUND HEAT PIPE OPERATES OVER BROAD TEMPERATURE RANGE
H. B. McKee (McDouglas Douglas Corp.)
Dec. 1975
M-FS-23329
Device is combination of two or more heat pipes running adjacent to each other. Each pipe carries different working fluid in high-temperature pipe melts and begins to conduct heat.

07 MACHINERY, EQUIPMENT, AND TOOLS

B70-10014
THERMAL-DIFFERENCE COMPENSATION FOR STRUCTURAL MEMBERS
BELEW, R. R. DATE- SEP. 1970
M-FS-20433
Aluminum-thermal difference link maintains constant length of strut despite environmental temperature changes. An extension spring decreases load on the compensator drive linkage when strut is in tension, when strut is in compression, a compression spring is used. Perforated titanium outer tube exposes link to external heat.

B70-10028
HIGH PRESSURE FLOW-RATE SWITCH
GALE, G. P. DATE- JUN. 1970
NPO-10722
Flow-rate switch adjusts easily over a wide switching range and operates uniformly over many cycles. It adapts easily to control of various fluids and has the possibility of introducing multi-point switching. Novel design features include the tapered spool, balanced porting, capillary-bypass lubrication, and capillary-restriction damping.

B70-10037
ADJUSTABLE FLOW RESTRICTOR
TUFTE, R. J. /LTV AEROSPACE CORP./ DATE- SEP. 1970
MSC-13433
Flow-rate restrictor with sharp-edged threads generates turbulence in the fluid flow, providing greater pressure reduction than is possible with a smooth-walled device. It is less susceptible to clogging.

B70-10040
DRY-FRICTIONAL SHOCK ABSORBER
TENER, W. M. DATE- SEP. 1970
NPO-11212
Kinetic energy absorber that can safely decelerate a vehicle as it impacts a surface affords minimum rebound, is lightweight and compact, and needs no lubrication or hydraulic fluids.

B70-10050
GAS FLOWMETER
MORRIS, T. P. WELLS, F. E. DATE- AUG. 1970
REAN- SEE ALSO NASA-TN-D-5517
M-FS-20663
Mass flowmeter measures rates of flow of all common gases from purges and collected leaks at leak ports. Without dependence on gravity, it measures rates between 5 and 650 cc/min with pressures ranging from 0.001 to 10 to the minus thirteenth torr at temperatures between 70 and 500 degrees K.

B70-10066
SOLENOID VALVE PERFORMANCE CHARACTERISTICS STUDIED
ABE, J. T. /MCDONNELL DOUGLAS CORP./ BLACKBURN, S. DATE- AUG. 1970
M-FS-12458
Current and voltage waveforms of a solenoid coil are recorded as the valve opens and closes. Analysis of the waveforms with respect to time and the phase of the valve cycle accurately describes valve performance.

B70-10068
VIBRATION DAMPING OF MECHANICAL SEALS
HAMMOND, R. R. /N. AM. ROCKWELL CORP./ DATE- JAN. 1970
M-FS-14160
Bellows seal filled with spherical powder reacts to vibration inputs by absorbing displacement energy through inertia and friction of the particle masses acting on the inside surface of the cylinders.

B70-10072
MECHANICAL CHARACTERISTICS OF THE BOSSLER COUPLING
BOSSLER, R. B., JR. /KAMAN CORP./ MAYERJAK, R. J. DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-1241
HQ-10508
Test results indicate the Bossler coupling has unusual capability for accomodating combined axial motion, misalignment, and torque, suitability for applications requiring long life combined with reliability, lightweight, and minimal maintenance, and the ability to survive shock-torque greatly in excess of ultimate continuous torque.

B70-10077
CONTROLLED RELEASE OF FREE-FALLING TEST MODELS
FIFE, W. J. HOLWAY, H. P. DATE- SEP. 1970
NPO-11314
Releasing device, powered by a drill motor through an adjustable speed reducer, has a spinning release head with three retractable spring-loaded fingers. The fingers are retracted by manual triggering of a cable at the motor end of the unit.

B70-10087
MAGNETIC GEAR BACKUP
SHEFKE, R. A. /GARRETT CORP./ DATE- JAN. 1970
MSC-13408
Backup clutch for magnetic gear operates only in case of slippage. Contacting a pin arrangement in the driven gear, the clutch provides extra force for continuing output. It does not interfere with normal, noncontact action.

B70-10088
TANDEM WHEEL DROP-LEGS FOR STANDARD TRUCK TRAILER
CANTWELL, W. /MCDONNELL-DOUGLAS CORP./ SELSTAD, R. DATE- JUN. 1970
M-FS-13466
Tandem wheel drop-leg device provides a semitrailer with fore and aft mobility that allows it to be moved without a prime mover. The modified drop-legs have trunnion dual wheels and an adjustable brace.

B70-10089
PHENOLIC CUTTER FOR MACHINING FOAM INSULATION
BLAIR, T. A. /N. AM. ROCKWELL CORP./ MILLER, A. C. PRICE, B. W. STILES, W. S. DATE- JUN. 1970
M-FS-14170
Pre-pregged fiber glass is an efficient abrasive for machining polystyrene and polyurethane foams. It bonds easily to any cutter base made of aluminum, steel, or phenolic, is inexpensive, and is readily available.

B70-10090
COMPACT, ELECTROMAGNETIC MULTIPLE-STREAM PUMP FOR LIQUID METALS - DESIGN CONCEPT
DAVIS, J. P. DATE- JAN. 1970
NPO-10755
Pump provides independent liquid-metal streams at a uniform flow rate. The toroidal magnet structure can accomodate any reasonable number of pump circuits. The power requirement is suited to the output voltage of the basic thermionic diode output.

B70-10101
THERMOSTATIC EXPANSION VALVE IMPROVED BY DUAL PNEUMATIC MODULATION
PRINGLE, G. /CHRYSLER CORP./ DATE- MAY 1970
KSC-10072
Addition of a secondary pneumatic modulation input improves the standard devices used on thermostatic expansion valves. The valves normally meter incoming refrigerant flow through an orifice valve controlled by a valve-actuating diaphragm.

B70-10103
WATER SURFACE DEPTH INSTRUMENT
DAVIS, Q. C., IV DATE- APR. 1970
LANGLEY-10576
Measurement gage provides instant visual indication of water depth based on capillary action and light diffraction in a group of solid, highly polished polymethyl methacrylate rods. Rod lengths are adjustable to measure various water depths in any desired increments.

B70-10126
LOW-COST ORBITING GRINDER FOR CUTTING DUCTS
LANG, E. J. /N. AM. ROCKWELL CORP./ DATE- MAY 1970
M-FS-20684
Low-cost, portable machine cuts ducts made from heat-treated alloys. An abrasive wheel, powered by a high-speed air motor mounted on an expandible plug against the inner wall of the duct, gives precise cutting.

B70-10144
IMPROVED MECHANICAL REMOTE CONTROL ASSEMBLY - CONCEPT
MATICA, S. W. /N. AM. ROCKWELL CORP./ DATE- FEB. 1970
M-FS-16249
Remote control mechanical device is made more efficient by a twisted-ribbon shaft which moves in the casing on dumbbell rollers. Excessive friction and overstressing are eliminated.

B70-10160
NOVEL VALVE FOR RECIPROCATING COMPRESSORS - CONCEPT
WAGNER, C. E. /N. AM. AVIATION, INC./ DATE- APR. 1970
MSC-15060
Thin ring valve for the inlets and exhausts of reciprocating compressors, and possibly for the inlets of internal combustion engines, encircles the cylinder and operates on the Bernoulli principle.

B70-10165
FOUR-WAY, FULL-THROTTLING VALVE CONCEPT
SHOCKEY, J. S. /SERV. TECHNOL. CORP./ DATE- APR. 1970
MSC-13437
Valve regulates the flow of a fluid over the limits from full flow in one direction to full

flow in the opposite direction. At the midpoint valve position both flow paths are closed. Gradually increasing port size on both flow paths results in good throttling characteristics.

B70-10170
UMBILICAL DISCONNECT ACTUATOR
DAVIS, D. P. MC DOUGAL, A. R. DATE- APR. 1970
NPO-11202
Contamination of sensitive equipment when squibs are fired is prevented by O-rings which retain the debris of squib discharge within the disconnect device.

B70-10171
AN ELECTROTHERMALLY ACTUATED MICRO VALVE
CHARLTON, K. W. SIPMAN, R. DATE- JUN. 1970
NPO-10730
Microminiature slide action valve requires power only during actuation and can be used as an on-off or single inlet to alternately selected outlets.

B70-10176
INVESTIGATION OF POSITIVE SHAFT SEALS
PFOUTS, J. O. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-97143
M-FS-18589
Welded metal bellows secondary seals prevent secondary seal leakage with a minimum number of potential leak paths. High performance seal is obtained by controlling the potentially unstable seal-face movements induced by mechanical vibrations and fluid pressure pulsations.

B70-10193
TWO-SPEED WHEEL-DRIVE SYSTEM WITHOUT LUBRICATION
BURCH, J. L. DATE- SEP. 1970
M-FS-20645
System based on sprockets and toothed belts provides high and low speeds in forward drive and high speed in reverse. It is inexpensive to produce and maintain, light in weight, reliable, and long-lived without lubrication.

B70-10198
HIGH-POWERED AUTOMATIC LATCHING DEVICE
COBIN, J. C. /N. AM. ROCKWELL CORP./ RHODES, L. L. DATE- OCT. 1970
MSC-15474
Latches automatically lock together two remotely controlled bodies when their triggers are engaged by the docking ring of the lesser body. Latches are disengaged by manual actuation of the handle of each latch through two complete cycles. Emergency locking by manual actuation is also provided.

B70-10207
HYDRAULIC BRAKE SAFETY VALVE
HOBSON, Z. A. /N. AM. ROCKWELL CORP./ DATE- APR. 1970
M-FS-16444
Safety device, consisting of three separate fluid chambers, insures that two wheels of a brake system continue to function if a failure occurs.

B70-10228
FAST-ACTING, FOUR-WAY SLIDE VALVE
ABSALOM, J. /N. AM. ROCKWELL CORP./ KIMMEL, M. DATE- APR. 1970
M-FS-18608
Valve is insensitive to fluctuating sense pressure. It remains in full-open position until the supply pressure is removed.

B70-10244
PRECISION CONTROL SYSTEM FOR ENGINE FUEL
HAWKINS, D. E. /N. AM. ROCKWELL CORP./ DATE- NOV. 1970
NPO-12017
System controls two or more pneumatically operated metering valves from common pneumatic source without interaction between valve controls. Unit affords independent metering of liquid from single source to two concurrent applications. Calibration and testing demonstrate complete absence of interaction between valves and corresponding flow rates.

B70-10248
SELF-SEALING PROPELLANT-ACTUATED DEVICE ELIMINATES ATMOSPHERE CONTAMINATION
HEINEY, O. K. DATE- JUL. 1970
NPO-11013
Device retains internally generated combustion products by a plug which seals the barrel end after projectile ejection. Since no blast wave is produced, only the projectile can disturb the surrounding surfaces and atmosphere.

B70-10279
A LONG-LIVED PRECISION SWITCH ACTUATOR FOR CONTROLLING PUMP-PISTON ACTION
DAVIS, R. R. DATE- JUL. 1970
NPO-10757
Switch mechanism limits the stroke of the piston by stopping the piston motor drive. This allows retention of a fluid sample in an automated wet-chemical analysis system.

B70-10283
A TEMPERATURE-CONTROLLED FLUID FLOW REGULATOR
TOMLINSON, L. E. /N. AM. ROCKWELL CORP./ DATE- AUG. 1970
M-FS-14259
Slide-type valve, constructed of materials having different coefficients of thermal expansion, provides variable flow area as the slides move in relation to each other with temperature changes.

B70-10287
A CONCEPT FOR IMPROVING EFFICIENCY OF MULTISTAGE CENTRIFUGAL PUMPS
GARDY, H. F. /N. AM. ROCKWELL CORP./ DATE- MAY 1970
LEWIS-10966
Multichannel impeller consists of successive stage impellers arranged concentrically without clearances between them. Reduction in friction is predicted to increase pump efficiency by 5 to 10 percent.

B70-10289
SELF-FORMING SHIM OR GASKET FOR MOUNTING HEAVY EQUIPMENT
WALTER, G. W. DATE- MAY 1970
KSC-10504
Soft, cross-serrated aluminum shims are used as mating gaskets between uneven surfaces. Under pressure, the aluminum flows to conform with surface irregularities, forming a plane of uniform bearing.

B70-10291
DEVELOPMENT OF LIGHTWEIGHT CRYOGENIC TANK SUPPORTS
BARLETT, D. H. /BOEING CO./ MC GINNIS, J. C. DATE- MAY 1970 REAN- SEE ALSO NASA-CR-61309
M-FS-20726
Fiber glass honeycomb conical support with integral, tapered-laminate edge members is developed for a liquid hydrogen tank. Special processing prevents collapse of the core and adds rigidity.

B70-10295
INTEGRATED TURBINE-COMPRESSOR PROVIDES AIR FLOW FOR COOLING
FERRI, A. /N. Y. UNIV./ DATE- SEP. 1970
HQ-10442
Modified supersonic turbine cycle provides cooling air to surrounding structures. Simplified mechanical design assures correct balance of air flow, allows direct issue of cool air to the structure, and assists in matching turbine work output to work input required by the compressor.

B70-10302
VOLUMETRIC LEAK DETECTOR
ELSER, M. J. /N. AM. ROCKWELL CORP./ DATE- MAY 1970
MSC-11325
Portable volumetric leak detector measures leakage in the range of 5 to 40 cc/hr. The detector, a fluid displacing apparatus, measures the leakage of gases across valve seats and checks components and systems of components independent of size in relatively short periods of time.

B70-10306
LOW HEAT-GAIN CRYOGENIC-LIQUID TRANSFER SYSTEM
HOWS, G. E. /N. AM. ROCKWELL CORP./ WRIGHT, B. J. DATE- JUL. 1970
MSC-15165
Cryogenic-liquid transfer system, containing a ring structure with tensioned small diameter, high strength wires, provides adequate physical support for the piping, minimizes the conductive heat paths between the piping and jacket, and allows for thermal expansion and contraction of the piping.

B70-10312
GAS TURBINE COMBUSTOR INSENSITIVE TO COMPRESSOR OUTLET DISTORTION
HUMENIK, F. NORGREN, C. DATE- JUN. 1970 REAN- SEE ALSO NASA-TN-D-5570
LEWIS-10286
Short-length annular combustor for turbojet engines eliminates change of exit temperature profile. Individual scoops of full annular height control air distribution so that shifts in the radial velocity profile of air entering the combustor will not affect combustion process or alter exit temperature profile.

B70-10313
UNIVERSAL ROUTER CONCEPT
PESCH, W. A. /HAYES INTERN. CORP./ DATE- JUN. 1970
M-FS-20756
Portable universal router can cut holes of large diameter and irregular shapes, machine recesses, and drill holes with certain edge-distance limitations. Rectangular and round holes may be cut without a template.

B70-10320
INEXPENSIVE TAMPER PROOF SAFETY RELIEF VALVE
FRANKEWICH, P. A. /CATALYTIC-DOW/ DATE- AUG. 1970
KSC-10470
Basic relief valve has added safety relief valve capability that relieves overpressure before failure can occur. It may be installed in inaccesible areas with a high degree of reliability, constructed from a variety of materials, and adapted to the user*s specific application.

B70-10322
SWIRL-CAN COMBUSTOR SEGMENT
JONES, R. MOYER, H. NIEDZWIECKI, R. DATE- JUN. 1970 REAN- SEE ALSO NASA-TN-D-5597
LEWIS-11082
Combustor produces uniform circumferential and radial combustor exit temperature profiles and high combustion efficiency at high temperature loads. Absence of diluent air entry ports eliminates stress concentration points, low pressure fuel alleviates nozzle fouling, and abundant air at all burning stages reduces smoke.

B70-10339
PORTABLE VIBRATION EXCITER
BEECHER, L. C. /BENDIX CORP./ WILLIAMS, F. T. DATE- SEP. 1970
KSC-10069
Gas-driven vibration exciter produces a sinusoidal excitation function controllable in frequency and in amplitude. It allows direct vibration testing of components under normal loads, removing the possibility of component damage due to high static pressure.

B70-10343
LOW COST LOBED BEARING
SCHULLER, F. T. DATE- SEP. 1970
LEWIS-11076
Separate sectors for each lobed area of the bearing are assembled into the bearing housing individually and bolted tightly against the housing inside diameter. The center of a grinding wheel and the center of the housing are offset, resulting in the desired inner radius and tilt of the sector.

B70-10347
LIQUID CRYOGENIC LUBRICANT
DIETRICH, M. W. TOWNSEND, D. P. ZARETSKY, E. V. DATE- SEP. 1970 REAN- SEE ALSO NASA-TN-D-5566
LEWIS-11075
Fluorinated polyethers are suitable lubricants for rolling-element bearings in cryogenic systems. Lubrication effectiveness is comparable to that of super-refined mineral oil lubricants operating at room temperature.

B70-10348
ELECTROMECHANICAL HAND INCORPORATES TOUCH SENSORS AND TRIGGER FUNCTION
DANE, D. H. DATE- MAY 1970
M-FS-20812
Electromechanical hand incorporates touch sensors, concealed fingers, and a structure that allows the hand to hold a tool on a flat surface. The hands can be mounted on most types of existing manipulators either directly or by means of modified mounting brackets.

B70-10358
TEST FIXTURE INSURES HIGH DEGREE OF ACCURACY IN FLEXURE TESTS
DURAN, E. M. /WESTINGHOUSE ASTRONUCL. LAB./ ELLENBURG, G. W. DATE- SEP. 1970
NUC-10246
Modified die set improves accuracy in load application, minimizes problems of parallelism, and eliminates testing errors normally encountered during flexure tests. Test results are given for a comparison test of the old and new fixtures.

B70-10362
SINGLE-PHASE HEAT TRANSFER IMPROVED BY HELICAL INSERTS IN TUBES
GUTSEIN, M. U. DATE- SEP. 1970 REAN- SEE ALSO NASA-TM-X-52665
LEWIS-11063
Helical-vane insert creates a single, well defined helical flow passage resulting in more reliable predictions and extrapolations of the thermal and hydraulic performance. Insert core houses instrumentation which does not disturb the flow.

B70-10363
HEAT-BARRIER COATINGS FOR COMBUSTION CHAMBERS
CARPENTER, H. W. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970
M-FS-18618
Arc-plasma-sprayed layered coating of graded Inconel and zirconia protects film-coolant ring below injector plate of rocket engine combustion chamber. Interfacial temperature is designed for minimum buildup of stress and to avoid melting of the metal phase in the graded layers.

B70-10368
LARGE-CAPACITY PUMP VAPORIZER FOR LIQUID HYDROGEN AND NITROGEN
HAUSER, J. A. DATE- SEP. 1970
M-FS-20508
Pump vaporizer system delivers 500 standard cubic feet per minute of hydrogen or nitrogen, one system delivers both gases. Vacuum-jacketed pump discharges liquid hydrogen or liquid nitrogen into vaporizing system heated by ambient air. Principal characteristics of the flow and discharge system, pump, and vaporizer are given.

B70-10389
HYDRODYNAMIC SQUEEZE-FILM BEARINGS FOR GYROSCOPES
CHIANG, T. /MECH. TECHNOL., INC./ SMITH, R. L. DATE- DEC. 1970
M-FS-20802
Experimental tests are conducted on squeeze-film bearings by applying electricity to piezoelectric ceramics, causing vibrations at thousands or millions of Hz that are amplified and transmitted to the bearing. Rotor operation through 24,000 rpm without whirl instability proved bearing ability to support rotor weight without hydrodynamic action.

B70-10390
FABRICATING SUBSCALE COMPONENTS FOR APPLICATION TO FULL-SCALE PARTS
SPON- INNOVATOR NOT GIVEN /WHITTAKER CORP./ DATE- NOV. 1970
M-FS-20805
Equipment requirements and fabrication methods required for manufacture of large cylindrical boron/epoxy shroud are based on subscale component production methods. Plywrap technique is well suited to fabrication of cylindrical shapes using composite materials. This method offers savings in time, labor, raw materials, and equipment costs.

B70-10391
CORE DRILL*S BIT IS REPLACEABLE WITHOUT WITHDRAWAL OF DRILL STEM - A CONCEPT
RUSHING, F. C. /WESTINGHOUSE ELEC. CORP./ SIMON, A. B. DATE- SEP. 1970
M-FS-20819
Drill bit is divided into several sectors. When collapsed, the outside diameter is forced down the drill stem, when it reaches bottom the sectors are forced outward and form a cutting bit. A dulled bit is retracted by reversal of this procedure.

B70-10400
HYDRAULIC CHARACTERISTICS OF FLOW THROUGH MINIATURE SLITS
POWELL, W. B. RIEBLING, R. W. DATE- SEP. 1970
REAN- SEE ALSO NASA-CR-105897
NPO-11354
Hydraulic characteristics of micro-orifices arrayed in close proximity across the face of a liquid fuel injector are studied. Effects of geometry and flow variables on discharge coefficients and flow regimes are determined, as well as visible characteristics of the emerging liquid streams.

B70-10409
FOOLPROOF QUICK-RELEASE LOCKING PIN
NELSON, E. P. /N. AM. ROCKWELL CORP./ OTHMAN, T. E. ZMUDA, L. J. DATE- SEP. 1970
M-FS-18495
Locking pin can be withdrawn only when stress on the joint is negligible. Pin consists of a forward-pointing sleeve, a spring-loaded sliding handle, and a sliding plunger. Plunger movement controls installation and withdrawal of pin.

B70-10416
SMALL HYDRAULIC TURBINE DRIVES
ROSTAFINSKI, W. DATE- OCT. 1970 REAN- SEE ALSO NASA-TM-X-52661
LEWIS-11064
Turbine, driven by the fluid being pumped, requires no external controls, is completely integrated into the flow system, and has bearings which utilize the main fluid for lubrication and cooling. Torque capabilities compare favorably with those developed by positive displacement hydraulic motors.

B70-10418
X-CONNECTORS FOR TUBING - FEASIBILITY STUDY
BRAGG, K. /PARKER AIRCRAFT CO./ FUHRMANN, H. W. DATE- OCT. 1970 REAN- SEE ALSO NASA-CR-93923
M-FS-20827
Connector tests, including 70 deg F leakage and vibration, proof pressure, burst pressure, tensility, thermal shock, high and low temperature leakage, and simultaneous high temperature vibration and leakage, prove feasibility of lightweight 0.5-in. X-connectors for 4500-lb/sq in. service pressures.

B70-10424
MOLECULAR SIEVES CONTROL CONTAMINATION AND INSULATE IN THERMAL REGENERATORS - A CONCEPT
GASSER, M. G. DATE- OCT. 1970
GSFC-10910
Zeolitic molecular sieves prolong the lives of cryogenic engines by preventing contamination of the thermal regenerators on the cold ends of closed-cycle engines. Sieves also serve as thermal insulators by preventing conduction of heat along regenerators through contiguous disks of mesh.

B70-10455
ACCURATE REASSEMBLY OF SMALL BROKEN TEST SPECIMENS
PARDOE, A. R. /N. AM. ROCKWELL CORP./ PELLETT, H. E. DATE- SEP. 1970
M-FS-16730
Collets hold specimen in place while epoxy resin cements the broken ends, thereby eliminating relative rotation of the fracture faces. The cemented fracture can then be sectioned metallographically.

B70-10465
FLEXIBLE OR RIGID EXTENDING ARM
SIEBERT, C. J. /MARTIN MARIETTA CORP./ DATE- SEP. 1970
MSC-13512
One motion of a manual clamp makes a universally flexible arm instantly rigid in any configuration. Device is locked rigid by meshing of gear teeth, providing great resistance to loading.

B70-10468
DRILLED BALL BEARINGS - AN APPROACH TO EXTENDING BEARING FATIGUE LIFE AT HIGH SPEEDS
ANDERSON, W. J. COE, H. H. DATE- SEP. 1970
REAN- SEE ALSO NASA-TM-X-52747
LEWIS-10856
Reducing the mass of the rolling elements in ball bearings causes a reduction of centrifugal forces and thereby extends bearing fatigue life. Ball mass is reduced by drilling a concentric hole through each ball. Concentricity and finish of the drilled hole can be closely controlled and the balls accurately balanced.

B70-10502
VOLUME-CHECKING TOOL
ERBE, C. J. /IBM/ POULOS, L. J. DATE- SEP. 1970
KSC-10514
Tool, consisting of a graduated storage vessel and a control panel, can determine the amount of gas entrained by fluid in a closed system, the amount of fluid remaining in a dried system of known volume, or the volume of a container of unknown size.

B70-10509
EASY INSERT, EASY RELEASE TOGGLE BOLT FASTENER
KUBOKAWA, C. C. DATE- DEC. 1970
ARC-10140
Releasable pin-type toggle bolt fastener is constructed so that, when positioned in hole, toggle action prevents its removal and locknut anchors it firmly in place. Fastener is easily removed by loosening locknut and retraction of toggle wings.

B70-10516
CONCEPT FOR A GAS OPERATED ACTUATOR
AMBRUSO, A. /BECKMAN INSTR. INC./ DATE- SEP. 1970
NPO-11340
Palladium valve, permeable to hydrogen gas, is used to fill a bellows mechanism from a source of hydrogen to power an actuator. A similar valve provides retraction. The valves have no moving parts and are heat operated. One limitation on the use of this actuator is discussed.

B70-10517
BISTABLE FLUIDIC VALVE IS ELECTRICALLY SWITCHED
FIET, O. O. /TRW SYSTEMS GROUP/ SALVINSKI, R. J. DATE- NOV. 1970
NPO-10416
Bistable control valve is selectively switched by direct application of an electrical field to divert fluid from one output channel to another. Valve is inexpensive, has no moving parts, and operates on fluids which are relatively poor electrical conductors.

B70-10523
COMPRESSION SPRINGS USED FOR VIBRATION ISOLATION

NORMAN, R. M. DATE- OCT. 1970
NPO-11012
System that employs opposed pairs of compression springs can be totally compressed to provide a **hard mount** during component installation and adjustment, and can be released to a free-floating condition for vibration isolation during test.

B70-10526
STANDARDS FOR MATERIAL HANDLING AND FACILITIES EQUIPMENT PROOFLOAD TESTING
BONN, S. P. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970
MSC-15788
Document provides information on verifying the safety of material handling and facilities equipment /MH/FE/, ranging from monorail systems to ladders and non-powered mobile equipment. Seven catagories of MH/FE equipment are defined.

B70-10535
SIMPLE TECHNIQUE EXTENDS LIFE OF ANGULAR-CONTACT BALL BEARINGS
ZARETSKY, E. V. DATE- OCT. 1970
LEWIS-11117
Split ring, angular-contact bearing has only one ball path on the inner race and the outer race. Upon failure of either races or balls, bearing is reversed in its housing so that force is applied to opposite points on the races and bearing operation is unaffected by previous failure.

B70-10542
SUPPORT FOR EQUIPMENT - QUICK MOUNTING WITH QUICK RELEASE
CHAMBERLAIN, W. W., II /N. AM. ROCKWELL CORP./ JACOBSON, H. B. DATE- NOV. 1970
MSC-15874
Temporary support device for equipment consists of pin bracket for attachment to item and socket bracket for mounting on any structure. System is adaptable to broad range of temporary storage media. No engagement, release, or adjustment of components is required.

B70-10543
EASY MANUAL OPERATION OF OVERHEAD GARAGE DOORS - A CONCEPT
FULLER, C. J. /BOEING CO./ DATE- NOV. 1970
REAN- SEE ALSO B67-10611
KSC-10555
Manually actuated mechanical device easily raises or lowers two-section overhead garage door. Rolamite principle is used to provide controlled but varying rate of ascent or descent. Device is applicable where vertical shielding or baffling needs to be raised or lowered.

B70-10547
ADJUSTABLE DRILL BAR REPLACES COMPLEX JIGS
COVENTRY, J. H. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970
MSC-15624
Adjustable drill bar incorporates a micrometer screw which, when used in conjunction with standard gage blocks, provides rapid method of drill hole location and reduces time and skill requirements for precision drilling on large surfaces. Device picks up oddly dimensioned tool hole points and acts as sine drill bar.

B70-10548
REPLACEABLE FILTERS AND CONES FOR FLARED-TUBING CONNECTORS
GRANT, L. E. /N. AM. ROCKWELL CORP./ HOWLAND, B. T. DATE- NOV. 1970
MSC-15750
Connector is modified by machining the cone from one end before the fitting is bored to accommodate a metallic-filament type of slip-in filter. Thus, when surface of the cone is damaged, only the cone needs replacement.

B70-10550
SPECIAL WRENCH FOR B-NUTS REDUCES TORQUE STRESS IN TUBING
STEIN, J. A. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970
MSC-15885
Gear-driven torque wrench with bearing support is used to tighten B-nut connection of partially supported fluid line with minimum stress to adjacent tubing and fittings. Wrench is useful for working with weak or brittle lines such as glass tubing.

B70-10558
PILOT-BOOSTER CONTROL VALVE
MARLEY, D. /PARKER-HANNIFIN CORP./ DATE- NOV. 1970
M-FS-20635
Two-stage, pressure-sensing control valve is designed for servocontrol of 10-inch main tank valve regulating pressure of liquid oxygen in tank and serving to vent tank during filling. Valve uses a negative-rate Belleville spring to cancel positive spring rates of bellows and coil springs.

B70-10559
SAFE SUSPENSION OF SPECIMENS OR CLUSTERS DURING DYNAMIC TESTING - A CONCEPT
HOCH, G. C. /BOEING CO./ RUSSELL, J. B. DATE- DEC. 1970
M-FS-15110
Support system without point supports permits dynamic testing of complex or delicate mechanical units without excessive movement which might cause damage. Motion-sensor pressure-control system regulates inflation of molded rubber bags surrounding test specimen, so that any excessive motion is smothered until test is terminated.

B70-10566
ELECTROTHERMAL FRACTURING OF TENSILE SPECIMENS
BLINN, H. O. /WESTINGHOUSE ASTRONUCL. LAB./ HANKS, J. G. PERKINS, H. P. DATE- DEC. 1970
NUC-10185
Pulling device consisting of structural tube, connecting rod, spring-loaded nuts, loading rod, heating element, and three bulkheads fractures tensile specimens. Alternate heating and cooling increases tensile loading by increments until fracturing occurs. Load cell or strain gage, applied to pulling rod, determines forces applied.

B70-10567
THREE-DIMENSIONAL PANTOGRAPH FOR USE IN HAZARDOUS ENVIRONMENTS
COWFER, C. D. /WESTINGHOUSE ELEC. CORP./ WAGNER, H. A. DATE- NOV. 1970
NUC-10222
Material measurement device is used with radioactive probes which can be approached only to distance of 3 feet. Tracer-following unit is capable of precisely controlled movement in X-Y-Z planes. Pantograph is usable in industrial processes involving chemical corrosives, poisons, and bacteriological hazards, as well as nuclear applications.

B70-10577
FLEXIBLE PIVOT MOUNT ELIMINATES FRICTION AND HYSTERESIS
HIGHMAN, C. O. /BALL BROTHERS RES. CORP./ DATE- NOV. 1970
M-FS-20725
Flexible steel pivot mount, suspended by flat vertical beryllium copper springs, is capable of rotation, free of hysteresis and starting friction. Mount requires no lubrication, is made in varying sizes, and is driven with either dc torque motor or mechanical linkage.

B70-10583
IMPROVED BURST DISK/CUTTER ASSEMBLY
MARTINEZ, J. /AMETEK/STRAZA/ DATE- DEC. 1970
REAN- SEE ALSO B70-10582
KSC-10516
Burst disk/cutter, prewelded before assembly, eliminates external leakage into a vacuum annulus and provides a means for more accurate burst-pressure prediction. Two reverse buckling type configurations are described and test results are given.

B70-10586
DEADWEIGHT CALIBRATION OF PRESSURE GAGES WITHOUT CONTAMINATION
HENSLEY, D. R. /N. AM. ROCKWELL CORP./ DATE- NOV. 1970
M-FS-18690

Calibration of pressure gages is accomplished by use of fluid chamber in conjunction with conventional single chamber hydraulic deadweight tester. System eliminates cleaning of gages with liquid oxygen after tests and is simple to construct and operate.

B70-10589
BIDIRECTIONAL FLOW METER
SUTTON, R. F. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970
M-FS-18737
Device provides wide variety of flow metering on a volume demand basis, in either of two directions. Flow is controlled by number, locations, and sizes of orifices and O-rings. Device is useful in pneumatic or hydraulic systems where valve sequence and timing functions vary from point to point.

B70-10595
EFFICIENT PRESSURE-TRANSFORMER FOR FLUIDS
MORANDO, J. A. /CRANE CO./ DATE- DEC. 1970
M-FS-20830
Fluid transformer utilizes fluid under pressure at one level to drive series of free pistons in positive displacement pump. Pump in turn delivers hydraulic fluid at different pressure level to a load. Transformer is constructed of corrosion resistant materials and is extremely light and compact in relation to capacity.

B70-10609
TFE COATING EXTENDS LIFE OF FLEXIBLE METAL COMPRESSOR DIAPHRAGM
GORLAND, S. DATE- NOV. 1970
LEWIS-11113
Tetrafluoroethylene /TFE/ aerosol sprayed onto entire surface of diaphragm acts as film lubricant and permits diaphragm to slide between upper and lower plates in a reciprocating compressor. Flexing occurs over an area rather than about a single line of action and operating life of diaphragm is more than quadrupled.

B70-10610
HYDROGEN-OXYGEN POWERED INTERNAL COMBUSTION ENGINE
CAMERON, H. /VICKERS, INC./ MORGAN, N. DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-255
LEWIS-90264
Hydrogen at 300 psi and oxygen at 800 psi are injected sequentially into the combustion chamber to form hydrogen-rich mixture. This mode of injection eliminates difficulties of preignition, detonation, etc., encountered with carburated, spark-ignited, hydrogen-air mixtures. Ignition at startup is by means of a palladium catalyst.

B70-10635
HIGH AMPLITUDE SINUSOIDAL PRESSURE GENERATOR
ROBINSON, R. E. /BATTELLE MEM. INST./ DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-72656, B66-10031
LEWIS-11241
Generator is an inlet-area-modulated, gas-flow-through device utilizing hydrogen gas and a rotating disk for operation. Design enables generator to produce pressure oscillations as high as 120, 18, and 12 percent of the mean chamber pressure at frequencies of 1, 10, and 15 kHz, respectively.

B70-10636
ADJUSTABLE SUPPORT SPRING
HADLAND, W. O. DATE- DEC. 1970
ARC-10203
Restraining spring mechanism acting against a force has adjustable spring constant, and its performance is not affected by changes in ambient pressure. Natural frequency of device is varied by changing absolute pressures within bellows and may be tuned to prevent coupling while maintaining a given spring constant.

B70-10640
LOW-NOISE FLOW VALVE FOR AIR DUCTS
GALLO, E. A. /SERV. TECHNOL. CORP./ DATE- DEC. 1970
MSC-13441
Valve assembly controls air flow from feeder into main duct, with minimum of turbulence, friction, pressure differential, and noise. Valve consists of damper, deflector, and spring. Streamlining of damper and deflector merges flow smoothly, while spring keeps damper and deflector in contact and eliminates valve chatter and damping vibrations.

B70-10652
CONTROLLED DROPLET SPRAY GENERATOR
NICHOLLS, J. A. /MICH. UNIV./ DATE- DEC. 1970
REAN- SEE ALSO NASA-CR-72668
LEWIS-11193
Spray generator produces streams of uniform-size droplets issuing at uniform rate by applying an oscillatory disturbance to free liquid jets. Jets of varying diameters can be grouped together and oscillated as a group to produce simultaneous streams of uniform-size droplets.

B70-10653
LONG LIFE, LOW COST BALL VALVE, WITH LIFTED SEALS AND CARTRIDGE TYPE CONSTRUCTION
CARRIKER, J. W. /AEROJET-GEN. CORP./ FIEWEGER, R. DATE- DEC. 1970
MSC-13430
Ball valve design incorporates modular construction in easy-to-install, easy-to-replace cartridge housing, and a system of cams to lift upstream and downstream seals away from the ball during rotation. Tests conducted on nitrogen tetroxide prove new valve to be more efficient than previous models in preventing leakage.

B70-10668
METHOD OF STABILIZING FLUERIC VORTEX VALVES AND VORTEX AMPLIFIERS
ERWIN, L. R. /BENDIX CORP./ MC FALL, R. H.
DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-72423
LEWIS-10553
Inducing losses in the vortex chamber of vortex valves and vortex amplifiers resolves the problem of unstable operation caused by a sufficiently large positive feedback. Induced losses also reduce pressure gain and throttling range of vortex pressure amplifier.

B70-10671
TWIN-SPOOL TURBOPUMPS FOR **LOW** NET POSITIVE SUCTION PRESSURE OPERATIONS
BAIR, E. K. /AEROJET-GEN. CORP./ CAMPBELL, W. E.
FORD, O. I. DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-72540
LEWIS-11105
Modified single-shaft turbopump incorporates inducer and main pump, each separately driven at different speeds through coaxial-shaft arrangement. Inducer operates at low speed for low net positive suction pressure, main pump operates at high speed to generate high pressure. This arrangement requires no external control for the inducer.

B70-10679
COMPACT FLUID-FLOW RESTRICTOR
SHEERE, R. W. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970
MSC-15803
Fluid-flow restrictor has degree of restriction easily and accurately controlled during manufacture. Restrictor*s flow channel is machined square thread around a solid slug which is shrink-fitted to cylindrical case. One end of case is closed, open end capped, and both ends tapped for tube fittings for fluid flow.

B70-10688
LOW LEAK RATE POPPET-AND-SEAT CHECK VALVE
WHITTER, D. E. /BENDIX CORP./ DATE- DEC. 1970
MSC-13587
Valve leakage due to contaminant entrapment and chattering is effectively minimized by a metallic poppet-and-seat check valve designed for use in extreme environmental and fluid temperature conditions.

B70-10692
RESONANT SYSTEMS FOR DYNAMIC EVALUATION OF PRESSURE TRANSDUCERS
LIU, C. Y. /BATTELLE MEM. INST./ ROBINSON, R. E.
DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-72435
HQ-10609

Tests were conducted with contrived inlet modulated sinusoidal pressure generator to study possible use in calibrating pressure sensors. Results indicate concept is feasible and applicable to transducer evaluation.

B70-10699
SELF-SEALING, EASILY PURGED QUICK-DISCONNECT HOSE COUPLING
LEYERLE, R. B. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970
MSC-17009
Coupling for pressurized hoses handles gas or liquid, is easily purged, and automatically seals the hose when disconnected. Volatile or toxic materials can be isolated before the connection is broken. This device may interest food processors and manufacturers of fluid delivery systems.

B70-10701
STARTER PROPELLANTS AND AUXILIARY GENERATORS FOR GAS TURBINES
GILL, G. S. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970
M-FS-18813
Study relates geometry of an internally burning, single, solid-propellant grain to propellant characteristics, engine requirements, and selected starting pressure. Study derives curves for selecting propellants to meet specific engine requirements, or for tailoring engine requirements to propellant limitations.

B70-10714
CARRIAGE-RAIL ASSEMBLY FOR HIGH-RESOLUTION MECHANICAL POSITIONING
BOSWORTH, R. H. /BENDIX CORP./ RONEY, B. W.
DATE- DEC. 1970
M-FS-20908
Carriage-rail assembly effects extreme resolution and position accuracy with little friction, and is applicable to such apparatus as optical benches, inspection fixtures, machine tools, and photographic equipment. Directions for assembly construction are given.

B70-10728
ABSOLUTE FOCUS LOCK FOR MICROSCOPES
CONE, C. D., JR. LOOP, R. W. TONGIER, M., JR.
DATE- DEC. 1970
LANGLEY-10184
Mechanism absolutely immobilizes microscope stage at a preset focus, preserving focus indefinitely. The lock is a second-class lever consisting of a straight body having a fulcrum with a cylindrical bearing surface at one end and a thumbscrew at the other end.

B71-10012
WELDED POLYPROPYLENE LINERS FOR LARGE DESCALING TANKS
ABEL, H. P./N. AM. ROCKWELL CORP./
JAN. 1971
M-FS-18711
Liners for nitric and hydrofluoric acid tanks show no sign of deterioration after 18 months of continuous use. Each side of each edge of the polypropylene sheets is chamfered, and sheets are welded from both sides with polypropylene filler rod and a special hot-air welding torch.

B71-10018
VACUUM-JACKETED ROTARY JOINTS FOR PIPELINES
MURSINNA, R. C./AMETEK, INC./
FEB. 1971 SEE ALSO NASA-CR-107244
KSC-10519
Joint absorbs all significant torque, is as rugged as heavy metallic pipe, and has thermal insulation comparable to length of flexible pipe. Design is adaptable to any pipes transporting gases or liquids, including those which are noxious or corrosive.

B71-10020
STUDY AIDS ACCURACY OF TURBOPUMP AXIAL THRUST ANALYSIS
NIELSON, C. E./N. AM. ROCKWELL CORP./
JAN. 1971
M-FS-18774
Test program to verify theory used in calculating axial thrust uses turbopump instrumented with /a/ proximity transducers for measuring shaft position, /b/ a strain gage thrust bearing carrier to measure axial thrust, and /c/ internal pressure taps to define component pressure gradients used in thrust calculations.

B71-10023
PEAK WIND SPEED ANEMOMETER /MAXIMETER/
CAMP, D. W. KAUFMAN, J. W. TURNER, R. E.
JAN. 1971
M-FS-20916
Peak wind speed recording device, which employs a drag disk with two constant-rate springs /high and low/ and a precision clutching mechanism, measures wind speeds from 8 m/sec up to 200 m/sec while retaining permanent record of peak wind. Device withstands temperatures up to 810 K.

B71-10067
CHATTER-FREE CHECK VALVE - A CONCEPT
DUNBAR, J. E./BENDIX CORP./
APR. 1971
MSC-13262
Valve head moves in spiral motion away from seat. Motion is controlled by travel of pin along spiral groove in valve guide. Clearances between pin and groove permit free motion of valve, but effectively dampen vibration and chattering.

