

# Index to 1982 NASA Tech Briefs

Volume 7, Numbers 1-4

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Electronic Components and Circuits

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P-79



Electronic Systems



Physical Sciences



Materials



Computer Programs



Mechanics



Machinery



Fabrication Technology



Mathematics and Information Sciences



Life Sciences

(NASA-TM-89329) INDEX TO 1982 NASA TECH  
BRIEFS, VOLUME 7, NUMBERS 1-4 (NASA) 79 P

N92-70023

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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 — subject, personal author, originating Center, and Tech Brief number — for 1982 Tech Briefs.

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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 at \$35.00 for Volume 1 and \$20.00 for Volume 2.



## Originating Center Prefixes

ARC	Ames Research Center
GSC	Goddard Space Flight Center
HQN	NASA Headquarters
KSC	Kennedy Space Center
LAR	Langley Research Center
LEW	Lewis Research Center
MFS	Marshall Space Flight Center
MSC	Johnson Space Center (formerly Manned Spacecraft Center)
NPO	Jet Propulsion Laboratory/NASA Pasadena Office

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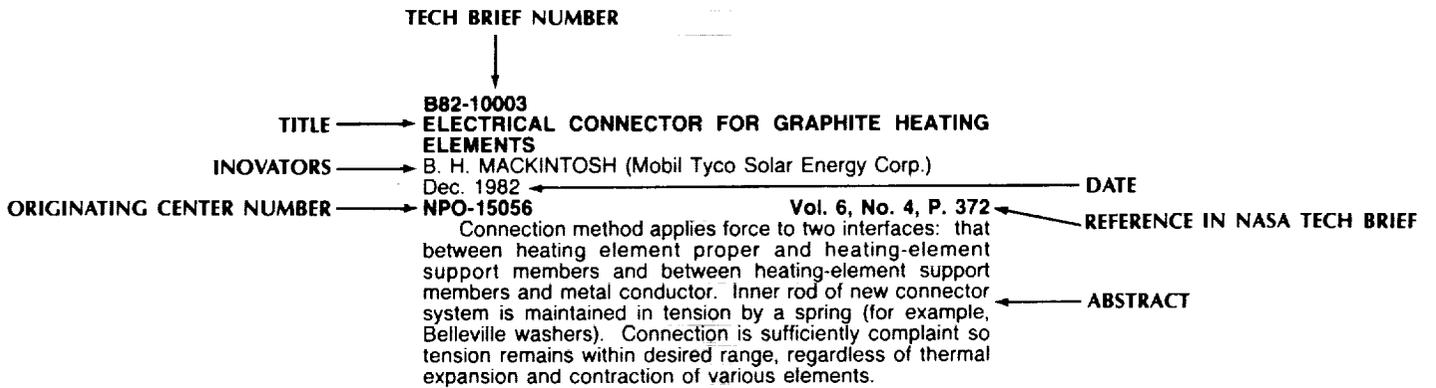
## Abstract Section

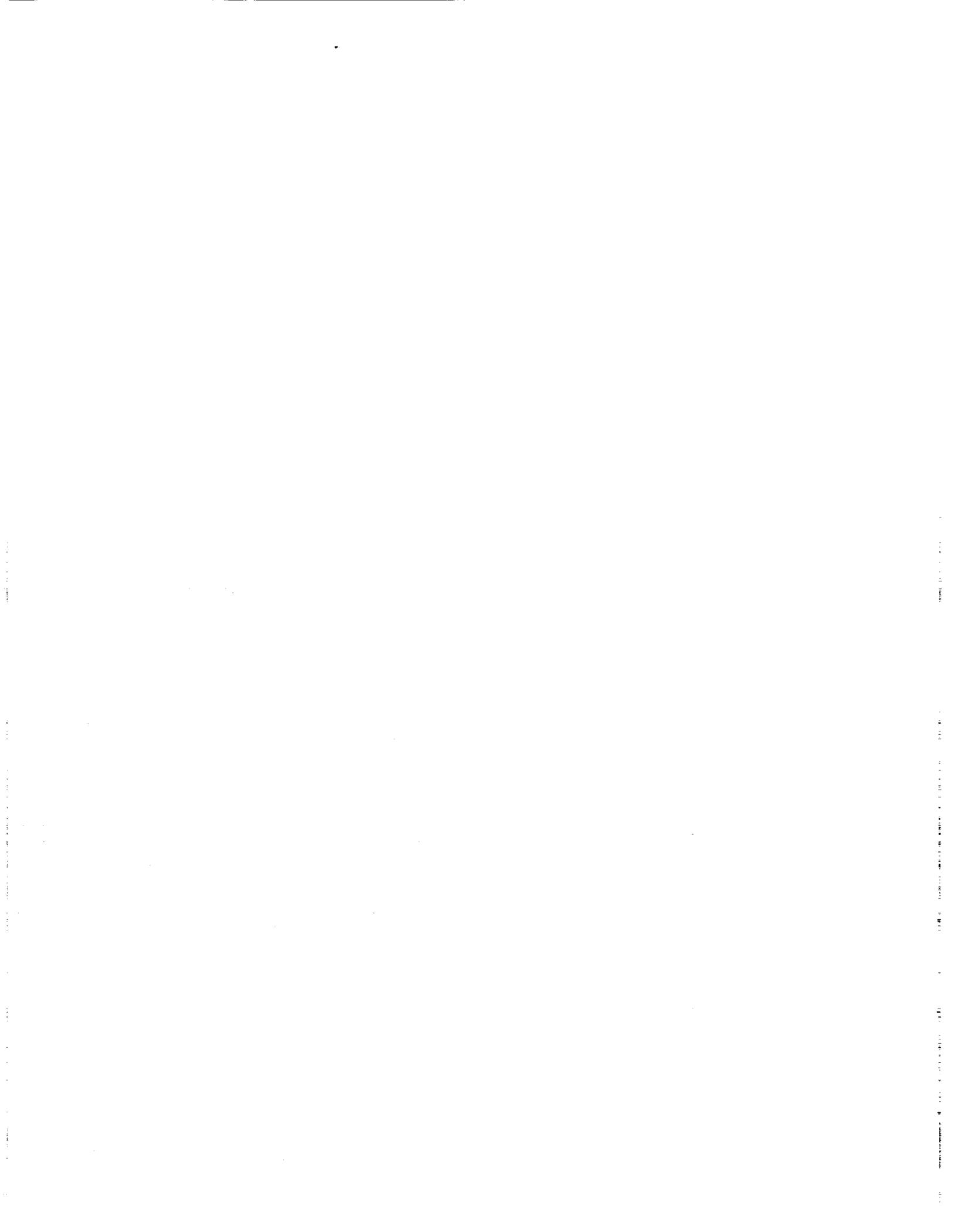
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# TYPICAL ABSTRACT ENTRY







# Index to 1982 NASA Tech Briefs

## September 1986

### Abstract Section

## 01 ELECTRONIC COMPONENTS AND CIRCUITS

**B82-10001**  
**SIMPLE TEMPERATURE REGULATOR FOR A COLD CHAMBER**  
W. G. REDMOND (Vought Corp.)  
Dec. 1982

**MSC-18927** Vol. 6, No. 4, P. 371  
Electronic control circuit holds cold chamber at selectable temperature and lights warning light if temperature exceeds predetermined level amplifiers. Temperature regulator circuit and warning-light circuit are independent of one another, but reference-level potentiometers are ganged. Temperature control circuit includes some feedback to prevent refrigeration unit from cycling on and off too frequently.

**B82-10002**  
**LONG-LIFE/LOW-POWER ION-GUN CATHODE**  
D. J. FITZGERALD (CALTECH)  
Dec. 1982

**NPO-15328** Vol. 6, No. 4, P. 372  
New cathode has form of hollow tube through which gas enters region of high electron density, produced by electric discharge with auxiliary electrode referred to as 'keeper.' Ion-gun cathode emits electrons that bombard gas in chamber. Ions accelerated out of source are used to dope semiconductor material.

**B82-10003**  
**ELECTRICAL CONNECTOR FOR GRAPHITE HEATING ELEMENTS**  
B. H. MACKINTOSH (Mobil Tyco Solar Energy Corp.)  
Dec. 1982

**NPO-15056** Vol. 6, No. 4, P. 372  
Connection method applies force to two interfaces: that between heating element proper and heating-element support members and between heating-element support members and metal conductor. Inner rod of new connector system is maintained in tension by a spring (for example, Belleville washers). Connection is sufficiently compliant so tension remains within desired range, regardless of thermal expansion and contraction of various elements.

**B82-10004**  
**LOW SPEED CONTROL FOR AUTOMATIC WELDING**  
W. E. ICELAND (Rockwell International Corp.)  
Dec. 1982

**MSC-20114** Vol. 6, No. 4, P. 373  
Amplifier module allows rotating positioner of automatic welding machine to operate at speeds below normal range.

Low speeds are precisely regulated by a servomechanism as are normal-range speeds. Addition of module to standard welding machine makes it unnecessary to purchase new equipment for low-speed welding.

**B82-10005**  
**PARRALLEL CONNECTIONS WOULD IMPROVE ARRAY RELIABILITY**  
M. S. CROUTHAMEL (RCA Corp.) and P. J. COYLE (RCA Corp.)  
Dec. 1982  
**NPO-15310** Vol. 6, No. 4, P. 375

Hexagonally-close-packed round solar cells are interconnected in series strings. Parallel contacts between cells at equipotential in adjacent series strings insure redundant current paths to relieve adverse effects of cell failures and mismatches. Parallel connections carry no current if cells are matched and functioning normally. If cell fails, tabs carry current to bypass inoperative cell.

**B82-10006**  
**INEXPENSIVE LOGIC-LEVEL CONVERTER**  
S. W. WILCOX (Rockwell International Corp.) and S. J. ZUCCARO (Rockwell International Corp.)  
Dec. 1982  
**MSC-18965** Vol. 6, No. 4, P. 376

Relatively-simple transformer circuit boosts 0-to-5 volt pulses from TTL circuitry to plus or minus 10-volt pulses for transmission over data bus. Also reduces bus voltages to lower voltages required by TTL circuitry. Circuit consists of transformer, two voltage-reference networks, quad differential line receiver, and line driver.

**B82-10125**  
**POWER FACTOR CONTROLLER AVOIDS FALSE TURN-OFF**  
F. J. NOLA  
Mar. 1983  
**MFS-25616** Vol. 7, No. 1, P. 3

Single-phase power-factor controller includes special inhibiting circuit to avoid false turnoff. If thyristor trigger signal occurs during flow of current from preceding half cycle, inhibiting signal delays application of trigger pulse until beginning of next current half cycle.

**B82-10126**  
**SOFT-STARTING POWER-FACTOR MOTOR CONTROLLER**  
F. J. NOLA  
Mar. 1983  
**MFS-25586** Vol. 7, No. 1, P. 4

Three-phase power-factor controller with soft start is based on earlier version that does not control starting transients. Additional components serve to turn off 'run' command signal and substitute gradual startup command signal during preset startup interval. Improved controller

## 01 ELECTRONIC COMPONENTS AND CIRCUITS

reduces large current surge that usually accompanies starting. Controller applies power smoothly, without causing motor vibrations.

**B82-10127**  
**IMPLEMENTING EXCLUSIVE-OR LOGIC**  
M. E. HOUGH (Rockwell International Corp.)  
Mar. 1983

**MSC-18458** Vol. 7, No. 1, P. 5  
Two integrated circuits, BCD-to-decimal decoder and four-input NAND gate, form basic four, input XOR circuit. Multiple-input exclusive-OR logic is implemented by combining several basic elements. 16-input XOR gate is assembled from five NAND gates and five decoders. Same principle extended to handle more inputs.

**B82-10128**  
**AUDIO DISTRIBUTION AND MONITORING CIRCUIT**  
J. M. KIRKLAND (Taft Broadcasting Corp.)  
Mar. 1983

**MSC-20073** Vol. 7, No. 1, P. 6  
Versatile circuit accepts and distributes TV audio signals. Three-meter audio distribution and monitoring circuit provides flexibility in monitoring, mixing, and distributing audio inputs and outputs at various signal and impedance levels. Program material is simultaneously monitored on three channels, or single-channel version built to monitor transmitted or received signal levels, drive speakers, interface to building communications, and drive long-line circuits.

**B82-10129**  
**500-WATT, 10-GHZ SOLID STATE AMPLIFIER**  
K. J. RUSSELL (Hughes Aircraft Co.) and O. PITZALIS JR (Hughes Aircraft Co.)  
Mar. 1983

**NPO-15022** Vol. 7, No. 1, P. 7  
X-band system amplifies low-duty-cycle pulses. Amplifier chain consists of driver-amplifier section using GaAs FET's with hybrid couplers, and power-amplifier section using IMPATT diodes with circulators for input/output coupling and for isolation between stages. Solid-state X-band amplifier package constitutes reliable, lightweight, compact, RF source. Used for many applications involving low-and variable-duty-cycle operation as well as fixed and high-duty-cycle operation.

**B82-10130**  
**INTEGRATED SUBMILLIMETER-WAVE MIXER**  
J. MASERJIAN (CALTECH), U. LIENEWEG (CALTECH), and M. LITRAK (CALTECH)  
Mar. 1982

**NPO-15238** Vol. 7, No. 1, P. 8  
Indium arsenide Schottky-Barrier diodes in gallium antimonide substrate mix submillimeter waves, producing much lower frequency output. Integrated diode array has relatively-high signal-to-noise ratio and wide frequency band. Operates at moderate cryogenic temperatures (100 K).

**B82-10131**  
**PORTABLE I/V-CURVE TESTER**  
S. W. COLE (CALTECH)  
Mar. 1983

**NPO-15266** Vol. 7, No. 1, P. 9  
Electronic load circuit for displaying current/voltage characteristic curves of power sources uses low-cost low-power CMOS operational amplifiers to control load current flowing through power MOSFET Q2 and main load transistor Q3. Thermal cutoff device turns off transistor Q3 in case of overload. To maximize battery life, battery is connected via 'push-to-read' momentary-contact pushbutton switch.

**B82-10132**  
**ELECTRONIC LOAD TESTS HIGH-VOLTAGE SOLAR ARRAYS**

E. L. MILLER (CALTECH)  
Mar. 1982  
**NPO-15358** Vol. 7, No. 1, P. 10  
Adjustable electronic load in solar-cell-array test instrument uses ten power MOSFET's and eight resistors. Two gate-control voltages adjusting load are derived from single, manually-operated, ganged potentiometer control. Third adjustable resistor adjusts relative turn-on points of two groups of transistors.

**B82-10133**  
**FLIP-CHIP CARRIER WOULD MATCH MICROWAVE FET IMPEDANCES**  
H. C. HUANG (RCA Corp.)  
Mar. 1982

**GSC-12442** Vol. 7, No. 1, P. 11  
Proposed field-effect transistor consists of three cells which make up one complete FET pellet. Pellet is flip-chip mounted on carrier with source grounded gate and drain posts connected directly to impedance-matching transmission-line segments. Impedance transformers are part of mounting and contact strips.

**B82-10134**  
**DIPOLE-EXCITED RING ANTENNA**  
H. ELLIS JR. (Rockwell International Corp.)  
Mar. 1982

**MSC-20201** Vol. 7, No. 1, P. 12  
Dipole radiator drives ring radiator in compact C-band antenna. Antenna can be mounted flush with surface. Compared with horn or parabolic dish with same aperture, new ring antenna has greater gain, lower side lobes, and narrower beam width. Used on vehicles requiring flush-mounted antennas with very directive signals. Used as radar altimeter antenna for aircraft.

**B82-10249**  
**VOLTAGE REGULATOR FOR A DC-TO-DC CONVERTER**  
C. W. MCLYMAN (CALTECH)  
May 1983

**NPO-15208** Vol. 7, No. 2, P. 127  
New voltage regulator isolates signals from power-switching converter without use of complex circuitry or optical couplers. Only addition is extra secondary winding on existing interstage transformer. Error signals shortcircuit new winding and inhibit converter action. Resistor in series with primary winding limits short-circuit current to prevent damage to circuit components. Extra transformer winding eliminates need for isolation components.

**B82-10250**  
**MICROPROGRAMMED SEQUENCER FOR TUNABLE RF OSCILLATOR**  
R. H. COUCH, C. P. HEARN, and J. B. WILLIAMS  
May 1983

**LAR-12903** Vol. 7, No. 2, P. 128  
Standard IC chips and digitally tuned oscillator combined. circuit consists of PROM-based microprogrammed control sequencer, which drives group of diode switches to select one of eight tuning capacitors in L-C oscillator. Circuit originally designed to 'dither' transmitter frequency of K-band radar at high rates finds application in other areas, as automated test equipment or computer-controlled receiver tuning.

**B82-10251**  
**TANGLEPROOF ROTARY ELECTRICAL COUPLING**  
F. KELLER (American Science & Engineering, Inc.)  
May 1983  
**MFS-25174** Vol. 7, No. 1, P. 129

New rotary coupling connects large number of electrical cables to turntable without stressing cables or tangling them. Device accommodates 246 cables containing total of 758 conductors and allows turntable to rotate through arc of 320 degrees. At extremes of rotation, cables are loose enough that they are not pulled taut and overstressed. At

halfway point, cables are not so loose that they become entangled.

**B82-10252**  
**VLSI REED-SOLOMON ENCODER**

K. Y. LIU (CALTECH)  
May 1983

**NPO-15470** Vol. 7, No. 2, P. 130

Modular Reed-solomon encoder uses identical custom VLSI chips called 'symbol slices.' By cascading and properly interconnecting group of these chips, encoder is made for any desired error-correcting capability and interleaving level. VLSI encoder requires only one-tenth the number of chips required by conventional Reed-Solomon Circuit implemented with discrete IC's.

**B82-10253**  
**USING SAW RESONATORS IN RF OSCILLATORS**

R. M. WESTBROOK and G. J. DEBOO  
May 1983

**ARC-11390** Vol. 7, No. 2, P. 131

Surface-acoustic-wave (SAW) resonators used as frequency-determining elements in radio-frequency oscillators circuits. Oscillators are frequency modulated, phase-modulated, or pulse-modulated. SAW resonators are especially applicable to low-power subminiature applications, such as biotelemetry and wind-tunnel instrumentation, where they advantageously replace crystals. Resonators are smaller than crystals and very thin--advantage where small package size is important.

**B82-10254**  
**MILLIWATT DC/DC INVERTER**

C. W. MCCLYMAN (CALTECH)  
May 1983

**NPO-15157** Vol. 7, No. 2, P. 132

Compact dc/dc inverter uses single integrated-circuit package containing six inverter gates that generate and amplify 100-kHz square-wave switching signal. Square-wave switching inverts 10-volt local power to isolated voltage at another desired level. Relatively high operating frequency reduces size of filter capacitors required, resulting in small package unit.

**B82-10255**  
**SOLID STATE CIRCUITS FOR CRYOGENIC OPERATION**

D. PETRAC (CALTECH) and R. L. SPENCER (CALTECH)  
May 1983

**NPO-15255** Vol. 7, No. 2, P. 133

Tests confirm operation of five commercial semiconductor devices at cryogenic temperatures. The five devices - one tunnel diode, one field-effect transistor, and three CMOS integrated circuits - all perform well in circuits immersed in liquid-helium bath. For some tests, bath temperature was reduced to 1,25K by pumping.

**B82-10256**  
**CHARGING NI/CD CELLS**

G. HALPERT and C. M. TASEVOLI  
May 1983

**GSC-12779** Vol. 7, No. 2, P. 133

New procedure for recharging nickel/cadmium batteries is fast and eliminates overcharging. Method charges 'dead' cells using increments rather than continuous, constant current. Time required for procedure is approximately 18 hours and correspondingly reduced overcharging reduces generation of heat. Further advantage is cells are more electrochemically active than after 48 hours charging by old method.

**B82-10257**  
**TERMINAL STRIP FACILITATES PRINTED-CIRCUIT BOARD CHANGES**

E. A. PINTO (General Electric Co.) and C. E. MCOSKER (General Electric Co.)  
May 1983

**GSC-12748**

Vol. 7, No. 2, P. 134

Laminated copper and polyimide terminal strip makes it easy to modify printed-circuit (PC) board, after board has been fabricated. When epoxied over conductors or insulating portion of PC board, strip provides series of solder-coated copper conductor pads to which integrated-circuit leads are soldered for functional changes. Terminal strips accommodate leads on dual inline IC package or as staggered single or multiple leads on planar mounted flatpacks.

**B82-10263**  
**SPACE PLATFORM TECHNOLOGY**

May 1983 See Also NASA CR-161807 (N81-26164/NSP) and CR-161808 (N81-26165/NSP)

**MFS-25704** Vol. 7, No. 2, P. 141

Study examines possibility of using few large platforms in space instead of many small satellites to provide communications and other services. Study was based in large measure on user survey. List of 31 potential services was presented to leading telecommunications firms (including carriers, programmers, users and manufacturers). Both favorable and antagonistic viewpoints were solicited.

**B82-10264**  
**SHUTTLE COMMUNICATIONS BLACKOUT STUDY**

R. L. HABEN (Rockwell International Corp.) and R. J. BUDICA (Rockwell International Corp.)

Mar. 1983

**MSC-20141** Vol. 7, No. 2, P. 142

Space Shuttle Orbiter Entry Communications Blackout Study computer program models, investigates, and predicts communication blackout envelopes based on mission entry trajectory and associated data from tracking stations. Of interest to those designing and using communications systems susceptible to blackout. Program is readily adapted to predict entry communications blackout for any nonablative entry vehicle.

**B82-10274**  
**EFFICIENT SILICON REACTOR**

H. E. BATES (Energy Materials Corp.), D. M. HILL (Energy Materials Corp.), and D. N. JEWETT (Energy Materials Corp.)

May 1983

**NPO-15636** Vol. 7, No. 2, P. 155

High-purity silicon efficiently produced and transferred by continuous two-cycle reactor. New reactor operates in relatively-narrow temperature range and uses large surfaces area to minimize heat expenditure and processing time in producing silicon by hydrogen reduction of trichlorosilane. Two cycles of reactor consists of silicon production and removal.

**B82-10275**  
**SILICON-DELIVERY TUBE**

H. E. BATES (Energy Materials Corp.), D. M. HILL (Energy Materials Corp.), and D. M. JEWETT (Energy Materials Corp.)

May 1983

**NPO-15637** Vol. 7, No. 2, P. 156

Delivery tube transfers molten silicon between high-temperature vessel. Transport tube is sealed to delivery vessel and receiving vessel and slanted so gravity moves molten silicon. Contamination is prevented since molten silicon only contacts quartz delivery tube.

**B82-10276**  
**A MILD SOLUTION FOR STRESS-CORROSION TESTS**

T. S. HUMPHRIES and J. E. COSTON  
May 1983 See Also NASA TM-82452 (N82-13216/NSP)

**MFS-25792** Vol. 7, No. 2, P. 156

In search for mild corrosive, 14 different salt solutions screened in alternate-immersion tests on 3 aluminum alloys. Best results were obtained with NaCl/MgCl<sub>2</sub> solution and with synthetic seawater (contains nearly same proportions of NaCl and MgCl<sub>2</sub> along with precise, minute amounts of eight other salts). Because solution is less expensive than

## 01 ELECTRONIC COMPONENTS AND CIRCUITS

artificial seawater, it is probably preferred for future stress-corrosion-cracking (SCC) testing.

**B82-10277**  
**HEATED ALUMINUM TANKS RESIST CORROSION**  
L. E. JOHNSON (Martin Marietta Corp.)  
May 1983

**MFS-25780** Vol. 7, No. 2, P. 157  
Simple expedient of heating foam-insulated aluminum alloy tanks prevents corrosion by salt-laden moisture. Relatively-small temperature difference between such tank and surrounding air will ensure life of tank is extended by many years.

## 02 ELECTRONIC SYSTEMS

**B82-10007**  
**PROGRAMMABLE PULSE GENERATOR**  
W. K. RHIM (CALTECH) and J. A. DART (CALTECH)  
Dec. 1982

**NPO-15168** Vol. 6, No. 4, P. 379  
New pulse generator programmed to produce pulses from several ports at different pulse lengths and intervals and virtually any combination and sequence. Unit contains a 256-word-by-16-bit memory loaded with instructions either manually or by computer. Once loaded, unit operates independently of computer.

**B82-10008**  
**EVENT RECORDER SCANS 2,048 CHANNELS**  
K. J. SLUSSER (Rockwell International Corp.)  
Dec. 1982

**MFS-19609** Vol. 6, No. 4, P. 380  
Up to 16 input signals feed each of up to 128 input circuit cards. Single input circuit card contains optical isolators with input-diode lamping, RC filters, Schmitt-trigger input buffers, and 16-to-1 multiplexer. Input circuit cards feed logic, memory, and input/output circuits, which are standard, off-the-shelf devices. Instrument records sequence and time of events and could be useful in monitoring operation of manufacturing machinery and furnishing information useful in diagnosis of machinery malfunctions.

**B82-10009**  
**SCANNING SEISMIC INTRUSION DETECTOR**  
R. D. LEE  
Dec. 1982

**ARC-11317** Vol. 6, No. 4, P. 381  
Scanning seismic intrusion detector employs array of automatically or manually scanned sensors to determine approximate location of intruder. Automatic-scanning feature enables one operator to tend system of many sensors. Typical sensors used with new system are moving-coil seismic pickups. Detector finds uses in industrial security systems.

**B82-10010**  
**MEASURING THE ELECTRICAL PROPERTIES OF EPOXIES**  
J. E. SERGENT (University of South Florida)  
Dec. 1982

**MFS-25656** Vol. 6, No. 4, P. 382  
Two techniques rapidly determine low-frequency resistivity of conductive epoxies and high-frequency dielectric properties of insulating epoxies. Conductive epoxy is molded in channels in plastic block. Four-point ohmmeter is used to apply current and sense voltage; it reads out

resistance. Because mold has precise and stable dimensions, it produces accurate consistent measurements.

**B82-10011**  
**AUTOMATIC CALIBRATION SYSTEMS**  
A. T. FERRIS, S. F. EDWARDS, W. F. STEWART, D. R. J. MASON, T. D. FINLEY, and H. E. WILLIAMS (Wyle Laboratories)  
Dec. 1982

**LAR-12566** Vol. 6, No. 4, P. 382  
A continuous requirement exists for calibration and environmental testing of instruments in use at multitude of test facilities at Langley Research Center. Brief summarizes several automated systems available for calibration of research instruments to include: six-component balance, multimeter, amplifier, pyrometer, voltage-controlled oscillator, pressure transducer and accelerometer.

**B82-10012**  
**RADIOMETER NOISE-INJECTION CONTROL**  
W. D. STANLEY (Old Dominion University) and R. LAWRENCE, W. (Old Dominion University)  
Dec. 1982 See Also NASA TM-81932 (N81-18296/NSP)

**LAR-12905** Vol. 6, No. 4, P. 383  
New technique for controlling noise injection in Dicke feedback noise-injection microwave radiometer utilizes digital counter in which noise injection is kept on during countdown interval. Digital portion of loop replaces analog filters used in previous systems.

**B82-10135**  
**PULSED PHASE SHIFTER IMPROVES DOPPLER RADAR**  
H. S. KOBAYASHI, P. W. SHORES, and P. ROZAS  
Mar. 1982

**MSC-18675** Vol. 7, No. 1, P. 15  
Ability of microwave Doppler radar to measure velocity of slow moving nearby target is enhanced by pulsed 90 degrees phase shifter in radar transmission line between circulator and antenna. Because of phase shifting, Doppler frequency is detected as modulation on carrier instead of baseband signal. Carrier is amplified and filtered before demodulation, resulting in strong, clean demodulated Doppler for measurement and display.

