Component Data Base for Space Station Resistojet Auxiliary Propulsion

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ABSTRACT

The resistojet has been baselined for Space Station auxiliary propulsion because of its operational versatility, efficiency, and durability. This report was conceived as a guide to designers and planners of the Space Station auxiliary propulsion system. It is directed to the low thrust resistojet concept, though it should have application to other station concepts or systems such as the Environmental Control and Life Support System (ECLSS), Manufacturing and Technology Laboratory (MTL), and the Waste Fluid Management System (WFMS). The report will likely be quite useful in the same capacity for other non Space Station systems including satellites, freeflyers, explorers, and maneuvering vehicles.

This report is a catalog of the most useful information for the most significant feed system components and is organized for the greatest convenience of the user.

INTRODUCTION

In August 1986 the resistojet was baselined for Space Station auxiliary propulsion. Propellant strategies and system designs have not been resolved. However, multipropellant capability has been baselined for the resistojets. This is predicated on the use of station waste fluids as propellants, simultaneously eliminating certain waste fluid management problems and resupply requirements. The field of options is open to a wide variety of gaseous and liquid propellants and propellant handling strategies. Propellant selection has been tentatively narrowed to: inert gases, carbon dioxide, nitrogen, hydrogen, oxygen, water, and hydrazine. Some of these propellants have unique characteristics and applications that make them attractive candidates for Space Station auxiliary propulsion. Others are waste products from other systems onboard or on orbit with the Space Station. Table I shows the annual waste gas production for a Bosch ECLSS, Table II shows the same for a Sabatier ECLSS. It is not expected that the exclusive use of waste products will be sufficient to meet the total impulse requirements of orbit maintenance. Therefore some propellant resupply for the exclusive use in the resistojets may be necessary if the main and auxiliary propulsion systems are to use different propellants.

Source strategies will be a major influencing factor in the selection of that propellant. The base propellant for auxiliary propulsion may be scavenged from other systems on the station. Hydrogen and/or oxygen may be derived from main propulsion storage, electrolysis of water or from Orbital Transfer Vehicle (OTV) tank farm boiloff. Nitrogen could be drawn from the ECLSS or be shared from an onboard pressurization system. CO₂ will be recovered from the ECLSS as a waste product of the breathing air recycling process. Methane may be recovered with the CO₂ depending on whether the Sabatier or the Bosch process is used. Water may be scavenged from the ECLSS as well though not necessarily as a waste product. Inert gases, such as argon, helium, xenon, and krypton would be recovered from the MTL as waste products, along with Freon and potentially any of the other above listed propellants excluding hydrazine. Recovering and using propellants that might otherwise be waste...
products with handling problems would provide the advantage of operational cost savings.

Hydrazine has the advantage of low volume storage and broad experience base. Nitrogen's largest advantage is its handling safety. Since nitrogen is the major component in breathing air, a nitrogen system could be at least partially routed through a crew compartment, allowing easy access for maintenance or repair, without immediate concern for contamination due to leakage. Because the prior mentioned waste fluids, and potentially others not mentioned or yet identified, will likely be recovered from the ECLSS, MTL, and WIMS sections, a system will have to be developed for multipropellant operation. Matching components to multipropellant systems could be a challenge to the designer, particularly in the area of seat/seal material compatibility.

In order to reduce development cost and time it is desirable to reutilize existing component technology wherever possible. There is a significant number of components with space flight heritage. Enough of these components may have application to Space Station in their current design configuration or with minor modification to warrant a study resulting in compilation of all such available information.

The major components that apply to the Space Station auxiliary propulsion feed system include: connectors, tanks and accumulators, service valves, filters, pumps and compressors, pressure switches, check valves, pressure and temperature transducers, relief valves, pressure regulators, line and isolation valves, heaters, and gas generators. Fig. 1 compares the simplified propellant feed systems and their components. These are the components that will be cataloged in this report.

This report is intended to serve as a starting point for auxiliary propulsion design, trade studies, cost estimating, and planning. It is designed to contain as much data as possible for the purposes mentioned without being superfluous. The information contained herein was derived from many sources including: manufacturer's specifications and drawings, technical papers, and other data bases. Naturally, there are voids in the data provided. This was unavoidable as some data was not readily available during the preparation of this report. A disproportionately larger amount of effort would have been necessary to fill in all of the voids. It is up to the user to determine if, based on the data provided, further investigation is warranted to uncover additional data as required.

The information contained herein is organized into three sections for the sake of user indexing. The first is a list of the manufacturers covered in the catalog with last known address, phone, and contact for each. The second section is a fast index by component type including: feature specification, part number, manufacturer, and a cross reference to the next section. In this section, the difference between psia and psig is not always addressed because some data in certain categories was simply noted as psi. In such instances the gage and absolute notations are ignored and all pressures are noted as psi. The relative positions of these components in the index is correct to within one atm. The third and final section, the Component Data
Catalog section (pp. 55-381), is included as a microfiche supplement in an envelope stapled to the inside back cover of this report. Components within each type category are organized in 1) alphabetical order by the manufacturer, 2) in alphanumerical order by part number. In this section all available pertinent data for each component category is organized into data formats. Blank copies of these formats are given in the Component Data Sample Format section. The catalog section of this report is designed to be periodically updated. Contributors should use the blank formats to organize information to be changed, included or deleted. This information should be forwarded to Dan Briehl, Mail Stop 500-221, National Aeronautics and Space Administration, Lewis Research Center, 21000 Brookpark Road, Cleveland, Ohio 44135

In order to limit the field of coverage in the common component categories, general parameters have been defined for both gas and liquid feed systems, as follows: maximum system pressure - 6000 psi, maximum tank volume - 50,000 cubic inches, and minimum valve cycle life - 100. However, when regarding those components for which data is scarce, these parameters may be ignored. This allows the user a look at components that may at least be closely related to the components required. Further, some components that may have special applications will be included even though they do not conform to all of the parameters as defined. An example of this is the pyrotechnic valve with no cycle life. This valve could prove necessary in an emergency venting system. Component cost should be a significant factor in component selection, but because cost data has proved to be largely unavailable and cost restrictions are not yet defined; the catalog will not be limited by cost data.

There are other aspects to Space Station auxiliary propulsion system design to be considered when selecting components. The projected on-orbit life of the station is at least ten years. Components capable of a ten year service life would be logical candidates. The majority of the components qualified in space have not demonstrated a ten year service life with the throughputs projected for Space Station. To account for this, maintainability and redundancy become necessary considerations. The Space Station will be manned. Crew safety and therefore component safety and reliability are important considerations. The overall effort to develop, fabricate, and launch the Space Station will be costly. Component qualifications, cost, and weight are the balance of the important considerations. Unfortunately, at the time of writing, certain forms of component data were not readily available. Cost and reliability data will, in most instances, have to be acquired by the user of this document.

It will be desirable to reuse existing technology whenever possible to reduce development time and cost requirements in the development of the auxiliary propulsion system for Space Station. There are many qualified or qualifiable components available for consideration. This catalog should provide the propulsion system designer with a useful reference source to aid in design decisions.
ABBREVIATIONS AND ACRONYMS

abs - absolute

APS - auxiliary propulsion system

APU - auxiliary power unit

ARPCS - atmospheric revitalization & pressure control system

ASME - American Society of Mechanical Engineers

atm - atmosphere

BC - bolt circle

bhp - brake horsepower

C_D - discharge coefficient

CRES - corrosion resistant steel (includes stainless steel)

DI - deionized

ECLSS - environmental control & life support systems

ECS - environmental control system

EPR - ethylene propylene rubber

est - estimated

EQ SP - equally spaced

FEOD - flow equivalent orifice diameter

FS - full scale

G - gaseous

GPM - gallons per minute

HYD - hydraulic

i.d. - inner diameter

IOC - initial operational capability

L - liquid
lbf - pounds force
lbm - pounds mass
IH - left hand
LOA - length overall
LOX - liquid oxygen
LPM - liters per minute
max. - maximum
min. - minimum
MMH - monomethylhydrazine
MPS - main propulsion system
MTL - Manufacturing & Technology Laboratory
N.C. - normally closed
N.O. - normally open
nom. - nominal
NTO - nitrogen tetroxide
o.d. - outer diameter
OP - operational
PL - places
psi - pounds per square inch
psia - pounds per square inch, absolute
psid - pounds per square inch, differential
psig - pounds per square inch, gauge
RCS - reaction control system
RH - right hand
SCCH - standard cubic centimeters per hour
SCCM - standard cubic centimeters per minute
SCCS - standard cubic centimeters per second
SCFM - standard cubic feet per minute
Sh - sheet
SPDT - single pole double throw
SRB - solid rocket booster
std - standard
TBO - time before overhaul
TFE - tetrafluoroethylene (generic for Teflon)
UDMH - unsymmetrical dimethylhydrazine
WFMS - waste fluid management system
w/ - with
w/o - without
LIST OF MANUFACTURERS

Abex Corporation
Aerospace Division
3151 West 5th Street
Oxnard, CA 93030
Contact: M. W. Leisten - Product Sales Manager-Rotating
(805) 985-0217
D. L. Simpson - Product Sales Manager
Product: pump, valve

Aerodyne Controls Corporation
30 Haynes Court
Ronkonkoma, NY 11779
Contact: Richard B. Graeb - Director of Sales and Marketing
(516) 737-1900
Product: relief valve, check valve

Aeroquip Corporation
Aerospace Division
Jackson Plant
300 South East Avenue
Jackson, Michigan 49203-1972
Contact: Mark C. Schmidt - Sales Engineering Service Coordinator
(517) 787-8121
Product: fitting

Aircraft Porous Media
Pall Corporation
6301 49th Street North
Pinellas Park, FL 33565
(813) 522-3111
Product: filter
Ref. 4

Bendix Fluid Power Division
Allied Bendix Aerospace
211 Seward Avenue
P.O. Box 457
Utica, NY 13503
Contact: Louis A. Steppello - Senior Marketing Representative
(315) 793-1353
Richard Padgett - Director of Marketing
Product: compressor
Brunswick Defense Division  
Brunswick Corporation  
4300 Industrial Avenue  
Lincoln, Nebraska 68504  
Contact: Thomas R. Flynn - Director of Marketing  
(402) 464-8211  
Product: tank

Cajon Company  
9760 Shepard Road  
Macedonia, Ohio 44056  
Product: fitting  
Representative: Abbott Valve & Fitting Co.  
6090 Cochran Road  
Cleveland, Ohio 44139  
(216) 248-6515  
Contact: John Fant - Sales Representative

Carleton Technologies, Inc.  
P.O. Box 28  
East Aurora, NY 14052  
Contact: James Walleshauser - Manager, Space Programs  
(716) 652-8100  
Product: pressure regulator, relief valve

CEC Instruments Division  
Transamerica Delaval Inc.  
325 Halstead Street  
P.O. Bin 7087  
Pasadena, CA 91190-7087  
(818) 351-4410  
Contact: Robert A. Bachus - Senior Applications Engineer  
(818) 351-4241  
James A. Vail - Account Manager (Dayton, Ohio)  
(513) 252-1987  
Product: pressure transducer

Circle Seal Controls  
Brunswick Corporation  
P.O. Box 3666  
Anaheim, CA 92803  
(714) 774-6110  
Product: check valve
Consolidated Controls Corporation
Condec Corporation
15 Durant Avenue
Bethel, CT 06801
Contact: Peter D. VanVessem - Chief Project Engineer
(203) 743-6721
James L. Costanza - Manager, Technical Marketing (El Segundo, CA)
M. T. Petrozzi - Marketing Manager, Space Components (El Segundo, CA)
(213) 772-5301
Product: pressure regulator, pressure switch, pressure transducer, service
valve, line/thruster valve

Deutsch Metal Components
14800 South Figueroa Street
P.O. Box 61188
Los Angeles, CA 90061
Contact: Clement Law - Media Specialist
(213) 321-3040
Product: fitting

Facet Enterprises, Inc.
Filter Products Division
8439 Triad Drive
Greensboro, NC 27409-9621
(919) 852-6800
Product: filter

Fairchild Control Systems Company
1800 Rosecrans Avenue
Manhattan Beach, CA 90266-3797
(213) 643-9222
Product: pressure regulator
Ref. 4

Fansteel, Inc.
5235 West 104th Street
Los Angeles, CA 90045
(213) 670-1030
Product: tank
ref. 5
Futurecraft Corporation
15430 Proctor Avenue
City of Industry, CA 91747
Contact: James J. Castor - Engineering/Sales Manager
(818) 330-1611
Product: check valve, relief valve, line/thruster valve, pressure regulator

Garrett Corp.
AiResearch Mfg. Co. Division
2525 West 190th Street
Torrance, CA 90509
(213) 323-9500
Product: tank
ref. 5

HTL Industries, Inc.
Allegheny International Company
101 East Wheeler Avenue
Arcadia, CA 91006
(213) 574-7880
Product: service valve
ref. 4

Hughes Aircraft Company
Space & Communications Group
Box 92919
Los Angeles, CA 90009
(213) 648-2345
Product: service valve
ref. 4

ITT Neo-Dyn
21411 Prairie Street
P.O. Box 3789
Chatsworth, CA 91311
(818) 998-8611
Contact: Jeffrey D. Anderson - Regional Sales Manager-Airborne
(313) 329-9082
Product: pressure switch
Lexair Inc.
299 Goldrush
Lexington, KY 40503
Contact: C. W. Allen - President
(606) 278-5001
Product: compressor

Marotta Scientific Controls, Inc.
Boonton Avenue
Boonton, NJ 07005
(201) 334-7800
Product: pressure regulator
ref. 4

The Marquardt Company
16555 Saticoy Street
Van Nuys, CA 91409
Contact: Tom E. Hudson - Manager, Rocket Applications
(818) 989-6400
Product: gas generator (water vaporizer)

Martin Marietta Corporation
Denver Division
P. O. Box 179
Denver, CO 80201
(303) 794-5211
Product: tank
ref. 5

Metal Bellows Division
Parker Berta Aerospace Group
1075 Providence Hwy
Sharon, MA 02067
Contact: John Barrett - Marketing Manager
(617) 668-3050
Product: compressor, accumulator
Moog Inc.
Space Products Division
East Aurora, NY 14052-0018
Contact: Jay Hennig - Sales & Marketing Engineer
(716) 687-4499
Douglas H. Morash - Engineering Manager
(716) 652-2000
Product: line/thruster valve, service valve, pump

Norman Equipment Company
Norman Filter Division
9850 South Industrial Drive
Bridgeview, IL 60454
Contact: O. Garapolo - Vice President-Filter Division
(312) 430-4000
Representative: Stanley M. Proctor Company
Box 446, Twinsburg, Ohio 44087
(216) 425-7814
Product: filter

Paine Corporation
2401 South Bayview Street
Seattle, WA 98144
(206) 329-8600
Product: pressure transducer

Pall Pneumatic Products Corporation
Pall Corporation
2200 Northern Boulevard
East Hills, NY 11548
Contact: Edward J. Murphy - Marketing Manager
(516) 484-5400
Product: filter

Parker Hannifin Corporation
Air and Space Products Division (Parker Aerospace)
18321 Jamboree Blvd.
P. O. Box C-19510
Irvine, CA 92713
Contact: William Hostetler - Marketing Manager
(714) 833-3000
Product: valve
Pressure Systems, Inc.
2017 Camfield Avenue
Los Angeles, CA 90040
(213) 685-4520
Product: tank
ref. 5

Purolator Technologies
H R Textron
2323 Teller Road
Newbury Park, CA 91320
(805) 499-2661
Product: filter

Pyronetics Devices, Inc.
OEA, Inc.
P. O. Box 10488
Denver, CO 80210
(303) 693-1411
Product: service valve
ref. 4

Resistoflex Company
UMC Industries, Inc.
Roseland, NJ 07068
(201) 226-7700
Anaheim, CA 92803
(714) 772-4700
Product: fitting

Rocket Research Corporation
York Center
Redmond, WA 98052
Contact: J. J. Galbreath
(206) 885-5000
Product: gas generator (thruster)
ref. 5
Rockwell International
Space Division
12214 Lakewood Blvd.
Downey, CA 90241
(213) 594-3838
Product: tank
ref. 5

Snap-Tite
Quick Disconnect Division
Union City, PA 16438
(814) 438-3821
Product: fitting

Statham Division
Solartron Transducers
2230 Statham Boulevard
Oxnard, CA 93033
(805) 487-8511
Product: pressure transducer

Sterer Engineering & Manufacturing Company
Box 39787
4690 Colorado Blvd
Los Angeles, CA 90039
Contact: J. Pauly
(213) 245-7161
Product: pressure regulator
ref. 4

Structural Composites Industries (SCI)
Harsco Corporation
325 Enterprise Place
Pomona, CA 91768
Contact: Vicki Lynn - Marketing Engineer
(714) 594-7777
Product: tank
Systron Donner
Edcliff Division
1711 South Mountain Avenue
Monrovia, CA 91016-0727
Contact: Gordon L. Glau - Applications Engineering Manager
(818) 358-4571
Product: pressure transducer, pressure switch

Tavco, Inc.
20500 Prairie Street
Chatsworth, CA 91311
(818) 882-5411
Product: pressure regulator
ref. 4

TRW
One Space Park
Redondo Beach, CA 90278
(213) 535-4321
Product: service valve, pressure regulator, gas generator (thruster)
ref. 4

Vacco Industries
10350 Vacco Street
South El Monte, CA 91723
(213) 443-7121
Product: filter
ref. 4

Valcor Engineering Corporation
2 Lawrence Road
Springfield, NJ 07081
Contact: Bernard W. Quail - Vice President Sales Engineering
(201) 467-8400
Product: valve

Weed Instrument Company, Inc.
707 Jeffrey Way
P. O. Box 300
Round Rock, TX 78680-0300
Contact: Bill Byrd - Division Manager-Nuclear,Aerospace
(512) 255-7043
Product: temperature transducer
Western Filter Corporation
P.O. Box 3685
8968 Fullbright Avenue
Chatsworth, CA 91313-6158
Contact: Phillip Flor - Fluid Power Sales Manager
(818) 886-8450
Product: filter

Whittaker Controls Division
12838 Saticoy Street
North Hollywood, CA 91605
(818) 765-8160
Product: pressure regulator
ref. 4

Wiggins Connectors Division
Transamerica Delaval, Inc.
5000 Triggs Street
Los Angeles, CA 90022
(213) 269-9181
Product: fitting

Wintec
Brunswick Technetics
2313 South Susan Street
Santa Ana, CA 92704
Contact: Harry Buehrle - Marketing Manager
(714) 966-0831
Product: filter, service valve

Wright Components, Inc.
An EG&E Company
Route 96
P. O. Box 160
Phelps, NY 14532
Contact: C. J. Weeks - Sales Manager
(315) 548-9501
Product: valve
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<td><strong>DROP</strong></td>
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<td><strong>LEAKAGE, INTERNAL-MAX INLET PRESS</strong></td>
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<td><strong>EXTERNAL-MAX INLET PRESS</strong></td>
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<td><strong>MASS</strong></td>
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<td><strong>MATERIAL, BODY</strong></td>
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<td><strong>SEAT/SEAL</strong></td>
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<td><strong>PORTS, SIZE &amp; TYPE, INLET</strong></td>
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<td><strong>OUTLET</strong></td>
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<td><strong>INTEGRAL RELIEF</strong></td>
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<td><strong>INTEGRAL FILTER</strong></td>
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<td><strong>OPERATING TEMPERATURE RANGE</strong></td>
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<td><strong>VIBRATION, RANDOM</strong></td>
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<td><strong>SINE</strong></td>
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<td><strong>ACCELERATION</strong></td>
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<td><strong>DATA SOURCE</strong></td>
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<td>MANUFACTURER</td>
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<th>VOLTAGE</th>
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<td><strong>Description</strong></td>
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<td><strong>Propellant/Fluid</strong></td>
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### Temperature Transducer

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<th>Part Number</th>
<th>Description</th>
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<th>Min</th>
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<th>Signal</th>
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<tr>
<th>Vibration, Random</th>
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<tr>
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<th>Reliability</th>
<th>Lead Time</th>
<th>Cost</th>
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Data Source

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**MANUFACTURER**  Aeroguip Corporation  
**PART NUMBER (SERIES)**  3900 series (dash number = tube o.d. in 1/16 in. increments)  
**DESCRIPTION**  Positive valve, quick disconnect  

**CONFIGURATIONS**

**QUALIFICATION STATUS**

**PROPELLANT/FLUID**  Liquid

**PRESSURE, OPERATING**  1000 psi  
  - PROOF  1500 psi  
  - BURST  2500 psi  
**MASS**  0.15 lbm for 3900-4

**TUBE SIZE(S), O.D.**  1/4, 3/8, 1/2, 5/8, 3/4, 1 in.

**DIMENSIONS**  For 3900-4, coupled length 2.95 in.

**MATERIAL, BODY**  Al alloy, CRES  
**SEAL**

**TUBE-FITTING ATTACHMENT**

**OPERATING TEMPERATURE RANGE**  -65 to 160 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**  Ball and race lock

**DATA SOURCE**  Aeroquip catalog - 1985
**FITTING/CONNECTOR**

**MANUFACTURER**  Cajon Company  
**PART NUMBER (SERIES)**  VCO series  

**DESCRIPTION**  Threaded locking nut connection, O-ring face seal

**CONFIGURATIONS**  Union, T, elbow, reducer, accessory adapters, bullshead union

**QUALIFICATION STATUS**

**PROPELLANT/FLUID**

**PRESSURE, OPERATING**  2400 to 14,400 psig (for CRES) (16,500 to 99,200 kPa)

**PROOF**

**BURST**

**MASS**

**TUBE SIZE(S), O.D.**  1/8 to 1 in. std sizes

**TUBE-FITTING ATTACHMENT**  Weld; thread – male, female; taper, O-ring sealed

**OPERATING TEMPERATURE RANGE**  To 450 °F for Viton and TFE (232 °C), to 250 °F for Buna-N (121 °C)

**VIBRATION, RANDOM**

**SINE ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**  Some fittings compatible with Swagelok, Nupro, or Whitey components

**DATA SOURCE**  Cajon product data sheet - 1986
**FITTING/CONNECTOR**

**MANUFACTURER**  Cajon Company  
**PART NUMBER (SERIES)**  VCR series  

**DESCRIPTION**  Threaded locking nut connection, gasket sealed  

**CONFIGURATIONS**  Union, reducer union, T, cross, elbow, accessory adapters  

**QUALIFICATION STATUS**  

**PROPELLANT/FLUID**  

**PRESSURE, OPERATING**  2300 to 16,400 psig (15,800 to 112,000 kPa)  

**PROOF**  

**BURST**  

**TUBE SIZE(S), O.D.**  1/8 to 1 in. std sizes  

**DIMENSIONS**  

**MATERIAL, BODY**  316 CRES  

**SEAL**  Silver-plated CRES and Ni, Ni, Cu, TFE, Al  

**TUBE-FITTING ATTACHMENT**  Weld; thread - male, female  

**OPERATING TEMPERATURE RANGE**  To 1000 °F for CRES, Ni, Cu (537 °C); to 450 °F for TFE (232 °C); to 650 °F for Al (343 °C)  

**VIBRATION, RANDOM**  

**SINE**  

**ACCELERATION**  

**SHOCK**  

**LIFE, SERVICE**  

**CYCLE**  

**SHELF**  

**RELIABILITY**  

**LEAD TIME**  

**COST**  

**REMARKS**  Filtered gasket available, blind gaskets available; some fittings adapt to Swagelok, Nupro, or Whitey components  

**DATA SOURCE**  Cajon product data sheet - 1986
FITTING/CONNECTOR

MANUFACTURER  Deutsch Metal Components
PART NUMBER (SERIES)  D9855, D10255, DNR 9855 series "Permaswage"

DESCRIPTION  Swage-on tee

CONFIGURATIONS

QUALIFICATION STATUS

PROPELLANT/FLUID

PRESSURE, OPERATING  3000 psi (for D), 4000 psi (for DNR)

PROOF

BURST

MASS  0.031 lbm CRES, 0.011 lbm Al, 0.018 lbm Ti for 1/4 in.

TUBE SIZE(S), O.D.  3/16 to 1/2 in. std sizes

DIMENSIONS  2.10 by 1.25 by 0.39 in. for 1/4 in.

MATERIAL, BODY  CRES, Al, Ti

SEAL

TUBE-FITTING ATTACHMENT  Swage-on

OPERATING TEMPERATURE RANGE  To 275 °F

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS  Special tooling required

DATA SOURCE  Deutsch catalog - 1985
FITTING/CONNECTOR

MANUFACTURER  Deutsch Metal Components
PART NUMBER (SERIES)  D9856, D10256, DNR 9856 series "Permaswage"

DESCRIPTION  Swage-on 90° elbow fitting

QUALIFICATION STATUS

PROPELLANT/FLUID

PRESSURE, OPERATING  3000 psi (for D), 4000 psi (for DNR)

PROOF

BURST

MASS  0.025 lbm CRES, 0.009 lbm Al, 0.014 lbm Ti for 1/4 in.

TUBE SIZE(S), O.D.  3/16 to 1 1/2 in. std sizes

DIMENSIONS  1.25 by 1.25 by 0.39 in. for 1/4 in.