B71-10072
SYSTEMS FOR DEAD-RECKONING NAVIGATION AND FOR SIMULATION OF INSTRUMENTAL ERROR - CONCEPTS
GREEN, W. L.
APR. 1971 SEE ALSO NASA-TM-X-53953
M-FS-20860
Navigational system for manned lunar vehicles is intended for travel totaling 30 km within 5 km of home base, total distance traveled must be indicated with 2 percent accuracy. Hardware includes two two-degrees-of-freedom gyroscopes, odometers, tachometers, and signal processing equipment.

B71-10080
HIGH-RELIABILITY RELEASE MECHANISM
PARADISE, J. J./LOCKHEED MISSILES AND SPACE CO./
MAY 1971
LEWIS-11233
Release mechanism employing simple clevis fitting in combination with two pin-pullers achieves high reliability degree through active mechanical redundancy. Mechanism releases solar arrays. It is simple and inexpensive and performs effectively. It adapts to other release-system applications with variety of pin-puller devices.

B71-10081
PNEUMATIC AMPLIFIER CONTROLS HIGH PRESSURE FLUID SUPPLY
JOHNSON, H. L. TRADER, A. G.
APR. 1971
MSC-12121
Pneumatic servo system has pneumatic amplifier containing novel control valve that provides linear control of the flow rate. Fluid supply is isolated from control pressure.

B71-10083
FLUID SLIP RING TRANSFERS COOLANT TO ROTATING EQUIPMENT
MAINS, D. K./LOCKHEED ELECTRON. CO./
APR. 1971
MSC-13451
Rotating fluid coupler, consisting of rotor and housing made of aluminum, that is concentric with electrical slip-ring assembly, transfers cooling fluid to instrumentation undergoing environmental tests on rotating platform. Rotating fluid coupler permits unlimited platform revolutions and eliminates danger of lines being pulled loose from supplies.

B71-10098
HIGH-TEMPERATURE, LONG-LIFE POLYIMIDE SEALS FOR HYDRAULIC ACTUATOR RODS
JOHNSON, R. L. LEE, J./FAIRCHILD HILLER CORP./ LOOMIS, W. R.
MAY 1971 SEE ALSO NASA-TM-X-52888, NASA-CR-72563
LEWIS-11212
Two types of polyimide seals are developed for hydraulic actuator rod in low pressure second stage of two-stage configuration. Each seal melts test objectives of twenty million cycles of

operation at 534 K. Analytical and experimental study results are discussed. Potential applications are given.

B71-10100
HIGH-TEMPERATURE PUMP-MOTOR ASSEMBLY
COLKER, C./AEROJET-GEN. CORP./ WALDRON, W.
MAY 1971 SEE ALSO NASA-CR-72823, NASA-CR-72824
LEWIS-10256
Assembly pumps liquid sodium-potassium /NaK/ eutectic at 950 K for up to 20,000 hours. Design features include - high operating-temperature capability, zero leakage, process fluid lubricant/coolant, insulation system compatible with ionizing radiation environments, and reliability and long life without maintenance.

B71-10101
REMOTE COUPLING OF AIR LINES
FUCHS, C. E./WESTINGHOUSE ASTRONUCL. LAB/
MAY 1971
NUC-10225
Bullseye coupler is projected pneumatically from one railroad car at the second car's point of connection. System depends on assumption that inaccuracies in relative position of cars do not exceed certain limits. System is usefull to oil drilling, marine rescue and salvage, nuclear work and chemical plant operations.

B71-10140
IMPROVED TRANSDUCER FOR SQUEEZE-FILM BEARINGS
HOOGENBLOOM, L./MECH. TECHNOL., INC./
MAY 1971 SEE ALSO B66-10226, B68-10180
M-FS-20826
Transducer amplifies vibrations produced by piezoelectric drivers, creating greater amplitudes than were possible with direct drive devices. Drivers isolated from bearing surfaces result in bearings with high axial load capacity and stiffness, thus, wear on ceramic cylinders is reduced.

B71-10146
SIMPLE, SHOCK-FREE, QUICK RELEASE CONNECTOR - A CONCEPT
JEWETT, H. R., JR.
MAY 1971
LEWIS-11178
Connector concept is based on characteristics of friction between sliding surfaces and consists of two packs of foil strips. Advantages of this connector are - separation is smooth and shock-free, and connector can also act as a seal. Equation for computing tensile load-carrying capability is also given.

B71-10152
AN INVESTIGATION OF TANDEM-ROW, HIGH-HEAD PUMP INDUCERS
ETTER, R. J./HYDRONAUTICS, INC./
JUN. 1971 SEE ALSO NASA-CR-110790
M-FS-21139
Investigation results indicate optimum design is tandem inducer system using supercavitating first stage and subcavitating second stage operating over wide range of suction specific speeds and flow coefficients. Fluid-flow cavitation effects theory and experimental results also apply to other fluid power system designs.

B71-10159
A LIGHTWEIGHT, HIGH OUTPUT SOIL SAMPLER
HOWARD, E. A. IMUS, R. E. STOCKWELL, D. W.
JUN. 1971
NPO-10797
Sampler is useful on or under earth's surface or on sea bottom. Larger sample amount is obtained relative to sampler size and weight and limited particle size-sample material is continuously delivered. Silicone rubber linear in transport tube nearly eliminates grinding or particulate processing during sampling, and reduces required torque.

B71-10173
SERIES-HYBRID BEARING - AN APPROACH TO EXTENDING BEARING FATIGUE LIFE AT HIGH SPEEDS
ANDERSON, W. J. COE, H. H. FLEMING, D. P. PARKER, R. J.
JUN. 1971 SEE ALSO NASA-TN-D-7011
LEWIS-11152
Fluid film bearing of hybrid device consists of orifice compensated annular thrust bearing and self-acting journal bearing. In series hybrid bearing, both ball bearing and annular thrust bearing carry full system thrust load, but two bearings share speed. Operation of system is stable and automatically fail-safe.

B71-10175
RECOMMENDED SAFETY GUIDES FOR INDUSTRIAL LABORATORIES AND SHOPS
ALLISON, W. W.
JUN. 1971 SEE ALSO SC-M-68-378
SAN-10050
Booklet provides references to 29 publications providing information on hazard control and approved safety practices. Areas include pressurized gas and vacuum systems. Guidelines are presented for safeguarding facilities where machinery, equipment, electrical devices, or hazardous chemicals are used.

B71-10178
WALL ATTACHMENT, FLUERIC CROSSOVER ''AND'' GATE
HELLBAUM, R. F.
JUN. 1971
XLA-07391
Gate performance is not adversely affected by normal dimensional variations encountered in fabrication and it operates throughout full loading range. Flow from one control must be sufficiently monostable to allow initial attachment and upon switching, return to outer wall. Venting must be adequate.

B71-10207
HYDROSTATIC LIQUID-BEARING FOR PRECISION GYRO
SGAMBATI, R. J./BENDIX CORP./
JUL. 1971 SEE ALSO NASA-CR-102991
M-FS-21138
Unit with 2W power increase and slightly larger overall dimensions performs as well as or better than its gas-bearing counterpart. Liquid-bearings are built by reworking serviceable gas-bearing components /sleeves, endplates, and cylinders/. Hydrostatic bearing is self-centered, requiring no magnetic suspension or centering jewel.

B71-10214
DEVICE PREPARES ALUMINUM SURFACES FOR WELDING
FAULKNER, G. E./IIT RES. INST./ SAPERSTEIN, Z. P.
JUL. 1971
M-FS-20750
Dry machining technique removes original surfaces to obtain contamination free welding surface. Device straddles edge being prepared and aligns with existing edges and adjacent surfaces of workpiece while sensing device regulates cut depth. Description of prototype is given.

B71-10219
SUBMERGED GAS INJECTOR EXPELS CRYOGENIC LIQUIDS FROM TANKS
CONRAD, E. W. JOHNSON, W. R.
JUL. 1971 SEE ALSO NASA-TN-D-4102
LEWIS-11231
Vaporizing small portion of cryogenic liquid into pressurizing gas reduces amount of pressurizing gas required to expel cryogenic liquid from tank. Specific example of injecting helium gas, stored at same temperature of liquid hydrogen, through submerged porous plate directly into liquid hydrogen is described.

B71-10222
VARIABLE-AREA NOZZLE AUTOMATICALLY CONTROLS FLUID FLOW
CONRAD, E. W.
JUL. 1971
LEWIS-11217
Simple, passive nozzle requires no active control system to vary injection area. Injection area changes with changing pressure, thereby allowing greater flow as pressure increases. As pressure drop across nozzle is decreased, spring action of segments causes them to move inward, decreasing the flow area.

B71-10233
HYDRAULIC ACTUATOR MOTION LIMITER ENSURES OPERATOR SAFETY
STEINMETZ, C. P.
JUL. 1971
ARC-10131
Device regulates action of hydraulic linkage to control column to minimize hazard to operator. Primary components of device are flow rate control valve, limiter accumulator, and shutoff valve. Limiter may be incorporated into other hydraulic systems to prevent undue wear on hydraulic actuators and associated components.

B71-10237
PORTABLE LIGHTWEIGHT BANDSAW
SEARLE, H. J./N. AM. ROCKWELL CORP./
JUL. 1971
M-FS-16927
Bandsaw of aluminum-6061 weighs about five kg and is operable by one or two men. Spiral blade cuts in any direction and at any angle. Hardness of materials to be cut is limited by material and dimension of blade.

B71-10239
IMPROVED METHOD FOR CALCULATING PUMP THERMODYNAMIC SUPPRESSION HEAD
KAGEYAMA, Y.
JUL. 1971
M-FS-20852
Method of calculation improves by introducing the sound velocity of two phase flow into the equation for the vapor to liquid volume ratio. Comparisons of required net positive suction head and thermodynamic suppression head are made for a head coefficient ratio of 0.98.

B71-10301
HIGH MOBILITY WORK STATION RESTRAINT SUPPORT
SCHERMERHORN, R. S.
AUG. 1971
MSC-12419
Chair holds man in semistanding posture enabling astronauts to work comfortably with minimum restriction in weightless environment. Seat, angled at 130 deg to back support, twists and swivels up to 20 deg in all directions but forward. Two flexible thigh clips prevent occupant from slipping off.

B71-10302
HOT TAP THERMOWELL INSTALLATION
ROMERO, C. A.
AUG. 1971
MSC-12427
System permits valve housings or other fillings to be installed in live steam lines or water pipes without interrupting their operation, thus eliminating current tapping restrictions. Two basic assemblies for installation under pressure are described.

B71-10315
REDUCTION OF VALVE LEAKAGE - A CONCEPT
DOSHI, N. H./TRW SYSTEMS, INC./ SALVINSKI, R. J.
AUG. 1971
NPO-12003
Leakage elimination occurs by increasing pressure on poppet seat, heating poppet plunger or cooling valve body, and then exerting force between 4.45 and 44.5 kN at poppet seat interface. Valves are useful in handling of corrosive fluids.

B71-10328
HERMETICALLY SEALED MOTION TRANSMITTER
ECKERT, R. L./N. AM. ROCKWELL CORP./
AUG. 1971
MSC-17348
Transmitter allows transmission of rotational or single planar arc motion through hermetically sealed chamber without use of dynamic seals or complex mechanisms. Device may interest pressure vessel designers and those who need to isolate equipment from a hostile environment.

B71-10358
IMPROVED DIAMOND CORING BITS DEVELOPED FOR DRY AND CHIP-FLUSH DRILLING
DECKER, W. E./WESTINGHOUSE ELEC. CORP./ HAMPE, W. R. HAMPTON, W. H. SIMON, A. B.
SEP. 1971
M-FS-21111
Two rotary diamond bit designs, one operating with a chip-flushing fluid, the second including auger section to remove drilled chips, enhance usefulness of tool for exploratory and industrial core-drilling of hard, abrasive mineral deposits and structural masonry.

B71-10412
ULTRATHIN GATE VALVE FOR HIGH VACUUM OPERATION
UGIANSKY, R. J.
NOV. 1971
GSFC-11028
Thin, compact, high-vacuum gate valve used to join two vacuum systems together demonstrates multiple operation reliability. Valve measurements and non-protruding handle make valve usable in confined areas.

B71-10449
LIQUID-FUEL VALVE WITH PRECISE THROTTLING CONTROL
MC DOUGAL, A. R. PORTER, R. N. RIEBLING, R. W.
NOV. 1971
NPO-10808
Prototype liquid-fuel valve performs on-off and throttling functions in vacuum without component cold-welding or excessive leakage. Valve design enables simple and rapid disassembly and parts replacement and operates with short working stroke, providing maximum throttling sensitivity commensurate with good control.

B71-10468
PROPORTIONAL PULSED PILOT VALVE
RUSK, S. J./LOCKHEED MISSILES AND SPACE CO./
DEC. 1971
ARC-10228
Proportional pulsed pilot valve using conventional efficient solenoid valve for pilot stage provides proportional thrust control for cold gas thrusters with zero leakage of main stage.

B71-10479
LASER DEVICE PROVIDES ACCURATE REFERENCE TO TRUE GRAVITATIONAL VERTICAL
BILLMAN, K. W. LEONARD, E. T./DOT/
DEC. 1971
ARC-10444
Modification of conventional laser provides correct gravitational alignment by utilizing surface pool of mercury as a gravity-sensitive cavity mirror. Laser action is stimulated only when mirrors are normal to the axis of the beam.

B71-10480
TOOL EXPEDITES INSTALLATION OF BNC CONNECTORS
HARO, P. J.
DEC. 1971
ARC-10327
Tool is devised which holds BNC connector during installation and permits tightening nut without damaging connector.

B71-10481
DISTRIBUTION AND METERING SYSTEM FOR SOIL SAMPLES
DEBENHAM, C. H./TRW, INC./
DEC. 1971
ARC-10429
Electromechanical assembly with movable hopper, commanded to put soil samples into inlet sorts of sampling valves, distributes metered volumes of soil samples into test cells.

B71-10493
AIR LOCK MECHANISM SPEEDS SPECIMEN TESTING IN HIGH-TEMPERATURE VACUUM FURNACES
WHITEHEAD, C.
DEC. 1971 SEE ALSO B68-10135
LANGLEY-10841
Mechanism, made of 347 stainless steel, is attached to furnace port by bolted flange. Unit incorporates quick opening, high vacuum valve and associated fittings which provide connections to air lock evacuation and to inert gas supply for

quenching specimen after it is withdrawn from furnace into air lock.

B71-10496
SCALE FACTOR GAGE FOR FIBER OPTICS INSPECTION DEVICE
MC MAHON, W./N. AM. ROCKWELL CORP./ SUGG, P. E.
DEC. 1971
MSC-17361
Flexible wire device, fastened along outside of fiber bundle from viewing portion to tip, positions calibrated adjustable gage in field of view. Scale factor is determined from known magnification characteristics of fiber optics system or from graduations on gage tip.

B71-10503
METAL-SHEARING ENERGY ABSORBER
FAY, R. J./DENVER UNIV./ WITTROCK, E. P.
DEC. 1971
HQ-10638
Device, consisting of tongue of thin aluminum alloy strip, pull tab, slotted steel plate which serves as cutter, and steel buckle, absorbs mechanical energy when its ends are subjected to tensile loading. Device is applicable as auxiliary shock absorbing anchor for automobile and airplane safety belts.

B71-10511
HYDRAULIC EXPANSION PROCESS SHAPES LARGE METAL SHEETS
ANDERSON, E./GRUMMAN AEROSPACE CORP./
DEC. 1971
MSC-12432
Process imparts dome shape to titanium sheets and is applicable to shaping other metals. Method is of interest to automobile and aircraft body manufacturers.

B71-10516
GLASS TUBE SPLITTING TOOL
KLEIN, J. A./N. AM. ROCKWELL CORP./ MURRAY, C. D.
STEIN, J. A.
DEC. 1971
MSC-17183
Tool accurately splits glass tubing so cuts are aligned 180 deg apart and reassembled tube forms low pressure, gastight enclosure. Device should interest industries using cylindrical closed glass containers.

B71-10522
ANTI-SLIPPING SYSTEM IMPROVES WIRE SAW PERFORMANCE
GALLO, E. A./SERV. TECHNOL. CORP./
DEC. 1971
MSC-13508
System prevents wire saw slippage by providing sufficient friction to turn idler spools even when turns of wire on spools do not provide sufficient friction. Low cost system is easily applied to existing equipment.

B72-10036
OPTICAL ALIGNMENT OF ELECTRODES ON ELECTRICAL DISCHARGE MACHINES
A. G. Boissevain and B. W. Nelson
1972
XAC-09489
Shadowgraph system projects magnified image on screen so that alignment of small electrodes mounted on electrical discharge machines can be corrected and verified. Technique may be adapted to other machine tool equipment where physical contact cannot be made during inspection and access to tool limits conventional runout checking procedures.

B72-10066
POSITION INDICATING, ROTATING BOOM
A. C. Dibble, F. W. Gibson, J. R. Padelt, and W. S. Saunders
Dec. 1972
LANGLEY-11202
Universal multiplanar position indicating, rotating boom for mounting various instruments or sensors is described. Boom is telescoping, and apparatus is capable of 3 types of rotation controlled by electric motors. Movement may be continuous or incremental.

B72-10095
TUBING CUTTER
A. Giandomenico
1972
NPO-11524
Replacement of opposing smooth rollers with appropriately grooved rollers in manual tubing cutter allows smooth severance of tubing of different diameters and eliminates raised lip around cut end.

B72-10110
HYDRAULIC VALVE LIFTER REMOVER
R. F. Horton
Jul. 1952
M-FS-21377
Threaded rod, mounted in tubular housing which is flanged and expandable at one end, removes valve lifter after removal of valve covers and push rods.

B72-10114
HIGH SPEED, SELF-ACTING, FACE-CONTACT SHAFT SEAL HAS LOW LEAKAGE AND VERY LOW WEAR
J. Zuk, L. P. Ludwig, and R. L. Johnson
Aug. 1972 See also B72-10447; NASA-TN-D-5744; NASA-TN-D-6164; NASA-TN-D-7006
LEWIS-11598
Design adds gas thrust bearing to face of conventional face seal. Bearing lifts seal's carbon face out of contact after startup and establishes thin gas film between sealing surfaces. Operating pressure and speed capabilities are greater than those of conventional face seals.

B72-10117
DISPERSION RING REDUCES INJECTOR ORIFICE-TO-ORIFICE FLOW VARIATION
R. L. Garber (N. Am. Rockwell Corp.) and V. W. Jaqua (N. Am. Rockwell Corp.)
1972
MSC-15953
Technique substantially reduces machine complexity, improves injector performance and is useful for products mixed or homogenized by injector process. Method is applicable to pharmaceutical, food, dairy and petrochemical industries.

B72-10118
THREE-POINT COMPOUND SINE PLATE OFFERS COST AND WEIGHT SAVINGS
A. P. Barras (N. Am. Rockwell Corp.)
1972
MSC-15818
Work piece adjustment fixture reduces size, weight and set-up complexity of alignment platforms used in metal blank machining. Design benefits designers and manufacturers of machine tools and measuring equipment.

B72-10120
DYNAMIC VALVE TO SUPPLY CONSTANT TOTAL THRUST TO TWO ORIFICE JETS
W. H. Egli (Honeywell, Inc.)
1972
ARC-10239
Valve, maintaining constant total flow, is driven mechanically in periodic alterations to yield correspondingly periodic outputs of constant sum. Design is applicable to development of jet flaps for helicopter use and may be useful in a multinozzle system.

B72-10122
UNIVERSAL INVERTED FLEXURE
W. O. Hadland
1972
ARC-10345
Flexure block fabricated from single piece of material minimizes effect of temperature changes and prevents overstressing of the flexing element.

B72-10173
VORTEX SERVOVALVE FOR FLUIDIC OR ELECTRICAL INPUT
T. S. Honda (GE)
1972 See also NASA-CR-73304
ARC-10155
Proportional pressure control servovalve consisting of fluid amplifier bellows-driven jet-pipe and two vortex valves operating in push-pull, with a pair of bellows for pressure feedback is tolerant to contaminant particles and meets minimum standby flow requirements for applications such as rocket thruster nozzles.

B72-10174
NEW FULL-COMPLEMENT BALL BEARING LUBRICATION TECHNIQUE
B. Rockower (MIT)
1972
MSC-13850
Undersized spacer balls rub against oil impregnated wiper, pick up lubricant, and transmit it to load carrying balls and raceways.

B72-10178
AIRFLOW DISTRIBUTION CONTROL FOR IMPROVED TURBINE ENGINE PERFORMANCE
A. J. Juhasz and J. D. Holdeman
May 1972 See also NASA-TN-D-6435
LEWIS-11593
Control allows significant diffuser length and weight reduction, reduces combustor exhaust emissions during engine idle, and improves combustor altitude relight capability.

B72-10179
IMPROVED SYSTEM FOR MEASURING SPEED OF ROTATING MACHINERY
E. G. Smith (GE)
1972
ARC-10413
Gear designed with spaces for 61 or 62 teeth but having 1- or 2-tooth gap provides reference point that can be detected electronically and retains convenient count of 60 per revolution obviating need for duplicate electronic equipment.

B72-10197
BILEAF MECHANICAL STRAIN GAGE
L. R. Guist
May 1972
ARC-10303
Bileaf lever detects small deformations by highly magnifying linear displacements. Device is applicable to force measuring instruments, pressure cells, temperature gages, existing strain gages, dial gages, or extensometers. Additional magnification is obtained by cementing a small mirror to mobile end of bileaf.

B72-10211
MINIATURE HIGH PRESSURE REGULATOR
H. W. Wright, Jr. (TRW Systems Group) and W. S.-S. Wang (TRW Systems Group)
May 1972
ARC-10428
Metal bellows, capable of supplying required spring rate and operational stability, replaced diaphragms, sliding seals, and springs in design of small gas regulator.

B72-10216
DETERMINATION OF IMPACT SENSITIVITY OF MATERIALS AT HIGH PRESSURES
L. Davis, D. Pippen, J. Stradling, and D. Whitaker (Service Technol. Corp.)
Dec. 1972
MSC-13700
Compact device is used to determine impact sensitivity of material in static, high pressure, gaseous environment. It can also be instrumented to monitor and record pressure, temperature, and striker impact force. Device is used in conjunction with commercially available liquid oxygen impact tester which provides impact energy.

B72-10264
TURBOPUMP RADIAL AND AXIAL ROTOR SUPPORT SYSTEM
P. S. Buckmann (Aerojet Liquid Rocket Co.)
Jun. 1972
M-FS-21495
Design of thrust balancer minimizes leakage bypass and obviates need for conventional thrust balancer. System allows operation at low flow rates and high thrust capacity at cryogenic temperatures and high pressures.

B72-10283
A CABLE STABILIZER FOR OUTDOOR ELEVATORS
E. J. Davis and B. A. Tolson
Jun. 1972
KSC-10513
Stabilizer, developed for outdoor elevators, prevents cables from swaying in the wind.

B72-10287
COMBINATION THROTTLE AND SHUTOFF VALVE
J. W. Carriker (Aerojet Liquid Rocket Co.)
Jun. 1972
M-FS-21513
Combination of translating sleeve throttle valve and conventional poppet valve provides capability of shutting off flow completely by poppet and sleeve control of the rate of flow. Integration of the two concepts can be accomplished without difficulty and in a manner that requires a minimum of development.

B72-10292
A METHOD FOR CALCULATING THE EFFECTS OF DESIGN ERRORS AND MEASUREMENT ERRORS ON PUMP PERFORMANCE
D. A. Anderson
Jun. 1972 See also NASA-TN-D-5919
LEWIS-11503
Technique has been developed for calculating effects of design errors and measurement errors on pump performance. Error equations and charts are utilized to relate amount of error in given performance parameter to amount of error in given design or measured variable. Error equations were derived primarily for axial flow pumps, but are not limited to axial flow.

B72-10319
TOOL CARRIER
V. A. DesCamp (Martin Marietta Corp.)
Dec. 1972
M-FS-21469
Flexible fingers meshed together in hinged container secure working tools and parts around waist or thigh of workman. Hairbrush-like fingers across carrier interior allow tool placement from top or bottom without visual coordination.

B72-10322
BALL BEARING PROTECTOR
R. A. Burns
Jul. 1972
M-FS-21612
Mechanical device for reducing the stresses imposed on ball bearings when bearings are exposed to forces caused by vibration is described. Bearing protector is press fitted on rotor shaft and slip fitted into bearing housing. Bearing stop which contacts inner race stops shaft and bearing when moving along shaft axis and removes load from ball bearings.

B72-10325
REMOTE WEIGHING DEVICE
J. P. Valinsky (McDonnell-Douglas Corp.)
Jul. 1972
M-FS-21556
Mechanical device for accurate measurement of weight and changes in weight is presented. Diagram of mechanical equipment

is illustrated. Construction of system is described and method of operation is analyzed.

B72-10326
TURBULENT MIXING FILM COOLING CORRELATION
A. J. Juhasz and C. J. Marek
Dec. 1972 See also NASA-TN-D-6360
LEWIS-11417

Film cooling effectiveness correlation predicts air flow requirement for cooling gas turbine combustors. Turbulent mixing model accounts for mixing rate between cooling film and hot gas stream. Resulting equation correlates data within plus or minus 20 percent.

B72-10329
PACKAGING CONCEPT FOR LSI BEAM LEAD INTEGRATED CIRCUITS
B. W. Kennedy
Jul. 1972
M-FS-21374

Development of packaging system for mounting beam lead integrated chip circuit on lead frame is discussed. Process for fabricating large scale integration circuits is described. Diagrams illustrating method of construction are included.

B72-10332
NONCONTACT TORQUE MEASUREMENT USING STROBOSCOPIC TECHNIQUES
W. H. Leonard (Grumman Aerospace Corp.)
Jul. 1972
MSC-12282

Noncontact torquemeter measures torsional deflection of rotating shaft and results are viewed on vernier scale. Magnitude of torque must be calculated from measured deflection. Device has no electric connections with the rotating member and is easy to use.

B72-10345
STEM CLUTCH FOR MOTOR DRIVEN VALVE
D. E. Blum and J. F. Wiltens
1972
LRL-10032

Development of mechanical device to reduce possibility of damage to motor driven needle valve is discussed. Mechanical clutch is employed to allow slippage when needle valve reaches limit of travel. Operation of system for various conditions is described.

B72-10348
AN ECONOMICAL VENT COVER
A. C. Lee (McDonnell-Douglas Astron. Co.) and M. D. McDonald (McDonnell-Douglas Astron. Co.)
Jul. 1972
M-FS-20692

Inexpensive formed-plastic vent cover has been developed that allows controlled purge of vent systems and also provides blowout protection. Cover can also be used in relief mode to allow normal system relief flows without disengaging from vent system. Cover consists of two parts made of plastics with varying densities to fit media used and desired pressures.

B72-10352
REMOTE CONTROL FLARE STACK IGNITER FOR COMBUSTIBLE GASES
W. L. Ray
Jul. 1972
M-FS-21675

Device has been designed and developed for igniting nonrecoverable combustible gases and sustaining combustion of gases evolving from various gas vent stacks. Igniter is superior to existing systems because of simplicity of operation, low cost fabrication, installation, operational and maintainability features, and excellent reliability in all phases of required operations.

B72-10355
PERLOAD INDICATING TURNBUCKLE
W. T. Appleberry (McDonnell-Douglas Corp.)
Jul. 1972
M-FS-21488

Low cost, easily manufactured turnbuckle was developed for applying a predetermined load on strap assemblies. Unit consists of sleeve and nut assembled on turnbuckle that is pulled to predetermined load in tension test machine.

B72-10377
SIMPLE TURBINE BALANCING TEST APPARATUS
M. H. Vavra (Astro-Aeron. Propulsion Lab.), J. E. Hammer (Astro-Aeron. Propulsion Lab.), and L. E. Bell (Astro-Aeron. Propulsion Lab.)
Jul. 1972 See also NASA-CR-1967
LEWIS-11658

Simple, inexpensive apparatus has been devised for testing dynamic balance of turbine rotors. No elaborate instrumentation is required and rotor is spun by directing jet of air against blades. Basic principle involved is that of the vibration of a mass on a spring. Apparatus can be used where conventional, expensive balance facilities are not readily available.

B72-10384
CAVITATION DATA FOR HYDRAULIC EQUIPMENT
J. Hord (NBS) and R. O. Voth (NBS)
Jul. 1972
LEWIS-11642

Development of cavitation B-factors for helium, parahydrogen, nitrogen, fluorine, oxygen, refrigerant 114, and water is discussed. B-factor is defined and numerical relationships are established. Mathematical models are included and alternative methods of determining B-factor are explained.

B72-10385
NONCONTAMINATING TECHNIQUE FOR MAKING HOLES IN EXISTING PROCESS SYSTEMS
T. P. Hecker, H. P. Czapor, and S. M. Giordano
Jul. 1972 See also NASA-TM-X-2431
LEWIS-11595

Technique is developed for making cleanly-contoured holes in assembled process systems without introducing chips or other contaminants into system. Technique uses portable equipment and does not require dismantling of system. Method was tested on Inconel, stainless steel, ASTMA-53, and Hastelloy X in all positions.

B72-10398
PLANETARY ROCK CORER AND DRILL CONCEPTS
R. E. Imus
Jul. 1972
NPO-11416

Several planetary rock corers and drill design concepts have been developed for obtaining subsurface rock samples in future planetary explorations. Tools are designed for unmanned space vehicles. Two devices are rotary impact multiple chisel trepan rock corer and hole drilling tool.

B72-10400
A VALVE CONCEPT FOR REMOTE FLUID FLOW CONTROL
W. J. Flynn (N. Am. Aviation, Inc.)
Jul. 1972
M-FS-16097

Valve concept has been devised which offers lightweight, simplified mechanism capable of automatic control of large number of fluid flow ports. Valve control is achieved with valve stem which is bimetallic device activated by heating coil to open or close selected supply port. Number of controlled ports is limited only by desired physical size of system.

B72-10404
CONTROLLED FLOW ASSEMBLY
A. E. Cohen (McDonnell-Douglas Corp.)
Jul. 1972
M-FS-21716

Incorporation of isolation valves in high pressure oxygen supply system prevents occurrence of shock ignition when valves are

opened. Specifications of equipment show flow rates, pressure ratings, and service life. Illustration of equipment is provided.

B72-10414
CHUCK FOR DELICATE DRILLS
C. S. Copeland
Sep. 1972
ARC-10660

Development of oil film technique to couple power between drive spindle and drill chuck for delicate drilling operations is discussed. Oil film permits application of sufficient pressure, but stops rotating when drill jams. Illustration of equipment is provided.

B72-10426
MAGNET-WIRE WRAPPING TOOL FOR INTEGRATED CIRCUITS
T. H. Takahashi
Aug. 1972
NPO-11815

Wire-dispensing tool which resembles mechanical pencil is used to wrap magnet wire around integrated circuit terminals uniformly and securely without damaging insulative coating on wire. Tool is hand-held and easily manipulated to execute wire wrapping movements.

B72-10433
A TOOL FOR CUTTING ULTRA THIN SLITS IN METALS
W. McMahon (N. Am. Rockwell Corp.)
Jul. 1972
KSC-10770

Tool produces slits of 0.0305 mm widths in materials up to RC 50 hardness, minimizes material waste and improves precision. Device may be used for general metal cutting and for producing simulated cracks in metal samples used in fatigue tests.

B72-10434
AIR ASSIST FUEL NOZZLE REDUCES AIRCRAFT GAS TURBINE ENGINE EMISSIONS AT IDLE OPERATION
D. Briehl and L. C. Papathakos
Jul. 1972 See also NASA-TN-D-6404
LEWIS-11512

Reduction in unburned hydrocarbons from jet engine by use of air assist fuel nozzle is discussed. Operation of nozzle for improving combustion efficiency by improving fuel atomization is analyzed. Advantages to be achieved by air assist fuel nozzle are analyzed.

B72-10447
HIGH-SPEED, SELF-ACTING SHAFT SEAL (CIRCUMFERENTIAL TYPE)
L. P. Ludwig and W F. Hady
Jul. 1972 See also B72-10114; NASA-TN-D-5744
LEWIS-11274

Shaft riding circumferential seal is used with turbine engines under high pressure conditions. Construction of seal is discussed and schematic diagram to show operations is provided.

B72-10459
ADJUSTABLE LOCKING DEVICE
O. J. Fincannon (McDonnell-Douglas Corp.)
Aug. 1972
M-FS-21650

Adjustable locking device is used for taking up end play of shaft without displacing shaft radially. Coincidentally threaded collars fastened to one or both ends of shaft are threaded in and out of one another for adjustment of end play. Intrinsic feature is its ability to be locked in any translatory position without axial displacement of shaft.

B72-10470
BALL DETENT MECHANISM
A. S. Cousin (McDonnell-Douglas Corp.)
Aug. 1972
M-FS-21735

Mechanical device for providing redundancy for critical operation is described. Operation of equipment and details of construction are discussed. Two illustrations of equipment to show basic and modified configurations are provided.

B72-10475
EFFICIENT BAFFLE PREVENTS OIL BACKSTREAMING IN DIFFUSION PUMPS
J. R. Meneghetti
Aug. 1972
LRL-10025

High vacuum diffusion pump baffle, positioned immediately above pump stack, prevents vaporized pumping oil from entering and contaminating test chamber. Pumping vapors are collected and condensed on the baffle and flow back to pump base reservoir.

B72-10484
SLOT CONFIGURATION FOR AXIAL-FLOW TURBOMACHINERY BLADES
W. E. Taylor (United Aircraft Res. Labs.)
Aug. 1972 See also NASA-CR-72870
LEWIS-11572

Machining of slot in turbine blades of axial flow turbines to provide flow path between pressure and suction surfaces is discussed. Slot configuration and improvements in blade performance are described. Diagram of blade slot to show geometry of modification is included.

B72-10497
A RAPID, PRECISE, RECIPROCATING-MOVEMENT COLOR FILTER SYSTEM
P. G. Phillipps (Electron. Image Systems Corp.), P. Epstein (Electron. Image Systems Corp.), G. Donovan (Electron. Image Systems Corp.), and E. LaWhite (Electron. Image Systems Corp.)
Aug. 1972
GSFC-11255

Unit was designed for moving color filters in and out of position in less than 46 ms. System may be used to record previously derived colors on photorecorder or to scan different color or wavelength components of rapidly passing scene, as in aerial reconnaissance. Rapid, precise reciprocating movement may be useful in purely mechanical and chemical applications.

B72-10498
NO-ERR TYPING AIDS
R. D. Dubois (Boeing Co.) and G. T. Pinson (Boeing Co.)
Aug. 1972
M-FS-15218

Device for aligning paper in typewriter to correct one letter or line of type is discussed. Two types of correcting devices are described and illustrations of the devices are provided.

B72-10499
TANDEM STEERABLE RUNNING GEAR
O. J. Fincannon (McDonnell-Douglas Corp.) and D. L. Glenn (McDonnell-Douglas Corp.)
Aug. 1972
M-FS-22012

Characteristics of steering assembly for vehicle designed to move large components of space flight vehicles are presented. Design makes it possible to move heavy and bulky items through narrow passageways with tight turns. Typical configuration is illustrated to show dimensions of turning radius and minimum distances involved.

B72-10509
A TOOL FOR MEASURING ELEVATOR CABLE TENSION
E. L. Weaver (Bendix Corp.)
Dec. 1972
KSC-10708

Simple tool for measuring relative cable tension is described, which weighs approximately two pounds and can be produced at one-tenth cost of present tools.

B72-10536
HIGH-VOLUME PRESSURE RELIEF VALVE
W. H. Dillard (Bendix Corp.)
Dec. 1972
KSC-10707

Valves with counterweights to assist in opening and closing are described, which can release large volumes of gas almost instantaneously, and provide airtight seals.

B72-10537
ADVANCED HIGH-TEMPERATURE ELECTROMAGNETIC PUMP
J. W. Gahan (GE) and A. H. Powell (GE)
Sep. 1972 See also NASA-CR-1949; NASA-CR-1950; NASA-CR-1951
LEWIS-11283
Three phase helical, electromagnetic induction pump for use as boiler feed pump in potassium Rankine-cycle power system is described. Techniques for fabricating components of pump are discussed. Specifications of pump are analyzed.

B72-10538
SELF-ALIGNING, LOW-PRESSURE SEALING POPPET VALVE
R. Gonzalez (N. Am. Rockwell Corp.) and W. A. Bratfisch (N. Am. Rockwell Corp.)
Sep. 1972
MSC-17745
Design and characteristics of poppet valve operated by very low differential pressures to control fluid flow are described. Valve is used to control flow of petroleum, chemical, and aircraft hydraulics where low leakage rates and activation at low pressures are required.

B72-10539
FILM HANDLING SYSTEM FOR LASER SCANNER/RECORDER
A. Maciel, Jr. (Singer-Gen. Precision, Inc.)
Dec. 1972
MSC-14121
System is described for transporting and holding cut or roll 35-mm, 70-mm, 12.50-cm, and 24.13-cm films without replacement of platens or use of tools of any kind.

B72-10542
FILM HOLDER FOR CURVED VACUUM PLATEN
A. Maciel, Jr. (Singer Corp.) and C. E. Hauber (Singer Corp.)
Sep. 1972
MSC-14120
Vacuum apparatus for holding photographic film of various widths against cylindrically curved patens is discussed. Construction details and method of operation are explained. Illustration of equipment is provided.

B72-10569
VISE TO HOLD BONES OR OTHER IRREGULAR OBJECTS
R. H. Dowell
Sep. 1972
ARC-10679
Vise with stationary vee-shaped jaw and segmented notched jaw for holding irregular shaped objects is described. Operation of the device and specific application to holding bones are explained. Diagram of equipment is provided.

B72-10574
SELF-DEPLOYING BOOM
W. T. Tumulty and W. P. Sours
Sep. 1972
GSFC-10566
Development and operation of metal ribbon which acts like self deploying boom are described. Metal ribbon is retained on two rollers for storage and extends into nonretractable tubular structure upon release. Illustration of equipment is provided.

B72-10575
SLITTING FLAT CONDUCTOR CABLES WITH THE SINGLE CUTTING EDGE SLITTER
W. Angele and C. M. Chambers
Sep. 1972
M-FS-20111
Manually operated slitter can cut single slit in flat conductor cable to any desired length. Lateral position of flat conductor cable is adjusted with aid of optical magnifier and cursor glass to ensure that slit is accurately placed between conductors. Multiple slits may be made by repeating procedure for single slit.

B72-10597
PRECISION MACHINING OF STEEL DECAHEDRONS
W. J. Abernathy and J. R. Sealy
Sep. 1972
M-FS-21361
Production of highly accurate decahedron prisms from hardened stainless steel is discussed. Prism is used to check angular alignment of mounting pads of strapdown inertial guidance system. Accuracies obtainable using recommended process and details of operation are described. Photographic illustration of production device is included.

B72-10640
FLUID OPERATED QUICK RELEASE MECHANISM
R. A. Brown (Sperry Rand Corp.)
Oct. 1972
M-FS-20205
Gas operated release mechanism releases load by fluid pressure to provide positive action quick release. Method can be used with large loads and is useful in repetitive cycling functions where shear pins and similar devices would be cumbersome.

B72-10645
FILL AND VENT QUICK DISCONNECT
R. Y. Boerner (McDonnell-Douglas Corp.) and R. W. Hedrick (McDonnell-Douglas Corp.)
Dec. 1972
M-FS-21822
Hydraulic disconnect coupling on ground serving half of spacecraft refrigeration cooling system employs movable center stem for venting and closing nipple poppet. Self sealing poppet quickly connects cooling system to spacecraft without manual work. Recessed sealing surface insures open poppet when stem retracts.

B72-10672
IMPROVED LIP SEAL FOR ROTATING SHAFTS
D. L. Endicott (McDonnell-Douglas Corp.)
Oct. 1972
LEWIS-11602
Sealing efficiency, service life, and seal loading limits of lip seal for rotating shafts are analyzed. Construction of seal and areas of application are described. Specific advantages of improved lip seal over conventional seals are listed.

B72-10678
PORTABLE BEVELING TOOL
R. H. Snowden (N. Am. Rockwell Corp.)
Oct. 1972
M-FS-16863
Portable tool was designed to semiautomatically bevel end surfaces of tubular or cylindrical components. Tool may be used for fabrication of elbow assembly which requires mating flange and elbow by fusion butt welding.

B72-10681
HIGH TORQUE BELLOWS SEAL ROTARY DRIVE
A. J. Diaguila, J. W. Macomber, and D. W. Adams
Oct. 1972
LEWIS-11813
Bellows seal rotary drive device was developed which allows high torque transmission through sealed compartments. Bearing friction which would normally be carried by sealing bellows in comparable devices is absorbed by universal-gimbal joint. It can be used to transmit high torque, low speed, rotary motion through sealed barriers to prevent contamination or escape of fluids.

B72-10685
A CONCEPT FOR UNIVERSAL PLIERS
E. T. Neal (Boeing Co.)

Oct. 1972
KSC-10768

By modification in existing design, pliers can be made to have one pair of handles that will accept number of different jaws. Concept is useful for light to medium duty service. Complete set of jaws may be made to suit specific hobbies or applications.

B72-10687
A SHUT-OFF VALVE FOR FLEXIBLE TUBING
W. W. Reyburn (McDonnell-Douglas Corp.)
Dec. 1972
M-FS-21731

Design of light weight valve for flexible tubing is described. Valve is hand operated and provides positive sealing in normally closed position. Diagram is provided to show construction of valve. Principles of operation are explained.

B72-10688
CYLINDRICALLY SHAPED ROPE LADDER
C. S. Range (N. Am. Aviation, Inc.)
Oct. 1972
M-FS-16319

Cylindrical shaped ladder is rope net held in cylindrical configuration by supporting metal hoops which are spaced at vertical intervals along ladder. Rope ladder is easily handled and transported.

B73-10001
A FLEXIBLE CRUCIFORM JOURNAL BEARING MOUNT
A. E. Frost (Mechanical Technol., Inc.) and W. A. Geiger (Mechanical Technol., Inc.)
Nov. 1973 See also NASA-CR-121098
LEWIS-11035

Flexible mount achieves low roll, pitch and yaw stiffnesses while maintaining high radial stiffness by holding bearing pad in fixed relationship to deep web cruciform member and holding this member in fixed relationship to bearing support. This mount has particular application in small, high performance gas turbines.