**B82-10136**  
**CONVERTING TIME SIGNALS FROM BCD TO IRIG-B**  
J. B. HOUSTON (Rockwell International Corp.)  
Mar. 1982

**MSC-18963** Vol. 7, No. 1, P. 16  
Coded representation of time signals--day, hour, minute, second--is changed from binary-coded decimal (BCD) to IRIG standard time-code format B by circuit that uses nine integrated circuits. Input to code-converter circuit is parallel BCD pulses on bus output is serial pulses of IRIG-B on single line.

**B82-10137**  
**SLED CONTROL AND SAFETY SYSTEM**  
L. J. FORREST (Technology, Inc.)  
Mar. 1982 See Also NASA CR-167425(N82-10061/NSP)

**MSC-20082** Vol. 7, No. 1, P. 16  
Computerized system for controlling motion of linear-track accelerator applied to other automated equipment, such as numerically-controlled machine tools and robot manipulators on assembly lines. System controls motions of sled with sine-wave signal created digitally by microprocessor. Dynamic parameters of sled motion are monitored so sled may be stopped safely if malfunction occurs. Sled is capable of sinusoidal accelerations up to 0.5 g with 125-kg load.

**B82-10138**  
**RIDE-QUALITY METER**  
J. D. LEATHERWOOD, T. K. DEMPSEY, S. A. CLEVENSON, and D. G. STEPHENS  
Mar. 1983

**LAR-12882****Vol. 7, No. 1, P. 17**

Single- and combined-Axis discomfort are corrected by effects of noise and vibration to yield measure of total discomfort experienced by rider. Three modules transform mathematically-weighted rms accelerations, which represent physical vibration characteristics, into subjective discomfort units. Portable 'ride-quality' meter measures passenger discomfort and acceptability of vehicle interior noise and vibration. Meter especially suited for determining vehicle comfort and design tradeoffs and for comparing ride quality of vehicles.

**B82-10139****IMPROVING POWER-SUPPLY REGULATION FOR PULSED LOADS**

C. R. GULICK (Hughes Aircraft Co.) and R. B. CHAN (Hughes Aircraft Co.)

Mar. 1982

**MSC-20016****Vol. 7, No. 1, P. 18**

Power supply voltage-regulator circuit speeds up response to sudden load changes. As load increases, additional feedback path is enabled. Path bypasses and provides faster loop response than normal feedback path. Steady-state instability due to faster loop response avoided by progressively disabling bypass loop and allowing normal feedback path to take over.

**B82-10140****COMPACT, RUGGED TEMPERATURE RECORDED**

R. M. WESTBROOK, L. D. BENNETT, R. A. STEINHAEUER, and G. J. DEBOO

Mar. 1982 See Also NASA TM-81267(N81-23434/NSP)

**ARC-11304****Vol. 7, No. 1, P. 19**

Solid-state temperature recorder is compact, lightweight, and rugged. Records 2,048 temperature readings over period of up to nearly a year and retains them at least another 4 months using batteries. Battery-operated recorder has no moving parts--is completely solid-state electronic.

**B82-10141****HIGH-RESOLUTION SUBSURFACE-INTERFACE RADAR**

W. J. STEINWAY (Georgia Institute of Technology)

Mar. 1983

**KSC-11212****Vol. 7, No. 1, P. 20**

Homomorphic deconvolution signal processing enhances information obtained in high-resolution soil-depth measurements by radar. Proposed technique is expected to increase accuracy with which soil-layer depths are gaged. Intended use with subsurface-interface radar sounding, in which subsurface features of soils are mapped.

**B82-10142****OPTIMAL REGULATOR ALGORITHMS FOR THE CONTROL OF LINEAR SYSTEMS**

E. S. ARMSTRONG

Mar. 1982

**LAR-12313 AND LAR-12953****Vol. 7, No. 1, P. 21**

Control-theory design package, called Optimal Regulator Algorithms for Control of Linear Systems (ORACLS), aids in design of controllers and optimal filters for systems modeled by linear, time invariant differential and difference equations. ORACLS is particularly attractive rigorous tool for dealing with multi-input and multi-output dynamic systems in both continuous and discrete forms.

**B82-10143****ANALYSIS OF FEEDBACK CONTROL SYSTEMS**

H. P. FRISCH

Mar. 1982

**GSC-12723****Vol. 7, No. 1, P. 21**

BLOCK IT implements algorithm that obtains reduced-order feedback control equations for use in both time and frequency domain analysis. BLOCK IT computes real nonsingular similarity-transformation matrix--reduces real nonsymmetric matrix to block-diagonal form; each block is real quasi-upper triangular matrix. Algorithm works with

defective and derogatory matrices. If program fails, algorithm generates data output used as guide for reformulation of mathematical equations that lead to ill-conditioned matrix not block-diagonalized.

**B82-10258****VIDEO TARGET TRACKING AND RANGING SYSTEM**

L. A. FREEDMAN (RCA Corp.)

May 1983

**MSC-20098****Vol. 7, No. 2, P. 137**

Proposed target tracking and ranging system uses two automatic video target trackers to keep two TV cameras trained on object being tracked. Microcomputer calculates range and range-rate information by triangulation. Input data for calculation are position coordinates of two cameras and pan and tilt aiming angles of two cameras. System is useful for target ranging at distances up to about 1,000 feet (300 m) in such applications as vehicle collision avoidance, traffic monitoring and surveillance. Also substitutes for short-range radar in situations where radar signal can not be tolerated.

**B82-10259****TRANSPORT CONTROL FOR HIGH-DENSITY DIGITAL RECORDER**

M. D. MATLIN (Martin Marietta Corp.) and A. M. YORK (Martin Marietta Corp.)

May 1983

**GSC-12727****Vol. 7, No. 2, P. 138**

Tape capstan drive motor speed controlled by phase-locked loop to keep data rate off of tape compatible with demand clock rate preventing deskewbuffer overflow or underflow. Immunity to speed perturbations caused by data dropouts is obtained by switching to different data-channel reference signal whenever dropout is detected by frame synchronizer in channel currently in use. Desired tape speed is selected by changing frequency of demand rate clock and changing divisor N in programable divider.

**B82-10260****PHASE-SENSING GUIDANCE FOR WIRE-FOLLOWING VEHICLES**

G. R. HANSEN (CALTECH)

May 1983

**NPO-15341****Vol. 7, No. 2, P. 139**

Guidance system for wire-following vehicles tested successfully at speeds exceeding 50 mi/h (80 km/h) on difficult 1 mile (1.6km) course. Unlike previous sensors that compare amplitudes of signals picked up from guide wire, new system compares signal phases. Array of coils is mounted in line along front bumper of vehicle and monitors electromagnetic signal radiating from wire. Guide wire on ground beneath vehicle carrier 6- to 7-kHz alternating current.

**B82-10261****HARDWARE FAULT SIMULATOR FOR MICROPROCESSORS**

L. M. HESS (CALTECH) and C. C. TIMOC (CALTECH)

Mar. 1983

**NPO-15080****Vol. 7, No. 2, P. 140**

Breadboarded circuit is faster and more thorough than software simulator. Elementary fault simulator for AND gate uses three gates and shaft register to simulate stuck-at-one or stuck-at-zero conditions at inputs and output. Experimental results showed hardware fault simulator for microprocessor gave faster results than software simulator, by two orders of magnitude, with one test being applied every 4 microseconds.

**B82-10262****CONTROL SYSTEM DAMPS VIBRATIONS**

E. H. KOPF JR., T. K. BROWN, and E. L. MARSH

May 1983

**NPO-15002****Vol. 7, No. 2, P. 141**

New control system damps vibrations in rotating equipment with help of phase-locked-loop techniques. Vibrational

## 02 ELECTRONIC SYSTEMS

modes are controlled by applying suitable currents to drive motor. Control signals are derived from sensors mounted on equipment.

**B82-10269**  
**ION MASS/VELOCITY/CHARGE SPECTROMETER**  
M. M. NEUGEBAUER (CALTECH), D. R. CLAY (CALTECH),  
and B. E. GOLDSTEIN (CALTECH)  
May 1983

**NPO-15423** Vol. 7, No. 2, P. 148  
Ion spectrometer distributes ions two-dimensionally and measures three characteristics of incident-ion beam: (1) mass/charge distribution, (2) ion velocity distribution, and (3) direction of incidence. Also useful for diagnosis in experimental plasma physics in collisionless regime. Ion spectrometer uses novel combination of standard electrostatic and magnetic deflection techniques to sort incident ions according to speed, direction of incidence, and mass/charge ratio.

## 03 PHYSICAL SCIENCES

**B82-10013**  
**STABLE STRATIFICATION FOR SOLAR PONDS**  
G. D. MEHTA (InterTechnology/Solar Corp.)  
Dec. 1982

**NPO-15439** Vol. 6, No. 4, P. 387  
Stable density gradient forms in pond saturated with disodium phosphate (DSP). Volume of DSP saturated water tends to develop temperature and density layers. Since tests indicate thermal and density gradients remain in equilibrium at heat removal rates of 60 percent or more of heat input rate, pond containing DSP would be suitable for collecting solar energy and transferring it to heat exchanger for practical use.

**B82-10014**  
**IMPROVED ESTIMATES OF THERMODYNAMIC PARAMETERS**  
D. D. LAWSON (CALTECH)  
Dec. 1982

**NPO-14880** Vol. 6, No. 4, P. 388  
Techniques refined for estimating heat of vaporization and other parameters from molecular structure. Using parabolic equation with three adjustable parameters, heat of vaporization can be used to estimate boiling point, and vice versa. Boiling points and vapor pressures for some nonpolar liquids were estimated by improved method and compared with previously reported values. Technique for estimating thermodynamic parameters should make it easier for engineers to choose among candidate heat-exchange fluids for thermochemical cycles.

**B82-10015**  
**EQUATION FOR COMBUSTION NOISE**  
T. M. LIU (CALTECH)  
Dec. 1982

**NPO-15156** Vol. 6, No. 4, P. 388  
Mathematical relationship derived for interactions between turbulent flame and combustion noise. Relationship is rigorous theoretical correlation of combustion noise and combustion process. Establishes foundation for acoustic measurements as tool for investigating structure of turbulent flames. Mathematical relationship is expected to aid researchers in field of noise generated by combustion.

**B82-10016**  
**FINDING THE FOCAL AXES OF OFFSET ANTENNAS**

R. F. SCHMIDT  
Dec. 1982  
**GSC-12630** Vol. 6, No. 4, P. 389  
Focal axis of offset paraboloidal reflector antennas determined by direct measurement instead of trial and error. Two feed horns transmit sum or difference pattern to antenna under test, which reflects energy to far-field detector. When axis of feed horns coincides with focal axis of antenna reflector, far-field detector records minimum in amplitude difference and maximum in absolute-magnitude phase difference between sum and difference signals.

**B82-10017**  
**SOLAR-HEATED HEALTH EDUCATION CENTER--NORTH CAROLINA**  
Innovator Not Given(Ferebee, Walters and Associates) Dec. 1982 See Also DOE/NASA CR-161731(N81-23606/NSP)

**MFS-25686** Vol. 6, No. 4, P. 390  
Solar heating system described in 55-page report uses 171 collectors, roof-mounted in two arrays. System is designed to supply about 45 percent of heat needs of building with minimal effects on existing structure, mechanical systems, and appearance.

**B82-10018**  
**SOLAR SPACE AND WATER HEATING FOR SCHOOL -DALLAS, TEXAS**  
Innovator Not Given(Dallas Independent School District, Office of the General Superintendent) Dec. 1982 See Also DOE/NASA CR-161482(N80-29847/NSP)

**MFS-25514** Vol. 6, No. 4, P. 390  
90 page report gives overview of retrofitted solar space-heating and hot-water system installation for 61-year-old high school. Description, specifications, modifications, plan drawings for roof, three floors, basement, correspondence, and documents are part of report.

**B82-10019**  
**SOLAR-HEATED OFFICE BUILDING -- DALLAS, TEXAS**  
Innovator Not Given(Travis-Braun & Associates, Inc.) Dec. 1982 See Also DOE/NASA CR-161483(N80-29846/NSP)

**MFS-25515** Vol. 6, No. 4, P. 391  
Solar heating system designed to supply 87 percent of space heating and 100 percent of potable hot-water needs of large office building in Dallas, Texas. Unique feature of array serves as roofing over office lobby and gives building attractive triangular appearance. Report includes basic system drawings, test data, operating procedures, and maintenance instructions.

**B82-10020**  
**SOLAR HOT-AIR SYSTEM --MEMPHIS, TENNESSEE**  
Innovator Not Given(Belz Investment Co.) Dec. 1982 See Also DOE/NASA CR-161803(N81-28521/NSP)

**MFS-25727** Vol. 6, No. 4, P. 391  
Solar collectors using air as collection medium provide space heating for four-building office complex in Memphis. 98 page report furnishes details on installation, including: description of system; system startup and acceptance-test results; technical data on collector; installation manuals for collectors, air handler and heat-storage unit.

**B82-10021**  
**MODIFIED EVACUATED-TUBE COLLECTOR TESTED IN SOLAR SIMULATOR**  
Innovator not Given(Wyle Laboratories) Dec. 1982 See Also DOE/NASA CR-161845(N81-32606/NSP)

**MFS-25764** Vol. 6, No. 4, P. 392  
According to report, particular commercial evacuated-tube solar collector performs slightly more efficiently with larger manifold. Tests were performed with Marshall Space Flight Center solar simulator. Report describes test conditions and procedures, provides analysis of results, and presents tables and graphs of data, both measured and calculated.

**B82-10022****ONSITE MEASUREMENT OF ALL-DAY EFFICIENCY**

Innovator Not Given(Wyle Laboratories) Dec. 1982 See Also DOE/NASA CR-161866(N82-10504/NSP)

**MFS-25782** Vol. 6, No. 4, P. 392

All-day efficiency of selected flat-plate and evacuated-tube solar collectors computed from measurements taken at 36 sites in United States. Measurements were performed month by month under actual solar and meteorological conditions. Results are documented in 158-page report.

**B82-10144****SUNLIGHT-PUMPED LASER**

W. R. J. WEAVER and J. H. LEE (Vanderbilt University)

Mar. 1982

**LAR-12870** Vol. 7, No. 1, P. 25

Organic iodide gas is stimulated by portion of Sun's spectrum to emit laser light. Chopper forms pulses from beam of Xenon-Arc light. Chopper is only necessary to avoid buildup of laser-quenching species in sealed tube of present experiment. Perfluoropropyl iodide lasing medium functions at temperatures of about 670 K, a fact that reduces cooling requirements in space.

**B82-10145****IMPROVED HEAT-OF-FUSION ENERGY STORAGE**

K. H. CHEN (CALTECH) and R. MANVI (CALTECH)

Mar. 1982

**NPO-15318** Vol. 7, No. 1, P. 26

Alkali metal/alkali-halide mixtures proposed for preventing solid buildup during energy recovery. When mixture melts (by absorption of heat of fusion), it forms two immiscible liquids. Salt-rich phase is heavier and has higher melting/recrystallization temperature; so during energy recovery salt crystallizes in this phase first. Since heat exchanger for energy recovery is in lighter metal-rich phase, solids do not form and there is no reduction of heat-recovery efficiency.

**B82-10146****SOLAR-ASSISTED SOLUTION-MINING CONCEPT**

W. L. DOWLER (CALTECH), R. L. FRENCH (CALTECH), J. C. J. BECKER (CALTECH), and J. BILLS (Kerr McGee Corp.)

Mar. 1983

**NPO-15343** Vol. 7, No. 1, P. 26

Brine heated in solar pond dissolves minerals from deposits. In proposed solution-mining process, hot brine is pumped down one well and recovered at one or more other wells. Emerging brine is rich in desired mineral. Brine is evaporated in solar ponds to recover mineral.

**B82-10147****MAPPING OCEAN WINDS BY RADAR**

J. E. OVERLAND (CALTECH), M. G. WURTELE (CALTECH), and P. M. WOICESHYN (CALTECH)

Mar. 1982

**NPO-15267** Vol. 7, No. 1, P. 27

Information about ocean weather is extracted from radar returns with aid of special algorithm. Algorithm determines wind-speeds and wind directions at ocean surface, and from this information can locate low- and high-pressure centers, convergence regions, and zones of strong winds and wind shear associated with ocean weather system fronts.

**B82-10148****A NEW USE FOR HIGH-SULFUR COAL**

D. D. LAWSON (CALTECH) and C. ENGLAND (CALTECH)

Mar. 1982

**NPO-15194** Vol. 7, No. 1, P. 28

New process recovers some of economic value of high-sulfur coal. Although high-sulfur content is undesirable in most coal-utilization schemes (such as simple burning), proposed process prefers high-sulfur coal to produce electrical power or hydrogen. Potential exists for widespread application in energy industry.

**B82-10149****ADVANCED COAL-BASED POWER GENERATIONS**

F. L. ROBSON (United Technologies Research Center)

Mar. 1982

**MFS-25652** Vol. 7, No. 1, P. 28

Advanced power-generation systems using coal-derived fuels are evaluated in two-volume report. Report considers fuel cells, combined gas- and steam-turbine cycles, and magnetohydrodynamic (MHD) energy conversion. Presents technological status of each type of system and analyzes performance of each operating on medium-Btu fuel gas, either delivered via pipeline to powerplant or generated by coal-gasification process at plantsite.

**B82-10150****SOLAR-RADIATION MEASURING EQUIPMENT AND GLOSSARY**

E. A. CARTER (University of Alabama in Huntsville), A. M. PATEL (University of Alabama in Huntsville), and S. A. GREENBAUM (University of Alabama in Huntsville)

Mar. 1982

**MFS-25770** Vol. 7, No. 1, P. 29

1976 listing of commercially available solar-radiation measuring equipment is presented in 50-page report. Sensor type, response time, cost data, and comments concerning specifications and intended usage are listed for 145 instruments from 38 manufactures.

**B82-10151****CUBE-CORNER RETROREFLECTOR MODELING**

J. G. KIRK (Computer Sciences Corp.), M. L. REGARDIE (Computer Sciences Corp.), P. N. KUMAR (Computer Sciences Corp.), and J. ZIMMERMAN (Computer Sciences Corp.)

Mar. 1982

**GSC-12718** Vol. 7, No. 1, P. 29

Collection of computer programs analyzes arrays of optical cube corners used in laser ranging. Programs compute impulse-response and interference effects of reflected pulses from optical cube corners and calculates interference-effects histogram and far-field diffraction patterns.

**B82-10152****TWO- AND THREE-DIMENSIONAL GALAXY SIMULATIONS**

F. HOHL and T. A. ZANG (College of William and Mary)

Mar. 1983

**LAR-12907** Vol. 7, No. 1, P. 29

Dynamics of galaxies with up to 100,000 stars are simulated in set of computer programs available from COSMIC. In these models, large number of simulation stars move in combined gravitational field produced by stars themselves (self-consistent field) or by external matter (fixed field).

**B82-10153****STAR-CATALOG DATA BASE**

D. GOTLIEB (Computer Sciences Corp.) and S. MCLAUGHLIN (Computer Sciences Corp.)

Mar. 1982

**GSC-12445** Vol. 7, No. 1, P. 30

SKYMAP is collection of computer programs and utility software for creating and maintaining master star catalog and hierarchical set of derivative star catalogs. Developed to provide accurate stellar position and magnitude information for attitude-determination and analysis systems utilizing star sensor observations. Current master star catalog includes all documented stars with blue or visual magnitudes brighter than magnitude 9.0

**B82-10265****CURVED SURFACE BEAM SPLITTER**

P. O. MINOTT

Mar. 1983

**GSC-12683** Vol. 7, No. 2, P. 145

## 03 PHYSICAL SCIENCES

Beam splitter with curved entrance and exit surfaces introduces less chromatic aberration and Seidel aberrations in some optical systems than traditional plate or block beam splitters. Spherical-surface beam splitter is used in Schmidt-type mirror objective to split converging image-forming beam so two images are formed. Small aberrations introduced are corrected by compensator plate located at or near aperture stop.

### B82-10266

#### OPTICAL SENSOR FOR ROBOTICS

F. WEINDLING (United Aircraft Corp.)

May 1983

MFS-25713

Vol. 7, No. 2, P. 146

Optical Method for precisely docking spacecraft and satellite promises useful in terrestrial applications, such as control of robot movements in manufacturing. Reflections of laser beam from patterns on satellite yield information on radial misalignment, angle between axes, and range. Target pattern consists of rings of alternating high and low reflectivity and central section where reflectivity varies with angle of incidence but not with position.

### B82-10267

#### HOLOGRAPHIC MICROSCOPY SYSTEM

W. K. WITHEROW

May 1983 See Also NASA TM-82437 (N81-30212/NSP)

MFS-25673

Vol. 7, No. 2, P. 147

Holographic system originally developed for testing theories of two systems used for measurements of aerosols, particles in transparent medium or microscopic biological specimens. Holograms are recorded in 3 - to 5milli-second exposures on high-resolution holographic film. In-line holographic microscopy system includes construction or recording system and reconstruction or playback system.

### B82-10268

#### TRISCAN ANTENNA-POSITIONING ALGORITHM

R. C. BUNCE (Bendix Field Engineering Corp.)

May 1983

NPO-15577

Vol. 7, No. 2, P. 148

TRISCAN scanning algorithm improves alignment between boresight of radar antenna and target. Algorithm originally developed for digitally pointed antennas in deep-space network; however, is possibly used in locating radio sources on Earth. TRISCAN estimates coordinate errors in hour angle and declination between predicted and true locations of radio source.

### B82-10270

#### DESIGN CALCULATIONS FOR THERMOELECTRIC GENERATORS

B. ZELDIN (CALTECH)

May 1983

NPO-15286

Vol. 7, No. 2, P. 149

Nine simplified analytic models based on average properties accurately predict heat rates for silicon/germanium thermoelectric generators. Solutions from simplified models were compared with those obtained using sophisticated numerical analysis. Maximum errors in calculated heat rate range from about 4 percent to about 0.2 percent. Models also used to calculate power delivered to load and thermodynamic efficiency.

### B82-10271

#### EVALUATING ENERGY CONVERSION EFFICIENCY

C. E. BYVIK, B. T. SMITH (Christopher Newport College), and A. M. BUONCRISTIANI (Christopher Newport College) May 1983 See Also NASA TM-83230 (N82-18696/NSP) and NASA TM-83228 (N82-18697/NSP)

LAR-12948

Vol. 7, No. 2, P. 150

Devices that convert solar radiation directly into storable chemical or electrical energy, have characteristic energy absorption spectrum; specifically, each of these devices has energy threshold. The conversion efficiency of generalized system that encompasses all threshold devices is analyzed,

resulting in family of curves for devices of various threshold energies operating at different temperatures.

### B82-10272

#### LARGE ELECTROCHEMICAL STORAGE SYSTEMS

S. KRAUTHAMER (CALTECH) and H. A. FRANK (CALTECH)

May 1983 See Also JPL Publication 79-95, Revision 1, (N80-29858/NSP)

NPO-15185

Vol. 7, No. 2, P. 151

Study released in 1979 assesses status of electrochemical energy storage for power plants that utilize Suns heat to drive electric generators. Major conclusion was that familiar lead/acid battery is only existing cell to meet needs for near-term demonstration programs.

### B82-10273

#### ESTIMATING INSOLATION INCIDENT ON TILTED SURFACES

R. E. ELKIN and R. G. TOELLE

May 1983

MFS-25501

Vol. 7, No. 2, P. 151

ASHMET computer program estimates amount of solar insolation incident on surfaces of several types of solar collectors, including fixed-position flat-plate, monthly-tilt-adjusted flat-plate, beam-tracking, and fixed-azimuthtracker. Basic methodology employed in ASHMET is to use ASHRAE relationships to obtain clear-day total daily insolation incident on collector surface of representative day of each month of year. ASHMET is interactive program and prompts user for all required data.

## 04 MATERIALS

### B82-10023

#### ENSURING THE CONSISTENCY OF SILICIDE COATINGS

V. RAMANI (The Marquardt Co.) and F. K. LAMPSON (The Marquardt Co.)

Dec. 1982

MSC-18900

Vol. 6, No. 4, P. 395

Diagram specifies optimum fusing time for given thicknesses of refractory metal-silicide coatings on columbium C-103 substrates. Adherence to indicated fusion times ensures consistent coatings and avoids underdiffusion and overdiffusion. Accuracy of diagram has been confirmed by tests.

### B82-10024

#### PPQ'S CONTAINING PENDENT ETHYNYL AND PHENYLETHYNYL GROUPS

P. M. HERGENROTHER

Dec. 1982

LAR-12838

Vol. 6, No. 4, P. 396

Polyphenylquinoxalines (PPQ's) containing cross-linking groups have higher use temperature and solvent resistance. As polymers are exposed to elevated temperatures, thermally induced reaction of pendent groups occurs to provide cross-linking, which raises use temperature of polymer and improves solvent resistance.

### B82-10025

#### LOW-WASTE PURIFICATION OF SILICON

W. C. BRENEMAN (Union Carbide Corp.) and L. M. COLEMAN (Union Carbide Corp.)

Dec. 1982

NPO-15033

Vol. 6, No. 4, P. 397

Ultra-high-purity silicon required for solar cells, transistors and integrated circuits can be produced from metallurgi-

cal grade silicon by formation and pyrolysis of silane gas in continuous-flow process that maximizes product purity with minimum amount of equipment. Integrated process recycles unreacted and byproduct materials, minimizing material losses and simplifying waste disposal. Ensures effective removal of impurities, including boron.

**B82-10026**  
**ELIMINATING IMPURITY TRAPS IN THE SILANE PROCESS**

L. M. COLEMAN (Union Carbide Corp.)

Dec. 1982

**NPO-15217** Vol. 6, No. 4, P. 398

Redistribution reaction section of silane process progressively separates heavier parts of chlorosilane feedstock until light silane product is available for pyrolysis. Small amount of liquid containing impurities is withdrawn from processing stages in which trapping occurs and passed to earlier processing stage in which impurities tend to be removed via chemical reactions.

**B82-10027**  
**REMOVING CHLORIDES FROM METALLURGICAL-GRADE SILICON**

W. C. BRENEMAN (Union Carbide Corp.) and L. M. COLEMAN (Union Carbide Corp.)

Dec. 1982

**NPO-15218** Vol. 6, No. 4, P. 399

Process for making low-cost silicon for solar cells is further improved. Silane product recycled to feed stripper column converts some of heavy impurities to volatile ones that pass off at top of column with light wastes. Impurities--chlorides of arsenic, phosphorus, and boron--would otherwise be carried to subsequent distillations where they would be difficult to remove. Since only a small amount of silane is recycled, silicon production efficiency remains high.

**B82-10028**  
**EXTRACTING SILICON FROM SODIUM-PROCESS PRODUCTS**

V. KAPUR (SRI International), A. SANJURJO (SRI International), K. M. SANCIER (SRI International), and L. NANIS (SRI International)

Dec. 1982

**NPO-15260** Vol. 6, No. 4, P. 400

New acid leaching process purifies silicon produced in reaction between silicon fluoride and sodium. Concentration of sodium fluoride and other impurities and byproducts remaining in silicon are within acceptable ranges for semi-conductor devices. Leaching process makes sodium reduction process more attractive for making large quantities of silicon for solar cells.