MATERIAL, BODY  CRES, Ti, Al
SEAL  Silicone

TUBE-FITTING ATTACHMENT  Swage-on

OPERATING TEMPERATURE RANGE  To 275 °F

VIBRATION, RANDOM
SINE

ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST

REMARKS  Special tooling required

DATA SOURCE  Deutsch catalog - 1985
# Fitting/Connector

**Manufacturer** Deutsch Metal Components  
**Part Number (Series)** D10036, DNR 10036 series "Permaswage"

**Description** Swage-on union

**Configurations**

**Qualification Status**

**Propellant/Fluid**

**Pressure, Operating** 3000 psi (for D), 4000 psi (for DNR)

**Pf of burst**

**Mass** 0.013 lbm CRES, 0.005 lbm Al, 0.007 lbm Ti for 1/4 in.

**Tube Size(s), O.D.** 3/16 to 1 1/2 in.

**Dimensions** 1.540 by 0.338 in. diam for 1/4 in.

**Material, Body** Ti, CRES, or Al  
**Seal** Silicone

**Tube-Fitting Attachment** Swage-on

**Operating Temperature Range** To 275 °F

**Vibration, Random**

**Sine**

**Acceleration**

**Shock**

**Life, Service**

**Cycle**

**Shelf**

**Reliability**

**Lead Time**

**Cost**

**Remarks** Special tooling required

**Data Source** Deutsch catalog - 1985

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**FITTING/CONNECTOR**

**MANUFACTURER** Deutsch Metal Components

**PART NUMBER (SERIES)** D10045, DNR 10045 series "Permaswage"

**DESCRIPTION** Swage-on reducer union

**CONFIGURATIONS**

**QUALIFICATION STATUS**

**PROPELLANT/FLUID**

**PRESSURE, OPERATING** 3000 psi (for D), 4000 psi (for DNR)

**PROOF**
**BURST**

**MASS**

**TUBE SIZE(S), O.D.** 3/16 to 1 1/2 in. various tube size combinations

**DIMENSIONS** 1.640 by 0.338 in. diam for 1/4 to 3/16 in.

**MATERIAL, BODY** CRES, Ti, Al
**SEAL** Silicone

**TUBE-FITTING ATTACHMENT** Swage

**OPERATING TEMPERATURE RANGE** To 275 °F

**VIBRATION, RANDOM**
**SINE**
**ACCELERATION**
**SHOCK**

**LIFE, SERVICE**
**CYCLE**
**SHELF**
**RELIABILITY**
**LEAD TIME**
**COST**
**REMARKS** Special tooling required

**DATA SOURCE** Deutsch catalog - 1985
MANUFACTURER  Resistoflex Company
PART NUMBER (SERIES)  R44XXX, R45XXX series "Dynatube"
DESCRIPTION  Screw-together coupling
CONFIGURATIONS  T, union, elbow, cross, reducer, etc.
QUALIFICATION STATUS  Gemini, Apollo, space shuttle
PROPELLANT/FLUID
PRESSURE, OPERATING  3000 to 10,000 psi
PROOF
BURST
MASS
TUBE SIZE(S), O.D.  3/16 to 1 1/2 in.
DIMENSIONS
MATERIAL, BODY  Ti, CRES, Inconel
SEAL  Same (metal to metal)
TUBE-FITTING ATTACHMENT  Internal swage, weld, braze; external swage for TFE hose
OPERATING TEMPERATURE RANGE  To 600 °F (1200 °F for Inconel)
VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK
LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Resistoflex Catalog DY-48 - 1985
**FITTING/CONNECTOR**

**MANUFACTURER** Snap-tite  
**PART NUMBER (SERIES)** Series 28  
**DESCRIPTION** Quick-disconnect coupling  

**CONFIGURATIONS**

**QUALIFICATION STATUS**

**PROPELLANT/FLUID**

**PRESSURE, OPERATING** 1000 psi (600 psi for 1 1/4 and 1 1/2 in.)  
**PROOF**
**BURST** 2500 psi (1500 psi for 1 1/4 and 1 1/2 in.)  
**MASS**

**TUBE SIZE(S), O.D.** 1/4, 3/8, 1/2, 5/8, 3/4, 1, 1 1/4, 1 1/2 in.  
**DIMENSIONS**

**MATERIAL, BODY** 316 CRES, Al alloy  
**SEAL** Nitrile, Viton, EPR  
**TUBE-FITTING ATTACHMENT** MS 33614, 15, 49, 56, 57, SAE, pipe  

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**
**SINE**
**ACCELERATION**
**SHOCK**

**LIFE, SERVICE**
**CYCLE**
**SHELF**
**RELIABILITY**
**LEAD TIME**
**COST**
**REMARKS**

**DATA SOURCE** Snap-Tite product data sheet - 1986
MANUFACTURER  Wiggins Division of Transamerica Delaval
PART NUMBER (SERIES)  Series 20 "Min-O-Matic"

DESCRIPTION  Quick disconnect

CONFIGURATIONS

QUALIFICATION STATUS

PROPELLANT/FLUID

PRESSURE, OPERATING

PROOF
BURST  13,000 psi

MASS  0.064 lbm

TUBE SIZE(S), O.D.  1/4 in. (1/8 and 3/8 in. available)

DIMENSIONS

MATERIAL, BODY  Al alloy
SEAL  Viton A (other options)

TUBE-FITTING ATTACHMENT  Lock ring, spring load

OPERATING TEMPERATURE RANGE  -20 to 400 °F

VIBRATION, RANDOM
SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS  Self-sealing, MS 33656,7 ends

DATA SOURCE  Wiggins catalog - 1985
FITTING/CONNECTOR

MANUFACTURER  Wiggins Division of Transamerica Delaval
PART NUMBER (SERIES)  3600 series (3608 -4D, -6D, -8D, -10D (Al);
3618 -4 to -10 (CRES])
DESCRIPTION  Full connector (hard tube to hard tube) flexible

CONFIGURATIONS

QUALIFICATION STATUS

PROPELLANT/FLUID

PRESSURE, OPERATING

PROOF
BURST  To 3000 psig
MASS  0.03 to 0.056 lbm (Al); 0.106 to 0.163 lbm (CRES)

TUBE SIZE(S), O.D.  1/4, 3/8, 1/2, 5/8 in.
DIMENSIONS  1.731 by 0.781 in. diam to 1.952 by 1.157 in. diam

MATERIAL, BODY  Al or CRES
SEAL  O-ring (customer provided) ARP568-10, -110, -112,
-114
TUBE-FITTING ATTACHMENT  Threaded sleeves

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE

CYCLE
SHELF
RELIABILITY
LEAD TIME
COST

REMARKS  Requires tube end treatment

DATA SOURCE  Wiggins catalog - 1985
**FITTING/CONNECTOR**

**MANUFACTURER**  Wiggins Division of Transamerica Delaval
**PART NUMBER (SERIES)**  6000 series

**DESCRIPTION**  Quick disconnect

**CONFIGURATIONS**

**QUALIFICATION STATUS**

**PROPELLANT/FLUID**  Hydraulic

**PRESSURE, OPERATING**

<table>
<thead>
<tr>
<th>PROOF</th>
<th>BURST</th>
</tr>
</thead>
<tbody>
<tr>
<td>13,500 psi (1/4 in.)</td>
<td>4000 psi (2 in.)</td>
</tr>
</tbody>
</table>

**MASS**

<table>
<thead>
<tr>
<th>TUBE SIZE(S), O.D.</th>
<th>1/4 to 2 in. std sizes</th>
</tr>
</thead>
</table>

**DIMENSIONS**

**MATERIAL, BODY**  CRES, Al

**SEAL**

**TUBE-FITTING ATTACHMENT**  Dog latch

**OPERATING TEMPERATURE RANGE**  -65 to 275 °F

**VIBRATION, RANDOM**

<table>
<thead>
<tr>
<th>SINE</th>
</tr>
</thead>
</table>

**ACCELERATION**

**SHOCK**  20G 12 times

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**  Self-sealing or break-away available, MS 33656,7 ends

**DATA SOURCE**  Wiggins catalog - 1985
FITTING/CONNECTOR

MANUFACTURER  Wiggins Division of Transamerica Delaval

PART NUMBER (SERIES)  6300 series [63051-4A to -104A (Al) and 63151-4 to 104 (CRES)]

DESCRIPTION  Full connector (less ferrule) flexible

CONFIGURATIONS

QUALIFICATION STATUS

PROPELLANT/FLUID

PRESSURE, OPERATING

PROOF

BURST  To 3000 psi

MASS  0.041 lbm for -10A, 0.118 lbm for -10 (5/8)

TUBE SIZE(S), O.D.  1/4- to 6-1/2-in. std sizes

DIMENSIONS  1.225 by 1.282 diam for -10A/-10

MATERIAL, BODY  Al or CRES

SEAL  O-ring and ARP568-110 to -439

TUBE-FITTING ATTACHMENT  Threaded sleeves

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS  Tube ends require swaged-on ferrule (part numbers 63052 and 63152)

DATA SOURCE  Wiggins catalog - 1985
<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Brunswick Defense Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>BLD 99901</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Filament-wound over liner</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Space shuttle OMS</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td>He</td>
</tr>
<tr>
<td>VOLUME</td>
<td>30,033 in.³</td>
</tr>
<tr>
<td>PRESSURE, OPERATING</td>
<td>4875 psig</td>
</tr>
<tr>
<td>PROOF</td>
<td>6473 psig</td>
</tr>
<tr>
<td>BURST</td>
<td>7313 psig</td>
</tr>
<tr>
<td>MASS</td>
<td>277.5 lb</td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td>38.28 in. i.d.</td>
</tr>
<tr>
<td>MATERIAL</td>
<td>6Al-4V Ti liner; Kevlar 49 and LRF-092 resin</td>
</tr>
<tr>
<td>PORT(S), SIZE &amp; TYPE</td>
<td></td>
</tr>
<tr>
<td>MOUNTING</td>
<td></td>
</tr>
<tr>
<td>EXPULSION METHOD</td>
<td></td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td></td>
</tr>
<tr>
<td>VIBRATION, RANDOM</td>
<td></td>
</tr>
<tr>
<td>SINE</td>
<td></td>
</tr>
<tr>
<td>ACCELERATION</td>
<td></td>
</tr>
<tr>
<td>SHOCK</td>
<td></td>
</tr>
<tr>
<td>LIFE, SERVICE</td>
<td></td>
</tr>
<tr>
<td>CYCLE</td>
<td>1000</td>
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<tr>
<td>SHELF</td>
<td></td>
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<tr>
<td>RELIABILITY</td>
<td></td>
</tr>
<tr>
<td>LEAD TIME</td>
<td></td>
</tr>
<tr>
<td>COST</td>
<td></td>
</tr>
<tr>
<td>REMARKS</td>
<td></td>
</tr>
</tbody>
</table>

DATA SOURCE Brunswick Defense product data sheet - 1985
TANK/ACCUMULATOR

MANUFACTURER  Brunswick Defense Division

PART NUMBER  BLD 999020

DESCRIPTION  Filament-wound shell over liner

QUALIFICATION STATUS  Space shuttle MPS

PROPELLANT/FLUID  He

VOLUME  8181 in.³

PRESSURE, OPERATING  4500 psig
    PROOF  6150 psig
    BURST  6750 psig

MASS  76.0 lbm

DIMENSIONS  24.92 in. i.d. by 0.558 in. wall

MATERIAL  6Al-4V Ti liner; Kevlar 49 and LRF-092 resin

PORT(S), SIZE & TYPE

MOUNTING

EXPULSION METHOD

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM

SIN.

ACCELERATION

SHOCK

LIFE, SERVICE
    CYCLE  1000
    SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Brunswick Defense product data sheet - 1985
MANUFACTURER  Brunswick Defense Division
PART NUMBER  BLD 999030
DESCRIPTION  Filament-wound shell over liner
QUALIFICATION STATUS  Space shuttle MPS auxiliary

PROPELLANT/FLUID  He

VOLUME  3008 in.³
PRESSURE, OPERATING  4500 psig
PROOF  5800 psig
BURST  6750 psig
MASS  28.1 lbm
DIMENSIONS  17.91 in. i.d. by 0.404 in. wall

MATERIAL  6Al-4V Ti liner; Kevlar 49 and LRF-092 resin

PORT(S), SIZE & TYPE
MOUNTING
EXPULSION METHOD

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE  1000
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Brunswick Defense product data sheet - 1985
<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Brunswick Defense Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>BLD 999040</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Filament-wound shell: over liner</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Space shuttle RCS</td>
</tr>
</tbody>
</table>

| PROPELLANT/FLUID | He |

| VOLUME       | 3008 in.³ |
| PRESSURE, OPERATING | 4000 psig |
| PROOF          | 5270 psig |
| BURST          | 6000 psig |
| MASS           | 26.3 lbm  |
| DIMENSIONS     | 17.91 in. i.d. by 0.351 in. wall |
| MATERIAL       | 6Al-4V Ti liner; Kevlar 49 and LRF-092 resin |

| PORT(S), SIZE & TYPE | ____________________________________________ |
| MOUNTING             | ____________________________________________ |
| EXPULSION METHOD     | ____________________________________________ |

| OPERATING TEMPERATURE RANGE | ____________________________________________ |

| VIBRATION, RANDOM | ____________________________________________ |
| SINE              | ____________________________________________ |
| ACCELERATION      | ____________________________________________ |
| SHOCK             | ____________________________________________ |

| LIFE, SERVICE | ____________________________________________ |
| CYCLE         | 1000                                      |
| SHELF         | ____________________________________________ |
| RELIABILITY   | ____________________________________________ |
| LEAD TIME     | ____________________________________________ |
| COST          | ____________________________________________ |
| REMARKS       | ____________________________________________ |

DATA SOURCE Brunswick Defense product data sheet - 1985
MANUFACTURER  Brunswick Defense Division
PART NUMBER  BLD 999050
DESCRIPTION  Filament-wound shell over liner
QUALIFICATION STATUS  Space shuttle ARPCS

PROPELLANT/FLUID  N₂

VOLUME  8181 in.³
PRESSURE, OPERATING  3300 psig
    PROOF  4135 psig
    BURST  4950 psig
MASS  56.4 lbm
DIMENSIONS  25 in. i.d. by 0.41 in. wall

MATERIAL  6Al-4V Ti liner; Kevlar 49 and LRF-092 resin

PORT(S), SIZE & TYPE
MOUNTING
EXPULSION METHOD

OPERATING TEMPERATURE RANGE
VIBRATION, RANDOM
    SINE
ACCELERATION
SHOCK

LIFE, SERVICE
    CYCLE  1000
    SHELF

RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Brunswick Defense product data sheet - 1985
TANK/ACCUMULATOR

MANUFACTURER  Brunswick Defense Division
PART NUMBER  BLD 999060
DESCRIPTION  Filament-wound shell over liner
QUALIFICATION STATUS  Space shuttle ARPCS

PROPELLANT/FLUID  

<table>
<thead>
<tr>
<th>VOLUME</th>
<th>8181 in.³</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESSURE, OPERATING</td>
<td>3300 psig</td>
</tr>
<tr>
<td>PROOF</td>
<td>4225 psig</td>
</tr>
<tr>
<td>BURST</td>
<td>4950 psig</td>
</tr>
<tr>
<td>MASS</td>
<td>66.6 lbm</td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td>25 in. i.d. by 0.388 wall</td>
</tr>
<tr>
<td>MATERIAL</td>
<td>Inconel 718 liner; Kevlar 49 and LRF-092 resin</td>
</tr>
</tbody>
</table>

PORT(S), SIZE & TYPE
MOUNTING
EXPULSION METHOD

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE 1000
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Brunswick Defense product data sheet - 1985
TANK/ACCUMULATOR

MANUFACTURER  Fansteel, Inc.
PART NUMBER  942-D-03
DESCRIPTION  Spherical
QUALIFICATION STATUS

PROPELLANT/FLUID  Liquid

VOLUME  13,478 in.³ (0.2209 m³)
PRESSURE, OPERATING  700 psig (482 N/cm²)
  PROOF  1,100 psig (758.4 N/cm²)
  BURST  1,465 psig (1010 N/cm²)
MASS  71.0 lbm (32.2 kg)

DIMENSIONS

MATERIAL  17-7PH CRES

PORT(S), SIZE & TYPE
MOUNTING
EXPULSION METHOD

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
  SINE
  ACCELERATION
  SHOCK

LIFE, SERVICE
  CYCLE
  SHELF
RELIABILITY
LEAD TIME
COST

REMARKS

DATA SOURCE  NASA CR-142666 and NASA CR-142531 (ref. 5)
**TANK/ACCUMULATOR**

**MANUFACTURER**  Garrett Corp, AiResearch

**PART NUMBER**  851240

**DESCRIPTION**  Spherical

**QUALIFICATION STATUS**

**PROPELLANT/FLUID**  Gas

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VOLUME</strong></td>
<td>34,560 in.(^3) (0.56643 m(^3))</td>
</tr>
<tr>
<td><strong>PRESSURE, OPERATING</strong></td>
<td>320 psig (220 N/cm(^2))</td>
</tr>
<tr>
<td><strong>MASS</strong></td>
<td>160 lbm (72 kg)</td>
</tr>
<tr>
<td><strong>DIMENSIONS</strong></td>
<td>43.3 in. o.d. (109 cm)</td>
</tr>
<tr>
<td><strong>MATERIAL</strong></td>
<td>5A1-2.5Sn Ti</td>
</tr>
<tr>
<td><strong>OPERATING TEMPERATURE RANGE</strong></td>
<td></td>
</tr>
<tr>
<td><strong>VIBRATION, RANDOM</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SINE ACCELERATION</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SHOCK</strong></td>
<td></td>
</tr>
<tr>
<td><strong>LIFE, SERVICE</strong></td>
<td></td>
</tr>
<tr>
<td><strong>CYCLE</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SHELF</strong></td>
<td></td>
</tr>
<tr>
<td><strong>RELIABILITY</strong></td>
<td></td>
</tr>
<tr>
<td><strong>LEAD TIME</strong></td>
<td>10 to 12 months in 1974</td>
</tr>
</tbody>
</table>

**DATA SOURCE**  NASA CR-142666 and NASA CR-142531 (ref. 5)
MANUFACTURER Garrett Corp, AiResearch
PART NUMBER Grumman P/N LSC-270-821
DESCRIPTION Spherical, pressurant
QUALIFICATION STATUS Apollo LM descent stage
PROPELLANT/FLUID Liquid, supercritical He

VOLUME 10,200 in.\(^3\) (0.167 m\(^3\))
PRESSURE, OPERATING 1,500 psi (1068 N/cm\(^2\))
    PROOF 2274 psi (1567 N/cm\(^2\))
    BURST 3,420 psi design (2358 N/cm\(^2\))
MASS 102 lbm (46 kg)
DIMENSIONS 26.9 in. i.d. by 0.147 in. wall (683 by 0.373 cm)
MATERIAL 5A1-2.5Sn Ti (ELI)

PORT(S), SIZE & TYPE __________________________
MOUNTING __________________________
EXPULSION METHOD Vapor

OPERATING TEMPERATURE RANGE __________________________
VIBRATION, RANDOM __________________________
    SINE __________________________
    ACCELERATION __________________________
    SHOCK __________________________

LIFE, SERVICE __________________________
    CYCLE __________________________
    SHELF __________________________
RELIABILITY __________________________
LEAD TIME __________________________
COST __________________________
REMARKS Two integral, independent pressure transducers

DATA SOURCE NASA CR-142666 and NASA CR-142531 (ref. 5)
TANK/ACCUMULATOR

MANUFACTURER  Martin Marietta Corporation
PART NUMBER  80801E36220-049
DESCRIPTION  Cylinder with hemispherical ends
QUALIFICATION STATUS  Titan III C

PROPELLANT/FLUID  Liquid N₂H₄

VOLUME  14,750 in.³ (0.24175 m³)
PRESSURE, OPERATING  400 psig (275 N/cm²)
  PROOF  600 psig (413 N/cm²)
  BURST  760 psig (524 N/cm²)
MASS  52 lbm (23 kg)
DIMENSIONS  33.24 in. by 28.24 in. diam (844.2 by 717.2 cm)
MATERIAL  6A1-4V Ti
PORT(S), SIZE & TYPE  Four tapped holes in bosses
EXPULSION METHOD  Ethylene propylene diaphragm

OPERATING TEMPERATURE RANGE
VIBRATION, RANDOM
  SINE
ACCELERATION
SHOCK

LIFE, SERVICE
  CYCLE  300
  SHELF
RELIABILITY
LEAD TIME
COST  $50,000 U.S. in 1974
REMARKS

DATA SOURCE  NASA CR-142666 and NASA CR-142531 (ref. 5)
TANK/ACCUMULATOR

MANUFACTURER  Martin Marietta Corporation
PART NUMBER  88-4000500
DESCRIPTION  Cylinder with hemispherical ends
QUALIFICATION STATUS  Saturn V

PROPELLANT/FLUID  GHe

VOLUME  53,910 in.\(^3\) (0.8835 m\(^3\))
PRESSURE, OPERATING  3000 psi (2068 N/cm\(^2\))
    PROOF  5000 psi (3,447 N/cm\(^2\))
    BURST  6660 psi (4591 N/cm\(^2\))
MASS  1144 lbm (518.9 kg)
DIMENSIONS  211.88 in. by 20.90 in. o.d. by 0.90 in. wall (5381.7
            by 53.09 by 2.29 cm)
MATERIAL  Al 2014-T6
PORT(S), SIZE & TYPE
MOUNTING  Bosses
EXPULSION METHOD

OPERATING TEMPERATURE RANGE  -180 to 160 °F (118 to 71 °C)
VIBRATION, RANDOM
    SINE
ACCELERATION
SHOCK

LIFE, SERVICE
    CYCLE
    SHELF
RELIABILITY
LEAD TIME  No spares
COST
REMARKS

DATA SOURCE  NASA CR-142666 and NASA CR-142531 (ref. 5)
MANUFACTURER: Pressure Systems, Inc.  
PART NUMBER: 80111-1  
DESCRIPTION: Spherical  
QUALIFICATION STATUS: Beaver Submarine (Rockwell)  
PROPELLANT/FLUID: Gas  

<table>
<thead>
<tr>
<th>VOLUME</th>
<th>35,300 in.³ (0.57856 m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESSURE, OPERATING</td>
<td>890 psig (613 N/cm²)</td>
</tr>
<tr>
<td>PROOF</td>
<td>1335 psig (920 N/cm²)</td>
</tr>
<tr>
<td>BURST</td>
<td>1780 psig (1227 N/cm²)</td>
</tr>
<tr>
<td>MASS</td>
<td>255 lbm (115 kg)</td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td>40.74 in. o.d. by 0.282 in. wall (103.4 by 0.716 cm)</td>
</tr>
<tr>
<td>MATERIAL</td>
<td>6Al-4V Ti</td>
</tr>
</tbody>
</table>

PORT(S), SIZE & TYPE: One, polar  
MOUNTING: EXPULSION METHOD  

OPERATING TEMPERATURE RANGE:  
VIBRATION, RANDOM:  
SINE:  
ACCELERATION:  
SHOCK:  
LIFE, SERVICE:  
CYCLE:  
SHELF:  
RELIABILITY:  
LEAD TIME:  
COST:  
REMARKS:  

DATA SOURCE: NASA CR-142666 and NASA CR-142531 (ref. 5)
**MANUFACTURER**  Pressure Systems, Inc.
**PART NUMBER**  80140-1
**DESCRIPTION**  Spherical
**QUALIFICATION STATUS**  Qualified and flown in 1969 (JPL)

**PROPELLANT/FLUID**  Liquid - MMH, NTO

<table>
<thead>
<tr>
<th>VOLUME</th>
<th>13,442 in.³ (0.22031 m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESSURE, OPERATING</td>
<td>300 psig (206 N/cm²)</td>
</tr>
<tr>
<td>PROOF</td>
<td>600 psig (413 N/cm²)</td>
</tr>
<tr>
<td>BURST</td>
<td>750 psig (517 N/cm²)</td>
</tr>
<tr>
<td>MASS</td>
<td>22.5 lbm (1.02 kg)</td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td>29.5 in. i.d. by 0.031 in. wall (749 by 0.078 cm)</td>
</tr>
<tr>
<td>MATERIAL</td>
<td>Al-4V Ti</td>
</tr>
<tr>
<td>PORT(S), SIZE &amp; TYPE</td>
<td>Two, polar</td>
</tr>
<tr>
<td>MOUNTING</td>
<td>Four equatorial lugs</td>
</tr>
<tr>
<td>EXPULSION METHOD</td>
<td>Teflon bladder FED-TFE</td>
</tr>
</tbody>
</table>

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**  34 weeks in 1974

**COST**

**REMARKS**

**DATA SOURCE**  NASA CR-142666 and NASA CR-142531 (ref. 5)
### TANK/ACCUMULATOR

**MANUFACTURER**  Rockwell International  
**PART NUMBER**  240-48202  
**DESCRIPTION**  Spherical  
**QUALIFICATION STATUS**  X-15  

**PROPELLANT/FLUID**  Liquid H$_2$O$_2$

---

**VOLUME**  17,300 in.$^3$ (0.283 m$^3$)  
**PRESSURE, OPERATING**  600 psi (413 N/cm$^2$)  
**PROOF**  900 psi (620 N/cm$^2$)  
**BURST**  975 psi (672 N/cm$^2$)  
**MASS**  64 lbm (29 kg)  
**MATERIAL**  350 CRES  
**DIMENSIONS**  
**PORT(S), SIZE & TYPE**  
**MOUNTING**  
**EXPULSION METHOD**  

---

**OPERATING TEMPERATURE RANGE**  
**VIBRATION, RANDOM**  
**SINE**  
**ACCELERATION**  
**SHOCK**  

---

**LIFE, SERVICE**  
**CYCLE**  
**SHELF**  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS**  

---

**DATA SOURCE**  NASA CR-142666 and NASA CR-142531 (ref. 5)  

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**81**
**TANK/ACCUMULATOR**

MANUFACTURER: Structural Composite Industries  
PART NUMBER: Model 156  
DESCRIPTION: Filament-wound gas cylinder  
QUALIFICATION STATUS: MMU (Martin Marietta)  

PROPELLANT/FLUID: GN₂

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLUME</td>
<td>1631 in.³ (0.0267 m³)</td>
</tr>
<tr>
<td>PRESSURE, OPERATING</td>
<td>3600 psig</td>
</tr>
<tr>
<td>PROOF BURST</td>
<td></td>
</tr>
<tr>
<td>MASS</td>
<td>27.5 lbm (12.5 kg)</td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td>10 in. diam by 31 in. (25.4 by 78.7 cm)</td>
</tr>
<tr>
<td>MATERIAL</td>
<td>6061-T6 liner; Kevlar 49 and epoxy wrap</td>
</tr>
<tr>
<td>PORT(S), SIZE &amp; TYPE</td>
<td></td>
</tr>
<tr>
<td>MOUNTING</td>
<td></td>
</tr>
<tr>
<td>EXPULSION METHOD</td>
<td></td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td></td>
</tr>
<tr>
<td>VIBRATION, RANDOM</td>
<td></td>
</tr>
<tr>
<td>SINE ACCELERATION</td>
<td></td>
</tr>
<tr>
<td>SHOCK</td>
<td></td>
</tr>
<tr>
<td>LIFE, SERVICE</td>
<td></td>
</tr>
<tr>
<td>CYCLE</td>
<td></td>
</tr>
<tr>
<td>SHELF</td>
<td></td>
</tr>
<tr>
<td>RELIABILITY</td>
<td></td>
</tr>
<tr>
<td>LEAD TIME</td>
<td></td>
</tr>
<tr>
<td>COST</td>
<td></td>
</tr>
<tr>
<td>REMARKS</td>
<td>SCI manufactures filament-wound pressure vessels from 55 to 363,000 in.³ in spheres, near-spheres, and cylinders</td>
</tr>
</tbody>
</table>