B73-10008
CARBIDE FACTOR PREDICTS ROLLING-ELEMENT BEARING FATIGUE LIFE
J. L. Chevalier (Army Air Mobility R & D Lab.) and E. V. Zaretsky
Mar. 1973 See also NASA-TN-D-6835
LEWIS-11940

Analysis was made to determine correlation between number and size of carbide particles and rolling-element fatigue. Correlation was established, and carbide factor was derived that can be used to predict fatigue life more effectively than such variables as heat treatment, chemical composition, and hardening mechanism.

B73-10047
FATIGUE TESTING DEVICE
F. E. Eichenbrenner and L. A. Imig
Feb. 1973
LANGLEY-10426

Anti-buckling assembly prevents buckling of sheet metal fatigue specimen when axial compressive load is applied. It provides for cyclic heating and cooling of specimen during testing. Assembly permits tests at two locations on specimen. Device has ports for visual, optical, or photographic monitoring of fatigue crack propagation in test specimen.

B73-10070
REDUNDANT SCREWJACK
R. W. Benjamin (Rockwell Intern, Corp.)
Aug. 1973
JSC-19200

Device uses differential gears to drive either one of two nut-screw assemblies. In event that one assembly jams, second assembly is driven at twice its normal rate with no loss in overall performance.

B73-10098
BEAM LEAD FORMING TOOL
P. W. Clemons (Sperry Rand Corp.)
Feb. 1973
M-FS-22133

Tool was designed for table-top manual operation that can bend leads to any desired angle up to 90 degrees. It can be readily adapted to electrical, hydraulic, or pneumatic operation. This innovation may be of interest to electronics, sheet metal, and appliance industries.

B73-10110
GEYSERING INHIBITOR PIPE
F. S. Howard
Jun. 1973
KSC-10615

Smaller concentric pipe is welded to main pipe beginning above bottom of isolation valve and terminating in storage tank at top. There is continuous circulation of fluid which maintains fluid temperature below boiling temperature of liquid oxygen.

B73-10124
MAGNETOCALORIC PUMP
G. V. Brown
Aug. 1973 See also NASA-TM-X-52983
LEWIS-11672

Very cold liquids and gases such as helium, neon, and nitrogen can be pumped by using magnetocaloric effect. Adiabatic magnetization and demagnetization are used to alternately heat and cool slug of pumped fluid contained in closed chamber.

B73-10125
ELECTROMAGNETIC CONNECTOR
W. C. Gardner (Rockwell Intern. Corp.)
Mar. 1973
JSC-17420

Connector pair consists of two iron cores brought together a short distance from each other. Each core is wound with insulated wire. Ac signal is connected through the pair across the gap by magnetic induction. Device can be used underwater or in flammable atmosphere.

B73-10190
FLOATING BAFFLE TO IMPROVE EFFICIENCY OF LIQUID TRANSFER FROM TANKS
F. S. Howard
Jun. 1973
KSC-10639

When liquid tank is full, baffle is held up against a stop on top of shaft to prevent restriction of flow from outlet. As tank is being emptied, baffle, floating on top of liquid surface, descends with liquid level toward outlet until it reaches its bottom stop. Baffle prevents gas pull-through until practically all liquid is emptied from tank.

B73-10193
MULTIHEAD MEASURING TAPE
D. L. Posey
Jun. 1973
LANGLEY-11266

By using multihead measuring tape, procedure to obtain length and angle measurement on either wood or metal stock is reduced to one step. Length and angle of measurement can be locked in on measuring device for repetitive measurements. Measuring tape can be used for layout work or to duplicate length and angle of existing stock.

B73-10203
LEAK DETECTOR-MEASURER
J. T. Sawyer
Jun. 1973
M-FS-21761

Detector locates leaks from inside pressurized cabins. Head is placed flush against area being tested. Should leak be present, most air inside detector housing will escape. Diaphragm will then flex into chamber and push electrical contact together, closing circuit and turning on warning light.

B73-10204
ADVANCED ACTION MANIPULATOR SYSTEM (ADAMS)
D. A. Kugath (GE), D. H. Dane, and H. T. Blaise
Jun. 1973
M-FS-22022

Manipulator offers improved performance over other models in its category. It features larger force and reach capabilities and is readily convertible for underwater use. Unique kinematic arrangement provides extremely large working envelope. System has six degrees of motion: azimuth joint, shoulder joint, upper arm rotating joint, elbow joint, wrist pitch, and wrist twist.

B73-10216
A PROPOSED HAND-TOOL ASSEMBLY FOR ROBOTS
D. H. Dane and H. T. Blaise
Aug. 1973 See also B73-10204
M-FS-22266

Terminator Kit Assembly (TKA) includes all features that mechanical manipulator needs to use hand tools for maintenance, repair, or assembly work. Tool box holds hand tools and, on command, releases them to hand interface which accepts and operates them. TKA is being studied as possible prosthetic device.

B73-10250
SELF-ADJUSTING ASSEMBLY JIG
M. J. Haaser
Dec. 1973
LEWIS-12034

Jig adjusts for thermal expansion and contraction to hold parts being joined under constant pressure and in correct alignment during entire joining operation. Jig is simple and easy to use, durable and maintenance free. Several methods may be used to join parts of many sizes and shapes.

B73-10324
UNIVERSAL DRILL JIG
E. J. Stringer (Rockwell Intern. Corp.)
Oct. 1973
M-FS-24464

Inexpensive jig can steadily guide drill at selected angles to flat plane from any direction. Jig uses two mutually perpendicular bevel bodies, each corresponding to interval settings. Drill block has spline on one side to engage groove on bevel body at selected angle. Angles are set by loosening wing nuts, tilting drill block to desired angle until spline engages groove, and tightening nuts.

B73-10329
SMALL PORTABLE SPEED CALCULATOR
J. L. Burch and J. C. Billions
Oct. 1973
M-FS-22638

Calculator is adapted stopwatch calibrated for fast accurate measurement of speeds. Single assembled unit is rugged, self-contained, and relatively inexpensive to manufacture. Potential market includes automobile-speed enforcement, railroads, and field-test facilities.

B73-10335
VARIABLE LOAD INDICATOR
W. T. Appleberry (McDonnell Douglas Corp.)
Oct. 1973
M-FS-21728

Weighing device measures loads as a function of its elongation. Device is compact, simple, and inexpensive. It does not require presetting and will measure any load from zero to its yield point. Because of its low cost relative to other load indicators such as strain gauges, device can be used as turnbuckle for tensioning straps, rods, or cables where accurate preloading is critical.

B73-10369
EMERGENCY-ESCAPE DEVICE
P. M. Broussard
Oct. 1973
M-FS-22720

Relatively simple inexpensive device uses reeled steel cable, is controlled by automotive-type shock absorber, and allows safe descent from burning building. Device is cheap to manufacture and assemble and requires neither skill, special knowledge, or athletic ability to operate. It is reliable and fireproof and can be deployed instantly.

B73-10412
DESIGN HANDBOOK FOR GASEOUS FUEL ENGINE INJECTORS AND COMBUSTION CHAMBERS
D. F. Calhoon (Aerojet Liquid Rocket Co.), I. Ito (Aerojet Liquid Rocket Co.), and D. L. Kors (Aerojet Liquid Rocket Co.)
Dec. 1973 See also NASA-CR-121234
LEWIS-12154

Results of investigation of injection, mixing, and combustion processes using gaseous fuels and oxidizers have been summarized in handbook presenting succinct design procedures for injectors and methods for estimating combustion efficiency, chamber heat flux and stability characteristics. Handbook presents two approaches to injector and combustion chamber design: empirical and analytical.

B73-10413
COLLAPSIBLE PISTONS FOR LIGHT-GAS GUNS
R. N. Teng (McDonnell Douglas Corp.)
Dec. 1973
JSC-13789

Moving and expandable parts of gun consist of pump-tube diaphragm, piston, launch-tube diaphragm, and saboted projectile. As a result of improved piston design, pressure cycle has been significantly improved by smoother buildup, increasing muzzle velocities up to 50%.

B73-10415
POPPET VALVE TESTER
G. F. Tellier (Rockwell Intern. Corp.)
Dec. 1973 See also NASA-CR-120976
LEWIS-11655

Tester investigates fundamental factors affecting cyclic life and sealing performance of valve seats and poppets. Tester provides for varying impact loading of poppet against seat and rate of cycling, and controls amount and type of relative motion between sealing faces of seat and poppet. Relative motion between seat and poppet can be varied in three modes.

B73-10416
CONTAINER SEAL FOR DUSTY ENVIRONMENT
R. S. Nevin, Sr. (Martin Marietta Corp.)
Dec. 1973
LANGLEY-10962

Method maintains cleanliness of joint-sealing surfaces under dust-laden conditions. This is accomplished by keeping seal and sealing surface covered with sliding plastic rings, which slide out of the way when a joint is seated.

B73-10433
TOOL FOR INSTALLING OR EXTRACTING SMALL BULBS IN LIMITED-ACCESS SPACES
E. B. Snyder and J. H. Parker
Dec. 1973
Langley-11543

Installing and extracting component of tool is plastic tubing with inside diameter which provides snug fit over bulb. Other components, which provide sturdiness and ease of operation, consist of metal tube, with collar near one end, and plunger, with knob on one end and Teflon tip on the other.

B73-10450
FAIL-SAFE BIDIRECTIONAL VALVE DRIVER
H. Fujimoto
Feb. 1974
NPO-11958

Cross-coupled diodes are added to commonly used bidirectional valve driver circuit to protect circuit and power supply. Circuit may be used in systems requiring fail-safe bidirectional

valve operation, particularly in chemical- and petroleum-processing control systems and computer-controlled hydraulic or pneumatic systems.

B73-10461
INJECTOR HAS NO BACKSPLASH
W. B. Powell
Jan. 1974
NPO-13208

Passages of injector have been modified to eliminate backsplashing. All fluid is expelled in downstream spray fan. Result is that face of injector is completely free of liquid obstructions.

B73-10463
FERROFLUID SEPARATOR FOR NONFERROUS SCRAP SEPARATION
R. Kaiser (Avco Corp.) and L. Mir (Avco Corp.)
Mar. 1974
LANGLEY-11523

Behavior of nonmagnetic objects within separator is essentially function of density, and independent of size or shape of objects. Results show close agreement between density of object and apparent density of ferrofluid required to float it. Results also demonstrate that very high separation rates are achievable by ferrofluid sink-float separation.

B73-10472
A METHANOL/AIR FUEL CELL SYSTEM
W. J. Asher (Exxon Corp.)
Mar. 1974 See also B73-10472; B73-10473; B73-10475; B73-10489
M-FS-22541

High power-density, self-regulating fuel cell develops electrical power from catalyzed reaction between methanol and atmospheric oxygen. Cells such as these are of particular interest, because they may one day offer an emission-free, extremely efficient alternative to internal-combustion engines as power source.

B73-10473
AN ELECTROCHEMICAL ENGINE
W. J. Asher (Exxon Corp.)
Mar. 1974 See also B73-10472; B73-10475; B73-10489
M-FS-22542

Thin-electrode fuel cell, with electrodes arranged in circular shape, can provide power for new electrochemical engine. With this system, a safe high-voltage engine may be constructed. Since each electrode assumes a potential relative to electrolyte, and since there are no electrolyte paths between cells, any number of cell stacks can be connected in series.

B73-10489
FUEL-CELL HEAT AND MASS PLATE
W. J. Asher (Exxon Corp.)
Mar. 1974 See also B73-10472; B73-10473; B73-10475
M-FS-21318; M-FS-21319

Plate, serving as heat pipe, can be built into cell to control temperature and water inventory. Plate consists of matrix, filled with liquid water, and a space, filled with water vapor. Both matrix and space extend beyond fuel-cell stack so heat and water may be removed as necessary.

B73-10521
APPARATUS FOR CUTTING ELASTOMERIC MATERIALS
A. B. Corbett
Mar. 1974
NPO-13146

Sharp thin cutting edge is held in head of milling machine designed for metal working. Controls of machine are used to position cutting edge in same plane as vibrating specimen. Controls then are operated, making blade come into contact with specimen, to cut it into shapes and sizes desired. Cut surfaces appear mirror-smooth; vibrating mechanism causes no visible striations.

B74-10008
DESIGN CRITERIA MONOGRAPH FOR LIQUID PROPELLANT GAS GENERATORS
Innovator not given Mar. 1974 See also NASA-SP-8081
LEWIS-12139

Monograph reviews and assesses current design practices, and from them establishes firm guidance for achieving greater consistency in design, increased reliability in end product, and greater efficiency in design effort. Main emphasis of monograph is on bipropellant gas generators using hydrogen peroxide and hydrazine monopropellants.

B74-10009
VERTICAL COPY CAMERA SYSTEM PROVIDES PHOTOGRAPHS FROM ERTS-1 IMAGERY
R. J. Schertler and R. E. Texler
Apr. 1974
LEWIS-12140

Versatility of commercially-available camera system permits wide range of enlargement (up to 10X) and reduction (down to 1/8) to be achieved with standard lenses. Use of easily interchangeable camera backs permits photographic formats from 35 mm to 10.2 X 12.7 cm (4 x 5 in) and permits easy use of black and white and color films and Polaroid materials.

B74-10010
DESIGN CRITERIA MONOGRAPH FOR PRESSURE REGULATORS, RELIEF VALVES, CHECK VALVES, BURST DISKS, AND EXPLOSIVE VALVES
Innovator not given Apr. 1974 See also NASA-SP-8080
LEWIS-12168

Monograph reviews and assesses current design practices, and from them establishes firm guidance for achieving greater consistency in design, increased reliability in end product, and greater efficiency in design effort. Five devices are treated separately. Guides to aid in configuration selection are outlined.

B74-10014
DESIGN CRITERIA MONOGRAPH ON TURBOPUMP SHAFTS AND COUPLINGS
Innovator not given May 1974 See also NASA-SP-8101
LEWIS-12204

Monograph reviews and assesses current design practices, and considers all aspects of turbopump system shaft dynamics peculiar to and necessary to shaft and coupling design. Associated components (bearings, housing, etc.) that influence shaft or coupling design are treated to extent necessary to define that influence.

B74-10020
PROCESS TO RESTORE OBLITERATED SERIAL NUMBERS ON METAL SURFACES
S. G. Young, B. Parker (Sacramento State Univ.), and W. J. Chisum (Calif. State Dept. of Justice)
Jun. 1974 See also B71-10099; NASA-TM-X-52929; NASA-TM-X-68257
LEWIS-12085

Metal smeared into grooves of serial numbers by grinding or filing can be cleaned out by process called cavitation. Ultrasonic vibrator generates very high frequency vibrations in water which create millions of microscopic bubbles. Cavitation bubbles impact metal surface at thousands of pounds per square inch pressure. Metal particles filling grooves are broken away.

B74-10023
MODULAR SUPPORT BLOCKS FOR FLUID LINES
J. M. Dimino (Rockwell Intern. Corp.) and R. D. Deskin (Rockwell Intern. Corp.)
Apr. 1974
MSC-19335

Modular line block comprises matched modular elements machined to accept fluid lines of different diameters. Modules can support different fluid-line configurations. Top and bottom surfaces are machined to accept dovetail strip used for holding modules together. End modules have holes drilled through to accept fastening screws.

B74-10031
PRECISION GLASSCUTTER
D. S. Coombs
May 1974
LANGLEY-11604

Glass is positioned against preset stops; and glasscutter, which is permanently mounted in carrier support by cutter guide rails, is used to scribe glass at predetermined length. Glass is placed against predetermined groove at opposite end to correspond with setting of cutter carrier support and it is broken on end of cutter base.

B74-10039
CONTROL OF ELASTICITY IN CAST ELASTOMERIC SHOCK/VIBRATION ISOLATORS
L. Owens and C. Bright
Jul. 1974
KSC-10850

Elasticity is determined by isolators physical dimensions and by type of elastomer used. Once elastomer is selected and cast between two concentric tubes of device, isolator elasticity will remain fixed. Isolators having same dimensions can be built to different elasticity requirements using same elastomer.

B74-10062
IMPROVED CIRCUMFERENTIAL SHAFT SEAL
L. P. Ludwig and T. N. Strom
Jul. 1974 See also NASA-TN-D-7130
LEWIS-11873

Comparative tests of modified and unmodified carbon ring seals showed that addition of helical grooves to conventional segmented carbon ring seals reduced leakage significantly. Modified seal was insensitive to shaft runout and to flooding by lubricant.

B74-10105
SHUTOFF AND THROTTLING VALVE
L. G. Hays
Aug. 1974
NPO-11951

Leaktight shutoff, precise flow control, and very low pressure drop are incorporated in all-metal valve designed for operation under extreme temperatures. Valve constructed with refractory metal is intended for control of high-temperature liquid cesium, but has applications related to control of high- and low-temperature liquids and gases.

B74-10148
DYNAMOMETER FOR MEASURING MACHINING FORCES IN TWO PERPENDICULAR DIRECTIONS
I. A. Sutherland
Sep. 1974
M-FS-22899

Published report discusses development of two-component force dynamometer which is used for dynamic measurement of machining forces in cutting and thrust directions. Resulting data suggest that faster metal-cutting machines may be developed that have reduced vibrations.

B74-10164
BOLT INSTALLATION TOOL FOR TIGHTENING LARGE NUTS AND BOLTS
A. R. McDougal and R. M. Norman
Sep. 1974
NPO-13059

Large bolts and nuts are accurately tightened to structures without damaging torque stresses. There are two models of bolt installation tool. One is rigidly mounted and one is hand held. Each model includes torque-multiplier unit.

B74-10237
MECHANICAL ROD PEENING
E. J. Minter and V. P. Caruso
Dec. 1974
M-FS-23047

Tool is inexpensive and gives repeatable results. It is modified commercially-available rod-type weld slag removal gun and is pneumatically operated by regulated compressed air supply.

B74-10240
A BAND CLAMP WITH A SPRING TOGGLE LEVER
M. Simmonds (ATO, Inc.)
Dec. 1974
MSC-14736

Clamp could have several applications, as it provides tolerance for both expansion and contraction. It might be useful with firemen's breathing apparatus and luggage racks and other freight-carrying equipment. Also, using same piece as handle and spring reduces production costs by reducing number of parts.

B74-10266
SELF-REGENERATING DESICCANT SYSTEM
K. G. Anthony and E. P. Herndon
Jan. 1975
M-FS-23057

Compact system uses inherent diurnal cyclic airflow in system and energy of sun as drying heat. System requires no power for operation, has no moving parts to wear out, requires no blowers or manifolds, and is relatively inexpensive to produce.

B74-10269
NEW INSULATION ATTACHMENT METHOD ELIMINATES COMPATIBILITY BONDLINE STRESSES
W. C. Schneider
Jan. 1975
MSC-12615

Auger-shaped single-point fastener attaches rigid surface insulation tiles to orbiter shuttle spacecraft. Method can be used to bond wide variety of materials, including insulation, elastomers, and fibrous materials. Since insulation is attached at only one point, insulation and structure are free to form without inducing bond separation.

B74-10292
MECHANICAL SOLAR MOTOR: A CONCEPT
L. A. Hein and W. N. Myers
Feb. 1975
M-FS-23062

Motor is proposed to convert radiation from sun directly into mechanical energy. Motor utilizes thermal expansion of liquid, heated by sun, as driving force. Unlike most thermally powered systems, it does not require that liquid be converted into vapor.

B74-10297
STRAIN GAUGE SENSITIVITY IMPROVED BY USING A COMPOSITE BEAM
R. H. Silver and S. H. Kalfayan
Feb. 1975
NPO-13170

Composite beam connected to strain gauge and mounted on test specimen is capable of amplifying small strains by factor of 10. Tests indicate that resulting output can be 10 times greater than standard method.

B74-10298
REMOTELY OPERATED GAS-PRESSURE REGULATOR AND SHUTTLE VALVE
E. F. Koch
Feb. 1975
NPO-13201

Valve features precise gas-pressure regulation and shuts off flow by remote control. Valve is made up of regulator valve cavity and spring-compression adjusts cavity. Elements in regulator cavity are conventional and include high-pressure inlet, ball which mates with seat, push rod, and pressure-sensing diaphragm.

B75-10011
DESIGN CRITERIA MONOGRAPH ON TRANSMISSION SEALS
S. T. Hayden (Sikorsky Aircraft) and C. H. Keller, Jr. (Sikorsky Aircraft)

Apr. 1975 See also NASA-CR-120997
LEWIS-12403
Guide is based on experience obtained in wide variety of applications using lip, circumferential, and face seals. Particular attention is given to capabilities and lubrication of various seal types. Special limitations as a result of storage requirements, quality control, installation, operation, and removal are discussed.

B75-10054
LOW-COST TOOL SET FOR REMOVING BRAZED FITTINGS
A. Giandomenico
Apr. 1975
NPO-13495
Set includes crimping tool and pull tube. Crimping tool is modified vise-grip pliers which has special jaws designed to crimp fittings. Pull tube has single thread on each end. Tube can be used once on each end before discarding.

B75-10078
FERROLUBRICANTS
A. F. Whitaker
May 1975
M-FS-23151
Ferrolubricants have magnetized angstrom-size iron particles which stick oil to moving surfaces at all times, significantly reducing frictional wear. Magnetic fluids can be produced in families of various fluids having widely-varying chemical and physical properties.

B75-10241
SAFETY MANAGEMENT OF A COMPLEX R&D GROUND OPERATING SYSTEM
J. Connors and R. A. Mauer
Oct. 1975 See also NASA-TM-X-71697
LEWIS-12559
Report discusses safety program implementation for large R&D operating system. Analytical techniques are defined and suggested as tools for identifying potential hazards and determining means to effectively control or eliminate hazards.

B75-10249
POSITION SENSING MATERIALS WOUND ON A REEL
R. M. Muller
Oct. 1975
GSFC-11902
Electro-optical counter measures number of layers of web wound on reel and indicates layer number and web position digitally, without physically contacting reel or requiring numerical interpolation from mechanical readout device.

B75-10276
RELIABILITY COMPUTATION FROM RELIABILITY BLOCK DIAGRAMS
P. O. Chelson and E. Y. Eckstein (VIP Engineering)
Oct. 1975
NPO-13304
Computer program computes system reliability for very general class of reliability block diagrams. Four factors are considered in calculating probability of system success: active block redundancy, standby block redundancy, partial redundancy, and presence of equivalent blocks in the diagram.

B75-10322
FAST SEMIAUTOMATIC DIMENSIONAL TEST SET AND DATA LOGGER
G. E. Meunier (Rockwell Intern. Corp.)
Dec. 1975
MSC-19554
System measures and records tolerance deviations of thermal-protection ceramic tiles in less than 30 seconds. Accuracy of the machine is within 0.001 inch.

B75-10334
SIMPLIFIED HEAT ENGINE
W. H. Higa
Dec. 1975
NPO-13613
In Sterling-cycle heat engine, pneumatic system is used to drive displacer/regenerator, eliminating mechanical linkages and valves.

08 FABRICATION TECHNOLOGY

B70-10015
MEASURING THE CONDUCTOR SPACING IN FLAT CONDUCTOR CABLES
ANGELE, W. DATE- AUG. 1970 REAN- SEE ALSO NASA-TM-X-53843
M-FS-20560
Interference method produces a moire pattern having a shape correlated with the lead spacing. A continuous check of the spacing is possible if the material between the leads is translucent. Technique is quick, accurate, convenient, and simple to operate.

B70-10019
USE OF ACRYLIC SHEET MOLDS FOR ELASTOMERIC PRODUCTS
HEISMAN, R. M. /N. AM. ROCKWELL CORP./ KOERNER, A. E. MESSINEO, S. M. DATE- JUN. 1970
MSC-15636
Molds constructed of acrylic sheet are more easily machined than metal, are transparent to ensure complete filling during injection, and have smooth surfaces free of contamination. Technique eliminates flashing on molded parts and mold release agents.

B70-10038
SPLIT RADIUS-FORM BLOCKS FOR TUBE BENDERS
LANGE, D. R. /N. AM. ROCKWELL CORP./ SEIPLE, C. W. DATE- MAY 1970
MSC-15773
Two-piece, radius-form block permits accurate forming and removing of parts with more than a 180 degree bend. Tube bender can shape flexible metal tubing in applications dealing with plumbing, heating, and pressure transmission lines.

B70-10041
SPINARC GAS TUNGSTEN ARC TORCH HOLDER
BRACE, D. F. /N. AM. ROCKWELL CORP./ CROCKETT, J. L. DATE- AUG. 1970
MSC-15646
Semiautomatic welding torch enables operator to control arc length, torch angle, and spring tension when welding small diameter aluminum tubing. Tungsten is preset for the weld to make arc initiation easier and to eliminate searching for the joint through a dark welding lens.

B70-10044
MODIFIED FACEPLATE ASSEMBLY FOR STUD-WELDING GUN
JOHNSON, R. E. /N. AM. ROCKWELL CORP./ DATE- JUL. 1970
M-FS-16725
Ventilated barrel assembly aids installation of studs on narrow uneven weld lands. The modified faceplate permits proper aligning of the percussion stud-welding gun in any position and on a smaller surface, and it maintains gap setting without any other adjustment.

B70-10120
SALVAGING SURFACE-DAMAGED ALUMINUM CASTINGS
HANNA, T. L. /N. AM. ROCKWELL CORP./ DATE- MAY 1970
M-FS-18789
Repair operation for damaged aluminum parts includes anodizing the part, removing the oxide layer, filling the pit or scratch with copper, capping the fill with cadmium, and hand polishing.

B70-10121
A METHOD FOR OBTAINING HIGH DUCTILITY IN CRITICAL AREAS OF ALUMINUM CASTINGS
STRANGELAND, M. L. ZUECH, R. A. /N. AM. ROCKWELL CORP./ DATE- APR. 1970
M-FS-18705
Wrought aluminum alloys provide high-strength substitute in the damaged area of aluminum castings. The segment can either be welded to the cast alloy or built in with a heat-treatable welding rod.

B70-10127
IMPROVED ELECTRON-BEAM WELDING TECHNIQUE
SCHUMACHER, B. /WESTINGHOUSE ELEC. CORP./ DATE- JUN. 1970
M-FS-20714
Electron-beam generator produces high quality welds without vaporization by relying on the mobility and hydrodynamic properties of the material in its liquid phase. The power density of the beam is relative to the speed of the workpiece, producing an inclined weld-front.

B70-10136
BUTT WELDER FOR FINE GAGE WIRE
KABANA, W. B. DATE- AUG. 1970
LANGLEY-10103
Device welds fine gage wire 0.001-in. in diameter. It permits welding of thermocouple junctions of the same size with straight sections adjacent to the junctions. Electrode arrangement provides constant pressure on the joint during welding while fully supporting the wires to prevent buckling or movement.

B70-10155
APPLICATIONS OF GAP WELDING
ADAMS, G. D. DATE- AUG. 1970
M-FS-20715
Gap welding of electronic interconnections yields high strength joints, is easy to use, and allows visual inspection of the welding process. It is easily adaptable to automated circuit assembly.

B70-10194
INTERMOLECULAR BONDING OF METALS OR ALLOYS BY THERMOCHEMICAL DECOMPOSITION
WILSON, R. /MARTIN-MARIETTA CORP./ DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-80721
M-FS-13823
Various metals and alloys are bonded at temperatures below their recrystallization temperature with a Ni-Fe-C alloy grown by thermochemical vapor deposition from organometallic plating compounds. Process time is short, the joints are strong, and microthrowing power is good.

B70-10202
SURFACE TREATMENT FOR VALVE SEATS
MAC GLASHAN, W. F., JR. DATE- SEP. 1970
NPO-10779
Valve with embedded fine particles of diamond in the metal surface of the valve seat resists galling, corrosion, erosion, and cold welding. Diamond powder has an average particle diameter of 0.01 micron and is used with a standard fine diamond polishing compound.

B70-10215
INORGANIC BONDING OF SEMICONDUCTOR STRAIN GAGES
WOODRUFF, N. L. /KULITE SEMICONDUCTOR PROD., INC./ DATE- JUL. 1970 REAN- SEE ALSO NASA-CR-100015
GSFC-10833
Inorganic bonding materials minimize outgassing and improve electrical and mechanical properties of semiconductor strain-gage transducers in high-vacuum and high-temperature operations. The two basic methods described are ceramic-glass-bonding and metallic bond formation between the strain gage and the substrate.

B70-10241
PREVENTION OF CRACKING OF SOLDERED JOINTS IN ELECTRONIC ASSEMBLIES
BEASLEY, B. DATE- AUG. 1970
M-FS-20544
Printed circuit board design allows for thermal stressing of the soldered joints during many thermal cycles. Components* leads should be cleaned, tinned, and freed of particles that prevent solder adherence, have a thin conformal coating, and have an air space between the coating and the body of the component.

B70-10331
FABRICATION OF HOLLOW BALL BEARINGS BY DIFFUSION WELDING
MOORE, T. J. DATE- JUN. 1970
LEWIS-11026
Two steel hemispheres are diffusion welded in an atmosphere of 0.00002 torr at a temperature of 2130 degrees F for 4 hours with a pressure of 4 psi holding the hemispheres together. Weld is accomplished with only microdeformation.

B70-10342
FIBERGLASS HONEYCOMB ELEMENTS FORMED QUICKLY AND CHEAPLY
SMITH, R. H. /NORTHROP CORP./ DATE- AUG. 1970
REAN- SEE ALSO NASA-CR-66301
LANGLEY-10125
Cookie cutter device initiates production of identical, double-contoured fiber glass elements used as shock absorbers. Three-bladed edges convert triangular honeycomb elements into hexagonal shapes which are then stamped to desired length by concave and convex dies. Sandpaper smoothing completes the process.

B70-10367
IMPROVED WELDING OF RENE-41
NUNEZ, S. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970
M-FS-18821
Gas-tungsten arc welding with a filler of Rene-41 produces strong welded joints. When Rene-41 is used, resistance to strain-age cracking is greatly increased by post-weld solution annealing in an inert atmosphere. Mechanical properties of Rene-41 and Hastelloy-W are compared.

B70-10397
NONDESTRUCTIVE SONIC TESTING OF ADHESIVE-BONDED COMPOSITES
CAUSTIN, E. L. /N. AM. ROCKWELL CORP./ DATE- OCT. 1970 REAN- SEE ALSO B69-10366
M-FS-20793
System detects and determines the location, depth, and areas of crushed core or of breaks in bonding between core and adhesive, adhesive and face sheet, or face sheet and external doubler. It is applicable to honeycomb panels of metal and/or plastics and to metal-to-metal laminates.

B70-10412
IMPROVED ELECTRON BEAM WELDING TECHNIQUE
SCHUMAKER, B. W. /WESTINGHOUSE ELEC./ DATE- SEP. 1970
M-FS-20753
Energy transferred from the source to the workpiece is maximized by relying on the mobility of the material in its liquid phase. This permits more beam energy to transfer to the weld front.

B70-10417
TESTING OF BRAZED AND WELDED CONNECTIONS OF STAINLESS-STEEL TUBING
CAHILL, J. B. /BROWN ENG. CO./ DATE- SEP. 1970
REAN- SEE ALSO NASA-CR-61310
M-FS-20806
Test procedures and results are given for three types of semipermanent sleeve-type connections for stainless-steel tubing. Subject to the limited resistances to corrosion and vibration, all three types are found to be suitable for extremes in reliability and environment, if given close control during manufacture.

B70-10428
HIGH-TEMPERATURE **HYDROSTATIC** EXTRUSION
HUNT, J. G. /NUCL. METALS, INC./ RICE, R. W. /BOEING CO./ DATE- SEP. 1970
NPO-10811
Quasi-fluids permit hydrostatic extrusion of solid materials. The use of sodium chloride, calcium fluoride, or glasses as quasi-fluids reduces handling, corrosion, and sealing problems, these

materials successfully extrude steel, molybdenum, ceramics, calcium carbonate, and calcium oxide. This technique also permits fluid-to-fluid extrusion.

B70-10429
HIGH EXPANSION COEFFICIENT GLASSES CAN BE SEALED TO COMMON METALS
CAMP, F. E. /WESTINGHOUSE ELEC. CORP./ CHAMPMAN, J. W. HIRAYAMA, C. DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-72520
LEWIS-10698
New series of high expansion coefficient glasses can be sealed by fusion onto hot surfaces of metals and alloys. Glasses have relatively low working temperatures, good chemical durability, and can be used in electrical insulators and feedthroughs to fluid or vacuum systems.

B70-10430
HIGH TEMPERATURE GLASS COATINGS FOR SUPERALLOYS AND REFRACTORY METALS
CHAPMAN, J. W. /WESTINGHOUSE ELEC. CORP./ GREKILA, R. B. HIRAYAMA, C. MATTOX, D. M. DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-72520
LEWIS-10700
New glasses are used as protective coatings on metals and alloys susceptible to oxidation at high temperatures in oxidizing atmospheres. Glasses are stable and solid at temperatures up to 1000 deg C, adhere well to metal surfaces, and are usable for metals with broad range of expansion coefficients.

B70-10466
NONDESTRUCTIVE ASSESSMENT OF PENETRATION OF ELECTRON-BEAM WELDS
HARMON, T. J. /N. AM. ROCKWELL CORP./ HILLMAN, J. L. YOST, M. C. DATE- SEP. 1970
MSC-15955
Empirical method correlates penetration of an electron-beam weld with external measurements of the weld. Empirical polygon accurately confirms full-penetration welds while a second, larger polygon provides for penetration of welds near the tip.

B70-10489
IMPROVED REINFORCEMENT FOR OPENINGS IN DIFFICULT FABRICS
BESSETTE, R. J. /ILC IND., INC./ DATE- SEP. 1970
MSC-13554
Plastic film is applied to each side of the fabric and the two films are then fused together with conventional heat-sealing equipment. With the inner area of the fabric cut away, a flexible, sturdy band of material is left around the opening with no raw edges.

B70-10512
MOLDING PROCEDURE FOR CASTING A VARIETY OF ALLOYS
FONTES, M. J. KOURTIDES, D. LEIBFRITZ, E. R. DATE- DEC. 1970
ARC-10358
General procedure and molding sand composition for preparing molds usable for casting variety of alloys are developed. Molds are prepared from mixture of sand, sodium silicate binder, and organic liquid ester. Castings of radiographic quality are produced from various alloys.

B70-10513
SYNTHESIS OF DIAMONDS
ESTES, M. F. RASQUIN, J. R. DATE- SEP. 1970
M-FS-20698
Shock wave transmitted through a solid exponential horn generates heat and pressure to convert part of a charge of graphite to diamonds. The shock wave is generated in the apparatus by a complex of magnetic fields and eddy currents.

B70-10514
ULTRASONIC DETECTION OF FLAWS IN FUSION BUTT WELDS
CROSS, B. T. /AUTOMATION IND., INC./ HANNA, K. J. TOOLEY, W. M. DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-61952
M-FS-20824 M-FS-20843
Reliable and accurate Delta technique, a nondestructive ultrasonics method, uses redirection of energy to detect randomly oriented imperfections in fusion butt welds. Data on flaws can be read from either an oscilloscope or a printout.

B70-10537
HIGH-TEMPERATURE NICKEL-BRAZING ALLOY
POWELL, A. H. /GE/ THOMPSON, S. R. DATE- OCT. 1970
LEWIS-10928
Gold-nickel brazing alloy, with 5 percent indium added to depress the melting point, is used for brazing of nickel-clad silver electrical conductors which operate at temperatures to 1200 deg F. Alloy has low resistivity, requires no flux, and is less corrosive than other gold-nickel, gold-copper alloys.

B70-10544
IMPROVED HEAT-RESISTANT GARMENTS
JOHNSTON, R. S. DATE- DEC. 1970
MSC-12109
Fabrication method for protective clothing eliminates the common heat-short by avoiding the stitch which is common to all layers, and preventing external exposure of any stitch to the outer environment. A unique overlap arrangement is described and additional protective methods are discussed.

B70-10580
SIMPLE BONDING TECHNIQUE FOR HIGH-TEMPERATURE CERAMIC COATINGS
ACCOUNTIUS, O. E. /N. AM. ROCKWELL CORP./ CARPENTER, H. W. ONODA, G. Y., JR. DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-72569
LEWIS-11085
Coatings, consisting of zirconia powder bonded with orthophosphoric acid and a small amount of hydrofluoric acid, are hard, strong, and refractory, resist thermal shock, and provide good thermal protection. After the aqueous coating is applied to a metallic surface, only a 600 deg F cure is required before service.

B70-10594
METAL DRILLING WITH PORTABLE HAND DRILLS
EDMISTON, W. B. /BOEING CO./ HARRISON, H. W. MORRIS, H. E. DATE- DEC. 1970
M-FS-15180
Study of metal drilling solves problems of excessive burring, oversized holes, and out-of-round holes. Recommendations deal with using the proper chemical coolants, applying the coolants effectively, employing cutting oils, and dissipating the heat caused by drilling.

B70-10604
FILLER-WIRE POSITIONER FOR ELECTRON BEAM WELDING
BEAUPRE, W. M. /N. AM. ROCKWELL CORP./ FUEG, L. B. PHILLIPS, J. A. DATE- NOV. 1970
MSC-15637
Miniaturized positioner is installed in any electron beam vacuum chamber for use with wire feed applications requiring filler wire. Horizontal and vertical control of the positioner is maintained from a console while chamber is under vacuum. Device permits more positive positioning of welding filler wire.

B70-10624
REPAIR OF BRAZED STEEL HONEYCOMB-SANDWICH PANELS WITH VERTICAL PINS ONLY
ROWE, J. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970
MSC-15831
Vertical steel tubular pins restore the shear strength of honeycomb panels and improve the quality of the repaired panel. New repair method eliminates diagonal pins. Vertical pins are welded to face sheets, forming **Vierendeel Truss** arrangement to transmit shear loads.

B70-10654
HOLOGRAPHIC ANALYSIS OF THIN FILMS
NORDEN, B. N. WILLIAMS, J. R. DATE- DEC. 1970
M-FS-20823
Technique for monitoring deposition of films on surfaces, in place on a real-time basis, reads both the thickness and the uniformity of the deposited film. Holograms are produced from both reflected and transmitted light on one plate.

B70-10663
IMPROVEMENT OF ADHESIVE-BONDED STRUCTURAL JOINTS
EVENSEN, H. A. /WHITTAKER CORP./ DATE- DEC. 1970
REAN- SEE ALSO NASA-CR-108973
M-FS-20876
Investigation is described of methods for obtaining uniform shear stress distribution in adhesives used in double-lap bonded joints. Design rules for reducing adhesive peak shear stresses are listed. Test results of an analysis of straight-lap joint design and stepped-lap joint design are given.

B70-10706
IMPROVED PROTECTION FOR SILICON SOLAR CELLS
BRODER, J. D. DATE- DEC. 1970
LEWIS-11065
Fluorinated ethylene propylene /FEP/ film is substituted for epoxy cement in bonding glass covers to silicon solar cells. Insensitivity of FEP to ultraviolet radiation reduces requirement for filtering and does not impair cell performance. Cell costs are reduced and cover mounting is simplified.

B70-10719
FIXTURE FOR PLATING STRIPPED CONDUCTORS OF FLAT CONDUCTOR CABLES /FCC/
RAMSEY, L. E. DATE- DEC. 1970
M-FS-20122
Fixture supports flat conductor cables /FCC/ while providing electrical contact to stripped ends of cable during electroplating process. Cable is held in the form of a coil.

B70-10723
IMPROVED METHOD FOR CLADDING THE INSIDE OF METAL TUBES
MAAG, W. L. MATTSON, W. F. DATE- DEC. 1970
LEWIS-11174
Creep characteristics of molybdenum at high temperature and stress are utilized to compress tungsten foil liner against inner surface of tantalum alloy cylinder to form bond at interface. Temperature and pressure can be accurately controlled and size of workpiece is limited only by furnace size.

B71-10028
METHOD OF JOINING METALS OF SIGNIFICANTLY DIFFERENT EXPANSION RATES
CALER, W./ROCKETDYNE/ LA SALLE, F. TRAYLOR, J.
FEB. 1971
NPO-12076
To join a refractory metal to a dissimilar high-temperature metal, braze a section of high elasticity, high ductility metal /such as columbium or columbium alloy/ between the metals to be joined, using a fork-type joint to hold the braze and transition member in place during expansion.

B71-10045
ULTRASONICS USED FOR HIGH-PRECISION NONDESTRUCTIVE INSPECTION OF BRAZED JOINTS
PETERSON, R. M./AEROJET-GEN. CORP./
MAR. 1971
NUC-10352
Technique detects voids greater than or equal to 0.1016 cm in braze depths of 0.254 cm, detecting voids of smaller dimensions is possible. Internal design ensures control of beam's water path length to within 0.635 cm, this length is critical to system's accuracy.

B71-10048
ACCURATE POINTING OF TUNGSTEN WELDING ELECTRODES
ZIEGELMEIER, P.
MAR. 1971
ARG-10449
Thoriated-tungsten is pointed accurately and quickly by using sodium nitrite. Point produced is smooth and no effort is necessary to hold the tungsten rod concentric. The chemically produced point can be used several times longer than ground points. This method reduces time and cost of preparing tungsten electrodes.

B71-10050
CONCENTRIC TUBES COLD-BONDED BY DRAWING AND INTERNAL EXPANSION
HYMES, L. C. STONE, C. C.
MAR. 1971
ARG-90033
Metal tubes bonded together without heat application or brazing materials retain strength at elevated temperatures, and when subjected to constant or cyclic temperature gradients. Combination drawing and expansion process produces residual tangential tensile stress in the outer tube and tangential compressive stress in the inner tube.

B71-10060
HOBEL STRIPPER FOR SHIELDED AND UNSHIELDED FLAT CONDUCTOR CABLE
ANGELE, W.
MAR. 1971
M-FS-20120
Stripping tool exposes an area of shield for grounding purposes without removing an area of insulation between terminated shield and exposed conductors. Tool does not require heated blade and is capable of removing small portions of material at a time, to any depth.

B71-10062
THIN SPRAY FILM THICKNESS MEASURING TECHNIQUE
JONES, G. KURTZ, G. W.
APR. 1971
M-FS-20842
Thin spray film application depths, in the 0.0002 cm to 0.002 cm range, are measured by portable, commercially available, light density measuring device used in conjunction with glass plate or photographic film. Method is automated by using mechanical/electrical control for shutting off film applicator at desired densitometer reading.

B71-10070
TORCH KIT FOR WELDING IN DIFFICULT AREAS
STEIN, J. A./N. AM. ROCKWELL CORP./
APR. 1971
MSC-15704
Miniature tungsten inert gas welding torch, used with variously formed interchangeable soft copper tubing extensions, provides inexpensive, accurate welding capability for inaccessible joints. Kit effectively welds stainless steel tubing 0.089 cm thick. Other applications are cited.