**B82-10029**  
**PRODUCING CRYOLITE FROM WASTE SODIUM FLUORIDE**

R. W. BARTLETT (SRI International)

Dec. 1982

**NPO-15258** Vol. 6, No. 4, P. 400

Simple chemical process makes synthetic cryolite by utilizing byproducts of one kind of silicon production process. Potential result of commercialization could be economic benefit to silicon industry or to aluminum industry, in which cryolite is used as flux.

**B82-10030**  
**PRODUCING HIGH-PURITY SILICON WITH SODIUM**

A. SANJURJO (SRI International)

Dec. 1982

**NPO-15381** Vol. 6, No. 4, P. 401

Simple technique for producing silicon for solar cells employs solid sodium to reduce silicon fluoride. Since solid rather than liquid sodium is used, careful temperature control is unnecessary, and simple feed equipment is used. Technique is energy-efficient, since reaction produces enough heat to sustain itself.

**B82-10031**  
**NONCLOGGING LIQUID-SODIUM NOZZLES**

A. SANJURJO (SRI International)

Dec. 1982

**NPO-15259** Vol. 6, No. 4, P. 402

Reacting liquid sodium with gaseous silicon tetrafluoride effective way of producing high-purity silicon for solar cells; but liquid sodium is such active substance, it readily clogs nozzle through which it is introduced into reactor. Flowing through constriction around sodium-delivery nozzle, silicon tetrafluoride gas cools liquid sodium emerging from nozzle. Sodium-delivery nozzle consists of stainless-steel tube with one-fourth inch outside diameter.

**B82-10032**  
**INEXPENSIVE ANTIREFLECTION COATING FOR SOLAR CELLS**

C. E. TRACY (RCA Corp.), W. KERN (RCA Corp.), and R. D. VIBRONEK (RCA Corp.)

Dec. 1982

**NPO-15025** Vol. 6, No. 4, P. 402

Continuous method for applying antireflection coating to solar cells increases efficiency of devices by preventing energy from being reflected away, but adds little to manufacturing cost. Method consists of spraying solution on cells or glass collector plates, drying sprayed layer, and curing it. Solution is formulated to spread evenly over surfaces.

**B82-10033**  
**PREPOLYMER SYRUP FOR ENCAPSULATING SOLAR CELLS**

A. GUPTA (CALTECH), J. D. INGHAM (CALTECH), and A. H. YAVROUIAN (CALTECH)

Dec. 1982

**NPO-15154** Vol. 6, No. 4, P. 403

Clear polymer syrup, made by dissolving n-butyl acrylate prepolymer in monomer, used to encapsulate solar cells by any of three standard processes (dipping, multiple coating, or automated machine coating). Use of cyclohexane instead of methanol/water solvent during initial polymerization stage maintains high molecular weight and raises yield of linear polymer to essentially 100 percent.

**B82-10034**  
**PRECISE SEALING OF FUSED-QUARTZ AMPOULES**

W. J. J. DEBNAN and I. O. CLARK

Dec. 1982

**LAR-12847** Vol. 6, No. 4, P. 404

New technique rapidly evacuates and seals fused-quartz ampoule with precise clearance over contents without appreciably thinning ampoule walls. Quartz plug is lowered into working section of ampoule after ampoule has been evacuated. Plug is then fused to ampoule walls, forming vacuum seal. New technique maintains wall strength and pumping speed.

**B82-10035**  
**OXIDATION-STRENGTHENED HIGH-TEMPERATURE RIVETS**

R. L. MCLEMORE (The Marquardt Co.)

Dec. 1982

**MSC-20095** Vol. 6, No. 4, P. 405

Shear strength of titanium-niobium rivets improves with oxidation. Ti-Nb rivets developed for fastening parts of Space Shuttle thrusters may be suitable also for other high-temperature applications in oxidizing environments--for example, in burner cans of commercial jet engines and boilers and retorts for coal gasification systems.

**B82-10036**  
**IMPROVED SUPERCRITICAL-SOLVENT EXTRACTION OF COAL**

L. COMPTON (CALTECH)

Dec. 1982

**NPO-15210** Vol. 6, No. 4, P. 405

Raw coal upgraded by supercritical-solvent extraction

## 04 MATERIALS

system that uses two materials instead of one. System achieved extraction yields of 20 to 49 weight percent. Single-solvent yields are about 25 weight percent. Experimental results show extraction yields may be time dependent. Observed decreases in weight of coal agreed well with increases in ash content of residue.

**B82-10037**  
**HIGH-TEMPERATURE ULTRAFILTRATION MEMBRANE**  
M. N. SARBOLOUKI (CALTECH)  
Dec. 1982  
**NPO-15431** Vol. 6, No. 4, P. 406  
Ultrafiltration membrane with high-temperature capability prepared from polyimide soluble in organic solvent such as dimethylacetamide, made in single step by solution-casting phase inversion.

**B82-10038**  
**GLASS FOR SOLID STATE DEVICES**  
R. F. BAILEY (Rockwell International Corp.)  
Dec. 1982  
**LAR-12781** Vol. 6, No. 4, P. 407  
Glass film has low intrinsic compressive stress for isolating active layers of magnetic-bubble and other solid-state devices. Solid-state device structure incorporates low-stress glasses as barrier and spacer layers. Glass layers mechanically isolate substrate, conductor, and nickel/iron layers.

**B82-10039**  
**LOW-COST AQUEOUS COAL DESULFURIZATION**  
J. J. KALVINSKAS (CALTECH), N. VASILAKOS (CALTECH), W. H. CORCORAN (CALTECH), K. GROHMANN (CALTECH), and N. K. ROHATGI (CALTECH)  
Dec. 1982  
**NPO-14902** Vol. 6, No. 4, P. 408  
Water-based process for desulfurizing coal not only eliminates need for costly organic solvent but removes sulfur more effectively than an earlier solvent-based process. New process could provide low-cost commercial method for converting high-sulfur coal into environmentally acceptable fuel.

**B82-10040**  
**ACID SOLUTIONS FOR ETCHING CORROSION-RESISTANT METALS**  
J. R. SIMMONS (Martin Marietta Corp.)  
Dec. 1982  
**MFS-25467** Vol. 6, No. 4, P. 409  
New study characterized solutions for etching austenitic stainless steels, nickel-base alloys, and titanium alloys (annealed). Solutions recommended for use remove at least 0.4 mil of metal from surface in less than an hour. Solutions do not cause intergranular attack on metals for which they are effective, when used under specified conditions.

**B82-10041**  
**IMPROVED CERAMIC FOR HEAT EXCHANGERS**  
T. P. HERBELL, H. W. RAUCH (General Electric Co.), and L. R. MCCREEGHT  
Dec. 1982 See Also NASA CR-159678(N81-14082/NSP)  
**LEW-13068** Vol. 6, No. 4, P. 409  
Most promising composition developed in investigation consisted of mixed oxides described generically as ZrMAS. Has been commercially designated as GE-7808. Material was obtained from low-cost clay/talc mixture. Overall assessment of ZrMAS indicates it is a viable candidate for heat-exchanger application in automotive gas-turbine engines and possibly other areas that require dielectric materials of moderate refractoriness, good corrosion resistance, and excellent thermal-shock resistance.

**B82-10042**  
**RESISTANCE OF SOME STEELS TO STRESS CORROSION CRACKING**  
T. S. HUMPHRIES and E. E. NELSON

Dec. 1982 See Also NASA TM-78276(N80-25413/NSP)  
**MFS-25470** Vol. 6, No. 4, P. 410  
Evaluations of stress-corrosion cracking resistance of five high-strength low-alloy steels described in report now available. Steels were heat-treated to various tensile strengths and found to be highly resistant to stress-corrosion cracking.

**B82-10043**  
**FATIGUE IN MULTIDIRECTIONAL COMPOSITES**  
S. V. RAMANI and D. P. WILLIAMS  
Dec. 1982  
**ARC-11396** Vol. 6, No. 4, P. 410  
Data in new report on fatigue properties of graphite/epoxy composites prove valuable to designers of aircraft, space vehicles, and automobiles. Graphite/epoxy composites are being used increasingly in lightweight load-bearing structures, and fatigue of such structures is always major concern of designers.

**B82-10044**  
**PROCESSING MATERIALS IN SPACE**  
L. K. ZOLLER  
Dec. 1982  
**MFS-25667** Vol. 6, No. 4, P. 411  
Suggested program of material processing experiments in space described in 81 page report. For each experiment, report discusses influence of such gravitational effects as convection, buoyancy, sedimentation, and hydrostatic pressure. Report contains estimates of power and mission duration required for each experiment. Lists necessary equipment and appropriate spacecraft.

**B82-10045**  
**STRENGTH OF REWELDED INCONEL 718**  
E. BAYLESS, C. V. LOVOY, M. C. MCLLWAIN, and P. MUNAFO  
Dec. 1982  
**MFS-25649** Vol. 6, No. 4, P. 411  
Inconel 718, nickel-based alloy used extensively for high-temperature structural service, welded repeatedly without detriment to its strength. According to NASA report, tests show 12 repairs on same weld joint do not adversely affect ultimate tensile strength, yield strength, fatigue strength, metallurgical grain structures, or ability of weld joint to respond to post weld heat treatments.

**B82-10046**  
**HYDRAZINE-COMPATIBLE ELASTOMER**  
O. MARKLES, F. (Rockwell International Corp.) and T. G. DYE (Rockwell International Corp.)  
Dec. 1982  
**MSC-20007** Vol. 6, No. 4, P. 412  
Hydrazine hardly reacts with ethylene propylene diene monomer, even at high temperatures. According to report to tests, EPDM is most hydrazine-compatible material among elastomers. Has strong potential as valve-seat and O-ring seal with hydrazine, especially at high temperatures.

**B82-10047**  
**XPS STUDY OF OXIDE/GAAS AND SiO2/Si INTERFACES**  
F. J. GRUNTHANER (USC), P. J. GRUNTHANER (USC), R. P. VASQUEZ (USC), B. F. LEWIS (USC), J. MASERJIAN (USC), and A. MADHUKAR (USC)  
Dec. 1982  
**NPO-14969** Vol. 6, No. 4, P. 412  
Concepts developed in study of SiO<sub>2</sub>/Si interface applied to analysis of native oxide/GaAs interface. High-resolution X-ray photoelectron spectroscopy (XPS) has been combined with precise chemical-profiling technique and resolution-enhancement methods to study stoichiometry of transitional layer. Results are presented in report now available.

**B82-10154**  
**CLEAR FILM PROTECTS AGAINST ULTRAVIOLET RAD-**

**IATION**

A. GUPTA (CALTECH) and A. YAVROUIAN (CALTECH)

Mar. 1983

**NPO-14971****Vol. 7, No. 1, P. 33**

Acrylic film contains screening agent filtering ultraviolet radiation up to 380 nanometers in wavelength but passes other components of Sunlight. Film used to protect such materials as rubber and plastics degraded by ultraviolet light. Used as protective cover on outdoor sheets or pipes made of such materials as polyethylene or polypropylene and on solar cells.

**B82-10155****CLOSED-LOOP PROCESS YIELDS ULTRAPURE SILICON**

J. C. SCHUMACHER (J. C. Schumacher Co.) and E. B. MOORE (J. C. Schumacher Co.)

Mar. 1982

**NPO-15283****Vol. 7, No. 1, P. 34**

Metallurgical-grade silicon transforms into tribromosilane by reacting it with process byproducts. Tribromosilane is separated from mixture, purified, and finally decomposed in presence of hydrogen in silicon-product reactor. Conversion efficiencies of 30 to greater than 60 percent of tribromosilane to ultrapure granular polycrystalline silicon are typical in produce reactor.

**B82-10156****BIPULSATING TECHNIQUE FOR SILICON PRODUCTION**

A. SANJURJO (SRI International)

Mar. 1982

**NPO-15367****Vol. 7, No. 1, P. 34**

Method controls reaction temperature and rate of reaction of sodium and silicon tetrafluoride by alternately adding measured amounts of reactants. Technique used in large reactor, where heat dissipation becomes serious problem, to control reactor temperatures. Highly efficient method, which would utilize almost 100 percent of raw materials.

**B82-10157****CRYOLITE BYPRODUCT IN SILICON PRODUCTION**

R. W. BARTLETT (SRI International)

Mar. 1982

**NPO-15364****Vol. 7, No. 1, P. 35**

Process reacts alumina hydrate with HF and NaF from silicon-production process. Cryolite is produced by adding reaction step to process that makes high-purity silicon from fluoro-silicic acid. New extended process has been demonstrated in laboratory and could be used in commercial plants.

**B82-10158****TUBE-FURNACE PRODUCTION OF SILICON**

E. G. FARRIER (Union Carbide Corp.), J. REXER (Union Carbide Corp.), and P. J. TIMMEL (Union Carbide Corp.)

Mar. 1982

**NPO-15274****Vol. 7, No. 1, P. 36**

Packed-bed reactor produces silicon by decomposing ultrapure silane gas in temperature gradient. Based on previous experiments with relatively low decomposition temperatures and with temperature gradients, heterogeneous decomposition will produce few fines. Fines produced are screened out and reinserted into furnace.

**B82-10159****SEPARATING SILICON FROM SI/NAF MIXTURES**

A. SANJURJO (SRI International) and L. NANIS (SRI International)

Mar. 1982

**NPO-15365****Vol. 7, No. 1, P. 36**

New method of extracting silicon from mixture produced when silicon tetrafluoride is reduced by sodium takes advantage of lower melting point of NaF. Method is effective at temperatures up to 400 degrees C below melting point of Si. Results in energy and economic savings: simpler and smaller furnaces, less volatilization loss, and high percentage of separation.

**B82-10160****CONSOLIDATING SUBMICRON SILICON PARTICLES**

K. A. YAMAKAWA (CALTECH) and R. LUTWACK (CALTECH)

Mar. 1983

**NPO-15250****Vol. 7, No. 1, P. 37**

Molten-silicon pool receives fine silicon powder and melts it. After stable molten layer forms, pedestal is lowered at rate equal to silicon powder feed rate. If silane is directly decomposed on silicon pool, powder feeder is replaced by jet of silane on silicon surface, and hydrogen produced in decomposition of silane is pumped from bottom end of chamber.

**B82-10161****CONDUIT FOR TRANSFERRING MOLTEN SILICON**

G. FIEGL (Siltec Corp.) and W. TORBET (Siltec Corp.)

Mar. 1982

**NPO-15109****Vol. 7, No. 1, P. 38**

Proposed three-part conduit transfers pure silicon between crucibles. Four-strip heater augments layers of insulation to prevent molten silicon from cooling and solidifying during transfer. Since melt is maintained at temperature relatively close to fusion point, to minimize quartz erosion, even relatively-minor heat losses precipitate solidification and terminate work in progress. Several crucibles may be fed through conduits from central crucible. Each would be contained in its own compartment under inert atmosphere.

**B82-10162****COMPACTING SILICON POWDER**

E. G. FARRIER (Union Carbide Corp.) and J. REXER (Union Carbide Corp.)

Mar. 1983

**NPO-15271****Vol. 7, No. 1, P. 38**

Silicon powder is compacted by sandwiching it between two flat sheets scaled up for production, choice of metal making contact with silicon will be important, if high purity of silicon is to be preserved.

**B82-10163****SEPARATING SILICON AND SODIUM FLUORIDE BY MELTING**

L. NANIS (SRI International) and V. K. KAPUR (SRI International)

Mar. 1983

**NPO-15363****Vol. 7, No. 1, P. 39**

Silicon is withdrawn from bottom of crucible, once two immiscible liquid states form, in quasi-continuous method of separating silicon from other reaction products. Process is periodically halted to remove accumulated buildup of salts.

**B82-10164****THERMOSET/THERMOPLASTIC AROMATIC POLYAMIDES FOR COMPOSITES**

T. L. ST. CLAIR, A. K. ST. CLAIR, J. D. BARRICK, J. F. WOLFE (Virginia Polytechnic Institute and State University), and T. D. GREENWOOD (King College)

Mar. 1983 See Also NASA TM-81918 (N81-14080/NSP)

**LAR-12723****Vol. 7, No. 1, P. 39**

Aromatic polyamides are processed at relatively low temperature, then heat-treated to attain high softening temperature required when polyamides are used as matrix resins in structural composites. New polyamides are compatible with organic fibers often used as reinforcing agents in such composites. Pendent propargyl groups serve as latent cross-linking agents in new series of polyamide resins.

**B82-10165****STERILIZABLE BINDER IS STABLE AT 135 DEGREES C**

S. H. KALFAYAN (CALTECH) and A. H. YAVROUIAN (CALTECH)

Mar. 1982

## 04 MATERIALS

**NPO-15020**

**Vol. 7, No. 1, P. 40**

Polyurethane binder for solid propellants endures heat sterilization without decomposition based on an ester diol. Binder resists oxidation under prolonged exposure to 135 degrees C temperature, low enough in viscosity to be handled easily during processing, and readily mixed with oxidizers, such as ammonium perchlorate. Polyurethane is also suitable material for encapsulants, potting compounds, and coatings that must be sterilized.

**B82-10166**

### **FIRE-RETARDANT EPOXY ADHESIVES**

N. BILOW (Hughes Aircraft Co.) and T. W. GIANTS (Hughes Aircraft Co.)

Mar. 1982

**ARC-11430**

**Vol. 7, No. 1, P. 41**

Phosphorus-containing epoxy is fire-retardant and translucent. Intended as adhesive for laminated plastic sheets, new material bonds well to titanium dioxide-filled plastic film, which ordinarily shows little surface interaction with adhesives. Fire retardancy has been demonstrated, and smoke density is low enough to avoid smoke obscuration.

**B82-10167**

### **ETCHANT FOR HGXCD1-XTE CRYSTALS**

E. A. IRENE (IBM Corp.)

Mar. 1983

**MFS-25705**

**Vol. 7, No. 1, P. 42**

Preferential etching by mixture of nitric and hydrochloric acids reveals crystal dislocation defects (type D) and impurity-dislocation defects (type S) in these crystals, which have optical and electrical applications.

**B82-10168**

### **LINER FOR SILICON REACTOR**

A. SANJURJO (SRI International)

Mar. 1983

**NPO-15366**

**Vol. 7, No. 1, P. 42**

Coating of sodium tetrafluoride minimizes contaminating high-purity silicon during removal from reactor chamber. Using an NaF liner, reaction products are removed by simply turning reactor chamber upside down. Liner acts as seeding agent for NaF formed during reaction and insulates nickel walls from hot reaction products.

**B82-10169**

### **CORROSION-PROTECTION COATINGS FOR ALUMINUM**

R. H. HIGGINS

Mar. 1983 See Also NASA TM-82402 (N81-19274/NSP)

**MFS-25640**

**Vol. 7, No. 1, P. 42**

Study investigates 21 combinations of surface treatments, primers and topcoats. Study considers several types of coatings, including primers, enamels, chlorinated rubbers, alkyds, epoxies, vinyls, polyurethanes, waterbased paints, and antifouling paints. 20-page report summarizes the study.

**B82-10170**

### **ENVIRONMENTAL DURABILITY OF ELECTROPLATED BLACK CHROMIUM**

J. R. LOWERY

Mar. 1983

**MFS-25797**

**Vol. 7, No. 1, P. 43**

Report describes tests of durability of electroplated black chromium coatings on solar-collector panels in rural, industrial, and seacoast environments for 60, 36, and 13 months, respectively. Black-chromium coating showed exceptionally-good optical durability in all three environments.

**B82-10171**

### **EQUATIONS FOR COMPOSITE-PROPELLANT BURNING**

L. D. STRAND (CALTECH) and N. S. COHEN (CALTECH)

Mar. 1983

**NPO-15324**

**Vol. 7, No. 1, P. 43**

Reported study of composite-propellant burning sum-

marizes recent advances in understanding behavior of propellant formulations based on ammonium perchlorate (AOP), binder, and aluminum in various proportions and particle size distributions. Approach presented incorporates adapted version of earlier model for monopropellant AP. Objective is to predict burning-rate characteristics of composite propellants at high pressure.

**B82-10172**

### **PROPERTIES OF NICKEL-BASED HYDROGEN-TURBINE BLADES**

D. P. DELUCA (United Technologies Pratt & Whitney Aircraft), J. P. WARREN (United Technologies Pratt & Whitney Aircraft), B. A. COWLES (United Technologies Pratt & Whitney Aircraft), D. SHOEMAKER (United Technologies Pratt and Whitney Aircraft), J. R. J. TEEL (United Technologies Pratt and Whitney Aircraft), D. L. PEARSON (United Technologies Pratt and Whitney Aircraft), C. G. J. ANNIS (United Technologies Pratt and Whitney Aircraft), D. A. WILSON, and B. J. SCHWARTZ

Mar. 1983 See Also NASA CR-14844 (N81-31192/NSP)

**MFS-25733**

**Vol. 7, No. 1, P. 44**

120 page report presents data on mechanical properties of cast nickelbased alloys for turbine blades operating in hydrogen and steam at high temperatures. Tests on alloys for hydrogen-burning engines of future are described.

**B82-10278**

### **VACUUM AMPOULE ISOLATES CORROSIVE MATERIALS**

R. K. CROUCH, W. J. DEBNAM, and R. TAYLOR (CINDAS)

May 1983

**LAR-12898**

**Vol. 7, No. 2, P. 158**

Quartz vacuum ampoule confines corrosive sample wafer between two quartz plugs inserted in quartz tube. One quartz plug is window for measuring sample thermodynamic properties while laser pulse entering other quartz plug heats sample to molten state. Confinement of sample in vacuum prevents contamination of measurement system by hot corrosive vapors and any interference by preferential evaporation of melt.

**B82-10279**

### **A SOLVENT-RESISTANT, THERMOPLASTIC POLY(IMIDESULFONE)**

T. L. ST. CLAIR (Massachusetts Institute of Technology) and D. YAMAKI

May 1983

**LAR-12858**

**Vol. 7, No. 2, P. 159**

Process for preparing thermoplastic poly(imidesulfone) results in material having excellent thermoplastic properties generally associated with polysulfones and excellent solvent resistance generally associated with polyimides. New thermoplastic, solvent-resistant polymer is used as molding resin, as adhesive, and as matrix resin for fiber reinforced composites.

**B82-10280**

### **HIGH-PERFORMANCE MATRIX RESINS**

R. H. PATER

May 1983 See Also NASA TM-82733 (N82-11117/NSP)

**LEW-13864**

**Vol. 7, No. 2, P. 159**

State-of-the-art PMR polyimides provide good strength and light weight in wide variety of critical applications. However, improved processability and elevated temperature thermo-oxidative stability are desired in such polyimide systems. Resins, intended for use in advanced composites, adhesives, and neat resin articles, show improvements in both processability and elevated temperature stability over state-of-the-art PMR-15 polymers.

**B82-10281**

### **DESIGNING GLASS PANELS FOR ECONOMY AND RELIABILITY**

D. M. MOORE (CALTECH)

May 1983

**NPO-15252****Vol. 7, No. 2, P. 160**

Analytical method determines probability of failure of rectangular glass plates subjected to uniformly distributed loads such as those from wind, earthquake, snow, and deadweight. Developed as aid in design of protective glass covers for solar-cell arrays and solar collectors, method is also useful in estimating the reliability of large windows in buildings exposed to high winds and is adapted to nonlinear stress analysis of simply supported plates of any elastic material.

**B82-10282****THERMAL GRADIENT FINING OF GLASS**

W. WILCOX (Westinghouse R &amp; D Center)

May 1983

**MFS-25757****Vol. 7, No. 2, P. 161**

Molten glass fined (cleared of bubbles) by heating with suitable temperature gradient, according to preliminary experiments. Temperature gradient produces force on gas bubbles trapped in molten glass pushing bubbles to higher temperature region where they are collected. Concept demonstrated in experiments on Earth and on rocket.

**B82-10283****PROCESSOR GENERATES AND EXTRACTS SILICON**

R. K. GOULD (AeroChem Research Laboratories, Inc.) and C. R. DICKSON (AeroChem Research Laboratories)

May 1983

**NPO-15582****Vol. 7, No. 2, P. 161**

Processor under development continuously generates pure silicon and separates it from reaction by-products. Silicon separator/collector intercepts impinging jet of reaction products and selectively funnels silicon into larger collector. Salt byproduct is removed by tubular condenser held at 1,000 degrees C, and then flows into collector, where it solidifies. Vacuum locks permit periodic salt removal without disturbing continuous operation.

**B82-10284****SODIUM SPRAY WOULD SPEED SILICON PRODUCTION**

K. M. SANCIER (SRI International)

May 1983

**NPO-15246****Vol. 7, No. 2, P. 162**

Production rate of solar-grade silicon in sodium/silicon tetrafluoride reactor increase by spray feed. Liquid-sodium droplet size is controlled by pressure of argon gas and by nozzle design. Baffle helps to prevent reactor opening from becoming clogged by reaction products.

**B82-10285****TWO-TEMPERATURE-ZONE SILICON REACTOR**

A. SANJURJO (SRI International), L. NANIS (SRI International), V. K. KAPUR (SRI International), and R. D. WEAVER (SRI International)

May 1983

**NPO-15368****Vol. 7, No. 2, P. 163**

When high purity silicon is synthesized by reduction of silicon tetrafluoride by sodium, very-fast highly exothermic reaction takes place. Controlled reaction is proposed in which SiF<sub>4</sub>-pressurized vertical reactor operates with two temperature zones. Liquid sodium feeds from nozzle at top of reactor without reacting with SiF<sub>4</sub>. When sodium reaches higher temperature region at bottom, reaction takes place immediately.

**B82-10286****CASTING SILICON PELLETS FROM POWDER**

E. G. FARRIER (Union Carbide Corp.) and J. REXER (Union Carbide Corp.)

May 1983

**NPO-15272****Vol. 7, No. 2, P. 163**

New technique converts finely powdered silicon into solid pellets. Fine silicon powder melts in thin quartz bubble that breaks upon cooling, leaving behind crack-free pellet of silicon.

**B82-10287****SHORT SHOT TOWER FOR SILICON**

H. E. BATES (Energy Materials Corp.), D. M. HILL (Energy Materials Corp.), and D. N. JEWETT (Energy Materials Corp.)

May 1983

**NPO-15607****Vol. 7, No. 2, P. 164**

Drop length necessary to convert molten silicon to shot reduced by proposed new process. Conversion of silicon from powder or chunks to shot often simplifies processing. Shot is more easily handled in most processing equipment. Drops of liquid silicon fall through protective cloud of argon, then through rapidly cooling bath of methanol, where they quickly turn into solid shot.

**B82-10288****ESTIMATING THE DEGREE OF CROSS-LINKING IN RUBBER**

R. F. FEDORS (CALTECH)

May 1983

**NPO-15590****Vol. 7, No. 2, P. 165**

Degree of cross-linking or network chain concentration of rubber estimated with aid of new method. Quantity is needed in studies of mechanical behavior of rubber. New method is based on finding rubber follows different stress/strain relationships in extension and retraction. When rubber specimen is stretched to given extension ratio and released. Stress-vs-strain curve follows two paths: one for extension and other for retraction.

**B82-10289****IMPROVED FLUIDIZED-BED GAS INJECTOR**

R. A. HOGLE (CALTECH)

May 1983

**NPO-15572****Vol. 7, No. 2, P. 166**

Gas-injection cone in fluidized-bed reactor for coating particles with silicon or carbon cooled and protected from abrasion by stream of gas flowing over surface of cone. Hot particles entering reaction zone are coated with silicon or carbon supplied by thermal decomposition of suitable gas injected into reaction zone.