DATA SOURCE: SCI product data sheets - 1985; ASME proceedings (ref. 6)
**TANK/ACCUMULATOR**

**MANUFACTURER** Structural Composite Industries

**PART NUMBER** Model 200

**DESCRIPTION** Filament-wound composite

**QUALIFICATION STATUS**

**PROPELLANT/FLUID**

<table>
<thead>
<tr>
<th>Volume</th>
<th>11,000 in.³ (0.18 m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure, Operating</td>
<td>3000 psig</td>
</tr>
<tr>
<td>Proof</td>
<td>5000 psig</td>
</tr>
<tr>
<td>Burst</td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>300 lbm (136 kg)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>50 in. by 21.4 in. o.d. (127 by 54.4 cm)</td>
</tr>
</tbody>
</table>

**MATERIAL**

**PORT(S), SIZE & TYPE**

**MOUNTING**

**EXPULSION METHOD**

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

<table>
<thead>
<tr>
<th>Cycle</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shelf</td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td></td>
</tr>
<tr>
<td>Lead Time</td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td></td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
</tr>
</tbody>
</table>

**DATA SOURCE** SAMPE symposium (ref. 7)
MANUFACTURER  Carleton Technologies, Inc.
PART NUMBER  1-4-00-51-27
DESCRIPTION  Manual toggle valve
QUALIFICATION STATUS  Space shuttle ARPCS

PROPELLANT/FLUID  O₂

PRESSURE, OPERATING  1250 psig
  PROOF  1875 psig
  BURST  2500 psig

RATED FLOW  50 lbm/hr at 300 psi, 10 psid

LEAKAGE, INTERNAL  5.0 SCCM
  EXTERNAL  5.0 SCCM

MASS  0.49 lbm

DIMENSIONS

MATERIAL, BODY
  SEAT/SEAL

CONNECTIONS, GROUND SIDE
  SPACECRAFT SIDE

INTEGRAL FILTER

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
  SINE
  ACCELERATION
  SHOCK

LIFE, SERVICE
  CYCLE
  SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Carleton product data sheet - 1987
## Service Valve

**Manufacturer** Carleton Technologies, Inc.  
**Part Number** 1-4-00-51-43  
**Description** Manual toggle valve  
**Qualification Status** Space shuttle ARPCS

### Propellant/Fluid

<table>
<thead>
<tr>
<th>Propellant/Fluid</th>
<th>O₂</th>
</tr>
</thead>
</table>

### Pressure

<table>
<thead>
<tr>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating</td>
<td>0 to 1250 psig</td>
</tr>
<tr>
<td>Proof</td>
<td>1875 psig</td>
</tr>
<tr>
<td>Burst</td>
<td>2500 psig</td>
</tr>
</tbody>
</table>

### Rated Flow

| Value                    | 150 lbm/hr at 300 psi |

### Leakage

- **Internal**: 2.0 SCCM
- **External**: 0.2 SCCM

### Mass

- **0.69 lbm**

### Dimensions

- **N/A**

### Material

- **Body**: N/A
- **Seat/Seal**: N/A

### Connections

- **Ground Side**: N/A
- **Spacecraft Side**: N/A

### Integral Filter

- **Mounting**: N/A

### Operating Temperature Range

- **35 to 120 °F**

### Vibration

- **Random**: N/A
- **Sine**: N/A

### Shock

- **N/A**

### Life, Service Cycle

- **N/A**

### Shelf Reliability

- **N/A**

### Lead Time

- **N/A**

### Cost

- **N/A**

### Remarks

- **N/A**

### Data Source

Carleton product data sheet - 1987
**SERVICE VALVE**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Carleton Technologies, Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>1-4-00-51-45</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Manual toggle valve</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Space shuttle ARPCS</td>
</tr>
</tbody>
</table>

| PROPELLANT/FLUID | O₂, N₂                      |

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>0 to 295 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROOF</td>
<td>443 psig</td>
</tr>
<tr>
<td>BURST</td>
<td>590 psig</td>
</tr>
</tbody>
</table>

| RATED FLOW | 7.0 lbm/hr at 100 psi, 1.0 psid max. |

<table>
<thead>
<tr>
<th>LEAKAGE, INTERNAL</th>
<th>2.0 SCCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTERNAL</td>
<td>0.2 SCCM</td>
</tr>
</tbody>
</table>

| MASS | 0.530 lbm |

| DIMENSIONS |

| MATERIAL, BODY |
| SEAT/SEAL |

| CONNECTIONS, GROUND SIDE |
| SPACECRAFT SIDE |

| INTEGRAL FILTER |
| MOUNTING |

| OPERATING TEMPERATURE RANGE | 35 to 120 °F |

| VIBRATION, RANDOM |
| SINE |

| ACCELERATION |
| SHOCK |

| LIFE, SERVICE |
| CYCLE |
| SHELF |

| RELIABILITY |
| LEAD TIME |
| COST |
| REMARKS |

| DATA SOURCE | Carleton product data sheet - 1987 |
SERVICE VALVE

MANUFACTURER Consolidated Controls Corporation
PART NUMBER 71665
DESCRIPTION Manual fill and drain
QUALIFICATION STATUS USAF program

PROPELLANT/FLUID GN₂

PRESSURE, OPERATING 3015 psia (2078 N/cm²)
PROOF 4155 psia (3113 N/cm²)
BURST 6015 psia (4147 N/cm²)

RATED FLOW

LEAKAGE, INTERNAL 5 SCCH GN₂ at 3615 psia (2492 N/cm²)
EXTERNAL 0.0002 SCCS GN₂ at 3615 psia (2492 N/cm²)

MASS 1.0 lbm (0.45 kg)

DIMENSIONS 4.71 in. LOA

MATERIAL, BODY CRES
SEAT/SEAL CRES

CONNECTIONS, GROUND SIDE
SPACECRAFT SIDE Brazed tube

INTEGRAL FILTER 200 µm abs

MOUNTING

OPERATING TEMPERATURE RANGE -30 to 140 °F (-34 to 60 °C)

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE 100

RELIABILITY
LEAD TIME 180 days in 1974
COST 5 to 10 units - $2000 in 1974

REMARKS May be scaled up or down as required. Compatible with pneumatics and storable propellants.

DATA SOURCE II'RI lists (ref. 8) and Aerospace Corporation report (ref. 9)
<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Consolidated Controls Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>72580</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Manual fill and vent</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>USAF P-95</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td>N₂, N₂O₄, UDMH, H₂O</td>
</tr>
<tr>
<td>PRESSURE, OPERATING</td>
<td>3615 psia (2492 N/cm²)</td>
</tr>
<tr>
<td>PROOF</td>
<td>5415 psia (3733 N/cm²)</td>
</tr>
<tr>
<td>BURST</td>
<td>9015 psia (6215 N/cm²)</td>
</tr>
<tr>
<td>RATED FLOW</td>
<td>Equivalent to 0.5 in. (1.27 cm) orifice</td>
</tr>
<tr>
<td>LEAKAGE, INTERNAL</td>
<td>5 SCCS GN₂ at max. pressure</td>
</tr>
<tr>
<td>EXTERNAL</td>
<td>0.0002 SCCS GN₂</td>
</tr>
<tr>
<td>MASS</td>
<td>1.0 lbm (0.45 kg)</td>
</tr>
<tr>
<td>MATERIAL, BODY</td>
<td>CRES</td>
</tr>
<tr>
<td>SEAT/SEAL</td>
<td>CRES</td>
</tr>
<tr>
<td>CONNECTIONS, GROUND</td>
<td>MS tube fitting 0.56-18 UNF</td>
</tr>
<tr>
<td>SPACECRAFT SIDE</td>
<td>Brazed tube</td>
</tr>
<tr>
<td>INTEGRAL FILTER</td>
<td>200 μm abs</td>
</tr>
<tr>
<td>MOUNTING</td>
<td></td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td>-30 to 140 °F (-34 to 60 °C)</td>
</tr>
<tr>
<td>VIBRATION, RANDOM</td>
<td></td>
</tr>
<tr>
<td>SINE</td>
<td></td>
</tr>
<tr>
<td>ACCELERATION</td>
<td></td>
</tr>
<tr>
<td>SHOCK</td>
<td></td>
</tr>
<tr>
<td>LIFE, SERVICE</td>
<td></td>
</tr>
<tr>
<td>CYCLE</td>
<td>100</td>
</tr>
<tr>
<td>SHELF</td>
<td></td>
</tr>
<tr>
<td>RELIABILITY</td>
<td></td>
</tr>
<tr>
<td>LEAD TIME</td>
<td>180 days in 1974</td>
</tr>
<tr>
<td>COST</td>
<td>5 to 10 units - $2000 in 1974</td>
</tr>
<tr>
<td>REMARKS</td>
<td></td>
</tr>
<tr>
<td>DATA SOURCE</td>
<td>IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)</td>
</tr>
</tbody>
</table>
MANUFACTURER  Consolidated Controls Corporation
PART NUMBER  72855
DESCRIPTION  Manual fill and vent
QUALIFICATION STATUS  USAF P-50

PROPELLANT/FLUID  GN₂, N₂H₄

PRESSURE, OPERATING  345 psia (237 N/cm²)
PROOF  515 psia (355 N/cm²)
BURST

RATED FLOW  Equivalent to 0.5 in. (1.27 cm) orifice (See remarks.)

LEAKAGE, INTERNAL  5 SCCH GN₂
EXTERNAL  0.72 SCCH GN₂

MASS  1.20 lbm (0.544 kg) flight half only

DIMENSIONS

MATERIAL, BODY  CRES
SEAT/SEAL  CRES

CONNECTIONS, GROUND SIDE
SPACECRAFT SIDE
INTEGRAL FILTER  200 μm abs
MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

<table>
<thead>
<tr>
<th>Dash</th>
<th>Spacecraft brazed-tube</th>
<th>Flow</th>
<th>fitting-tube</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>0.375 in. (0.952 cm)</td>
<td>2.0 lbm/s GN₂</td>
<td>0.50-20 UNF</td>
</tr>
<tr>
<td>-3</td>
<td>0.750 in. (1.904 cm)</td>
<td>1.0 CFM H₂O</td>
<td>0.875-14 UNF</td>
</tr>
</tbody>
</table>

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
<table>
<thead>
<tr>
<th><strong>SERVICE VALVE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MANUFACTURER</strong></td>
</tr>
<tr>
<td><strong>PART NUMBER</strong></td>
</tr>
<tr>
<td><strong>DESCRIPTION</strong></td>
</tr>
<tr>
<td><strong>QUALIFICATION STATUS</strong></td>
</tr>
<tr>
<td><strong>PROPELLANT/FLUID</strong></td>
</tr>
<tr>
<td><strong>PRESSURE, OPERATING</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>RATED FLOW</strong></td>
</tr>
<tr>
<td><strong>LEAKAGE, INTERNAL</strong></td>
</tr>
<tr>
<td><strong>EXTERNAL</strong></td>
</tr>
<tr>
<td><strong>MASS</strong></td>
</tr>
<tr>
<td><strong>DIMENSIONS</strong></td>
</tr>
<tr>
<td><strong>MATERIAL, BODY</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>CONNECTIONS, GROUND SIDE</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>INTEGRAL FILTER</strong></td>
</tr>
<tr>
<td><strong>MOUNTING</strong></td>
</tr>
<tr>
<td><strong>OPERATING TEMPERATURE RANGE</strong></td>
</tr>
<tr>
<td><strong>VIBRATION, RANDOM</strong></td>
</tr>
<tr>
<td><strong>ACCELERATION</strong></td>
</tr>
<tr>
<td><strong>SHOCK</strong></td>
</tr>
<tr>
<td><strong>LIFE, SERVICE</strong></td>
</tr>
<tr>
<td><strong>CYCLE</strong></td>
</tr>
<tr>
<td><strong>SHELF</strong></td>
</tr>
<tr>
<td><strong>RELIABILITY</strong></td>
</tr>
<tr>
<td><strong>LEAD TIME</strong></td>
</tr>
<tr>
<td><strong>COST</strong></td>
</tr>
<tr>
<td><strong>REMARKS</strong></td>
</tr>
<tr>
<td><strong>DATA SOURCE</strong></td>
</tr>
<tr>
<td>MANUFACTURER</td>
</tr>
<tr>
<td>--------------------</td>
</tr>
<tr>
<td>PART NUMBER</td>
</tr>
<tr>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
</tr>
<tr>
<td>PRESSURE, OPERATING</td>
</tr>
<tr>
<td>PROOF</td>
</tr>
<tr>
<td>BURST</td>
</tr>
<tr>
<td>RATED FLOW</td>
</tr>
<tr>
<td>LEAKAGE, INTERNAL</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>MASS</td>
</tr>
<tr>
<td>DIMENSIONS</td>
</tr>
<tr>
<td>MATERIAL, BODY</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>CONNECTIONS, GROUND</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>INTEGRAL FILTER</td>
</tr>
<tr>
<td>MOUNTING</td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
</tr>
<tr>
<td>VIBRATION, RANDOM</td>
</tr>
<tr>
<td>SINE</td>
</tr>
<tr>
<td>ACCELERATION</td>
</tr>
<tr>
<td>SHOCK</td>
</tr>
<tr>
<td>LIFE, SERVICE</td>
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<td>RELIABILITY</td>
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<tr>
<td>LEAD TIME</td>
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<tr>
<td>COST</td>
</tr>
<tr>
<td>REMARKS</td>
</tr>
<tr>
<td>DATA SOURCE</td>
</tr>
</tbody>
</table>
**SERVICE VALVE**

**MANUFACTURER**  Futurecraft Corporation  
**PART NUMBER**  900491-1, -2  
**DESCRIPTION**  
**QUALIFICATION STATUS**  ASAT (Hamilton Standard)  
**PROPELLANT/FLUID**  \( \text{N}_2\text{H}_4, \text{GN}_2, \text{GHe}, \text{other compatible fluid} \)  
**PRESSURE, OPERATING**  0 to 500 (for -1), 8000 psia (for -2)  
**PROOF**  1000 (for -1), 16,000 psia (for -2)  
**BURST**  2000 (for -1), 32,000 psia (for -2)  
**RATED FLOW**  
**LEAKAGE, INTERNAL**  
**EXTERNAL**  
**MASS**  
**DIMENSIONS**  1.94/2.25 in. less tube by 1.50 in. by 1.25 in.  
**MATERIAL, BODY**  17-4PH CRES  
**SEAT/SEAL**  Metal to metal seat; ethylene propylene and Kel-F seal  
**CONNECTIONS, GROUND SIDE**  
**SPACECRAFT SIDE**  0.25-in.-diam tube  
**INTEGRAL FILTER**  
**MOUNTING**  0.221-in.-diam holes, two each, 1.000 in. apart  
**OPERATING TEMPERATURE RANGE**  
**VIBRATION, RANDOM**  
**SINE**  
**ACCELERATION**  
**SHOCK**  
**LIFE, SERVICE**  
**CYCLE**  
**SHELF**  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS**  
**DATA SOURCE**  Futurecraft drawing 900491 - 1985
MANUFACTURER  HTL Industries, Inc.
PART NUMBER  255620-3, 255921-3, (255610-2 ground fitting)
DESCRIPTION  Fill and drain
QUALIFICATION STATUS  Viking orbiter - 1975, Mariner - 1973

PROPELLANT/E J  N2, MMH, N2O4

PRESSURE, OPERATING  0 to 4015 psia (0 to 2768 N/cm²)
       PROOF  6015 psia (4147 N/cm²)
       BURST  16015 psia (11,042 N/cm²)

RATED FLOW  Liquid - 0.28 lbm/s H2O at 75 psid (0.12 kg/s at
51 N/cm²); gas - 17 SCFM N2 at 25 psid (8000 SCCS at 17 N/cm²)
LEAKAGE, INTERNAL  0.003 SCCS H2
       EXTERNAL  0.005 SCCS N2

MASS  0.30 lbm (0.13 kg)

DIMENSIONS

MATERIAL, BODY
       SEAT/SEAL

CONNECTIONS, GROUND SIDE
       SPACECRAFT SIDE

INTEGRAL FILTER

MOUNTING

OPERATING TEMPERATURE RANGE  25 to 125 °F (-3.8 to 51.6 °C)

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE
       CYCLE  100

SHelf

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
SERVICE VALVE

MANUFACTURER  Hughes Aircraft Company
PART NUMBER  325-7167
DESCRIPTION  Inline ball fill and vent valve
QUALIFICATION STATUS  Intelsat IV A, Westar, Anik

PROPELLANT/FLUID  N₂H₄

PRESSURE, OPERATING  415 psia (286 N/cm²)
PROOF  6015 psia (4147 N/cm²)
BURST  8015 psia (5526 N/cm²)

RATED FLOW  0.0553 lbm/s at 30 psid (0.0250 kg/sec at 20 N/cm²)

LEAKAGE, INTERNAL  0.50 SCCH

EXTERNAL

MASS  0.27 lbm (0.12 kg) flight half only

DIMENSIONS

MATERIAL, BODY  6Al-4V Ti
SEAT/SEAL

CONNECTIONS, GROUND SIDE  AND818-4J (1/4 in.)
SPACECRAFT SIDE

INTEGRAL FILTER
MOUNTING

OPERATING TEMPERATURE RANGE  -20 to 170 °F (-28 to 76.6 °C)

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE  1200

RELIABILITY
LEAD TIME
COST  $1400 in 1974

REMARKS

DATA SOURCE  IITRI lists (ref. 8)
<table>
<thead>
<tr>
<th><strong>MANUFACTURER</strong></th>
<th>Moog Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PART NUMBER</strong></td>
<td>Model 50-527</td>
</tr>
<tr>
<td><strong>DESCRIPTION</strong></td>
<td>Fill and drain</td>
</tr>
<tr>
<td><strong>QUALIFICATION STATUS</strong></td>
<td>Unknown</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PROPELLANT/FLUID</strong></th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>PRESSURE, OPERATING</strong></th>
<th>510 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROOF</strong></td>
<td>950 psig</td>
</tr>
<tr>
<td><strong>BURST</strong></td>
<td>1509 psig</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>RATED FLOW</strong></th>
<th>0.25 lbm/min He at 4 psid</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>LEAKAGE, INTERNAL</strong></th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>EXTERNAL</strong></th>
<th>Zero liquid at 510 psig, $10^{-5}$ SCCS GHe</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>MASS</strong></th>
<th>0.50 lbm max.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>DIMENSIONS</strong></th>
<th>3.48 in. by 2.79 in. diam</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>MATERIAL, BODY</strong></th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>SEAT/SEAL</strong></th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>CONNECTIONS, GROUND SIDE</strong></th>
<th>MS 33656-3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPACECRAFT SIDE</strong></td>
<td>1/4-in. tube</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>INTEGRAL FILTER</strong></th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>MOUNTING</strong></th>
<th>Three 0.196-in.-diam holes on 2.321-in.-diam BC</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>OPERATING TEMPERATURE RANGE</strong></th>
<th>-30 to 250 °F</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>VIBRATION, RANDOM</strong></th>
<th></th>
</tr>
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<table>
<thead>
<tr>
<th><strong>SINE</strong></th>
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<table>
<thead>
<tr>
<th><strong>ACCELERATION</strong></th>
<th></th>
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<table>
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<tr>
<th><strong>SHOCK</strong></th>
<th></th>
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</thead>
</table>

<table>
<thead>
<tr>
<th><strong>LIFE, SERVICE</strong></th>
<th>10 yr</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CYCLE</strong></td>
<td>100</td>
</tr>
<tr>
<td><strong>SHELF</strong></td>
<td>4 yr</td>
</tr>
<tr>
<td><strong>RELIABILITY</strong></td>
<td></td>
</tr>
<tr>
<td><strong>LEAD TIME</strong></td>
<td></td>
</tr>
<tr>
<td><strong>COST</strong></td>
<td></td>
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<tr>
<td><strong>REMARKS</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>DATA SOURCE</strong></th>
<th>Moog drawing A77479 - 1985</th>
</tr>
</thead>
</table>

95
MANUFACTURER   Moog Inc.
PART NUMBER   Model 50-528
DESCRIPTION   Fill and drain
QUALIFICATION STATUS   Unknown

PROPELLENT/FLUID

PRESSURE, OPERATING   510 psig
PROOF   950 psig
BURST   1509 psig

RATED FLOW   0.25 lbm/min at 4 psid

LEAKAGE, INTERNAL

EXTERNAL 10^-5 SCCS GHe at 510 psig zero liquid

MASS   0.50 lbm

DIMENSIONS   3.58 in. by 2.79 in. diam

MATERIAL, BODY

SEAT/SEAL

CONNECTIONS, GROUND SIDE   MS 33656-4
SPACECRAFT SIDE   1/4-in. tube

INTEGRAL FILTER

MOUNTING

OPERATING TEMPERATURE RANGE   -30 to 250 °F

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE   10 yr
CYCLE   100
SHELF   4 yr

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE   Moog drawing A77481 - 1985
## Service Valve

**Manufacturer:** Moog Inc.  
**Part Number:** Model 50-529  
**Description:** Fill, drain, and vent  
**Qualification Status:** Unknown

### Propellant/Fluid

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propellant/Fluid</td>
<td>MMH</td>
</tr>
</tbody>
</table>

### Pressure, Operating

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure, Operating</td>
<td>510 psig</td>
</tr>
<tr>
<td>Proof</td>
<td>950 psig</td>
</tr>
<tr>
<td>Burst</td>
<td>1509 psig</td>
</tr>
</tbody>
</table>

### Rated Flow

- 0.30 lbm/min at 15 psid

### Leakage

- Internal
- External: Zero liquid at 510 psig, $10^{-5}$ SCCS GHe

### Mass

- 0.50 lbm max.

### Dimensions

- 3.98 in. by 2.790 in. diam

### Material

- Body
- Seat/Seal

### Connections

- Ground Side: MS 33656-6
- Spacecraft Side: 0.375 in. o.d. tube

### Integral Filter

- Mounting

### Operating Temperature Range

- -30 to 250 °F

### Vibration

- Random
- Sine

### Acceleration

- Sine

### Shock

- Random

### Life

- Service: 10 yr  
- Cycle: 100  
- Shelf: 4 yr

### Reliability

- Shelf Reliability: 4 yr

### Lead Time

- Cost

### Remarks

- Moog drawing A77483 - 1985

### Data Source

- Moog drawing A77483 - 1985
SERVICE VALVE

MANUFACTURER  Moog Inc.
PART NUMBER  Model 50-530
DESCRIPTION  Fill, drain, and vent w/cover
QUALIFICATION STATUS  Unknown

PROPELLANT/FLUID  N₂O₄

PRESSURE, OPERATING  510 psig
  PROOF  950 psig
  BURST  1509 psig

RATED FLOW  30 lbm/min at 15 psid

LEAKAGE, INTERNAL
  EXTERNAL  Zero liquid at 510 psig, 10⁻⁵ SCCS GHe

MASS  0.50 lbm max.

DIMENSIONS  3.90 in. by 2.790 in. diam

MATERIAL, BODY
  SEAT/SEAL

CONNECTIONS, GROUND SIDE  MS 33656-8
  SPACECRAFT SIDE  0.375 in. o.d. tube

INTEGRAL FILTER

MOUNTING  Three 0.196-in.-diam holes EQ SP at 2.114 in.

OPERATING TEMPERATURE RANGE  -30 to 250 °F

VIBRATION, RANDOM
  SINE
  SHOCK

LIFE, SERVICE  10 yr
  CYCLE  100
  SHELF  4 yr

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Moog drawing A77485 - 1985
SERVICE VALVE

MANUFACTURER  Pyronetics Devices, Inc.
PART NUMBER  1146, 1176
DESCRIPTION  Inline manifold mounted, manual operation
QUALIFICATION STATUS  ATS, Surveyor, SAM-D, Apollo, etc.

PROPELLANT/FLUID

PRESSURE, OPERATING  4015 psia (2768 N/cm²) for Al alloy
PROOF  6015 psia (4147 N/cm²) for Al alloy
BURST  8015 psia (5526 N/cm²) for Al alloy

RATED FLOW

LEAKAGE, INTERNAL  0.03 SCCH He at 3015 psia (2078 N/cm²)

EXTERNAL

MASS  0.019 lbm (0.0086 kg) for Al alloy, 0.057 lbm (0.025 kg) for CRES

DIMENSIONS

MATERIAL, BODY  6061T6 Al alloy or 303 CRES
SEAT/SEAL

CONNECTIONS, GROUND SIDE
SPACECRAFT SIDE

INTEGRAL FILTER
MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  IITRI lists (ref. 8)
**SERVICE VALVE**

**MANUFACTURER** Pyronetics Devices, Inc.

**PART NUMBER** 1176-16; 1832-1

**DESCRIPTION** Manual, single-seat axial flow, fill and vent

**QUALIFICATION STATUS** Transit Improvement (TIP-II)

**PROPELLANT/FLUID** $\text{N}_2\text{H}_4$

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>535 psia (368 N/cm$^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROOF</td>
<td>1100 psia (758.4 N/cm$^2$)</td>
</tr>
<tr>
<td>BURST</td>
<td>2100 psia (1447 N/cm$^2$)</td>
</tr>
</tbody>
</table>

**RATED FLOW**

**LEAKAGE, INTERNAL** $3 \times 10^{-3}$ SCCS He at OP pressure

**EXTERNAL** $1 \times 10^{-6}$ SCCS He at OP pressure

**MASS** 0.1 lbm (0.04 kg) flight half only

**DIMENSIONS**

**MATERIAL, BODY** CRES

**SEAT/SEAL** Steel on steel

**CONNECTIONS, GROUND SIDE** 5/16-24 (for 1176), 3/8-24 (for 1832)

**SPACECRAFT SIDE** 1/2-20 (for 1176), 9/16-18 (for 1832)

**INTEGRAL FILTER** No

**MOUNTING**

**OPERATING TEMPERATURE RANGE** 41 to 122 °F (5 to 50 °C)

**VIBRATION, RANDOM**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE** 50

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
SERVICE VALVE

MANUFACTURER  Pyronetics Devices, Inc.
PART NUMBER  1811-4
DESCRIPTION  Inline fitting mounted, manually operated
QUALIFICATION STATUS  N. Rocket

PROPELLANT/FLUID  GN₂, He

PRESSURE, OPERATING  0 to 3015 psia (0 to 2078 N/cm²)
  PROOF  6015 psia (4147 N/cm²)
  BURST  12015 psia (8284 N/cm²)

RATED FLOW

LEAKAGE, INTERNAL  3.9x10⁻⁶ SCCH He at max. OP pressure
  EXTERNAL

MASS  0.07 lbm (0.03 kg)

DIMENSIONS

MATERIAL, BODY  6061-T6 Al alloy
  SEAT/SEAL

CONNECTIONS, GROUND SIDE
  SPACECRAFT SIDE
  INTEGRAL FILTER
  MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
  SINE
  ACCELERATION
  SHOCK

LIFE, SERVICE
  CYCLE
  SHELF
  RELIABILITY
  LEAD TIME
  COST
  REMARKS

DATA SOURCE  IITRI lists (ref. 8)
SERVICE VALVE

MANUFACTURER_ Pyronetics Devices, Inc.
PART NUMBER_ 1819
DESCRIPTION_ Inline bulkhead or manifold mount
QUALIFICATION STATUS_ COMSAT, Viking 1975, P-72, B-1, Scout, etc.