B71-10073
PROCESS FOR PRODUCING MOLYBDENUM FOIL AND COLLAPSIBLE TUBING
BRETTS, G. R./GE/ GAVERT, R. B. GROSCHKE, G. F.
APR. 1971 SEE ALSO NASA-CR-78308
GSFC-10008
Manufacturing process produces molybdenum foil 0.002 cm thick and 305 m long, and forms foil into high-strength, thin-walled tubing which can be flattened for storage on a spool. Desirable metal properties include high thermal conductivity stiffness, yield and tensile stress, and low thermal expansion coeffecient.

B71-10076
REFRIGERATED CUTTING TOOLS IMPROVE MACHINING OF SUPERALLOYS
DUDLEY, G. M.
APR. 1971
LANGLEY-10488
Freon-12 applied to tool cutting edge evaporates quickly, leaves no residue, and permits higher cutting rate than with conventional coolants. This technique increases cutting rate on Rene-41 threefold and improves finish of machined surface.

B71-10116
METAL-TO-CERAMIC SEALS - A LITERATURE SURVEY
PHILLIPS, W. M.
MAY 1971 SEE ALSO AFML-TR-65-143, JPL-TR-34-1420
NPO-11430
Survey of unclassified literature furthers design and development of nuclear thermionic converter seals. Data cover topics which are particularly relevant to thermionics. Data are reviewed and review discussion is presented along with summary of earlier work.

B71-10117
CERAMIC BACKUP RING PREVENTS UNDESIRABLE WELD-METAL BUILDUP

LEONARD, G. E./AEROJET-GEN. CORP./
MAY 1971
NUC-10357
Removable ceramic backup material butted against weld zone back prevents weld metal buildup at that site. Method is successful with manual tungsten-inert gas /TIG/ welding of 316 corrosion resistant steel /CRES/ pieces with 0.76 cm throat diameter and 1.57 cm pipe internal diameter.

B71-10123
INDUCTION BRAZING MANUAL
INNOVATOR NOT GIVEN MAY 1971 SEE ALSO NASA-PB-183-419
M-FS-14924
Manual presents standards and techniques which are known or are particular to specific industry, and is useful as guide in closing tolerance brazing. Material and equipment specifications, tool setting tables, and quality control data and instructions are included. Since similar standards are available, manual is supplementary reference.

B71-10127
PHOTOSENSITIVE PLASTIC USED TO PRODUCE THREE-DIMENSIONAL CASTING PATTERNS
WILLMENT, D. A.
MAY 1971
LANGLEY-10742
Patterns with small lettering and intricate designs are prepared by using two-dimensional artwork, photographic reduction and Dycril. Two-dimensional artwork and photographic processes replace conventional relief work. Artwork size is convenient and does not restrict lettering and design size in casting.

B71-10135
ULTRA THIN GAGE PLASTIC FILM
COX, D. W., JR./SEA-SPACE SYSTEMS, INC./ STRUBLE, A. D.
MAY 1971
LEWIS-11276
Process utilizing specially modified conventional equipment, with changes in process temperature, pressure, and cooling requirements produces ultra thin 1.56 micron /0.0614 mil/ thick polyethylene film.

B71-10168
PARALLEL-GAP WELDING FOR JOINTS BETWEEN COPPER CONDUCTORS AND KOVAR
MC DANIEL, G. E.
JUN. 1971 SEE ALSO NASA-TN-D-6236
M-FS-21224
Welding technique produces more reliable joints than soldering. Investigation used different sizes of copper conductors and component lead ribbons, corrosion protection platings, and melting points of metals being joined. Optimum combination is gold-plated component lead ribbons and solder-plated copper conductors.

B71-10199
ALLOY VAPOR DEPOSITION USING ION PLATING AND FLASH EVAPORATION
SPALVINS, T.
JUN. 1971 SEE ALSO B67-10006, NASA-TM-X-52823
LEWIS-11262
Method extends scope of ion plating technique to include deposition of alloy films without changing composition of plating alloy. Coatings flow with specimen material without chipping or peeling. Technique is most effective vacuum deposition method for depositing alloys for strong and lasting adherence.

B71-10206
INTERPRETATION OF ALUMINUM-ALLOY WELD RADIOGRAPHY
DUREN, P. C. RISCH, E. R.
JUL. 1971 SEE ALSO NASA-TM-X-53939
M-FS-20943
Report proposes radiographic terminology standardization which allows scientific interpretation of radiographic films to replace dependence on individual judgement and experience. Report includes over 50 photographic pages where radiographs of aluminum welds with defects are compared with prepared weld sections photomacrographs.

B71-10212
FABRICATION OF LARGE TUNGSTEN STRUCTURES BY CHEMICAL VAPOR DEPOSITION
KAHLE, V. E./AEROJET-GEN. CORP./ LEWIS, W. J. STUBBS, V. R.
JUL. 1971 SEE ALSO B67-10232, NASA-CR-72742
LEWIS-11239
Process is accomplished by reducing tungsten hexafluoride with hydrogen. Metallic tungsten of essentially 100 percent purity and density is produced and built up as dense deposit on heated mandrel assembly. Process variations are building up, sealing or bonding refractory metals at temperatures below transition temperatures of base metal substrates.

B71-10247
TECHNIQUE FOR THE INTEGRAL CASTING OF PRESSURE INSTRUMENTATION IN WIND-TUNNEL MODELS
JACKSON, C. M., JR. SUMMERFIELD, D. G.
JUL. 1971
LANGLEY-10812
Wind tunnel models are cast around core consisting of array of tubing. Principal advantage of technique is that greater number of pressure orifices are easily installed, without compromising aerodynamic shape of model. Technique reduces construction cost by about 50 percent.

B71-10253
LOW-TEMPERATURE BONDING OF TEMPERATURE-RESISTANT ELECTRONIC CONNECTIONS
PELUSO, R. F./MARTIN MARIETTA CORP./
JUL. 1971
M-FS-20909
Bonding of flat metal surfaces utilizes low temperature melting intermediate material, pulse heating, and pressure application to produce strong, electrically conductive bond resistant to melting at temperatures well above melting point of intermediate material. Little or no intermediate material remains at the interface.

B71-10256
PLATING BY GLASS-BEAD PEENING
BABECKI, A. J. HAEHNER, C. L.
JUL. 1971
GSFC-11163
Technique permits plating of primarily metallic substrates with either metals or nonmetals at normal temperature. Peening uses compressed air to apply concurrent streams of small glass beads and powdered plating material to the substrate.

B71-10257
TECHNIQUE FOR IN-PLACE WELDING OF ALUMINUM BACKED UP BY A COMBUSTIBLE MATERIAL
SPAGNUOLO, A. C.
JUL. 1971
LEWIS-11328
Welding external aluminum jacket, tightly wrapped around inner layer of wood composition fiberboard, in oxygen free environment prevents combustion and subsequent damage to underlying fiberboard. Technique also applies to metal cutting in similar assemblies without disassembly to remove combustible materials from welding heat proximity.

B71-10268
DIFFERENTIAL EXPANSION FITTING FOR CRYOGENIC LIQUID TANKS
LANDES, R. E./AEROJET-GEN. CORP./ MORRIS, E. E.
AUG. 1971 SEE ALSO NASA-CR-72599
LEWIS-11260
Sliding contact between liner and interior surface of fitting accommodates stresses and strains developed in shell composite and metal liner system. Stresses and strains are transmitted to liner portion which is recessed in fitting and which acts as differential expansion fitting.

B71-10280
WELD BEVELING OF LARGE-DIAMETER PIPES
LIEBENSTEIN, R./BENDIX CORP./
AUG. 1971 SEE ALSO B68-10551, B69-10229, B69-10231
KSC-10550
Technique employs electric drill and newly developed special jig to J-bevel, in the field, ends of pipes measuring between 15.24 cm and

45.72 cm in diameter in preparation for welding. Jig's construction and operation are described.

B71-10293
IMPROVED BRAZING TECHNIQUE FOR PYROLYTIC GRAPHITE
BOGOWITZ, R. G./INTERN. HARVESTER CO./ METCALFE, A. G.
AUG. 1971
NPO-12026
Technique uses braze metal and joint design that together compensate for the difficult anisotropic properties of the graphite and are usable at elevated temperatures.

B71-10336
STRONG, EASY-TO-MOLD, SPIRAL BUTTRESS THREAD
HEIER, W. C.
SEP. 1971
LANGLEY-10755
Buttress thread with steep taper connects two molded plastic cylinders without changing wall thickness or sacrificing longitudinal strength at the juncture. Technique lends itself to conventional molding methods.

B71-10338
ELECTROPLATING ON TITANIUM ALLOY
LOWERY, J. R.
SEP. 1971
M-FS-21251
Activation process forms adherent electrodeposits of copper, nickel, and chromium on titanium alloy. Good adhesion of electroplated deposits is obtained by using acetic-hydrofluoric acid anodic activation process.

B71-10354
MODULAR CONSTRUCTION PROVIDES LARGE VOLUME STORAGE FACILITY IN MINIMUM SPACE
FAHNER, T./MCDONNELL DOUGLAS CORP./ HARWOOD, O. P.
SEP. 1971
M-FS-13568
Each modular element consists of two hemispherical shells with material removed near their apexes to permit joining by a weldment to form a passage. Elements are welded together at their largest dimensions to form either a straight line continuous or a circular pressure vessel.

B71-10363
CAST SEGMENT EVALUATION
DIEM, H. G./ROCKETDYNE/ STUDHALTER, W. R.
SEP. 1971
M-FS-21354
Evaluation program to determine feasibility of fabricating segmented rocket engine thrust chambers using low cost, lightweight castings extends state of the art in areas of casting size and complexity, and in ability to provide thin sections and narrow, deep, cooling channels. Related developments are discussed.

B71-10369
FABRICATION TECHNIQUES FOR THORIA-DISPERSED /TD/ NICKEL
INNOVATOR NOT GIVEN /BELL AEROSPACE CO., C. S. IND./
SEP. 1971 SEE ALSO NASA-CR-72742
LEWIS-11240
Metal spinning forms combustion chamber sections and nozzle sections, arc welding joints sections to form rocket motor. Hastelloy-X as filler results in slightly weaker weld than the TD nickel weld, but permits formation of larger rocket motor than is otherwise possible.

B71-10375
USE OF CERMET THIN FILM RESISTORS WITH NITRIDE PASSIVATED METAL INSULATOR FIELD EFFECT TRANSISTOR
BROWN, G. A./TEX. INSTR., INC./ HARRAP, V.
OCT. 1971 SEE ALSO NASA-CR-97459
GSFC-10835
Film deposition of cermet resistors on same chip with metal nitride oxide silicon field effect transistors permits protection of contamination sensitive active devices from contaminants produced in cermet deposition and definition processes. Additional advantages include lower cost, greater reliability, and space savings.

B71-10381
PROTECTIVE COATING FOR SALT-BATH BRAZING
FRANCISCO, A. C. GYORGAK, C. A.
OCT. 1971
LEWIS-90255
Ceramic coating, consisting of graphite, enameler's clay, and algin binder, applied to materials prior to salt bath brazing facilitates brazing process and results in superior joints. Alternate coating materials and their various proportions are given.

B71-10415
FOLDING TOOLS FOR FLAT CONDUCTOR CABLE HARNESSES
LOGGINS, R.
NOV. 1971
M-FS-20121
Vise grip pliers have detachable metal gripping plates which are changed to accommodate cables from 1 to 3 in. wide and to form any desired fold angle. A second tool squeezes cable along crease to complete the fold.

B71-10416
SPOOL FOR RELEASING AND RETRACTING FLAT CONDUCTOR CABLE
ANGELE, W. CAMPBELL, E. C.
NOV. 1971
M-FS-20234
Spool design and operation permit installation of up to 8 cables on single unit. Heat treating the cables while wound in a coil obtains effective recoil action.

B71-10417
SEATING TOOL FOR PREPARING MOLDED-PLUG TERMINATIONS ON FCC
CHAMBERS, C. M. CORUM, C. C.
NOV. 1971 SEE ALSO B71-10422
M-FS-20123
Hand-operated tool positions and seats window piece and conductor spacer onto conductors of two stripped cables during process of terminating cables with molded plug. Tool accommodates cables up to 3 in. wide and is used in conjunction with folding tools.

B71-10418
DURABILITY TESTER FOR FCC CONNECTORS
CHAMBERS, C. M. MARTINECK, H. G.
NOV. 1971
M-FS-20128
Testing device monitors continuity and resistance of each circuit, it includes springloaded stationary fixture which holds plug, and moving fixture which is driven by small electric motor and is geared to mate and unmate connector 10 times per minute.

B71-10419
PRECISION DIE-PUNCH FOR TRIMMING THE CONDUCTORS OF FLAT CONDUCTOR CABLE
WEEKS, G. E., JR.
NOV. 1971
M-FS-20142
Operation trims conductor to width of 0.004 in. and consistently leaves 0.035 in. spaces between adjacent conductors, adapting cable for termination with standard plug.

B71-10420
FIXTURE FOR MULTIPLE-FCC CHEMICAL STRIPPING AND PLATING
ANGELE, W. NORTON, W. E.
NOV. 1971
M-FS-20237
For chemical stripping, lead tape applied near ends to be stripped protects insulation. Taped ends are submerged half way in stripping solution. For electroplating, both ends of FCC are stripped - top ends for electric contact, others for submersion in electroplating solution.

B71-10421
SPRUE CUTOFF TOOL FOR MOLDED FCC PLUGS
ANGELE, W. CHAMBERS, C. M.
NOV. 1971
M-FS-20236
Sprue removal operation is accomplished by positioning plug on tool bed, adjusting blades, and moving handle down for cutting process. Blades are raised to remove trimmed plug.

B71-10422
FOLDING TOOL FOR PREPARING FCC MOLDED-PLUG TERMINATIONS
CAMPBELL, E. C. CHAMBERS, C. M.
NOV. 1971
M-FS-20116
Assemblies consist of window piece, conductor spacer, insulator, outer seal, and molded portion that integrates all components. Preparation of FCC for molded plug termination requires that terminated ends of conductors in each cable be accurately folded simultaneously into spacer end and groove.

B71-10433
HIGH TEMPERATURE AUTOCLAVE VACUUM SEALS
HOFFMAN, J. R. SIMPSON, W. G. WALKER, H. M.
NOV. 1971
M-FS-21131
Aluminum sheet forms effective sealing film at temperatures up to 728 K. Soft aluminum wire rings provide positive seal between foil and platen. For applications at temperatures above aluminum's service temperature, stainless steel is used as film material and copper wire as sealant.

B71-10435
CARTESIAN-COORDINATE DIMENSIONING FOR PLUMBING SYSTEMS
BUIRGY, P. A./N. AM. ROCKWELL CORP./
NOV. 1971
M-FS-18867
Nonprogressive dimensioning method specifies Cartesian coordinates for each critical point in detail drawings of precision plumbing and ducting components to avoid tolerance accumulation. Method permits direct fabrication of tubing shapes without necessitating generation of a preproduction tubing mockup.

B71-10455
PRACTICAL METHOD OF DIFFUSION-WELDING STEEL PLATE IN AIR
HOLKO, K. H. MOORE, T. J.
DEC. 1971 SEE ALSO NASA-TN-D-6409
LEWIS-11387
Method is ideal for critical service requirements where parent metal properties are equaled in notch toughness, stress rupture and other characteristics. Welding technique variations may be used on a variety of materials, such as carbon steels, alloy steels, stainless steels, ceramics, and reactive and refractory materials.

B71-10457
MULTIEDGE SLITTER FOR FCC
TUCKER, D. T. WEEKS, G. E., JR.
NOV. 1971
M-FS-20112
Tool cuts multiple slits up to 3 in. long between conductors of flat conductor cables up to 3 in. wide to prepare them for termination on terminal boards or in multipin connectors.

B71-10458
APPARATUS TESTS FLEXURAL DURABILITY OF FCC
CHAMBERS, C. M. NORTON, W. E.
NOV. 1971
M-FS-20113
Device tests electric continuity of flat cable conductors, FCC, in temperature controlled environment. Test method is described.

B71-10459
CABLE INSULATION CUT-THROUGH TESTER
CAMPBELL, E. C. NORTON, W. E.
NOV. 1971
M-FS-20114
Device accurately measures cut-through load within specified time or time when cut-through occurs at specific load. Tests are performed at ambient conditions or in an environmental chamber.

B71-10460
COLD-BLADE STRIPPER FOR POLYIMIDE AND TFE INSULATION ON FCC
ANGELE, W. CHAMBERS, C. M.
NOV. 1971
M-FS-20115
Stripper removes insulation to any desired depth by adjusting the distance between the blade and the plates on either side of the flat conductor cable, FCC.

B71-10461
HOT-BLADE STRIPPER FOR POLYESTER INSULATION ON FCC
ANGELE, W. CHAMBERS, C. M.
NOV. 1971
M-FS-20117
Stripper incorporates a blade which is electrically heated to a controlled temperature. Heated blade softens and strips insulation from cable while paper ribbon removes insulation material and keeps blade clean for next operation.

B71-10464
HANDLING FIXTURE FOR SOLDERING ROUND WIRES TO FCC
LOGGINS, R. MARTINECK, H. G.
NOV. 1971
M-FS-20118
Fixture holds flat conductor cable and wires in position until after soldering of contacting conductor ends and potting of junctions. Device provides for proper spacing of wires and adequate access for soldered joints during fabrication, and positions mold halves during potting operation.

B71-10465
ROTARY STRIPPER FOR SHIELDED AND UNSHIELDED FCC
ANGELE, W. CHAMBERS, C. M.
NOV. 1971
M-FS-20119
Rotary stripper removes narrow strips of insulation and shielding to any desired depth. Unshielded cables are stripped on both sides with one stroke, shielded cables are stripped in steps of different depths.

B71-10467
EXOTHERMIC BRAZING UNITS
MC CAIG, J. C./WHITTAKER CORP./
NOV. 1971
M-FS-21435
Units are used for repairing and assembling stainless steel tubing. Heat generated by chemical reaction is used to melt brazing alloy and bonded area is not contaminated by the reactants or by-products of the reaction.

B71-10505
MEASURING INTERNAL DIMENSIONS OF SMALL TRANSPARENT OBJECTS
MILLS, S. M. SALMIRS, S.
DEC. 1971
LANGLEY-10712
Technique individually photographs first the orifice in the transparent object and then a microscopic scale immersed in a liquid having the same index of refraction as the transparent object. Using a scale photograph, the orifice photograph is measured.

B71-10520
SOLID STATE WELDING OF DISPERSION-STRENGTHENED NICKEL ALLOYS
HOLKO, K. H. MOORE, T. J.
DEC. 1971 SEE ALSO NASA-TN-D-6493
LEWIS-11388
Two-step solid state welding cycle applied to carefully prepared surfaces of an unrecrystallized alloy prevents loss of parent-metal strength at weld joint of dispersion-strengthened, nickel-chromium alloy.

B71-10523
FOLDABLE PATTERNS FORM CONSTRUCTION BLOCKS
HUBER, W. C. RITTER, D. L./INTERN. PAPER CO./
DEC. 1971
MSC-13860
Building blocks with interlocking tabs can be constructed from flat sheets of material using minimum of tools and equipment. Blocks can be used for storing and shipping supplies to remote areas, then filled with soil and stacked to form inhabitable structures which can be dismantled and reused.

B71-10525
COPPER/NICKEL EUTECTIC BRAZING OF TITANIUM
KUTCHERA, R. E./GE/

DEC. 1971
ARC-10337
Technique joins titanium or one of its alloys to materials, such as iron, nickel or cobalt base material, or to refractory metals. To ensure formation of a satisfactory bond, the temperature, time, environment and pressure must be controlled.

B71-10531
JOINT PRELOAD PROPERTIES OF STRUCTURAL THREADED FASTENERS
BRENNER, H. S./ALMAY RES. AND TESTING CORP./
DEC. 1971 SEE ALSO NASA-CR-103179
M-FS-21453
Proper installation techniques are described and reliable torque-tension values are presented on joint preload /or clamp load/ properties of structural threaded fasteners.

B72-10025
SIMPLE METHOD FOR FORMING THIN-WALL PRESSURE VESSELS
A. L. Erickson and L. R. Guist
1972 See also NASA-TM-X-62043
ARC-10511
Application of internal hydrostatic pressure to seam-welded circular cylindrical tanks having corner-welded, flat, circular ends forms large thin-walled high quality tanks. Form limits expansion of cylindrical portion of final tank while hemispherical ends develop freely; no external form or restraint is required to fabricate spherical tanks.

B72-10041
BONDING TITANIUM TO RENE 41 ALLOY
R. W. Scott (GE)
1972
ARC-10311
Pair of intermediate materials joined by electron beam welding method welds titanium to Rene 41 alloy. Bond is necessary for combining into one structure high-strength-to-density-ratio titanium fan blades and temperature-resistant nickel-base alloy turbine buckets in VTOL aircraft lift-fan rotor.

B72-10058
ALUMINUM FOIL INTERCONNECTS FOR SOLAR CELL PANELS
S. Schwartz (Hughes Aircraft Co.) and L. B. Keller (Hughes Aircraft Co.)
1972
ARC-10374
Commercially available sonic welding system and a specially-designed tip bonds aluminum foil interconnects to titanium-silver solar cell contacts.

B72-10081
LOW-FRICTION BALL-AND-SOCKET
R. E. Imus
1972
NPO-11348
Ball-bearing retainer assembly reduces friction in ball-and-socket mount which replaces gimbals mounting used with spacecraft antennas.

B72-10237
THERMAL ANALOG DEVICE REDUCES MACHINING ERRORS
E. R. McClure
Dec. 1972
AEC-10080
Thermal analog devices predict thermal expansion and contraction of machine structures subjected to various heat inputs. Analog devices correct positioning of machine tools to compensate for distortion of machine frame.

B72-10238
SURVEY OF INFORMATION CONCERNING LARGE DIAMETER DEEP HOLE DRILLING
Innovator not given (Nucl. Defense Res. Corp.) Dec. 1972 See also NVO-423-1
AEC-10051
Data are presented, covering drilling techniques, factors affecting penetration rates, cost estimation, and system improvement. Various drill bits are also discussed.

B72-10252
THERMALLY STABLE STRUCTURAL FRAMEWORK
H. U. Schuerch (Astro Res. Corp.)
Sep. 1972 See also NASA-CR-1973
ARC-10612
Development of structural framework with zero or negligible thermal expansion is discussed. Combination of two types of metallic materials in binary trellis to compensate for thermal expansion is explained. Construction details are presented and illustration is included.

B72-10288
JOINING PRECIPITATION-HARDENED NICKEL-BASE ALLOYS BY FRICTION WELDING
T. J. Moore
Jun. 1972 See also NASA-TM-X-2411
LEWIS-11514
Solid state deformation welding process, friction welding has been developed for joining precipitation hardened nickel-base alloys and other gamma-prime-strengthened materials which heretofore have been virtually unweldable. Method requires rotation of one of the parts to be welded, but where applicable, it is an ideal process for high volume production jobs.

B72-10293
EXPLOSIVE CORD
Innovator not given (Explosive Technol. Co.) Jun. 1972
M-FS-21928
Device, jetcord, is metal-clad linear explosive of sufficient flexibility to allow forming into intricate shapes. Total effect is termed "cutting" with jetcord consistently "cutting" a target of greater thickness than can be penetrated. Applications include sheet metal working, pipe cutting and fire-fighting.

B72-10349
TECHNIQUE FOR PRODUCING WIND-TUNNEL HEAT-TRANSFER MODELS
C. E. DeRose, W. C. Norman, L. Yee, and D. M. Oishi
Dec. 1972
ARC-10658
Inexpensive thin skinned wind tunnel models with thermocouples on certain surface areas were fabricated. Thermocouples were designed for measuring aerodynamic heat transfer in wind tunnels.

B72-10356
NEW COMPRESSION MOLDING PROCESS OF THERMO-SETTING PLASTIC COMPOUNDS
W. C. Heier
Jul. 1972
LANGLEY-10782
Process permits molding of longer, thinner bodies, such as cylindrical rocket motors, while maintaining equal or superior physical properties. Major advantages of process are presented.

B72-10359
LOW COST ANTI-GALLING BUSHINGS
E. O. Spencer (N. Am. Rockwell Corp.)
Dec. 1972
LEWIS-11724
Heat shrinkable Teflon tubing is cut to size, slipped onto shaft, heated to shrink tightly to shaft, or machined to final outside diameter size. Shaft bushings fabricated from shrinkable Teflon tubing provide economical close fitting sleeves that prevent galling and contamination in valves.

B72-10374
NONDESTRUCTIVE TESTING FOR BRAZE VOIDS IN THIN PANELS BY USE OF SPECIAL COATINGS
J. C. Gibson (AiRes. Mfg. Co.)
Jul. 1972
LANGLEY-10486
Application of commercial coating to exterior of sandwich

panel structures for determining presence of voids in brazed plates is discussed. Procedure for applying coating material and method of conducting nondestructive tests are explained. Illustrations are included to show appearance of voids.

B72-10394
MANUFACTURING CONTAMINATION PREVENTION HANDBOOK
R. T. Mackey, Sr. (N. Am. Rockwell Corp.)
Jul. 1972
M-FS-19113

Manufacturing management discipline handbook concerning contamination prevention may present principles and guidelines which can be adopted for industrial and commercial manufacturer usage. Contamination prevention program is categorized into three basic aspects: initial prevention; control of amount of unpreventable contamination; and detection and elimination of remaining contamination.

B72-10427
ACOUSTIC EMISSION USED AS WELD QUALITY MONITOR
W. O. Jolly
Dec. 1972
AEC-10018

Acoustic emission technique is described for use as quality control tool in nondestructive inspection of welds. Stress mounts around weld defect until it exceeds yield strength of material. Pressure wave relieving the stress is emitted and followed by oscillations caused by multiple reflections. Acoustic emissions are then detected by sensor similar to ultrasonic sensor.

B72-10428
FABRICATION TECHNIQUES FOR ORGANIC ELECTROLYTE BATTERY
G. D. McDonald
Dec. 1972 See also SC-CR-69-3290
AEC-10019

Experiments in fabrication and testing of silver chloride electrodes for use in organic electrolyte batteries are discussed. Electrodes were fabricated by pelletizing, sintering, hot press binding, and paste binding silver chloride on expanded metal grids of nickel or silver. Each technique was investigated by statistically designed factorial experiment.

B72-10432
TWISTABLE MOLD FOR HELICOPTER BLADES
E. S. Carter (United Aircraft Corp.) and E. F. Kiely (United Aircraft Corp.)
Dec. 1972
ARC-10682

Design is described of mold for fabrication of blades composed of sets of aerodynamic shells having same airfoil section characteristics but different distributions. Mold consists of opposing stacks of thin templates held together by long bolts. When bolts are loosened, templates can be set at different positions with respect to each other and then locked in place.

B72-10445
NONFLAMMABLE AND ABRASION RESISTANT COATING PROCESS FOR GLASS FIBERS
J. J. Dillon
Jul. 1972
MSC-14024

Surface treating glass fibers with polytetrafluoroethylene improves their resistance to heat and flammability. Organosilicon lubricant padding improves fabric flexibility.

B72-10457
LATCH MECHANISM
G. W. Ulrich (McDonnell-Douglas Corp.)
Aug. 1972
M-FS-21606

Rachet device transfers loads imposed on latch to support structure before latch springs resist loads, positively locks two pivoted structures on contact, and carries loads in all directions.

B72-10513
A NEW LOW-COST METHOD FOR PRODUCING COLLIMATING MIRRORS
Innovator not given (Lewis Res. Center) Aug. 1972
LEWIS-11553

New method for finishing and plating machined surfaces for collimating mirrors holds surface tolerances within accepted limits. Technique reduces cost to less than one-tenth that of conventional methods.

B72-10534
SPUTTER ETCHING OF HEMISPHERICAL BEARINGS
R. J. Schiesser (MIT)
Sep. 1972
HQ-10712

Technique was developed for fabricating three dimensional pumping grooves on gas bearings by sputter etching. Method eliminates problems such as groove nonuniformity, profile, and finish, which are associated with normal grooving methods.

B72-10562
BUILT-IN BLEEDER SYSTEM IN LAMINATED PLASTIC STRUCTURES
A. G. Aguilar (N. Am. Rockwell Corp.) and G. J. Cizek (N. Am. Rockwell Corp.)
Dec. 1972
MSC-17713

Method is described for interplying resin-absorbing, glass bleeder cloth with the layup for fabricating laminated nonflammable plastic structures with wrinkle-free surfaces.

B72-10593
FABRICATION OF COOLED, GRAPHITE-LINED STRUCTURES
R. A. Duscha and V. R. Stubbs (Aerojet Liquid Rocket Co.)
Sep. 1972 See also NASA-CR-120853
LEWIS-11741

Improved method of fabricating cooled graphite-lined thrust chamber has been developed. Layer of nickel is electrodeposited onto outer surface of machined and contoured graphite liner. Coolant passages are machined into nickel layer, filled with wax, outer shell electroformed over this, and wax removed. Tests in flox/methane rocket engine were completely successful.

B72-10595
MACHINE FINISHES BALLS TO HIGH DEGREE OF ROUNDNESS
W. Angele and J. P. Hill, Jr.
Sep. 1972
M-FS-21448

Machine was developed to finish ball to roundness within 12.5 nm (half a microinch) from any types of hard material. Grinding and polishing to this tolerance is accomplished by lapping elements on four to six motor-driven spindles. Spindles are adjustably spring-loaded to ensure constant contact pressure on ball and are driven by variable speed electric motors.

B72-10616
POLISHING IS MADE CHEAPER BY DISPOSABLE DIAMOND-IMPREGNATED ABRASIVE CLOTH
F. J. Harper (Brown and Root/Northrop)
Dec. 1972
MSC-14247

Diamond impregnated abrasive cloth eliminated expensive diamond pastes and was economically disposed of to avoid contamination. Cloth was spunbonded nylon, but any napless fabric could be used. Cloth was sprayed with diamond abrasive gel.

B72-10635
DESIGN CRITERIA MONOGRAPH ON TURBOPUMP INDUCERS
Innovator not given (Lewis Res. Center) Dec. 1972 See also NASA-SP-8052
LEWIS-11824

State of the art and design criteria for liquid rocket engine

turbopump inducers are summarized for optimal fabrication. Design criteria optimize hydrodynamic parameters to obtain highest suction specific speed without violating structural and mechanical constraints.

B72-10638
PHOTOEMISSIVE COATING
R. A. Gange (RCA)
Dec. 1972
M-FS-22003

Polystyrene coating is applied to holographic storage tube substrate via glow discharge polymerization in an inert environment. After deposition of styrene coating, antimony and then cesium are added to produce photoemissive layer. Technique is utilized in preparing perfectly organized polymeric films useful as single-crystal membranes.

B72-10644
AN APPROACH TO REAL-TIME PROCESS CONTROL OF SEMICONDUCTOR WIRE-BONDING
Innovator not given (Vanzetti Infrared and Computer Systems) Oct. 1972
M-FS-21558

Thermal probe using infrared-transparent optical fiber attached to tip of collet with resin to prevent movement during bonding is used to accurately measure temperature during wire bonding on semiconductors for use in large scale integrated circuits.

B72-10649
A SIMPLE, EFFICIENT RESISTANCE SOLDERING APPARATUS
C. M. Vermillion
Dec. 1972
GSFC-10913

Multiple resistance soldering device for attaching electric leads to multiple terminal block connectors uses power source with one terminal connected to working probe, and other terminal attached to connector carrying common pins for lead insertion. Mating of male and female connectors solders each lead to individual cup pin.

B72-10683
THE WELD-BRAZING METAL JOINING PROCESS
T. T. Bales, W. E. Arnold, Jr., and A. B. Lawson
Dec. 1972
LANGLEY-11072

Superior mechanical properties were obtained in metal joints weld-brazed between faying surfaces. Weld-braze applications and advantages are listed.

B72-10734
REDUCTION OF POROSITY IN ALUMINUM WELDMENTS
W. S. Lee
Dec. 1972
MSC-14198

Method is described for elimination of porosity of aluminum weldments by replacing polyvinyl chloride tubing (used to connect welder to gas source, and permeable to moisture at high humidity) with copper tubing. In addition liquid argon gas is used at weld stations.

B72-10744
ELECTRO-CHEMICAL GRINDING
P. L. Feagans (AiRes. Manuf. Co.)
Dec. 1972
LANGLEY-10801

Electro-chemical grinding technique has rotation speed control, constant feed rates, and contour control. Hypersonic engine parts of nickel alloys can be almost 100% machined, keeping tool pressure at virtual zero. Technique eliminates galling and permits constant surface finish and burr-free interrupted cutting.

B72-10745
IMPROVED PHOTOETCHING FABRICATION METHOD
C. L. Kistler (Pratt and Whitney Aircraft)
Dec. 1972
LEWIS-11268

Photoetching method producing well-defined lines with minimum undercutting was developed for etching coolant passages in nickel sheet. Phosphate coating is applied over conventional silver plate maskant and phosphoric acid solution is used to remove silver maskant. Phosphoric acid prevents etching of silver edges and mask has sharply-defined lines.

B72-10754
JOINING POROUS COMPONENTS TO SOLID METAL STRUCTURES
A. Fortini and G. Tulisiak
Dec. 1972 See also B68-10331; NASA-CR-72994
LEWIS-11259

Process for joining porous metal material to solid metal structure without cracking or blockage of porous component is described. Procedures of electron beam welding and electroforming are discussed. Illustration of microstructure resulting from process is included.

B73-10003
PRODUCTION OF SMALL DIAMETER HIGH-TEMPERATURE-STRENGTH REFRACTORY METAL WIRES
D. W. Petrasek, R. A. Signorelli, and G. W. King (Westinghouse Elec. Corp.)
Mar. 1973 See also NASA-CR-120925; NASA-TN-D-6881
LEWIS-11802

Special thermomechanical techniques (schedules) have been developed to produce small diameter wire from three refractory metal alloys: colombian base alloy, tantalum base alloy, and tungsten base alloy. High strengths of these wires indicate their potential for contributing increased strength to metallic composites.

B73-10005
IMPROVED DIFFUSION WELDING AND ROLL WELDING OF TITANIUM ALLOYS
K. H. Holko
Mar. 1973 See also B71-10455; NASA-TN-D-6409; NASA-TN-D-6958
LEWIS-11852

Auto-vacuum cleaning technique was applied to titanium parts prior to welding. This provides oxide-free welding surfaces. Diffusion welding can be accomplished in as little as five minutes of hot pressing. Roll welding can be accomplished with only 10% deformation.

B73-10013
REFRACTORY INSERTS USED TO FORM COOLING PASSAGES IN CAST SUPERALLOY TURBINE VANES
A. Terpay
Mar. 1973
LEWIS-11169

Economical technique has been developed for manufacturing air-cooled turbine blades and vanes for gas turbine engines. Process uses tungsten inserts to form coolant passages. After casting, inserts are reduced to tungsten oxide during sublimation with oxygen at elevated temperature. Tungsten oxide is leached out of coolant passages with a molten salt solution.

B73-10032
METHOD FOR CASTING POLYETHYLENE PIPE
R. M. Elam, Jr.
Feb. 1973
ARC-10706

Short lengths of 7-cm ID polyethylene pipe are cast in a mold which has a core made of room-temperature-vulcanizable (RTV) silicone. Core expands during casting and shrinks on cooling to allow for contraction of the polyethylene.

B73-10038
LARGE BORON--EPOXY FILAMENT-WOUND PRESSURE VESSELS
W. M. Jensen, R. L. Bailey, and A. C. Knoell
Feb. 1973
NPO-11900

Advanced composite material used to fabricate pressure vessel is prepeg (partially cured) consisting of continuous, parallel

boron filaments in epoxy resin matrix arranged to form tape. To fabricate chamber, tape is wound on form which must be removable after composite has been cured. Configuration of boron--epoxy composite pressure vessel was determined by computer program.

B73-10040
DENSIFICATION OF POWDER METALLURGY BILLETS BY A ROLL CONSOLIDATION TECHNIQUE
W. H. Sellman (Fansteel, Inc.) and W. R. Weinberger (Fansteel, Inc.)
Mar. 1973 See also NASA-CR-120796
LEWIS-11395

Container design is used to convert partially densified powder metallurgy compacts into fully densified slabs in one processing step. Technique improves product yield, lowers costs and yields great flexibility in process scale-up. Technique is applicable to all types of fabricable metallic materials that are produced from powder metallurgy process.

B73-10072
DIFFUSION WELDING TOOL
T. B. Milam (Pratt & Whitney Aircraft Corp.)
Feb. 1973
LEWIS-11807

Tool allows flat plate diffusion welding to be done in standard brazing furnace. Weld is achieved using high water pressure applied by hand-operated positive-displacement pump. Good welds have been obtained between nickel and nickel-base alloy plates at temperature of 1200 K and water pressure of 13.8 million N/sq m.

B73-10082
FILAMENT WINDING TECHNIQUE PRODUCES STRONG LIGHTWEIGHT OXYGEN TANKS
J. F. Shuessler (McDonnell Douglas Corp.) and R. J. Dannenmueller (McDonnell Douglas Corp.)
May 1973
M-FS-22470

Fiberglass is wound in three winding and cure sequences with first two followed by grit blasting of surface before final step. Result is uniformly stressed metal liner assembly with excellent structural characteristics.

B73-10258
IMPROVED FIBERGLASS-TO-METAL JOINT PRODUCES LIGHTER STRONGER FIBERGLASS STRUT
J. R. Barber, H. E. Johnson (Lockheed Missiles & Space Co.), and K. T. Eugene (Lockheed Missiles & Space Co.)
Aug. 1973 See also NASA-CR-72538
LEWIS-11661

Axial tension and compression are transmitted between end fittings and fiberglass tube without depending on glass-to-metal bonding, conventional fasteners or combination of these things. Joint design significantly reduces both structural weight of strut and its cross-sectional area.

B73-10265
BORON--EPOXY TUBULAR STRUCTURE MEMBERS
W. B. J. Shakespeare (TRW Systems Group), P. T. Nelson (TRW Systems Group), and E. C. Lindkvist (TRW Systems Group)
Jun. 1973
ARC-10737

Composite materials fabricate thin-walled tubular members which have same load-carrying capabilities as aluminum, titanium, or other metals, but are lighter. Interface between stepped end fitting and tube lends itself to attachments by primary as well as secondary bonding. Interlaminar shear and hoop stress buildup in attachment at end fitting is avoided.

B73-10284
EUTECTIC BONDING OF SAPPHIRE TO SAPPHIRE
J. J. Deluca
Aug. 1973
GSFC-11577

Eutectic mixture of aluminum oxide and zirconium oxide provides new bonding technique for sapphires and rubies. Technique effectively reduces possibility of contamination. Bonding material is aluminum oxide and zirconium oxide mixture that matches coefficient of thermal expansion of sapphire.

B73-10287
SHUTTLE ORBITER STORAGE LOCKER SYSTEM: A STUDY
D. R. Butler (Raymond Loewy/William Snaith, Inc.), D. T. Schowalter (Raymond Loewy/William Snaith, Inc.), and D. C. Weil (Raymond Loewy/William Snaith, Inc.)
Sep. 1973 See also NASA-CR-128864
JSC-14448

Study has been made to assure maximum utility of storage space and crew member facilities in planned space shuttle orbiter. Techniques discussed in this study should be of interest to designers of storage facilities in which space is at premium and vibration is severe. Manufacturers of boats, campers, house trailers, and aircraft could benefit from it.

B73-10298
EMBOSSED METAL DIAPHRAGM HAS TWO-WAY STRETCH
W. F. MacGlashan, Jr.
Jul. 1973
NPO-11635

Diaphragm with embossed pattern has greater structural rigidity than one with smooth surfaces, but under severe stress, tensile loads will flatten embossing. This provides necessary additional panel stretch needed to prevent rupture of diaphragm material. Hexagonal embossing-configuration allows panel stretch in any direction or in all directions simultaneously.

B73-10311
DESIGN GUIDE FOR GLASS FIBER REINFORCED METAL PRESSURE VESSEL
R. E. Landes (Structural Composites Ind.)
Dec. 1973 See also NASA-CR-120917; NASA-CR-120918
LEWIS-12042

Design Guide has been prepared for pressure vessel engineers concerned with specific glass fiber reinforced metal tank design or general tank tradeoff study. Design philosophy, general equations, and curves are provided for safelife design of tanks operating under anticipated space shuttle service conditions.

B73-10340
RADIAL HONEYCOMB CORE
R. B. Cantley (Lockheed-Georgia Co.), C. C. Nelson, Jr. (Lockheed-Georgia Co.), R. W. Patterson (Lockheed-Georgia Co.), and K. H. Potter (Lockheed-Georgia Co.)
Aug. 1973
ARC-10727

Core alleviates many limitations of conventional nacelle construction methods. Radical core, made of metals or nonmetals, is fabricated either by joining nodes and then expanding, or by performing each layer and then joining nodes. Core may also be produced from ribbons or strips with joined nodes or ribbons oriented in longitudinal planes.

B73-10358
NEW CONCEPT IN BRAZING METALLIC HONEYCOMB PANELS
P. D. Carter (Boeing Co.), R. E. Layton (Boeing Co.), and F. W. Stratton (Boeing Co.)
Oct. 1973
LANGLEY-10957

Aluminum oxide coating provides surface which will not be wetted by brazing alloy and which stops metallic diffusion welding of tooling materials to part being produced. This method eliminates loss of tooling materials and parts from braze wetting and allows fall-apart disassembly of tooling after brazing.

B73-10375
MANUFACTURE OF LARGE, LIGHTWEIGHT PARABOLIC ANTENNAS
S. W. Hooper (TRW, Inc.)
Sep. 1973
ARC-10741

Antenna was produced in segments. Parabole sections were built up as aluminum foil sandwich with core bonded by film

adhesive; whole structure was oven-cured after assembly. Structure was assembled with special tool for splice-bonding segments into complete dish, and inflatable bladder to apply pressure at joints during cure.

B73-10391
FLAT-BAND ASSEMBLY FOR TOROIDAL TRANSFORMER CORES
W. T. McLyman
Sep. 1973
NPO-11966

Toroidal transformer cores are often banded together by means of strap. Spot welds secure strap. Proper tension is obtained by use of special fixture in conjunction with winding of wire which is placed temporarily on core; winding is excited by dc current to hold core halves together magnetically during alignment.