**B82-10290****MEMBRANES REMOVE METAL IONS FROM INDUSTRIAL LIQUIDS**

W. P. L. HSU and C. MAY

May 1983 See Also NASA TM-81670 (N81-16123/NSP) and NASA TP-1407 (N79-21120/NSP)

**LEW-13853****Vol. 7, No. 2, P. 167**

Use of membrane films affords convenient and economical alternative for removing and recovering metal cations present in low concentrations from large quantities of liquid solutions. Possible applications of membrane films include use in analytical chemistry for determination of small amounts of toxic metallic impurities in lakes, streams, and municipal effluents. Also suitable for use as absorber of certain pollutant gases and odors present in confined areas.

**B82-10291****VISCOSITY DEPRESSANTS FOR COAL LIQUEFACTION**

S. H. KALFAYAN (CALTECH)

May 1983

**NPO-15174****Vol. 7, No. 2, P. 167**

Proposed process modification incorporates viscosity depressants to prevent coal from solidifying during liquefaction. Depressants reduce amount of heat needed to liquefy coal. Possible depressants are metallic soaps, such as stearate, and amides, such as stearamide and dimer acid amides.

**B82-10292****DEVELOPMENT OF SILANE HYDROLYSATE BINDER FOR THERMAL-CONTROL COATINGS**

W. J. PATTERSON

May 1983 See Also NASA Technical Paper 1900 (N81-31365/NSP)

**MFS-25749****Vol. 7, No. 2, P. 168**

## 05 LIFE SCIENCES

Technical report describes theoretical and experimental development of methyltriethoxysilane (MTES) hydrolysate binder for white, titanium dioxidepigmented thermal-control coatings often needed on satellites. New coating is tougher and more abrasion-resistant than conventional coating, S-13G, which comprises zinc oxide in hydroxyl-terminated dimethylsiloxane binder.

## 05 LIFE SCIENCES

### **B82-10048 LOW-NOISE IMPLANTABLE ELECTRODE**

G. F. LUND

Dec. 1982

**ARC-11258**

**Vol. 6, No. 4, P. 415**

New implantable electrocardiogram electrode much less sensitive than previous designs to spurious biological potentials. Designed in novel 'pocket' configuration, new electrode is intended as sensor for radiotelemetry of biological parameters in experiments on unrestrained subjects. Electrode is essentially squashed cylinder that admits body fluid into interior. Cylinder and electrical lead are made of stainless steel. Spot welding and crimping are used for assembly, rather than soldering.

### **B82-10049 MOVING-SURFACE FOLLOWER AIDS MICROSURGERY**

C. FELDSTEIN (CALTECH), T. W. ANDREWS (CALTECH), D. W. CRAWFORD (University of Southern California), and M. A. COLE (University of Southern California)

Dec. 1982

**NPO-15197**

**Vol. 6, no. 4, P. 416**

Novel manipulator follows movements of arteries and muscles, enabling precise placement of probe or other microsurgical tool in moving tissue. Microprobe assembly is mounted on output of pneumatic servo of commercial noncontracting thickness gage. Pulsations of tissue surface to be penetrated by probe are sensed by gage and followed by servo, eliminating relative motion between tissue and probe.

### **B82-10173 SPINE IMMOBILIZER FOR ACCIDENT VICTIMS**

H. C. VYKUKAL and K. LAMPSON (Kenneth Lampson & Associates)

Mar. 1983

**ARC-11167**

**Vol. 7, No. 1, P. 47**

Proposed conformal bladder filled with tiny spheres called 'microballoons,' enables spine of accident victim to be rapidly immobilized and restrained and permit victim to be safely removed from accident scene in extremely short time after help arrives. Microballoons expand to form rigid mass when pressure within bladder is less than ambient. Bladder strapped to victim is also strapped to rescue chair. Void between bladder and chair is filled with cloth wedges.

### **B82-10174 IMPLANTABLE DRUG DISPENSER**

E. R. J. COLLINS (CALTECH)

Mar. 1983

**NPO-15160**

**Vol. 7, No. 1, P. 48**

Drugs such as insulin are injected as needed directly into bloodstream by compact implantable dispensing unit. Two vapor cavities produce opposing forces on drug-chamber diaphragm. Heaters in cavities allow control of direction and rate of motion of bellows. Dispensing capsule fitted with coil so batteries can be recharged by induction.

### **B82-10293 TISSUE-CULTURE METHOD OF CLONING RUBBER PLANTS**

E. A. BALL (The Regents of the University of California)

May 1983

**NPO-15756**

**Vol. 7, No. 2, P. 171**

Guayule plant, a high-yield rubber plant cloned by tissue-culture method to produce multiple new plants that mature quickly. By adjusting culture medium, excised shoot tip produces up to 50 identical guayule plants. Varying concentration of cytokinin, single excised tip produces either 1 or several (up to 50) new plants.

### **B82-10294 LIFE SCIENCES MIS**

R. A. DITTMAN and V. MARKS (MATSCO)

May 1983

**MSC-20238**

**Vol. 7, No. 2, P. 171**

Management Information System, MIS, provides Life Sciences Projects Division at Johnson Space Center with automated system for project management. MIS utilizes Tektronix 4027 color graphics display terminal and form-fillout capability. User interface with MIS data base is through series of forms.

## 06 MECHANICS

### **B82-10050 PORTABLE RADIOMETER IDENTIFIES MINERALS IN THE FIELD**

A. F. H. GOETZ (CALTECH) and R. A. MACHIDA (CALTECH)

Dec. 1982

**NPO-15234**

**Vol. 6, No. 4, P. 419**

Hand-held optical instrument aids in identifying minerals in field. Can be used in exploration for minerals on foot or by aircraft. The radiometer is especially suitable for identifying clay and carbonate minerals. Radiometer measures reflectances of mineral at two wavelengths, computes ratio of reflectances, and displays ratio to user.

### **B82-10051 ANCHOR FOR FIBERGLAS GUY ROD**

A. H. WILSON (CALTECH)

Dec. 1982

**NPO-14970**

**Vol. 6, No. 4, P. 420**

Solution to problem of anchoring fiberglass guy rods to install nut with threads on outer circumference, followed by aluminum sleeve. Sleeve has opening oval at upper and round at bottom end. End of rod is split so fiberglass wedge can be inserted to form V-shaped end. Spread end of rod fits into tapered hole in sleeve and threaded aluminum coupling is put over rod and sleeve.

### **B82-10052 WATER-VAPOR SAMPLE HOLDER FOR MASS SPECTROMETERS**

R. F. HAACK (CALTECH) and W. W. REILLY (CALTECH)

Dec. 1982

**NPO-15007**

**Vol. 6, No. 4, P. 421**

Water-vapor sample holder for mass spectrometer contains water vapor for calibration. It is sealed by aluminum disk. Calibration sample and integrated circuit modules are tested sequentially in same manner.

### **B82-10053 MEASURING HYDROGEN PROPERTIES IN ALUMINUM**

R. A. OUTLAW

Dec. 1982

**LAR-12906****Vol. 6, No. 4, P. 421**

System in use at Langley Research Center measures concentration and diffusion coefficient of hydrogen in pure aluminum. Principal components are high-temperature ultra-high-vacuum furnace and quadrupole mass spectrometer. Quantities of hydrogen and other gases that evolve from heated metal are measured in real time and correlated with data on aluminum porosity.

**B82-10054****THREE-DIMENSIONAL AIR CURTAINS**

J. G. STEPHENSON (Rockwell International Corp.) and C. E. J. DANIHER (Rockwell International Corp.)

Dec. 1982

**MSC-20058****Vol. 6, No. 4, P. 422**

Proposed scheme for gas 'curtains' partitions large volume into several separate spaces. Concept may also be useful in such terrestrial applications as unobtrusive isolation of smoking and nonsmoking sections in restaurants and office. Scheme is suitable for isolation of objectionable or hazardous gases in free space.

**B82-10055****REENTRANT-GROOVE HYDROGEN HEAT PIPE**

J. ALARIO (Grumman, Aerospace Corp.) and R. KOSSON (Grumman Aerospace Corp.)

Dec. 1982

**ARC-11381****Vol. 6, No. 4, P. 22**

Aluminum heat pipe extruded with reentrant axial grooves, which give better overall performance than conventional rectangular grooves. Reentrant grooves increase wicking height of cryogenic fluids and also lower amount of fluid charge required.

**B82-10056****REFLECTIVE-SHIELD RADIATIVE COOLER**

W. PETRICK (CALTECH) and R. D. GARCIA (CALTECH)

Dec. 1982

**NPO-15465****Vol. 6, No. 4, P. 423**

Tests show radiative cooler consisting of several thin reflective shields with a slight angle between them redirects flow of heat very effectively. Shield can be used for deflecting virtually any level of thermal radiation can be deflected by technique; but it may be useful in construction reflecting baffles in front of ovens or furnaces.

**B82-10057****TRANSDUCER SYSTEM TRACES MINE-FACE CURVE**

Innovator Not Given (Benton Corp.) Dec. 1982

**MFS-25289****Vol. 6, No. 4, P. 424**

Electromechanical system capable of obtaining contour information on longwall coal face while longwall shearer mines coal. Two heavy-duty angle transducers 2.5 feet apart are attached to common reference surface and operate in conjunction with distance encoder to measure angle between adjacent track sections along coal face.

**B82-10058****X RAY MEASUREMENT OF TANK LIQUID LEVEL**

R. G. MACIAS (Rockwell International Corp.)

Dec. 1982

**MSC-18935****Vol. 6, No. 4, P. 424**

Liquid surface observed through metal container wall, allowing direct determination of quantities and changes. X-ray measurement of liquid level produces photograph in which liquid appears as solid dark mass. Commercially-available portable X-ray machine is used.

**B82-10059****HEAT AND PRESSURE SEAL FOR DOORS**

C. A. GILLESPIE (Rockwell International Corp.)

Dec. 1982

**KSC-11216****Vol. 6, No. 4, P. 425**

Proposed tubular gasket for doors performs dual function: seals in pressure, and seals out heat. Composed

of quartz fabric filled with alumina matting, gasket is bonded with room-temperature-vulcanizing material to periphery of door. When door is closed, gasket is compressed like O-ring: fills gap between door and frame; and prevents leakage of air and heat.

**B82-10060****DETERMINING SHEAR MODULI OF ORTHOTROPIC COMPOSITES**

H. T. SUMSION and Y. D. RAJAPAKSE

Dec. 1982

**ARC-11395****Vol. 6, No. 4, P. 426**

Torsion tests on specimens of same orthotropic composite material having at least two different thicknesses enable determination of effective in-plane and out-of-plane shear moduli. Moduli are calculated from experimental data with elasticity-theory equations that relate applied torque, torsional twist angle, specimen width/thickness ratio, and ratio of two shear moduli. Tests were developed to yield information on degradation of properties of composite saturated by moisture.

**B82-10061****WRINKLING OF STRETCHED FILMS: COMPRESSIVE STRESS**

M. A. ZAK (CALTECH)

Dec. 1982

**NPO-15203****Vol. 6, No. 4, P. 427**

Recent report presents derivation of equations of motion for wrinkles forming in planar films under compressive in-plane stress. Study was prompted by wrinkling of thin film solar-cell arrays with consequent reduction in collection efficiency. Lack of adequate theoretical understanding made it difficult to design large film structures and specify oscillation tests for large solar array systems.

**B82-10062****WRINKLING OF STRETCHED FILMS: SHEAR STRESS**

M. A. ZAK (CALTECH)

Dec. 1982

**NPO-15204****Vol. 6, No. 4, P. 427**

Report presents theoretical investigation on nonlinear shearing characteristics of wrinkling films under applied shear stress. Report helps explain force/deflection characteristic of in-planeboom and solar-array blanket structural combinations.

**B82-10063****A CLOSER LOOK AT TRACK/TRAIN DYNAMICS**

P. P. MARCOTTE (Martin Marietta Corp.), K. MATHEWSON (Martin Marietta Corp.), and R. L. BERRY (Martin Marietta Corp.)

Dec. 1982

**MFS-25696****Vol. 6, No. 4, P. 427**

Report describes analytical approach to question of operational safety for six-axle locomotives. Essential mathematical elements are locomotive model with corresponding data on suspension characteristics, method of track-defect characterization, and quantitative measures for characterizing operational safety.

**B82-10064****HIGHER-ORDER PANEL METHOD FOR AERODYNAMIC FLOW ANALYSIS**

L. ERICKSON, R. L. CARMICHAEL, A. D. LEVIN, A. MAGNUS (Boeing Computer Services), M. EPTON (Boeing Computer Services), P. BARUAH (Boeing Computer Services), B. MASSENA (Boeing Computer Services), J. BUSSOLETTI (Boeing Computer Services), K. SIDWELL (Boeing Computer Services), F. JOHNSON (Boeing Computer Services) et al

Dec. 1982

**ARC-11398****Vol. 6, No. 4, P. 428**

PANAIR uses high-order panel method to predict inviscid subsonic or supersonic flows about arbitrary configuration. Panel method solves linear partial differential equation

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numerically by approximating configuration surface with panels on which unknown 'singularity strengths' are defined. PANAIR includes advanced software technology as well as advanced aerodynamic technology.

### B82-10065

#### PLANAR-WING FLUTTER ANALYSIS

R. N. DESMARAIS and R. M. BENNETT

Dec. 1982

LAR-12610

Vol. 6, No. 4, P. 429

Flutter Analysis System, FAST, is group of five programs that perform flutter analysis of single planar wing. Each program performs certain portions of flutter analysis and may be run sequentially or individually. Modular approach is very versatile and flexible. FAST uses natural vibration modes as input data and performs conventional V-g solution.

### B82-10066

#### MODELING OF LARGE LATTICED SURFACES

M. S. ANDERSON, C. L. HERSTROM, A. H. NAYFEH (University of Cincinnati), and M. S. HEFZY (University of Cincinnati)

Dec. 1982

LAR-12868

Vol. 6, No. 4, P. 429

GEOMLLS program determines dimensions and coordinates of flat segmented triangular surfaces that approximate spherical and paraboloidal surfaces of revolution, where vertexes of triangles lie on true surface. GEOMLLS calculates complete geometry of segmented surface and quantities that measure surface accuracy, such as maximum deviation and root-mean-square deviation from true surface.

### B82-10067

#### DYNAMIC ANALYSIS OF SIX-AXLE LOCOMOTIVES

Innovator Not Given (Denver Aerospace Division of Martin Marietta Corp.) Dec. 1982

MFS-25710

Vol. 6, No. 4, P. 430

Locomotive and track parameters modeled by the Track-Train Dynamic analysis computer program. Typical applications might include: assessment of importance of specific suspension design details, comparison of different locomotive designs, determination of appropriate maintenance standards on locomotive suspension elements, determination of acceptable track-geometry defects and minimum track-strength, and investigation of specific derailment mechanisms.

### B82-10068

#### TWO-DIMENSIONAL GRIDS ABOUT AIRFOILS AND OTHER SHAPES

R. SORENSON

Dec. 1982

ARC-11379

Vol. 6, No. 4, P. 430

GRAPE computer program generates two-dimensional finite-difference grids about airfoils and other shapes by use of Poisson differential equation. GRAPE can be used with any boundary shape, even one specified by tabulated points and including limited number of sharp corners. Numerically stable and computationally fast, GRAPE provides aerodynamic analyst with efficient and consistent means of grid generation.

### B82-10069

#### STRUCTURAL ANALYSIS OF SHELLS

B. O. ALMROTH (Lockheed Missiles & Space Co.), F. A. BROGAN (Lockheed Missiles & Space Co.), and G. M. STANLEY (Lockheed Missiles & Space Co.)

Dec. 1982

HQN-10960

Vol. 6, No. 4, P. 431

Structural Analysis of General Shells computer program STAGSC-1 analyzes thin shell branches or segments connected to one another along their boundaries. Program includes stress buckling, vibration and transient analysis of multisegment shells.

### B82-10070

#### NASTRAN: APRIL 1982 RELEASE

R. L. BRUGH (COSMIC)

Dec. 1982

HQN-10952

Vol. 6, No. 4, P. 431

Latest public release of NASTRAN, April 1982 most efficient and versatile to date. Intended range of applications of NASTRAN includes almost every kind of structure and construction. Users may develop their own analysis capabilities by using Direct Matrix Abstraction Programming (DMAP) language to direct NASTRAN in solution of general matrix problems.

### B82-10071

#### STEADY, OSCILLATORY, AND UNSTEADY SUBSONIC AND SUPERSONIC AERODYNAMICS

R. N. DESMARAIS, H. J. CUNNINGHAM, E. C. J. YATES, L. MORINO (Aerospace Systems, Inc.), R. D. PREUSS (Aerospace Systems, Inc.), S. A. SMOLKA (Aerospace Systems, Inc.), K. TSENG (Aerospace Systems, Inc.), and J. AVERICK (Aerospace Systems, Inc.)

Dec. 1982

LAR-12433

Vol. 6, No. 4, P. 432

Computer program SOUSSA-P (Steady, Oscillatory, and Unsteady Subsonic and Supersonic Aerodynamics--Production Version) accurately and efficiently evaluates steady and unsteady aerodynamic loads on aircraft having arbitrary shapes and motions, including structural deformations.

### B82-10175

#### LIGHTWEIGHT THERMAL-PROTECTION SYSTEM

I. O. MACCONOCHIE, A. G. LAWSON, T. C. WHITEMAN, and E. P. BRIEN (Kentron International, Inc.)

Mar. 1983

LAR-12880

Vol. 7, No. 1, P. 51

Hexagonal honeycomb panels secured by Y-shaped plates form lightweight, easily-maintained thermal-protection system. Honeycomb outer panel and fastener materials are selected to match local heating rates. Typical materials include composites, titanium, superalloys, and refractory metals. Advantages include complete symmetry of components--there are no left- or right-hand parts and no asymmetry in thermal expansion.

### B82-10176

#### PRESSURE-DECAY MEASUREMENTS IMPROVE BUBBLE-POINT TEST

J. S. SILKEY (McDonnell Douglas Corp.) and G. F. ORTON (McDonnell Douglas Corp.)

Mar. 1983

MSC-18970

Vol. 7, No. 1, P. 52

Technique reduces by factor of about 100 minimum detectable flaw size in bubble-point test. By measuring rate of slow leakage, flaws as small as about 10-4 in. 2 (0.06mm2) are detected. Since technique does not require observation of screen, tests run on screens already installed inside tanks and pipes.

### B82-10177

#### CONNECTOR FOR COMPOSITE TUBES

E. J. HARRISON (Mississippi Methodist Rehabilitation Center)

Mar. 1983

LAR-12744

Vol. 7, No. 1, P. 53

Difficulties in joining tubular structural members made of composite materials are overcome by improved connectors. Connectors are made from same composite as structural shapes, eliminating stress and weight problems experienced with metal connectors. Composites allow joint strength to be optimized by properly choosing fiber orientation and fabric. Only two basic shapes are required to make 90 degrees and T-joints in plane. Used to assemble strong, lightweight, three-dimensional structures.

**B82-10178****CONTINUOUS MONITORING OF AEROSOLS**

S. P. MAHADEVA (CALTECH), C. E. GIFFIN (CALTECH), D. D. NORRIS (CALTECH), and S. K. FRIEDLANDER (CALTECH)

Mar. 1983

**NPO-15292****Vol. 7, No. 11, , P. 54**

Online spectrometer monitors composition of individual aerosol particles. Single aerosol particles up to about 5 microns in diameter are analyzed for chemical composition, yielding valuable information on nature of pollution source. Tests show system has promise for monitoring oxidation of sulfur dioxide to sulfates important in controlling pollution from coal-fired power plants.

**B82-10179****MOBILE AIR SAMPLER**

C. E. TUCKER (CALTECH) and H. P. HOLWAY (CALTECH)

Mar. 1983

**NPO-15220****Vol. 7, No. 1, P. 55**

Vehicle-mounted sampler gathers specimens along highways and in tunnels. In contrast to fixed air-collection installations, mobile sampler requires no official approval for use on highways.

**B82-10180****MEASURING MIRROR TILT WITH HIGH ACCURACY**

T. J. MAGNER

Mar. 1983

**GSC-12701****Vol. 7, No. 1, P. 55**

Stroboscopic technique freezes mirror motion so displacements can be measured. Improved autocollimator accurately measures angular tilt of plane mirrors in rotational or reciprocating motion. Device is conventional autocollimator in which steady light source is replaced by stroboscope synchronized with mirror motion. It is accurate to 1 second of arc.

**B82-10181****EXHAUST-PLUME IMPINGEMENT CHARACTERISTICS**

S. D. SMITH (Lockheed Missiles &amp; Space Co., Inc.) and C. J. WOJCIEHOWSKI (Lockheed Missiles &amp; Space Co., Inc.)

Mar. 1983

**MFS-25489****Vol. 7, No. 1, P. 56**

Model for rocket-exhaust plumes calculates effects of heat, pressure, and particle-impingement on nearby structures. Model has potential industrial applications in studies of impingement of multiphase mixtures inside coalgasification equipment and turbines.

**B82-10182****HEAT PIPES COOL POWER MAGNETICS**

I. HANSEN, M. CHESTER (TRW, Inc.), and E. LUEDKE (TRW, Inc.)

Mar. 1983

**LEW-13507****Vol. 7, No. 1, P. 57**

Configurations originally developed for space use are effective in any orientation. Heat pipes integrated into high-power, high-frequency, high-voltage spaceflight magnetics reduce weight and improve reliability by lowering internal temperatures. Two heat pipes integrated in design of power transformer cool unit in any orientation. Electrostatic shield conducts heat from windings to heat pipe evaporator. Technology allows dramatic reductions in size and weight, while significantly improving reliability. In addition, all attitude design of heat pipes allows operation of heat pipes independent of local gravity forces.

**B82-10183****TAPPED-HOLE VENT PATH**

J. A. CHANDLER

Mar. 1983

**MSC-20146****Vol. 7, No. 1, p. 59**

Long helical vent path cools and releases hot pyrotechnical gas that exits along its spiraling threads. Current design uses 1/4-28 threads with outer diameter of stud reduced

by 0.025 in. (0.62 mm). To open or close gassampler bottle, pyrotechnic charges on either one side or other of valve cylinder are actuated. Gases vented slowly over long path are cool enough to present no ignition hazard. Vent used to meter flow in refrigeration, pneumatic control, and fluid-control systems by appropriately adjusting size and length of vent path.

**B82-10184****FIELD MEASUREMENT OF THERMAL INERTIA**

A. B. KAHLE (CALTECH), J. P. SCHIELDGE (CALTECH), and S. E. MARSH (CALTECH)

Mar. 1983

**NPO-15309****Vol. 7, No. 1, P. 59**

Radiometric measurements determine thermal inertia for geologic materials. Measurements are correlated with data obtained by remote sensing, for discriminating varieties of rock encountered when exploring for minerals by aircraft or by satellites equipped with infrared scanners.

**B82-10185****CALCULATING CLEARANCES FOR MANIPULATORS**

E. L. COPELAND (Lockheed Engineering and Management Services Co.), J. D. PETICOLAS (Lockheed Engineering and Management Services Co.), and L. D. RAY (Lockheed Engineering and Management Services Co.)

Mar. 1983

**MSC-20208****Vol. 7, No. 1, P. 60**

Set of algorithms rapidly calculates minimum safe clearances for remote manipulators. Such calculations are used in design of trajectories for manipulators to ensure they do not accidentally strike surrounding objects. Structural parts are considered as cylindrical shells having circular plane areas for ends. Clearance calculation method offers special benefits in industrial robotics, particularly in automated machining.

**B82-10186****ROD-WALL SOUND SHIELD FOR WIND TUNNELS**

T. R. J. CREEL and I. E. BECKWITH

Mar. 1983 See Also NASA TP-1672 (N80-26622/NSP)

**LAR-12883****Vol. 7, No. 1, P. 61**

Test model is shielded from turbulence radiated from wind tunnel walls. Shield overcomes problems caused by leading-edge configuration and leading edge angle of inclination of previous designs. Has successfully maintained a laminar rather than turbulent boundary layer.

**B82-10187****SEMIEMPIRICAL ESTIMATE OF AIRCRAFT WING WEIGHT**

P. YORK (Grumman Aerospace Corp.) and R. W. LABELL (Grumman Aerospace Corp.)

Mar. 1983

**ARC-11435****Vol. 7, No. 1, P. 62**

Computational method estimates weight of aircraft wings from theoretical relationships and empirical data. Permits comparison of alternative materials, methods of construction, and design philosophies. Method used to make tradeoffs in preliminary design phases on basis of simple input data and for more accurate calculations in later phases when more data are available.

**B82-10188****MEASURING THE TENSILE STRENGTH OF B/AL COMPOSITES**

J. A. DICARLO

Mar. 1983 See Also NASA TM-79080 (N79-16077/NSP)

**LEW-13807****Vol. 7, No. 1, P. 62**

Proposed nondestructive technique correlates damping measurements with material strength. Increasing axial damping and decreasing axial tensile strength are observed after 1-hour treatment of B/AL composites containing about 50 percent fiber. Damping was measured in vacuum at frequencies near 2,000 Hz, and tensile strength was

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normalized by maximum strength observed before thermally induced degradation.

**B82-10189**

### CERAMIC-CORD GAS SEAL

C. W. ETZEL (Rockwell International Corp.)

Mar. 1983

**MSC-20200**

**Vol. 7, No. 1, P. 63**

High-temperature gasket material seals at temperatures above 1,100 degrees C. Concentric exhaust pipes are typical of applications in which ceramic-cord seals might be used. Cord is crushed to form seal between inner and outer pipes when inner pipe is expanded into place. Typical applications include engine exhaust ducts or hot pipes passing through firewalls.

**B82-10190**

### FLEXIBLE SEAL ACCOMMODATES PART MISMATCH

I. BOBB (Rockwell International Corp.)

Mar. 1983

**MFS-19710**

**Vol. 7, No. 1, P. 64**

Chain of plates embedded in flexible seal enables it to withstand side loading of 2,300 psi (116MPa) while sealing gap of up to 0.5 inch (13 mm) between cylindrical chamber wall and test fixture. Pressure-actuated seal along inner edge forces seal into contact even though cylinder wall becomes eccentric as cylinder pressure increases. Seal has many industrial applications, particularly where heat or pressure causes distortion of chamber being sealed.

**B82-10191**

### THEORY OF COMPOUND LIQUID DROPS

M. M. SAFFREN (CALTECH), D. D. ELLEMAN (CALTECH), and W. K. RHIM (CALTECH)

Mar. 1983

**NPO-15389**

**Vol. 7, No. 1, P. 65**

Dynamic behavior is analyzed for drop within drop within infinite fluid. Report gives theoretical basis for understanding behavior of compound drops. Aids in planning and interpreting experiments in laboratory, spacecraft, and research aircraft. Provides insight into fabrication of target pellets for nuclear fusion.

**B82-10192**

### LARGE, EASILY DEPLOYABLE STRUCTURES

W. E. AGAN (Vought Corp.)

Mar. 1983

**MFS-25647**

**Vol. 7, No. 1, P. 65**

Study of concepts for large space structures will interest those designing scaffolding, radio towers, rescue equipment, and prefabricated shelters. Double-fold, double-cell module was selected for further design and for zero gravity testing. Concept is viable for deployment by humans outside space vehicle as well as by remotely operated manipulator.