PROPELLANT/FLUID____________________________________________________

PRESSURE, OPERATING_ 0 to 5015 psia (0 to 3457 N/cm²)
PROOF_ 7515 psia (5181 N/cm²)
BURST_ 15,015 psia (10,352 N/cm²)

RATED FLOW__________________________________________________________

LEAKAGE, INTERNAL_ 0.03 SCCH He at max. OP pressure
EXTERNAL_____________________________________________________________

MASS_ 0.057 lbm (0.025 kg)

DIMENSIONS________________________________________________________

MATERIAL, BODY_ 303 CRES, AMS-5639 CRES
SEAT/SEAL_ Viton "A"

CONNECTIONS, GROUND SIDE
SPACECRAFT SIDE
INTEGRAL FILTER_____________________________________________________
MOUNTING___________________________________________________________

OPERATING TEMPERATURE RANGE_ -10 to 150 °F (-23 to 65.5 °C)

VIBRATION, RANDOM__________________________________________________
SINE_______________________________________________________________
ACCELERATION_______________________________________________________
SHOCK_______________________________________________________________

LIFE, SERVICE_____________________________________________________
CYCLE_ 100
SHELF______________________________________________________________
RELIABILITY_________________________________________________________
LEAD TIME__________________________________________________________
COST_______________________________________________________________
REMARKS____________________________________________________________

DATA SOURCE_ IITRI lists (ref. 8) and Aerospace Corporation report
(referenced).
SERVICE VALVE

MANUFACTURER Pyronetics Devices, Inc.
PART NUMBER 1821-1
DESCRIPTION Inline fitting mount, manually operated
QUALIFICATION STATUS N. Rocket

PROPELLANT/FLUID GN\(_2\), He

PRESSURE, OPERATING 365 psia (251 N/cm\(^2\))
PROOF 715 psia (492 N/cm\(^2\))
BURST 1415 psia (975.6 N/cm\(^2\))

RATED FLOW

LEAKAGE, INTERNAL $6.5 \times 10^{-8}$ SCCS He at 365 psia

EXTERNAL

MASS 0.07 lbm (0.03 kg)

DIMENSIONS

MATERIAL, BODY 304L CRES
SEAT/SEAL

CONNECTIONS, GROUND SIDE
SPACECRAFT SIDE
INTEGRAL FILTER
MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM SINE
ACCELERATION
SHOCK

LIFE, SERVICE CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE IITRI lists (ref. 8)
### SERVICE VALVE

MANUFACTURER  Pyronetics Devices, Inc.

PART NUMBER  1831

DESCRIPTION  Inline, flange mounted, manual fill and vent

QUALIFICATION STATUS  Viking 1975, MJS, GPR, CTS, HEAO, HCM

PROPELLANT/FLUID  GN₂, He

PRESSURE, OPERATING  555 psia (382 N/cm²)

PROOF  1115 psia (768.7 N/cm²)

BURST  2195 psia (1513 N/cm²)

RATED FLOW  0.15 lbm/s H₂O at 20 psid (0.068 kg/s at 13 N/cm²)

LEAKAGE, INTERNAL  1.7x10⁻³ SCCH He at OP pressure

EXTERNAL  1.3x10⁻⁷ SCCS He at 27 N/cm² (40 psia)

MASS  0.17 lbm (0.07 kg)

DIMENSIONS

MATERIAL, BODY  304L CRES

SEAT/SEAL

CONNECTIONS, GROUND SIDE

SPACECRAFT SIDE

INTEGRAL FILTER

MOUNTING

OPERATING TEMPERATURE RANGE  41 to 123 °F (5 to 50.5 °C)

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE  550

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
SERVICE VALVE

MANUFACTURER TRW
PART NUMBER 409708
DESCRIPTION Manually operated inline flow
QUALIFICATION STATUS Atmosphere Explorer 1973

PROPELLANT/FLUID $N_2H_4$

PRESSURE, OPERATING 600 psia (413 N/cm²)
    PROOF 900 psia (620 N/cm²)
    BURST 2400 psia (1654 N/cm²)

RATED FLOW

LEAKAGE, INTERNAL $1x10^{-5}$ SCCH He at OP pressure
    EXTERNAL $1x10^{-7}$ SCCS He at OP pressure

MASS 0.22 lbm (0.10 kg)

DIMENSIONS

MATERIAL, BODY CRES with Al₂O₃ ceramic ball
    SEAT/SEAL Ceramic on steel

CONNECTIONS, GROUND SIDE TRW P/N G404306
    SPACECRAFT SIDE 1/4-in. braze joint (Aeroquip)

INTEGRAL FILTER

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
    SINE

ACCELERATION

SHOCK

LIFE, SERVICE
    CYCLE 100
    SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE ITTRI lists (ref. 8)
SERVICE VALVE

MANUFACTURER  Wright Components, Inc.
PART NUMBER  12183
DESCRIPTION  Manual fill and drain, two-way
QUALIFICATION STATUS  MSD, classified

PROPELLANT/FLUID  N₂H₄

PRESSURE, OPERATING  0 to 350 psia (0 to 241 N/cm²)
  PROOF  615 psia (424 N/cm²)
  BURST  1215 psia (837 N/cm²)

RATED FLOW  52 SCCS He (0.156 in. diam; Cρ = 0.65)

LEAKAGE, INTERNAL  1.5x10⁻⁶ SCCS He at 79.2 N/cm²
  EXTERNAL  1.5x10⁻⁶ SCCS at 79.2 N/cm²

MASS  0.35 lbm (0.15 kg)

DIMENSIONS

MATERIAL, BODY  304 CRES
  SEAT/SEAL  304 CRES

CONNECTIONS, GROUND SIDE  Four-bolt flange
  SPACECRAFT SIDE  Special flange

INTEGRAL FILTER MOUNTING

OPERATING TEMPERATURE RANGE  -20 to 160 °F (-28 to 71 °C)

VIBRATION, RANDOM
  SINE

ACCELERATION

SHOCK

LIFE, SERVICE
  CYCLE  250
  SHELF

RELIABILITY

LEAD TIME  Special order; 18 to 24 weeks in 1974 (ARO)

COST

REMARKS

DATA SOURCE  Wright catalog - 1984, IITRI lists (ref. 8), and
  Aerospace Corporation report (ref. 9)
SERV\(\text{ICE VALVE}\)

MANUFACTURER  Wright Components, Inc.
PART NUMBER  12319
DESCRIPTION  Fill and drain, manual
QUALIFICATION STATUS  Shuttle-launched dispenser (See Remarks.)

PROPELLANT/FLUID  He, N\(_2\), 1PA, Freon, N\(_2\)H\(_4\), N\(_2\)O\(_4\), H\(_2\)O

PRESSURE, OPERATING  315 psia
PROOF
BURST

RATED FLOW  100 ppm H\(_2\)O (seat diam. 0.625 in.)

LEAKAGE, INTERNAL  1\times 10^{-6} SCCS He
EXTERNAL  1\times 10^{-6} SCCS He

MASS  1.5 lbm

DIMENSIONS

MATERIAL, BODY
SEAT/SEAL  TFE

CONNECTIONS, GROUND SIDE
STACECRAFT SIDE

INTEGRAL FILTER

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE  100 minimum

RELIABILITY

LEAD TIME

COST

REMARKS  Not known to have flown

DATA SOURCE  Wright catalog - 1984
FILTER

MANUFACTURER Aircraft Porous Media
PART NUMBER AC-A370-6
DESCRIPTION Fiberglass-mat element gas filter

QUALIFICATION STATUS ELMS
PROPELLANT/FLUID
RATING, ABSOLUTE 0.3 μm

PRESSURE, OPERATING 3500 psia (2415 N/cm²)
PROOF
BURST
DIFFERENTIAL

RATED FLOW 0.001 lbm/s N₂ at 2 psid (0.0005 kg/s)

MASS
DIMENSIONS

MATERIAL, BODY
ELEMENT

PORTS, INLET
OUTLET
MOUNTING

OPERATING TEMPERATURE RANGE -80 to 150 °F

VIBRATION, RANDOM 22.3g rms
SINE
ACCELERATION 15g
SHOCK 30g

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE Aerospace Corporation report (ref. 9)
FILTER

MANUFACTURER  Aircraft Porous Media
PART NUMBER  AC-6875-4
DESCRIPTION  Sintered wire-mesh element gas filter

QUALIFICATION STATUS  ELMS
PROPELLANT/FLUID
RATING, ABSOLUTE  5 μm

PRESSURE, OPERATING  180 psia (124 N/cm²)
PROOF
BURST
DIFFERENTIAL

RATED FLOW  0.0005 lbm/s He (0.00014 kg/s)

THROUGHPUT
LEAKAGE, EXTERNAL

MASS
DIMENSIONS

MATERIAL, BODY
ELEMENT

PORTS, INLET

OUTLET
MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 9)

109
FILTER

MANUFACTURER   Aircraft Porous Media
PART NUMBER    AC-6875-853
DESCRIPTION    Fiberglass element, inline, 0.5-in. (1.27-cm) gas filter
QUALIFICATION STATUS  Apollo LEM
PROPELLANT/FLUID   He
RATING, ABSOLUTE  5 μm
PRESSURE, OPERATING  4015 psia (2768 N/cm²)
   PROOF 5335 psia (3678 N/cm²)
   BURST 8015 psia (5526 N/cm²)
RATED FLOW    380 SCFM (1.7x10⁵ SCCS)
THROUGHPUT
LEAKAGE, EXTERNAL
MASS   0.38 lbm (0.17 kg)
DIMENSIONS

MATERIAL, BODY
   ELEMENT    Fiberglass

PORTS, INLET   Inline braze
   OUTLET    Inline braze

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
   SINE
ACCELERATION
SHOCK

LIFE, SERVICE
 CYCLE
 SHELF
RELIABILITY

LEAD TIME

COST   5 to 9 units -- $600 in 1974

REMARKS

DATA SOURCE   IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
FILTER

MANUFACTURER: Aircraft Porous Media
PART NUMBER: AC-6875-855
DESCRIPTION: Inline-braze gas filter

QUALIFICATION STATUS: Apollo LEM
PROPELLANT/FLUID: GHe
RATING, ABSOLUTE: 15 μm

PRESSURE, OPERATING: 1765 psia (1216 N/cm²)
PROOF: 2345 psia (1616 N/cm²)
BURST: 3515 psia (2423 N/cm²)
Differential

RATED FLOW: 380 SCFM (1.7x10⁵ SCCS)

THROUGHPUT
LEAKAGE, EXTERNAL

MASS: 0.43 lbm (0.19 kg)

DIMENSIONS

MATERIAL, BODY:
ELEMENT: Fiberglass mat

PORTS, INLET: Inline braze
OUTLET: Inline braze

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF

RELIABILITY

LEAD TIME
COST: 5 to 9 units - $1450 in 1974

REMARKS

DATA SOURCE: IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
FILTER

MANUFACTURER Circle Seal Controls, Brunswick

PART NUMBER F7008, F7009

DESCRIPTION

QUALIFICATION STATUS Apollo (Martin Marietta)

PROPELLANT/FLUID

RATING, ABSOLUTE

PRESSURE, OPERATING 6000 psi

PROOF

BURST

Differential

RATED FLOW

THROUGHPUT

LEAKAGE, EXTERNAL

MASS

DIMENSIONS

MATERIAL, BODY 304 CRES, TFE

ELEMENT

PORTS, INLET MS 33656-6

OUTLET Same as inlet

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE Circle Seals Controls list (ref. 10)
**FILTER**

**MANUFACTURER**  Facet Enterprises, Inc.

**PART NUMBER**  1736760-05

**DESCRIPTION**  Replaceable element, bypass

**QUALIFICATION STATUS**  Lear Fan 2100 Aircraft

**PROPELLANT/FLUID**  Liquid (jet fuel)

**RATING, ABSOLUTE**  20 μm nom.

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>80 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>DIFFERENTIAL</td>
<td>0.6 psid clean, 1.5 psid switch, 2.25 psid bypass</td>
</tr>
</tbody>
</table>

**RATED FLOW**  3 GPM

**THROUGHPUT**

**LEAKAGE, EXTERNAL**

**MASS**  1.5 lbm

**DIMENSIONS**  8.38 by 3.50 in.

**MATERIAL, BODY**

**ELEMENT**  Cellulose fiber and phenolic resin; CRES or Inconel may be available

**PORTS, INLET**  MS 33649-10

**OUTLET**  Same as inlet

**MOUNTING**

**OPERATING TEMPERATURE RANGE**  -65 to 160 °F

**VIBRATION, RANDOM**

**3INE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**  Integral 1.5 psid switch

**DATA SOURCE**  Facet product data catalog - 1986
FILTER

MANUFACTURER  Facet Enterprises, Inc.
PART NUMBER  1740001
DESCRIPTION  Replaceable element, integral differential pressure indicator
QUALIFICATION STATUS  Variation used on Nomad aircraft
PROPELLANT/FLUID  Liquid (jet fuel, gasoline)
RATING, ABSOLUTE  3 to 250 μm nom.

PRESSURE, OPERATING  100 psi
PROOF
BURST
DIFFERENTIAL  Indicator - 1 to 15 psid, bypass - 1.5 to 20 psid
RATED FLOW  To 10 GPM

THROUGHPUT
LEAKAGE, EXTERNAL

MASS  1.5 lbm
DIMENSIONS  7.75 by 4.00 in.

MATERIAL, BODY
ELEMENT

PORTS, INLET  MS 33656E10 fitting in MS 33649-12 port
OUTLET  Same as inlet
MOUNTING  Three-bolt holes

OPERATING TEMPERATURE RANGE  -65 to 300 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Facet product data catalog - 1986
FILTER

MANUFACTURER  Norman Equipment Company
PART NUMBER  4200T series
DESCRIPTION  Bidirectional, straight inline

QUALIFICATION STATUS

PROPELLANT/FLUID  Any fluid compatible w/304 CRES
RATING, ABSOLUTE  2x to 200 µm

PRESSURE, OPERATING  0 to 6000 psi; 0 to 3000 psi
PROOF  9000 psig
BURST  24,000 psig
DIFFERENTIAL

RATED FLOW

THROUGHPUT

LEAKAGE, EXTERNAL

MASS

DIMENSIONS  1-in. hex by 1.6-in.² element (for 0 to 6000 psi);
1.375-in. hex by 3.3-in.² element, 1.75-in. hex by 6.6-in.²
element (for 0 to 3000 psi)
MATERIAL, BODY  304 CRES
ELEMENT  304 CRES

PORTS, INLET  0.25 to 0.5-in. pipe, 37° SAE, MS 33656, or AND-10050
OUTLET  Same as inlet
MOUNTING

OPERATING TEMPERATURE RANGE  -320 to 800 °F

VIBRATION, RANDOM

SINE
ACCELERATION
SHOCK

LIFE, SERVICE

CYCLE
SHELF
RELIABILITY
LEAD TIME
COST

REMARKS  Cleanable, pleated, woven element

DATA SOURCE  Norman Equipment product data sheet - 1986
FILTER

**MANUFACTURER**  Norman Equipment Company  
**PART NUMBER**  4300 series  
**DESCRIPTION**  Straight inline

**QUALIFICATION STATUS**  
**PROPELLANT/FLUID**  Liquid (MIL-H-5606) and gas (air)  
**RATING, ABSOLUTE**  2x to 200 μm

**PRESSURE, OPERATING**  0 to 3000 psi  
**PROOF**  4500 psig  
**BURST**  12,000 psig  
**DIFFERENTIAL**  

**RATED FLOW**  1.2 to 29 GPM liquid/15 to 1750 SCFM gas

**THROUGHPUT**  
**LEAKAGE, EXTERNAL**  

**MASS**  
**DIMENSIONS**  

**MATERIAL, BODY**  303 CRES or 2024T351  
**ELEMENT**  304 CRES

**PORTS, INLET**  Pipe, 37° SAE, MS 33656, or AND10050  
**OUTLET**  Same as inlet

**MOUNTING**  

**OPERATING TEMPERATURE RANGE**  

**VIBRATION, RANDOM**  
**SINE**  
**ACCELERATION**  
**SHOCK**  

**LIFE, SERVICE**  
**CYCLE**  
**SHELF**  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS**  Cleanable, woven element

**DATA SOURCE**  Norman Equipment product data sheet - 1986
<table>
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<th><strong>FILTER</strong></th>
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<td><strong>MANUFACTURER</strong></td>
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<td><strong>PART NUMBER</strong></td>
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<th><strong>QUALIFICATION STATUS</strong></th>
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<tbody>
<tr>
<td><strong>PROPELLANT/FLUID</strong></td>
</tr>
<tr>
<td><strong>RATING, ABSOLUTE</strong></td>
</tr>
</tbody>
</table>

| **PRESSURE, OPERATING** | 150 psig |
| **PROOF** |
| **BURST** |
| **DIFFERENTIAL** | 0.3 psid clean |

| **RATED FLOW** | 350 SCFM |

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<tr>
<th><strong>THROUGHPUT</strong></th>
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<tbody>
<tr>
<td><strong>LEAKAGE, EXTERNAL</strong></td>
</tr>
</tbody>
</table>

| **MASS** | 20 lbm |
| **DIMENSIONS** | 24 by 7.8 by 6 in. |

| **MATERIAL, BODY** | 304 CRES |
| **ELEMENT** |

| **PORTS, INLET** | 1.5-in. NPT |
| **OUTLET** | 1.5-in. NPT, 0.25-in. NPT drain |

<table>
<thead>
<tr>
<th><strong>MOUNTING</strong></th>
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</thead>
</table>

| **OPERATING TEMPERATURE RANGE** | To 200 or 425 °F |

| **VIBRATION, RANDOM** |
| **SINE** |

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<td><strong>SHOCK</strong></td>
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</tbody>
</table>

| **LIFE, SERVICE** |
| **CYCLE** |
| **SHELF** |

| **RELIABILITY** |
| **LEAD TIME** |
| **COST** |

| **REMARKS** | Two-piece housing, removable element; PCS 350AF or HT cartridge P/N |

| **DATA SOURCE** | Pall product data sheet - 1986 |
FILTER

MANUFACTURER  Pall Pneumatic Products Corporation
PART NUMBER  PCS 33501 G24
DESCRIPTION  Single cartridge, particulate or coalescing

QUALIFICATION STATUS
PROPELLANT/FLUID  Pneumatic
RATING, ABSOLUTE

PRESSURE, OPERATING  300 psig
PROOF
BURST
DIFFERENTIAL  0.3 psid clean

RATED FLOW  810 SCFM

THROUGHPUT
LEAKAGE, EXTERNAL

MASS  30 lbm
DIMENSIONS  24 by 7.8 by 6 in.

MATERIAL, BODY  304 CRES
ELEMENT

PORTS, INLET  1.5-in. NPT
OUTLET  1.5-in. NPT, 0.25-in. NPT drain
MOUNTING

OPERATING TEMPERATURE RANGE  To 200 or 425 °F

VIBRATION, RANDOM
SINE ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST

REMARKS  Two-piece housing, removable element

DATA SOURCE  Pall product data sheet - 1986
FILTER

MANUFACTURER: Purolator Technologies
PART NUMBER
DESCRIPTION: Pressure, return, case drain elements

QUALIFICATION STATUS: Space shuttle (Rockwell)
PROPELLANT/FLUID: Hydraulic (MIL-H-83282)
RATING, ABSOLUTE: 5 μm for pressure, 15 μm for case drain/return

PRESSURE, OPERATING
PROOF
BURST
DIFFERENTIAL

RATED FLOW: 65 GPM for pressure and return, 5 GPM for case drain

THROUGHPUT
LEAKAGE, EXTERNAL

MASS: 22 lbm
DIMENSIONS: 12.25 by 6.5 by 10.5 in.

MATERIAL, BODY
ELEMENT

PORTS, INLET

OUTLET
MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST

REMARKS: Check valves and shutoff valves integral

DATA SOURCE: Purolator product data sheet - 1985
FILTER

MANUFACTURER  Vacco Industries
PART NUMBER  E-81916-4-15
DESCRIPTION  Cartridge element, liquid-propellant filter

QUALIFICATION STATUS  Titan III
PROPELLANT/FLUID  N₂H₄
RATING, ABSOLUTE  15 μm

PRESSURE, OPERATING  400 psia (275 N/cm²)
PROOF  668 psia (460 N/cm²)
BURST  888 psia (612 N/cm²)

RATED FLOW  0.222 lbm/s N₂H₄ at 4 psid and 75 °F (0.100 kg/s at 2 N/cm² and 23 °C)
THROUGHPUT LEAKAGE, EXTERNAL

MASS  0.75 lbm (0.34 kg)
DIMENSIONS

MATERIAL, BODY  303 CRES
ELEMENT  303 CRES, etched disc

PORTS, INLET  Special cartridge
OUTLET  Same as inlet

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM SINE
ACCELERATION
SHOCK

LIFE, SERVICE CYCLE
SHELF

RELIABILITY

LEAD TIME  8 to 10 weeks in 1974

COST

REMARKS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
FILTER

MANUFACTURER  Vacco Industries
PART NUMBER  FID10064-01
DESCRIPTION  0.25-in. inline liquid filter assembly, etched-disc element
QUALIFICATION STATUS  COMSAT, Intelsat IV, SDS
PROPELLANT/FLUID  N₂H₄
RATING, ABSOLUTE  10 μm

PRESSURE, OPERATING  315 psia (217 N/cm²)
    PROOF  465 psia (320 N/cm²)
    BURST  1215 psia (837.7 N/cm²)
DIFFERENTIAL

RATED FLOW  0.015 lbm/s N₂H₄ (0.007 kg/s)

THROUGHPUT

LEAKAGE, EXTERNAL

MASS  0.3 lbm (0.1 kg)

DIMENSIONS

MATERIAL, BODY  Ti
    ELEMENT

PORTS, INLET  0.25-in. o.d. by 0.020-in. wall tube
    OUTLET  Same as inlet

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
    SINE

ACCELERATION

SHOCK

LIFE, SERVICE
    CYCLE
    SHELF

RELIABILITY

LEAD TIME  8 to 10 weeks in 1974

COST

REMARKS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
FILTER

MANUFACTURER  Vacco Industries
PART NUMBER  F1D10093
DESCRIPTION  Etched-disc element, liquid filter

QUALIFICATION STATUS  Mariner, Viking
PROF. LANT/FLUID  N₂H₄
RATING, ABSOLUTE  35 μm

PRESSURE, OPERATING  300 psia (206 N/cm²)
PROOF
BURST  1200 psia (828 N/cm²)
DIFFERENTIAL

RATED FLOW  0.44 lbm/s at 3 psid and 70 °F (0.19 kg/s at 2 N/cm² and 21 °C)
THROUGHPUT
LEAKAGE, EXTERNAL

MASS  1.6 lbm (0.75 kg)
DIMENSIONS  6.3 in. length (16 cm)

MATERIAL, BODY  304 CRES
ELEMENT  304 CRES

PORTS, INLET  0.5-in. tube
OUTLET  Same as inlet
MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 9)
FILTER

MANUFACTURER  Vacco Industries
PART NUMBER  F1D10106-01
DESCRIPTION  Inline liquid-propellant filter assembly

QUALIFICATION STATUS  ERTS
PROPELLANT/FLUID  N₂H₄
RATING, ABSOLUTE  25 μm

PRESSURE, OPERATING  600 psia (413 N/cm²)
          PROOF  990 psia (682 N/cm²)
          BURST  1320 psia (910 N/cm²)
          DIFFERENTIAL

RATED FLOW

THROUGHPUT
LEAKAGE, EXTERNAL

MASS
DIMENSIONS

MATERIAL, BODY  304 CRES
           ELEMENT

PORTS, INLET
           OUTLET
MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
          SINE
ACCELERATION
SHOCK

LIFE, SERVICE
          CYCLE
          SHELF
RELIABILITY
LEAD TIME  8 to 10 weeks in 1974
COST

REMARKS

DATA SOURCE  IITRI lists (ref. 8)
FILTER

MANUFACTURER: Vacco Industries
PART NUMBER: F1D10106-02
DESCRIPTION: Inline liquid-propellant filter assembly

QUALIFICATION STATUS: ERB
PROPELLANT/FLUID: N₂H₄
RATING, ABSOLUTE: 25 μm

PRESSURE, OPERATING: 880 psia (606 N/cm²)
PROOF: 1320 psia (910 N/cm²)
BURST: 2640 psia (1870 N/cm²)

RATED FLOW

THROUGHPUT
LEAKAGE, EXTERNAL

MASS
DIMENSIONS

MATERIAL, BODY: 304 CRES
ELEMENT

PORTS, INLET
OUTLET
MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME: 8 to 10 weeks in 1974
COST
REMARKS

DATA SOURCE: IITRI lists (ref. 8)
**FILTER**

**MANUFACTURER**  Vacco Industries  
**PART NUMBER**  F1D10132-01  
**DESCRIPTION**  0.25-in. inline filter assembly, etched-disc element  