B73-10438
PROCEDURE FOR DISPERSING FIBER BUNDLES
D. Padilla (Martin Marietta Corp.)
Feb. 1974
LANGLEY-11224

Fiber bundles are dispersed and fibers are cleaned within enclosed container; therefore, safety clothing, masks, and eye protection are not required. Procedure also could be used wherever materials, such as fiberglass or insulation, require dispersion, fluffing, or cleaning. Process could be automated into continuous operation for handling large quantities of fiber.

B73-10439
ADHESIVE COATING ELIMINATED IN NEW HONEYCOMB-CORE FABRICATION PROCESS
W. L. Batty (Martin Marietta Corp.), R. H. Hayes (Martin Marietta Corp.), and F. S. Magee (Martin Marietta Corp.)
Jan. 1974
LANGLEY-11134

Technique eliminates use of silicone-based adhesive material as bonding medium. Adhesive requires precise time-temperature cure. Prepreg resin is used as bonding medium, and each layer is laminated together to form honeycomb billet. Process can be used in any application where nonmetallic honeycomb core is being fabricated.

B73-10508
GRAIN REFINEMENT CONTROL IN GAS-SHIELDED ARC WELDING OF ALUMINUM TUBING
W. F. Iceland (Rockwell Intern. Corp.) and E. L. Whiffen (Rockwell Intern. Corp.)
Mar. 1974
JSC-19095

When sections are being welded, operator varies pulse rate of power supply and simultaneously monitors signal on oscilloscope until rate is found which produces maximum arc gas voltage. Remainder of welding is performed with power supply set at this pulse rate, producing desired maximum weld puddle agitation and fine uniform weld of grain structure.

B73-10528
X-RAY OPAQUE ADDITIVE FOR INSPECTION OF WELD JOINTS
R. L. Brown and J. L. Cook (McDonnell Douglas Corp.)
Mar. 1974
M-FS-22896

Thin coating of copper applied to each faying surface of aluminum-alloy improve X ray detection of welding defects. Copper may be applied by spraying, coating, or deposition. Thickness of faying surfaces must be uniform in range. Coating must be free from spalling and blistering and must contain no porosity.

B74-10018
HIGH STRENGTH, WIRE-REINFORCED ELECTROFORMED STRUCTURES
J. M. Kazaroff, R. A. Duscha, and L. C. McCandless (Gen. Technologies Corp.)
Jun. 1974 See also NASA-CR-134480
LEWIS-12087

Using half-round reinforcing wires, electrodeposited matrix metal readily fills spaces between wires in intimate contact with wires and without voids. Procedure combines advantages of electroforming with high-strength of commonly available wire to produce non-welded shell structures for high pressure uses.

B74-10114
LIGHT-WEIGHT SPHERICAL SUBMERGENCE VESSEL
I. Baker (Hughes Aircraft Co.)
Aug. 1974
ARC-10838

Design vessel with very low thickness-to-radius ratio to obtain low weight, and fabricate it with aid of precision tracer-lathe to limit and control imperfections in spherical shape. Vessel is thin-walled, spherical, monocoque shell constructed from hemispheres joined with sealed and bolted meridional flange.

B74-10125
BINARY ALLOYS FOR REFRACTORY-METAL BRAZING
J. F. Morris
Nov. 1974 See also NASA-TM-X-68190
LEWIS-12184

Data on binary-metal eutectics and melting-point minimums have been assembled for use in selecting brazing filler compositions for refractory metals. Data are presented in four tables for ready reference. Brief discussion of problems and potentials of metallides is included in appendix.

B74-10126
FABRICATION OF THICK STRUCTURES BY SPUTTERING
J. M. Kazaroff, E. D. McClanahan (Battelle Pacific Northwest Labs.), R. Busch (Battelle Pacific Northwest Labs.), and R. W. Moss (Battelle Pacific Northwest Labs.)
Dec. 1974 See also NASA-CR-134542; NASA-SP-5111
LEWIS-12331

Deposit, 5500-gram of Cu-0.15 wt % Zr alloy, sputtered onto copper cylinder to average thickness of 12.29 mm. Structure was achieved with high-rate sputter deposition for about 100 hours total sputtering time. Material had twice the strength of unsputtered material at temperatures to 723 K and equivalent strength at nearly 873 K.

B74-10141
PRESSURE APPLICATION TECHNIQUE FOR HIGH-TEMPERATURE COMPOSITE FABRICATION
R. M. Baucom and J. F. Powers
Sep. 1974
LANGLEY-11601

Technique utilizes characteristic of room-temperature vulcanizing rubber (RTV) which expands readily when heated. RTV expansion can exert uniform pressure on filament-reinforced polymer materials during curing. Technology accommodates high-temperature pressure application for P13-N polyimide composite consolidation during cure.

B74-10185
PROCESS FOR FABRICATION OF STABILIZED ALUMINUM PHOSPHATE FIBERS
T. J. Ormiston (GE) and R. A. Tanzilli (GE)
Nov. 1974 See also NASA-CR-132331
LANGLEY-11526

Ceramic possesses ideal property combination of high refractoriness and low thermal expansion. Fiber exceeds performance of fused silica fibers at high temperatures. It shrinks less, does not devitrify into unstable cristobalite structure, and is potentially less sensitive to impurities. Might be used for high-temperature insulation, fire protection, composites, and refractories.

B74-10214
SIDE WIRE FEED FOR WELDING APPARATUS
J. C. Arnett
Nov. 1974
NPO-13148

Coaxial electrode arrangement has solid central electrode, insulated outer electrode, and transverse channel for feeding wire through tip of electrode assembly. Polymeric insulation is thrust

aside by pressure, which is provided by separately operated mechanism acting through central electrode.

B74-10263
LOW-TEMPERTURE ELECTROSTATIC SILICON-TO-SILICON SEALS USING SPUTTERED BOROSILICATE GLASS
C. A. Hardesty, A. D. Brooks (Res. Triangle Inst.), and R. P. Donovan (Res. Triangle Inst.)
Jan. 1975
LANGLEY-11589
Silicon members are hermetically sealed to each other. Process produces no measurable deformation of silicon surfaces and is compatible with package designs of tight tolerance. Seals have been made with glass coatings in 10-mm to 20-mm thickness range without any prior annealing of coated silicon substrates.

B74-10270
PLASTIC COVERING ON AIRFOIL STRUCTURE PROVIDES SMOOTH UNINTERRUPTED SURFACE
J. A. Kinzler, L. G. Fehrenkamp, J. T. Heffernam, and W. S. Lee
Jan. 1975
MSC-12631
Primed surface is covered with adhesive. Sheet of plastic film is stretched over adhesive and mechanical holder is used to apply tension to ends of sheet to make it conform to surface of airfoil. After adhesive cures, plastic can be trimmed with sharp cutting tool.

B74-10272
EXPLOSIVE WELDING TECHNIQUE FOR JOINING ALUMINUM AND STEEL TUBES
M. E. Wakefield (Martin Marietta Corp.)
Jan. 1975
MSC-14721
Silver sheet is wrapped around aluminum portion of joint. Mylar powder box is wrapped over silver sheet. Explosion welds silver to aluminum. Stainless-steel tube is placed over silver-aluminum interface. Mylar powder box, covered with Mylar tape, is wrapped around steel member. Explosion welds steel to silver-aluminum interface.

B75-10006
INHIBITING KIRKENDALL VOID GROWTH IN WELDED BIMETALLIC STRUCTURES
F. G. Arcella (Westinghouse Astronucl. Lab.), G. A. Lessman (Westinghouse Astronucl. Lab.), and R. A. Lindberg
Mar. 1975 See also NASA-CR-134490; NASA-CR-134526
LEWIS-11573
Technique employs pre-aged, void-free junction composed of parent materials. Basic process for Kirkendall void inhibition can be applied to thermionic power systems, high temperature seals, high temperature junctions between any two metals of differing melting points where Kirkendall void formation would be detrimental.

B75-10089
SPUTTERED GOLD MASK FOR DEEP CHEMICAL ETCHING OF SILICON
B. P. Pisciotta, C. Gross, and R. S. Olive
Jun. 1975
LANGLEY-11661
Sputtered mask resists chemical attack from acid and has adherence to withstand prolonged submergence in etch solution without lifting from silicon surface. Even under prolonged etch conditions with significant undercutting, gold mask maintained excellent adhesion to silicon surface and imperviousness to acid.

B75-10145
MOUNTING TECHNIQUE FOR PRESSURE TRANSDUCERS MINIMIZES MEASUREMENT INTERFERENCES
R. N. Lanham (Northrop Corp.), C. E. Taylor (Northrop Corp.), C. E. Balmer (Northrop Corp.), and C. Hwang (Northrop Corp.)
Jul. 1975
ARC-10933
Miniaturized transducers are fabricated from commercially available four-arm semiconductor gages; transducers are connected as bridge circuit and mounted on internal face of small diaphragm. Jacket made of conductive plastic may be needed to avoid buildup or static charges.

B75-10164
FABRICATION AND REPAIR OF GRAPHITE/EPOXY LAMINATES
J. R. Lager (Martin Marietta Corp.) and B. Burke (Martin Marietta Corp.)
Aug. 1975
M-FS-23228; M-FS-23229
New forming and patching methods have been developed for high-quality graphite/epoxy laminates. Laminates range in thickness from 0.012 to 0.018 in. (0.31 to 0.46 mm).

B75-10179
THREE-DIMENSIONAL MODELS AID VISUALIZATION OF ENGINEERING DRAWINGS
A. R. McDougal and C. E. Aardahl
Aug. 1975
NPO-13394
Inexpensive cut-and-paste method allows construction of complex three-dimensional models in less than an hour. Models are constructed from film or paper copies made on office copier.

B75-10212
IMPROVED CHEMICAL VAPOR-DEPOSITION REACTOR
S. S. Chern and J. Maserjian
Sep. 1975
NPO-13650
Formation of large particles on substrate is eliminated by actively exhausting reacted gases. Effluent gas backflow is prevented by pumping in curtain of nitrogen above fresh reactive gases from several directions.

B75-10216
MACHINE FOR FABRICATION OF BATTERY-ELECTRODE PLAQUES
W. C. Harsch (Eagle-Picher Industries, Inc.)
Oct. 1975
GSFC-12004
Functional parts of device are built to close tolerances of 0.001 inch (0.025 mm) and can be adjusted within range of plus or minus 0.005 inch (plus or minus 0.0127 mm).

B75-10238
DIP MOLDING TO FORM INTRICATELY-SHAPED MEDICAL ELASTOMER DEVICES
H. F. Broyles
Oct. 1975
NPO-13535
Preshaped mandrel mounted on rotating mechanism is partially immersed in tank filled with liquid elastomer. While mandrel rotates, elastomer film forms on mandrel surface due to surface tension and capillary behavior of liquid. Devices with well-defined flanges can be made using process.

B75-10257
PROCESS FOR PREPARING POLYIMIDE ADHESIVES
D. J. Progar, V. L. Bell, and T. L. St. Clair (Virginia Polytechnic Institute and State Univ.)
Oct. 1975
LANGLEY-11397
High bonding strengths are obtained for metals and fiber-reinforced organic resin composites with no significant loss in thermo-oxidative stability of the adhesive resin.

B75-10261
DIAMINE CURING AGENTS FOR POLYURETHANES
V. L. Bell and T. L. St. Clair (Viriginia Polytechnic Institute and State Univ.)
Oct. 1975
LANGLEY-11829
Three aromatic diamines have properties that make them promising candidates as curing agents for converting isocyanates

to polyurethanes with higher adhesive strengths, higher softening temperatures, better toughness, and improved abrasion resistance.

B75-10267
INDUSTRIAL LASER WELDING: AN EVALUATION
R. Hella (Avco Everett Res. Lab.), E. Locke (Avco Everett Res. Lab.), and S. Ream (Avco Everett Res. Lab.)
Oct. 1975
M-FS-23237

Report describes 10-kW laser welding system, designed to weld large structures made from 1/4-inch and 1/2-inch aluminum (2219) and D6AC steel.

B75-10299
FORMATION OF INTERNALLY-CONFINED SEMICONDUCTOR LASERS
V. M. Cannuli (RCA)
Dec. 1975
LANGLEY-11770

In technique for fabrication of strip lasers, current constriction is accomplished by diffusing blocking regions into n-type substrate prior to growth. Current flow is controlled by blocking layers, which results in reduction of threshold current and better heat dissipation.

B75-10301
LOW-COST HOT-AIR SOLAR COLLECTOR
E. P. Herndon and K. G. Anthony
Dec. 1975
M-FS-23272

System has only three components per cell. Cell parts are fabricated from readily available materials and, following a construction procedure which requires use of only simple handtools, can be mounted in place by one person.

B75-10309
FOAM-MACHINING TOOL WITH EDDY-CURRENT TRANSDUCER
W. P. Copper (Martin Marietta Corp.)
Dec. 1975
M-FS-23298

Three-cutter machining system for foam-covered tanks incorporates eddy-current sensor. Sensor feeds signal to numerical controller which programs rotational and vertical axes of sensor travel, enabling cutterhead to profile around tank protrusions.

B75-10319
BIAXIAL COMPRESSION TEST TECHNIQUE
E. T. Hansard (Gen. Dyn. Corp.)
Dec. 1975
MSC-14883

Fixture and technique have been developed for predicting behavior of stiffened skin panels under biaxial compressive loading. Tester can load test panel independently in longitudinal and transverse directions. Data can also be obtained in combined mode.

09 COMPUTER PROGRAMS

B70-10063
SYSTEM AVAILABILITY MANAGEMENT TECHNIQUE FOR RELIABILITY AND MAINTAINABILITY ANALYSIS
DAVENPORT, G. K. /BENDIX CORP./ DATE- JUL. 1970
KSC-10315

Method for total system availability analysis is based on numerical prediction of the reliability, maintainability, and availability of each function system. It incorporates these functional-system estimates into an overall mathematical model.

B70-10067
AUTOMATIC DATA GENERATION SCHEME FOR FINITE-ELEMENT METHOD /FEDGE/ - COMPUTER PROGRAM
AKYUZ, F. DATE- SEP. 1970
NPO-11069

Algorithm provides for automatic input data preparation for the analysis of continuous domains in the fields of structural analysis, heat transfer, and fluid mechanics. The computer program utilizes the natural coordinate systems concept and the finite element method for data generation.

B70-10078
POLYNOMIAL-SMOOTHING AND DERIVATIVE-ESTIMATING FORMULAS FOR FUNCTIONS OF ONE OR TWO INDEPENDENT VARIABLES
SEMTNER, A. J. DATE- AUG. 1970 REAN- SEE ALSO NASA-CR-98657
NPO-11256

Application of polynomial-smoothing formulas and related derivative-estimating formulas simplifies certain linear least-squares problems. These problems can then be solved by a computer method.

B70-10091
WIRING HARNESSES DOCUMENTED BY PUNCHED-CARD TECHNIQUE
HICKS, W. W. KLOEZEMAN, W. G. DATE- JUN. 1970
REAN- SEE ALSO NASA-CR-97150
NPO-11249

Cards representing a connector are punched, sorted, and then used to printout wiring documentation for that connector. When wiring changes are made, new cards are punched and the wiring documentation is reprinted to reflect the latest configuration.

B70-10132
COMPUTER PROGRAMS FOR DETERMINATION OF TRANSONIC FLOW PARAMETERS IN A CONVERGENT-DIVERGENT NOZZLE
JAFFE, B. (RAO (G. V. R.) AND ASSOCIATES) RAO, G. V. R. DATE- NOV. 1970
NPO-10895

Programs based on equations that include functions for boundary values along nozzle axis yield different types of flow field configurations. Program*s documentation details method of calculating subsonic flow field and sonic line, and describes modified method of characteristics for calculating supersonic flow downstream of sonic line.

B70-10133
A PROGRAM FOR COMPUTING SHOCK-TUBE GAS DYNAMIC PROPERTIES
HORTON, T. E. MENARD, W. A. DATE- MAY 1970
NPO-11068

Computer program calculates thermodynamic properties from basic spectroscopic data. Program capacity is a mixture of 100 different species composed of ten different elements. The output is a complete thermodynamic and chemical description of the gas.

B70-10158
CALCULATION OF THE INERTIA TENSOR AND CENTER OF GRAVITY OF COMPLEX BODIES
HOWARD, L. A. DATE- APR. 1970
NPO-10827

Inertia tensor is calculated for each component part of a body about its own principal axes, and then with respect to the body*s reference axes /rotation/. All parts are then combined to calculate the center of gravity and inertia tensor of the body.

B70-10184
PERT **C**
SPON- INNOVATOR NOT GIVEN /MARSHALL SPACE FLIGHT CENTER/ DATE- SEP. 1970
M-FS-20164

Computer program, PERT, provides method and technique for planning, evaluating, and graphically portraying in orderly related sequence the activities necessary to achieve a stated objective.

B70-10230
IMPROVED ANTENNA PATTERN RECORDER PROVIDES VISUAL DISPLAY OF RF POWER
LIPIN, R., JR. /SPERRY RAND CORP./ DATE- AUG. 1970
M-FS-20447
Antenna pattern recording system has a discretionary signal level monitor which senses a specified minimum level occurring between sampling intervals. This enables RF power and percent coverage to be calculated more accurately.

B70-10257
AUTOMATED VALIDATION OF A COMPUTER OPERATING SYSTEM
DERVAGE, M. M. /BOEING CO./ MILBERG, B. A. DATE- DEC. 1970
M-FS-14510
Programs apply selected input/output loads to complex computer operating system and measure performance of that system under such loads. Technique lends itself to checkout of computer software designed to monitor automated complex industrial systems.

B70-10265
SIMULTANEOUS RANDOM AND SEQUENTIAL COMPUTER PROCESSING USING AN EXPANDED SEQUENTIAL INDEX
WARREN, C. G. /CHRYSLER CORP./ DATE- JUL. 1970
M-FS-20266
Redesigned second-generation, tape-oriented computer system updates a data record, increases the capability to perform update runs, and produces a sequential report for every update run.

B70-10308
VISUAL DEVICE TO ASSIST COMPUTER PROGRAM DEBUGGING
GARCIA, G. /N. AM. ROCKWELL CORP./ DATE- JUN. 1970
MSC-15833
Interrupt status indicators allow computer programs to be debugged during checkout and provide a quick-look analysis for updating. Computer coupled indicator lamps and lamp driver circuitry register program malfunctions in priority interrupt controlled programs.

B70-10317
COMPUTER PROGRAM FOR ANALYSIS OF FLOW ACROSS A GAS TURBINE SEAL
SMITH, P. J. ZUK, J. DATE- JUL. 1970
LEWIS-10975
Computer program analyzes the flow /leakage/ across a sealing dam for the case of steady, laminar, subsonic, isothermal, compressible flow. The analysis considers both parallel sealing-dam surfaces and surfaces with small tilt angles.

B70-10374
LOW-POWER INTEGRATED-CIRCUIT DRIVER FOR FERRITE-MEMORY WORD LINES
KATZ, S. /RCA/ DATE- OCT. 1970
ERC-10212
Composite circuit uses both n-p-n bipolar and p-channel MOS transistors /BIMOS/. The BIMOS driver provides 1/ ease of integrated circuit construction, 2/ low standby power consumption, 3/ bidirectional current pulses, and 4/ current-pulse amplitudes and rise times independent of active device parameters.

B70-10446
ERROR COMPENSATION FOR HYBRID-COMPUTER SOLUTION OF LINEAR DIFFERENTIAL EQUATIONS
KEMP, N. H. /WOLF RES. AND DEVELOP. CORP./ DATE- NOV. 1970
ERC-10262
Z-transform technique compensates for digital transport delay and digital-to-analog hold. Method determines best values for compensation constants in multi-step and Taylor series projections. Technique also provides hybrid-calculation error compared to continuous exact solution, plus system stability properties.

B70-10452
SELF TESTING AND REPAIRING COMPUTER - A CONCEPT
AVIZIENIS, A. A. DATE- SEP. 1970
NPO-10567
STAR computer has five redundant modular function units, fixed store, arithmetic, memory, input, and output. Each unit is connected to a diagnostic control unit, each is coded for error detection and error correction. Separation into function units permits assembly of many different systems from the set of units.

B70-10484
CONCEPT FOR HIGH SPEED COMPUTER PRINTER
STEPHENS, J. W. /BOEING CO./ DATE- OCT. 1970
KSC-10373
Printer uses Kerr cell as light shutter for controlling the print on photosensitive paper. Applied to output data transfer, the information transfer rate of graphic computer printers could be increased to speeds approaching the data transfer rate of computer central processors /5000 to 10,000 lines per minute/.

B70-10496
RAPID METHOD FOR INTERCONVERSION OF BINARY AND DECIMAL NUMBERS
LIN, R. S. DATE- DEC. 1970
ARC-10159
Decoding tree consisting of 40-bit semiconductor read-only memories interconverts binary and decimal numbers 50 to 100 times faster than current methods. Decimal-to-binary conversion algorithm is based on a divided-by-2 iterative equation, binary-to-decimal conversion algorithm utilizes multiplied-by-2 iterative equation.

B70-10501
COPTRAN - A METHOD OF OPTIMUM COMMUNICATION SYSTEMS DESIGN
BRINKMAN, K. L. /HUGHES AIRCRAFT CO./ PRATT, W. K. STOKES, L. S. WEBER, J. W. DATE- OCT. 1970
ERC-10273
Single set of mathematical expressions describes system cost and probability of error of data transmission in terms of four basic parameters in the link equation. A Lagrange multiplier sets up equations whose solutions yield the optimum values for system design considerations and weight and cost values.

B70-10532
DISC PACK CLEANING TABLE SAVES COMPUTER TIME
GUY, J. T., SR. DATE- SEP. 1970
LANGLEY-10590
Disc pack holding table is support frame upon which computer disc pack is loaded and protective cover released. This combination permits manual off-line cleaning of disc pack storage units at any time without shutting down the computer, and eliminates on-line disc drive unit to hold pack during cleaning.

B70-10555
SATURN S-2 BASE ENVIRONMENT FOR FLIGHT EVALUATION
GEORGATSOS, F. D. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970
M-FS-16597
Computer program reduces base region flight data to isothermal and cold wall conditions and predicts instrument readings before and after flight. The flight data is made appropriate for nominal J-2 engine combustion. This program is used for any five-engined stage with center engine fixed.

B70-10556
INFORMATION RETRIEVAL SYSTEM
BERG, R. F. /BELLCOMM, INC./ HOLCOMB, J. E. KELROY, E. A. LEVINE, D. A. MEE, C., III DATE- OCT. 1970
HQ-10426
Generalized information storage and retrieval system capable of generating and maintaining a file, gathering statistics, sorting output, and generating final reports for output is reviewed. File generation and file maintenance programs written for the system are general purpose routines.

B70-10557
NEUTRON AGES COMPUTED FROM EXPERIMENTAL ACTIVATION DATA
SEMLER, T. T. DATE- OCT. 1970
LEWIS-10949
Computer program reduces time manually required to compute neutron age and to provide definite plan of procedural choices. Program allows convenient comparison of several fitting and error analysis procedures. Program code provides for error estimation of various integration options.

B70-10561
GROUND COMPUTER TEST TRAP
FONDRIE, D. G. /IBM/ HIGGINS, P. H. DATE- NOV. 1970 REAN- SEE ALSO B70-10560
KSC-10574
Test trap consists of logic nest of five printed circuit boards, plus power supply within the unit. Device monitors more than one logic area simultaneously, gives visual display of detected error, operates at computer speed, maintains readily available logic description of cards used, and is compatible with existing computer circuitry.

B70-10597
DIGITAL PROGRAM ANALYZES SUPERSONIC FLOW FIELD WITHIN BELL-SHAPED ROCKET NOZZLES
ELLIOTT, J. J. /N. AM. ROCKWELL CORP./ STROMSTA, R. R. DATE- NOV. 1970
M-FS-14292
Digital computer program computes and analyzes supersonic flow field in axisymmetric rocket nozzle for specified gas properties, nozzle geometry, and input or starting line. Method of characteristics is used for solution of set of hyperbolic partial differential equations.

B70-10599
A METHOD OF NUMERICALLY CONTROLLED MACHINE PART PROGRAMMING
SPON- INNOVATOR NOT GIVEN /BOEING CO./ DATE- NOV. 1970
M-FS-15039
Computer program is designed for automatically programmed tools. Preprocessor computes desired tool path and postprocessor computes actual commands causing machine tool to follow specific path. It is used on a Cincinnati ATC-430 numerically controlled machine tool.

B70-10602
EXPANDED SUN-LOOK ANGLE PROGRAM
BOYD, C. C. /LOCKHEED ELECTRON. CO./ DATE- DEC. 1970
MSC-13176
Computer program provides time history of sun aspect angles as seen from spacecraft and generates binary tape containing time history of position, velocity, and body attitude angles of vehicle in local horizontal, local vertical system. Program is written in FORTRAN 5 and SLEUTH 2 for Univac 1108 computer.

B70-10603
MULTIBODY INTERPLANETARY SWINGBY TRAJECTORIES /MIST-1/
DAVIS, D. A. /BOEING CO./ ROBERTS, G. R. DATE- DEC. 1970
M-FS-15081
Computer program incorporates new isolation procedure to determine interplanetary trajectories which utilize a maximum of three flybys. Program also computes singe planet flybys and direct transfer trajectories. The three principle systems employed in MIST-1 use as their fundamental plane the mean plane of the earth*s orbit around the sun.

B70-10605
POST FLIGHT DYNAMIC ANALYSIS SIMULATION
GREGORY, B. R. /BOEING CO./ DATE- NOV. 1970
M-FS-15067
Digital six-degrees-of-freedom, open loop Saturn 5 first stage flight evaluation simulation program obtains post flight simulation of the launch vehicle using actual flight data as input. Results are compared with measured data. For preflight analysis, the program uses predicted flight data as input.

B70-10606
COMPUTERIZED TOROIDAL TRANSFORMER DESIGN
SPON- INNOVATOR NOT GIVEN /CALTECH/JPL/ DATE- NOV. 1970
NPO-11115
Computer program designs transformers which have one primary /center tap permissible/ and up to 20 untapped secondaries, and which can handle up to 500 V across any one winding. Computer determines total secondary power, core type, primary turns, secondary turns, and wire sizes for primary and secondary windings.

B70-10613
CONDENSATION OF WET VAPORS IN TURBINES
KOTHMAN, R. E. /WESTINGHOUSE ASTRONUCL. LAB./ DATE- NOV. 1970
NPO-10773
Computer program predicts condensation point in wet vapor turbines and analyzes subsequent nucleation and growth processes to determine both moisture content and drop size and number distribution as a function of position. Program includes effects of molecular association on condensation and flow processes and handles both subsonic and supersonic flows.

B70-10614
RELIABILITY ANALYSIS MODEL
SPON- INNOVATOR NOT GIVEN /BOEING CO./ DATE- NOV. 1970 REAN- SEE ALSO B68-10252
M-FS-14513
RAM program determines probability of success for one or more given objectives in any complex system. Program includes failure mode and effects, criticality and reliability analyses, and some aspects of operations, safety, flight technology, systems design engineering, and configuration analyses.

B70-10615
ANALYSIS OF SURFACE ABLATION OF NONCHARRING MATERIALS
MATTING, F. W. DATE- NOV. 1970 REAN- SEE ALSO NASA-TN-D-3758
ARC-10223
Computer program solves combined problem of heat transfer and material response for the stagnation region of blunt bodies experiencing melting and vaporizing or subliming ablation. Program contains formulas for the transitional regime to bridge between the free-molecule and continuum regimes.

B70-10625
SEPARATION OF TWO BODIES IN SPACE
CHAMBERLAIN, R. G. MACK, T. H. SILSBY, W. DATE- DEC. 1970
NPO-10663
Computer program analyzes the motion of two rigid bodies in space, separating as a result of any one, or a combination of, the following mechanisms - springs with ball ends, springs with one end guided, pyrotechnics, rockets, cold-gas jets, air pistons, and Coulomb drag.

B70-10637
GLOBAL SEARCH ALGORITHM FOR OPTIMAL CONTROL
BROCKER, D. H. KAVANAUGH, W. P. STEWART, E. C. DATE- DEC. 1970 REAN- SEE ALSO NASA-TN-D-5642
ARC-10359
Random-search algorithm employs local and global properties to solve two-point boundary value problem in Pontryagin maximum principle for either fixed or variable end-time problems. Mixed boundary value problem is transformed to an initial value problem. Mapping between initial and terminal values utilizes hybrid computer.

B70-10642
MICROPROGRAM SCHEME FOR AUTOMATIC RECOVERY FROM COMPUTER ERROR
BATTIN, R. A. /MIT/ COPPS, E. M. HOPKINS, A. L., JR. MILLER, J. S. SMITH, H. B. DATE- DEC. 1970
MSC-13387
Microprogram scheme enables computer to recover from failure in one of its two central processing units during time duration of instruction in which

failure occurs. Microprogram advantages include - /1/ built-in interpretive capability, /2/ selection of processing interrupts by priority, and /3/ economical use of bootstrap sequence.

B70-10660
MAN-MACHINE INTERACTIVE SYSTEM SIMPLIFIES COMPUTER-AIDED CIRCUIT DESIGN
BAVUSO, S. J. DATE- DEC. 1970
LANGLEY-10711
Langley interactive computerized circuit analysis capability /LICCA/ enables designer to draw electronic circuit diagrams on cathode ray tube screen. This information is submitted as input to user-selected circuit analysis program. LICCA accommodates binary logic circuits and circuits with discrete components, and monitors operator*s instructions to detect errors.

B70-10669
COMPUTER PROGRAM FOR THE DESIGN OF AXIAL-FLOW TURBINES
CARTER, A. F. /NORTHERN RES. AND ENG. CORP./
LENHERR, F. K. DATE- DEC. 1970 REAN- SEE ALSO B69-10111
LEWIS-11029
Computer program, capable of analyzing single and multispool units, computes absolute and relative flow fields within the turbine at the first stator inlet, at each interblade row plane, and at the final rotor exit. No simplifying assumptions are made which would result in restrictive design.

B70-10698
IMPROVED CONVOLUTIONAL CODING
DOLAND, G. D. /LOCKHEED ELECTRON. CO./ DATE- DEC. 1970
MSC-13625
Convolutional coding, used to upgrade digital data transmission under adverse signal conditions, has been improved by a method which ensures data transitions, permitting bit synchronizer operation at lower signal levels. Method also increases decoding ability by removing ambiguous condition.

B70-10705
DIGITAL SIMULATION PROGRAM IMPROVED
BRAMBLETT, E. K. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970
M-FS-01504
Modified Integration Digital Analog Simulation /MIDAS/ program, which provides time oriented solutions to equations from system block diagram descriptions, is given greater speed, accuracy, flexibility, and applicability. Improved program incorporates additional elements for extended solution capability not readily available from analog computers.

B70-10720
TIME DATA SEQUENTIAL PROCESSOR /TDSP/
JOSEPH, A. E. PAVLOVITCH, T. ROTH, R. Y.
STURMS, F. M. DATE- DEC. 1970
NPO-11327
Time Data Sequential Processor /TDSP/ computer program provides preflight predictions for lunar trajectories from injection to impact, and for planetary escape trajectories for up to 100 hours from launch. One of the major options TDSP performs is the determination of tracking station view periods.

B71-10002
FAST MARS COMMUNICATION GEOMETRY PROGRAM
GARNER, W. R./MARTIN MARIETTA CORP./ TULLY, J. Q.
JAN. 1971
LANGLEY-10658
Computer program calculates trajectories of orbiting spacecraft and lander vehicles simultaneously. Using data from both vehicles, program calculates communications geometry which consists of orbiting spacecraft cone/clock angle, lander cone/clock angle, range, range rate and acceleration, and fade, reflective, and system margins.

B71-10003
DIGITAL SIMULATION ERROR CURVES FOR A SPRING-MASS-DAMPER SYSTEM
KNOX, L. A./IBM/
FEB. 1971
M-FS-20770
Plotting digital simulation errors for a spring-mass-damper system and using these error curves to select type of integration, feedback update method, and number of samples per cycle at resonance reduces excessive number of samples per cycle and unnecessary iterations.

B71-10006
SYSTEMS OF CODING AND THEIR IMPLEMENTATION
ANDERSON, T. O.
JAN. 1971
NPO-11469
Engineering planning document surveys mechanics, utility, and potential improvements of codes which control noise-generated errors introduced into radio transmission of binary information. Chronological development of certain codes and a comprehensive bibliography are included.

B71-10007
NON-SYMMETRICAL TWO DIMENSIONAL SCATTERING PROGRAM
HATFIELD, J. RUSCH, W. V. T.
JAN. 1971
NPO-11576
Computer program, 2DSCAT, solves integral equation for currents induced by electric or magnetic plane wave incident upon one or more conducting cylinders. Subroutine, FIELD, assumes that an incident wave is perpendicular to the cylindrical surface. Restrictions on this program are given.

B71-10008
SYMMETRICAL TWO DIMENSIONAL SCATTERING PROGRAM
HATFIELD, J. RUSCH, W. V. T.
JAN. 1971
NPO-11578
Computer program solves integral equation for currents induced by electric or magnetic plane wave incident upon one or more conducting cylinders with a midplane of symmetry. Program utilizes symmetry of the geometry. Restrictions on the program are given.

B71-10017
TRACKING ANTENNA DEFORMATION PROGRAM
GALEF, A. E./TRW SYSTEMS GROUP/
JAN. 1971
GSFC-11191
Computer program provides capability for analyzing accelerometer data obtained from impulsive testing of large antennas, and of determining from that data pertinent characteristics /amplitude, frequency, damping/ of the structural modes excited by the impulse.

B71-10030
LIFT DISTRIBUTION IN A RECTANGULAR JET
JAMESON, A./GRUMMAN AEROSPACE CORP./
FEB. 1971
ARC-10424
Computer programs predict effect of slipstream-wing flow interaction on aerodynamic characteristics of deflected slipstream and tilt aircraft. One program calculates lift distribution, lift, and drag of wing in wide slipstream. Results permit development of simplified lifting surface theory for circular jet.

B71-10037
COMPUTER PROGRAM FOR PREDICTING CREEP BEHAVIOR OF BODIES OF REVOLUTION
ADAMS, R./TRW SYSTEMS/ GREENBAUM, G.
FEB. 1971
NUC-11104
Computer program, CRAB, uses finite-element method to calculate creep behavior and predict steady-state stresses in an arbitrary body of revolution subjected to a time-dependent axisymmetric load. Creep strains follow a time hardening law and a Prandtl-Reuss stress-strain relationship.

B71-10038
FEATS - FINITE ELEMENT THERMAL STRESS ANALYSIS OF PLANE OR AXISYMMETRIC SOLIDS
SWANSON, J. A./WESTINGHOUSE ASTRONUCL. LAB./

FEB. 1971
NUC-10242
FEATS computer code uses finite element analysis to calculate steady state temperature and thermal stress fields for either axisymmetric or plane two-dimensional bodies with boundary conditions, including specified displacements, loads, and thermal boundary conditions.

B71-10039
AUTOTEM - AUTOMATED GEOMETRY MESHING AND HEAT CONDUCTION CALCULATION
LEE, A. Y./WESTINGHOUSE ASTRONUCL. LAB./ WELLS, K. J.
FEB. 1971
NUC-10241
Temperature distribution for an arbitrary irregular body is calculated by AUTOTEM, which generates required input data automatically by computer. Temperature distribution is calculated for a two-dimensional plane section in /x,y/ coordinates or for an axisymmetric irregular body in /r,z/ coordinates.

B71-10052
FORTRAN PROGRAMMING - A SELF-TAUGHT COURSE
BLECHER, S./COMPUTER SCI. CORP./ BUTLER, R. V. HORTON, M. NORROD, V.
APR. 1971 SEE ALSO NASA-CR-1478
LANGLEY-10738
Comprehensive programming course begins with numerical systems and basic concepts, proceeds systematically through FORTRAN language elements, and concludes with discussion of programming techniques. Course is suitable either for individual study or for group study on informal basis.

B71-10054
PROGRAM FOR IMPROVED ELECTRICAL HARNESS DOCUMENTATION AND FABRICATION
INNOVATOR NOT GIVEN /GE/ APR. 1971
GSFC-10386
Computer program provides automated print-out of harness interconnection table and automated cross-check of reciprocal pin/connector assignments, and improves accuracy and reliability of final documented data. Programs and corresponding library tapes are successfully and continuously employed on Nimbus spacecraft programs.

B71-10086
DIGITAL-CODED MATRIX SYSTEM SIMPLIFIES DESIGN AND CONSTRUCTION OF FLOW CHARTS
OTOOLE, E./MARTIN MARIETTA CORP./
APR. 1971
MSC-13539
Matrix system utilizing unique digital code enables drawing block diagrams with parallel blocks. Complete freedom is obtained in laying out diagram, and it is possible to go directly from matrix to finished drawing. Need to rough out diagram is eliminated and time involved is greatly reduced.

B71-10106
RADIATION VIEW FACTOR PROGRAM
LOVIN, J. K./LOCKHEED MISSILES AND SPACE CO./
LUBKOWITZ, A. W.
MAY 1971
M-FS-21075
Computer program, RAYFAC, calculates diffuse radiation view factors, using contour integrals. Technique is combined with finite difference /double summation/ technique to compose total program package.

B71-10108
FISCAL OUTPUT DATA PRODUCE VERSATILE GRAPHIC-NUMERIC CHARTS
POWELL, R. W./AERO JET-GEN. CORP./ ROMO, J. J.
MAY 1971
NUC-10394
Refined computerized plotting system produces low-cost graphic-numeric charts that illustrate fiscal data on monthly incremental or cumulative basis, or both. Output is in the form of hard copy or microfilm, or visual-aid transparencies prepared from hard copy for rapid management status presentations.

B71-10115
COMPUTER PROGRAM FOR THERMAL ANALYSIS OF SHADOW SHIELDS IN A VACUUM
BOYLE, R. J. KNOLL, R. H.
MAY 1971
LEWIS-11236
Computer program determines temperature profiles and heat transfer rates for shadow shielded cryogenic tank. Tank, shields, and thermal radiation heat source are all axisymmetric. Thermal analysis considers varying shield and tank temperatures, surface properties, and geometric arrangements. Similar heat source properties are also considered.

B71-10122
PUZZLE - A PROGRAM FOR COMPUTER-AIDED DESIGN OF PRINTED CIRCUIT ARTWORK
HARRELL, D. A. W. ZANE, R.
MAY 1971
LRL-10050
Program assists in solving spacing problems encountered in printed circuit /PC/ design. It is intended to have maximum use for two-sided PC boards carrying integrated circuits, and also aids design of discrete component circuits.

B71-10130
CSM PROGRAMS SM RCS PROPELLANT QUANTITY GAGING SYSTEMS PROGRAM
COX, G. R./N. AM. ROCKWELL CORP./ REYNOLDS, R. G.
MAY 1971
MSC-17308
Computer program calculates actual and useable remaining propellant quantities as required in positive expulsion rocket engine propellant feed system. Program establishes relationship between helium system pressures and temperatures and propellant weight remaining in tanks. Program is written in FORTRAN 4 for IBM-360 computer.

B71-10133
MULTI-DIMENSIONAL REAL FOURIER TRANSFORM
KROGH, F. T.
MAY 1971
NPO-11648
Four subroutines compute one-dimensional and multi-dimensional Fourier transforms for real data, multi-dimensional complex Fourier transforms, and multi-dimensional sine, cosine and sine-cosine transforms. Subroutines use Cooley-Tukey fast Fourier transform. In all but one-dimensional case, transforms are calculated in up to six dimensions.

B71-10134
HIGH-IMPACT DYNAMIC-RESPONSE ANALYSIS OF NONLINEAR STRUCTURES
GUPTA, K. K.
MAY 1971
NPO-11716
Program predicts expected deformations and stresses in nonlinear simple geometric structures subjected to high-impact loading. Technique is based on node-wise predictor-corrector approach and requires moderate computer storage and run time for most problems. Program extends to include physical and geometrical nonlinearities.

B71-10138
SUBROUTINES FOR EVALUATING SINGLE AND MULTIPLE INTEGRALS USING MODIFIED ROMBERG METHOD
BUNTON, W. R. DIETHELM, M.
MAY 1971
NPO-11718
Routines, which have been thoroughly tested, are found to be equal to or better than comparable routines. They are more reliable than SQUANK and capable of solving a larger class of problems.

B71-10147
QUICK RESPONSE TARGETING PROGRAM
BOSLEY, J. T./BOEING CO./
MAY 1971
M-FS-15157
Computer program generates and verifies operational launch vehicle targeting presettings for lunar free-return missions and lunar landing missions. Program is applicable in astronomy and nuclear physics, and in areas where improved targeting techniques are valuable.

B71-10151
METHOD FOR CONSTRUCTING PERIODIC ORBITS IN NONLINEAR DYNAMIC SYSTEMS
BENNETT, A. G./BOEING CO./ HANAFY, L. M. PALMORE, J. I.
MAY 1971
M-FS-14654
Method is modification of generalized Newton-Ralphson algorithm for analyzing two-point boundary problems. It constructs sequence of solutions that converge to precise dynamic solution in the sequence limit. Program calculates periodic orbits in either circular or elliptical restricted three-body problems.

B71-10153
COMPUTER PROGRAM FOR CALCULATING AERODYNAMIC FORCES ON BLADE SECTIONS
MC NALLY, W. D.
JUN. 1971 SEE ALSO LEWIS-10743 LEWIS-10789, LEWIS-11097
LEWIS-11382
Calculation is taken from pressure or velocity distribution along blade surface. Blade sections have either one or two /tandem/ blade segments. Program is recommended primarily for use with ideal flow pressure distributions where forces in drag direction are neglected.

B71-10155
COMPUTING INCOMPRESSIBLE LAMINAR AND TURBULENT BOUNDARY LAYER FORMATION
HERRING, H. J./PRINCETON UNIV./ MELLOR, G. L.
MAY 1971
LEWIS-11190
Program generates initial laminar conditions, such as in Falkner-Skan similarity flows, or turbulent equilibrium profiles. Initial profile input data is used. Combination with inviscid-freestream calculations to predict entire flow field in turbine cascade or around airfoil is possible.