**B82-10193**

### TRAJECTORY-ESTIMATION ERROR ANALYSIS

B. PUTNEY

Mar. 1983

**GSC-12766**

**Vol. 7, No. 1, P. 65**

Orbital and Geodetic Parameter Estimation Error Analysis Program (ORAN) is Bayesian least-squares simulation program for orbital trajectories. ORAN does not process data; rather, computes accuracy of results of data reduction if measurements are processed by minimum-variance data-reduction program. Actual data used to provide time when given measurement was available and estimated noise on that measurement.

**B82-10295**

### BOOM DEPLOYS WITH CONTROLLED ENERGY RELEASE

D. T. PACKARD (AEC-ABLE Corp.), M. D. BENTON (AEC-ABLE Corp.), and R. F. CRAWFORD (AEC-ABLE Corp.)

May 1983

**NPO-15418**

**Vol. 7, No. 2, P. 175**

Collapsible boom is deployed in controlled fashion, yet has no electric or commandable elements. In effect, structure consists of many fiberglass 'springs' forcibly coiled during initial stowage in canister. Considerable amount of energy stored in structure is released during deployment. Boom consists of erect base, uncoiling transition zone, and still-coiled zones. Boom members form lattice structure shear-stiffened by diagonal elements when erected.

**B82-10296**

### ELIMINATING WIND TUNNEL FLOW BREAKDOWN

J. E. HACKETT (Lockheed-Georgia Co.)

May 1983

**ARC-11338**

**Vol. 7, No. 2, P. 176**

Undesirable vortexes near floor in small wind tunnels suppressed by simple device that alters flow pattern there. Air is injected along floor and interacts with backflow from wind-tunnel model. Results in smoother, more correct air-flow and to more-reliable wind-tunnel data.

**B82-10297**

### VIBRATION ANALYSIS REDUCES COMPUTER TIME

R. C. ENGELS (Martin Marietta Aerospace)

May 1983

**MFS-25711**

**Vol. 7, No. 2, P. 176**

Improved calculation method promises to reduce computer time by factor of 10 for vibration analysis of complex structures. Method originally developed to predict mechanical response of spacecraft to maneuvers in various cases in which same booster is used with different payloads. Method is more exact than conventional normal-mode methods; it involves no initial approximations or assumptions. Calculation cost is reduced without loss of accuracy.

**B82-10298**

### OPTICAL TEMPERATURE SENSOR HAS DIGITAL OUTPUT

K. JAMES (Rockwell International Corp.), W. QUICK (Rockwell International Corp.), and V. H. STRAHAN (Rockwell International Corp.)

May 1983

**LEW-13413**

**Vol. 7, No. 2, P. 177**

New instrument measures temperature reliably and accurately. Device uses Fabry-Perot multiple-beam sensor. Both temperature sensor and optical lines are free of all electrical and electromagnetic effects and interference. Variation in spacer is made sensitive to other physical quantities, such as pressure. Sensing element itself is quite small, enhancing use in confined areas.

**B82-10299**

### RADIONUCLIDE COUNTING TECHNIQUE MEASURES WIND VELOCITY

J. J. SINGH, G. S. KHANDELWAL (Old Dominion University), and G. H. MALL (Computer Sciences Corp.)

May 1983 See Also NASA TM-83202(N82-12419/NSP)

**LAR-12971**

**Vol. 7, No. 2, P. 178**

Proposed technique for measuring wind velocity based on inverse-square-law variation of radioactive counting rates. In proposal, radioactive source is deposited on bottom of light, hollow sphere and suspended by flexible wire over radiation counter. Anemometer based on this concept is self-contained, portable, yet not too fragile. Used for extended periods of time, even at remote, inhospitable and inaccessible sites.

**B82-10300**

### MICROWAVE ICE-ACCRETION MEASUREMENT INSTRUMENT (MIAMI)

B. MAGENHEIM (Ideal Research, Inc.)

May 1983

**LEW-13784**

**Vol. 7, No. 2, P. 178**

Instrument used on operations aircraft to warn pilot of onset of dangerous ice buildup or as research tool for use in studying aircraft icing phenomena and in cloud research.

MIAMI is embedded in surface to be monitored and conforms to surface contour.

**B82-10301**  
**MINIMIZING VIBRATIONS WHILE ORIENTING LARGE STRUCTURES**

F. AUSTIN (Grumman Aerospace Corp.)

May 1983

**MFS-25439** Vol. 7, No. 2, P. 179

Attitude error and error rate minimized by properly-designed control law. Control thruster returns attitude to point within control dead band whenever attitude error or error rate strays outside. Within dead band, attitude drifts under environmental torque. Leftward thruster fires when system phase point is to right of error dead band. Opposite is case for rightward thruster.

**B82-10302**  
**LOCATING SMALL LEAKS IN LARGE STRUCTURES**

W. F. LAWLER (Beech Aircraft Corp.)

May 1983

**MSC-20327** Vol. 7, No. 2, P. 180

Test tool for detecting minute leaks in bimetal joints, welds, or other locations employs fine-control valve and hypodermic needle. Test item is connected in conventional manner to helium mass spectrometer tuned to read extremely small amounts of helium gas. Uniqueness of method is ability to detect tiny leaks, through surfaces, not discoverable by gross coverage of test structures by helium gas.

**B82-10303**  
**ACOUSTIC GROUND-IMPEDANCE METER**

A. J. ZUCKERWAR

May 1983 See Also NASA TM-83227 (N82-17476/NSP)

**LAR-12995** Vol. 7, No. 2, P. 181

Helmoltz resonator used in compact, portable meter measures acoustic impedance of ground or other surfaces. Earth's surface is subject of increasing acoustical investigations because of its importance in aircraft noise prediction and measurement. Meter offers several advantages. Is compact and portable and set up at any test site, irrespective of landscape features, weather or other environmental condition.

**B82-10304**  
**RETAINING RING FASTENER FOR SOLAR PANELS**

A. H. WILSON (CALTECH)

May 1983

**NPO-15369** Vol. 7, No. 2, P. 182

Simple articulating linkage secures solar panels into supporting framework. Five element linkage collapses into W-shape for easy placement into framework, then expands to form rectangle of same dimensions as those of panel.

**B82-10305**  
**THE DESIGN OF LIGHTNING PROTECTION**

May 1983

**KSC-11224** Vol. 7, No. 2, P. 182

Engineering study guides design and monitoring of lightning protection. Design studies for project are collected in 150-page report, containing wealth of information on design of lightning protection systems and on instrumentation for monitoring current waveforms of lightning strokes.

**B82-10306**  
**MEASURING CONTOURS OF COAL-SEAM CUTS**

May 1983

**MFS-25734** Vol. 7, No. 2, P. 183

Angle transducers measure angle between track sections as longwall shearer proceeds along coal face. Distance transducer functions in conjunction with angle transducers to obtain relative angles at known positions. When cut is complete, accumulated data are stored on cassette tape, and track profile is computed and displayed. Micro-processor-based instrument integrates small changes in angle and distance.

**B82-10307**  
**FLOW DISTRIBUTION IN HYDRAULIC SYSTEMS**

S. N. NGUYEN (Rockwell International Corp.)

May 1983

**MSC-20306** Vol. 7, No. 2, P. 184

General Flow Distribution Program analyzes pressure drops and flow distribution in closed and open hydraulic systems. Analyzes system on basis of incompressible flow though system may contain either compressible or incompressible fluid. Program solves fixed or variable flow problems for series, parallel, or series/parallel systems.

**B82-10308**  
**STRUCTURAL OPTIMIZATION**

J. L. ROGERS JR., J. SOBIESZCZANSKI-SOBIESKI, and R. B. BHAT (George Washington University)

May 1983

**LAR-13010** Vol. 7, No. 2, P. 184

Programming Structural Synthesis System (PROSS) provides structural synthesis capability by combining SPAR and CONMIN computer programs with set of interface procedures. SPAR is large general-purpose finite-element structural-analysis program, and CONMIN is large general-purpose optimization program. User supplies two small problem-dependent programs to define design variables, constraints, and objective function.

**B82-10309**  
**STRUCTURAL-VIBRATION-RESPONSE DATA ANALYSIS**

W. R. SMITH (Rockwell International Corp.), R. N. HECHENLAIBLE (Rockwell International Corp.), and R. C. PEREZ (Rockwell International Corp.)

May 1983

**MSC-20182** Vol. 7, No. 2, P. 184

Computer program developed as structural-vibration-response data analysis tool for use in dynamic testing of Space Shuttle. Program provides fast and efficient time-domain least-squares curve-fitting procedure for reducing transient response data to obtain structural model frequencies and dampings from free-decay records. Procedure simultaneously identifies frequencies, damping values, and participation factors for noisy multiple-response records.

**B82-10310**  
**COSTS AND BENEFITS OF ADVANCED AERONAUTICAL TECHNOLOGY**

J. C. BOBICK (SRI International) and R. E. DENNY (SRI International)

May 1983

**ARC-11382** Vol. 7, No. 2, P. 185

Programs available from COSMIC used to evaluate economic feasibility of applying advanced aeronautical technology to civil aircraft of future. Programs are composed of three major models: Fleet Accounting Module, Airframe manufacturer Module, and Air Carrier Module.

**B82-10311**  
**LOADS AND PRESSURES ON AXISYMMETRIC BODIES WITH CRUCIFORM FINS**

M. F. E. DILLENIIUS (Nielsen Engineering & Research, Inc.) and C. A. SMITH (Nielsen Engineering & Research, Inc.)

May 1983

**LAR-12936** Vol. 7, No. 2, P. 185

NSWCDM computer program calculates aerodynamic loading and pressure distributions on supersonic configurations consisting of axisymmetric bodies with cruciform or planar canard and tail fins. Versatile program allows for configuration pitched and rolled, and fins deflected. Tail fins are interdigitated with respect to forward fins.

**B82-10312**  
**VERTICAL PROFILES FOR TURBOJET-POWERED AIRCRAFT**

J. A. SORENSEN (Analytical Mechanics Associates, Inc.) and M. H. WATERS (Analytical Mechanics Associates, Inc.)

May 1983

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**LAR-12940** Vol. 7, No. 2, P. 185

OPTIM generates profile of altitude, airspeed, and flightpath angle as function of range between given set or origin and destination points for particular models of transport aircraft. Profile is optimized in sense of minimizing fuel or time or in minimizing direct operating cost expressed as combination of fuel and time.

**B82-10313**  
**SUPERSONIC-WING NONLINEAR AERODYNAMICS**

H. W. CARLSON and R. J. MACK  
May 1983

**LAR-12788** Vol. 7, No. 2, P. 186

Supersonic Wing Nonlinear Aerodynamics computer program, LTSTAR, estimates nonlinear aerodynamics characteristics of wing at supersonic speeds. Program provides generally improved predictions of wing overall force and moment coefficients. LTSTAR is useful in design studies aimed at aerodynamic performance optimization and providing more-realistic tradeoff information for selection of wing planform geometry and airfoil section parameters.

**B82-10314**  
**FLEXIBLE AIRCRAFT TAKEOFF AND LANDING ANALYSIS**

H. D. CARDEN and J. R. MCGEHEE  
May 1983

**LAR-12992** Vol. 7, No. 2, P. 186

Flexible Aircraft Takeoff and Landing Analysis Program, FATOLA, simulates aircraft takeoff and landing dynamics. Program includes maneuver logic and autopilots for glide slope, flare, landing, and takeoff and is modular so performance of aircraft in flight and during landing and ground maneuvers can be studied separately or in combination.

Centrifuge bowl composed of laminated aluminum offers required combination of high strength at reduced weight. Around outside wall of bowl core of 1/16 inch thick spun aluminum are wrapped two layers of aluminum, each also one-sixteenth inch thick. Layered structure prevents cracks from propagating through wall.

**B82-10075**  
**HIGH-RATIO GEAR TRAIN**

A. E. LEFEVER (Rockwell International Corp.)

Dec. 1982

**MSC-20054**

Vol. 6, No. 4, P. 437

Proposed arrangement of two connected planetary differentials results in gear ratio many times that obtainable in conventional series gear assembly of comparable size. Ratios of several thousand would present no special problems. Selection of many different ratios is available with substantially similar gear diameters. Very high gear ratios would be obtained from small mechanism.

**B82-10076**  
**FLUID-INJECTION TOOL FOR INACCESSIBLE AREAS**

J. E. MYERS (Rockwell International Corp.)

Dec. 1982

**KSC-11217**

Vol. 6, No. 4, P. 438

New tool injects liquids or gases into narrow crevices. Can be used to apply caulking and waterproofing compounds, adhesives, detergent, undercoats and oil and to aerate hard-to-reach places. Nozzle can reach into opening 1/32 inch wide to depth of more than 4 inches. Although thin, device is rigid and strong.

**B82-10077**  
**CONTINUOUSLY-VARIABLE POSITIVE-MESH POWER TRANSMISSION**

J. L. JOHNSON (National Research Council)

Dec. 1982

**MFS-25461**

Vol. 6, No. 4, P. 439

Proposed transmission with continuously-variable speed ratio couples two mechanical trigonometric-function generators. Transmission is expected to handle higher loads than conventional variable-pulley drives; and, unlike variable pulley, positive traction through entire drive train with no reliance on friction to transmit power. Able to vary speed continuously through zero and into reverse. Possible applications in instrumentation where drive-train slippage cannot be tolerated.

**B82-10078**  
**HIGH-TEMPERATURE CAPTIVE NUT ASSEMBLY**

M. L. MARKE (Rockwell International Corp.) and J. F. CHARLES (Rockwell International Corp.)

Dec. 1982

**MSC-20010**

Vol. 6, No. 4, P. 440

High-temperature captive-nut assembly consists of removable nut element that snaps into loose-fitting recesses in shell. Replacement of nut element is easily accomplished with simple handtools. Old nut is pried out and new one pushed into position. Removal is easily accomplished with help of U-shaped tool.

**B82-10079**  
**SELF-ALIGNING, LATCHING JOINT FOR FOLDING STRUCTURAL ELEMENTS**

H. G. BUSH and R. E. WALLSOM (Kentron International Inc.)

Dec. 1982

**LAR-12864**

Vol. 6, No. 4, P. 440

Structural column elements assembled quickly and easily with aid of new center joint. Joint aligns column elements automatically and fastens them together securely. Tapered half columns are stacked like paper cups, unfolded, and connected to other similar elements to form truss structures.

**B82-10080**  
**AUTOMATIC FLUSHING UNIT WITH CLEANLINESS**

## 07 MACHINERY

**B82-10072**  
**COMPRESSION RATIO ADJUSTER**

J. W. AKKERMAN

Dec. 1982

**MSC-18807**

Vol. 6, No. 4, P. 435

New mechanism alters compression ratio of internal-combustion engine according to load so that engine operates at top fuel efficiency. Ordinary gasoline, diesel and gas engines with their fixed compression ratios are inefficient at partial load and at low-speed full load. Mechanism ensures engines operate as efficiently under these conditions as they do at highload and high speed.

**B82-10073**  
**REACHING HIGH BOOKSHELVES FROM A WHEELCHAIR**

A. J. WALCH

Dec. 1982

**GSC-12772**

Vol. 6, No. 4, P. 436

'Book retriever' allows people confined to wheelchairs to remove or replace books from upper shelves of library stacks. Retriever is mechanical device composed of aluminum tube approximately 5 feet long with two jaws at upper end. Jaws securely clamp selected book; they are thin enough to be inserted between adjacent books.

**B82-10074**  
**LIGHTWEIGHT SHIELD FOR CENTRIFUGE**

C. LUPER (Beckman Instruments, Inc.)

Dec. 1982

**MSC-18995**

Vol. 6, No. 4, P. 436

**MONITOR**

N. E. HILDEBRANDT (McDonnell Douglas Corp.)  
Dec. 1982

**MSC-18971** Vol. 6, No. 4, P. 441

Liquid-level probe kept clean, therefore at peak accuracy, by unit that flushes probe with solvent, monitors effluent for contamination, and determines probe is particle-free. Approach may be adaptable to industrial cleaning such as flushing filters and pipes, and ensuring that manufactured parts have been adequately cleaned.

**B82-10081**

**SQUEEZE-FILM-DAMPED SPRING FOR TURBOPUMPS**  
K. ROTHE (Rockwell International Corp.)

Dec. 1982

**MFS-19690** Vol. 6, No. 4, P. 442

New use for squeeze-film damping proposed for turbopump bearings. Damping of axial shaft vibrations improved with properly-designed squeeze-film spring. Capillary-squeeze-film springs damp turbopump shaft axial vibrations. Disks deflect to left and right as pump bearing vibrates. Fluid fills and empties from spaces between disks to damp vibration.

**B82-10082**

**TOOL PRELOADS SCREW AND APPLIES LOCKNUT**

K. E. WOOD (Rockwell International Corp.)

Dec. 1982

**MSC-18791** Vol. 6, No. 4, P. 443

Special tool reaches through structural members inside Space Shuttle fasten nut on preloaded screw that holds thermal protection tile against outside skin of vehicle. Tool attaches tiles with accurately controlled tensile loading.

**B82-10083**

**LOCK FOR GANTRY TROLLEY**

H. F. NEWBERG (Rockwell International Corp.)

Dec. 1982

**MSC-20092** Vol. 6, No. 4, P. 444

Single operator on ground controls trolley-locking mechanism on portable gantry. Mechanism prevents trolley and load from moving along track when gantry is wheeled from one location to another. A downward pull on chain withdraws brakeshoes from trolley wheels. When operator releases chain, brakeshoes reengage to wheels.

**B82-10084**

**TOOL BLUNTS COTTER PIN LEGS FOR SAFETY**

J. A. STEIN (Rockwell International Corp.) and D. R. HELBLE

Dec. 1982

**MSC-20086** Vol. 6, No. 4, P. 445

Jaws on new insertion tool contain upset point and anvil. Point forces cotter-pin legs into loop as it engages anvil. Cotter pin before insertion consists of loop and straight shaft composed of two legs welded together as tips. After insertion, welded legs have been shaped into loop. Tool used to prevent bent loose ends of cotter pins from scratching workers' fingers or cutting and entangling wires.

**B82-10085**

**OVERHEAT PREVENTION IN SOLAR-POWERED STIRLING ENGINES**

W. E. GARRIGUS (Ford Aerospace & Communications Corp.) and R. L. PONS (Ford Aerospace & Communications Corp.)

Dec. 1982

**NPO-15069** Vol. 6, No. 4, P. 445

Proposed controller for solar-powered Stirling engine prevents engine from burning up when energy added by Sun exceeds that withdrawn by load. Head-temperature controller used existing electrical control unit of Stirling engine to regulate power output in response to head temperature. Power out-put is varied so keeps head temperature fairly constant.

**B82-10086**

**WIND-RESISTANT FILLER FOR TILE GAPS**

J. BELLAVIA (Rockwell International Corp.), I. A. QUIGLEY (Rockwell International Corp.), and T. S. CALLAHAN (Rockwell International Corp.)

Dec. 1982

**MSC-18966** Vol. 6, No. 4, P. 446

Filler developed for gaps between insulating tiles on Space Shuttle finds application in industries that use tiles for thermal or environmental protection. Filler consists of tight-fitting ceramic tubes and fibrous alumina. Combination resists high wind loads while providing requisite heat protection. Quartz-thread stitching holds envelope together.

**B82-10087**

**MAGNETIC-GEAR CONCEPT FOR SPECIAL APPLICATIONS**

J. A. CHANDLER

Dec. 1982

**MSC-20132** Vol. 6, No. 4, P. 447

Proposed gear has magnetic instead of mechanical teeth. Magnetic gears consists of permanent magnets resembling mechanical gears but with smooth faces and alternating magnetic poles in place of mechanical teeth. Low torque, noncontacting gears useful in special environments.

**B82-10088**

**CABLE-TWISTING MACHINE**

S. KURNETT (Rockwell International Corp.)

Dec. 1982

**MSC-18874** Vol. 6, No. 4, P. 448

New cable-twisting machine is smaller and faster than many production units. Is useful mainly in production of short-run special cables. Already-twisted cable can be fed along axis of machine. Faster operation than typical industrial cable-twisting machines possible by using smaller spools of wire.

**B82-10089**

**TWO-SPEED VALVE**

D. F. DRAPEAU (United Technologies Corp.)

Dec. 1982

**MSC-20112** Vol. 6, No. 4, P. 448

Operating torque adjustment of two-speed valve provided by preload spring and nut. Torque is adjusted so user finds valve easy to turn but does not turn it too quickly during fast-moving portion of valve stem travel. Drive pin transmits torque to differential nut.

**B82-10090**

**TIEDOWN BRACKET**

D. MASHBURN (Boeing Services International, Inc.), J. E. WALD (Boeing Services International, Inc.), and F. K. HELMSIN (Boeing Services International, Inc.)

Dec. 1982

**KSC-11200** Vol. 6, No. 4, P. 449

Tiedown bracket secured to concrete slab with lag anchor and lag bolt. A trailer or other heavy equipment can be anchored by tethering it to strapping bolt. When bracket is no longer needed, it can be removed, leaving behind only lag anchor. Bracket is easily installed and removed without damage to concrete slab.

**B82-10091**

**DEPLOYABLE REFLECTOR FOR SOLAR CELLS**

K. L. JOHNSON (Lockheed Missiles & Space Co., Inc.)

Dec. 1982

**NPO-15027** Vol. 6, No. 4, P. 450

Unfoldable-membrane-reflector concept leads to mobile photovoltaic generators. Hinged containers swing open for deployment, and counterbalance beam swings into position. Folded reflector membranes are unfolded as deployment mast is extended, until stretched out flat.

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**B82-10194**

**DEVICE MAKES HANDTOOLS 'DROPPROOF'**

B. MCCANDLESS II

Mar. 1983

**MSC-20319**

**Vol. 7, No. 1, P. 69**

Interchangeable-socket dropproof wrench comprises three essential parts: handle assembly, socket assembly, and pip-pin assembly. Socket assembly is disengaged from handle assembly only when engaged to pip-pin assembly. Socket assembly therefore remains tethered and cannot be dropped or lost except by deliberate removal of pip-pin. Dropproof tool is useful where ever loss of component would be inconvenient or hazardous. Used by divers and by people working on scaffolds. Mechanism is easily operated by Technicians wearing thick gloves, space suits, diving suits, or other protective attire.

**B82-10195**

**QUICK-CONNECT, SELF-ALINING LATCH**

G. C. BURNS (McDonnell Douglas Corp.) and E. J. WILLIAMS (McDonnell Douglas Corp.)

Mar. 1983

**MSC-20205**

**Vol. 7, No. 1, P. 70**

Sturdy latch tolerates 10 degrees of angular mismatch in joining structural elements. Hexagonal passive plate nests in active plate, guided by capture plates and alignment keys and grooves. Center hole in both active and passive plates is 1 meter in diameter. Latch has possible uses a pipe joint, connector for parts of portable structures, and fitting for marine risers on offshore drilling rigs.

**B82-10196**

**SCREEN SECURES DETONATOR TO EXPLOSIVE CHARGE**

H. D. MOSHENROSE (Rockwell International Corp.) and R. A. KINDFATHER (Rockwell International Corp.)

Mar. 1983

**MSC-20138**

**Vol. 7, No. 1, P. 71**

Brass screen sleeve attaches blasting cap to fuse, shaped charge, detonating cord, or other formed explosive. Screen makes it easy to control distance between cap and charge, because user can see both parts, and to cool cap by convection, making use of low-cost blasting caps possible for some hot environments.

**B82-10197**

**CAN-FILLED CRASH BARRIER**

A. H. WILSON (CALTECH)

Mar. 1983

**NPO-15188**

**Vol. 7, No. 1, P. 72**

Crash barrier composed largely of used aluminum beverage cans protects occupants of cars in collisions with poles or trees. Lightweight, can-filled barrier very effective in softening impact of an automobile in head-on and off-angle collisions. Preliminary results indicate barrier is effective in collisions up to 40 mi/h (64 km/h).

**B82-10198**

**REDUNDANT GEAR TRAIN**

D. T. PACKARD (CALTECH)

Mar. 1983

**NPO-15317**

**Vol. 7, No. 1, P. 73**

Tandem harmonic drives are immune to single-point failure. One mechanism continues transmitting power regardless of how other fails. Harmonic drive mechanism, combination of elliptical wave generator and tooth differential between flexible spline and circular spline produces rotational speed reduction in compact volume.

**B82-10199**

**FLEXIBLE COUPLING CORRECTS SHAFT MISALIGNMENTS**

R. A. MAYO (CALTECH)

Mar. 1983

**NPO-15393**

**Vol. 7, No. 1, P. 74**

Proposed flexible coupling provides nearly error free

measurements of shaft rotation in presence of misalignments between shaft and position sensing transducer. Intended to be used in situations in which input or output shaft is mounted on flexible joint. Its function is to insure equal input and output angular velocities by forcing input and output shafts to remain parallel.

**B82-10200**

**DEEP-ACCESS VALVE WRENCH**

H. E. FLECK (Boeing Services International)

Mar. 1983

**KSC-11229**

**Vol. 7, No. 1, P. 75**

Bent rod on modified basin wrench holds wrench jaw against valve stem. Rod swivels to accommodate 180 degrees rotation of wrench jaw. Valves 5 feet (1.5 meters) underground can be operated with tool.

**B82-10201**

**IMPROVED ATOMIZER RESISTS CLOGGING**

J. Y. DEA (Nevada Desert Research Institute)

Mar. 1983

**MFS-25631**

**Vol. 7, No. 1, P. 76**

Improved constant-output atomizer has conical orifice that permits air to sweep out all liquid thoroughly and prevent any buildup of liquid or dissolved solids. Capillary groove guides liquid to gas jet. Simple new design eliminates clogging.

**B82-10202**

**MAGNETIC BEARINGS WOULD INCREASE PUMP EFFICIENCY**

P. A. STUDER

Mar. 1983

**GSC-12668**

**Vol. 7, No. 1, P. 76**

Active feedback applied to bearings windings compensate for unbalanced forces. Helical-screw rotation compresses and transports gas charges, which subject shafts to forces tend to displace them from their equilibrium positions. Magnetic bearings restore shafts to equilibrium, lowering friction and increasing efficiency.

**B82-10203**

**PREVENTING CRACKS IN TITANIUM ROTARY SEALS**

J. J. CIANA (Rockwell International Corp.)

Mar. 1983

**MFS-19686**

**Vol. 7, No. 1, P. 77**

Titanium rubs against plastic instead of metal in new rotary seal for cryogenic pump. Friction-induced cracks in titanium parts are thereby avoided.

**B82-10204**

**MINIATURE TWO-AXIS JOYSTICK CONTROLLER**

R. HOLLOW (Computer Sciences Corp.)

Mar. 1983

**ARC-11372**

**Vol. 7, No. 1, P. 78**

Novel movable-button-actuated self-centering controller uses optoelectronics to produce X and Y signals for aircraft control. In addition to be extremely compact, device puts out voltages having high signal-to-noise ratio, especially at critical center position where in many controllers this ratio is poorest. Combination of new saddle-shaped button and positive centering gives 'feel' and 'breakout' met with pilot approval.

**B82-10205**

**CUTTER FOR WOVEN MATERIALS**

J. M. HAMMONS (Rockwell International Corp.) and A. R. KEIR (Rockwell International Corp.)

Mar. 1983

**MSC-20178**

**Vol. 7, No. 1, P. 79**

Simple tool makes accurate square cuts through strips of woven or felted materials, such as high temperature aramid fabric. Pressing handle on Guillotine Cutter forces razor blade through strip of material in slot, cutting strip off squarely.