**QUALIFICATION STATUS**  Apollo  
**PROPELLANT/FLUID**  GN₂  
**RATING, ABSOLUTE**  40 µm  

**PRESSURE, OPERATING**  1000 psia (689.4 N/cm²)  
**PROOF**  2040 psia (1406 N/cm²)  
**BURST**  4080 psia (2813 N/cm²)  
**DIFFERENTIAL**

**RATED FLOW**  423 SCFM GN₂ at 15 psid and 75 °F (1.99x10⁵ SCCS at 10 N/cm² and 23 °C)  
**THROUGHPUT**
**LEAKAGE, EXTERNAL**

**MASS**  0.5 lbm (0.1 kg)  
**DIMENSIONS**

**MATERIAL, BODY**  304L CRES  
**ELEMENT**  304L CRES  

**PORTS, INLET**  0.25-in. o.d. by 0.035-in. wall tube  
**OUTLET**  Same as inlet  
**MOUNTING**

**OPERATING TEMPERATURE RANGE**  -275 to 170 °F (-170 to 76.6 °C)  
**VIBRATION, RANDOM**
**SINE**
**ACCELERATION**
**SHOCK**

**LIFE, SERVICE**
**CYCLE**
**SHELF**
**RELIABILITY**
**LEAD TIME**  8 to 10 weeks in 1974  
**COST**  
**REMARKS**

**DATA SOURCE**  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
MANUFACTURER  Vacco Industries
PART NUMBER  FIDI0151-01
DESCRIPTION  0.25-in. inline liquid-propellant filter assembly

QUALIFICATION STATUS  CTS
PROPELLANT/FLUID  Anhydrous N₂H₄
RATING, ABSOLUTE  10 µm

PRESSURE, OPERATING  300 psia (206 N/cm²)
                  PROOF  450 psia (310 N/cm²)
                  BURST  1200 psia (827.3 N/cm²)
DIFFERENTIAL  

RATED FLOW  0.05 lbm/s for N₂H₄ at 10 psid and 75 °F (0.02 kg/s at 6.8 N/cm² and 23 °C)

THROUGHPUT

LEAKAGE, EXTERNAL

MASS  0.50 lbm (0.22 kg)

DIMENSIONS

MATERIAL, BODY  304L CRES
              ELEMENT  304L CRES, etched disc

PORTS, INLET  0.25-in. by 0.020-in. wall tube

OUTLET  Same as inlet

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME  8 to 10 weeks in 1974

COST

REMARKS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
MANUFACTURER: Vacca Industries
PART NUMBER: F1D10178-01
DESCRIPTION: 0.375-in. inline gas filter assembly

QUALIFICATION STATUS: Qualified

PROPELLANT/FLUID: He
RATING, ABSOLUTE: 12 μm

PRESSURE, OPERATING: 4000 psia (2757 N/cm²)
PROOF: 6000 psia (4136 N/cm²)
BURST: 14900 psia (10273 N/cm²)

RATED FLOW: 16 SCFM He at 5 psid and 75 °F (7500 SCCS at 3 N/cm² and 23 °C)

THROUGHPUT

LEAKAGE, EXTERNAL

MASS: 1.0 lbm (0.45 kg)

DIMENSIONS

MATERIAL, BODY: 304L CRES
ELEMENT: 304L CRES

PORTS, INLET: 0.375-in. o.d. by 0.050-in. wall tube
OUTLET: Same as inlet

MOUNTING

OPERATING TEMPERATURE RANGE: 30 to 90 °F (-1 to 32 °C)

VIBRATION, RANDOM
SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME: 8 to 10 weeks in 1974

COST

REMARKS

DATA SOURCE: IITRI lists (ref. 8)
**FILTER**

**MANUFACTURER**  
Vacco Industries

**PART NUMBER**  
FID10180-01

**DESCRIPTION**  
0.25 in. inline gas filter assembly

**QUALIFICATION STATUS**  
OSO-1

**PROPELLANT/FLUID**  
GN₂

**RATING, ABSOLUTE**  
10 μm

**PRESSURE, OPERATING**  
4000 psia (2757 N/cm²)

**PROOF**  
6000 psia (4136 N/cm²)

**BURST**  
14,000 psia (9652 N/cm²)

**RATED FLOW**  
7.0 SCFM GN₂ at 1 psid and 75 °F (3300 SCCS at 0.6 N/cm² and 23 °C)

**THROUGHPUT LEAKAGE, EXTERNAL**

**MASS**  
0.30 lbm (0.13 kg)

**DIMENSIONS**

**MATERIAL, BODY**  
Ti

**ELEMENT**  
.04L CRES, etched disc

**PORTS, INLET**  
0.25-in. tube (0.63 cm) by 0.018-in. wall

**OUTLET MOUNTING**  
Bracket; two holes, 0.217 in. diam (0.55 cm)

**OPERATING TEMPERATURE RANGE**  
-40 to 140 °F (-40 to 60 °C)

**VIBRATION, RANDOM**  
18.6g rms

**SINE**  
12g

**ACCELERATION**  
18g

**LIFE, SERVICE CYCLE**

**RELIABILITY**

**LEAD TIME**  
8 to 10 weeks in 1974

**COST**

**REMARKS**

**DATA SOURCE**  
IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
FILTER

MANUFACTURER  Vacco Industries
PART NO. 3ER F1D10182-01 and -02
DESCRIPTION 0.1875-in. inline liquid filter assembly

QUALIFICATION STATUS  CTS
PROPELLANT/FLUID  N$_2$H$_4$
RATING, ABSOLUTE  10 $\mu$m

PRESSURE, OPERATING  396 psia (273 N/cm$^2$)
PROOF  594 psia (409 N/cm$^2$)
BURST  1584 psia (1092 N/cm$^2$)
Differential

RATED FLOW  0.025 lbm/s N$_2$H$_4$ at 5 psid and 75°F (0.011 kg/s at 3 N/cm$^2$ and 23 °C)

THROUGHPUT
LEAKAGE, EXTERNAL  1x10$^{-6}$ SCCS He at 315 psia (217 N/cm$^2$)

MASS  0.23 lbm (0.10 kg)

DIMENSIONS

MATERIAL, BODY  Ti
ELEMENT  316L CRES (F.H.)

PORTS, INLET
OUTLET
MOUNTING

OPERATING TEMPERATURE RANGE  40 to 160°F (4.4 to 71 °C)

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME  8 to 10 weeks in 1974
COST
REMARKS  -01 dynamic unit, -02 production unit

DATA SOURCE  IITRI lists (ref. 8)
FILTER

MANUFACTURER  Vacco Industries
PART NUMBER  SL-81019
DESCRIPTION  Inline gas filter assembly

QUALIFICATION STATUS  Viking lunar orbiter
PROPELLANT/FLUID  GN₂
RATING, ABSOLUTE  12 μm

PRESSURE, OPERATING  3820 psia (2633 N/cm²)
                     PROOF  5730 psia (3950 N/cm²)
                     BURST  7640 psia (5267 N/cm²)
                     DIFFERENTIAL

RATED FLOW  10 SCFM GN₂ at 15 psid and 75 °F (4700 SCCS at 10 N/cm² and 23 °C)

THROUGHPUT
LEAKAGE, EXTERNAL

MASS  0.033 lbm (0.014 kg)
DIMENSIONS

MATERIAL, BODY  304L CRES
                 ELEMENT  304L CRES

PORTS, INLET  0.25-in. o.d. by 0.035-in. wall tube
               OUTLET  Same as inlet
MOUNTING

OPERATING TEMPERATURE RANGE  -65 to 160 °F (-53 to 71 °C)

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY

LEAD TIME  8 to 10 weeks in 1974
COST
REMARKS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
**FILTER**

**MANUFACTURER**  Vacco Industries  
**PART NUMBER**  SL-81500  
**DESCRIPTION**  Inline gas filter assembly  

**QUALIFICATION STATUS**  Apollo  
**PROPELLANT/FLUID**  GHe  
**RATING, ABSOLUTE**  12 \( \mu \)m  

**PRESSURE, OPERATING**  1000 psia (689.4 N/cm\(^2\))  
**PROOF**  3500 psia (2413 N/cm\(^2\))  
**BURST**  7000 psia (4826 N/cm\(^2\))  

**RATED FLOW**  40 SCFM He at 10 psid and 75 °F (1.9x10\(^4\) SCCS at 6.8 N/cm\(^2\) and 23 °C)  

**THROUGHPUT, LEAKAGE, EXTERNAL**  
**MASS**  0.22 lbm (0.1 kg)  
**DIMENSIONS**  

**MATERIAL**  BODY 304L CRES  
**ELEMENT**  304L CRES, etched disc  

**PORTS, INLET**  0.25-in. o.d. by 0.035-in. wall tube  
**OUTLET**  Same as inlet  
**MOUNTING**  

**OPERATING TEMPERATURE RANGE**  -275 to 160 °F (-170 to 71 °C)  
**VIBRATION, RANDOM**  
**ACCELERATION**  
**SHOCK**  

**LIFE, SERVICE**  
**CYCLE**  
**SHELF**  
**RELIABILITY**  
**LEAD TIME**  8 to 10 weeks in 1974  
**COST**  
**REMARKS**  

**DATA SOURCE**  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)  

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FILTER

MANUFACTURER  Vacco Industries

PART NUMBER  S2-8846

DESCRIPTION  Inline gas filter assembly

QUALIFICATION STATUS  LEM

PROPELLANT/FLUID  GHe

RATING, ABSOLUTE  15 µm

PRESSURE, OPERATING  4000 psia (2757 N/cm²)

PROOF  5320 psia (3668 N/cm²)

BURST  8000 psia (5515 N/cm²)

Differential

RATED FLOW  130 SCFM He at 2.8 psid and 65 °F (6.3x10⁴ SCCS at 1.9 N/cm² and 18 °C)

THROUGHPUT

LEAKAGE, EXTERNAL

MASS  0.43 lbm (0.19 kg)

DIMENSIONS

MATERIAL, BODY  304L CRES

ELEMENT  304 CRES, etched disc

PORTS, INLET  0.375-in. o.d. by 0.040-in. wall tube

OUTLET  Same as inlet

MOUNTING

OPERATING TEMPERATURE RANGE  -65 to 160 °F (-53 to 71 °C)

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME  8 to 10 weeks in 1974

COST

REMARKS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
**FILTER**

**MANUFACTURER** Western Filter Corporation  
**PART NUMBER** Series 6030  
**DESCRIPTION** Inline, gas or liquid

**QUALIFICATION STATUS**

**PROPELLANT/FLUID** Compatible w/300 series CRES  
**RATING, ABSOLUTE** 10 to 75 μm

**PRESSURE, OPERATING** 6000 psi  
**PROOF** 9000 psi  
**BURST**  
**DIFFERENTIAL** 75 or 300 psid

**RATED FLOW** To 8 GPM liquid, to 200 SCFM gas

**THROUGHPUT**
**LEAKAGE, EXTERNAL**

**MASS**
**DIMENSIONS**

**MATERIAL, BODY** 304 CRES  
**ELEMENT**

**PORTS, INLET** Optional for 0.25 to 0.5-in. line  
**OUTLET** Same as inlet

**MOUNTING**

**OPERATING TEMPERATURE RANGE** Cryogenic to 800 °F

**VIBRATION, RANDOM**
**SINE**
**ACCELERATION**
**SHOCK**

**LIFE, SERVICE**
**CYCLE**
**SHELF**
**RELIABILITY**
**LEAD TIME**
**COST**
**REMARKS**

**DATA SOURCE** Western Filter product data sheet - 1982

133
FILTER

MANUFACTURER Western Filter Corporation
PART NUMBER XX-1-16510-XX (series 16510)
DESCRIPTION Inline filter, twilled Dutch double-weave element

QUALIFICATION STATUS

PROPELLANT/FLUID LHe, GHe, LN₂, GN₂, LOX, 90-percent H₂O₂
RATING, ABSOLUTE 10 to 85 μm

PRESSURE, OPERATING 4500 psi
PROOF
BURST
DIFFERENTIAL

RATED FLOW 4 GPM

THROUGHPUT

LEAKAGE, EXTERNAL

MASS

DIMENSIONS 3.5 in. by 1.25 or 1.375 in. diam (excluding ports)

MATERIAL, BODY 300 series CRES, TFE seal
ELEMENT 304 CRES

PORTS, INLET MS 33565-4, -6, -8, or -12

OUTLET Same as inlet

MOUNTING

OPERATING TEMPERATURE RANGE -425 to 500 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE

CYCLE
SHELF
RELIABILITY
LEAD TIME
COST

REMARKS Filtration rating increases w/tube and port size

DATA SOURCE Western Filter product data sheet - 1982
FILTER

MANUFACTURER  Wintec, Brunswick
PART NUMBER  8228-501
DESCRIPTION

QUALIFICATION STATUS  Apollo
PROPELLANT/FLUID
RATING, ABSOLUTE

PRESSURE, OPERATING  150 psia (104 N/cm²)
 PROOF
 BURST
 DIFFERENTIAL

RATED FLOW

THROUGHPUT
LEAKAGE, EXTERNAL

MASS
DIMENSIONS

MATERIAL, BODY
 ELEMENT

PORTS, INLET

OUTLET
MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
 SINE
 ACCELERATION
 SHOCK

LIFE, SERVICE
 CYCLE
 SHELF
 RELIABILITY
 LEAD TIME
 COST
 REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 9)
<table>
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<th>FILTER</th>
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<tbody>
<tr>
<td>MANUFACTURER: Wintec, Brunswick</td>
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<tr>
<td>PART NUMBER: 11267-504</td>
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<tr>
<td>DESCRIPTION: Sintered metal-fiber element gas filter</td>
</tr>
<tr>
<td>QUALIFICATION STATUS: Viking</td>
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<tr>
<td>PROPELLANT/FLUID:</td>
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<tr>
<td>RATING, ABSOLUTE: 5 μm</td>
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<tr>
<td>PRESSURE, OPERATING: 50 psia (35 N/cm²)</td>
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<tr>
<td>PROOF:</td>
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<tr>
<td>BURST:</td>
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<td>SHOCK:</td>
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<tr>
<td>LIFE, SERVICE:</td>
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<td>SHELF:</td>
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<tr>
<td>REMARKS:</td>
</tr>
<tr>
<td>DATA SOURCE: Aerospace Corporation report (ref. 9)</td>
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</tbody>
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FILTER

MANUFACTURER  Wintec, Brunswick
PART NUMBER  12204-508
DESCRIPTION  Woven-wire element gas filter

QUALIFICATION STATUS  Apollo
PROPELLANT/FLUID  He
RATING, ABSOLUTE  60 µm

PRESSURE, OPERATING  315 psia (217 N/cm²)
PROOF  465 psia (320 N/cm²)
BURST  1215 psia (837 N/cm²)
Differential

RATED FLOW  8 SCFM He at 155 psid

THROUGHPUT

LEAKAGE, EXTERNAL  0.0001 SCCS He

MASS  0.8 lbm (0.3 kg)

DIMENSIONS

MATERIAL, BODY  300 series CRES
ELEMENT  300 series CRES

PORTS, INLET  MS 24385-4

OUTLET  AND10050-4

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  ITTRI lists (ref. 8) and Aerospace Corporation report (ref. 9)

137
MANUFACTURER Wintec, Brunswick
PART NUMBER 14228-502
DESCRIPTION Woven-wire element gas filter

QUALIFICATION STATUS USAF classified program

RATED FLOW 20 SCFM GN₂ at 450 psid and 70 °F (9440 SCCS GN₂ at 310 N/cm² and 21 °C)

PRESSURE, OPERATING 5215 psia (3595 N/cm²)
PROOF 7515 psia (5181 N/cm²)
BURST 10,015 psia (6905 N/cm²)
DIFFERENTIAL 10.00 psid (6.9 N/cm²)

RATED FLOW 20 SCFM GN₂ at 450 psid and 70 °F (9440 SCCS GN₂ at 310 N/cm² and 21 °C)

THROUGHPUT

LEAKAGE, EXTERNAL

MASS 0.4 lbm (0.1 kg)

MATERIAL, BODY 300 series CRES
ELEMENT 300 series CRES

PORTS, INLET MS 33656E4
OUTLET Same as inlet

OPERATING TEMPERATURE RANGE -100 to 160 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE CYCLE

RELIABILITY
LEAD TIME
COST

REMARKS

DATA SOURCE Wintec product data sheet - 1985, IITRI lists (ref. 8), and Aerospace Corporation report (ref. 9)
FILTER

MANUFACTURER  Wintec, Brunswick
PART NUMBER 14228-621-3
DESCRIPTION __________________________________________________
QUALIFICATION STATUS  Classified program
PROPELLANT/FLUID  H₂O, alcohol
RATING, ABSOLUTE  25 µm

PRESSURE, OPERATING  330 psia (228 N/cm²)
PROOF
BURST
DIFFERENTIAL  0.90 psid (0.6 N/cm²)

RATED FLOW  1.3 lbm/s (0.6 kg/s)
THROUGHPUT
LEAKAGE, EXTERNAL

MASS
DIMENSIONS ____________________________________________________

MATERIAL, BODY
ELEMENT ______________________________________________________

PORTS, INLET

OUTLET  AN818-12J

MOUNTING _____________________________________________________

OPERATING TEMPERATURE RANGE  -65 to °F

VIBRATION, RANDOM
SINE  ACCELERATION
SHOCK ________________________________________________________

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS ______________________________________________________

DATA SOURCE  Wintec product data sheet - 1985 and Aerospace Corporation report (ref. 9)

139
**FILTER**

**MANUFACTURER**  Wintec, Brunswick  
**PART NUMBER**  14267-602  
**DESCRIPTION**  Wire-mesh element gas filter  

**QUALIFICATION STATUS**  ERTS, NIMBUS  
**PROPELLANT/FLUID**  
**RATING, ABSOLUTE**  10 µm  

**PRESSURE, OPERATING**  2000 psia (1380 N/cm²)  
**PROOF**  
**BURST**  
**DIFFERENTIAL**  

**RATED FLOW**  12 SCFM at 50 psia and 70 °F (5.6x10⁻³ SCCS at 35 N/cm² and 21 °C)  
**THROUGHPUT**  
**LEAKAGE, EXTERNAL**  

**MASS**  
**DIMENSIONS**  

**MATERIAL, BODY**  
**ELEMENT**  304 CRES wire mesh  

**PORTS, INLET**  
**OUTLET**  
**MOUNTING**  

**OPERATING TEMPERATURE RANGE**  -60 to 160 °F (-51 to 71 °C)  
**VIBRATION, RANDOM**  20g rms  
**SINE**  20g  
**ACCELERATION**  30g  
**SHOCK**  

**LIFE, SERVICE**  5 yr  
**CYCLE**  
**SHELF**  3 yr  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS**  

**DATA SOURCE**  Aerospace Corporation report (ref. 9)
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<thead>
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<th>MANUFACTURER</th>
<th>Wintec, Brunswick</th>
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<td>PART NUMBER</td>
<td>15204-516</td>
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<tr>
<td>DESCRIPTION</td>
<td>Woven-wire element gas filter</td>
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<td>PROPELLANT/FLUID</td>
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<td>RATING: ABSOLUTE</td>
<td>74 μm (33 μm nom.)</td>
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<td>PRESSURE, OPERATING</td>
<td>186 psi</td>
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<tr>
<td>PROOF</td>
<td>215 psi</td>
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<td>BURST</td>
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<td>DIFFERENTIAL</td>
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<tr>
<td>RATED FLOW</td>
<td>403 SCFM He at 186 psi and 60 °F (270 lbm/hr)</td>
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<tr>
<td></td>
<td>1.9x10^5 SCCS He at 128 N/cm² and 15 °C</td>
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<td>THROUGHPUT</td>
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<tr>
<td>LEAKAGE, EXTERNAL</td>
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<tr>
<td>MASS</td>
<td>1.5 lbm (0.68 kg)</td>
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<td>DIMENSIONS</td>
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<td>MATERIAL, BODY</td>
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<td>ELEMENT</td>
<td>300 series CRES</td>
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<tr>
<td>PORTS, INLET</td>
<td></td>
</tr>
<tr>
<td>OUTLET</td>
<td>1-in. tube</td>
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<td>MOUNTING</td>
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<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td>65 to 275 °F</td>
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<td>VIBRATION, RANDOM</td>
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<td>SINE</td>
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<td>ACCELERATION</td>
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<td>COST</td>
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<td>REMARKS</td>
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DATA SOURCE Wintec product data sheet - 1985 and IITRI lists (ref. 8)
FILTER

MANUFACTURER  Wintec, Brunswick
PART NUMBER  15228-572
DESCRIPTION  Woven-wire element liquid-propellant filter

QUALIFICATION STATUS  Viking (qualified, not flown)
PROPELLANT/FLUID  $N_2H_4$
RATING, ABSOLUTE  35 µm

PRESSURE, OPERATING  555 psia (382 N/cm²)
   PROOF  825 psia (568 N/cm²)
   BURST  1095 psia (754 N/cm²)
   DIFFERENTIAL  1.50 psid

RATED FLOW  2.30 lbm/s $H_2O$ at 315 psid and 70 °F (1.04 kg/s $H_2O$ at 217 N/cm² and 21 °C)

THROUGHPUT
LEAKAGE, EXTERNAL

MASS  0.45 lbm (0.2 kg)
DIMENSIONS

MATERIAL, BODY  300 series CRES
   ELEMENT  300 series CRES

PORTS. INLET Flange; three 0.25-in. 28 UNJF-3A studs
   OUTLET Flange; four 0.187-in.-diam holes

MOUNTING

OPERATING TEMPERATURE RANGE  -20 to 125 °F

VIBRATION, RANDOM
   SINE
   ACCELERATION
   SHOCK

LIFE, SERVICE
   CYCLE
   SHELF
   RELIABILITY
   LEAD TIME
   COST
   REMARKS

DATA SOURCE  Wintec product data sheet - 1985, IITRI lists (ref. 8), and Aerospace Corporation report (ref. 9)
FILTER

MANUFACTURER  Wintec, Brunswick
PART NUMBER  15241-508
DESCRIPTION

QUALIFICATION STATUS  Apollo, AE
PROPELLANT/FLUID  UDMH, GN₂, GHe, deionized H₂O
RATING, ABSOLUTE  18 μm (5 μm nom.)

PRESSURE, OPERATING  250 psia (173 N/cm²)
PROOF
BURST
DIFFERENTIAL  0.50 psid

RATED FLOW

THROUGHPUT
LEAKAGE, EXTERNAL

MASS
DIMENSIONS

MATERIAL, BODY
ELEMENT

PORTS, INLET
OUTLET
MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Wintec product data sheet - 1985, and Aerospace Corporation report (ref. 9)
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<td><strong>MASS</strong></td>
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<td><strong>DIMENSIONS</strong></td>
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<td><strong>MATERIAL, BODY</strong></td>
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<td><strong>ELEMENT</strong></td>
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<td><strong>PORTS, INLET</strong></td>
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<td><strong>MOUNTING</strong></td>
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<tr>
<td><strong>OPERATING TEMPERATURE RANGE</strong></td>
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<td><strong>VIBRATION, RANDOM</strong></td>
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<td><strong>SINE</strong></td>
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<td><strong>ACCELERATION</strong></td>
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<td><strong>SHOCK</strong></td>
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<td><strong>COST</strong></td>
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**DATA SOURCE** | ITTRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
FILTER

MANUFACTURER  Wintec, Brunswick
PART NUMBER  15241-647
DESCRIPTION  Woven-wire element liquid-propellant filter

QUALIFICATION STATUS  USAF P777, AE, DSCSII, DSP
PROPELLANT/FLUID  N₂H₄
RATING, ABSOLUTE  15 μm

PRESSURE, OPERATING  615 psia (424 N/cm²)
                        PROOF  1017 psia (701 N/cm²)
                        BURST  1347 psia (928 N/cm²)
Differential

RATED FLOW  0.05 lbm/s N₂H₄ at 1.0 psid and 70 °F (0.02 kg/s at
                        0.69 N/cm² and 21 °C)

THROUGHPUT
LEAKAGE, EXTERNAL  1x10⁻⁷ SCCS He

MASS  0.4 lbm (0.2 kg)

DIMENSIONS

MATERIAL, BODY  300 series CRES
                        ELEMENT  300 series CRES

PORTS, INLET  0.25-in. o.d. tube
                        OUTLET  Same as inlet

MOUNTING

OPERATING TEMPERATURE RANGE  -50 to 300 °F (-51 to 149 °C)

VIBRATION, RANDOM  20g rms
                        SINE  10g
ACCELERATION  24g
SHOCK  1000g

LIFE, SERVICE  7 yr
                        CYCLE  3 yr

RELIABILITY
LEAD TIME
COST

DATA SOURCE  ITTRI lists (ref. 8) and Aerospace Corporation report
                        (ref. 9)
MANUFACTURER  Wintec, Brunswick
PART NUMBER  15241-685 (TRW P/N EQ1-464)
DESCRIPTION  Metal-mesh element liquid-propellant filter

QUALIFICATION STATUS  Atmosphere Explorer (qualified)
PROPELLANT/FLUID  N₂H₄
RATING, ABSOLUTE  15 µm

PRESSURE, OPERATING  600 psia (413 N/cm²)
PROOF  900 psia (620 N/cm²)
BURST  2400 psia (1544 N/cm²)

RATED FLOW  0.02 lbm/s N₂H₄ at 1.0 psid and 70 °F (0.0009 kg/s at 0.68 N/cm² and 21 °C)

THROUGHPUT
LEAKAGE, EXTERNAL  1x10⁻⁷ SCCS He at 750 psia (517 N/cm²)

MASS  0.4 lbm (0.2 kg)
DIMENSIONS  5-in. length including tube connection

MATERIAL, BODY  All CRES welded inline
ELEMENT  Twilled Dutch double-weave wire cloth

PORTS, INLET  0.25-in. o.d. tube (brazed into system by Aeroquip process)
OUTLET  Same as inlet

OPERATING TEMPERATURE RANGE  41 to 122 °F (5 to 50 °C)

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  ITTRI lists (ref. 8)
FILTER

MANUFACTURER  Wintec, Brunswick
PART NUMBER  15241-694-1 and -2
DESCRIPTION  Wire-mesh element liquid filter

QUALIFICATION STATUS  FLTSATCOM
PROPELLANT/FLUID  N₂H₄
RATING, ABSOLUTE  10 µm

PRESSURE, OPERATING  350 psi
   PROOF
   BURST
   DIFFERENTIAL  0.50 psid

RATED FLOW  60 lbm/hr

THROUGHPUT
LEAKAGE, EXTERNAL

MASS
DIMENSIONS

MATERIAL, BODY
ELEMENT

PORTS, INLET
OUTLET
MOUNTING

OPERATING TEMPERATURE RANGE  40 to 120 °F (for -1) and 150 °F (for -2)
VIBRATION, RANDOM  20.8g rms
   SINE
   ACCELERATION  15g
SHOCK  2500g

LIFE, SERVICE  5 yr
   CYCLE
   SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Wintec product data sheet - 1985 and Aerospace Corporation report (ref. 9)
FILTER

MANUFACTURER  Wintec, Brunswick
PART NUMBER  15267-602
DESCRIPTION

QUALIFICATION STATUS  Classified program
PROPELLANT/FLUID  Aerozine 50, GN₂, GHe, alcohol, Freon
RATING, ABSOLUTE  10 µm

PRESSURE, OPERATING  400 psia (276 N/cm²)
PROOF
BURST
DIFFERENTIAL  2.00 psid

RATED FLOW  2520 lbm/hr

THROUGHPUT
LEAKAGE, EXTERNAL

MASS
DIMENSIONS

MATERIAL, BODY
ELEMENT

PORTS, INLET
OUTLET 0.50-in. tube

MOUNTING

OPERATING TEMPERATURE RANGE  40 to 140 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Wintec product data sheet - 1985 and Aerospace
Corporation report (ref. 9)
FILTER

MANUFACTURER Wintec, Brunswick

PART NUMBER 15267-60.