B71-10181
ACCUMULATIVE WEIGHTS PROGRAM
PATE, W. B./BOEING CO./ PINCHA, P. J.
JUN. 1971
M-FS-15066
Program provides capability of assessing weight above given structural station planes for inert and variable masses for any selected loading condition. Output is produced that yeilds weight data concentrated on and/or cantilevered from stations along Saturn 5 vehicle's verticle axis. Input data availability limits program's function to vertical structures.

B71-10185
ELAS8 - COMPUTER PROGRAM FOR LINEAR STRUCTURE EQUILIBRIUM PROBLEMS
UTKU, S.
JUN. 1971 SEE ALSO B68-10187
NPO-11555
Program generates and solves governing equations for unknown deflection of mesh points as if problem were to locate stationary point of total potential function associated with given loading and unknown deflections. Solution is obtained by means of displacement method and finite element technique.

B71-10186
NUMERICAL INTEGRATION OF SECOND ORDER DIFFERENTIAL EQUATIONS
SHANKS, E. B./VANDERBILT UNIV./
JUN. 1971
M-FS-20536
Performance characteristics of higher order approximations of Runge-Kutta type are analyzed, and performance predictors for time required on machine and for error size are developed. Technique is useful in evaluating system performance, analyzing material characteristics, and designing inertial guidance and nuclear instrumentation and materials.

B71-10211
ROTORDYNAMIC RESPONSE ANALYSIS PROGRAM
SHEN, P. A./ROCKETDYNE/
JUL. 1971
HQ-10579
Computer routine is similar to Holzer's method in torsional vibration treatment, and Prohl's and Myklestad's approach in computing rotor deflection. Matrix iteration technique is used to compute rotordynamic response by a simulated discrete mass system.

B71-10215
DIGITAL COMPUTER PROGRAM FOR ANALYZING CHUGGING INSTABILITIES
SZUCH, J. R.
JUL. 1971
LEWIS-11294
Program computes combustion delays, gas residence time, characteristic velocity, and other steady-state parameters required for solution of the characteristic equation. Equation is solved for critical values of injector pressure drops and chugging frequency.

B71-10238
COMPUTER-AIDED DESIGN OF LARGE-SCALE INTEGRATED CIRCUITS - A CONCEPT
SCHANSMAN, T. T./M&S COMPUTING, INC./
JUL. 1971
M-FS-20600
Circuit design and mask development sequence are improved by using general purpose computer with interactive graphics capability establishing efficient two way communications link between design engineer and system. Interactive graphics capability places design engineer in direct control of circuit development.

B71-10240
STORED PROGRAM CONCEPT FOR ANALOG COMPUTERS
HANNAUER, G., III/ELECTRON. ASSOCIATES INC./ PATMORE, J. R.
JUL. 1971
M-FS-20874
Optimization of three-stage matrices, modularization, and black boxes design techniques provides for automatically interconnecting computing component inputs and outputs in general purpose analog computer. Design also produces relatively inexpensive and less complex automatic patching system.

B71-10243
DSIF STATION SCHEDULES
FLARITY, L. D. HANSON, R. J. THOM, E. H.
JUL. 1971
NPO-11547
System manages Deep Space Instrumentation Facilities /DSIF/ equipment construction and modification planning. Versatile program applies to such tasks as employee time and task schedules, pay schedules, operations schedules, and plant and equipment procurement, construction, modification or service.

B71-10244
MANPOWER FORECAST PROGRAM
MC CORNOCK, M. D. MINER, R. R.
JUL. 1971
NPO-11551
Program reports distribution of actual manpower levels in each section versus accounts, projects versus sections, sections versus manpower classes, and project offices versus sections.

B71-10248
VARIABLE ORDER INTEGRATORS FOR THE NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS
KROGH, F. T.
JUL. 1971
NPO-11643
Series of computer subroutines integrates systems of ordinary differential equations and is used for numerical quadrature.

B71-10250
BATTERY SIMULATION PROGRAM
ABREU, A. SLONSKI, J. P.
JUL. 1971
NPO-11580
Computer program calculates spacecraft battery energy at specific times dictated by input sequence of recharge, discharge, and no activity phases. Recharge phases are assumed during times

not specified, unless batteries are fully charged. Warnings are printed when energy falls below specified level. Program assumes two identical batteries.

B71-10267
ANALYSIS OF LOW RESOLUTION MASS SPECTRA
BABST, R. W./SPERRY RAND CORP./ SHAPIRO, H.
AUG. 1971
GSFC-11279
Computer program determines gas constituents from measurements of mass/peak-height spectrum from residual gas analyzer. Applications of program include residual gas analysis for work in space environmental simulators, space environment contamination, and air pollution monitoring.

B71-10284
ON-LINE ANALYSIS OF RANDOM VIBRATIONS
COLE, H. A., JR.
AUG. 1971
ARC-10154
Measuring device, Randomdec, provides continuous on-line signatures representative of system free vibration curve. Selected points on curve are used in control and failure detection systems. Apparatus applied to both linear and nonlinear systems under nonstationary vibratory states.

B71-10285
NASTRAN COMPUTER SYSTEM LEVEL 12.1
BUTLER, T. G.
AUG. 1971 SEE ALSO NASA-SP-221, NASA-SP-222, NASA-SP-223, NASA-SP-224, NASA-SP-260
GSFC-10991
Program uses finite element displacement method for solving linear response of large, three-dimensional structures subject to static, dynamic, thermal, and random loadings. Program adapts to computers of different manufacture, permits up-dating and extention, allows interchange of output and input information between users, and is extensively documented.

B71-10294
RAY TRACING PROGRAM WITH OPTIONS FOR DIFFRACTION GRATINGS
HOWELL, B. J./SPERRY RAND CORP./
AUG. 1971
GSFC-11305
Diffraction theory, developed in vectorial form and coded into ray tracing routines, permits tracing rays of any wavelength through surfaces that are plane, spherical, conical, or aspheric polynomial. Ruled diffraction gratings may run in either X-direction or Y-direction, where Z is optical axis.

B71-10295
DETERMINATION OF RADIATION INTERCHANGE FACTORS
BOBCO, R. P./HUGHES AIRCRAFT CO./ EGENDORF, P. L. MC GRATH, R. J.
AUG. 1971
MSC-13475
Method utilizes an analytical model, a method of solution which is compatible with digital computer analysis, and a generalized computer program to carry out the computations.

B71-10296
SPIN VECTOR CONTROL OF A SPINNING SPACE STATION
HENDRICKS, T./MARTIN MARIETTA CORP./
AUG. 1971
M-FS-21333
Digital computer program simulates system and related functions. Program is intended for, but not limited to, altitude control studies of rotating space station. Russel's method of formulating and solving motion equations for system of rigid bodies connected by movable joints is applied. Program features are listed.

B71-10306
CLOSED-LOOP CONTROL OF STOCHASTIC NONLINEAR SYSTEMS
SCHMIDT, G. T./MIT/
AUG. 1971
MSC-13858
Technique resolves problems in complex control systems, such as those used for space vehicle guidance and control. Main disadvantage of procedure is that it is only appropriate in situations where trajectory concept is valid.

B71-10308
ENERGY LEVELS AND TRANSITION PROBABILITY MATRIX ELEMENTS OF RUBY FOR MASER APPLICATIONS
BERWIN, R. W.
AUG. 1971
NPO-11687
Program computes fine structure energy levels of ruby as a function of magnetic field. Included in program is matrix formulation, each row of which contains a magnetic field and four corresponding energy levels.

B71-10314
TCB OPERATION SUPPLY INVENTORY SYSTEM /TCBSYS/
TU, H.-Y./COMPUTING AND SOFTWARE, INC./
AUG. 1971
GSFC-11306
System produces inventory report for each updated period and special report for long term inventory information summary. Report summarizes consumption, outstanding orders, and balance of each inventory item. System generates, corrects, and adjusts inventory tapes. Restrictions of system are listed.

B71-10321
MAPS - A COMPUTERIZED MANAGEMENT ANALYSIS AND PLANNIN(SYSTEM
PACKE, D. R. RAFFAELI, G. A.
AUG. 1971
LEWIS-11349
Program lists work structure of projects at all levels. System integrates work item, its schedule, its status against the schedule, responsible personnel, and explanatory comments. structure of MAPS promotes natural organization of project work elements, project features and uses are given.

B71-10372
ANALYSIS OF MULTILAYERED FIBER COMPOSITES
CHAMIS, C.
OCT. 1971
LEWIS-11347
Multilevel analysis computer program is useful in fiber matrix composites diagnosis, in structural syntheses of multilayered thornel/epoxy composite plates, in buckling studies of simply supported multilayered fiber composite plates, and in computing lamination residual stresses in angle ply composites.

B71-10373
COMPUTATION OF GROUP TABLE ALPHANUMERIC DISPLAY
ALLEN, G. EVANS, D. D.
SEP. 1971
LEWIS-11346
Computer program, using only group elements as input data, provides machine computation of group tables used for proving theorems and algorithms of finite groups. Program is written for second generation computers.

B71-10374
DYNAMICS OF SHORT PRESSURE PROBES
ENGLUND, D. R. NYLAND, T. W.
SEP. 1971
LEWIS-11293
Report presents practical information for incorporating particle impact protection features and average total pressure measurement into probe design while optimizing probe transient response. Computer program calculates probe response, based on Bergh-Tijdeman equation.

B71-10376
NEW PROCEDURE FOR DETERMINING MINIMUM TIME ORBIT TRANSFERS
DAVIS, D. A./BOEING CO./
OCT. 1971
M-FS-14804
Computer program includes time minimizing function required for propellant constrained minimum time impulsive transfer between coplanar circular orbits or unrestricted orbits. Basic formulation

is extended to include inclined circular or inclined elliptic orbits.

B71-10377
COMPUTER PROGRAM FOR DISCOUNTED CASH FLOW/RATE OF RETURN EVALUATIONS
ROBSON, W. D./ROCKETDYNE/
OCT. 1971
M-FS-19040
Technique, incorporated into set of three computer programs, provides economic methodology for reducing all parameters to financially sound common denominator of present worth, and calculates resultant rate of return on new equipment, processes, or systems investments.

B71-10382
STUDY-SIMULATION OF SPACE STATION DYNAMICS
GAITENS, M. J./GE/
OCT. 1971
M-FS-21227
Matrix algebra translator and executor /MATE/ takes equations describing structural control system environmental interaction problem for flexible spacecraft components and loads them into self programming computer.

B71-10384
METABOLIC BALANCE ANALYSIS PROGRAM
ROMBACH, J./MARTIN MARIETTA CORP./
OCT. 1971
M-FS-21237
Computer program calculates 28 day diet for life support consumables requirements and waste removal. Equations representing food breakdown into carbohydrates, fats, and proteins, modified to account for digestive materials and indigestible crude fibers, formulate total energy consumption. Program applications are listed.

B71-10386
THERMAL ANALYSIS SYSTEM /TAS-1/ PROGRAM
HULTBERG, J. A. OBRIEN, P. F.
OCT. 1971
NPO-11849
Digital computer program develops temperature control system which maintains various subsystems within proper temperature limits. Coding is simple and input rules are easy to use and remember. Output format is easy to understand and to analyze for error diagnosis.

B71-10389
TOLERANCE ANALYSIS PROGRAM
WATSON, H. K./N. AM. ROCKWELL CORP./
OCT. 1971
MSC-17487
Digital computer program determines tolerance values of end to end signal chain or flow path, given preselected probability value. Technique is useful in the synthesis and analysis phases of subsystem design processes.

B71-10390
DOUBLE PRECISION TRAJECTORY PROGRAM /DPTRAJ 2.2C/
JOSEPH, A. E. KHATIB, A. R. STRAND, J. STURMS, F. M., JR. TALBOT, T. D. WARNER, M. R. WITT, J.
OCT. 1971
NPO-11798
Four part program computes trajectory of space probe moving in solar system and subject to variety of forces.

B71-10392
COMPUTER PROGRAM /TURBLE/ FOR CALCULATING VELOCITIES AND STREAMLINES IN TURBOMACHINES
KATSANIS, T. MC NALLY, W. D.
OCT. 1971 SEE ALSO B68-10097
LEWIS-10788
Program is used in design of turbomachinery blade rows, where fluid velocities in blade to blade passage must be obtained. TURBLE requires input data on blade geometry, meridional stream-channel geometry, total flow conditions, weight flow, and inlet and outlet flow angles.

B71-10398
STEADY TEMPERATURE AND DENSITY DISTRIBUTIONS IN A GAS CONTAINING HEAT SOURCES
DAVISON, H. W.
OCT. 1971
LEWIS-10905
Computer program, STADDIG, is based on steady state, one dimensional heat transfer calculation using cylindrical coordinates. Program allows for conduction across gas and container walls. Heat is dissipated from walls by forced convection cooling with incompressible coolant. Heat sources are included in coolant, gas, and walls.

B71-10399
ANALYSIS AND DESIGN OF A FLAT CENTRAL FINNED-TUBE RADIATOR
AUER, B. M. HALLER, H. C. KREBS, R. P.
OCT. 1971
LEWIS-10893
Computer program based on fixed conductance parameter yields minimum weight design. Second program employs variable conductance parameter and variable ratio of fin length to tube outside radius, and is used for radiator designs with geometric limitations. Major outputs of the two programs are given.

B71-10400
COMPUTER PROGRAM OPTIMIZES DESIGN OF NUCLEAR RADIATION SHIELDS
LAHTI, G. P.
OCT. 1971
LEWIS-10998
Computer program, OPEX 2, determines minimum weight, volume, or cost for shields. Program incorporates improved coding, simplified data input, spherical geometry, and an expanded output. Method is capable of altering dose-thickness relationship when a shield layer has been removed.

B71-10401
MICROBIAL BURDEN PREDICTION MODEL PROGRAM
MEUSER, R. F./MARTIN MARIETTA CORP./ NELSON, B. A.
OCT. 1971
NPO-11709
Model supplements biological surveys of spacecraft by simulating microbial burden accumulation process during periods when surveys are not taken. Important application of model is to predict microbial loading on spacecraft landing capsule immediately prior to terminal heat sterilization.

B71-10402
COMPUTER PROGRAM CALCULATES TRANSONIC VELOCITIES IN TURBOMACHINES
KATSANIS, T.
OCT. 1971
LEWIS-10977
Computer program, TSONIC, combines velocity gradient and finite difference methods to obtain numerical solution for ideal, transonic, compressible flow for axial, radial, or mixed flow cascade of turbomachinery blades.

B71-10413
FRACTURE MECHANICS EVALUATION OF TI-6A1-4V PRESSURE VESSELS
COX, D. G./BOEING CO./
NOV. 1971
MSC-13995
Computer program calculates maximum potential flaw depth after specific cyclic pressure history. Kobayashi's solution to critical stress intensity equation and empirical relation for flaw growth rate are used. Program assesses pressure vessels of any material but only cylindrical or spherical shapes.

B71-10414
FRAME MODAL ANALYSIS
GUYAN, R. J./N. AM. ROCKWELL CORP./ HECKENLAIBLE, R. N.
NOV. 1971
MSC-17562
Computer model calculates natural frequencies and modal displacements of three-dimensional frame structures, and generates stiffness and mass matrices. Structures may be divided into several substructures prior to calculation of modal characteristics.

B71-10423
ERROR EVALUATION FOR DIFFERENCE APPROXIMATIONS TO ORDINARY DIFFERENTIAL EQUATIONS
HAMMOND, J. L., JR./GA. INST. OF TECH./
NOV. 1971 SEE ALSO B71-10424 NASA-CR-103015
M-FS-21610
Method involves relationships between errors introduced by using finite sampling rates and parameters describing specific numerical method used. Procedurre is used in design and analysi of digital filters and simulators.

B71-10424
HYBRID COMPUTER TECHNIQUES FOR SOLVING PARTIAL DIFFERENTIAL EQUATIONS
HAMMOND, J. L., JR./GA. INST. OF TECH./ ODOWD, W. M.
NOV. 1971 SEE ALSO B71-10423
M-FS-21386
Techniques overcome equipment limitations that restrict other computer techniques in solving trivial cases. The use of curve fitting by quadratic interpolation greatly reduces required digital storage space.

B71-10431
MANPOWER MANAGEMENT INFORMATION SYSTEM /MIS/
GRAVETTE, M. C./COMPUTER SCI. CORP./ KING, W. L.
NOV. 1971
M-FS-21477
System of programs capable of building and maintaining data bank provides all levels of management with regular manpower evaluation reports and data source for special management exercises on manpower.

B71-10441
VIBRATIONAL TRANSFER FUNCTIONS FOR BASE EXCITED SYSTEMS
ERNST, C./MARTIN MARIETTA CORP./ JONES, P. J.
NOV. 1971
M-FS-21432
Computer program GD203 develops transfer functions to compute governing vibration environment for complex structures subjected to a base motion.

B71-10447
MINIMUM WEIGHT METEOROID SHIELDING DETERMINATION
FURUIKE, S. C./N. AM. ROCKWELL CORP./ MC HUGH, A. H.
RICHARDSON, A. J.
NOV. 1971
MSC-17017
Computer program determines minimum shielding necessary for adequate protection of flight hardware, based on component physical size, methods of shielding to be used, and amount of damage which can be sustained without component failure.

B71-10448
FORTRAN 4 DIGITAL PROGRAM CHANGER
MADDEN, M. F./N. AM. ROCKWELL CORP./
NOV. 1971
MSC-17567
Computer program modifies other source language programs as aid to debugging, checkout and final documentation to eliminate manual performance of rearranging and incrementing statement numbers, identifying and sequencing cards and inserting and/or removing end-of-batch symbols.

B71-10453
GRAPHICAL METHOD FOR ANALYZING DIGITAL COMPUTER EFFICIENCY
CHAN, S. P./SANTA CLARA UNIV./ MUNOZ, R. M.
NOV. 1971
ARC-10210
Analysis method utilizes graph-theoretic approach for evaluating computation cost and makes logical distinction between linear graph of a computation and linear graph of a program. It applies equally well to other processes which depend on quatitative edge nomenclature and precedence relationships between edges.

B71-10456
OPTICAL DESIGN AND ANALYSIS PROGRAM
MEREDITH, C. F./SPERRY RAND CORP./
NOV. 1971
GSFC-11393
Computer program provides efficient handling of optical analysis equations and is sufficiently general in approach to accept wide variety of systems. Diagnostic messages are generated to aid user in pinpointing any inconsistencies in system definition.

B71-10462
RADIATION DIFFRACTION CALCULATION PROGRAM /DIFF2/
INNOVATOR NOT GIVEN /PROGRAMMING METHODS, INC./ NOV. 1971
GSFC-11422
Computer program computes maximum possible strength of interference pattern sent from high altitude tracking and data relay satellite to low altitude user satellite.

B71-10463
CLOUD-FREE RESOLUTION ELEMENT STATISTICS PROGRAM
LILEY, B./N. AM. ROCKWELL CORP./ MARTIN, C. D.
NOV. 1971
GSFC-11494
Computer program computes number of cloud-free elements in field-of-view and percentage of total field-of-view occupied by clouds. Human error is eliminated by using visual estimation to compute cloud statistics from aerial photographs.

B71-10472
LANDING DYNAMICS PROGRAM FOR IMPACT ATTENUATING VEHICLES /LANDIT/
KNOELL, A. C. PATTON, R. H.
DEC. 1971
NPO-10840
Computer program accurately predicts impact response of previously designed disc-type Mars prototype landing vehicle. Program may be used in any design area where energy dissipation is considered.

B71-10473
COMPUTER DESIGN OF EXTENSION SPRINGS
MOORE, D. R./N. AM. ROCKWELL CORP./
DEC. 1971
M-FS-24073
Computer program speeds up design process of tension springs and simultaneously optimizes the design by varying the input.

B71-10490
MONTE CARLO PROGRAM FOR THE TRANSPORT OF NEUTRONS AND GAMMA RAYS
JORDON, T. M./A.R.T. RES. CORP./
DEC. 1971
LEWIS-11403
Computer program computes transport of neutrons and gamma rays in complex geometries and fluxes averaged over specified regions and surfaces of the geometry.

B71-10491
SYNTHESIS OF DYNAMIC SYSTEMS
ADMIRE, J./MARTIN MARIETTA CORP./ WOHLEN, R.
DEC. 1971
M-FS-21490
FORTRAN matrix analysis /FORMA/ program finds solutions of small and medium size structural dynamics problems of up to 150 deg of freedom.

B71-10492
OPTIMIZED TECHNIQUES AND REQUIREMENTS FOR COMPUTER IMPROVEMENT OF STRUCTURAL WELD RADIOGRAPHS
THOMAS, D. T.
DEC. 1971
M-FS-21627
Hardware and software specification covers requirements for using subroutines to improve structural weld photographs.

B71-10499
A LOW-ALTITUDE SATELLITE INTERACTION STUDY
BIENKOWSKI, G. K./RCA/ HOLMAN, J. M. L. MC KINLEY, R.
R. SISKIND, S. M.
DEC. 1971
GSFC-11384
Two computer programs calculate interaction effects of high speed spacecraft on the environment at altitudes from 90 km to 150 km. EXT program determines fluid field in bodies of arbitrary geometries in transient flow regime. INT program

uses EXT output and measures flow conditions inside spacecraft body.

B71-10500
AUTOMATED PREVENTIVE MAINTENANCE PROGRAM
CEA, E. J./SPERRY RAND CORP./ GRIEGER, T. H.
DEC. 1971
GSFC-11408
Maintenance program which is concise and inexpensive to operate adapts to almost any system that has a FORTRAN compiler. Program operates on a stored data base with an output consisting of scheduling information and various management reports.

B71-10501
PREDICTION OF STALL CHARACTERISTICS OF STRAIGHT WING AIRCRAFT
FOX, C. H. KISIELOWSKI, E./DYNASCI. CORP./ MC VEIGH, M. A.
DEC. 1971 SEE ALSO NACA-TM-1036, NACA-TR-1090, NASA-CR-1646
LANGLEY-11013
Digital computer program considers an unswept wing with a circular or elliptical fuselage. Wing has partial or full span deflected flaps and must have an aspect ratio of 6 or greater.

B71-10508
DESIGN AND EVALUATION OF CONVECTIVELY COOLED NOZZLES
DERDERIAN, G. DUSCHA, R. A. ROHDE, J. E.
DEC. 1971
LEWIS-10894
Computer program utilizes a desired gas sidewall temperature profile as an input and calculates the coolant passage dimensions required to achieve it. Second program utilizes fixed coolant passage dimensions as an input and calculates the resulting temperature profile.

B71-10509
EVALUATION OF ROTATING, INCOMPRESSIBLY LUBRICATED, PRESSURIZED THRUST BEARINGS
FLEMING, D. P.
DEC. 1971
LEWIS-11511
Program evaluates a series hybrid, fluid film ball bearing consisting of an orifice compensated pressurized thrust bearing in conjunction with a self-acting journal bearing. Oil viscosities corresponding to experimentally measured ball bearing outer-race temperatures were used.

B71-10532
A STUDY OF HIGH FREQUENCY NONLINEAR COMBUSTION INSTABILITY IN BAFFLED ANNULAR LIQUID PROPELLANT ROCKET MOTORS
ABREU, A. BURSTEIN, S. Z. KUSHIDA, R. O. SCHECHTER, H.
DEC. 1971
NPO-11800
Computer program contains mathematical model which provides relationship between engine gas dynamics and combustion processes. Mathematically simulated explosions initiate gas disturbances. Design methods for damping disturbances can be studied to prevent future engine shutdown or destruction.

B71-10535
VIBRATION CHARACTERISTICS OF RING-STIFFENED ORTHOTROPIC SHELLS OF REVOLUTION
ADELMAN, H. M. CATHERINES, D. S. DURLING, B. J. STEEVES, E. C. WALTON, W. C., JR.
DEC. 1971
LANGLEY-10989
Computer program solves vibration modes and frequencies of thin shells of revolution having general meridional curvature and orthotropic elastic properties in order to evaluate the dynamic behavior of structures with thin shelled components.

B72-10015
SOFTWARE CONTROL FOR LARGE SCALE ON-BOARD CHECKOUT: A CONCEPT
H. K. Grounds (IBM) and D. H. Norton, Jr. (IBM)
1972
MSC-13977

Two level system checkout in which first level satisfies continuous monitoring requirements and second level provides fault isolation to satisfy maintenance requirements, provides self-checking capability for monitoring system and enables recovery from unexpected error or failure interruptions. System must perform operational duties of navigation, control, and experimentation.

B72-10023
ALGORITHM FOR LIAPUNOV STABILITY ANALYSIS
G. R. Geiss (Grumman Aerospace Corp.), V. D. Cohen (Grumman Aerospace Corp.), and D. S. Rothschild (Grumman Aerospace Corp.)
1972 See also NASA-CR-1729; NASA-CR-73383
ARC-10498
Development of algorithm provides automatic computation of quadratic estimate of domain of stability for stable equilibrium states of nonlinear systems of ordinary differential equations.

B72-10064
PREDICTION OF DUCTED FAN PERFORMANCE
M. R. Mendenhall (Nielsen Eng. and Res., Inc.) and S. B. Spangler (Nielsen Eng. and Res., Inc.)
Aug. 1972
ARC-10615
Computer program to predict performance of ducted fan combination at specified advance ratio and angle of attack is described. Parameters affecting performance of ducted fan are presented. Information obtained from computer program is explained for various conditions considered.

B72-10065
VARIABLE DIMENSION AUTOMATIC SYNTHESIS PROGRAMS (VASP)
J. S. White and H. Q. Lee
1972
ARC-10616
Variable dimension FORTRAN 4 version of the Automatic Synthesis Program (ASP) compensates for limitations within the program itself. Improvements are versatile programming language, convenient input/output format, new subprograms, variable dimensioning, and efficient storage.

B72-10067
PROGRAM TO DETERMINE RADIATING, NONADIABATIC, INVISCID FLOW OVER A BLUNT BODY BY THE METHOD OF INTEGRAL RELATIONS
F. W. Taylor
1972
LANGLEY-11048
Computer program performs the many calculations necessary for solving radiating, nonadiabatic flow of air in chemical equilibrium. Solution method provides accurate description of blunt body flow field in subsonic region.

B72-10068
PROGRAM FOR THE TRANSIENT RESPONSE OF ABLATING AXISYMMETRIC BODIES INCLUDING THE EFFECTS OF SHAPE CHANGE
L. M. Howser and S. S. Tompkins
1972
LANGLEY-11049
Governing differential equation, boundary conditions for the analysis on which computer program is based, and method of solution of resulting finite difference equations are discussed in the documentation.

B72-10069
MAIN TANK INJECTION PRESSURIZATION PROGRAM
E. C. Cady (McDonnell-Douglas Corp.) and D. W. Kendle (McDonnell-Douglas Corp.)
Dec. 1972
LEWIS-11368
Computer program predicts performance of fluorine-hydrogen main tank injection pressurization system for full range of liquid-hydrogen-fueled space vehicles. Analytical model includes provisions for heat transfer, injectant jet penetration, and ullage

gas mixing. Analysis predicts GF2 usage, ullage gas and tank wall temperatures, and LH2 evaporation.

B72-10070
DESIGN OF TWO-DIMENSIONAL SHARP-EDGED-THROAT SUPERSONIC NOZZLE WITH BOUNDARY-LAYER CORRECTION
L. J. Goldman and M. R. Vanco
1972
LEWIS-11636

Computer program accounts for effective nozzle geometry changes due to boundary layer displacement thickness. Program input and output are discussed.

B72-10071
PROGRAM FOR DETERMINATION OF RADIATION INTERCHANGE FACTORS
L. W. Fesler (N. Am. Rockwell Corp.) and T. S. McClintic (N. Am. Rockwell Corp.)
Dec. 1972
MSC-17563

Digital computer model was devised for determining thermal and solar radiation interchange factors. Program computes interchange factors among surfaces having any combination of following properties: diffuse emittance and reflectance, diffuse emittance and specular reflectance, diffuse emittance and components of diffuse and specular reflectance, and directional emittance and bidirectional reflectances.

B72-10072
WIND TRAJECTORY TRACING FOR AIR POLLUTION STUDIES (AIRPOL)
A. B. Street and J. N. Strand
1972
NPO-11892

Wind trajectory computer program, consisting of data handling program and analysis program, traces Los Angeles Basin wind patterns either backward or forward in time. Program may be applicable to other areas.

B72-10073
STRUCTURAL DESIGN AND STRESS ANALYSIS PROGRAM FOR ADVANCED COMPOSITE FILAMENT-WOUND AXISYMMETRIC PRESSURE VESSELS (COMTANK)
A. C. Knoell
1972
NPO-11943

Computer program has been specifically developed to handle, in an efficient and cost effective manner, planar wound pressure vessels fabricated of either boron-epoxy or graphite-epoxy advanced composite materials.

B72-10111
PROGRAM FOR CALCULATING LAMINAR AND TURBULENT BOUNDARY LAYERS IN ARBITRARY PRESSURE GRADIENTS
W. D. McNally
1972
LEWIS-11097

Computer program predicts growth of boundary layers along any surface where air is flowing. Two integral methods, Cohen-Reshotko and Sasman-Cresici, calculate laminar boundary layers and turbulent boundary layers, respectively; Schlichting-Granville method predicts transition from laminar to turbulent flow.

B72-10142
STANDARDIZATION AND QUALIFICATION OF COMPUTER PROGRAMS FOR CIRCUIT DESIGN
D. F. Martin (Calif. Univ.), L. P. McNamee (Calif. Univ.), D. E. Meyerhoff (Calif. Univ.), and T. S. Chow (Calif. Univ.)
1972
M-FS-21537

Study presents methods and initial procedures which may be obtained for development of more efficient uniform network analysis input language and theoretical tools to prove equivalence of data representations.

B72-10153
MISLIFT AND MISS-DRAG PROGRAMS
C. M. Jackson, Jr. and W. C. Sawyer
May 1972
LANGLEY-10932; LANGLEY-10935

Method, developed and coded for digital computation, predicts aerodynamic loading on configurations for which linear theory assumptions are violated. Program is written in FORTRAN 4 for use on CDC-6000 series computers..

B72-10182
PROLATE SPHEROIDAL SLOSH MODEL FOR FLUID MOTION
H. A. Flanders (TRW Systems Group)
May 1972
MSC-13864

Mathematical model, designed for zero gravity conditions, analyzes dynamic effects of large amplitude fluid motion interior to a rigid body. It has two advantages over other mathematical models: (1) constrains slosh motion to given region in natural manner, and (2) allows equilibrium position of slosh mass to be anywhere on slosh surface.

B72-10214
RELIABILITY ANALYSIS BASED ON OPERATIONAL SUCCESS CRITERIA
F. G. Esmond (Santa Barbara Res. Center) and M. D. Johnson (Santa Barbara Res. Center)
May 1972
ARC-10490

Failure Modes, Effects, and Criticality Analysis Model disregards failures of insignificant components. Assumptions used to establish baselines for reliability prediction and analytical method are listed. Techniques are applicable to any commercial design and can be extended into software or management systems.

B72-10222
OPTIMIZATION TECHNIQUE FOR PROBLEMS WITH AN INEQUALITY CONSTRAINT
K. J. Russell (Hughes Aircraft Co.)
1972
ARC-10522

General technique uses a modified version of an existing technique termed the pattern search technique. New procedure called the parallel move strategy permits pattern search technique to be used with problems involving a constraint.

B72-10225
INDEFINITE INTEGRALS OF PRODUCTS OF SOME EXPONENTIAL AND TRIGONOMETRIC FUNCTIONS
W. Rostafinski
May 1972
LEWIS-11493

Two integrals have been developed which are needed to solve certain problems of mathematical physics related to the Bessel and Euler equations. Integrals of this type have known application in problems using cylindrical coordinates.

B72-10253
COMPUTER PROGRAM DRAWS THREE-DIMENSIONAL SURFACES
R. B. Canright, Jr. and P. Swigert
May 1972 See also NASA-TM-X-1589
LEWIS-10482

Computer plotting program PLOT 3D draws views of surface forms z = f(x,y). Surface thus defined by program may be drawn after arbitrary rotations. Program portrays behavior of various functions involving two variables in many engineering, physics, and mathematical relationships.

B72-10261
DUAL REDUNDANT CORE MEMORY SYSTEMS
F. E. Hull (Martin Marietta Corp.)
Jun. 1972
MSC-13993

Electronic memory system consisting of series redundant drive switch circuits, triple redundant majority voted memory timing

functions, and two data registers to provide functional dual redundancy is described. Signal flow through the circuits is illustrated and sequence of events which occur within the memory system is explained.

B72-10265
SNAP DYNAMICS
L. Kiefling, W. D. Whetstone, and C. E. Jones
Jun. 1972
M-FS-21531

Computer program calculates normal vibration modes of complex structures eliminating excessively large amounts of input data, run time, and core storage. Provision for accuracy improvement is also included.

B72-10267
VIDEO INFORMATION SYSTEM
E. R. Ritch (Ampex Corp.)
Jun. 1972
M-FS-21711

Computerized information storage and display system directs storage of documents, drawings, photographs, fingerprints, etc., and permits rapid retrieval for real-time viewing on remote consoles.

B72-10299
RAPID ANALYSIS OF ELECTRIC PROPULSION MISSIONS
A. C. Mascy
Sep. 1972
ARC-10430

Computer program has been designed to handle computations for low thrust missions rapidly and with acceptable accuracy. Program defines performance and system requirements of electrically-propelled unmanned planet-orbiter and flyby missions. The program is written in FORTRAN 4 for use on an IBM 360 or CDC 6600 computer.

B72-10311
CUBIC SPLINE FUNCTIONS FOR CURVE FITTING
J. D. Young
Dec. 1972 See also UCRL-17659; UCRL-17742; UCRL-18253; UCRL-18346; UCRL-18364
LRL-10034

FORTRAN cubic spline routine mathematically fits curve through given ordered set of points so that fitted curve nearly approximates curve generated by passing infinite thin spline through set of points. Generalized formulation includes trigonometric, hyperbolic, and damped cubic spline fits of third order.

B72-10335
MATHEMATICAL TECHNIQUES FOR ESTIMATING OPERATIONAL READINESS OF COMPLEX SYSTEMS
I. D. Jacquier (N. Am. Rockwell Corp.) and P. A. Miltz (N. Am. Rockwell Corp.)
Jul. 1972
MSC-17694

Development of methods for predicting operational readiness of complex systems based on probability theory is discussed. Operational readiness of systems is defined and mathematical relationships involved in determining readiness are presented. Example of reliability engineering and quality control is included.

B72-10350
MEMORY REDUCTION THROUGH HIGHER LEVEL LANGUAGE HARDWARE
H. Kerner and L. Gellman
Jul. 1972
M-FS-21128

Application of large scale integration in computers to reduce size and manufacturing costs and to produce improvements in logic function is discussed. Use of FORTRAN 4 as computer language for this purpose is described. Effectiveness of method in storing information is illustrated.

B72-10362
COMPUTER PROGRAM FOR NATURAL GAS FLOW THROUGH NOZZLES
R. C. Johnson
Dec. 1972
LEWIS-11534

Subroutines, FORTRAN 4 type, were developed for calculating isentropic natural gas mass flow rate through nozzle. Thermodynamic functions covering compressibility, entropy, enthalpy, and specific heat are included.

B72-10405
FORTRAN PROGRAM FOR COMPUTING COORDINATES OF CIRCULAR-ARC, SINGLE AND TANDEM, TURBINE AND COMPRESSOR, BLADE SECTIONS ON A PLANE
W. D. McNally and J. E. Crouse
Dec. 1972
LEWIS-11237

Coordinates for circular arc blade section of aircraft high speed compressor gas turbines were computed using FORTRAN 4 program. Aerodynamic configurations studied include single segment airfoils, airfoils with slots, and multiple segment tandem arranged airfoil.

B72-10410
PROGRAM TO DETERMINE SPACE VEHICLE RESPONSE TO WIND TURBULENCE
H. D. Wilkening (Martin Marietta Corp.)
Dec. 1972
M-FS-21614

Computer program was developed as prelaunch wind monitoring tool for Saturn 5 vehicle. Program accounts for characteristic wind changes including turbulence power spectral density, wind shear, peak wind velocity, altitude, and wind direction using stored variational statistics.

B72-10444
VARIABLE BOUNDARY II HEAT CONDUCTION
J. Gramer (Gen. Dyn./Convair) and R. F. ONeill (Gen. Dyn./Convair)
Jul. 1972
LEWIS-10679

Computer program for solving both transient and steady-state heat transfer problems is presented. Specific applications of computer program are described. Formulation for individual nodes of solid medium for heat balance is presented. Diffusion equation is solved for all nodes simultaneously at finite increments of time.

B72-10458
SYSTEMS EFFECTIVENESS EVALUATION PROGRAM
H. P. Nicely, Jr. (GE) and W. D. Givens (GE)
Aug. 1972
HQ-10306

Eight integrated computer programs provide needed capability to reduce man-hours needed to perform routine monitoring and assessment of effectiveness, reliability, and maintainability of large electronic equipment systems.

B72-10483
COMPUTER PROGRAM FOR CALCULATING THE TEMPERATURE FIELD OF FACE SEALS
T. E. Russell, G. P. Allen, L. P. Ludwig, and R. L. Johnson
Aug. 1972
LEWIS-11110

FORTRAN 4 program for use on IBM 7094 computer for calculating temperature field of shaft seals is described. Shaft seals are composed of basically axisymmetric bodies. Cylindrical coordinate system is used as basis for analysis. Program is quite general and can be applied to variety of axisymmetric body problems.

B72-10486
COMPENSATOR DESIGN FOR LOW-SENSITIVITY LINEAR TIME-INVARIANT SYSTEMS (COMPDES)
L. Willner (Rensselaer Polytech. Inst.)
Aug. 1972
M-FS-21652

Digital computer program written in FORTRAN 4 has capability of synthesizing low order compensators to stabilize dynamical system in presence of parameter variations. Design scheme is accomplished by means of sensitivity function which is minimized with respect to eigenvalues.

B72-10504
GEOMETRICALLY NONLINEAR STATIC AND DYNAMIC ANALYSIS OF ARBITRARILY LOADED SHELLS OF REVOLUTION
R. G. Ball (Naval Postgraduate School)
Aug. 1972
LANGLEY-11109

Computer program on axisymmetric response of shells with other meridional geometries and response of shells subjected to asymmetric loads is described. Description of theory, method of solution, instructions for preparing input data, and two sample problems to illustrate data preparation and output format are included.

B72-10568
HIGH SPEED SEQUENTIAL DECODER
K. S. Gilhousen (Linkabit Corp.)
Sep. 1972
ARC-10657

Operation of sequential decoding of data at high rates using Fano algorithm is discussed. Actions followed by decoder in systematically searching branches are described. Technique of diagonal steps is explained and illustrated.

B72-10577
ANALYSIS AND COMPUTER PROGRAMS TO CALCULATE ACOUSTIC WAVE PROPERTIES OF BAFFLED CHAMBERS
C. L. Oberg (N. Am. Rockwell Corp.), T. L. Wong (N. Am. Rockwell Corp.), and R. A. Schmeltzer (N. Am. Rockwell Corp.)
Sep. 1972
LEWIS-11529

Analytical methods and four computer programs have been developed for calculating wave motion in closed, baffled chambers with rigid and non-rigid boundaries. Application of these methods to design of injector-face baffles in liquid propellant engines will provide significant insight into effects of baffles on combustion stability.

B72-10582
COMPUTER METHOD FOR IDENTIFICATION OF BOILER TRANSFER FUNCTIONS
J. H. Miles
Sep. 1972 See also NASA-TM-X-2436
LEWIS-11808

Iterative computer aided procedure was developed which provides for identification of boiler transfer functions using frequency response data. Method uses frequency response data to obtain satisfactory transfer function for both high and low vapor exit quality data.

B72-10584
COMPUTER PROGRAMS FOR THE DESIGN OF LIQUID-TO-LIQUID JET PUMPS
N. L. Sanger
Dec. 1972
LEWIS-11679

Computer programs based on one-dimensional equations for cavitating and noncavitating flow in liquid-to-liquid jet pumps are described.

B72-10585
COMPUTER PROGRAM FOR FITTING LOW-ORDER POLYNOMIAL SPLINES BY METHOD OF LEAST SQUARES
P. J. Smith
Sep. 1972
LEWIS-11651

FITLOS is computer program which implements new curve fitting technique. Main program reads input data, calls appropriate subroutines for curve fitting, calculates statistical analysis, and writes output data. Method was devised as result of need to suppress noise in calibration of multiplier phototube capacitors.

B72-10586
COMPUTER PROGRAM FOR QUASI-THREE-DIMENSIONAL CALCULATION OF SURFACE VELOCITIES AND CHOKING FLOW FOR TURBOMACHINE BLADE ROWS
T. Katsanis
Sep. 1972 See also NASA-TM-X-1394: NASA-TN-D-6177
LEWIS-11635

Computer program, CHANEL, can obtain quasi-three-dimensional solutions in any well-guided channel. Conditions that can be handled by program that could not be handled previously are nonuniform inlet temperature, pressure, prewhirl, nonaxial flow where meridional flow angle, meridional stream-line curvature, and radius can vary as desired from hub to tip.

B72-10589
REDUNDANT DATA MANAGEMENT SYSTEM
J. R. Hall (McDonnell-Douglas Corp.)
Sep. 1972
M-FS-21831

Redundant data management system solves problem of operating redundant equipment in real time environment where failures are detected, isolated, and switched in simple manner. System consists of quadruply-redundant computer, input/output control units, and data bases. System inherently contains failure detection, isolation, and switching function.

B72-10599
SYSTEM/360 COMPUTER ASSISTED NETWORK SCHEDULING (CANS) SYSTEM
A. C. Brewer (IBM)
Oct. 1972
GSFC-10909

Computer assisted scheduling techniques that produce conflict-free and efficient schedules have been developed and implemented to meet needs of the Manned Space Flight Network. CANS system provides effective management of resources in complex scheduling environment. System is automated resource scheduling, controlling, planning, information storage and retrieval tool.

B72-10600
SIGNIFICANCE ARITHMETIC EXPERIMENTAL PACKAGE (SIGPAC)
I. Cole (Computation Planning, Inc.)
Oct. 1972
GSFC-11499

Method for use by computing facility to determine accuracy of computer calculations is presented. Primary goals of error analysis program are described. Program is designed for both FORTRAN 4 and ASSEMBLER for use with IBM 360 computer.