**B82-10206****BALL JOINT FOR QUICK CONNECTIONS AND DISCONNECTIONS**

L. W. PALMER (Rockwell International Corp.)

Mar. 1983

**LAR-12896****Vol. 7, No. 1, P. 79**

Joint is strong in shear and tension. When release tool is inserted into sleeve of joint, locking balls engage sleeve and allow it to be pulled upward compressing spring and releasing collet fingers. When sleeve is released, spring forces sleeve and collet fingers over ball on fixed part of joint.

**B82-10207****PRESSURE RELIEF VALVE**

T. A. BRABBS

Mar. 1983

**LEW-13800****Vol. 7, No. 1, P. 80**

Valve cap seated on an O-ring lifts to relieve positive pressure. Is attached to vacuum system by screw-on housing. Caps are loosely tied to pipe with twine or thin wire to make recovery simple.

**B82-10208****MICROMETER FOR MEASURING TREPANED GROOVES**

S. K. BIRD (Rockwell International Corp.)

Mar. 1983

**MFS-19704****Vol. 7, No. 1, P. 81**

Special micrometer measures diameter of circular groove on face of large part, while part is mounted in lathe chuck. Tool has curved frame so it can reach around obstruction on centerline of part. At one end of frame is blade/ micrometer spindle for reaching into groove to be measured; this type of spindle does not rotate when micrometer thimble is turned in taking measurement. Other end of frame has sliding foot with blade.

**B82-10209****CLEANER FOR SOLAR-COLLECTOR COVERS**

P. O. FRICKLAND (CALTECH) and E. L. CLELAND (CALTECH)

Mar. 1983

**NPO-15414****Vol. 7, No. 1, P. 81**

Simple self-contained cleaning system proposed for solar collectors or solar-collector protective domes. Perforated transparent plastic cap attached to top of protective dome in heliostat solar-energy collection system distributes cleaning fluid over surface of dome without blocking significant fraction of solar radiation.

**B82-10210****REMOTE-ACTION TUBE CRIMPER**

R. L. ROBBINS (Rockwell International Corp.) and S. T. HARRISON (Rockwell International Corp.)

Mar. 1983

**MSC-20197****Vol. 7, No. 1, P. 82**

Long-handled tube crimper stops leaks or reduces fluid flow in hard to reach and hazardous areas. Tool includes steel plunger, contained within pipe, and long cam-action handles that open and close crimping jaw. Movable jaw is wedge shaped and stationary jaw cylindrical.

**B82-10211****MODIFIED REAMER REMOVES CHIPS AND CONTAMINANTS**

L. L. LARSON (Rockwell International Corp.)

Mar. 1983

**MFS-19711****Vol. 7, No. 1, P. 83**

Reamer shaft is modified by central passage and intake and outlet slots. To help draw away chips and lubricant and augment vacuum, positive pressure is applied inside orifice of part being reamed. Tool especially useful when surroundings must be kept free from contamination.

**B82-10212****PROGRESS IN WIND-WHEEL TURBINES**

W. FROST (FWG Associates, Inc.) and P. A. KESSEL (FWG Associates, Inc.)

Mar. 1983

**MFS-25796****Vol. 7, No. 1, P. 84**

New wind turbine offers important advantages over conventional propeller wind turbines according to theoretical studies and tests of small working models. Project results are described in final report now available. Windwheel turbines consists of bladed wheel, main housing, two forward ducts (front concentrators), two side ducts (side concentrators) and base to support and elevate housing.

**B82-10315****DEVICE STORES AND DISCHARGES METERED FLUID**

S. L. HOOPER (Pan American World Airways, Inc.) and D. SETZER (Pan American World Airways)

May 1983

**MSC-20275****Vol. 7, No. 2, P. 189**

Hand-held container accepts measured amount of liquid from pressurized supply. Supply pressure drives spring-loaded piston that stores enough mechanical energy to discharge measured liquid into another container. Original application of container was to rehydrate sterilized pre-packaged food in zerogravity environment of space vehicles. Possible terrestrial applications include dispensing of toxic fluids or metering of fluids for household, commercial or laboratory uses.

**B82-10316****QUICK-DISCONNECT FASTENER**

L. W. PALMER (Rockwell International Corp.) and J. A. BILLYARD (Rockwell International Corp.)

May 1983

**LAR-12895****Vol. 7, No. 2, P. 190**

Proposed quick-disconnect fastener for two or more parts resists shear loads and torque. Device centers parts to be joined, clamps and tightens them into single unit. Potential applications for removable fastener include holding parts for welding, brazing, soldering, riveting, and gluing. Other possible uses are for attaching removable panels and panels with poor access on one side and plugging leaks in pressure vessels.

**B82-10317****SIX-AXIS ELECTRICAL-DISCHARGE MACHINE**

A. R. WERNER (Rockwell International Corp.)

May 1983

**MFS-19695****Vol. 7, No. 2, P. 190**

Electrical discharge machine (EDM) of unusual versatility made by conversion of radial drill. Drilling head is replaced by ram that holds and positions electrode. Tank and recirculation system for coolant are added. EDM has six independent motions and drastically reduced cost of manufacturing. New applications are constantly being found.

**B82-10318****PADDED ALLEN WRENCH GRIPS FASTENER**

M. K. SALISBURY

May 1983

**MFS-25739****Vol. 7, No. 2, P. 191**

Addition of PTFE pressure pad increases utility of hexagonal socket wrench. Pad presses against opposing inside socket walls, causing frictional force that retains socket-head screw against gravitational and handling forces. Developed for spacecraft repairs, tool is useful wherever tight clearance prevents insertion or removal of screw by hand.

**B82-10319****INEXPENSIVE BOLT-LOAD GAGE**

M. J. LONG

May 1983

**LAR-12774****Vol. 7, No. 2, P. 192**

'Built-in' gage determines whether large bolt or stud

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has been torqued to desired load and provides for continuous inspection to ensure proper load is being maintained. Gage detects longitudinal stress/strain bolt; requires no electronic or sonic test equipment.

### **B82-10320 PARACHUTE LINE HOOK INCLUDES INTEGRAL LOOP EXPANDER**

G. B. BAYLESS

May 1983

**LAR-12875**

**Vol. 7, No. 2, P. 193**

Parachute packing simplified with modified line hook. One person packs parachutes for test recovery vehicles faster than previously two-person team. New line hook includes expander that opens up two locking loops so parachute lines are pulled through them. Parachutes are packed at high pressure to be compressed into limited space available in test vehicles.

### **B82-10321 REGULATING OXYGEN PRESSURE SAFELY**

C. SIMONS (United Technologies Corp.)

May 1983

**MSC-20300**

**Vol. 7, No. 2, P. 194**

Pressure regulator for oxygen allows gas flow shut off on low-pressure (outlet) side rather than high-pressure (inlet) side. In modified pressure regulator initial rush of oxygen occurs in second stage rather than first stage of pressure reduction. Large volume of second stage prevents excessive heating of gas. High-pressure source remains on, and first stage remains pressurized at all times. New regulator reduces danger of fire in aircraft and in medical oxygen supplies.

### **B82-10322 TOOL SEVERS HIDDEN ADHESIVE BONDS**

A. R. KEIR (Rockwell International Corp.) and X. A. DOMIN-GUEZ (Rockwell International Corp.)

May 1983

**MSC-20198**

**Vol. 7, No. 2, P. 195**

New tool enters narrow gap between fragile materials and removes adhesively bonded filler without damage to adjacent surfaces. Reaches deep into narrow crevices to reach hidden bond lines. Tool originally developed to remove ceramic filler from between Space Shuttle surface-insulation tiles.

### **B82-10323 COULOMB FRICTION DAMPER**

W. T. APPLEBERRY (Rockwell International Corp.)

May 1983

**MSC-20179**

**Vol. 7, No. 2, P. 196**

Standard hydraulic shock absorber modified to form coulomb (linear friction) damper. Device damps very small velocities and is well suited for use with large masses mounted on soft springs. Damping force is easily adjusted for different loads. Dampers are more reliable than fluid dampers and also more economical to build and to maintain.

### **B82-10324 INSERTS AUTOMATICALLY LUBRICATE BALL BEAR- INGS**

J. A. HAGER (Rockwell International Corp.)

May 1983

**MFS-19727**

**Vol. 7, No. 2, P. 196**

Inserts on ball-separator ring of ball bearings provide continuous film of lubricant on ball surfaces. Inserts are machined or molded. Small inserts in ball pockets provide steady supply of lubricant. Technique is utilized on equipment for which maintenance is often poor and lubrication interval is uncertain, such as household appliances, automobiles, and marine engines.

### **B82-10325 LOCKING NUT AND BOLT**

R. BISHOP (Rockwell International Corp.)

May 1983

**MFS-19687**

**Vol. 7, No. 2, P. 197**

Threaded fastener locks parts securely together despite together large loosening torques, even under conditions of high temperature and vibration. Positive locking action is suitable for use where conventional fasteners tend to work loose—for example, on high-speed rotating machinery. Bolt, nut and key are joined together so key occupies aligned slots in bolt and nut and prevents nut from rotating off bolt.

**B82-10326**

### **FERROFLUID WOULD SEAL LINEAR-MOTION VALVE**

J. A. CHANDLER

May 1983

**MSC-20148**

**Vol. 7, No. 2, P. 197**

Proposed valve employs ferrofluid to make tight seal. Seal requires no precisely machined parts, and hand lapping of valve seats are unnecessary. Magnetic fluid fills gap between shaft and annular pole piece in chamber wall. Precise shaft fit is not necessary.

**B82-10327**

### **PORTABLE PIPE WRAPPER**

G. B. DENNIS (Boeing Services International)

May 1983

**KSC-11244**

**Vol. 7, No. 2, P. 198**

New tool applies fragile layered insulation to cryogenic tubing. Used routinely to apply two layers of fiberglass and one of aluminum foil on pipe used as inner line in vacuum jacketed cryogenic plumbing. Wrapper is easy to use and made from inexpensive, readily available parts. Wheeled to whatever location is convenient for wrapping.

**B82-10328**

### **TUBING CUTTER IS ACTIVATED HYDRAULICALLY**

D. G. MCSMITH and J. I. RICHARDSON

May 1983

**LAR-12786**

**Vol. 7, No. 2, P. 199**

Hydraulically-actuated tubing cutter severs tubing when operator squeezes handle grip. 'Gooseneck' extension enables cutter to be used in areas where accessibility is limited. Cutter has potential as flight-line tool and is useful in automobile and fire rescue work.

**B82-10329**

### **LIGHT, COMPACT PUMPER FOR HARBOR FIRES**

R. A. BURNS

May 1983

**MFS-25784**

**Vol. 7, No. 2, P. 199**

Report describes development of new transportable water-pumping unit for fire-fighting. Compact, self-contained unit provides fire protection at coastal and inland ports and is lighter than standard firetruck pumper of same capacity. Used to fight fires in harbors, cities, forests, refineries, chemical plants, and offshore drilling platforms. Other possible applications include cleaning up oilspills, pumping out ships, and flood control pumping.

**B82-10330**

### **ROTATING-MACHINERY CRITICAL SPEEDS**

R. F. BEATTY (Rockwell International Corp.), A. L. MOWERS (Rockwell International Corp.), and E. MOGIL (Rockwell International Corp.)

May 1983

**MFS-19669**

**Vol. 7, No. 2, P. 200**

Computer program available from COSMIC provides quick, efficient, and accurate results in support of preliminary and proposed rotating-machinery designs. Advanced rotating-machinery design is iterative process in early stages of development. New program provides timely, critical-speed calculations to support preliminary rotating-machinery designs.

## 08 FABRICATION TECHNOLOGY

**B82-10092****GAS-JET LEVITATION FURNACE**

E. C. ETHRIDGE, J. L. JOHNSON, S. A. DUNN (Bjorksten Research Laboratory), and E. G. PAQUETTE (Bjorksten Research Laboratory)

Dec. 1982

**MFS-25591****Vol. 6, No. 4, P. 453**

Gas jet levitates solid and viscous liquid spheroids at high temperatures in new contactless processing system. System can be used to observe high temperature transformations (for example, crystallization without contact with another solid surface) or in containerless studies to eliminate contamination by crucible.

**B82-10093****STOWABLE RIGID REFLECTOR**

W. B. PALMER (TRW, Inc.) and M. M. GIEBLER (TRW, Inc.)

Dec. 1982

**NPO-15253****Vol. 6, No. 4, P. 454**

Parabolic reflector 80 feet in diameter stowed in space of only 36.5 feet long and 14.5 feet in diameter with new folding scheme. Upon command, stowed reflector is automatically deployed to full size. Petal-like panels unfold from central fixed section to create inner reflector dish. Reflector is composed of rigid panels. Number of panels depend on reflector size when deployed and upon required package size when stowed.

**B82-10094****FABRICATING THIN-FILM HIGH-TEMPERATURE THERMOSET RESINS**

G. E. DICKERSON, E. R. J. LONG, and R. KITTS, G.

Dec. 1982

**LAR-12869****Vol. 6, No. 4, P. 455**

To prepare an epoxy thin film, quantity of uncured epoxy to be cast placed in vacuum oven and heated to melting temperature. Vacuum of about 30 mm Hg is applied to deaerate epoxy charge. Pressure is cycled with each foaming until all air and excess volatiles are removed. thermoset (cross-linked) resin is cast between thin, flexible, releasing substrate films. Films less than 0.025 mm in thickness are made routinely with this facility.

**B82-10095****PRESSURIZED PARABOLOIDAL SOLAR CONCENTRATOR**

E. L. CLELAND (CALTECH) and P. O. FRICKLAND (CALTECH)

Dec. 1982

**NPO-15427****Vol. 6, No. 4, P. 456**

Pressurized paraboloidal solar concentrator has high concentration ratio and is easy to maintain. Gas pressure forces reflecting film into contact with paraboloidal substrate. Reflective surface, which is low-cost metalized polymer film, can be quickly and easily replaced making new design less expensive to produce.

**B82-10096****PIPE-THREAD VACUUM SEAL**

J. A. CHANDLER

Dec. 1982

**MSC-20147****Vol. 6, No. 4, P. 456**

Lead/tin solder coating on pipe threads serves as seal in non-critical vacuum systems. Pipe-thread seal is less expensive than weld or knife-edge flanges. Can also be used in place of sealing tape.

**B82-10097****ONSITE FABRICATION OF TRUSSES AND STRUCTURES**

J. G. BODLE (General Dynamics Corp.), D. L. BROWNING (General Dynamics Corp.), J. G. FISHER (General Dynamics Corp.), E. J. HUJSAK (General Dynamics Corp.), E. H. KLEIDON (General Dynamics Corp.), L. E. SIDEN (General Dynamics Corp.), and G. A. TREMBLAY (General Dynamics)

Dec. 1982 See Also NASA CR-160345(N80-11111/NSP)

AND NASA CR-160288(N7929203/NSP) AND NASA CR-160747(N80-27399/NSP)

**MSC-18951****Vol. 6, No. 4, P. 457**

Tribeam truss that is strong and light made at site where used. Reinforced plastic members are fabricated by beam-making machine and assembled by assembly and welding machines. Although proposed for space-platform assembly, concept may be useful in terrestrial applications in remote or inaccessible places.

**B82-10098****DUAL-ALLOY DISKS ARE FORMED BY POWDER METALLURGY**

F. H. HARF, R. V. MINER, C. S. KORTOVICH (TRW, Inc.), and J. M. MARDER (TRW, Inc.)

Dec. 1982 See Also NASA CR-165224(N82-18370/NSP)

**LEW-13702****Vol. 6, No. 4, P. 458**

High-performance disks have widely varying properties from hub to rim. Dual property disk is fabricated using two nickel-base alloys, AF-115 for rim and Rene 95 for hub. Dual-alloy fabrication may find applications in automobiles, earth-moving equipment, and energy conversion systems as well as aircraft powerplants. There is potential for such applications as shafts, gears, and blades.

**B82-10099****ROBOT END EFFECTOR TO PLACE AND SOLDER SOLAR CELLS**

J. J. HAGERTY (MBAAssociates)

Dec. 1982

**NPO-15490****Vol. 6, No. 4, P. 458**

Encapsulated in robot end effector is RF induction-heating coil for heating solar cell while in transit. Holes in encapsulant permit end of unit to act as vacuum pickup to grip solar cell. Use of RF induction heating allows cell to be heated without requiring direct mechanical and thermal contact of bonding tool such as soldering iron.

**B82-10100****SYSTEM TO PREPARE SOLAR CELLS FOR ASSEMBLY**

J. J. HAGERTY (MBAAssociates)

Dec. 1982

**NPO-15489****Vol. 6, No. 4, P. 459**

To reduce labor, industrial robot used for solar-cell positioning and soldering operations. Cassette unloader feeds solar cell to vacuum chuck, which rotates cell into proper orientation as determined by optical sensor. Solder paste and interconnect ribbons are applied to cell. Industrial robot then picks up cell, heats it by RF inductions, and solders it into position in solar cell.

**B82-10101****DIP-COATING FABRICATION OF SOLAR CELLS**

B. KOEPKE (Honeywell, Inc.) and D. SUAVE (Honeywell, Inc.)

Dec. 1982

**NPO-15312****Vol. 6, No. 4, P. 460**

Inexpensive silicon solar cells made by simple dip technique. Cooling shoes direct flow of helium on graphite-coated ceramic substrate to solidify film of liquid silicon on graphite surface as substrate is withdrawn from molten silicon. After heaters control cooling of film and substrate to prevent cracking. Gas jets exit at points about 10 mm from substrate surfaces and 6 to 10 mm above melt surface.

**B82-10102****HIGH-EFFICIENCY SOLAR CELLS ON LOW-COST SUBSTRATES**

## 08 FABRICATION TECHNOLOGY

R. V. DAIELLO (RCA Corp.) and P. H. ROBINSON (RCA Corp.)

Dec. 1982

**NPO-15039**

**Vol. 6, No. 4, P. 460**

High-efficiency solar cells made in thin epitaxial films grown on low-cost commercial silicon substrates. Cost of cells is much less than if high-quality single-crystal silicon were used for substrates and performance of cells is almost as good.

**B82-10103**

**PLATING TO REINFORCE WELDED JOINTS**

J. E. OTOUSA (Rockwell International Corp.)

Dec. 1982

**MFS-19576**

**Vol. 6, No. 4, P. 461**

Electrodeposition used to strengthen welded joints gouged, nicked, or suffered other mechanical damage. Plating cell, typically of acrylic plastic such as poly (Methylmetacrylate), is assembled around part to be plated. Areas not to be plated are masked with plater's tape. Weld area is plated in standard nickel-plating process.

**B82-10104**

**MATERIAL PROTECTION DURING ELECTRON-BEAM WELDING**

R. L. TOMLINSON (Rockwell International Corp.) and F. J. KILUK (Rockwell International Corp.)

Dec. 1982

**MFS-19666**

**Vol. 6, No. 4, P. 462**

Alumina pellets behind electron-beam weld joint protect other parts of assembly from beam and from spattered material. Alumina pellets may be cleaned and reused. Easily applied and removed in regions that are narrow or have complex shapes.

**B82-10105**

**PLASMA ETCHING IMPROVES SOLAR CELLS**

S. M. BUNYAN (Spectrolab, Inc.)

Dec. 1982

**NPO-15205**

**Vol. 6, No. 4, P. 462**

Etching front surfaces of screen-printed silicon photovoltaic cells with sulfur hexafluoride plasma found to increase cell performance while maintaining integrity of screen-printed silver contacts. Replacement of evaporated-metal contacts with screen-printed metal contacts proposed as one way to reduce cost of solar cells for terrestrial applications.

**B82-10106**

**'SANDWICH' STIFFENER FOR COMPOSITE STRUCTURAL PANELS**

R. R. MCWITHEY, D. M. ROYSTER, and T. T. BALES

Dec. 1982

**LAR-12807**

**Vol. 6, No. 4, P. 463**

Concept uses commercial titanium honeycomb core brazed to cap material and panel skin. In fabrication of stringers, large sheets of cap material are brazed to pieces of honeycomb core of desired height. After brazing, individual stringers are cut by electrical-discharge machining, and stringers are subsequently brazed to skin. Sandwich beam stringer is light-weight, structurally-efficient, low-cost stiffener for metal-matrix composite structural panels.

**B82-10107**

**PRECIPITATING CHROMIUM IMPURITIES IN SILICON WAFERS**

A. M. SALAMA (CALTECH)

Dec. 1982

**NPO-15179**

**Vol. 6, No. 4, P. 464**

Two new treatments for silicon wafers improve solar-cell conversion efficiency by precipitating electrically-active chromium impurities. One method is simple heat treatment. Other involves laser-induced damage followed by similar heat treatment. Chromium is one impurity of concern in metallurgical-grade silicon for solar cells. In new treatment, chromium active centers are made electrically inactive by

precipitating chromium from solid solution, enabling use of lower grade, lower cost silicon in cell manufacture.

**B82-10108**

**SPLIT COIL FORMS FOR ROTARY TRANSFORMERS**

C. W. T. MCLYMAN (CALTECH)

Dec. 1982

**NPO-15457**

**Vol. 6, No. 4, P. 465**

Split cores for rotor and stator windings of rotary transformer mounted around their respective coils (which are in bobbins) and cemented together. This arrangement simplifies winding of stator coil to go in a slot in inner diameter of stator coil. One practical application of rotary transformers fabricated according to this technique is for centrifuges, in which conventional sliprings are of uncertain reliability.

**B82-10109**

**RECRYSTALLIZING SHORT LENGTHS OF SILICON RIBBON**

R. W. GURTLER (Motorola, Inc.)

Dec. 1982

**NPO-14916**

**Vol. 6, No. 4, P. 465**

Silicon recrystallization by laser-beam heating of ribbons proposed. One or both vertical edges of ribbon would not be melted, providing rigid support for moving ribbon. Use of rigid edge means no special atmosphere is required; consequently, electron-beam heating could be used instead of laser-beam heating.

**B82-10110**

**NONSLIP WRISTLET**

V. HIMEL (Grumman Aerospace Corp.)

Dec. 1982

**MFS-25085**

**Vol. 6, No. 4, P. 466**

Simple garment protects vulnerable area between sleeve end and glove. Mittenlike wristlet is restrained by thumb loop and cuff attachment with either single finger opening or separate openings for each digit. Worn under glove, wristlet provides additional layer of protective material over palm, back of hand, and over web of thumb.

**B82-10111**

**SOLAR CELLS FROM METALLURGICAL-GRADE SILICON**

R. V. DAIELLO (RCA, Corp.) and P. H. ROBINSON (RCA Corp.)

Dec. 1982

**NPO-15042**

**Vol. 6, No. 4, P. 467**

Epitaxial deposition produces acceptable solar cells from metallurgical-grade silicon. Instead of diffusing dopants into silicon to form pn junction, junction is formed by growing epitaxial layer--one having crystal structure continuous with that of substrate--on metallurgical-grade silicon. Less pure forms of silicon, such as metallurgical-grade, are less expensive than semiconductor-grade material and help to lower cost of solar cells.

**B82-10112**

**OXIDE CONTROL FOR SILICON CRYSTAL GROWTH**

H. A. I. WEHRLI (Westinghouse Electric Corp.)

Dec. 1982

**NPO-15199**

**Vol. 6, No. 4, P. 467**

Web dendrite growth process pulls sheet of newly crystallized silicon from molten silicon. Jets of argon pull outside gas into melt cavity, preventing silicon oxide from passing through heat-shield hold and depositing on it. Generated by aspirators, reversed flow is used in web dendrite process, which produces sheets of single-crystal silicon for low-cost solar cells.

**B82-10113**

**ANNULAR ELECTRODE IMPROVES SOLAR-CELL WELDS**

C. R. BARAONA, A. F. FORESTIERI, and W. E. FREY

Dec. 1982

**LEW-13804****Vol. 6, No. 4, P. 468**

Improved method of electrical-resistance welding of solar-cell inter-connections developed by using an annular welding-electrode shape. Improved weld electrode consists of two coaxial cylinders, outer one with annular cross section and inner one with circular cross section. Possible annular weld-electrode configurations result in better quality welds for interconnecting solar-array elements.

**B82-10114****BRIDGING GAPS BETWEEN REFRACTORY TILES**

J. W. J. HANEY (Rockwell International Corp.)

Dec. 1982

**MSC-20060****Vol. 6, No. 4, P. 469**

Excessively large gaps between tiles on Space Shuttle eliminated without time-consuming and costly procedure of removing and replacing tiles. Ceramic tile silver is bonded in gap. Bonded silver prevents airframe under gap from getting too hot during reentry and presents aerodynamically smooth exterior surface.

**B82-10115****PROGRAMMABLE PLASMA-SPRAY SYSTEM**

C. W. FETTEROFF (TRW, Inc.), T. DERKACS (TRW, Inc.), I. M. MATAY (TRW, Inc.), and I. TOTH (TRW, Inc.)

Dec. 1982 See Also NASA CR-165418(N81-31193/NSP)

**LEW-12986****Vol. 6, No. 4, P. 469**

NASA-funded research led to development of automated plasma-spray system programmable and reproducible. System utilizes standard plasma-spray equipment with noncoherent light-measuring system and microprocessor. System monitors and controls surface contours and coating thickness. Other advantages of system are constant coating reproducibility, exact blending and feathering operations, ability to handle complex shapes and ease of changing spray parameters.

**B82-10116****COATED ALUMINIZED FILM RESISTS CORROSION**

H. J. ROCKOFF (Rockwell International Corp.)

Dec. 1982

**MSC-20118****Vol. 6, No. 4, P. 470**

Commercially available corrosion-protection coating allows less costly metals - aluminum in particular used in heat-reflecting films for thermal barriers. Previously, such films had to incorporate gold as reflective layer to withstand humidity, moisture, and salt spray without corroding. This protective coating prevents corrosion of metalized films during environmental exposure yet remains flexible, thermally stable and clear.

**B82-10213****ASSEMBLY OF PHOTOVOLTAIC ARRAYS**

P. J. COYLE (RCA Corp.), A. G. LAZZERY (RCA Corp.), and M. S. CROUTHAMEL (RCA Corp.)

Mar. 1983

**NPO-15311****Vol. 7, No. 1, P. 87**

Vacuum holddown fixtures hold photovoltaic solar cells during assembly into array. Tab attachment fixture holds single cell and interconnecting tabs during heat-lamp soldering. Array-layout fixture has computer-scribed layout template and holds cells (with attached tabs) while being placed in position and transferred to array-interconnection fixture, which holds cells during final soldering step. Group of heat lamps on trolley passes slowly over interconnection fixture to heat cells to soldering temperature.

**B82-10214****PELLET FEED FOR DENDRITIC-WEB GROWTH**

C. S. DUNCAN (Westinghouse Electric Corp.), M. E. SKUTCH (Westinghouse Electric Corp.), and J. P. MCHUGH (Westinghouse Electric Corp.)

Mar. 1983

**NPO-15198****Vol. 7, No. 1, P. 88**

Melt replenishment system sustains continuous growth of silicon dendritic web for several days. Substantially

increases size of batch, limited mainly by level of impurities and life of crucible. Silicon pellets automatically added to crucible sustain crystal growth for days.

**B82-10215****BARRIER FOR CONTINUOUS-CRYSTAL-GROWTH CRUCIBLE**

M. E. SKUTCH (Westinghouse Electric Corp.) and P. A. PIOTROWSKI (Westinghouse Electric Corp.)

Mar. 1983

**NPO-15338****Vol. 7, No. 1, P. 89**

Properly designed openings permit free flow of melt while restraining pellets. Redesigned partition between growth region and melt-replenishment region of crystal-growth crucible makes it less likely crucible will run out of feed material in middle of cycle. Supply of molten silicon is maintained by addition of silicon pellets to compartment at one end of heated crucible, and partition or barrier is required to hold pellets while allowing melted silicon to flow from compartment.