DESCRIPTION

QUALIFICATION STATUS Skylab

PROPELLANT/FLUID Air, GN₂, GO₂

RATING, ABSOLUTE 10 μm

PRESSURE, OPERATING 300 psia (208 N/cm²)

PROOF

BURST

DIFFERENTIAL 25 psid

RATED FLOW 50 SCFM

THROUGHPUT

LEAKAGE, EXTERNAL

MASS

DIMENSIONS

MATERIAL, BODY

ELEMENT

PORTS, INLET

OUTLET MS 33656-4

MOUNTING

OPERATING TEMPERATURE RANGE -65 to 275 °F

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE Wintec product data sheet - 1985 and Aerospace Corporation report (ref. ?)
MANUFACTURER  Wintec, Brunswick
PART NUMBER  15267-604
DESCRIPTION

QUALIFICATION STATUS  Skylab

PROPELLANT/FLUID

RATING, ABSOLUTE  10 μm

PRESSURE, OPERATING  6000 psia (4160 N/cm²)

PROOF

BURST

DIFFERENTIAL

RATED FLOW

THROUGHPUT

LEAKAGE, EXTERNAL

MASS

DIMENSIONS

MATERIAL, BODY

ELEMENT

PORTS, INLET

OUTLET

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 9)
MANUFACTURER Wirtec, Brunswick
PART NUMBER 15312-501-1
DESCRIPTION Woven-wire element liquid-propellant filter

QUALIFICATION STATUS USAF P95 satellite
PROPELLANT/FLUID N₂H₄
RATING, ABSOLUTE 25 μm

PRESSURE, OPERATING 415 psia (286 N/cm²)
PROOF 915 psia (630 N/cm²)
BURST 1215 psia (837 N/cm²)
DIFFERENTIAL

RATED FLOW 0.075 lbm/s N₂H₄ at 2 psid and 70 °F (0.034 kg/s at 1 N/cm² and 21 °C)

THROUGHPUT
LEAKAGE, EXTERNAL No GN₂ bubbles at 415 psia (286 N/cm²) in Freon TF for 2 min
MASS 0.75 lbm (0.34 kg)

DIMENSIONS

MATERIAL, BODY 300 series CRES
ELEMENT 300 series CRES

PORTS, INLET AN-818-GJ "E" nut and MS 20819-GJ sleeve
OUTLET Same as inlet

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE IITRI lists (ref. 8)
FILTER

MANUFACTURER  Wintec, Brunswick
PART NUMBER  15312-501-3
DESCRIPTION  Woven-wire element liquid-propellant filter

QUALIFICATION STATUS  USAF P95 satellite
PROPELLANT/FLUID  N₂H₄
RATING, ABSOLUTE  25 μm

PRESSURE, OPERATING  415 psia (286 N/cm²)
PROOF  915 psia (630 N/cm²)
BURST  1715 psia (1182 N/cm²)

RATED FLOW  0.075 lbm/s at 2 psid and 70 °F (0.034 kg/s at 1 N/cm² and 21 °C)

THROUGHPUT
LEAKAGE, EXTERNAL  No GN₂ bubbles at operating pressure submerged in Freon TF for 2 min

MASS  0.46 lbm (0.20 kg)

DIMENSIONS

MATERIAL, BODY  300 series CRES
ELEMENT  300 series CRES

PORTS, INLET  0.375-in.-o.d. tube
OUTLET  Same as inlet

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
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<td>PART NUMBER</td>
<td>AM3C</td>
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<tr>
<td>DESCRIPTION</td>
<td>Hydraulic pump</td>
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<tr>
<td>QUALIFICATION STATUS</td>
<td>Space shuttle (rudder/speed brake)</td>
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**Propellant/Fluid**

**Pressure, Max Inlet**

**Max Outlet**

**Rated Flow**

**Leakage, Internal**

**Mass**

**Dimensions**

**Material, Body**

**Seals**

**Integral Check Valve**

**Ports, Size & Type**

**Motor, Volts**

**Watts**

**Power Output**

**Electrical Connection**

**RPM**

**Duty Cycle**

**Cooling Method**

**Mounting**

**Operating Temperature Range**

**Vibration, Random**

**Sine**

**Acceleration**

**Shock**

**Life, Service**

**Cycle**

**Shelf**

**Reliability**

**Lead Time**

**Cost**

**Remarks**

**Data Source** Abex product data sheet - 1984
## COMPRESSOR/PUMP

**MANUFACTURER**  Abex Corporation  
**PART NUMBER**  AP05VC  
**DESCRIPTION**  Multiple axial piston, single-stage, variable-volume pump  
**QUALIFICATION STATUS**  Aircraft - Boeing 707, 727, 737; McDAC DC8; SNIAS A300, A310; etc.  
**PROPELLANT/FLUID**  Hydraulic phosphate ester, MIL-H-5606, MIL-L-7808, MIL-H-83282  

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<th>PRESSURE, MAX INLET</th>
<th>30 psi</th>
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<tbody>
<tr>
<td>MAX OUTLET</td>
<td>3000 psig</td>
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<td>RATIO</td>
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<tr>
<td>FLUID FLOW</td>
<td>4.4 GPM (16.7 L/min)</td>
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<tr>
<td>INTERNAL MASS</td>
<td>1.9 lbm (0.86 kg)</td>
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<tr>
<td>DIMENSIONS</td>
<td>3.094 by 3.094 by 2.90 in. (7.86 by 7.86 by 7.46 cm)</td>
</tr>
</tbody>
</table>

**MATERIAL, BODY**  
**SEALS**  INTEGRAL CHECK VALVE  
**PORTS, SIZE & TYPE**  AND10050-6 (pressure and suction), -4 (case drain and seal drain)  
**MOTOR, VOLTS**  
**WATTS**  POWER OUTPUT  
**ELECTRICAL CONNECTION**  
**RPM**  12,000  
**DUTY CYCLE**  
**COOLING METHOD**  
**MOUNTING**  AND10260 type X  
**OPERATING TEMPERATURE RANGE**  -65 to 275 °F (-54 to 135 °C)  
**VIBRATION, RANDOM**  
**SINE**  
**ACCELERATION**  
**SHOCK**  
**LIFE, SERVICE**  2000-hr normal operation  
**CYCLE**  
**SHELF**  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS**  Allowed particle contamination up to 40 μm. Motor is separate from compressor.  

**DATA SOURCE**  Abex product data sheet - 1984
**COMPRESSOR/PUMP**

**MANUFACTURER** Abex Corporation

**PART NUMBER** AP27V

**DESCRIPTION** Multiple axial piston, single-stage pump

**QUALIFICATION STATUS** Shuttle orbiter and SRB

**PROPELLANT/FLUID** Phosphate esters, MIL-H-560<sup>C</sup>, MIL-L-7808, MIL-H-83282

<table>
<thead>
<tr>
<th>PRESSURE, MAX INLET</th>
<th>50 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX OUTLET</td>
<td>3000 psi</td>
</tr>
<tr>
<td>RATIO</td>
<td>60:1</td>
</tr>
</tbody>
</table>

**RATED FLOW** 90 GPM (341 L/min)

**LEAKAGE, INTERNAL**

**MASS** 29.75 lbm (13.49 kg)

**DIMENSIONS** 9.8 in. approximate length (25 cm)

**MATERIAL, BODY**

**SEALS** INTEGRAL CHECK VALVE

**PORTS, SIZE & TYPE** MS 33649-20 (suction), -16 (outlet), -8 (case drain)

**MOTOR, VOLTS** MS 33649-20

**WATTS**

**POWER OUTPUT**

**ELECTRICAL CONNECTION**

**RPM** 5000

**DUTY CYCLE**

**COOLING METHOD**

**MOUNTING** OPERATING TEMPERATURE RANGE -65 to 275 °F (-54 to 135 °C)

**VIBRATION, RANDOM**

**SINE ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS** Motor is a separate item

**DATA SOURCE** Abex product data sheet - 1984
COMPRESSOR/PUMP

MANUFACTURER  Bendix Fluid Power Division
PART NUMBER  33E08-1
DESCRIPTION  Motor-driven, double-ended, nonlubricated piston

QUALIFICATION STATUS

PROPELLANT/FLUID  Air

PRESSURE, MAX INLET  1 atm
MAX OUTLET  20 psig
RATIO  2.36:1

RATED FLOW  3 CFM

LEAKAGE, INTERNAL
MASS  13 lbm

DIMENSIONS

MATERIAL, BODY
SEALS  TFE (piston)
INTEGRAL CHECK VALVE

PORTS, SIZE & TYPE

MOTOR, VOLTS  25 to 31 Vdc
WATTS  527
POWER OUTPUT
ELECTRICAL CONNECTION
RPM

DUTY CYCLE  Continuous

COOLING METHOD

MOUNTING

OPERATING TEMPERATURE RANGE  -25 to 125 °F

VIBRATION, RANDOM
SINE

ACCELERATION

SHOCK

LIFE, SERVICE  1000 hr

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS  Designed for operation at 10,000-ft altitude max., integral relief 15 to 25 psi

DATA SOURCE  Bendix product data sheet - 1985
COMPRESSOR/PUMP

MANUFACTURER  Lexair Inc.
PART NUMBER  P57228
DESCRIPTION  Two-stage, convection cooled w/intercooler

QUALIFICATION STATUS  U.S. Navy submarine

PROPELLANT/FLUID  CO\textsubscript{2}

PRESSURE, MAX INLET  10 psig
MAX Outlet  550 psi
RATIO  22:1

RATED FLOW  1.2 to 3.5 SCFM (8 to 24 lbm/hr)

LEAKAGE, INTERNAL
MASS  44 lbm (30.8 lbm possible)

DIMENSIONS  12.84 by 12.35 by 18.1 in.

MATERIAL, BODY
SEALS
INTEGRAL CHECK VALVE

PORTS, SIZE & TYPE

MOTOR, VOLTS
WATTS  Optional
POWER OUTPUT  0.8 to 1.6 bhp

ELECTRICAL CONNECTION
RPM

DUTY CYCLE

COOLING METHOD

MOUNTING  Four 0.531-in. diam holes at 6.28 by 7.16 in.

OPERATING TEMPERATURE RANGE  to 340 °F

VIBRATION, RANDOM
SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST  $6680 w/o motor or ≈ $9000 w/motor per unit in 1985

REMARKS  Mineral oil pressure lubricated; may require modifications for microgravity operation; convection cooled

DATA SOURCE  Lexair product data sheet - 1985
MANUFACTURER  Metal Bellows Division
PART NUMBER  DX27312
DESCRIPTION  Three-stage bellows gas compressor

QUALIFICATION STATUS  Not qualified; MORL research

PROPELLANT/FLUID

PRESSURE, MAX INLET  30 psia
 MAX OUTLET  300 psia
 RATIO  10:1
RATED FLOW  0.5 SCFM min.
LEAKAGE, INTERNAL
MASS  25 lbm
DIMENSIONS

MATERIAL, BODY
SEALS
INTEGRAL CHECK VALVE
PORTS, SIZE & TYPE

MOTOR, VOLTS  200 V (three phase)
 WATTS  700 max.
 POWER OUTPUT  0.38 hp
 ELECTRICAL CONNECTION
 RPM  3700
DUTY CYCLE
COOLING METHOD
MOUNTING
OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
 SINE
ACCELERATION
SHOCK

LIFE, SERVICE
 CYCLE
 SHELF
RELIABILITY
LEAD TIME
COST  Four units $39,175 in 1972 (including $22,500 engineering)
REMARKS  Motors are no longer available; design modification necessary

DATA SOURCE  Metal Bellows drawing DX27312 - 1973
<table>
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<th><strong>COMPRESSOR/PUMP</strong></th>
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<tr>
<td><strong>DESCRIPTION</strong></td>
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<tr>
<td><strong>QUALIFICATION STATUS</strong></td>
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<td><strong>PROPELLANT/FLUID</strong></td>
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<td><strong>PRESSURE, MAX INLET</strong></td>
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<td><strong>RATED FLOW RATIO</strong></td>
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<td><strong>LEAKAGE, INTERNAL</strong></td>
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<td><strong>MASS</strong></td>
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<td><strong>DIMENSIONS</strong></td>
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<tr>
<td><strong>INTEGRAL CHECK VALVE</strong></td>
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<tr>
<td><strong>PORTS, SIZE &amp; TYPE</strong></td>
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<td><strong>MOTOR, VOLTS</strong></td>
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<tr>
<td><strong>WATTS</strong></td>
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<tr>
<td><strong>POWER OUTPUT</strong></td>
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<tr>
<td><strong>ELECTRICAL CONNECTION</strong></td>
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<tr>
<td><strong>RPM</strong></td>
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<tr>
<td><strong>DUTY CYCLE</strong></td>
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<tr>
<td><strong>COOLING METHOD</strong></td>
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<tr>
<td><strong>MOUNTING</strong></td>
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<tr>
<td><strong>OPERATING TEMPERATURE RANGE</strong></td>
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<td><strong>VIBRATION, RANDOM</strong></td>
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<tr>
<td><strong>SINE ACCELERATION</strong></td>
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<td><strong>SHOCK</strong></td>
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<td><strong>LEAD TIME</strong></td>
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<td><strong>COST</strong></td>
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<td><strong>REMARKS</strong></td>
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<td>DIMENSIONS</td>
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<td>INTEGRAL CHECK VALVE</td>
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<td>PORTS, SIZE &amp; TYPE</td>
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<td>VIBRATION, RANDOM</td>
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<tr>
<td>COST</td>
</tr>
<tr>
<td>REMARKS</td>
</tr>
</tbody>
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DATA SOURCE | Moog Model 50-503 Circulator Pump Rev A |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(Product description report)</td>
<td>1985</td>
</tr>
</tbody>
</table>
### PRESSURE SWITCH

Manufacturers: Consolidated Controls Corporation

**Part Number**: 21SN04-22

**Description**: __________

**Qualification Status**: Satellite (Walter Kidde)

**Propellant/Fluid**: __________

<table>
<thead>
<tr>
<th>压力</th>
<th>规格</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>18 ± 2 psig</td>
</tr>
<tr>
<td>Reset</td>
<td>12 psig min.</td>
</tr>
</tbody>
</table>

**Max Operating**:

- **Proof**: 50 psig
- **Burst**: 75 psig

**Duty Cycle**: __________

**Mass**: __________

**Dimensions**: __________

**Material**: __________

**Port, Size & Type**: 0.736-in.-diam special plug

**Voltage**: 28 ± 5 to 5.5 Vdc

**Watts**: 66

**Electrical Connection**: __________

**Mounting**: Four-bolt flange; 0.177-in.-diam holes on a 1.375 in. square

**Operating Temperature Range**: 40 to 120 °F

**Vibration, Random**: __________

**Sine Acceleration**: __________

**Shock**: __________

**Life, Service**: __________

**Cycle**: __________

**Shelf**: __________

**Reliability**: __________

**Lead Time**: __________

**Cost**: __________

**Remarks**: __________

**Data Source**: Consolidated Controls drawing R21SN04-22 - 1985
PRESSURE SWITCH

MANUFACTURER  Consolidated Controls Corporation
PART NUMBER  21SN04-93
DESCRIPTION

QUALIFICATION STATUS  Satellite (Walter Kidde)

PROPELLANT/FLUID

PRESSURE, OFF  3.2±0.15 psig
   RESET  2.85 psig min.
MAX OPERATING
   PROOF  50 psig
   BURST  75 psig

DUTY CYCLE

MASS

DIMENSIONS  4.06 in. max. by 1.75 in. diam less leads and port

MATERIAL
PORT, SIZE & TYPE  0.483-in.-diam special plug
VOLTAGE  28±5 to 5.5 Vdc
WATTS  17
ELECTRICAL CONNECTION  2 lead wires

MOUNTING

OPERATING TEMPERATURE RANGE  40 to 120 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Consolidated Controls drawing R21SN04-93 - 1985
**PRESSURE SWITCH**

**MANUFACTURER** Consolidated Controls Corporation  
**PART NUMBER** 21SN22-1  
**DESCRIPTION**  

**QUALIFICATION STATUS** Saturn (McDonnell Douglas)  
**PROPELLANT/FLUID** LOX  

**PRESSURE, OFF** 41.0 psia  
**RESET** 38.0 psia min.  
**MAX OPERATING**  
**PROOF** 74 psia  
**BURST** 125 psia  

**DUTY CYCLE**  
**MASS**  
**DIMENSIONS** 4.90 in. max. by 3.625 in. diam  
**MATERIAL**  
**PORT, SIZE & TYPE** MC172-4, MC172-2 test port  
**VOLTAGE** 30 Vdc  
**WATTS** 15  
**ELECTRICAL CONNECTION** Mates w/Bendix PTOGE-8-4S  

**MOUNTING**  

**OPERATING TEMPERATURE RANGE** -200 to 175 °F  
**VIBRATION, RANDOM**  
**SINE**  
**ACCELERATION**  
**SHOCK**  

**LIFE, SERVICE**  
**CYCLE**  
**RELIABILITY**  
**SHELF**  
**LEAD TIME**  
**COST**  
**REMARKS**  

**DATA SOURCE** Consolidated Controls drawing R21SN22-1 - 1985
### PRESSURE SWITCH

**MANUFACTURER**  Consolidated Controls Corporation  
**PART NUMBER**  21SN41 series  
**DESCRIPTION**  High temperature, low pressure  

**QUALIFICATION STATUS**  Airbus  

**PROPELLANT/FLUID**  

**PRESSURE, OFF**  0.75 to 40 psig  
**RESET**  
**MAX OPERATING**  80 psig  
**PROOF**  120 psig  
**BURST**  

**DUTY CYCLE**  

**MASS**  

**DIMENSIONS**  1.97 in. less connections and port by 1.76 in. diam  

**MATERIAL**  CRES  
**PORT, SIZE & TYPE**  MS 33514E6  
**VOLTAGE**  
**WATTS**  
**ELECTRICAL CONNECTION**  Mates w/MS 24266R12T3S  

**MOUNTING**  

**OPERATING TEMPERATURE RANGE**  -65 to 400 °F  
**VIBRATION, RANDOM**  
**SINE**  
**ACCELERATION**  
**SHOCK**  

**LIFE, SERVICE**  
**CYCLE**  
**SHELF**  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS**  

**DATA SOURCE**  Consolidated Controls product data sheet - 1985  

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### PRESSURE SWITCH

<table>
<thead>
<tr>
<th><strong>MANUFACTURER</strong></th>
<th>Consolidated Controls Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PART NUMBER</strong></td>
<td>212C50-54H</td>
</tr>
<tr>
<td><strong>DESCRIPTION</strong></td>
<td></td>
</tr>
<tr>
<td><strong>QUALIFICATION STATUS</strong></td>
<td>Peacekeeper (United Technologies Chemical Systems Division)</td>
</tr>
<tr>
<td><strong>PROPELLANT/FLUID</strong></td>
<td>Freon 12</td>
</tr>
</tbody>
</table>

| **PRESSURE, OFF** | 9.25 psia |
| **RESET**         | 0.5 psia min. |
| **MAX OPERATING** | 220 psia   |
| **PROJ F**        | 300 psia   |
| **BURST**         | 485 psia   |

| **DUTY CYCLE** |                                   |
| **MASS**       |                                   |
| **DIMENSIONS** | 4.38 by 2.25 by 1.28 in.          |

<table>
<thead>
<tr>
<th><strong>MATERIAL</strong></th>
<th>Port, Size &amp; Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLTAGE</td>
<td>28 Vdc</td>
</tr>
<tr>
<td>WATTS</td>
<td>112</td>
</tr>
<tr>
<td>ELECTRICAL CONNECTION</td>
<td>Mates w/ G&amp;H Technology P/N BLG6F11-5SN</td>
</tr>
</tbody>
</table>

| **OPERATING TEMPERATURE RANGE** | 23 to 121 °F |
| **VIBRATION, RANDOM**           |               |
| **SINE**                        |               |
| **ACCELERATION**                |               |
| **SHOCK**                       |               |

| **LIFE, SERVICE**               |               |
| **CYCLE**                      | 100 min       |
| **SHELF**                      |               |
| **RELIABILITY**                |               |
| **LEAD TIME**                  |               |
| **COST**                       |               |
| **REMARKS**                    | 1x10^{-7} SCCS He at 220 psia leakage |

| **DATA SOURCE**                | Consolidated Controls drawing R212C50-54H - 1985 |

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### PRESSURE SWITCH

**MANUFACTURER** Consolidated Controls Corporation  
**PART NUMBER** 212C117-5  
**DESCRIPTION**

**QUALIFICATION STATUS** Standard missile (Aerojet) (Morton Thiokol)

**PROPELLANT/FLUID**

**PRESSURE, OFF** 370 psig  
**RESET** 160 psig  
**MAX OPERATING**  
**PROOF** 4000 psi  
**BURST** 7500 psi

**DUTY CYCLE**

**MASS**

**DIMENSIONS** 2.821 in. by 1.00 in. diam

**MATERIAL**

**PORT, SIZE & TYPE** MS 33656E3  
**VOLTAGE**

**WATTS**

**ELECTRICAL CONNECTION** MS 3113H-10A-6P

**MOUNTING**

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE** 200 min.  
**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Consolidated Controls drawing R212C117-5 - 1985
PRESSURE SWITCH

MANUFACTURER  Consolidated Controls Corporation
PART NUMBER  218C50
DESCRIPTION  Vacuum switch

QUALIFICATION STATUS

PROPELLANT/FLUID

PRESSURE, OFF  1- to 30-in. mercury (vacuum)
RESET
MAX OPERATING
PROOF  150 percent max. operating
BURST

DUTY CYCLE
MASS  0.23 lbm
DIMENSIONS  2.94 in. by 1.40 in. diam

MATERIAL
PORT, SIZE & TYPE  AND10050-4
VOLTAGE
WATTS
ELECTRICAL CONNECTION  Mates w/MS 3106-10SL-3S

MOUNTING

OPERATING TEMPERATURE RANGE  -65 to 250 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE  50,000 min.
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS  Meets MIL-E-5272

DATA SOURCE  Consolidated Controls product data sheet - 1985
**PRESSURE SWITCH**

**MANUFACTURER**  ITT Neo-Dyn  
**PART NUMBER**  1103P, 1173P, and 1193P  
**DESCRIPTION**  Welded diaphragm type, pneumatic, hydraulic

**QUALIFICATION STATUS**

**PROPELLANT/FLUID**

<table>
<thead>
<tr>
<th>PRESSURE, OFF</th>
<th>1 to 100 psig (psia for 1193P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESET</td>
<td></td>
</tr>
<tr>
<td>MAX OPERATING</td>
<td></td>
</tr>
<tr>
<td>PROOF</td>
<td>300 psig for 1103P and 1193P, 100 psig for 1173P</td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
</tbody>
</table>

**DUTY CYCLE**

| MASS          | 0.13 lbn |

**MATERIAL**  CRES  
**PORT, SIZE & TYPE**  MS 33656E4  
**VOLTAGE**  28 Vdc rated  
**WATTS**  196 (28 for 1193P)  
**ELECTRICAL CONNECTION**

**MOUNTING**

**OPERATING TEMPERATURE RANGE**  -65 to 275 °F ambient  
**VIBRATION, RANDOM**  
SINE  J to 2000 Hz; 0 to 15g  
**ACCELERATION**  
SHOCK  25 to 50g  

**LIFE, SERVICE**  
CYCLE  75,000 to 100,000  
SHELF

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**  Optional: 100 to 1500 switch-off setpoint range; 550 °F max. ambient temperature, 600g vibration

**DATA SOURCE**  ITT Neo-Dyn product data sheet - 1985
### PRESSURE SWITCH

**MANUFACTURER**  ITT Neo-Dyn  
**PART NUMBER** 1105P and 1106P  
**DESCRIPTION** Diaphragm type, pneumatic (hydraulic optional)

**QUALIFICATION STATUS**  
**PROPELLANT/FLUID**  

**PRESSURE, OFF** 1 to 600 psig  
**RESET**  
**MAX OPERATING**  
**PROOF** 4500 psig  
**BURST**

**DUTY CYCLE**  
**MASS** 0.13 lbm  
**DIMENSIONS**

**MATERIAL** Al (CRES optional for 1105P only)  
**PORT, SIZE & TYPE** MS 33656E4  
**VOLTAGE** 28 Vdc rated  
**WATTS** 196  
**ELECTRICAL CONNECTION**  
**MOUNTING**

**OPERATING TEMPERATURE RANGE** -65 to 275 °F ambient  
**VIBRATION, RANDOM**  
**SINE** 0 to 2000 Hz; 0 to 15g  
**ACCELERATION**

**SHOCK** 25 to 50g

**LIFE, SERVICE**  
**CYCLE** 75,000 to 100,000  
**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS** Optional: 600 to 1400 psig switch-off setpoint range, dry circuit, 350 °F max. ambient OP temperature; 600g vibration; CRES body (1105P); hydraulic medium optional; hermetically sealed electicals

**DATA SOURCE** ITT Neo-Dyn product data sheet - 1985
PRESSURE SWITCH

MANUFACTURER  Systron Donner, Edcliff
PART NUMBER  2-54
DESCRIPTION  Snap action SPDT, diaphragm

QUALIFICATION STATUS

PROPELLANT/FLUID  Any material-compatible fluid

PRESSURE, OFF (ON) 1 to 300 psig
  RESET
  MAX OPERATING  300 psig
  PROOF  600 psig
BURST

DUTY CYCLE
MASS  0.11 lbm (0.05 kg)
DIMENSIONS  2.50 in. by 0.87 in. hex (6.35 by 2.21 cm)

MATERIAL  NiSpan-C, 17-7PH CRES
PORT, SIZE & TYPE  MS 33656-4 or optional
VOLTAGE  28 Vdc (rated)
WATTS  196 W (rated)
ELECTRICAL CONNECTION  Solder pins or optional

MOUNTING

OPERATING TEMPERATURE RANGE  -58 to 302 °F (-50 to 150 °C)

VIBRATION, RANDOM
  SINE  10g at 20 to 2000 Hz
ACCELERATION  100g
SHOCK  100g for 11 ms, 1000g for 0.6 ms

LIFE, SERVICE
  CYCLE  25,000

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Systron Donner product data sheet - 1986
PRESURE SWITCH

MANUFACTURER  Systron Donner, Edcliff
PART NUMBER  4-902
DESCRIPTION  Strain gage, N.O.