B72-10601
STUDY OF HIGH ALTITUDE PLUME IMPINGEMENT
C. J. Wojciechowski (Lockheed Missiles and Space Co.), M. M. Penny (Lockheed Missiles and Space Co.), R. J. Prozan (Lockheed Missiles and Space Co.), D. Seymour (Lockheed Missiles and Space Co.), and T. F. Greenwood (Lockheed Missiles and Space Co.)
Oct. 1972
M-FS-21414

Computer program has been developed as analytical tool to predict severity of effects of exhaust of rocket engines on adjacent spacecraft surfaces. Program computes forces, moments, pressures, and heating rates on surfaces immersed in or subjected to exhaust plume environments. Predictions will be useful in design of systems where such problems are anticipated.

B72-10602
PROGRAM FOR STANDARD STATISTICAL DISTRIBUTIONS
L. W. Falls
Oct. 1972
M-FS-21466

Development of procedure to describe frequency distributions involved in statistical theory is discussed. Representation of frequency distributions by first order differential equation is

presented. Classification of various types of distributions based on Pearson parameters is analyzed.

B72-10604
INTERPLANETARY TRAJECTORIES, ENCKE METHOD (ITEM)
F. H. Whitlock, H. Wolfe (Anal. Mech. Associates, Inc.), L. Lefton (Anal. Mech. Associates, Inc.), and N. Levine (Anal. Mech. Associates, Inc.)
Oct. 1972
GSFC-11576

Modified program has been developed using improved variation of Encke method which avoids accumulation of round-off errors and avoids numerical ambiguities arising from near-circular orbits of low inclination. Variety of interplanetary trajectory problems can be computed with maximum accuracy and efficiency.

B72-10605
PROPULSION SIZING PROGRAM
T. A. Kaemming (McDonnell-Douglas Corp.) and A. E. Burns (McDonnell-Douglas Corp.)
Oct. 1972
MSC-14016

Computer program was written to evaluate and define optimum design parameters of low pressure auxiliary propulsion system. APS will provide attitude and translational control of space shuttle vehicles. Program evaluates subsystem design parameters such as engine chamber pressure, mixture ratio, expansion ratio, and subsystem component weight and size.

B72-10606
PROGRAM TO PRODUCE HORIZONTAL STEREOGRAPHIC PRINT MAPS FROM NIMBUS HRIR DATA
H. W. Powell (Programming Methods, Inc.)
Oct. 1972
GSFC-11397

Computer program is written to display Nimbus high resolution infrared radiometer data in optimum form for experiment usage. Program produces three maps for Nimbus experimental data. Functions of program are to process data and prepare print maps from modified temperature measurements.

B72-10607
AUTOMATIC COMPUTER SUBPROGRAM SELECTION FROM APPLICATION-PROGRAM LIBRARIES - ALTLIB
J. M. Drozdowski
Oct. 1972
LANGLEY-11124

General purpose computer program for access and use of alternate library file with minimum programming effort by user is described. Manner in which program is implemented after determining external requirements is analyzed. Program was developed for use with CDC-6400 computer.

B72-10608
TWO AUTOWIRE VERSIONS FOR CDC-3200 AND IBM-360
J. B. Billingsley
Oct. 1972
GSFC-11526; GSFC-11539

Microelectronics program was initiated to evaluate circuitry, packaging methods, and fabrication approaches necessary to produce completely procured logic system. Two autowire programs were developed for CDC-3200 and IBM-360 computers for use in designing logic systems.

B72-10610
COMPUTER PROGRAM ANALYZES AND MONITORS ELECTRICAL POWER SYSTEMS (POSIMO)
K. Jaeger (Ges. fuer Weltraumforsch., Bonn)
Oct. 1972
GSFC-11505

Requirements to monitor and/or simulate electric power distribution, power balance, and charge budget are discussed. Computer program to analyze power system and generate set of characteristic power system data is described. Application to status indicators to denote different exclusive conditions is presented.

B72-10614
SPECTRAL ANALYSIS OF MULTIPLE TIME SERIES
M. R. Dubman (N. Am. Rockwell Corp.)
Oct. 1972
M-FS-18859

Application of spectral analysis for mathematically determining relationship of random vibrations in structures and concurrent events in electric circuits, physiology, economics, and seismograms is discussed. Computer program for performing spectral analysis of multiple time series is described.

B72-10618
VORTEX-LATTICE FORTRAN PROGRAM FOR ESTIMATING SUBSONIC AERODYNAMIC CHARACTERISTICS OF COMPLEX PLANFORMS
R. J. Margason and J. E. Lamar
Oct. 1972
LANGLEY-11047

Computer program for estimating subsonic aerodynamic characteristics of various aerodynamic configurations is presented. Program represents lifting planforms with vortex-lattice. Specific aerodynamic characteristics to be determined are described. Examples and typical running times of various types of configurations are provided.

B72-10619
SOURCE DECK COMPRESSION AND UPDATE PROGRAM (CAPS)
E. O. Merrill (Programming Methods, Inc.)
Oct. 1972
GSFC-11545

Computer program for compressing program source decks and other data coded in Hollerith format is described. Compression of card image record by substitution of special code characters is discussed. Program is written for IBM 360/75/95 Release 19 computer.

B72-10620
GPEDIT
J. B. Dash (Computer Appl., Inc.)
Dec. 1972
GSFC-11308

GPEDIT compares each character in data record to corresponding character in mask provided by user. Mask indicates that alphabetic or numeric character is allowed or that blank or punctuation mark is anticipated. Mask can also indicate that any data character other than some invalid character is allowed.

B72-10621
WATER IMPACT LOADS
D. H. Sanders (McDonnell-Douglas Corp.) and S. G. Safronski (McDonnell-Douglas Corp.)
Oct. 1972
M-FS-21955

Computer program to generate time history of load factor and pressure on conical body of revolution during impact with water is discussed. Program calculates depth of penetration, velocity, force, load factor, maximum pressure at water line, and average pressure. Program is written in FORTRAN 4 Level H for IBM 360/85/195 Release 20.1 computer.

B72-10622
METHOD FOR NONLINEAR EXPONENTIAL REGRESSION ANALYSIS
B. G. Junkin
Oct. 1972
M-FS-21965

Two computer programs developed according to two general types of exponential models for conducting nonlinear exponential regression analysis are described. Least squares procedure is used in which the nonlinear problem is linearized by expanding

in a Taylor series. Program is written in FORTRAN 5 for the Univac 1108 computer.

B72-10623
FORTRAN MANPOWER ACCOUNT PROGRAM
J. N. Strand
Oct. 1972
NPO-11973

Computer program for determining manpower costs for full time, part time, and contractor personnel is discussed. Twelve different tables resulting from computer output are described. Program is written in FORTRAN 4 for IBM 360/65 computer.

B72-10624
COMPUTER PROGRAM TO GENERATE ATTITUDE ERROR EQUATIONS FOR A GIMBALLED PLATFORM
W. A. Hall, Jr. (IBM), T. D. Morris (IBM), and K. Y. Rone (IBM)
Oct. 1972
M-FS-21991

Computer program for solving attitude error equations related to gimballed platform is described. Program generates matrix elements of attitude error equations when initial matrices and trigonometric identities have been defined. Program is written for IBM 360 computer.

B72-10625
PROGRAM TO REDUCE THE SIZE OF STRUCTURAL MATRICES
H. W. Spurlin (N. Am. Rockwell Corp.) and R. Heckenlaible (N. Am. Rockwell Corp.)
Dec. 1972
MSC-17619

Computer program was developed to reduce both mass and stiffness matrices by eliminating degrees of freedom using Cholesky decomposition. Program is written in FORTRAN G or H for IBM 360 computer.

B72-10634
COMPUTER PROGRAM FOR AFTERHEAT TEMPERATURE DISTRIBUTION FOR MOBILE NUCLEAR POWER PLANT
W. G. Parker (Westinghouse) and L. E. VanBibber (Westinghouse)
Dec. 1972
LEWIS-11693

ESATA computer program was developed to analyze thermal safety aspects of post-impacted mobile nuclear power plants. Program is written in FORTRAN 4 and designed for IBM 7094/7044 direct coupled system.

B72-10648
VIBRATIONAL TRANSFER FUNCTIONS FOR COMPLEX STRUCTURES
P. A. Jones (Martin Marietta Corp.) and R. L. Berry (Martin Marietta Corp.)
Oct. 1972
M-FS-20744

Evaluation of effects of vibrational multiple frequency forcing functions is discussed. Computer program for developing vibrational transfer functions is described. Possible applications of computer program are enumerated.

B72-10650
PROGRAM FOR CREATING AN OPERATING SYSTEM GENERATION CROSS REFERENCE INDEX (SGINDEX)
C. W. Barth
Oct. 1972
GSFC-11612

Computer program to collect key data from Stage Two input of OS/360 system and to prepare formatted listing of index entries collected is discussed. Program eliminates manual paging through system output by providing comprehensive cross reference

B72-10656
ANALYTIC PROCEDURES FOR DETERMINING DIMENSIONAL REDUNDANCIES IN ELECTRONIC DEVICES
G. J. Herskowitz (Stevens Inst. of Tech.)
Oct. 1972
HQ-10709

Methods for ascertaining dimensional redundancies in mathematical functions related to electronic phenomena and for removal of redundancies are presented. Two computer programs, one to determine a complete B-matrix and the other to optimize the matrix, are discussed. Three subroutines are analyzed.

B72-10667
NUMERICAL SOLUTION OF POTENTIAL FLOW PROBLEMS IN TERMS OF FLUX COMPONENTS
D. U. VonRosenberg (Tulane Univ.)
Dec. 1972
M-FS-21751

Numerical determination of flux components in vapor flow considers split boundary conditions in both directions to form grid lines for flow continuity equations. Matrix of coefficients obtains direct solution for potential flow problem without iteration.

B72-10671
A LINEAR PROGRAMMING MANUAL
R. C. Tuey (Informatics TISCO, Inc.)
Dec. 1972
HQ-10743

Computer solutions of linear programming problems are outlined. Information covers vector spaces, convex sets, and matrix algebra elements for solving simultaneous linear equations. Dual problems, reduced cost analysis, ranges, and error analysis are illustrated.

B72-10674
GEOMETRIC FIELD-LINE CALCULATIONS
E. G. Stassinopoulos and G. D. Mead
Oct. 1972
GSFC-11597

Procedure for calculating three components of vector field from spherical harmonic using either geocentric or geodetic coordinates as input and output is described. Three subroutines of computer program are explained. Program is written in FORTRAN for IBM 360 computer.

B72-10675
MATHEMATICAL ANALYSIS FOR THE PERFORMANCE ASSESSMENT OF SPACE COMMUNICATION PARAMETERS, IBM-360 VERSION
L. Grayson (Computer Sci. Corp.)
Dec. 1972
GSFC-11523

Development of equations to determine communication capability of pulse or digital transmission link is discussed. Equation specifies probability detection error for one-way transmission. Analysis is conducted on IBM 360 computer using FORTRAN 4.

B72-10676
INTEGRATED MULTI-PATH PROGRAM ANALYSIS AND COST TECHNIQUE (IMPACT)
O. Sullivan
Dec. 1972
M-FS-21880

SDS-930 computer determines impact cost-decision value at any chronological point in definition phase of multiprogram project. Options, option combinations, and different displays are listed. Graphical procedure was chosen as best method for project.

B72-10718
COMPUTER PROGRAM FOR CALCULATION OF COMPLEX CHEMICAL EQUILIBRIUM COMPOSITIONS
S. Gordon and B. J. McBride
Dec. 1972
LEWIS-11714; LEWIS-11740

Computer program is described for numerical solution of chemical equilibria in complex systems by using nonlinear algebraic equations. Free-energy minimization technique is used.

B72-10721
CHRYSLER IMPROVED NUMERICAL DIFFERENCING ANALYZER FOR THIRD GENERATION COMPUTERS CINDA-3G
J. D. Gaski (Chrysler Corp.), D. R. Lewis (Chrysler Corp.), and L. R. Thompson (Chrysler Corp.)
Dec. 1972 See also B67-10278
MSC-11653
New and versatile method has been developed to supplement or replace use of original CINDA thermal analyzer program in order to take advantage of improved systems software and machine speeds of third generation computers. CINDA-3G program options offer variety of methods for solution of thermal analog models presented in network format.

B72-10726
OPTIMIZING DESIGNS OF TWO-LEVEL FACTORIAL EXPERIMENTS GIVEN PARTIAL PRIOR INFORMATION (NAMER)
S. M. Sidik
Dec. 1972
LEWIS-11708
NAMER is used to find Bayes procedure for designing two level, fractional factorial experiments when given partial prior information. Program is written in FORTRAN 4 for IBM 7094 computer.

B72-10736
SINDA, SYSTEMS IMPROVED NUMERICAL DIFFERENCING ANALYZER
L. C. Fink (TRW Systems Group), H. M. -Y. Pan (TRW Systems Group), and T. Ishimoto (TRW Systems Group)
Dec. 1972
MSC-13805
Computer program has been written to analyze group of 100-node areas and then provide for summation of any number of 100-node areas to obtain temperature profile. SINDA program options offer user variety of methods for solution of thermal analog modes presented in network format.

B72-10739
AEROTHERM CHEMICAL EQUILIBRIUM (ACE) COMPUTER PROGRAM
C. A. Powars (Aerotherm Corp.) and R. M. Kendall (Aerotherm Corp.)
Dec. 1972
LEWIS-11722
Computer code was developed for calculating chemical quantities and qualities in equilibrium.

B72-10747
THREE BIT MASS SPECTRAL SEARCH PROGRAM
S. L. Grotch
Dec. 1972
NPO-11960
Computer program is developed to interpret spectral data in order to assist chemist in identifying low resolution mass spectra. Two versions of program, using approximately same amount of core, are available. In both programs, corerequirements are roughly proportional to maximum number of unknowns to be handled on each pass through tape.

B72-10750
FORTRAN READ PACKAGE
D. P. Diekelman (McDonnell-Douglas Corp.)
Dec. 1972
MSC-14161
Flexible input schemes for digital programs are described. No card format or special order of cards is required. Read package is controlled by small set of parameters which can be changed to account for differences in computers and digital programs.

B72-10753
FORTRAN PROGRAM FOR GENERATING A TWO-DIMENSIONAL ORTHOGONAL MESH BETWEEN TWO ARBITRARY BOUNDARIES
W. D. McNally
Dec. 1972
LEWIS-11863
Computer program is described which computes and plots coordinates for two-dimensional orthogonal mesh for channel containing solid body, about which flow passes and which spans channel from one wall to the other.

B73-10012
N-BODY U AND K MATRIX PROGRAM
R. N. Setter (Gen. Dynamics Corp.), L. Ojeda (Gen. Dynamics Corp.) and R. F. Hoeft (Gen. Dynamics Corp.)
Mar. 1973
LEWIS-11438
Computer program was devised to compute free-fall trajectories of satellites, allowing for injection errors and midcourse velocity perturbations. Program consists of trajectory perturbing program and N-body integrating conic program which can also be used as 2-body patch conic program.

B73-10049
A COMPREHENSIVE PROGRAM FOR TEXTUAL CONCORDANCES AND STATISTICS
L. A. Ule (Rockwell Intern. Corp.)
Mar. 1973
JSC-17484
Literary research tool can provide concordance and many other textual statistics relating to authorship or sequence of composition. Mechanical text manipulation provides wide variety of text formats and conventions (such as upper case). This program is written in FORTRAN H for use on IBM-360 computer.

B73-10053
AUTOMATED DATA MANAGEMENT INFORMATION SYSTEM
C. Blackstone, D. Dunn, E. Sullivan, J. Whitlock (GE), D. Buehler (GE), L. Pratt, T. Hoffiditz (Federal Elec. Corp.), J. Rose (Federal Elec. Corp.), M. Smithson (Federal Elec. Corp.), and J. Feeley (Federal Elec. Corp.)
Mar. 1974
KSC-10619
ADMIS stores and controls data and documents associated with manned space flight effort. System contains all data oriented toward a specific document; it is primary source of reports generated by the system. Each group of records is composed of one document record, one distribution record for each recipient of the document, and one summary record.

B73-10064
COMPUTER PROGRAM FOR TRANSIENT RESPONSE OF STRUCTURAL RINGS SUBJECTED TO FRAGMENT IMPACT
R. W. -H. Wu (MIT) and E. A. Witmer (MIT)
May 1973
LEWIS-11926
Mathematical optimization of containment/deflection system would save time, effort, and material as well as afford designer greater opportunity to investigate new ideas and variety of materials.

B73-10065
AEROTHERM CHARRING MATERIALS ABLATION COMPUTER PROGRAM
C. A. Powars (Acurex Corp.) and R. M. Kendal (Acurex Corp.)
May 1973
LEWIS-11854
Ablating-surface boundary conditions involve considerations of surface thermochemistry. Several programs may be used to provide surface thermochemistry information.

B73-10066
COMPUTER PROGRAM FOR PRELIMINARY DESIGN ANALYSIS OF AXIAL-FLOW TURBINES
A. J. Glassman
Feb. 1973
LEWIS-11815
Computations are based on mean-diameter flow properties. For any given turbine, all stages, except the first, are specified

to have same shape velocity diagram. First stage inlet flow is axial.

B73-10067
A METHOD FOR ECONOMIC EVALUATION OF REDUNDANCY LEVELS FOR AEROSPACE SYSTEMS
P. W. Hodge (Grumman Aerospace Corp.) and B. Frumkin (Grumman Aerospace Corp.)
Feb. 1973 See also NASA-CR-128494
KSC-10754
Principle comprises primary cost impacts, such as operational delays, reflown missions due to aborts, procurement of equipment, and vehicle expansion to accommodate additional equipment. Economics are estimated by criterion which is relatively insensitive to impertinent cost factors.

B73-10073
MEDICAL INFORMATION MANAGEMENT SYSTEM (MIMS): AN AUTOMATED HOSPITAL INFORMATION SYSTEM
S. Alterescu, R. A. Schwarz (Federal City Coll.), and L. S. Collins (Federal City Coll.)
Mar. 1973
GSFC-11540
Flexible system of computer programs allows manipulation and retrieval of data related to patient care. System is written in version of FORTRAN developed for CDC-6600 computer.

B73-10083
BINARY CONCATENATED CODING SYSTEM
L. G. Monford, Jr.
Mar. 1973
JSC-14082
Coding, using 3-bit binary words, is applicable to any measurement having integer scale up to 100. System using 6-bit data words can be expanded to read from 1 to 10,000, and 9-bit data words can increase range to 1,000,000. Code may be "read" directly by observation after memorizing simple listing of 9's and 10's.

B73-10087
PPUAS--PHOTOPEAK UNFOLDING AND SELF-SHIELDING PROGRAM
M. Taherzadeh
Mar. 1973
NPO-13188
Computer code was developed to determine radioactive emission rates of nuclear fuels. Code is basically written for two different source geometries; however, unfolding routine can be executed for other source geometries.

B73-10088
A GENERAL PURPOSE MANEUVER TURNS COMPUTER PROGRAM
G. I. Jaivin
Mar. 1973
NPO-13213
Program computes turns required to point given spacecraft-fixed vector in direction of given inertially-fixed vector. Program was written in FORTRAN V language for Univac-1108 computer.

B73-10091
A LINEAR CIRCUIT ANALYSIS PROGRAM WITH STIFF SYSTEMS CAPABILITY
C. H. Cook (Old Dominion Univ.) and S. J. Bavuso
Feb. 1973
LANGLEY-11184
Several existing network analysis programs have been modified and combined to employ a variable topological approach to circuit translation. Efficient numerical integration techniques are used for transient analysis.

B73-10101
A GENERALIZED APPROACH TO COMPUTER SYNTHESIS OF DIGITAL HOLOGRAMS
W. A. Hopper (Sperry Rand Corp.)
Feb. 1973
M-FS-21973
Hologram is constructed by taking number of digitized sample points and blending them together to form "continuous" picture New system selects better set of sample points resulting in improved hologram from same amount of information.

B73-10104
A SUMMARY REPORT ON SYSTEM EFFECTIVENESS AND OPTIMIZATION STUDY
O. L. Williamson (Federal Elec. Corp.), A. J. Rydberg (Federal Elec. Corp.), and G. Dorris (Federal Elec. Corp.)
Mar. 1973
M-FS-22126
Report treats optimization and effectiveness separately. Report illustrates example of dynamic programming solution to system optimization. Computer algorithm has been developed to solve effectiveness problem and is included in report.

B73-10114
EIGENVALUE ROUTINE BY STURM SEQUENCE METHOD
K. K. Gupta
Mar. 1973
NPO-11805
Computer program has been generated for efficient solution of certain broad classes of eigenvalue problems. Procedure fully exploits banded nature of associated matrices and further enables user to compute either all roots or any specific ones desired. Special storage options enable storing only nonzero elements of associated main matrix of eigenvalue problem.

B73-10115
AUTOMATED SHELL THEORY FOR ROTATING STRUCTURES (ASTROS)
B. J. Foster (Teledyne Brown Engineering) and J. M. Thomas (Teledyne Brown Engineering)
Mar. 1973
M-FS-21970
Computer program can be used to analyze any disk or shell of revolution of arbitrary cross section under inertial loads caused by rotation about shell axis and under various static loads, including thermal gradients. Geometric shapes incorporated in program are ellipsoidal, spherical, ogival, toroidal, conical, circular plate, cylindrical, and parabolic.

B73-10120
ASCENT CONTROL ANALYSIS FOR S-II DERIVATIVE LAUNCH VEHICLES, DIGITAL COMPUTER PROGRAM
P. D. Andrews (Rockwell Intern. Corp.)
May 1973
M-FS-24324
Model is used for analysis of the six degrees-of-freedom dynamics of general launch vehicle during atmospheric boost. Equations of motion are developed for rigid body and flat earth. Case may be started at any time beginning with ignition of stage and may be ended upon, or prior to, stage burnout. End of case may be at a specified time or based on propellant expended.

B73-10162
GREMEX UPDATE (GODDARD RESEARCH ENGINEERING MANAGEMENT EXERCISE)
M. J. Vaccaro and M. F. Denault
Jun. 1973
GSFC-11512; GSFC-11515
Management simulation techniques offer training in management problems. Exercise was developed to provide experience in research and development project decision making from management rather than technological perspective. Program and documentation have been revised innumerable times in past. Described report is revised version as it exists to date.

B73-10165
THEORY AND CALCULUS OF CUBICAL COMPLEXES
M. Perlman
Jun. 1973
NPO-11491

Combination switching networks with multiple outputs may be represented by Boolean functions. Report has been prepared which describes derivation and use of extraction algorithm that may be adapted to simplification of such simultaneous Boolean functions.

B73-10166
AN IMPROVED HOLOGRAPHIC RECORDING MEDIUM
R. A. Gange (RCA)
Jun. 1973 See also B73-10155
M-FS-22532

Solid, linear chain hydrocarbons with molecular weight ranging from about 300 to 2000 can serve as long-lived recording medium in optical memory system. Suitable recording hydrocarbons include microcrystalline waxes and low molecular weight polymers or ethylene.

B73-10186
PRESSURE DROP AND PUMPING POWER FOR FLUID FLOW THROUGH ROUND TUBES
D. Jelinek (Rockwell Intern. Corp.)
Jun. 1973
M-FS-24172

Program, written for Hewlett-Packard 9100A electronic desk computer provides convenient and immediate solution to problem of calculating pressure drop and fluid pumping power for flow through round tubes. Program was designed specifically for steady-state analysis and assumes laminar flow.

B73-10214
COMPUTER PROGRAM FOR THE DESIGN OF TOROIDAL TRANSFORMERS
J. A. Dayton, Jr.
Nov. 1973
LEWIS-11878

Program relieves designer of most of the computational details, while he maintains control over most engineering decisions. Number of specifications that must be supplied by user allows for considerable flexibility and for exercise of engineering judgment. Speed of program makes it possible to run many cases, economically determining effect of various parameter changes.

B73-10218
A FAULT-TOLERANT CLOCK
W. P. Daley (MIT) and J. F. McKenna, Jr. (MIT)
Aug. 1973
JSC-12531

Computers must operate correctly even though one or more off components have failed. Electronic clock has been designed to be insensitive to occurrence of faults; it is substantial advance over any known clock.

B73-10219
VALIDITY TEST FOR LINEAR ERROR ANALYSIS
L. S. Diamant (TRW, Inc.)
Aug. 1973
JSC-14378

To determine whether estimation process simulated by linear error analysis will converge, criterion has been developed based on extension of classical observability. Particular application of technique is with groups of batched navigation data where statistics of estimation errors are derived with classical minimum-variance methods.

B73-10227
SPECTRAL ANALYSIS PROGRAM (SAP)
D. M. Detchmendy (TRW, Inc.) and W. L. Hayden (TRW, Inc.)
Aug. 1973
JSC-14310

Program eliminates or reduces time-consuming aspects of computation of power spectrum for high-frequency communication system. This program was written in FORTRAN IV for UNIVAC 1230 or 1108 computer.

B73-10231
COMPUTER PROGRAM FOR CALCULATION OF THERMODYNAMIC AND TRANSPORT PROPERTIES OF COMPLEX CHEMICAL SYSTEMS
R. A. Svehla and B. J. McBride
Nov. 1973
LEWIS-11997

Program performs calculations such as chemical equilibrium for assigned thermodynamic states, theoretical rocket performance for both equilibrium and frozen compositions during expansion, incident and reflected shock properties, and Chapman-Jouget detonation properties. Features include simplicity of input and storage of all thermodynamic and transport property data on master tape.

B73-10232
A COMPUTER PROGRAM FOR CALCULATING DESIGN AND OFF-DESIGN PERFORMANCE FOR TURBOJET AND TURBOFAN ENGINES
R. W. Koenig and L. H. Fishbach
Nov. 1973 See also B73-10245
LEWIS-12010

Program uses component performance maps to enable user to do analytical engine cycle calculations. Through scaling procedure, each of the component maps can be used to represent a family of maps. Either convergent or convergent-divergent nozzles may be used.

B73-10233
COMPUTER PROGRAM TO DETERMINE THE IRROTATIONAL NOZZLE ADMITTANCE
W. A. Bell (Georgia Inst. of Tech.) and B. T. Zinn (Georgia Inst. of Tech.)
Nov. 1973
LEWIS-12019

Irrotational nozzle admittance is the boundary condition that must be satisfied by combustor flow oscillations at nozzle entrance. Defined as the ratio of axial velocity perturbation to the pressure perturbation at nozzle entrance, nozzle admittance can also be used to determine whether wave motion in nozzle under consideration adds or removes energy from combustor oscillations.

B73-10244
COMPUTER PROGRAM TO DETERMINE ROOTS OF POLYNOMIALS BY RATIO OF SUCCESSIVE DERIVATIVES
J. E. Crouse and C. W. Putt
Nov. 1973
LEWIS-11809

High speed computing finds roots of polynomials with real number coefficients. Ratios of successive polynomial derivatives approach provides accurate roots-of-polynomial computer programs with very high reliability. With derivative ratio method, root analysis can still be done even though the polynomial and its lower order derivatives cannot be evaluated with sufficient accuracy.

B73-10245
A COMPUTER PROGRAM FOR CALCULATING DESIGN AND OFF-DESIGN PERFORMANCE OF TWO- AND THREE-SPOOL TURBOFANS WITH AS MANY AS THREE NOZZLES
L. H. Fishbach and R. W. Koenig
Nov. 1973 See also B73-10232
LEWIS-12011

Program uses component performance maps to enable user to do analytical engine cycle calculations. Either convergent or convergent-divergent nozzles may be used.

B73-10246
COMPUTER PROGRAM FOR COMPRESSIBLE FLOW NETWORK ANALYSIS
M. E. Wilton (GE) and J. P. Murtaugh (GE)
Dec. 1973
LEWIS-11859

Program solves problem of an arbitrarily connected one dimensional compressible flow network with pumping in the channels and momentum balancing at flow junctions. Program

includes pressure drop calculations for impingement flow and flow through pin fin arrangements, as currently found in many air cooled turbine bucket and vane cooling configurations.

B73-10247
COMPUTER PROGRAM TO COMPUTE BUCKLING LOADS OF SIMPLY SUPPORTED ANISOTROPIC PLATES
C. C. Chamis
Dec. 1973
LEWIS-11961

Program handles several types of composites and several load conditions for each plate, both compressive or tensile membrane loads, and bending-stretching coupling via the concept of reduced bending rigidities. Vibration frequencies of homogeneous or layered anisotropic plates can be calculated by slightly modifying the program.

B73-10248
COMPUTER PROGRAM CALCULATES QUASI-ONE-DIMENSIONAL FLOW ACROSS FACE SEALS AND NARROW SLOTS
J. Zuk and P. J. Smith
Dec. 1973 See also B72-10114
LEWIS-11996

Program calculates mass and volume leakage across seal; mean friction factor; force; center of pressure; and distributions of pressure, temperature, density, friction parameter, velocity, and Mach number across seal for both laminar flow and turbulent flow regimes and for choked and subsonic flow.

B73-10256
A NEW ALGORITHM FOR FINDING SURVIVAL COEFFICIENTS EMPLOYED IN RELIABILITY EQUATIONS
W. G. Bouricus (IBM) and B. J. Flehinger (IBM)
Aug. 1973
M-FS-22295

Product reliabilities are predicted from past failure rates and reasonable estimate of future failure rates. Algorithm is used to calculate probability that product will function correctly. Algorithm sums the probabilities of each survival pattern and number of permutations for that pattern, over all possible ways in which product can survive.

B73-10263
COMPUTER PROGRAM FOR PREDICTING SYMMETRIC JET MIXING OF COMPRESSIBLE FLOW IN JETS
G. B. Gilbert (Dynatech Corp.) and P. G. Hill (Queens Univ.)
Jun. 1973 See also NASA-CR-2251
ARC-10730

Finite-difference computer program has been developed for treating mixing of two parallel and compressible air streams; one of them may be supersonic. This development is restricted to symmetric jet mixing in which high-speed jet is located on axis of channel and no provision is made for blowing or suction along channel walls.

B73-10266
DIGITAL RANDOM-NUMBER GENERATOR
D. H. Brocker
Jul. 1973
ARC-10096

For binary digit array of N bits, use N noise sources to feed N nonlinear operators; each flip-flop in digit array is set by nonlinear operator to reflect whether amplitude of generator which feeds it is above or below mean value of generated noise. Fixed-point uniform distribution random number generation method can also be used to generate random numbers with other than uniform distribution.

B73-10274
MINIMUM SWITCHING NETWORK FOR GENERATING THE WEIGHT OF A BINARY VECTOR
T. O. Anderson
Jun. 1973
NPO-11590

Vector is divided into three variable sections, and each section is processed by unary-to-binary decoder or adder. Resulting network performs on iterative collection process; all outputs of same kind are collected in same manner. In combination with simple comparator gates, weighting network can also be used as majority network.

B73-10296
NODE-RECORDING METHOD FOR STIFFNESS MATRIX WAVEFRONT REDUCTION IN STRUCTURAL ANALYSIS
R. Levy
Jul. 1973
NPO-11620

Method provides approach to automatic node relabeling that is consistent with requirements of wavefront concept. Specific applications are in analysis of aircraft, building structures, radar and surveillance structures, bridges, etc., or any other structure that is studied with aid of large and complex analytical model. Minimum growth sequencing is effective, rapid, and capable of producing economies.

B73-10300
HYBRID COORDINATE FORMULATION USED FOR THE DESIGN OF ATTITUDE CONTROL SYSTEMS FOR FLEXIBLE SPACECRAFT
P. W. Likins (UCLA) and E. E. Fleisher
Jul. 1973
NPO-11714

Formulation combines certain advantages of discrete and distributed coordinates by using both simultaneously. In report summarizing method, theoretical development is extended as necessary for applications of practical interest. Explicit analyses are presented in sufficient detail to establish utility in flexible space vehicle control system of hybrid coordinate formulation.

B73-10301
STRUCTURAL ANALYSIS OF VISCOELASTIC MATERIALS UNDER THERMAL AND PRESSURE LOADING
J. C. Chen
Jul. 1973
NPO-11727

Technique computes stresses resulting from axisymmetric transient thermal loading in circular solid-propellant grain section with circular ports. Propellant is assumed to be linear, thermal rheologically simple, viscoelastic material; material properties are represented by exponential series in time.

B73-10302
ANALYSIS OF NONLINEAR VIBRATIONS OF CYLINDERS
J. C. Chen
Jul. 1973 See also JPL-SPS-37-62-VOL-3; JPL-SPS-37-64-VOL-3
NPO-11736

In study of geometric nonlinear vibrations, infinite, long, thin-walled cylinder was analyzed under periodic, dynamic loading to demonstrate that some nonlinear phenomena cannot be obtained by straight-forward numerical solution methods. Results demonstrate that nonlinear phenomenon in large amplitude vibration traveling-wave condition can be predicted by analysis.

B73-10303
USE OF MULTIVARIABLE ASYMPTOTIC EXPANSIONS IN A SATELLITE THEORY
S. S. Dallas
Jul. 1973
NPO-11750

Initial conditions and perturbative force of satellite are restricted to yield motion of equatorial satellite about oblate body. In this manner, exact analytic solution exists and can be used as standard of comparison in numerical accuracy comparisons. Detailed numerical accuracy studies of uniformly valid asymptotic expansions were made.

B73-10307
COMPUTER PROGRAM FOR THE PREDICTION OF REORIENTATION FLOW DYNAMICS
W. S. Betts, Jr. (Gen. Dynamics Corp.)
Dec. 1973

LEWIS-11816

Program uses Navier-Stokes and continuity equations for incompressible, viscous fluid as the basic equations governing reorientation flow dynamics. Program can simulate curved as well as straight-walled boundaries; has ability to calculate both free-surface and confined flows; and can be used in either cylindrical or plane geometry.

B73-10309
PROGRAM FOR CALCULATING TOTAL-EFFICIENCY OF SPECIFIC-SPEED CHARACTERISTICS OF CENTRIFUGAL COMPRESSORS
M. R. Galvas (Army Air Mobility R. & D. Lab.)
Dec. 1973
LEWIS-12008

Program uses one-dimensional mean streamline analysis conducted at fixed stagnation conditions. Seven specific losses are calculated for each set of compressors geometric variables and inlet velocity diagram characteristics studied. Categories used as input information are compressor geometry, thermodynamic properties of working fluid, velocity diagram characteristics, and iteration limits.

B73-10322
CHARACTERISTICS OF FORTRAN
W. R. Garner (Martin Marietta Corp.)
Oct. 1973
LANGLEY-11177

Publication is announced which outlines source program differences between IBM 360, UNIVAC 1108, CDC 6000, and Honeywell Series 32 computer systems. Publication can be guide to programmer in converting existing program from one computer system to another.

B73-10344
LOW-COST CODING TECHNIQUES FOR DIGITAL FAULT DIAGNOSIS
A. Avizienis
Aug. 1973 See also JPL-TR-32-1476
NPO-11701

Published report discusses fault location properties of arithmetic codes. Criterion for effectiveness of given code is detection probability of local fault by application of checking algorithm to results of entire set of algorithms of processor. Report also presents analysis of arithmetic codes with low-cost check algorithm which possesses partial fault-location properties.

B73-10360
LOGICAL-FUNCTION GENERATOR
W. E. Sivertson, Jr.
Oct. 1973
XLA-05099

Apparatus and technique for generating logical functions and circuits have been developed. They provide aid in designing and constructing hardware to generate logic circuits, by defining circuit connections required to generate these functions. With this method, it is possible quickly and automatically to design logic, while eliminating involved and time-consuming mathematical manipulations.

B73-10362
COMPUTER PROGRAM TO DETERMINE PRESSURE DISTRIBUTIONS AND FORCES ON BLUNT BODIES OF REVOLUTION
C. M. Jackson, Jr., W. C. Sawyer, and R. S. Smith
Oct. 1973
LANGLEY-11197

Program was written to include integration of surface pressure in order to obtain axial-force, normal-force, and pitching-moment coefficients. Program was written in CDC FORTRAN for the CDC-6600 computer system.

B73-10363
COMPUTER PROGRAM FOR STRESS, VIBRATION, AND BUCKLING CHARACTERISTICS OF GENERAL SHELLS OF REVOLUTION
G. A. Cohen (Structures Res. Assoc.) and R. T. Haftka (Structures Res. Assoc.)
Sep. 1973
LANGLEY-11369

Structures Research Associates (SRA) system of programs is composed of six compatible computer programs for structural analyses of axisymmetric shell structures. Theories and methods upon which these programs are based are presented in documentation. They apply to a common structural model but analyze different modes of structural response.

B73-10384
IMPROVED PROCEDURES FOR MASS MATRIX-REDUCTIONS IN EIGENVALUE SOLUTIONS
R. Levy
Sep. 1973
NPO-11619

Analytical models of three structures were used to test mass matrix-reduction schemes. Accuracy of four mode shapes and frequencies was tracked through successive mass matrix-reductions with diminishing numbers of indicator degrees of freedom. Results were consistently disappointing. Two new procedures were developed in attempt to improve accuracy.

B73-10418
LOGISTICS HARDWARE AND SERVICES CONTROL SYSTEM
A. Koromilas (Boeing Co.), K. Miller (Boeing Co.), and T. Lamb (Boeing Co.)
Dec. 1973
KSC-10819

Software system permits onsite direct control of logistics operations, which include spare parts, initial installation, tool control, and repairable parts status and control, through all facets of operations. System integrates logistics actions and controls receipts, issues, loans, repairs, fabrications, and modifications and assets in predicting and allocating logistics parts and services effectively.

B73-10432
MARSHALL SYSTEM FOR AEROSPACE SIMULATION (MARSYAS)
H. H. Tranboth (Computer Sciences Corp.), A. J. Ventre (Computer Sciences Corp.), W. L. McCollum (Computer Sciences Corp.), T. L. Balentine (Computer Sciences Corp.), and R. Sevigny (Computer Sciences Corp.)
Dec. 1973
M-FS-22872

System is simple flexible language which can be coded by users unfamiliar with computer programming. It is designed for engineers with little experience in simulation, who desire to simulate large physical systems. User has ability to mix differential equations with diagrams in his model. With few exceptions, there is no rigid statement-operator structure within given module.

B73-10443
DYNAMIC NONLINEAR ANALYSIS OF SHELLS OF REVOLUTION (DYNASOR II)
J. R. Tillerson (Tex. A&M Univ.) and W. E. Haisler (Tex. A&M Univ.)
Feb. 1974 See also B73-10446
JSC-14496

Equations of motion of shell are solved using Houbolt's numerical procedure with nonlinear terms being moved to right-hand side of equilibrium equations and treated as generalized loads. Program was written in FORTRAN IV for IBM 360 or CDC 6000 series computers.

B73-10444
FREQUENCIES AND MODES FOR SHELLS OF REVOLUTION (FAMSOR)
L. B. McWhorter (Tex. A&M Univ.) and W. E. Haisler (Tex. A&M Univ.)
Feb. 1974 See also B73-10446
JSC-14497

Using stiffness matrix and lumped-mass representation specified number of natural frequencies are obtained using inverse iteration method. Mode shapes for each frequency are also

obtained. These frequencies and mode shapes can be found in reasonable periods of computer time utilizing this code.

B73-10445
THE STATIC NONLINEAR ANALYSIS OF SHELLS OF REVOLUTION (SNASOR II)
J. A. Stricklin (Tex. A&M Univ.) and W. E. Haisler (Tex. A&M Univ.)
Feb. 1974 See also B73-10446
JSC-14495

Utilizing stiffness matrices and supplying as input the loading and boundary conditions, program generates equilibrium equations for structure. Nonlinear strain energy terms result in pseudogeneralized forces which are combined with applied generalized forces. Resulting set of nonlinear algebraic equilibrium equations is solved by one of several methods.

B73-10446
STIFFNESS AND MASS MATRICES FOR SHELLS OF REVOLUTION (SAMMSOR II)
J. R. Tillerson (Tex. A&M Univ.) and W. E. Haisler (Tex. A&M Univ.)
Jan. 1974
JSC-14494

Utilizing element properties, structural stiffness and mass matrices are generated for as many as twenty harmonics and stored on magnetic tape. Matrices generated constitute input data to be used by other stiffness of revolution programs. Variety of boundary and loading conditions can be employed without having to create new mass and stiffness matrices for each case.

B73-10526
STEREOSCOPIC COMPUTER GRAPHICS DISPLAY SYSTEM
H. H. Plott, Jr. (Auburn Univ.) and J. D. Irwin (Auburn Univ.)
Mar. 1974
M-FS-22322

Handbook was published on study which describes relative merits of two general-purpose, steroscopic display systems. Both systems are adaptable to most small data processing facilities and, with minimal hardware development, greatly enhance user ability to interact with computer and to interpret data output. Section also describes digital-to-analog converters designed for use with system.

B74-10033
DESIGN STANDARDS FOR LOW-PROFILE FLANGES
W. P. Prasthofer
May 1974
M-FS-22708

Analysis of low-profile flange is based on thin shell theory and simple ring theory. Program produces comprehensive design procedure with subsequent stress and deformation analysis. Program was written in FORTRAN IV for UNIVAC 1108 computer.

B74-10034
MODULAR DIGITAL COMPUTER SYSTEM DESIGN
Innovator not given (Hughes Aircraft Corp.) Jul. 1974
M-FS-22935

Automatically-Reconfigurable Modular Multiprocessor System (ARMMS) provides redundant processing with dynamic mode switching in real time. Design will provide higher computer capability than that presently available for same amount of hardware and will furnish modular system which is responsive to diverse problems effectively.

B74-10037
COMPUTER PROGRAM FOR SPACECRAFT-BOOSTER SEPARATION SPRING SELECTION, SET COMPOSITION, AND LOCATION DETERMINATION
Innovator not given (Space Div. of GE) Jul. 1974
GSFC-11616

Program combines all calculation and determination requirements into one comprehensible technique. Program automatically performs selection of separation springs, composition of spring sets, and correct spring location with improved accuracy and reliability.

B74-10040
GRAPHICS SHADOWING ANALYSIS
S. R. Hayes (McDonnell-Douglas Astronautics Co.)
Jul. 1974
M-FS-21406

Visual image is generated on cathode-ray tube screen to scale and is constructed according to dimensions of specified craft. Once displayed, image may be manipulated by several different means.