**B82-10216****MODIFIED SILICON FURNACE LOWERS CRYSTAL COST**

R. L. LANE (Kayex, Corp.)

Mar. 1983

**NPO-15041****Vol. 7, No. 1, P. 90**

Modified Czochralski setup grows several large crystals in succession from one crucible. Modified apparatus is expected to reduce cost per crystal by about 50 percent. Key features are: isolation valve between growth and pulling chamber, and recharging mechanism. Functional changes reduce cycle time and prolong crucible life.

**B82-10217****CONTROLLING THERMAL GRADIENTS DURING SILICON WEB GROWTH**

C. S. DUNCAN (Westinghouse Electric Corp.), J. P. MCHUGH (Westinghouse Electric Corp.), M. E. SKUTCH (Westinghouse Electric Corp.), and P. A. PIOTROWSKI (Westinghouse Electric Corp.)

Mar. 1983

**NPO-15337****Vol. 7, No. 1, P. 91**

Strategically placed slot helps to control critical thermal gradients in crucible for silicon web growth. Slot thermally isolates feed region of crucible from growth region; region where pellets are added stays hot. Heat absorbed by pellets during melting causes thermal unbalance than upsets growth conditions.

**B82-10218****GETTERING SILICON WAFERS WITH PHOSPHORUS**

R. V. DAIELLO (RCA Corp.)

Mar. 1983

**NPO-15357****Vol. 7, No. 1, P. 92**

Silicon wafers subjected to gettering in phosphorus atmosphere have longer diffusion lengths and higher solar-cell efficiencies than untreated wafers. Gettering treatment improves properties of solar cells manufactured from impure silicon and is compatible with standard solar-cell processing.

**B82-10219****SILICON SHEET QUALITY IS IMPROVED BY MENISCUS CONTROL**

D. A. YATES (Mobil Tyco Solar Energy), A. E. HATCH (Mobil Tyco Solar Energy), and J. M. GOLDSMITH (Mobil Tyco Solar Energy)

Mar. 1983

**NPO-15384****Vol. 7, No. 1, P. 92**

Better quality silicon crystals for solar cells are possible with instrument that monitors position of meniscus as sheet of solid silicon is drawn from melt. Using information on meniscus height, instrument generates feedback signal to control melt temperature. Automatic control ensures more uniform silicon sheets.

**B82-10220****TECHNIQUE FOR CRYSTAL-RIBBON GROWTH**

D. N. JEWETT (Energy Materials Corp.) and H. E. BATES (Energy Materials Corp.)

Mar. 1983  
NPO-15177

Vol. 7, No. 1, P. 93

Single-crystal ribbon of silicon or other material is grown by pulling at low angle from shallow melt. By pulling crystal at small angle, technique prevents overflow problem experienced with horizontal growth. Also creates meniscus that minimizes growth defects in main portion of ribbon. Use of shallow pool prevents convection problems.

**B82-10221****ASYMMETRIC DIE GROWS PURER SILICON RIBBON**

J. P. KALEJS (Mobil Tyco Solar Energy Corp.), B. CHALMERS (Mobil Tyco Solar Energy Corp.) and T. SUREK (Mobil Tyco Solar Energy Corp.)

Mar. 1983  
NPO-15385

Vol. 7, No. 1, P. 94

Concentration of carbide impurities in silicon ribbon is reduced by growing crystalline ribbon with die one wall higher than other. Height difference controls shape of meniscus at liquid/crystal interface and concentrates silicon carbide impurity near one of broad faces. Opposite face is left with above-average purity. Significantly improves efficiency of solar cells made from ribbon.

**B82-10222****STRIPED ELECTRODES FOR SOLID-ELECTROLYTE CELLS**

R. RICHTER (CALTECH)

Mar. 1983  
NPO-15269

Vol. 7, No. 1, P. 94

Striped thick-film platinum electrodes help insure lower overall cell resistance by permitting free flow of gases in gaps between stripes. Thickfilm stripes are also easier to fabricate than porous thin-film electrodes that cover entire surface. Possible applications for improved cells include oxygen production from carbon dioxide, extraction of oxygen from air, small fluidic pumping, sewage treatment, and fuel cells.

**B82-10223****CARBON CLOTH SUPPORTS CATALYTIC ELECTRODES**

W. T. P. LU (Westinghouse Electric Corp.) and R. L. AMMON (Westinghouse Electric Corp.)

Mar. 1983  
NPO-15268

Vol. 7, No. 1, P. 95

Carbon cloth is starting material for promising new catalytic electrodes. Carbon-cloth electrodes are more efficient than sintered-carbon configuration previously used. Are also chemically stable and require less catalyst—an important economic advantage when catalyst is metal such as platinum.

**B82-10224****LAMINATING POLYIMIDE FILMS**

A. K. ST. CLAIR, T. L. ST. CLAIR, and P. D. ROBINSON

May 1983  
LAR-12742

Vol. 7, No. 1, P. 96

Thermoplastic polyimide adhesive is used to bond polyimide sheets into flexible laminates. Films are first primed with polyimide adhesive, then bonded together under heat and pressure. Adhesive is cast on separate surface, then sandwiched between polyimide and/or metal films for final assembly. Objectives of process are to improve bonding of high-temperature polyimide film, prepare flexible, large-area, void-free laminates from polyimide film, and laminate polyimide film not only to itself but to metal surfaces.

**B82-10225****REPAIRING VOIDS AND DELAMINATIONS IN COMPOSITE MATERIALS**

D. D. OTT (McDonnell Douglas Corp.)

Mar. 1983

**MSC-20131**

Vol. 7, No. 1, P. 97

Proposed tool forces adhesive into cracks. After inlet and outlet holes have been drilled to proper depth, alignment pin is inserted in inlet hole. Adhesive fills void or is forced into delamination, expanding delamination slightly to ensure full penetration. Potential applications in repair of fiber-reinforced components, boats, storage tanks, and some automobile bodies.

**B82-10226****SOLVENTLESS FABRICATION OF REINFORCED COMPOSITES**

R. M. BAUCOM

Mar. 1983  
LAR-12856

Vol. 7, No. 1, P. 98

Heat and pressure melt thermoplastic fibers, causing them to flow into voids around graphite reinforcement. On cooling, fiber bundle has been transformed into structural composite. Required temperature and pressure depend on properties of particular thermoplastic used.

**B82-10227****SOLAR-CELL ENCAPSULATION BY ONE-STEP LAMINATION**

M. N. SARBOLOUKI (CALTECH)

Mar. 1983  
NPO-15222

Vol. 7, No. 1, P. 99

Simple method of potting solar cells reduces encapsulating to one-step lamination process. Simplified process saves time and expense. Potting material is added to two inside faces of solar-cell assembly before they are sandwiced and cured.

**B82-10228****IMPROVED PHOTODIODE FOR LIGHT VALVES**

N. J. KODA (Hughes Aircraft Co.)

Mar. 1983  
MSC-20036

Vol. 7, No. 1, P. 99

Processing changes improve performance of liquid-crystal light valve for displaying projection TV images. New approach monitors performance of finished light valves for given changes in CdS process and experimentally to optimize process for good sensitivity and low negative memory.

**B82-10229****AMPOULE WITH INTEGRAL FEEDTHROUGHS**

R. K. CROUCH and W. DEBNAM

Mar. 1983  
LAR-12899

Vol. 7, No. 1, P. 100

Bridgman-growth ampoule has molybdenum-to-quartz feedthroughs at both ends. Ampoule is vacuum-tight, protects exposed areas of furnace from corrosive vapors emanating from sample and at same time prevents changes in composition of melt due to preferential vaporization of one of components.

**B82-10230****FABRICATING A MICROCOMPUTER ON A SINGLE SILICON WAFER**

V. L. EVANCHUK

Mar. 1983  
NPO-15053

Vol. 7, No. 1, P. 101

Concept for 'microcomputer on a slice' reduces microcomputer costs by eliminating scribing, wiring, and packaging of individual circuit chips. Low-cost microcomputer on silicon slice contains redundant components. All components—central processing unit, input/output circuitry, read-only memory, and random-access memory (CPU, I/O, ROM, and RAM) on placed on single silicon wafer.

**B82-10231****ELECTROLYTE RESERVOIR WOULD LENGTHEN CELL LIFE**

L. THALLER

Mar. 1983

**LEW-13788****Vol. 7, No. 1, P. 102**

Controlled-capillary sump supplies proper amount of electrolyte during cell operation. Releases electrolyte to compensate for electrolyte that empties from electrodes and separators: thus extending operating life of electrochemical cells that depend on recombination of gases in sealed condition without undue pressure buildup.

**B82-10232****STABLE POLYURETHANE COATINGS FOR ELECTRONIC CIRCUITS**

D. E. MORRIS

Mar. 1983

**MFS-25663****Vol. 7, No. 1, P. 103**

Alkane-based polyurethanes resist deterioration while maintaining good dielectric properties. Weight loss after prolonged immersion in hot water far less for alkane-based polyurethanes than for more common ether based polyurethanes, at any given oxygen content. Major uses of polyurethanes are as connector potting materials and conformal coatings for printed circuit boards.

**B82-10253****RF SPUTTERING OF GOLD CONTACTS ON NIOBIUM**

D. W. BARR (University of Virginia)

Mar. 1983

**NPO-15824****Vol. 7, No. 1, P. 104**

Reliable gold contacts are deposited on niobium by combination of RF sputtering and photolithography. Process results in structures having gold only where desired for electrical contact. Contacts are stable under repeated cycling from room temperature to 4.2 K and show room-temperature contact resistance as much as 40 percent below indium contacts made by thermal-compression bonding.

**B82-10234****MASS PRODUCING TARGETS FOR NUCLEAR FUSION**

T. G. WANG (CALTECH), D. D. ELLEMAN (CALTECH), and J. M. KENDALL (CALTECH)

Mar. 1983

**NPO-15455****Vol. 7, No. 1, P. 105**

Metal-encapsulating technique advances prospects of controlling nuclear fusion. Prefilled fusion targets form at nozzle as molten metal such as tin flows through outer channel and pressurized deuterium/tritium gas flows through inner channel. Molten metal completely encloses gas charge as it drops off nozzle.

**B82-10235****ETCHING AND GROWTH OF GAAS**

A. C. SEABAUGH (University of Virginia) and R. MATTAUCH, J. (University of Virginia)

Mar. 1983

**NPO-15625****Vol. 7, No. 1, P. 105**

In-place process for etching and growth of gallium arsenide calls for presaturation of etch and growth melts by arsenic source crystal. Procedure allows precise control of thickness of etch and newly grown layer on substrate. Etching and deposition setup is expected to simplify processing and improve characteristics of gallium arsenide lasers, high-frequency amplifiers, and advanced integrated circuits.

**B82-10236****RECHARGING 'HOT-MELT' ADHESIVE FILM**

D. J. PROGAR

Mar. 1983

**LAR-12881****Vol. 7, No. 1, P. 106**

Technique for recharging surface with 'hot-melt' film makes use of one sided, high-temperature, pressure-sensitive adhesive tape. Purpose of the one-sided tape is to hold hot-melt charge in place until fused to surface. After adhesive has fused to surface and cooled, tape is removed, leaving adhesive on surface.

**B82-10237****SIMPLIFIED HEAT-SOURCE/THERMIONIC CONVERTER**

K. SHIMADA (CALTECH)

Mar. 1983

**NPO-15278****Vol. 7, No. 1, P. 107**

Radiation coupling of heat from heat-source cylinder to converter cylinder through vacuum gap eliminates need for high-temperature electrical insulators between reactor heat pipes and thermionic converters. In addition no radiator heat pipe is necessary because collectors of thermionic converters from which excess heat must be removed radiate directly to space. New design concept is also applicable to terrestrial and non-nuclear thermionic power supplies.

**B82-10238****ETCHING INTEGRATED CIRCUITS**

B. W. KENNEDY

Mar. 1983 See Also NASA TM-82411 (N81-74978/NSP)

**MFS-25661****Vol. 7, No. 1, P. 108**

20-page report reviews methods available for etching specific layers on wafers and discusses automation techniques and features on one particular automated system. Compares two major etching methods, chemical (wet) and plasma (dry), and discusses areas in need of development. Methods covered include 'dip-and-dunk' manual method of chemical etching, automated chemical etching, and plasma etching.

**B82-10239****TESTS ON DOUBLE LAYER METALIZATION**

D. S. WOO (RCA Corp.)

Mar. 1983

**MFS-25688****Vol. 7, No. 1, P. 108**

28 page report describes experiments in fabrication of integrated circuits with double-layer metalization. Double-layer metalization requires much less silicon 'real estate' and allows more flexibility in placement of circuit elements than does single-layer metalization.

**B82-10331****PROCESS YIELDS STRONG, VOID-FREE LAMINATES**

L. E. BRYANT, E. W. COVINGTON III, W. J. DALE, E. T. HALL JR., J. E. JUSTICE, E. C. TAYLOR, and M. L. WILSON

May 1983

**LAR-12982****Vol. 7, No. 2, P. 203**

Need for lightweight materials as structural components for future space transportation systems stimulated development of systematic method for manufacturing a polyimide/graphite composite. Laminates manufactured by process are void-free, exhibit excellent thermo-oxidative stability up to 315 degrees C (600 degrees F) and are 40 percent lighter than aluminum. Process is precise, repeatable, and ideally suited for researchers and small-lot producers of composite materials.

**B82-10332****FABRICATION OF A PRECISE MICROWAVE REFLECTOR**

J. L. BAUER (CALTECH) and E. W. NOLLER (CALTECH)

May 1983

**NPO-15377****Vol. 7, No. 2, P. 204**

New antenna reflector integrates several fabrication techniques of optical and composite constraining materials. Reflector is composed of machined aluminum reflector tiles attached to graphite/epoxy structure with aluminum flexures.

**B82-10333****CURING OF FURFURYL ALCOHOL-IMPREGNATED PARTS**

J. W. LAWTON (Vought Corp.) and T. H. BRAYDEN (Vought Corp.)

May 1983

**MSC-20224****Vol. 7, No. 2, P. 204**

Delamination problem in reinforced carbon/carbon parts impregnated with oxalic acid-catalyzed furfuryl alcohol overcome by instituting two additional quality-control tests on alcohol and by changing curing conditions.

## 08 FABRICATION TECHNOLOGY

**B82-10334**

### HIGH TEMPERATURE FILLER FOR TILE GAPS

J. W. HOLT (Rockwell International Corp.) and D. S. WANG (Rockwell International Corp.)

May 1983

**MSC-20137** Vol. 7, No. 2, P. 205

Gaps between ceramic tiles filled with ceramic-coated fabric that withstands temperatures as high as 2,000 degrees F (1,300 degrees C). Reusable high-temperature gap filler is made of fabric coated with ceramic slurry and bonded in place with room-temperature-vulcanized adhesive. Procedure used in kilns and furnaces.

**B82-10335**

### PRESSURE ASSIST MAKES COATING MORE RELIABLE

W. A. BERG (Teledyne Microwave)

May 1983

**MSC-20210** Vol. 7, No. 2, P. 206

Applying pressure improves bond between viscous coating and porous surface. Pressurization forces silicone resin into pores of anodized surface. Resin must completely fill pores of anodized surface, or resin flakes off after put in service.

**B82-10336**

### MULTIPLE-PANEL CYLINDRICAL SOLAR CONCENTRATOR

E. M. BROWN (Hughes Aircraft Co.)

May 1983

**NPO-15627** Vol. 7, No. 2, P. 206

Trough composed of many panels concentrates Sun's energy on solar cells, even when trough is not pointed directly at Sun. Tolerates deviation as great as 5 degrees from direction of sun. For terrestrial applications, multiple-flat-plate design offers potential cost reduction and ease of fabrication.

**B82-10337**

### CONDUCTIVE-TAPE SUBSTRATE FOR ELECTROFORMING

M. L. CASSIDENTI (Rockwell International Corp.)

May 1983

**MFS-19715** Vol. 7, No. 2, P. 207

Conductive tape is versatile substrate for electroforming of odd shaped parts. Aluminum-foil tape used as electrical connection between two metal parts.

**B82-10338**

### PLASTIC-SEALED HYBRID POWER CIRCUIT PACKAGE

W. N. MILLER (Rockwell International Corp.) and O. E. GRAY (Rockwell International Corp.)

May 1983

**MSC-20181** Vol. 7, No. 2, P. 208

Proposed design for hybrid high-voltage power-circuit package uses molded plastic for hermetic sealing instead of glass-to-metal seal. New package used to house high-voltage regulators and solid-state switches for applications in aircraft, electric automobiles, industrial equipment, satellites, solarcell arrays, and other equipment in extreme environments.

**B82-10339**

### LOW-COST ELECTRICALLY-HEATED GLASS PANELS

P. J. SHLICHTA and B. A. NERAD

May 1983

**NPO-15753** Vol. 7, No. 2, P. 209

Inexpensive process converts architectural reflective-coated glass into electrically heated panels. Technique utilizes reflective layer as heating element in ordinary glass. Panels have many applications, including automobile windows, home-heating panels, temperature-controlled windows or containers, and food warming trays.

**B82-10340**

### PROCESS SPRAYS UNIFORMS PLASMA COATINGS

H. E. SLINEY, T. P. JACOBSON, G. C. WALTHER (IIT

Research Institute), and H. H. NAKAMURA (IIT Research Institute)

May 1983 See Also NASA CR-3163 (N79-28315/NSP)

**LEW-13237** Vol. 7, No. 2, P. 209

Composite-powder processing procedure developed along with plasma-spray parameters to achieve homogeneous, well-bonded, low-porosity, self-lubricating coatings. Multicomponent plasma coatings are applied without segregation of components.

**B82-10341**

### ACOUSTIC METHODS REMOVE BUBBLES FROM LIQUIDS

E. TRINH (CALTECH), D. D. ELLEMAN (CALTECH), and T. G. WANG (CALTECH)

May 1983

**NPO-15334** Vol. 7, No. 2, P. 210

Two acoustic methods applied to molten glass or other viscous liquids to remove bubbles. Bubbles are either absorbed or brought to surface by applying high-intensity Sonic field at resonant frequency. Sonic oscillation increases surface area of bubbles and causes them to dissipate.

**B82-10342**

### IMPROVED GLOVES FOR FIREFIGHTERS

R. P. TSCHIRCH (Arthur D. Little, Inc.), K. R. SIDMAN (Arthur D. Little, Inc.), and I. J. ARONS (Arthur D. Little, Inc.)

May 1983 See Also NASA CR-167572 (N82-77571/NSP)

**MSC-20261** Vol. 7, No. 2, P. 211

New firefighter's gloves are more flexible and comfortable than previous designs. Since some firefighters prefer gloves made of composite materials while others prefer dip-coated gloves, both types were developed. New gloves also find uses in foundries, steelmills, and other plants where they are substituted for asbestos gloves.

**B82-10343**

### EXPLOSIVE JOINING FOR NUCLEAR-REACTOR REPAIR

L. J. BEMENT and J. W. BAILEY (Kentron International)

May 1983

**LAR-12996** Vol. 7, No. 2, P. 211

In explosive joining technique, adapter flange from fuel channel machined to incorporate a V-notch interface. Ribbon explosive, 1/2 inch (1.3 cm) in width, drives V-notched wall of adapter into bellows assembly, producing atomic-level metallurgical bond. Ribbon charge yields joint with double parent metal strength.

**B82-10344**

### ELECTRICAL CONDUIT DISTRIBUTES WELD GAS EVENLY

D. P. AMBRISCO (Rockwell International Corp.)

May 1983

**MFS-19665** Vol. 7, No. 2, P. 212

Purge-gas distributor, made from flexible electrical conduit by drilling small holes along its length, provides even gas flow for welding. Flexible conduit adjusts to accommodate almost any shape and is used for gas coverage in other applications that previously needed formed and drilled solid tubing.

**B82-10345**

### REPLACEABLE SLEEVE PROTECTS WELDER COIL

W. L. BAKER (General Dynamics Corp.) and C. SIMPSON, E. (General Dynamics Corp.)

May 1983

**MSC-20236** Vol. 7, No. 2, P. 213

New replaceable carbon insert for deflection coil in electron-beam welder promises to decrease maintenance costs. Inserts made from materials other than carbon (not yet tried) are less expensive, thus reducing costs even further. With carbon insert, deflection coils last longer and are easier to maintain.

**B82-10346**

### TRANSPORT AND INSTALLATION OF FIBROUS INSULA-

**TION**

S. BORCK (The Marquardt Co.), F. L. FALCONER (The Marquardt Co.), and R. V. LOUSTAU (The Marquardt Co.)  
May 1983

**MSC-20074** Vol. 7, No. 2, P. 213

Two new techniques simplify transport and installation of oriented-fiber thermal insulation. Other applications involving oriented fibers or loose fillings also utilize methods.

**B82-10347****INGAASP CW LASERS ON (110) INP SUBSTRATES**

F. Z. HAWRYLO (RCA Corp.)

May 1983

**LAR-12840** Vol. 7, No. 2, P. 214

Quality InGaAsP/InP CW laser structures grown by conventional liquidphase epitaxy on (110) InP substrates without using special growth procedures. Improved surface quality and grown-layer morphology are attributable to nearly perfect surface stoichiometry of (110) surface which makes available equal numbers of In and P deposition sites.

**B82-10348****CHEMICAL VAPOR DEPOSITION OF GERMANIUM OF SILICON**

H. AHARONI (CALTECH)

May 1983

**NPO-15565** Vol. 7, No. 2, P. 214

Experimental work shows chemical vapor deposition (CVD) by pyrolysis of gaseous germanium tetrahydride provides epitaxial layers of germanium on silicon. Relatively low temperature of CVD process (500 degrees to 900 degrees C) reduces stresses that occur at layer/substrate interface during growth and cooling.

**B82-10349****CLEFT PROCESS FOR GAAS SOLAR CELLS**

J. C. C. FAN (Massachusetts Institute of Technology), C. O. BOZLER (Massachusetts Institute of Technology), and R. W. MCCLELLAND (Massachusetts Institute of Technology)

May 1983

**LEW-13912** Vol. 7, No. 2, P. 215

CLEFT (cleavage of lateral epitaxial films for transfer) process involves growing ultrathin gallium arsenide (GaAs) solar cell on much thicker layer of same material. Growth method is completed solar cell easily separated by cleaving from much thicker substrate. Thick substrate is reusable in making additional cells, which reduces cell material cost.

**B82-10350****WIPE MELT FOR INP SEED SUBSTRATE**

F. Z. HAWRYLO (RCA Corp.)

May 1983

**LAR-12912** Vol. 7, No. 2, P. 215

Seed substrate pulled under InGaAsP wipe melt at temperature of 650 degrees C for approximately 15 to 60 seconds. After pullthrough and meltback, surface has high smoothness and luster without meniscus lines, exaggerated erosion, pits, and pearls characteristic of other wipe melts. Layer-to-substrate interface structure is more planar and of better quality. New combination of elements leaves smooth high luster surface.

**B82-10351****HIGH-PRODUCTION SILICON-INGOT SLICER**

Y. S. KUO (CALTECH)

May 1983

**NPO-15483** Vol. 7, No. 2, p. 216

New concept for slicing silicon ingots into wafers promises to increase production rates and improve yields of good wafers, thereby reducing cost of manufacturing silicon solar cells. In proposed wafer slicer, stack of ganged blades cuts group of silicon ingots simultaneously. Blades cut horizontally while ingots rotate about their vertical axes.

**B82-10352****GROWING SILICON RIBBON HORIZONTALLY**

J. A. ZOUTENDYK (CALTECH)

May 1983

**NPO-14977** Vol. 7, No. 2, P. 217

Solid ribbon of silicon pulled horizontally over lip of crucible. As heat leaves silicon by radiation, conduction, and convections, surface layer solidifies from liquid. Horizontal growth of ribbon offers several advantages over vertical growth. It is faster--possibly 1 to 2 centimeters per second--and is done without using drawing dies, source of contamination in vertical growth.

**B82-10353****MENISCUS IMAGING FOR CRYSTAL-GROWTH CONTROL**

E. M. SACHS (Mobil Tyco Solar Energy Corp.)

May 1983

**NPO-15349** Vol. 7, No. 2, P. 217

Silicon crystal growth monitored by new video system reduces operator stress and improves conditions for observation and control of growing process. System optics produce greater magnification vertically than horizontally, so entire meniscus and melt is viewed with high resolution in both width and height dimensions.

**B82-10354****PREVENTING FREEZEUP IN SILICON RIBBON GROWTH**

B. MACKINTOSH (Mobil Tyco Solar Energy Corp.)

May 1983

**NPO-15294** Vol. 7, No. 2, P. 218

Carefully-shaped heat conductor helps control thermal gradients crucial to growth of single-crystal silicon sheets for solar cells. Ends of die through which silicon sheet is drawn as ribbon from molten silicon. Profiled heat extractor prevents ribbon ends from solidifying prematurely and breaking.

**B82-10355****VARIABLE-POSITION ACOUSTIC LEVITATION**

M. B. BARMATZ (CALTECH), J. D. STONEBURNER (CALTECH), N. JACOBI (CALTECH), and T. G. WANG (CALTECH)

May 1983

**NPO-15559** Vol. 7, No. 2, P. 219

Method of acoustic levitation supports objects at positions other than acoustic nodes. Acoustic force is varied so it balances gravitational (or other) force, thereby maintaining object at any position within equilibrium range. Levitation method applicable to containerless processing. Such objects as table-tennis balls, hollow plastic spheres, and balsa-wood spheres levitated in laboratory by new method.

**B82-10356****CONTROLLING THE ROTATION OF LEVITATED SAMPLES**

M. B. BARMATZ (CALTECH)

May 1983

**NPO-15522** Vol. 7, No. 2, P. 220

In proposed acoustic levitation system, separate excitation of different acoustic modes independently levitate and control rotation of sample. Three independent axes of rotation are available, leading to rotation of levitated object about any other selected axis.

**B82-10357****REPAIRING LOOSE CONNECTOR PINS**

W. T. DEAN III (Rockwell International Corp.) and E. J. STRINGER (Rockwell International Corp.)

May 1983

**MSC-20374** Vol. 7, No. 2, P. 221

In repair procedure, hypodermic needle applies epoxy adhesive in and behind cavity containing damaged locking finger. Damaged connector does not have to be demated or removed from harness to apply epoxy.

## 08 FABRICATION TECHNOLOGY

**B82-10358**

**JIG QUICKLY CHECKS CONNECTOR PIN ALINEMENT**  
W. M. HALL (Hughes Aircraft Co.) and T. P. PAPAC (Hughes Aircraft Co.)  
Jun. 1983

**MSC-20237**

**Vol. 7, No. 2, P. 222**

Test jig checks whether pins of connector are within location tolerance. Jig greatly reduces test time. Machined slots on opposite faces of plate form matrix of rectangular windows at intersections. If connector pin is out of alignment, it makes electrical contact with side of window, triggering indicator.

**B82-10359**

**ELECTROFORMING FOR HIGH-PERFORMANCE PRODUCTS**

G. A. MALONE (Bell Aerospace Co.)

May 1983

**LEW-12719**

**Vol. 7, No. 2, No. 222**

Report describes development of processes and procedures for preparation of specifications for electroforming nickel and copper outer shells on cooled rocket thrust-chamber liners. Specifications represent merging of technical contributions from many sources into guide for producers of electroformed, high-performance products. Raw materials, conducting solutions and deposition rates are evaluated.