QUALIFICATION STATUS

PROPELLANT/FLUID

PRESSURE, OFF  0 to 5000 psia/psig
RESET
MAX OPERATING  0 to 5000 psia/psig
PROOF  2X max.
BURST  5X max.

DUTY CYCLE
MASS  0.75 lbm (0.34 kg)
DIMENSIONS  1.50-in. hex by 3.60 in. less port (3.81 by 9.14 cm)

MATERIAL  17-7PH CRES
PORT, SIZE & TYPE  AN893-4S modified
VOLTAGE  32 Vdc; 28 Vdc nom.
WATTS
ELECTRICAL CONNECTION  PT1H-8-4P

MOUNTING

OPERATING TEMPERATURE RANGE  -58 to 248 °F (-50 to 120 °C)

VIBRATION, RANDOM
SINE  50g peak to 2000 Hz
ACCELERATION  100g
SHOCK  100g for 11 ms

LIFE, SERVICE
CYCLE  1x10⁹

RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Systron Donner product data sheet - 1936
PRESSURE SWITCH

MANUFACTURER  Systron Donner, Edcliff
PART NUMBER  610 and 612
DESCRIPTION  Low-pressure differential switch; single and dual

QUALIFICATION STATUS

PROPELLANT/FLUID

PRESSURE, OFF  0.2 to 20 in. H2O
RESET
MAX OPERATING
PROOF  50 psig
BURST

DUTY CYCLE

MASS

DIMENSIONS  2-in. hex by 1.63 or 2.40 in. (5.08 by 4.14 or 6.10 cm)

MATERIAL

PORT, SIZE & TYPE  1/8-27 female pipe thread
VOLTAGE  115 Vac rated
WATTS  575 W rated
ELECTRICAL CONNECTION  Solder pins

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE

CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Systron Donner product data sheet - 1986
Check Valve

Manufacturer: Aerodyne Controls Corporation
Part Number: 4022

Description: Inline
Qualification Status: DOD qualified

Propellant/Fluid: Pneumatic

Pressure, Operating:
- Cracking: 1.0 psid min.
- Proof: 750 psig
- Burst: 1500 psig

Rated Flow: 4.0 SCFM (FEOD - 0.11 in.)

Leakage:
- Internal: Zero at 2.5 to 750 psid
- External: Zero at 300 psig

Mass: 0.88 lbm

Dimensions: 1.54 by 0.68 in. hex

Material, Body:
- Seat/Seal
- Spring

Ports, Size & Type: MS 3365G4 (inlet)

Mounting

Operating Temperature Range: -65 to 185 °F

Vibration, Random:
- Sine

Acceleration:
- Shock

Life, Service:
- Cycle: 50,000 min
- Shelf

Reliability

Lead Time

Cost

Remarks

Data Source: Aerodyne Controls product data sheet - 1985
## CHECK VALVE

**MANUFACTURER**  Carleton Technologies, Inc.

**PART NUMBER**  2662-0001-13, -15

### DESCRIPTION

### QUALIFICATION STATUS  Space shuttle ARPCS

### PROPELLANT/FLUID  O₂, N₂

### PRESSURE, OPERATING

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 1250 psig</td>
<td></td>
</tr>
</tbody>
</table>

### CRACKING

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1875 psig</td>
<td></td>
</tr>
</tbody>
</table>

### BURST

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2500 psig</td>
<td></td>
</tr>
</tbody>
</table>

### RATED FLOW

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 lbm/hr at 100 psig, at 2 psid</td>
<td></td>
</tr>
</tbody>
</table>

### LEAKAGE, INTERNAL

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2 SCCM at 10 to 1250 psid</td>
<td></td>
</tr>
</tbody>
</table>

### EXTERNAL

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2 SCCM</td>
<td></td>
</tr>
</tbody>
</table>

### MASS

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.184 lbm</td>
<td></td>
</tr>
</tbody>
</table>

### DIMENSIONS

### MATERIAL, BODY

### SEAT/SEAL

### SPRING

### PORTS, SIZE & TYPE

### MOUNTING

### OPERATING TEMPERATURE RANGE

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 to 120 °F</td>
<td></td>
</tr>
</tbody>
</table>

### VIBRATION, RANDOM

### SINE

### ACCELERATION

### SHOCK

### LIFE, SERVICE

### CYCLE

### SHELF

### RELIABILITY

### LEAD TIME

### COST

### REMARKS

### DATA SOURCE  Carleton product data sheet - 1987

174
CHECK VALVE

MANUFACTURER  Circle Seal Controls, Brunswick

PART NUMBER  H249T1-4TT(L)

DESCRIPTION

QUALIFICATION STATUS  Saturn V (Martin Marietta)

PROPELLANT/FLUID

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>6000 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRACKING</td>
<td></td>
</tr>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
</tbody>
</table>

RATED FLOW

LEAKAGE, INTERNAL

LEAKAGE, INTERNAL

MASS

DIMENSIONS

MATERIAL, BODY  316 CRES

SEAT/SEAL  Buna-N

SPRING  302 CRES

PORTS, SIZE & TYPE  MS 33656-4

MOUNTING

OPERATING TEMPERATURE RANGE  -40 to 250 °F

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 10)
CHECK VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  H299T-16BB (M.M. P/N 47E8-10F)

DESCRIPTION
QUALIFICATION STATUS  Viking (Martin Marietta)

PROPELLANT/FLUID

PRESSURE, OPERATING  6000 psi
CRACKING
PROOF
BURST

RATED FLOW

LEAKAGE, INTERNAL
EXTERNAL

MASS
DIMENSIONS
MATERIAL, BODY  303 CRES
SEAT/SEAL  Buna-N
SPRING  302 CRES
PORTS, SIZE & TYPE  AND1050-16

MOUNTING

OPERATING TEMPERATURE RANGE  -65 to 250 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 10)

176
**CHECK VALVE**

**MANUFACTURER**  Circle Seal Controls, Brunswick  
**PART NUMBER**  HP220T-8TT to -16TT

**DESCRIPTION**

**QUALIFICATION STATUS**  Viking fuel systems (Martin Marietta)

**PROPELLANT/FLUID**

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>6000 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRACKING</td>
<td></td>
</tr>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
</tbody>
</table>

**RATED FLOW**

**LEAKAGE, INTERNAL**

**EXTERNAL**

**MASS**

**DIMENSIONS**

**MATERIAL, BODY**  303 CRES

**SEAT/SEAL**  Teflon

**SPRING**  302 CRES

**PORTS, SIZE & TYPE**  MS 33656-8 to -16

**MOUNTING**

**OPERATING TEMPERATURE RANGE**  -320 to 400 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**  M.M. P/N's 47D9-4 to -7

**DATA SOURCE**  Aerospace Corporation report (ref. 10)
CHECK VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  HP280T-4TF4 (Aerojet P/N 1159059)

DESCRIPTION
QUALIFICATION STATUS  Delta/E, Delta/F (Aerojet)

PROPELLANT/FLUID

PRESSURE, OPERATING  4500 psi
CRACKING
PROOF
BURST

RATED FLOW

LEAKAGE, INTERNAL
EXTERNAL

MASS
DIMENSIONS
MATERIAL, BODY  303 CRES
SEAT/SEAL  Teflon
SPRING  302 CRES
PORTS, SIZE & TYPE  MS 33656-4

MOUNTING

OPERATING TEMPERATURE RANGE  -320 to 400 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 10)
# CHECK VALVE

**MANUFACTURER**  Circle Seal Controls, Brunswick  
**PART NUMBER**  K220T-6TT, -12TT (Gen. Dyn. P/N 27/02108/10)  

**DESCRIPTION**  

**QUALIFICATION STATUS**  Atlas propulsion control box (General Dynamics)  

**PROPELLANT/FLUID**  

**PRESSURE, OPERATING**  3000 psi  
**CRACKING**  
**PROOF**  
**BURST**  

**RATED FLOW**  

**LEAKAGE, INTERNAL**  
**EXTERNAL**  

**MASS**  

**DIMENSIONS**  
**MATERIAL, BODY**  303 CRES  
**SEAT/SEAL**  Teflon  
**SPRING**  302 CRES  

**PORTS, SIZE & TYPE**  MS 33656-6/12  

**MOUNTING**  

**OPERATING TEMPERATURE RANGE**  -320 to 400 °F  

**VIBRATION, RANDOM**  
**SINE**  
**ACCELERATION**  
**SHOCK**  

**LIFE, SERVICE**  
**CYCLE**  
**SHELF**  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS**  

**DATA SOURCE**  Aerospace Corporation report (ref. 10)
**CHECK VALVE**

**MANUFACTURER**  Circle Seal Controls, Brunswick  
**PART NUMBER**  K5120T-16TT-38  

**DESCRIPTION**  Integral relief check valve  
**QUALIFICATION STATUS**  Saturn V (Martin Marietta)  

**PROPELLANT/FLUID**

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>2500 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRACKING</td>
<td></td>
</tr>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
</tbody>
</table>

**RATED FLOW**

<table>
<thead>
<tr>
<th>LEAKAGE, INTERNAL</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTERNAL</td>
<td></td>
</tr>
</tbody>
</table>

**MASS**

**DIMENSIONS**

<table>
<thead>
<tr>
<th>MATERIAL, BODY</th>
<th>303 CRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEAT/SEAL</td>
<td>Teflon</td>
</tr>
<tr>
<td>SPRING</td>
<td>302 CRES</td>
</tr>
</tbody>
</table>

**PORTS, SIZE & TYPE**  MS 33656-16

**MOUNTING**

**OPERATING TEMPERATURE RANGE**  -320 to 400 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE**  Aerospace Corporation report (ref. 10)

180
## CHECK VALVE

**MANUFACTURER** Circle Seal Controls, Brunswick

**PART NUMBER** P1-602, P2-602 (Bell P/N 8247-472065, -472070)

**DESCRIPTION**

**QUALIFICATION STATUS** Gemini - Agena engine

**PROPELLANT/FLUID**

**PRESSURE, OPERATING** 1700 psig

**CRACKING**

**PROOF**

**BURST**

**RATED FLOW**

**LEAKAGE, INTERNAL**

**EXTERNAL**

**MASS**

**DIMENSIONS**

**MATERIAL, BODY** 347 CRES (for P1), 2024-T351 (for P2)

**SEAT/SEAL** Teflon (for P1), Butyl (for P2)

**SPRING** 302 CRES

**PORTS, SIZE & TYPE** MS 24385-5, MS 24385-4, MS 24386-4

**MOUNTING**

**OPERATING TEMPERATURE RANGE** -35 to 160 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Aerospace Corporation report (ref. 10)
## CHECK VALVE

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Circle Seal Controls, Brunswick</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>P3-319 (Gen. Dyn. P/N GD/A27-08565-1)</td>
</tr>
</tbody>
</table>

| DESCRIPTION | |
|-------------| |
| QUALIFICATION STATUS | Atlas vernier solo system (General Dynamics) |

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>120 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRACKING</td>
<td></td>
</tr>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RATED FLOW</th>
</tr>
</thead>
</table>

| LEAKAGE, INTERNAL | |
|-------------------| |
| External          | |

<table>
<thead>
<tr>
<th>MASS</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>DIMENSIONS</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>MATERIAL, BODY</th>
<th>2024-T351</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEAT/SEAL</td>
<td>Buna-N</td>
</tr>
<tr>
<td>SPRING</td>
<td>302 CRES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PORTS, SIZE &amp; TYPE</th>
<th>MS 24385-4</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>MOUNTING</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>OPERATING TEMPERATURE RANGE</th>
<th>-30 to 275 °F</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>VIBRATION, RANDOM</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>SINE</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>ACCELERATION</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>SHOCK</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>LIFE, SERVICE</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>CYCLE</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>SHELF</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>RELIABILITY</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>LEAD TIME</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>COST</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>REMARKS</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>DATA SOURCE</th>
<th>Aerospace Corporation report (ref. 10)</th>
</tr>
</thead>
</table>

182
CHECK VALVE

MANUFACTURER  Circle Seal Controls, Brunswick

PART NUMBER  P6-180 (Aerojet P/N 094516)

DESCRIPTION

QUALIFICATION STATUS  Delta AJ10-118 engine (Aerojet General)

PROPELLANT/FLUID

PRESSURE, OPERATING  750 psig

CRACKING

PROOF

BURST

RATED FLOW

LEAKAGE, INTERNAL

EXTERNAL

MASS

DIMENSIONS

MATERIAL, BODY  2024-T351 Al alloy

SEAT/SEAL  Butyl

SPRING  302 CRES

PORTS, SIZE & TYPE  MS 33656-8

MOUNTING

OPERATING TEMPERATURE RANGE  -20 to 120 °F

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 10)
CHECK VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER P7-425 (Gen. Dyn. P/N GD/A27-01279-3)

DESCRIPTION  Pilot operated
QUALIFICATION STATUS  Atlas staging (General Dynamics)

PROPELLANT/FLUID

PRESSURE, OPERATING  4000 psig
CRACKING
PROOF
BURST

RATED FLOW

LEAKAGE, INTERNAL
EXTERNAL

MASS
DIMENSIONS
MATERIAL, BODY 2024-T351 Al alloy
SEAT/SEAL  Buna-N, Teflon
SPRING

PORTS, SIZE & TYPE  AND10050-4

MOUNTING

OPERATING TEMPERATURE RANGE  -65 to 180 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 10)
CHECK VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  P8-690 (GE P/N 133B2578)

DESCRIPTION  Pneumatic
QUALIFICATION STATUS  OAO (General Electric)

PROPELLANT/FLUID

PRESSURE, OPERATING  3250 psig
CRACKING
PROOF
BURST
RATED FLOW

LEAKAGE, INTERNAL

MASS
DIMENSIONS
MATERIAL, BODY  2024-T351 Al alloy
SEAT/SEAL  Buna-N
SPRING  302 CRES
PORTS, SIZE & TYPE  MS 33514-4

MOUNTING

OPERATING TEMPERATURE RANGE  -30 to 150 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE

COST

REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 10)
**CHECK VALVE**

MANUFACTURER  Circle Seal Controls, Brunswick  
PART NUMBER  P14-735 (Gen. Dyn. P/N 27-02109)

DESCRIPTION
QUALIFICATION STATUS  Atlas propulsion control box (General Dynamics)
PROPELLANT/FLUID

PRESSURE, OPERATING  1000 psig
CRACKING
PROOF
BURST

RATED FLOW

LEAKAGE, INTERNAL
EXTERNAL

MASS

DIMENSIONS

MATERIAL, BODY  303 CRES
SEAT/SEAL  Teflon
SPRING  302 CRES

PORTS, SIZE & TYPE  MS 33656-8, AND10050-8

MOUNTING

OPERATING TEMPERATURE RANGE  -100 to 165 °F

VIBRATION, RANDOM
SINE

ACCELERATION

SHOCK

LIFE, SERVICE
CYCLE
SHELFT

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 10)
CHECK VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  P15-698, P16-698 (Aerojet P/N 1120434,5)

DESCRIPTION
QUALIFICATION STATUS  Apollo AJ10-137 engine (Aerojet)

PROPELLANT/FLUID

PRESSURE, OPERATING  15 psig
CRACKING
PROOF
BURST

RATED FLOW

LEAKAGE, INTERNAL
EXTERNAL

MASS

DIMENSIONS

MATERIAL, BODY  2024-T351 Al alloy
SEAT/SEAL  Buna-N
SPRING  302 CRES

PORTS, SIZE & TYPE  MS 3356-4

MOUNTING

OPERATING TEMPERATURE RANGE  -40 to 250 °F

VIBRATION, RANDOM
SINE

ACCELERATION
SHOCK

LIFE, SERVICE

CYCLE
SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 10)
**CHECK VALVE**

**MANUFACTURER** Circle Seal Controls, Brunswick  
**PART NUMBER** P17-698 (Aerojet P/N 1120437)

**DESCRIPTION** 

**QUALIFICATION STATUS** Apollo AJ10-137 engine (Aerojet)

**PROPELLANT/FLUID**

**PRESSURE, OPERATING** 15 psig  
**CRACKING**  
**PROOF**  
**BURST**

**RATED FLOW**

**LEAKAGE, INTERNAL**  
**EXTERNAL**

**MASS**

**DIMENSIONS**

**MATERIAL, BODY** 303 CRES  
**SEAT/SEAL** Buna-N  
**SPRING** 302 CRES  
**PORTS, SIZE & TYPE** MS 33656-6

**MOUNTING**

**OPERATING TEMPERATURE RANGE** -40 to 250 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Aerospace Corporation report (ref. 10)
<table>
<thead>
<tr>
<th><strong>MANUFACTURER</strong></th>
<th>Circle Seal Controls, Brunswick</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PART NUMBER</strong></td>
<td>P24-698 (Aerojet P/N 1181725)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>DESCRIPTION</strong></th>
</tr>
</thead>
</table>

| **QUALIFICATION STATUS** | Space shuttle OMS |

<table>
<thead>
<tr>
<th><strong>PROPELLANT/FLUID</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>PRESSURE, OPERATING</strong></th>
<th>500 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CRACKING</strong></td>
<td></td>
</tr>
<tr>
<td><strong>PROOF</strong></td>
<td></td>
</tr>
<tr>
<td><strong>BURST</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>RATED FLOW</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>LEAKAGE, INTERNAL</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>EXTERNAL</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>MASS</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>DIMENSIONS</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>MATERIAL, BODY</strong></th>
<th>304 CRES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SEAT/SEAL</strong></td>
<td>Butyl</td>
</tr>
<tr>
<td><strong>SPRING</strong></td>
<td>302 CRES</td>
</tr>
</tbody>
</table>

| **PORTS, SIZE & TYPE** | MS 33656-4 |

<table>
<thead>
<tr>
<th><strong>MOUNTING</strong></th>
</tr>
</thead>
</table>

| **OPERATING TEMPERATURE RANGE** | -65 to 280 °F |

<table>
<thead>
<tr>
<th><strong>VIBRATION, RANDOM</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>SINE</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>ACCELERATION</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>SHOCK</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>LIFE, SERVICE</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>CYCLE</strong></th>
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<tr>
<th><strong>SHELF</strong></th>
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<tr>
<th><strong>RELIABILITY</strong></th>
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<tr>
<th><strong>LEAD TIME</strong></th>
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<tr>
<th><strong>COST</strong></th>
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<tr>
<th><strong>REMARKS</strong></th>
</tr>
</thead>
</table>

| **DATA SOURCE** | Aerospace Corporation report (ref. 10) |

189
### CHECK VALVE

**Manufacturer** Circle Seal Controls, Brunswick  
**Part Number** P25-180 (Gen. Dyn. P/N 55-02446)

**Description**

**Qualification Status** US Centaur (General Dynamics)

**Propellant/Fluid** H₂O₂

**Pressure, Operating** 350 psig

**Cracking**

**Proof**

**Burst**

**Rated Flow**

**Leakage, Internal**

**External**

**Mass**

**Dimensions**

**Material, Body** 316 CRES  
**Seat/Seal** Viton  
**Spring** 302 CRES  
**Ports, Size & Type** AND10050-8

**Mounting**

**Operating Temperature Range** -20 to 350 °F

**Vibration, Random**

**Sine**

**Acceleration**

**Shock**

**Life, Service**

**Cycle**

**Shelf**

**Reliability**

**Lead Time**

**Cost**

**Remarks**

**Data Source** Aerospace Corporation report (ref. 10)

190
CHECK VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  P29-180, P30-180 (Aerojet P/N 1158525)

DESCRIPTION
QUALIFICATION STATUS  Apollo AJ10-118 engine (Aerojet)

PROPELLANT/FLUID

PRESSURE, OPERATING  3000 psig
CRACKING
PROOF
BURST

RATED FLOW

LEAKAGE, INTERNAL
EXTERNAL

MASS
DIMENSIONS
MATERIAL, BODY  2024-T351 Al alloy
SEAT/SEAL  Teflon
SPRING  302 CRES

PORTS, SIZE & TYPE  MS 33656-4

MOUNTING

OPERATING TEMPERATURE RANGE  -20 to 120 °F

VIBRATION, RANDOM
SINE
ACCELERATION
CHECK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST

REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 10)
CHECK VALVE

MANUFACTURER_ Circle Seal Controls, Brunswick
PART NUMBER_ P45-220 (Hughes P/N 237278, 254207)

DESCRIPTION

QUALIFICATION STATUS_ Surveyor satellite vernier engine
(Hughes Aircraft)

PROPELLANT/FLUID

PRESSURE, OPERATING  1150 psig
CRACKING
PROOF
BURST

RATED FLOW

LEAKAGE, INTERNAL
EXTERNAL

MASS

DIMENSIONS

MATERIAL, BODY_ 6061-T6
SEAT/SEAL_ Teflon
SPRING_ 302 CRES

PORTS, SIZE & TYPE

MOUNTING

OPERATING TEMPERATURE RANGE  0 to 300 °F

VIBRATION, RANDOM
SINE

ACCELERATION
SHOCK

LIFE, SERVICE

CYCLE
SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE_ Aerospace Corporation report (ref. 10)
# CHECK VALVE

**MANUFACTURER** Circle Seal Controls, Brunswick  
**PART NUMBER** P64-344 (Boeing P/N 10-20387)

**DESCRIPTION**

**QUALIFICATION STATUS** Boeing project

**PROPELLANT/FLUID** LH$_2$

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<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>130 psig</th>
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</thead>
<tbody>
<tr>
<td>CRACKING</td>
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<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
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</tbody>
</table>

**RATED FLOW**

**LEAKAGE, INTERNAL**

**LEAKAGE, EXTERNAL**

**MASS**

**DIMENSIONS**

**MATERIAL, BODY** 303 CRES  
**SEAT/SEAL** Teflon  
**SPRING** 17-7PH CRES

**PORTS, SIZE & TYPE** MS 33656-6

**MOUNTING**

**OPERATING TEMPERATURE RANGE** -424 to 160 °F

**VIBRATION, RANDOM**

**VIBRATION, SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Aerospace Corporation report (ref. 10)
CHECK VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  P75-356

DESCRIPTION

QUALIFICATION STATUS  Apollo (Martin Marietta)

PROPELLANT/FLUID

PRESSURE, OPERATING  75 psi
CRACKING
PROOF
BURST

RATED FLOW

LEAKAGE, INTERNAL

LEAKAGE, EXTERNAL

MASS

DIMENSIONS

MATERIAL, BODY  Al alloy
SEAT/SEAL  Buna-N
SPRING  302 CRES

PORTS, SIZE & TYPE  MS 33656-4

MOUNTING

OPERATING TEMPERATURE RANGE  -65 to 275 °F

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 10)
CHECK VALVE

**MANUFACTURER**  Circle Seal Controls, Brunswick

**PART NUMBER**  119T1-1P-35 (GE P/N 47C142684)

**DESCRIPTION**

**QUALIFICATION STATUS**  BIOSAT (General Electric)

**PROPELLANT/FLUID**

**PRESSURE, OPERATING**  215 psig

**CRACKING**

**PROOF**

**BURST**

**RATED FLOW**

**LEAKAGE, INTERNAL**

**EXTERNAL**

**MASS**

**DIMENSIONS**

**MATERIAL, BODY**  316 CRES

**SEAT/SEAL**  Buna-N

**SPRING**  .302 CRES

**PORTS, SIZE & TYPE**  1/8-in. NPT

**MOUNTING**

**OPERATING TEMPERATURE RANGE**  -40 to 250 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE**  Aerospace Corporation report (ref. 10)
CHECK VALVE

MANUFACTURER Circle Seal Controls, Brunswick
PART NUMBER 220T-24BB-3, 220T-32BB-3 (M.M. P/N 47E8-22F, 26F)

DESCRIPTION

QUALIFICATION STATUS Viking (Martin Marietta)

PROPELLANT/FLUID

PRESSURE, OPERATING 3000 psi
CRACKING
PROOF
BURST

RATED FLOW

LEAKAGE, INTERNAL

MASS

EXTERNAL

DIMENSIONS

MATERIAL, BODY 303 CRES

SEAT/SEAL Teflon

SPRING 302 CRES

PORTS, SIZE & TYPE AND10050-24, -30

MOUNTING

OPERATING TEMPERATURE RANGE -320 to 400 °F

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE Aerospace Corporation report (ref. 10)
CHECK VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  220T-8TT (M.M. P/N 47E8C8)

DESCRIPTION
QUALIFICATION STATUS  Viking (Martin Marietta)

PROPELLANT/FLUID

PRESSURE, OPERATING  3000 psi
CRACKING
PROOF
BURST
RATED FLOW

LEAKAGE, INTERNAL
EXTERNAL

MASS
DIMENSIONS
MATERIAL, BODY  303 CRES
SEAT/SEAL  Teflon
SPRING  302 CRES

PORTS, SIZE & TYPE  MS 336565-8

MOUNTING

OPERATING TEMPERATURE RANGE  -320 to 400 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 10)
# CHECK VALVE