B74-10043
MARSHALL INFORMATION RETRIEVAL AND DISPLAY SYSTEM (MIRADS)
J. L. Groover (Computer Sci. Corp.), S. C. Jones (Computer Sci. Corp.), and W. L. King (Computer Sci. Corp.)
Jul. 1974
M-FS-22536

Program for data management system allows sophisticated inquiries while utilizing simplified language. Online system is composed of several programs. System is written primarily in COBOL with routines in ASSEMBLER and FORTRAN V.

B74-10044
GENERALIZED CURVE FIT AND PLOTTING (GECAP) PROGRAM
B. D. Beadle, II, B. D. Dolerhie, Jr., J. W. Owen, and R. A. Schlagheck
Jul. 1974
M-FS-22728

Program generates graphs on 8 1/2 by 11 inch paper and is designed to be used by engineers and scientists who are not necessarily professional programers. It provides fast and efficient method for display of plotted data without having to generate any additional FORTRAN instructions.

B74-10067
COMPUTER PROGRAM FOR PREDICTING OFF-DESIGN PERFORMANCE OF CENTRIFUGAL COMPRESSORS
M. R. Galvas (U. S. Army Air Mobility R and D Lab.)
Aug. 1974
LEWIS-12186

Complete knowledge of compressor overall geometry and working fluid total inlet conditions is required for program's use. On given speed line, compressor performance is calculated for range of inlet velocity levels. Working fluid state conditions and flow properties are calculated using mean stream line one-dimensional analysis.

B74-10084
COMPUTER PROGRAM FOR FLEXIBLE ROTOR DYNAMICS ANALYSIS
F. A. Shen (Rockwell Intern. Corp.)
Aug. 1974
LEWIS-12153

Program analyzes general nonaxisymmetric and nonsynchronous transient and steady-state rotor dynamic performance of bending- and shear-wise flexible rotor-bearing system under various operating conditions. Program can be used as analytical study tool for general transient spin-speed and/or nonaxisymmetric rotor motion.

B74-10113
COMPUTATION OF AERODYNAMIC INTERFERENCE BETWEEN LIFTING SURFACES AND LIFT- AND CRUISE-FANS
M. F. E. Dillenius (Nielsen Eng. and Res., Inc.), M. R. Mendenhall (Nielsen Eng. and Res., Inc.), and S. B. Spangler (Nielsen Eng. and Res., Inc.)
Aug. 1974
ARC-10833

Sequence of three computer programs predicts aerodynamic interference on lifting surfaces of transport-type aircraft which are equipped with lift and cruise fans; for example, high-bypass-ratio engine and wing-pylon tail configuration or fuselage-mounted lift-fan and wing-tail configuration.

B74-10123
COMPUTER PROGRAM FOR CALCULATING WATER AND STEAM PROPERTIES
R. C. Hendricks, I. C. Peller, and A. K. Baron
Nov. 1974
LEWIS-12206

Computer subprogram, WASP, accepts any two of pressure, temperature, and density as input conditions. Pressure and either entropy or enthalpy are also allowable input variables. This flexibility is especially useful in cycle analysis. Metastable calculations can also be made using WASP.

B74-10127
DATA SUMMARY AND COMPUTER PROGRAM FOR AXIAL-FLOW PUMP ROTOR PERFORMANCE
M. J. Miller (Iowa State Univ.), T. H. Okiishi (Iowa State Univ.), G. K. Serovy (Iowa State Univ.), D. M. Sandercock, and W. R. Britsch
Dec. 1974
LEWIS-11920

Assembly of noncavitating blade element performance data for axial-flow pump rotor configurations has been collected and organized. Program facilitates handling large amounts of experimental data involved and may be used as data reduction program to process flow and performance measurements from other axial-flow pump configurations.

B74-10128
COMPUTER PROGRAM FOR CALCULATING CRITICAL SPEEDS OF ROTATING SHAFTS
R. J. Trivisonno
Dec. 1974
LEWIS-11910

Shaft may include bearings, couplings, extra masses, and disks for gyroscopic effect. Shaft deflection is taken into account and provision is made in program for sections of shaft that are tapered. Plotter produces drawing of shaft with superimposed deflection curves at critical speeds together with all pertinent information related to shaft.

B74-10129
COMPUTER PROGRAM FOR CALCULATING LAMINAR, TRANSITIONAL, AND TURBULENT BOUNDARY LAYERS FOR A COMPRESSIBLE AXISYMMETRIC FLOW
J. A. Albers and J. L. Gregg
Dec. 1974
LEWIS-12178

Finite-difference computer program calculates viscous compressible boundary layer flow over either planar or axisymmetric surfaces. Flow may be initially laminar and progress through transitional zone to fully turbulent flow, or it may remain laminar, depending on imposed boundary conditions, laws of viscosity, and numerical solution of momentum and energy equations.

B74-10130
COMPUTER PROGRAM FOR CALCULATING VELOCITIES AND STREAMLINES ON MID-CHANNEL FLOW SURFACE OF AXIAL OR MIXED-FLOW TURBOMACHINE
T. Katsanis and W. D. McNally
Dec. 1974
LEWIS-12129

Program uses finite-difference and stream filament methods, input consists of blade and flow-channel geometry, upstream and downstream flow conditions from hub to shroud, and mass flow. Output includes streamline coordinates, flow angles, and velocities on mid-channel flow surface.

B74-10145
SPACE ULTRARELIABLE MODULAR COMPUTER (SUMC) INSTRUCTION SIMULATOR
R. T. Curran (Computer Sci. Corp.) and W. A. Hornfeck (Computer Sci. Corp.)
Sep. 1974
M-FS-22697

Simulator has been constructed as set of quasi-independent modules, regulated by one control module. All machine-dependent functions have been resolved such that simulation package is as machine independent as possible.

B74-10169
EIGENFUNCTION SOLUTION OF DAMPED STRUCTURAL SYSTEMS: DAMP
K. K. Gupta
Sep. 1974
NPO-13480

Program uses combination of procedures to determine eigenfunction solutions of discrete damped structures, including spinning ones, while fully exploiting banded configuration of associated matrices.

B74-10186
COMPUTER PROGRAM FOR STRUCTURAL ANALYSIS OF LAYERED ORTHOTROPIC RING-STIFFENED SHELLS OF REVOLUTION (SALORS): LINEAR STRESS ANALYSIS OPTION
M. S. Anderson, W. L. Heard, Jr., and M. M. Chen (Boston Univ.)
Nov. 1974
LANGLEY-11569

Program handles segmented, laminar, orthotropic shells with discrete rings. Meridional variations are handled in material properties, temperatures, and wall thickness. Allows for linear variations of temperature through each layer of shell wall.

B74-10189
MODEL OPTIMIZATION USING STATISTICAL ESTIMATION
J. D. Collins (J. H. Wiggins Co.), G. C. Hart (J. H. Wiggins Co.), T. K. Hasselman (J. H. Wiggins Co.), B. Kennedy (J. H. Wiggins Co.), and H. Pack, Jr. (J. H. Wiggins Co.)
Nov. 1974
M-FS-22873

Program revises initial or prior estimate of stiffness and mass parameters to parameters yielding frequency and mode characteristics in agreement with test data. Variances are also calculated and consequently define uncertainties of final estimates.

B74-10190
FORTRAN AUTOMATIC CODE EVALUATION SYSTEM (FACES)
J. C. Browne (Inform. Res. Associates), T. Davis (Inform. Res. Associates), A. Haller (Inform. Res. Associates), M. Henneman (Inform. Res. Associates), R. Kleir (Inform. Res. Associates), and G. L. Lasseter (Inform. Res. Associates)
Nov. 1974
M-FS-22910

Software package takes as input FORTRAN program which may contain many modules (subroutines and functions). Main parts: (1) FORTRAN front end gathers information about input program and (2) set of routines organized as diagnostic package evaluates information and prints warning messages concerning actual or potential errors.

B74-10203
COMPUTER PROGRAM FOR BUCKLING LOADS OF ORTHOTROPIC LAMINATED STIFFENED PANELS SUBJECTED TO BIAXIAL IN-PLACE LOADS (BUCLASP 2)
A. V. Viswanathan (Boeing Co.) and M. Tamekuni (Boeing Co.)
Nov. 1974
LANGLEY-11199

General-purpose program performs exact instability analyses for structures such as unidirectionally-stiffened, rectangular composite panels. Program was written in FORTRAN IV and COMPASS for CDC-series computers.

B74-10204
COMPUTER PROGRAM FOR STRESSES AND BUCKLING OF HEATED COMPOSITE-STIFFENED PANELS AND OTHER STRUCTURES (BUCLASP 3)
A. V. Viswanathan (Boeing Co.), M. Tamekuni (Boeing Co.), and L. L. Tripp (Boeing Co.)
Nov. 1974
LANGLEY-11533

General-purpose program is intended for thermal stress and instability analyses of structures such as axially-stiffened curved panels. Two types of instability analyses can be effected by program: (1) thermal buckling with temperature variation as specified and (2) buckling due to in-plane biaxial loading.

B74-10205
COMPUTER PROGRAM FOR STRESS, STABILITY, AND VIBRATION OF COMPLEX BRANCHED SHELLS OF REVOLUTION: BOSOR 4
D. Bushnell (Lockheed Missiles and Space Co.)
Nov. 1974
LANGLEY-11209

Code is easy to use yet is general with respect to: (a) type of analysis to be performed; (b) geometry of shell meridian; (c) type of wall construction; (d) type of boundary conditions, ring supports, and branching configuration; and (e) type of loading.

B74-10206
COMPUTER PROGRAM FOR STEAMTUBE CURVATURE ANALYSIS: ANALYTICAL METHOD
D. R. Ferguson (GE), P. H. Heck (GE), J. S. Keith (GE), D. J. Lahti (GE), and C. L. Merkle (GE)
Nov. 1974
LANGLEY-11535

Program provides design information for low-drag, high-drag-divergence, Mach number isolated nacelles suitable for use with advanced high-bypass-ratio, turbofan engines. One element is development of method to predict inviscid pressure distribution and flow field about arbitrary axisymmetric ducted body at transonic speeds.

B74-10207
INVESTIGATION OF EXIT-VELOCITY STRATIFICATION EFFECTS ON JETS IN A CROSSFLOW (STRJET)
H. Ziegler (Northrop Corp.)
Nov. 1974
LANGLEY-11581

Program determines flow field about jets with velocity stratification exhausting into crossflow. Jets with three different types of exit-velocity stratification have been considered: (a) jets with relatively high-velocity core, (b) jets with relatively low-velocity core, and (c) jets originating from vaned nozzle.

B74-10215
EIGENVALUE ALGORITHM BASED ON A COMBINED STURM SEQUENCE AND INVERSE ITERATION TECHNIQUE (EASI)
K. K. Gupta
Nov. 1974
NPO-13368

Desired roots are first isolated by Sturm sequence procedure. Then special variant of inverse iteration technique is applied for individual determination of each root along with its vector. Program was written in FORTRAN V for UNIVAC 1100-series computers.

B74-10221
CALCULATION OF AERODYNAMIC CHARACTERISTICS OF STOL AIRCRAFT
M. F. E. Dillenius (Nielson Eng. and Res., Inc.), M. R. Mendenhall (Nielson Eng. and Res., Inc.), and S. B. Spangler (Nielson Eng. and Res., Inc.)
Nov. 1974
ARC-10882

Method predicts lift and pitching moment characteristics of STOL aircraft with externally-blown, jet-augmented wing-flap combinations using potential-flow approach which involves combination of two flow models. Method can accommodate multiple engines per wing panel and part-span flaps.

B74-10225
COMPUTERIZED LOGIC DESIGN OF DIGITAL CIRCUITS
S. Gussow (Sperry Rand Corp.) and R. Oglesby (Sperry Rand Corp.)
Nov. 1974
M-FS-22401

Procedure performs all work required for logic design of digital counters or sequential circuits and simplification of Boolean expressions. Program provides simple, accurate, and comprehensive logic design capability to users both experienced and totally inexperienced in logic design

B74-10236
NUMERICAL PROGRAM FOR ANALYSIS OF THREE-DIMENSIONAL SUPERSONIC EXHAUST FLOW FIELDS (CHAR 3D)
S. Dash (Advanced Technol. Labs., Inc.), P. Del Guidice (Advanced Technol. Labs., Inc.), A. Ferri (Advanced Technol. Labs., Inc.), and G. Roffe (Advanced Technol. Labs., Inc.)
Dec. 1974
LANGLEY-11596

Choice of reference plane orientation depends on specific nozzle geometry, with different configurations requiring different reference plane systems. In addition, for given configuration several reference systems may be used in different regions of flow field, so each system is locally aligned with flow.

B74-10279
AUTOMATED MAINTENANCE FOR COMPLEX HYBRID SYSTEMS
G. C. Gilley
Jan. 1975
NPO-13143

Digital computer, Control Computer Subsystem (CCS), possess high degree of fault tolerance. CCS embodies concepts of self-test and repair. It is capable of monitoring its own performance and of identifying and replacing with standby spare any of its units that fail.

B75-10002
COMPUTER PROGRAM FOR THERMODYNAMIC ANALYSIS OF OPEN-CYCLE MULTISHAFT POWER SYSTEM
A. J. Glassman
Mar. 1975
LEWIS-12324

Program computes specific power output, specific fuel consumption, and cycle efficiency for power systems having any number os shafts up to maximum of five. Maximum temperatures should be no higher than about 2000 K (3140 F) because molecular dissociation is not included in stoichiometry.

B75-10005
COMPUTER PROGRAM TO GENERATE ENGINE INLET FLOW CONTOUR MAPS AND DISTORTION PARAMETERS
J. H. Dicus
Mar. 1975
LEWIS-12247

Program generates inlet contour maps with choice of mapping parameters. Contour maps are represented by symbols on picture produced by line printer. Program also generates variety of simple circumferential and radial distortion parameters that enable calculation of almost any specific distortion parameter.

B75-10015
REGENERATIVE COOLING DESIGN AND ANALYSIS COMPUTER PROGRAM
J. G. Gerstley (Rockwell Intern. Corp.) and R. D. Tobin (Rockwell Intern. Corp.)
Apr. 1975
LEWIS-12110

Program evaluates influences of heat transfer, stress, and cycle life. Coolant passages may be tubes or channels, with or without gas-side wall coating. Program options include two-dimensional thermal analysis model of tube or channel cross-section using relaxation technique with variable number of nodes.

B75-10018
COMPUTER PROGRAMS FOR CALCULATING POTENTIAL FLOW IN PROPULSION SYSTEM INLETS
N. O. Stockman and S. L. Button
Apr. 1975
LEWIS-12152

Calculational procedure evolved in process of designing inlets. Douglas axisymmetric potential flow program called EOD calculates incompressible potential flow about arbitrary bodies. Program SCIRCL generates input for EOD from inlet components. Program COMBYN takes basic solutions output by EOD and combines them into solutions of interest and applied compressibility correction.

B75-10019
COMPUTER PROGRAMS FOR HANDLING PROPULSION SYSTEM NOISE DATA
F. J. Montegani
Apr. 1975
LEWIS-12285

Computer programs have been developed for efficient handling of one-third-octave band noise data originating from outdoor full-scale fan noise facility and engine acoustic facility at Lewis Research Center.

B75-10020
COMPRESSIBLE FLOW COMPUTER PROGRAM FOR GAS FILM SEALS
J. Zuk and P. J. Smith
Apr. 1975
LEWIS-12286

Computer program, AREAX, calculates properties of compressible fluid flow with friction and area change. Program carries out quasi-one-dimensional flow analysis which is valid for laminar and turbulent flows under both subsonic and choked flow conditions. Program was written to be applied to gas film seals.

B75-10021
COMPUTER PROGRAM FOR DEFINITION OF TRANSONIC AXIAL-FLOW COMPRESSOR BLADE ROWS
J. E. Crouse
Apr. 1975
LEWIS-12325

Particular type of blade element used has two segments which have centerlines and surfaces described by constant change of angle with path distance on cone. Program is result of rework of earlier program to give major gains in accuracy, reliability and speed. It also covers more steps of overall compressor design procedure.

B75-10029
ANALYTIC MODEL FOR ASSESSING THERMAL PERFORMANCE OF SCUBA DIVERS
L. D. Montgomery
Feb. 1975
ARC-10927

To assist design of adequate protective clothing, mathematical model of man's thermoregulatory system has been developed so that body thermal responses under immersed conditions can be predicted accurately. Experimental data encompassed wide range of water temperatures, protective clothing, breathing-gas mixtures, and durations of immersion.

B75-10032
VIEW FACTOR COMPUTER PROGRAM (VIEW)
C. E. Jackson, Jr. and E. F. Puccinelli
Apr. 1975
GSFC-11910

Existing view factor program, RAVFAC, was modified to accept NASTRAN and/or RAVFAC surface descriptions. Output formatting was altered to produce view factor matrices which could be directly input to NASTRAN.

B75-10033
EXTENSIVE SET OF MACROS FOR STRUCTURED PROGRAMING IN OS/360 ASSEMBLY LANGUAGE (STRCMACS)
C. W. Barth
Apr. 1975
GSFC-11938

Development of consistent assembly language structured programming techniques has been enhanced by use of assembly macros developed for structured programing. Set of macros was written for IBM OS/360 Assembly language.

B75-10053
JPL TRANSIENT RADIATION ANALYSIS BY COMPUTER PROGRAM (JTRAC)
S. Weinstein
Apr. 1975
NPO-13470

Digital computer program, JTRAC, simulates time response of electronic circuit to arbitrary forcing functions which may include electrical and/or radiation stimuli. Program is designed to solve linear and nonlinear simultaneous equations which characterize mathematical models used to predict circuit response for electrical and/or radiation input.

B75-10060
PREDICTION OF AIRCRAFT NOISE SOURCE AND ESTIMATION OF NOISE-LEVEL CONTOURS
N. A. Peart (Boeing Co.)
Apr. 1975
ARC-10880

Two computer programs aid aircraft designers who need to identify noise characteristics of various aircraft and engine configurations; calculated noise levels can then be compared with community goals for noise limitation.

B75-10093
FOUR-DIMENSIONAL WORLDWIDE ATMOSPHERIC MODELS: ANYPT AND ANYRG
D. Johnson, C. Brown, D. Spiegler (Environ. Res. and Technol.), and M. Fowler (Environ. Res. and Technol.)
Jun. 1975
M-FS-22838

Computer programs read magnetic-tape data bases and computer meteorological profiles for any position, time, and height (from zero to 25 km). System assists in analyses of distortion of information obtained from aircraft-mounted or spacecraft-mounted electromagnetic sensors.

B75-10094
COMPUTER PROGRAM FOR NUMERICAL ANALYSIS OF STIFFENED SHELLS OF REVOLUTION
J. Key and V. Valbonas (Grumman Aerospace Co.)
Jun. 1975
M-FS-23027

Programs, using Love-Reissner first-order shell theory, can analyze orthotropic thin shells of revolution subjected to unsymmetric distributed loading or concentrated line loads and thermal strains. They can perform stability or vibration analysis of thin shells of revolution subjected to axisymmetric distributed loading or concentrated line loads and thermal strains.

B75-10100
PROGRAM FOR ANALYSIS OF NONLINEAR EQUILIBRIUM AND STABILITY (PANES)
R. G. Vos (Boeing Co.)
Jun. 1975
M-FS-23172

PANES utilizes improved techniques for analysis of structures with material and geometric nonlinearities, including limit point and bifurcations behavior which occurs in buckling and collapse problems. Incremental loading, Newton-Raphson iteration, and higher order methods are used in program.

B75-10106
COMPUTER PROGRAM FOR ANALYSIS OF VECTORCARDIOGRAMS (VECTAN II)
G. W. Hoffler, D. P. Golden (Technol. Inc.), and R. A. Wolthuis (Technol. Inc.)
Jun. 1975
MSC-14386

VECTAN II accepts as input digitized three-lead VCG data sampled at 320 samples/second/lead, analyzing one VCG complex in each 5-second interval for experiments of up to 25 minutes duration. Program calibrates these data, locates major waveforms, performs waveform analyses, and produces statistical summary of analyzed data.

B75-10130
COMPUTER MODELING OF ARC DRIVERS
R. E. Dannenberg and P. I. Slapnicar (Stanford Univ.)
Jun. 1975
ARC-10955

Model is generated from description of element connections involved in complete arc network, list of corresponding circuit element values, description of circuit current excitation, and list of out-puts desired. Waveform of current is determined by structure of capacitor storage system, driver geometry, and preset driver conditions.

B75-10133
MULTIPLEXING TECHNIQUE FOR COMPUTER COMMUNICATIONS VIA SATELLITE CHANNELS
R. Binder (Hawaii Univ.)
Jun. 1975
ARC-10879

Multiplexing scheme combines technique of dynamic allocation with conventional time-division multiplexing. Scheme is designed to expedite short-duration interactive or priority traffic and to delay large data transfers; as result, each node has effective capacity of almost total channel capacity when other nodes have light traffic loads.

B75-10140
METHOD OF IDENTIFYING CLUSTERS REPRESENTING STATISTICAL DEPENDENCIES IN MULTIVARIATE DATA
W. J. Borucki, D. H. Card, and G. C. Lyle
Jul. 1975
ARC-10744

Approach is first to cluster and then to compute spatial boundaries for resulting clusters. Next step is to compute, from set of Monte Carlo samples obtained from scrambled data, estimates of probabilities of obtaining at least as many points within boundaries as were actually observed in original data.

B75-10143
ALGORITHM FOR NONLINEAR STATIONARY NAVIER-STOKES PROBLEM
R. E. Gabrielsen and S. Karel
Jul. 1975
ARC-10960

Results of applications of algorithm suggest that it has potential application to variety of related fluid flow problems, such as presently intractable separation problem of aerodynamics. Details of mathematical development, as well as computation of explicit error estimates, are available.

B75-10146
SIMPLE COMPUTER METHOD PROVIDES CONTOURS FOR RADIOLOGICAL IMAGES
J. D. Newell (California Univ., San Diego), R. A. Keller (California Univ., San Diego), and N. A. Baily (California Univ., San Diego)
Jul. 1975
ARC-10940

Computer is provided with information concerning boundaries in total image. Gradient of each point in digitized image is calculated with aid of threshold technique; then there is invoked set of algorithms designed to reduce number of gradient elements and to retain only major ones for definition of contour.

B75-10155
REMOTE FILE INQUIRY (RFI) SYSTEM
Innovator not given (IBM) Aug. 1975
KSC-10837

System interrogates and maintains user-definable data files from remote terminals, using English-like, free-form query language easily learned by persons not proficient in computer programming. System operates in asynchronous mode, allowing any number of inquiries within limitation of available core to be active concurrently.

B75-10172
TRIMETRIC SCALE FOR DRAFTING MACHINES
J. C. Ryan (Rockwell Intern. Corp.) and R. Chu (Rockwell Intern. Corp.)
Aug. 1975
MSC-15829; JSC-19391

Device allows three basic projections to be drawn from a single scale zero setting. Ellipse proportions are included for convenience. Axonometric projections can also be determined.

B75-10186
RETSCP-A COMPUTER PROGRAM FOR ANALYSIS OF ROCKET ENGINE THERMAL STRAINS WITH CYCLIC PLASTICITY
R. W. Miller (Atkins and Merrill, Inc.)
Oct. 1975
LEWIS-12388

Finite element program employs three-dimensional isoparametric element for analysis of rocket engine thermal strains with cyclic plasticity.

B75-10187
COMPUTER PROGRAM FOR CALCULATING WATER AND STEAM PROPERTIES
R. C. Hendricks, I. C. Peller, and A. K. Baron
Nov. 1975
LEWIS-12519

Computer subprogram calculates thermodynamic and transport properties of water and steam. Program accepts any two of pressure, temperature, and density as input conditions. Pressure and either entropy or enthalpy are also allowable input variables. Output includes any combination of temperature, density, pressure, entropy, enthalpy, specific heats, sonic velocity, viscosity, thermal conductivity, surface tension, and the Laplace constant.

B75-10188
COMPUTER PROGRAM FOR CALCULATING THERMODYNAMIC AND TRANSPORT PROPERTIES OF FLUIDS
R. C. Hendricks, A. K. Braon, and I. C. Peller
Oct. 1975
LEWIS-12520

Computer code has been developed to provide thermodynamic and transport properties of liquid argon, carbon dioxide, carbon monoxide, fluorine, helium, methane, neon, nitrogen, oxygen, and parahydrogen. Equation of state and transport coefficients are updated and other fluids added as new material becomes available.

B75-10194
EXECUTIVE COMPUTER PROGRAM FOR LINKING INDEPENDENT COMPUTER PROGRAMS: ODINEX
C. R. Latt (Aerophysics Res. Corp.), D. S. Hague (Aerophysics Res. Corp.), and D. A. Watson (Aerophysics Res. Corp.)
Sep. 1975
LANGLEY-11324

Program controls sequence of execution of network of program elements and maintains data base of common information which forms communication link among them. Approach is applicable to any multiple-program task.

B75-10242
COMPUTER PROGRAM FOR THE ATTENUATION OF HIGH BYPASS TURBOFAN ENGINE NOISE
H. F. Veldman (Boeing Co.)
Oct. 1975
LEWIS-12179

Two computer programs determine effect of boundary layer on attenuation of sound in a circular duct lined with material used in noise suppresion in fan inlet and exhaust ducts of turbofan engines.

B75-10243
IMPROVED AXISYMMETRIC POTENTIAL FLOW COMPUTER PROGRAM
J. L. Hess (McDonnell Douglas Corp.)
Oct. 1975
LEWIS-12387

Basic method of calculating potential flow has been refined to increase accuracy of results and to reduce computational time. Program calculates low speed flows about or within bodies of

axially symmetric shape. Solid body, inlet, and purely internal flow problems can be solved.

B75-10252
COMPUTER INTEGRATION OF HYDRODYNAMICS EQUATIONS FOR HEAT PIPES
D. K. Edwards (TRW Systems Group), J. E. Eninger (TRW Systems Group), and B. D. Marcus (TRW Systems Group)
Oct. 1975
GSFC-12009

Program has five operational modes that provide user flexibility in answering crucial heat-pipe design questions. User specifies heat input and rejection distribution.

B75-10263
IMPROVED GENERAL-PURPOSE NAMELIST PROCESSOR
E. W. Wojtaszek (Martin Marietta Corp.)
Oct. 1975
LANGLEY-11834

Processor is written in FORTRAN with minimal machine-dependent coding, allowing easy conversion to various digital computers. It eliminates 19 continuation-card limit of current namelist processors and permits unlimited number of variables to be read in a single namelist declaration.

B75-10273
A STUDY OF ACCURACY IN SELECTED NUMERICAL-ANALYSIS INTEGRATION TECHNIQUES
W. M. Lear (TRW, Inc.)
Oct. 1975 See also NASA-CR-141784
MSC-14802

Report discusses several methods of performing numerical integration with computer. When data can be expressed as state vector that is dependent variable in a differential equation, self-starting integrators can be used to predict future data.

B75-10278
GENERATION OF KEY IN CRYPTOGRAPHIC SYSTEM FOR SECURE COMMUNICATIONS
M. Perlman
Oct. 1975
NPO-13451

Report discusses key generation for transmission of confidential data. A number of feedback functions are discussed for generation of long key sequences.

B75-10292
COMPUTER SYSTEM FOR LIBRARY ACCESS
A. DelFrate
Dec. 1975
GSFC-11952

Program performs traditional file creation, maintenance, and output. MARC II compatible data records can be added, changed, or deleted in bibliographic file.

B75-10294
GENERAL OPTICS EVALUATION PROGRAM (GENOPTICS)
B. J. Howell
Dec. 1975
GSFC-12038

Program prints and plots results of computations such as ray traces, radial energy distributions, and designs of two-mirror telescopes.

B75-10295
SMALL INTERACTIVE IMAGE PROCESSING SYSTEM (SMIPS)
J. G. Moik (Computer Sci. Corp.)
Dec. 1975
GSFC-12079

System facilitates acquisition, digital processing, and recording of image data, as well as pattern recognition in an iterative mode.

B75-10302
THE LANGLEY RESEARCH CENTER NASA/PERT TIME III
Innovator not given (Project Schedules and Analysis Group) Dec. 1975
LANGLEY-11887

Program provides practical system for total project management in areas of planning, scheduling, resource control, and reporting. It allows use of existing management and administrative tools and processes and is applicable to many types of projects.

B75-10318
POWER SPECTRUM ANALYSIS OF STAGGERED QUADRIPHASE-SHIFT-KEYED SIGNALS
F. L. McWhorter (Magnavox Co.) and D. E. Cartier (Magnavox Co.)
Dec. 1975
MSC-14865

Mathematical analysis of power spectrum of outputs from high-reliability communication system is used to determine system bandwidth. Analysis provides mathematical relationships of signal power spectrum at output of hard limiter for any type of baseband pulse input subjected only to output parameter constraints.

B75-10338
MINIMIZATION SEARCH METHOD FOR DATA INVERSION
A. L. Fymat
Dec. 1975 See also B75-10335
NPO-99999

Technique has been developed for determining values of selected subsets of independent variables in mathematical formulations. Required computation time increases with first power of the number of variables. This is in contrast with classical minimization methods for which computational time increases with third power of the number of variables.

SUBJECT INDEX

Subject Index

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Thin-film ultraviolet detector and spectrometer
NPO-11432 B72-10701 03

Reduction of porosity in aluminum weldments
MSC-14198 B72-10734 08

Semi-organic structural adhesive for aluminum
M-FS-21328 B73-10071 04

Fatigue of boron-aluminum composites bonds and joints
M-FS-22325 B73-10079 04

Effects of environmental exposure on cryogenic thermal insulation materials
LEWIS-12007 B73-10213 04

Applying high-emittance and solar-absorptance coating to aluminum
LANGLEY-10151 B73-10238 04

Manufacture of large, lightweight parabolic antennas
ARC-10741 B73-10375 08

Grain refinement control in gas-shielded arc welding of aluminum tubing
JSC-19095 B73-10508 08

In-process oxidation protection in fluxless brazing or diffusion bonding of aluminum alloys
MSC-14435 B74-10096 04

Explosive welding technique for joining aluminum and steel tubes
MSC-14721 B74-10272 08

Industrial laser welding: An evaluation
M-FS-23237 B75-10267 08

ALUMINUM ALLOYS

Testing filamentary composites
HQ-10268 B70-10004 04

Unidirectional composite stiffening
HQ-10266 B70-10054 04

A method for obtaining high ductility in critical areas of aluminum castings
M-FS-18705 B70-10121 08

Stress corrosion crack inhibiting method for titanium
NPO-10271 B70-10129 03

Effects of high pressure hydrogen on metals
M-FS-18612 B70-10162 04

Fatigue properties of sheet, bar, and cast metallic materials for cryogenic applications
M-FS-18427 B70-10199 04

Oxidation resistant iron and nickel alloys for high temperature use
LEWIS-10936 B70-10210 04

Techniques for forming skin panels for large-diameter cylinders from aluminum-2014
M-FS-14385 B70-10243 04

Mechanism and kinetics of aging in Inconel 718
M-FS-18775 B70-10261 04

An investigation of the strength of aluminum wire used in integrated circuits
NPO-11219 B70-10275 01

High precision cryogenic thermal conductivity standards
NUC-10555 B70-10310 04

Thermal treatment and mechanical properties of aluminum-2021
M-FS-20559 B70-10369 04

Heat-rejection windows for telescopes
M-FS-20634 B70-10386 04

Increased resistance to stress corrosion of aluminum alloys
M-FS-20788 B70-10396 04

Strain compatibility tests for sprayed foam cryogenic insulation
M-FS-16063 B70-10423 04

High expansion coefficient glasses can be sealed to common metals
LEWIS-10698 B70-10429 08

Aluminum-silicon eutectic alloy improves electrical and mechanical contact to silicon carbide
ERC-10277 B70-10445 03

Friction characteristics of graphite and graphite-metal combinations at various temperatures
NUC-10151 B70-10467 04

Effects of crystal defects on stress-corrosion susceptibility in aluminum alloy 7075
M-FS-18794 B70-10506 04

Molding procedure for casting a variety of alloys
ARC-10358 B70-10512 08

Ultrasonic detection of flaws in fusion butt welds
M-FS-20824 B70-10514 08

The mechanism of stress-corrosion cracking in 7075 aluminum alloy
M-FS-18614 B70-10527 04

The water-cryogen heat exchanger
NUC-11029 B70-10591 03

Metal drilling with portable hand drills
M-FS-15180 B70-10594 08

Metal alloy resistivity measurements at very low temperatures
NUC-10557 B71-10104 04

Differential expansion fitting for cryogenic liquid tanks
LEWIS-11260 B71-10268 08

Investigation to identify paint coatings resistive to microorganism growth
M-FS-20458 B71-10310 04

Electroplating on titanium alloy
M-FS-21251 B71-10338 08

Cadmium plated steel caps seal anodized aluminum fittings
M-FS-20137 B71-10355 05

Discrete-component S-band power amplifier
GSFC-11248 B71-10365 01

Fracture mechanics evaluation of Ti-6A1-4V pressure vessels
MSC-13995 B71-10413 09

Liquid-fuel valve with precise throttling control
NPO-10808 B71-10449 07

New primers for adhesive bonding of aluminum alloys
M-FS-21387 B71-10488 04

Metal-shearing energy absorber
HQ-10638 B71-10503 07

Nondestructive testing of bond integrity in foam insulation/aluminum composites
M-FS-20786 B71-10507 06

Joint preload properties of structural threaded fasteners
M-FS-21453 B71-10531 08

Small-scale explosive welding of aluminum
LANGLEY-10941 B72-10002 04

Advanced protective coating for superalloys
LEWIS-11473 B72-10150 04

Analysis of thermal stress and metal movement during welding
M-FS-20984 B72-10333 04

Strain gage attachment by spot welding reduces the fatigue strength of Ti-6Al-4V, Rene 41, and Inconel X
LANGLEY-10930 B72-10339 04

Adhesive for aluminum withstands cryogenic temperatures
M-FS-16848 B72-10346 04

Boron aluminum composite structures
M-FS-21571 B72-10386 04

Oxidation resistant, thoria-dispersed nickel-chromium-aluminum alloy
LEWIS-11541 B73-10077 04

Materials data handbooks on aluminum alloys
M-FS-22798 B73-10373 04

Welding high-strength aluminum alloys
M-FS-22918 B73-10481 04

X-ray opaque additive for inspection of weld joints
M-FS-22896 B73-10528 08

Addition of silicon improves oxidation resistance of nickel based superalloys
LEWIS-12138 B74-10007 04

In-process oxidation protection in fluxless brazing or diffusion bonding of aluminum alloys
MSC-14435 B74-10096 04

High-strength rivet does not require aging
MSC-19301 B75-10044 06

Aluminum alloys with improved strength
M-FS-23239 B75-10200 04

Biaxial compression test technique
MSC-14883 B75-10319 08

ALUMINUM CHLORIDES

Stabilization of porous glass reverse-osmosis membranes
ARC-10646 B72-10309 04

Chemical modification of poly(p-phenylene) for use in ablative compositions
ARC-10135 B72-10451 04

Al/Cl2 molten salt battery
HQ-10696 B72-10527 01

ALUMINUM COATINGS

Evaluation of two designs for cryogenic insulation
M-FS-14740 B70-10415 03

Improved heat-resistant garments
MSC-12109 B70-10544 08

Rugged, low-conductance, heat-flow probe
MSC-13443 B70-10622 03

Oxidation-resistant coatings for refractory metals used in inert atmospheres
NPO-11477 B70-10674 04

Rigid open-cell polyurethane foam for cryogenic insulation
LEWIS-11220 B71-10079 04

NASA-tricot - A lightweight radar reflective, knitted fabric
LANGLEY-10776 B71-10342 04

Superior cryogenic insulation developed
M-FS-21560 B72-10187 04

Selective coating for collecting solar energy on aluminum
M-FS-22562 B73-10527 04

Inexpensive lightweight mirror
MSC-14615 B74-10155 05

ALUMINUM COMPOUNDS

New materials for fireplace logs
M-FS-21363 B71-10339 04

Graphite-reinforced aluminum composite
M-FS-21077 B71-10482 04

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Interplanetary Trajectories, Encke Method (ITEM)
GSFC-11576 B72-10604 09

Propulsion sizing program
MSC-14016 B72-10605 09

Program to produce horizontal stereographic print maps from Nimbus HRIR data
GSFC-11397 B72-10606 09

Two autowire versions for CDC-3200 and IBM-360
GSFC-11526 B72-10608 09

Source deck compression and update program (CAPS)
GSFC-11545 B72-10619 09

GPEDIT
GSFC-11308 B72-10620 09

Method for nonlinear exponential regression analysis
M-FS-21965 B72-10622 09

FORTRAN manpower account program
NPO-11973 B72-10623 09

Program to reduce the size of structural matrices
MSC-17619 B72-10625 09

Computer program for afterheat temperature distribution for mobile nuclear power plant
LEWIS-11693 B72-10634 09

Analytic procedures for determining dimensional redundancies in electronic devices
HQ-10709 B72-10656 09

Integrated multi-path program analysis and cost technique (IMPACT)
M-FS-21880 B72-10676 09

Propellant feed systems transients
MSC-17848 B72-10677 06

Computer program for calculation of complex chemical equilibrium compositions
LEWIS-11714 B72-10718 09

Chrysler improved numerical differencing analyzer for third generation computers CINDA-3G
MSC-11653 B72-10721 09

Optimization of fluid line sizes with pumping power penalty IBM-360 computer program
MSC-17930 B72-10722 06

Analysis of circuits including magnetic cores (MTRAC)
NPO-11494 B72-10724 02

Three bit mass spectral search program
NPO-11960 B72-10747 09

Final report on a study of low-density nozzle flows, with application to microthrust rockets
HQ-10761 B72-10748 06

Effects of nonuniform swash-plate stiffness on coupled blade-control system dynamics and stability
LANGLEY-11068 B72-10749 06

FORTRAN read package
MSC-14161 B72-10750 09

FORTRAN program for generating a two-dimensional orthogonal mesh between two arbitrary boundaries
LEWIS-11863 B72-10753 09

N-body U and K matrix program
LEWIS-11438 B73-10012 09

A comprehensive program for textual concordances and statistics
JSC-17484 B73-10049 09

Computer program for transient response of structural rings subjected to fragment impact
LEWIS-11926 B73-10064 09

Aerotherm charring materials ablation computer program
LEWIS-11854 B73-10065 09

Computer program for preliminary design analysis of axial-flow turbines
LEWIS-11815 B73-10066 09

Medical Information Management System (MIMS): An automated hospital information system
GSFC-11540 B73-10073 09

PPUAS--photopeak unfolding and self-shielding program
NPO-13188 B73-10087 09

A general purpose maneuver turns computer program
NPO-13213 B73-10088 09

A linear circuit analysis program with stiff systems capability
LANGLEY-11184 B73-10091 09

Eigenvalue routine by Sturm sequence method
NPO-11805 B73-10114 09

Automated Shell Theory for Rotating Structures (ASTROS)
M-FS-21970 B73-10115 09

Ascent control analysis for S-II derivative launch vehicles, digital computer program
M-FS-24324 B73-10120 09

GREMEX update (Goddard research engineering management exercise)
GSFC-11512 B73-10162 09

Theoretical prediction of interference loading on aircraft stores: Part II - Supersonic speeds
LANGLEY-11250 B73-10183 06

Theoretical prediction of interference loading on aircraft stores: Part I - Subsonic speeds
LANGLEY-11249 B73-10184 06

Computer program for the design of toroidal transformers
LEWIS-11878 B73-10214 09

Spectral Analysis Program (SAP)
JSC-14310 B73-10227 09

Computer program for calculation of thermodynamic and transport properties of complex chemical systems
LEWIS-11997 B73-10231 09

A computer program for calculating design and off-design performance for turbojet and turbofan engines
LEWIS-12010 B73-10232 09

Computer program to determine the irrotational nozzle admittance
LEWIS-12019 B73-10233 09

Method for predicting rotor free-wake positions and the resulting rotor blade airloads
LANGLEY-10674 B73-10239 06

Computer program to determine roots of polynomials by ratio of successive derivatives
LEWIS-11809 B73-10244 09

A computer program for calculating design and off-design performance of two- and three-spool turbofans with as many as three nozzles
LEWIS-12011 B73-10245 09

Computer program for compressible flow network analysis
LEWIS-11859 B73-10246 09

Computer program to compute buckling loads of simply supported anisotropic plates
LEWIS-11961 B73-10247 09

Computer program calculates quasi-one-dimensional flow across face seals and narrow slots
LEWIS-11996 B73-10248 09

Computer program for the prediction of reorientation flow dynamics
LEWIS-11816 B73-10307 09

Program for calculating total-efficiency of specific-speed characteristics of centrifugal compressors
LEWIS-12008 B73-10309 09

Characteristics of FORTRAN
LANGLEY-11177 B73-10322 09

Computer program to determine pressure distributions and forces on blunt bodies of revolution
LANGLEY-11197 B73-10362 09

Computer program for stress, vibration, and buckling characteristics of general shells of revolution
LANGLEY-11369 B73-10363 09

Marshall system for aerospace simulation (MARSYAS)
M-FS-22672 B73-10432 09

Dynamic nonlinear analysis of shells of revolution (DYNASOR II)
JSC-14496 B73-10443 09

Frequencies and modes for shells of revolution (FAMSOR)
JSC-14497 B73-10444 09

The static nonlinear analysis of shells of revolution (SNASOR II)
JSC-14495 B73-10445 09

Stiffness and mass matrices for shells of revolution (SAMMSOR II)
JSC-14494 B73-10446 09

Improved method for aerodynamic analysis of wing-body-tail configurations in subsonic and supersonic flow
LANGLEY-11305 B73-10470 06

Improved method for design of expansion-chamber mufflers with application to operational helicopter
LANGLEY-11548 B73-10471 03

Stereoscopic computer graphics display system
M-FS-22322 B73-10526 09

Design standards for low-profile flanges
M-FS-22708 B74-10033 09

Computer program for spacecraft-booster separation spring selection, set composition, and location determination
GSFC-11616 B74-10037 09

Graphics shadowing analysis
M-FS-21406 B74-10040 09

Marshall information retrieval and display system (MIRADS)
M-FS-22536 B74-10043 09

Generalized curve fit and plotting (GECAP) program
M-FS-22728 B74-10044 09

Computer program for predicting off-design performance of centrifugal compressors
LEWIS-12186 B74-10067 09

Dynamic transformation method
M-FS-22848 B74-10076 06

Computer program for flexible rotor dynamics analysis
LEWIS-12153 B74-10084 09

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