**B82-10360**

**HEAT FLOW IN HORIZONTAL RIBBON GROWTH**

J. A. ZONTENDYK (CALTECH)

May 1983

**NPO-14979**

**Vol. 7, No. 2, P. 223**

Recent theoretical study reveals some important effects of heat flow in horizontal ribbon growth. Particular attention is paid to heat flow due to laminar convection current in melt induced by horizontal motion of ribbon-shaped semiconductor crystal being pulled from melt. Analysis focuses on conditions required for stable growth.

**B82-10361**

**IMPROVING SURFACE STRENGTH OF INSULATING TILES**

J. W. HOLT (Rockwell International Corp.) and L. W. SMISER (Rockwell International Corp.)

May 1983

**MSC-20063**

**Vol. 7, No. 2, P. 223**

Procedure for improving tile resistance to impact damage described in new report on tile densification. Developed for Space Shuttle reusable surface insulations, procedure has potential application when space restrictions necessitate thin layers of insulation with low thermal conductivity. Examples are advanced heat engines, such as adiabatic diesel and automotive gas turbine, as well as fast-heating high-temperature ovens.

**B82-10362**

**STANDARD TRANSISTOR ARRAYS**

G. W. COX (Auburn University), B. D. CARROLL (Auburn University), E. R. PITTS (M & S Computing), and R. A. WRIGHT (M & S Computing)

May 1983

**MFS-25327**

**Vol. 7, No. 2, P. 224**

Standard Transistor Array (STAR) design system is semicustom approach to generating random-logic integrated MOS digital circuits. Primary program in STAR system is CAPSTAR, STAR Cell Arrangement Program. CAPSTAR is augmented by automatic routing program, Display program and library of logic cells.

**B82-10363**

**TILE-FAILURE ANALYSIS**

E. A. OHERN (Rockwell International Corp.) and K. E. RYAN (Rockwell International Corp.)

May 1983

**MSC-20139**

**Vol. 7, No. 2, P. 224**

Tile Failure Probability Model (TFPM) program originally

developed to quantitatively assess risk of tile loss of thermal-protection tile from Space Shuttle Orbiter. TFPM is fairly specific to orbiter, but basic technique is applied in other structural design situations where anticipated loads and material strength have significantly variable probability distributions.

## 09 MATHEMATICS AND INFORMATION SCIENCES

**B82-10117**

**OPERATIONS PROGRAM EXECUTIVE**

M. A. FAGUE (Computer Sciences Corp.)

Dec. 1982

**MFS-25628**

**Vol. 6, No. 4, P. 473**

Ground Resource Operations Program executive (GROPE) is control program for binding system of programs into single, easily operated entity. It relieves user from complexity arising from decomposition of large application into number of interacting program units. System simplifies job control, data management, and recordkeeping for interacting programs.

**B82-10118**

**DISPLAYING GEOGRAPHICALLY-BASED DOMESTIC STATISTICS**

J. QUANN, J. DALTON, M. BANKS, D. HELFER, M. SZCZUR, G. WINKERT, J. BILLINGSLEY (Executive Office of the President), R. BÖRGSTEDE (Bureau of the Census), J. CHEN (General Software Corp.), L. CHEN (General Software Corp.) et al

Dec. 1982

**GSC-12747**

**Vol. 6, No. 4, P. 473**

Decision Information Display System (DIDS) is rapid-response information-retrieval and color-graphics display system. DIDS transforms tables of geographically-based domestic statistics (such as population or unemployment by county, energy usage by county, or air-quality figures) into high-resolution, color-coded maps on television display screen.

**B82-10119**

**ATMOSPHERIC CORRECTION FOR REMOTE SENSOR DATA**

R. E. TURNER (Environmental Research Institute of Michigan)

Dec. 1982

**LEW-13344**

**Vol. 6, No. 4, P. 474**

Mathematical model based on radiative transfer theory as applied to plane parallel, horizontally spatially homogeneous, isotropic atmosphere. Model includes effects of multiple scattering by gases and aerosols, and effects of absorption by ozone in near ultraviolet and visible parts of spectrum.

**B82-10120**

**PROJECT PLANNING AND REPORTING**

Innovator Not Given (Schedule Analysis and Control Office of Langley Research Center) Dec. 1982

**LAR-12919**

**Vol. 6, No. 4, P. 474**

Project Planning Analysis and Reporting System (PPARS) is automated aid in monitoring and scheduling of activities within project. PPARS system consists of PPARS Batch Program, five preprocessor programs, and two post-processor programs. PPARS Batch program is full CPM (Critical Path Method) scheduling program with resource capabilities. Can process networks with up to 10,000 activities.

**B82-10121****DATA-RETRIEVAL SYSTEM**

P. R. LAWRENCE (Planning Research Corp.)

Dec. 1982

**HQN-10921****Vol. 6, No. 4, P. 475**

NASA Graphics and Display System (NGDS) helps solve problem of data retrieval for management. Since NGDS is interactive online system, user controls display content and format, and has capability of always working with latest version of his data.

**B82-10122****ONSITE MEASUREMENT OF ALL-DAY EFFICIENCY**

Innovator Not Given (Office of University Affairs of NASA Headquarters) Dec. 1982

**HQN-10889****Vol. 6, No. 4, P. 475**

Special Report Writer (SRR) accepts input submitted by user, accesses sequential data base, and produces desired special report. Program is batch-oriented information-retrieval system that performs multiple correlations on files containing several data hierarchies. Report requests are specified in simple notation, readily learned by people without extensive backgrounds in data processing.

**B82-10123****OUT-OF-CORE SOLUTIONS OF COMPLEX SPARSE LINEAR EQUATIONS**

E. L. YIP (The Boeing Co.)

Dec. 1982

**LAR-12874****Vol. 6, No. 4, P. 476**

ETCLIB is library of subroutines for obtaining out-of-core solutions of complex sparse linear equations. Routines apply to dense and sparse matrices too large to be stored in core. Useful for solving any set of linear equations, but particularly useful in cases where coefficient matrix has no special properties that guarantee convergence with any of iterative processes. The only assumption made is that coefficient matrix is not singular.

**B82-10124****FORTRAN STATIC SOURCE CODE ANALYZER**

P. MERWARTH

Dec. 1982

**GSC-12693****Vol. 6, No. 4, P. 476**

FORTRAN Static Source Code Analyzer program (SAP) automatically gathers and reports statistics on occurrences of statements and structures within FORTRAN program. Provisions are made for weighting each statistic, providing user with overall figure of complexity. Statistics, as well as figures of complexity, are gathered on module-by-module basis. Overall summed statistics are accumulated for complete input source file.

**B82-10240****CONSISTENT TOLERANCE BOUNDS FOR STATISTICAL DISTRIBUTIONS**

M. A. MEZZACAPPA (Rockwell International Corp.)

Mar. 1983

**MSC-20090****Vol. 7, No. 1, P. 111**

Assumption that sample comes from population with particular distribution is made with confidence C if data lie between certain bounds. These 'confidence bounds' depend on C and assumption about distribution of sampling errors around regression line. Graphical test criteria using tolerance bounds are applied in industry where statistical analysis influences product development and use. Applied to evaluate equipment life.

**B82-10241****COMPUTING GRAPHICAL CONFIDENCE BOUNDS**

M. A. MEZZACAPPA (Rockwell International Corp.)

Mar. 1983

**MSC-18908****Vol. 7, No. 1, P. 112**

Approximation for graphical confidence bounds is simple enough to run on programmable calculator. Approximation is used in lieu of numerical tables not always available,

and exact calculations, which often require rather sizable computer resources. Approximation verified for collection of up to 50 data points. Method used to analyze tile-strength data on Space Shuttle thermal-protection system.

**B82-10242****FORMULAS FOR PRECISE TRANSVERSE MERCATOR PROJECTION**

D. E. WALLIS (CALTECH)

Mar. 1983

**NPO-15409****Vol. 7, No. 1, P. 113**

Transverse mercator projection, surface of Earth or other spheroid is mapped onto cylinder tangent at meridian of longitude. New method performs mapping by means of mathematical series in which higher order terms correct for deviation from exact sphericity. New method yields precise geodetic maps.

**B82-10243****SIMPLIFIED LIFE-CYCLE COST ESTIMATION**

D. S. REMER (CALTECH), G. LORDEN (CALTECH), and I. EISENBERGER (CALTECH)

Mar. 1983

**NPO-15228****Vol. 7, No. 1, P. 113**

Simple method for life-cycle cost (LCC) estimation avoids pitfalls inherent in formulations requiring separate estimates of inflation and interest rates. Method depends for validity observation that interest and inflation rates closely track each other.

**B82-10244****INTERACTIVE PLANNING SYSTEM**

D. A. NIPPERT (Battelle Memorial Institute), T. H. BEERMAN (Battelle Memorial Institute), and J. L. PITTINGER (Battelle Memorial Institute)

Mar. 1983

**HQN-10920****Vol. 7, No. 1, P. 114**

NASA Interactive Planning System (NIPS) assists program-planning groups at NASA Headquarters in developing long-range plans for total space effort. Functions involve meeting goals and objectives within time, budget, and resource-management and allocation problem.

**B82-10245****MANPOWER ALLOCATION AND REPORTING**

P. D. MERWARTH

Mar. 1983

**GSC-12708****Vol. 7, No. 1, P. 115**

Interactive Manpower Allocation and Reporting System (MARS) helps planners make manpower allocation decisions. Includes provisions to enter overall constraints for projects and persons, assign individuals to projects, compute automatically overhead category, report on deviations from constraints, and generate manpower resource allocation reports.

**B82-10246****SOFTWARE-ENGINEERING DATA-BASE SYSTEM**

D. N. CARD (Computer Sciences Corp.)

Mar. 1983

**GSC-12669****Vol. 7, No. 1, P. 115**

Software Engineering Laboratory Data Base Maintenance System (SEL/DBAM) collects and maintains data base for evaluating software-development methodologies. SEL/DBAM provides interactive facilities for management of data collected by Software Engineering Laboratory at Goddard Space Flight Center.

**B82-10247****PATH PASCAL**

R. H. CAMPBELL (University of Illinois at Urbana-Champaign), R. B. KOLSTAD (University of Illinois at Urbana-Champaign), D. F. HOLLE (University of Illinois at Urbana-Champaign), T. J. MILLER (University of Illinois at Urbana-Champaign), P. KRAUSE (University of Illinois at Urbana-Champaign), K. HORTON (University of Illinois at

## 09 MATHEMATICS AND INFORMATION SCIENCES

Urbana-Champaign), and T. MACKE (University of Illinois at Urbana-Champaign)

Mar. 1983

**LAR-12854**

**Vol. 7, No. 1, P. 115**

Path Pascal is high-level experimental programming language based on PASCAL, which incorporates extensions for systems and real-time programming. Pascal is extended to treat real-time concurrent systems.

**B82-10248**

**STABILITY STATISTICS DATA BASE SYSTEM**

G. Y. KWOK (Computer Science Corp.) and A. DOMINGUES (Computer Science Corp.)

Mar. 1983

**MSC-20014**

**Vol. 7, No. 1, P. 116**

Stability Statistics Data Base System is written entirely in FORTRAN and does not require use of outside data-management routines. Is used with directly-accessible data base containing simple card images. Four FORTRAN modules implement edit, sort, report-generation, and other functions.

**B82-10364**

**DOCUMENT UPDATE AND COMPARE**

C. F. KNOCH (Rockwell International Corp.), D. C. CALDWELL (Rockwell International Corp.), and D. L. CALDWELL (Rockwell International Corp.)

May 1983

**MSC-20349**

**Vol. 7, No. 2, P. 227**

Document Update and Compare programs provide simple computerized document maintenance system on Data General NOVA 840 computer. Document Update program allows user to update document either by batch or terminal input. Documents are modified and lists of modifications printed out.

**B82-10365**

**TEXT FILE COMPARATOR**

R. S. KOTLER (Intermetrics, Inc.)

May 1983

**MSC-20276**

**Vol. 7, No. 2, P. 227**

File Comparator program IFCOMP, is text file comparator for IBM OS/VScmpatible systems. IFCOMP accepts as input two text files and produces listing of differences in pseudo-update form. IFCOMP is very useful in monitoring changes made to software at the source code level.

**B82-10366**

**CONFIGURATION ANALYSIS TOOL**

P. D. MERWARTH

May 1983

**GSC-12710**

**Vol. 7, No. 2, P. 227**

Configuration Analysis Tool (CAT), is information storage and report generation system for aid of configuration management activities. Configuration management is discipline composed of many techniques selected to track and direct evolution of complex systems. CAT is interactive program that accepts, organizes and stores information pertinent to specific phases of project.

**B82-10367**

**SOFTWARE REPOSITORY**

P. MERWARTH, D.

May 1983

**GSC-12735**

**Vol. 7, No. 2, P. 228**

The Common Software Module Repository (CSMR) is computerized library system with high product and service visibility to potential users. Online capabilities of system allow both librarian and user to interact with library. Librarian is responsible for maintaining information in CSMR library. User searches library to locate software modules that meet his or her current needs.

**B82-10368**

**RESOURCE ESCALATION AND COST ANALYSIS**

D. A. WOOD

May 1983

**LAR-13018**

**Vol. 7, No. 2, P. 228**

Resource Escalation and Cost Analysis Program (RE-CAP) is cost compilation program for any project organized in work breakdown structure (WBS) format. In WBS at the high level includes those activities at lower level, so each activity at high level includes those activities at lower level. Permits the organization of activities into classes and subclasses.

**B82-10369**

**DRIVER FOR DISSPLA PLOTTER**

M. L. BALDWIN (McDonnell Douglas Corp.)

May 1983

**MSC-20290**

**Vol. 7, No. 2, P. 228**

DISPLOT is generalized outside driver for commercially-available DISSPLA (Display Integrated Software System and Plotting Language) plotting system. DISPLOT program provides user with simple-to-use graphics capability with great deal of application flexibility. DISPLOT is independent of whatever program generates data to be plotted. DISPLOT is used for generation of plotter microfilm, microfiche, and terminal plots.

**B82-10370**

**NAMELIST PREPROCESSOR**

D. S. CWYNAR

May 1983

**LEW-13530**

**Vol. 7, No. 2, P. 229**

INFORM program designed to aid assembly language programmers of SEL 810B computers in working with scaled-integer applications. INFORM was developed to meet needs of engineers designing real-time digital controls using SEL 810B where time and hardware constraints make use of integer arithmetic and scaled integers necessary. Package includes auxiliary routines that add dynamic data acquisition and high-speed dynamic display to INFORM capabilities.

**B82-10371**

**NAMELIST PREPROCESSOR**

P. D. MERWARTH

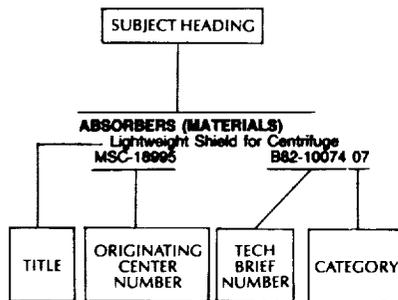
May 1983

**GSC-12704**

**Vol. 7, No. 2, P. 229**

FORTRAN code modified for use with F4P compiler. NAMELIST provides FORTRAN programmer with additional, flexible input and output capabilities. Feature is particularly useful in area of data input because NAMELIST data are input in form of variable symbolic name being set equal to constant value, similar to standard FORTRAN statement. Allows user to review input data readily and relieves user from having to place data in certain columns and formats as required in formatted READ statements.

**Typical Subject Index Listing**



The title of each Tech Brief is listed under several selected subject headings to provide the user with a variety of approaches in his search for specific information. The Tech Brief number, e.g., B82-10074, is located under and to the right of the title and is followed by a two-digit number, e.g., 07, which designates the subject category in which the entire entry can be found.

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 NPO-15577 B82-10268 03

**RADIO FREQUENCIES**  
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 LAR-12903 B82-10250 01

**RADIO FREQUENCY INTERFERENCE**  
 Shuttle Communications Blackout Study  
 MSC-20141 B82-10264 01

**RADIO METEORS**  
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**RADIO TELEMETRY**  
 Using SAW Resonators in RF Oscillators  
 ARC-11390 B82-10253 01

**RADIOCHEMISTRY**  
 Sodium Spray Would Speed Silicon Production  
 NPO-15246 B82-10284 04

**RADIOMETERS**  
 Radiometer Noise-Injection Control  
 LAR-12905 B82-10012 02  
 Portable Radiometer Identifies Minerals in the Field  
 NPO-15234 B82-10050 06  
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**RAIL TRANSPORTATION**  
 A Closer Look at Track/Train Dynamics  
 MFS-25696 B82-10063 06  
 Dynamic Analysis of Six-Axle Locomotives  
 MFS-25710 B82-10067 06

**RANGE AND RANGE RATE TRACKING**  
 Video Target Tracking and Ranging System  
 MSC-20098 B82-10258 02

**RECORDING INSTRUMENTS**  
 Event Recorder Scans 2,048 Channels  
 MFS-19609 B82-10008 02  
 Compact, Rugged Temperature Recorded  
 ARC-11304 B82-10140 02

**RECORDS**  
 Document Update and Compare  
 MSC-20349 B82-10364 09

**RECOVERY PARACHUTES**  
 Parachute Line Hook Includes Integral Loop Expander  
 LAR-12875 B82-10320 07

**RECRYSTALLIZATION**  
 Recrystallizing Short Lengths of Silicon Ribbon  
 NPO-14916 B82-10109 08  
 Chemical Vapor Deposition of Germanium of Silicon  
 NPO-15565 B82-10348 08

**REDUCED GRAVITY**  
 Processing Materials in Space  
 MFS-25667 B82-10044 04

**REDUCTION (CHEMISTRY)**  
 Processor Generates and Extracts Silicon  
 NPO-15582 B82-10283 04  
 Two-Temperature-Zone Silicon Reactor  
 NPO-15368 B82-10285 04

**REENTRY COMMUNICATION**  
 Shuttle Communications Blackout Study  
 MSC-20141 B82-10264 01

**REFERENCE ATMOSPHERES**  
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 NPO-15007 B82-10052 06

**REFINING**  
 Eliminating Impurity Traps in the Silane Process  
 NPO-15217 B82-10026 04  
 Improved Supercritical-Solvent Extraction of Coal  
 NPO-15210 B82-10036 04

**REFLECTANCE**  
 Portable Radiometer Identifies Minerals in the Field  
 NPO-15234 B82-10050 06  
 Cube-Corner Retroreflector Modeling  
 GSC-12718 B82-10151 03  
 Low-Cost Electrically-Heated Glass Panels  
 NPO-15753 B82-10339 08

**REFLECTORS**  
 Reflective-Shield Radiative Cooler  
 NPO-15465 B82-10056 06  
 Deployable Reflector for Solar Cells  
 NPO-15027 B82-10091 07  
 Stowable Rigid Reflector  
 NPO-15253 B82-10093 08  
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 NPO-15427 B82-10095 08

**REFRACTORY MATERIALS**  
 Improved Ceramic for Heat Exchangers  
 LEW-13068 B82-10041 04  
 Lightweight Thermal-Protection System  
 LAR-12880 B82-10175 06  
 Ceramic-Cord Gas Seal  
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**REFRIGERATING MACHINERY**  
 Magnetic Bearings Would Increase Pump Efficiency  
 GSC-12668 B82-10202 07

**REGRESSION ANALYSIS**  
 Consistent Tolerance Bounds for Statistical Distributions  
 MSC-20090 B82-10240 09  
 Computing Graphical Confidence Bounds  
 MSC-18908 B82-10241 09

**REINFORCED PLASTICS**  
 A Solvent-Resistant, Thermoplastic Poly(imidesulfone)  
 LAR-12858 B82-10279 04

**REINFORCEMENT (STRUCTURES)**  
 'Sandwich' Stiffener for Composite Structural Panels  
 LAR-12807 B82-10106 08  
 High Temperature Filler for Tile Gaps  
 MSC-20137 B82-10334 08

**REINFORCING FIBERS**  
 Thermoset/Thermoplastic Aromatic Polyamides for Composites  
 LAR-12723 B82-10164 04

**RELIABILITY**  
 Parallel Connections Would Improve Array Reliability  
 NPO-15310 B82-10005 01

**RELIEF VALVES**  
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 LEW-13800 B82-10207 07

**REMOTE CONTROL**  
 Miniature Two-Axis Joystick Controller  
 ARC-11372 B82-10204 07  
 Phase-Sensing Guidance for Wire-Following Vehicles  
 NPO-15341 B82-10260 02

**REMOTE HANDLING**  
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 MSC-20208 B82-10185 06

**REMOTE SENSORS**  
 Atmospheric Correction for Remote Sensor Data  
 LEW-13344 B82-10119 09

**REPORT GENERATORS**  
 Project Planning and Reporting  
 LAR-12919 B82-10120 09  
 Onsite Measurement of All-Day Efficiency  
 HQN-10889 B82-10122 09  
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 MSC-20139 B82-10363 08  
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 MSC-20276 B82-10365 09  
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 GSC-12710 B82-10366 09

**REPORTS**  
 Manpower Allocation and Reporting  
 GSC-12708 B82-10245 09

**RESCUE OPERATIONS**  
 Tubing Cutter is Activated Hydraulically  
 LAR-12786 B82-10328 07

**RESIN BONDING**  
 Pressure Assist Makes Coating More Reliable  
 MSC-20210 B82-10335 08

**RESIN MATRIX COMPOSITES**  
 High-Performance Matrix Resins  
 LEW-13864 B82-10280 04

**RESINS**  
 Fabricating Thin-Film High-Temperature Thermoset Resins  
 LAR-12869 B82-10094 08

**RESISTANCE HEATING**  
 Low-Cost Electrically-Heated Glass Panels  
 NPO-15753 B82-10339 08

**RESONATORS**  
 Using SAW Resonators in RF Oscillators  
 ARC-11390 B82-10253 01

**RESOURCE ALLOCATION**  
 Interactive Planning System  
 HQN-10920 B82-10244 09  
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**RESOURCES MANAGEMENT**

Resource Escalation and Cost Analysis  
LAR-13018 B82-10368 09

**RETROREFLECTION**

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GSC-12718 B82-10151 03

**RIGID STRUCTURES**

'Sandwich' Stiffener for Composite Structural Panels  
LAR-12807 B82-10106 08

**RIVETS**

Oxidation-Strengthened rivets  
MSC-20095 B82-10035 04

**ROBOTS**

Robot End Effector To Place and Solder Solar Cells  
NPO-15490 B82-10099 08  
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NPO-15489 B82-10100 08

**ROCKET ENGINES**

Heat Pipes Cool Power Magnetics  
LEW-13507 B82-10182 06

**ROCKS**

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NPO-15309 B82-10184 06

**ROTATING BODIES**

Preventing Cracks in Titanium Rotary Seals  
MFS-19686 B82-10203 07  
Tangleproof Rotary Electrical Coupling  
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**ROTATING SHAFTS**

Flexible Coupling Corrects Shaft Misalignments  
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**ROTORS**

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MSC-18995 B82-10074 07  
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**RUBBER**

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**SAFETY FACTORS**

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LAR-12880 B82-10175 06

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Scanning Seismic Intrusion Detector  
ARC-11317 B82-10009 02

**SCHOTTKY DIODES**

Integrated Submillimeter-Wave Mixer  
NPO-15238 B82-10130 01

**SCRAP**

Modified Reamer Removes Chips and Contaminants  
MFS-19711 B82-10211 07

**SCREWS**

Tool Preloads Screw and Applies Locknut  
MSC-18791 B82-10082 07  
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**SEALING**

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KSC-11217 B82-10076 07

**SEALS (STOPPERS)**

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MSC-20148 B82-10326 07

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**SELF ERECTING DEVICES**

Large, Easily Deployable Structures  
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**SEMICONDUCTOR DEVICES**

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**SEMICONDUCTOR LASERS**

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**SEPARATORS**

Electrolyte Reservoir Would Lengthen Cell Life  
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**SERVOMOTORS**

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**SHEAR PROPERTIES**

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ARC-11395 B82-10060 06  
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**SILICIDES**

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**SILICON**

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NPO-15483 B82-10351 08  
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MSC-20137 B82-10334 08

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NPO-15292 B82-10178 06

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Extracting Silicon From Sodium-Process Products  
NPO-15260 B82-10028 04  
Producing Cryolite From Waste Sodium Fluoride  
NPO-15258 B82-10029 04  
Producing High-Purity Silicon With Sodium  
NPO-15381 B82-10030 04  
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NPO-15259 B82-10031 04

**SOIL MAPPING**

High-Resolution Subsurface-Interface Radar  
KSC-11212 B82-10141 02

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NPO-15025 B82-10032 04  
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NPO-15490 B82-10099 08  
System To Prepare Solar Cells for Assembly  
NPO-15489 B82-10100 08  
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High-Efficiency Solar Cells on Low-Cost Substrates  
NPO-15039 B82-10102 08  
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Precipitating Chromium Impurities in Silicon Wafers  
NPO-15179 B82-10107 08  
Solar Cells From Metallurgical-Grade Silicon  
NPO-15042 B82-10111 08  
Annular Electrode Improves Solar-Cell Welds  
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NPO-15358 B82-10132 01  
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NPO-14971 B82-10154 04  
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NPO-15109 B82-10161 04  
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NPO-15311 B82-10213 08  
Gettering Silicon Wafers with Phosphorus  
NPO-15357 B82-10218 08  
Silicon Sheet Quality is Improved By Meniscus Control  
NPO-15384 B82-10219 08  
Technique for Crystal-Ribbon Growth  
NPO-15177 B82-10220 08  
Asymmetric Die Grows Purer Silicon Ribbon  
NPO-15385 B82-10221 08  
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- CLEFT Process for GaAs Solar Cells  
LEW-13912 B82-10349 08  
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MFS-25797 B82-10170 04  
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MFS-25686 B82-10017 03  
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Portable Radiometer Identifies Minerals in the Field  
NPO-15234 B82-10050 06
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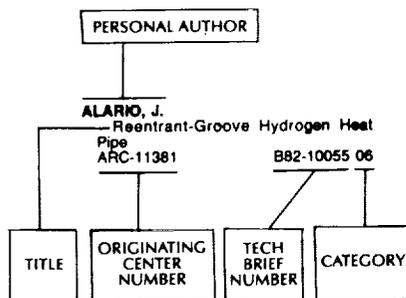
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**JOHNSON, J. L.**  
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**KALFAYAN, S. H.**  
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**KIRKLAND, J. M.**  
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**KLEIDON, E. H.**  
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**KNOCH, C. F.**  
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**KOBAYASHI, H. S.**  
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**LANE, R. L.**  
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**LAWLER, W. F.**  
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- MADHUKAR, A.**  
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- MCCREEGHT, L. R.**  
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**MCLLWAIN, M. C.**  
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**MCLYMAN, C. W.**  
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**MCLYMAN, C. W. T.**  
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**MCWITHEY, R. R.**  
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**MERWARTH, P. D.**  
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**MINER, R. V.**  
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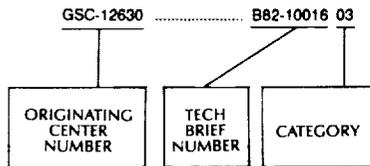
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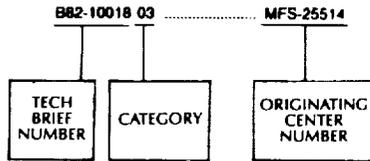
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