**MANUFACTURER** Circle Seal Controls, Brunswick  
**PART NUMBER** 249A-4TT(L)-15 (GE P/N SVS2635)

## DESCRIPTION

## QUALIFICATION STATUS
Nimbus attitude control system (General Electric)

## PROPELLANT/FLUID

## PRESSURE, OPERATING

### CRACKING

PROOF

### BURST

### RATED FLOW

### LEAKAGE, INTERNAL

### EXTERNAL

## MASS

## DIMENSIONS

**MATERIAL, BODY** 2024-T4 Al alloy  
**SEAT/SEAL** Buna-N  
**SPRING** 302 CRES

## PORTS, SIZE & TYPE

**MS 336565-4**

## MOUNTING

## OPERATING TEMPERATURE RANGE

-40 to 250 °F

## VIBRATION, RANDOM

**SINE**

## ACCELERATION

## SHOCK

## LIFE, SERVICE

### CYCLE

### SHELF

## RELIABILITY

## LEAD TIME

## COST

## REMARKS

### DATA SOURCE
Aerospace Corporation report (ref. 10)
**CHECK VALVE**

**MANUFACTURER** Circle Seal Controls, Brunswick

**PART NUMBER** 259T-4TT

**DESCRIPTION**

**QUALIFICATION STATUS** Sidewinder

**PROPELLANT/FLUID**

**PRESSURE, OPERATING** 3000 psig

**CRACKING**

**PROOF**

**BURST**

**RATED FLOW**

**LEAKAGE, INTERNAL**

**EXTERNAL**

**MASS**

**DIMENSIONS**

**MATERIAL, BODY** 303 CRES

**SEAT/SEAL** Buna-N

**SPRING** 302 CRES

**PORTS, SIZE & TYPE** MS 336565-4

**MOUNTING**

**OPERATING TEMPERATURE RANGE** -30 to 275 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Aerospace Corporation report (ref. 10)
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<thead>
<tr>
<th><strong>CHECK VALVE</strong></th>
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<tbody>
<tr>
<td><strong>MANUFACTURER</strong></td>
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<td><strong>PART NUMBER</strong></td>
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<th><strong>DESCRIPTION</strong></th>
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<tr>
<td><strong>QUALIFICATION STATUS</strong></td>
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<tr>
<td><strong>PROPELLANT/FLUID</strong></td>
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</table>

<table>
<thead>
<tr>
<th><strong>PRESSURE, OPERATING</strong></th>
<th>3000 psig</th>
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<td><strong>BURST</strong></td>
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<td><strong>LEAKAGE, INTERNAL</strong></td>
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<td><strong>EXTERNAL</strong></td>
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<td><strong>MASS</strong></td>
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<td><strong>DIMENSIONS</strong></td>
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<td><strong>SPRING</strong></td>
<td>302 CRES</td>
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<td><strong>PORTS, SIZE &amp; TYPE</strong></td>
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<tr>
<td><strong>MOUNTING</strong></td>
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<table>
<thead>
<tr>
<th><strong>OPERATING TEMPERATURE RANGE</strong></th>
<th>-80 to 350 °F</th>
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<tbody>
<tr>
<td><strong>VIBRATION, RANDOM</strong></td>
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<tr>
<td><strong>SINE</strong></td>
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<td><strong>ACCELERATION</strong></td>
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<td><strong>SHOCK</strong></td>
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<td><strong>LIFE, SERVICE</strong></td>
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<td><strong>CYCLE</strong></td>
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<td><strong>SHELF</strong></td>
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<td><strong>COST</strong></td>
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<td><strong>REMARKS</strong></td>
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| **DATA SOURCE** | Aerospace Corporation report (ref. 10) |
**CHECK VALVE**

**MANUFACTURER**  Circle Seal Controls, Brunswick  
**PART NUMBER**  859T-8TT  

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
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</table>
| QUALIFICATION STATUS  Apollo (Martin Marietta)  

**PROPELLANT/FLUID**

| PRESSURE, OPERATING  | 600 psi  
| CRACKING  |  
| PROOF  |  
| BURST  |  

**RATED FLOW**

| LEAKAGE, INTERNAL  |
| EXTERNAL  |  

**MASS**

| MATERIAL, BODY  | 303 CRES  
| SEAT/SEAL  | Buna-N  
| SPRING  | 302 CRES  

| PORTS, SIZE & TYPE  | MS 336565-8  

| MOUNTING  |

**OPERATING TEMPERATURE RANGE**  
-65 to 275 °F  

| VIBRATION, RANDOM  |
| SINE  |  

| ACCELERATION  |
| SHOCK  |  

| LIFE, SERVICE  |
| CYCLE  |  

| RELIABILITY  |
| SHELF  |  

| LEAD TIME  |
| COST  |  

| REMARKS  |

**DATA SOURCE**  Aerospace Corporation report (ref. 10)
## CHECK VALVE

**MANUFACTURER**  Circle Seal Controls, Brunswick  
**PART NUMBER**  869A-8TT/GA, 869A-8TT2 (Gen. Dyn. P/N 7-02337)

**DESCRIPTION**

**QUALIFICATION STATUS**  Atlas vernier fuel system (General Dynamics); Apollo (Martin Marietta)

**PROPELLANT/FLUID**

**PRESSURE, OPERATING**  600 psig

**CRACKING**

**PROOF**

**BURST**

**RATED FLOW**

**LEAKAGE, INTERNAL**

**EXTERNAL**

**MASS DIMENSIONS**

**MATERIAL, BODY**  2024-T4 Al alloy  
**SEAT/SEAL**  Buna-N  
**SPRING**  302 CRES

**PORTS, SIZE & TYPE**  MS 33556-8, -8TT2

**MOUNTING**

**OPERATING TEMPERATURE RANGE**  -65 to 180 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE**  Aerospace Corporation report (ref. 10)
CHECK VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  2249B-2MM (Army P/N 11242054)

DESCRIPTION
QUALIFICATION STATUS  Nike

PROPELLANT/FLUID

PRESSURE, OPERATING  250 psig
CRACKING
PROOF
BURST

RATED FLOW

LEAKAGE, INTERNAL

LEAKAGE, EXTERNAL

MASS
DIMENSIONS

MATERIAL, BODY  Brass
SEAT/SEAL  Buna-N
SPRING  302 CRES

PORTS, SIZE & TYPE  1/8-in. NPT

MOUNTING

OPERATING TEMPERATURE RANGE  -65 to 260 °F

VIBRATION, RANDOM
SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 10)
# CHECK VALVE

**MANUFACTURER** Circle Seal Controls, Brunswick

**PART NUMBER** 2633A-4TT (GE P/N R3447)

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**PROPELLANT/FLUID**

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<tbody>
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<tr>
<td>PROOF</td>
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<tr>
<td>BURST</td>
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**RATED FLOW**

<table>
<thead>
<tr>
<th>LEAKAGE, INTERNAL</th>
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<tr>
<td>EXTERNAL</td>
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**MASS DIMENSIONS**

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<th>MATERIAL, BODY</th>
<th>2024-T4 Al alloy</th>
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<tr>
<td>SEAT/SEAL</td>
<td>Neoprene</td>
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<td>SPRING</td>
<td>302 CRES</td>
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**PORTS, SIZE & TYPE** MS 33656-4

**MOUNTING**

**OPERATING TEMPERATURE RANGE** -40 to 300 °F

**VIBRATION, RANDOM**

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<thead>
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<th>ACCELERATION</th>
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<tbody>
<tr>
<td>SINE</td>
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<tr>
<td>SHOCK</td>
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**LIFE, SERVICE**

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<tr>
<th>CYCLE</th>
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<td>SHELF</td>
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<td>REMARKS</td>
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</table>

**DATA SOURCE** Aerospace Corporation report (ref. 10)
CHECK VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  8524T-6BB (Ham. Stan. P/N SVSK85341-1)

DESCRIPTION
QUALIFICATION STATUS  Space shuttle ECS (Hamilton Standard)

PROPELLENT/FLUID

PRESSURE, OPERATING  600 psig
CRACKING
PROOF
BURST

RATED FLOW

LEAKAGE, INTERNAL
EXTERNAL

MASS
DIMENSIONS
MATERIAL, BODY  303 CRES
SEAT/SEAL  Silicone
SPRING  302 CRES
PORTS, SIZE & TYPE  AND10050-6

MOUNTING

OPERATING TEMPERATURE RANGE  -70 to 500 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 10)
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<td>PART NUMBER</td>
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<tr>
<td><strong>DESCRIPTION</strong></td>
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<tr>
<td>QUALIFICATION STATUS</td>
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<tr>
<td>PROPELLANT/FLUID</td>
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<tr>
<td>PRESSURE, OPERATING</td>
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<td>PROOF</td>
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<td>BURST</td>
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<td>RATED FLOW</td>
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<td>LEAKAGE, INTERNAL</td>
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<td>MASS DIMENSIONS</td>
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<td>MATERIAL, BODY</td>
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<td>SEAT/SEAL</td>
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<tr>
<td>SPRING</td>
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<tr>
<td>PORTS, SIZE &amp; TYPE</td>
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<tr>
<td>MOUNTING</td>
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<tr>
<td>OPERATING TEMPERATURE RANGE</td>
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<tr>
<td>VIBRATION, RANDOM</td>
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<td>SINE</td>
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<td>ACCELERATION</td>
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<td>REMARKS</td>
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<tr>
<td><strong>DATA SOURCE</strong></td>
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</tbody>
</table>

206
CHECK VALVE

MANUFACTURER  Futurecraft Corporation
PART NUMBER  60616-19A

DESCRIPTION  Pneumatic, cartridge
QUALIFICATION STATUS  Space shuttle OMS engine (Aerojet)

PROPELLANT/FLUID  N₂ or MMH

PRESSURE, OPERATING  0 to 450 psig
   CRACKING  6.0 psig max. (reseat, 1.0 psig min.)
   PROOF  900 psig
   BURST  1800 psig
RATED FLOW  0.02 to 0.05 lbm/s min.  FEOD = 0.135 in. diam

LEAKAGE, INTERNAL
   EXTERNAL

MASS

DIMENSIONS  0.845 in. by 0.499 in. diam

MATERIAL, BODY  304L CRES
   SEAT/SEAL  Butyl
   SPRING  302/304 CRES

PORTS, SIZE & TYPE

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
   SINE
   ACCELERATION
   SHOCK

LIFE, SERVICE
   CYCLE
   SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Futurecraft drawing 60616 - 1985
### PRESSURE TRANSDUCER/GAGE

**MANUFACTURER**  
Carleton Technologies, Inc.

**PART NUMBER**  
2653-0001-1, 2001-3, 1001-5

**DESCRIPTION**  
Partial pressure oxygen sensor

**QUALIFICATION STATUS**  
Space shuttle ARPCS

**PROPELLANT/FLUID**  
$O_2$

**PRESSURE, MAX**  
5 psia $O_2$ partial pressure

**MIN**  
0 psia

**PROOF**

**BURST**

**MASS**  
0.79 lbm

**DIMENSIONS**

**MATERIAL**

**PORT, SIZE & TYPE**

**VOLTAGE, INPUT**  
18 to 32 Vdc

**WATTS**  
1.82 at 28 Vdc

**SIGNAL**

**ELECTRICAL CONNECTION**

**MOUNTING**

**OPERATING TEMPERATURE RANGE**  
35 to 120 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE**  
Carleton product data sheet - 1987
**PRESSURE TRANSDUCER/GAGE**

**MANUFACTURER** Carleton Technologies, Inc.
**PART NUMBER** 2657-0001-1
**DESCRIPTION**
**QUALIFICATION STATUS** Space shuttle ARPCS

**PROPELLANT/FLUID** N₂

**PRESSURE, MAX** 3300 psig  
**MIN** 0 psig  
**PROOF** 4950 psig  
**BURST** 6600 psig

**MASS** 0.46 lbm

**DIMENSIONS**

**MATERIAL**
**PORT, SIZE & TYPE**
**VOLTAGE, INPUT** 10 Vdc
**WATTS** 0.066 at 28 Vdc
**SIGNAL** 30 mV
**ELECTRICAL CONNECTION**

**MOUNTING**

**OPERATING TEMPERATURE RANGE** -65 to 200 °F

**VIBRATION, RANDOM**
**SINE**
**ACCELERATION**
**SHOCK**

**LIFE, SERVICE**
**CYCLE**
**SHELF**
**RELIABILITY**
**LEAD TIME**
**COST**
**REMARKS**

**DATA SOURCE** Carleton product data sheet - 1987
## Pressure Transducer/Gage

**Manufacturer**: Carleton Technologies, Inc.

**Part Number**: 2664-0001-11

**Description**: Cabin pressure decay sensor

**Qualification Status**: Space shuttle ARPCS

**Propellant/Fluid**: Air

### Pressure

- **Max**: 18 psia
- **Min**: 8 psia
- **Proof**: 24 psia
- **Burst**: 36 psia

### Mass

- **Value**: 3.64

### Dimensions

- **Material**: Port, size & type

### Voltage

- **Input**: 24 to 32 Vdc
- **Watts**: 1.96 at 28 Vdc

### Signal

- **Electrical Connection**:

### Mounting

- **Operating Temperature Range**: 35 to 120 °F

### Vibration

- **Random**:
- **Sine**:

### Shock

- **Life, Service**:
- **Cycle**:
- **Shelf**:

### Reliability

- **Lead Time**:
- **Cost**:
- **Remarks**:

### Data Source

- **Carleton product data sheet - 1987**
**PRESSURE TRANSDUCER/GAGE**

**MANUFACTURER** Carleton Technologies, Inc.
**PART NUMBER** 2730-0001-1
**DESCRIPTION**
**QUALIFICATION STATUS** Space shuttle ARPCS
**PROPELLANT/FLUID** N₂

**PRESSURE, MAX** 20 psig
**MIN** 0 psig
**PROOF** 30 psig
**BURST** 60 psig
**MASS** 0.89 lbm

**DIMENSIONS**

**MATERIAL**
**PORT, SIZE & TYPE**
**VOLTAGE, INPUT** 10 Vdc
**WATTS** 0.066 at 28 Vdc
**SIGNAL** 30 mV FS
**ELECTRICAL CONNECTION**

**MOUNTING**

**OPERATING TEMPERATURE RANGE** 35 to 120 °F

**VIBRATION, RANDOM**
**SINE**
**ACCELERATION**
**SHOCK**

**LIFE, SERVICE**
**CYCLE**
**SHELF**
**RELIABILITY**
**LEAD TIME**
**COST**
**REMARKS** External leakage, 0.2 SCCM

**DATA SOURCE** Carleton product data sheet - 1987
PRESSURE TRANSDUCER/GAGE

MANUFACTURER Carleton Technologies, Inc.
PART NUMBER 2731-0001-5
DESCRIPTION Cabin air pressure
QUALIFICATION STATUS Space shuttle ARPCS

PROPELLANT/FLUID Air

PRESSURE, MAX 20 psia
MIN 0 psia
PROOF 40 psia
BURST 80 psia

MASS 0.46 lbm

DIMENSIONS

MATERIAL
PORT, SIZE & TYPE

VOLTAGE, INPUT 24 to 32 Vdc
WATTS 1.5 at 28 Vdc
SIGNAL 0 to 5 Vdc
ELECTRICAL CONNECTION

MOUNTING

OPERATING TEMPERATURE RANGE 35 to 120 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST

REMARKS External leakage, 0.2 SCCM

DATA SOURCE Carleton product data sheet - 1987
<table>
<thead>
<tr>
<th><strong>PRESSURE TRANSDUCER/GAGE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MANUFACTURER</strong> Carleton Technologies, Inc.</td>
</tr>
<tr>
<td><strong>PART NUMBER</strong> 2732-0001-1</td>
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<tr>
<td><strong>DESCRIPTION</strong></td>
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<tr>
<td><strong>QUALIFICATION STATUS</strong> Space shuttle ARPCS</td>
</tr>
<tr>
<td><strong>PROPELLANT/FLUID</strong> O₂</td>
</tr>
</tbody>
</table>

| PRESSURE, MAX | 1500 psig |
| MIN |
| PROOF | 2500 psig |
| BURST | 4500 psig |
| **MASS** | 0.46 lbm |
| **DIMENSIONS** |

| **MATERIAL** |
| **PORT, SIZE & TYPE** |
| **VOLTAGE, INPUT** | 10 Vdc |
| **WATTS** | 0.066 at 28 Vdc |
| **SIGNAL** | 30 mV FS |
| **ELECTRICAL CONNECTION** |

| **MOUNTING** |

| **OPERATING TEMPERATURE RANGE** |

| **VIBRATION, RANDOM** |
| **SINE** |
| **ACCELERATION** |
| **SHOCK** |

| **LIFE, SERVICE** |
| **CYCLE** |
| **SHELF** |
| **RELIABILITY** |
| **LEAD TIME** |
| **COST** |
| **REMARKS** |

| **DATA SOURCE** Carleton product data sheet - 1987 |

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PRESSURE TRANSDUCER/GAGE

MANUFACTURER  Carleton Technologies, Inc.
PART NUMBER  2733-0001-1
DESCRIPTION
QUALIFICATION STATUS
PROPELLANT/FLUID  O₂, N₂

PRESSURE, MAX  300 psig
MIN
PROOF  450 psig
BURST  900 psig
MASS  0.26 lbm
DIMENSIONS

MATERIAL
PORT, SIZE & TYPE
VOLTAGE, INPUT  10 Vdc
WATTS  0.066 at 28 Vdc
SIGNAL  30 mV FS
ELECTRICAL CONNECTION
MOUNTING

OPERATING TEMPERATURE RANGE
VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Carleton product data sheet - 1987
**PRESSURE TRANSDUCER/GAGE**

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<thead>
<tr>
<th>MANUFACTURER</th>
<th>Carleton Technologies, Inc.</th>
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<tbody>
<tr>
<td>PART NUMBER</td>
<td>2767-0001-1</td>
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<tr>
<td>DESCRIPTION</td>
<td>Pressure gauge</td>
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<tr>
<td>QUALIFICATION STATUS</td>
<td>Space shuttle ARPCS</td>
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<tr>
<td>PROPELLANT/FLUID</td>
<td>O₂, air</td>
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<tr>
<td>PRESSURE, MAX</td>
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</tr>
<tr>
<td>MIN</td>
<td>0 psid</td>
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<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>MASS</td>
<td>1.0 lbm</td>
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<td>MATERIAL</td>
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<td>WATTS</td>
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<td>SIGNAL</td>
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<tr>
<td>ELECTRICAL CONNECTION</td>
<td></td>
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<tr>
<td>MOUNTING</td>
<td></td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td>-65 to 120 °F</td>
</tr>
<tr>
<td>VIBRATION, RANDOM</td>
<td></td>
</tr>
<tr>
<td>SINE</td>
<td></td>
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<tr>
<td>ACCELERATION</td>
<td></td>
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<tr>
<td>SHOCK</td>
<td></td>
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<tr>
<td>LIFE, SERVICE</td>
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<td>CYCLE</td>
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<td>SHELF</td>
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<tr>
<td>RELIABILITY</td>
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<tr>
<td>LEAD TIME</td>
<td></td>
</tr>
<tr>
<td>COST</td>
<td></td>
</tr>
<tr>
<td>REMARKS</td>
<td>Leakage, 5.0 SCCM max.</td>
</tr>
<tr>
<td>DATA SOURCE</td>
<td>Carleton product data sheet - 1987</td>
</tr>
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</table>

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<table>
<thead>
<tr>
<th><strong>PRESSURE TRANSDUCER/GAGE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MANUFACTURER</strong></td>
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<tr>
<td><strong>PART NUMBER</strong></td>
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<tr>
<td><strong>DESCRIPTION</strong></td>
</tr>
<tr>
<td><strong>QUALIFICATION STATUS</strong></td>
</tr>
<tr>
<td><strong>PROPELLANT/FLUID</strong></td>
</tr>
</tbody>
</table>

| **PRESSURE, MAX** | 15 to 10,000 psi |
| **MIN** | 0 psi |
| **PROOF** | 2X rated max. |
| **BURST** | 3X rated max. |

| **MASS** | 0.31 to 0.34 lbm (except -06, 0.50 lbm) |
| **DIMENSIONS** | 2.40-in. body by 1.01 in. diam (6.10 cm by 2.56 cm diam) except -06 |
| **MATERIAL** | 17-4PH CRES PORT, SIZE & TYPE MS-33656-4 |
| **VOLTAGE, INPUT** | |
| **WATTS** | |
| **SIGNAL** | 30 mV (except -06, 15 mV) |
| **ELECTRICAL CONNECTION** | PT1H-10-6P (101) or option |

| **MOUNTING** | |
| **OPERATING TEMPERATURE RANGE** | -420 to 650 °F (depending on model) |
| **VIBRATION, RANDOM** | Natural frequency = 80 kHz (for most models) |
| **SINE** | 35g (10 to 2000 Hz) |
| **ACCELERATION** | |
| **SHOCK** | 100g for 11 ms (8 ms for -09) |

| **LIFE, SERVICE** | |
| **CYCLE** | |
| **SHELF** | |
| **RELIABILITY** | |
| **LEAD TIME** | |
| **COST** | |
| **REMARKS** | Options include lead wire or PCS0GE-10-6S(SR) electrical connection, vent port |

| **DATA SOURCE** | CEC product data sheet - 1986 |
**PRESSURE TRANSDUCER/GAGE**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>CEC Instruments, Transamerica Delaval</th>
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<tbody>
<tr>
<td>PART NUMBER</td>
<td>CEC 2200 A/G</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Diffused semiconductor type</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>____________________________</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td>________________________________</td>
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</table>

<table>
<thead>
<tr>
<th>PRESSURE, MAX</th>
<th>15 to 6000 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN</td>
<td>0 psi</td>
</tr>
<tr>
<td>PROOF</td>
<td>2X rated max.</td>
</tr>
<tr>
<td>BURST</td>
<td>3X rated max.</td>
</tr>
<tr>
<td>MASS</td>
<td>0.38 lbm</td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td>3.87 in. (less connect) by 1.01 in. diam (9.81 cm by 2.57 cm diam)</td>
</tr>
<tr>
<td>MATERIAL</td>
<td>17-4PH CRES</td>
</tr>
<tr>
<td>PORT, SIZE &amp; TYPE</td>
<td>1/4-18 NPT male</td>
</tr>
<tr>
<td>VOLTAGE, INPUT</td>
<td>____________________</td>
</tr>
<tr>
<td>WATTs</td>
<td>____________________</td>
</tr>
<tr>
<td>SIGNAL</td>
<td>40 mV full range</td>
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<tr>
<td>ELECTRICAL CONNECTION</td>
<td>PT1H-10-6P</td>
</tr>
<tr>
<td>MOUNTING</td>
<td>____________________</td>
</tr>
</tbody>
</table>

| OPERATING TEMPERATURE RANGE | -65 to 250 °F |
| VIBRATION, RANDOM | ____________________ |
| SINE             | 35g peak at 5 to 2000 Hz |
| ACCELERATION     | 100g                  |
| SHOCK            | 1000g half sine wave pulse for 1 ms |

| LIFE, SERVICE | ____________________ |
| CYCLE        | ____________________ |
| SHELF        | ____________________ |
| RELIABILITY  | ____________________ |
| LEAD TIME    | ____________________ |
| COST         | ____________________ |
| REMARKS      | ____________________ |

| DATA SOURCE   | CEC product data sheet - 1986 |

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PRESSURE TRANSDUCER/GAGE

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>CEC Instruments, Transamerica Delaval</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>CEC 3000 A/G/S</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Sputtered thin-film type</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td></td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td></td>
</tr>
</tbody>
</table>

| PRESSURE, MAX               | 15 to 6000 psi                     |
| MIN                        | 0 psi                               |
| PROOF                      | 2X rated max.                      |
| BURST                      | 7000 psi                            |
| MASS                       | 0.31 lbm                            |
| DIMENSIONS                 | 3.66 in. (less connector) by 1.01 in. diam (9.30 by 2.56 cm) |
| MATERIAL                   | 17-4PH and 15-7Mo CRES              |
| PORT, SIZE & TYPE          | MS 33656-4                          |
| VOLTAGE, INPUT             |                                        |
| WATTS                      |                                        |
| SIGNAL                     | 30 mV typical full range            |
| ELECTRICAL CONNECTION      | PTIH-10-6P (101)                    |
| MOUNTING                   |                                        |

| OPERATING TEMPERATURE RANGE| -65 to 300 °F                      |
| VIBRATION, RANDOM          | SINE 35g peak at 5 to 2000 Hz       |
| ACCELERATION              |                                        |
| SHOCK                      | 1000g half sine wave pulse for 1 ms |

| LIFE, SERVICE              | 13,000 hr steady state              |
| CYCLE                      |                                        |
| SHELF                      |                                        |
| RELIABILITY                |                                        |
| LEAD TIME                  |                                        |
| COST                       |                                        |
| REMARKS                    |                                        |

| DATA SOURCE                | CEC product data sheet - 1986        |
PRESSURE TRANSDUCER/GAGE

MANUFACTURER  CEC Instruments, Transamerica Delaval

PART NUMBER  CEC 3300 A/G/S

DESCRIPTION  Sputtered thin-film type

QUALIFICATION STATUS

PROPELLANT/FLUID

PRESSURE, MAX  15 to 6000 psi
MIN  0 psi
PROOF  2X rated max.
BURST  3X rated max.

MASS  0.47 lbm
DIMENSIONS  4.72 in (less connector) by 1.01 in. diam (12.00 cm by 2.56 cm diam)

MATERIAL  17-4PH (and 15-7Mo below 30 psi) CRES
PORT, SIZE & TYPE  MS 33656-4

VOLTAGE, INPUT

WATTS

SIGNAL  5.0 Vdc full range; 2 mA

ELECTRICAL CONNECTION  PTH-10-6P (101) (Bendix)

MOUNTING

OPERATING TEMPERATURE RANGE  -65 to 250 °F

VIBRATION, RANDOM
SINE  35g peak at 5 tc 2000 Hz
ACCELERATION  100g
SHOCK  100g half sine wave pulse of 11 ms

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  CEC product data sheet - 1986
**PRESSURE TRANSDUCER/GAGE**

**MANUFACTURER**  Consolidated Controls Corporation  
**PART NUMBER**  41SG51-1, -2  
**DESCRIPTION**  Strain gage pressure transducer  
**QUALIFICATION STATUS**  Space shuttle (Rockwell)  

**PROPELLANT/FLUID**  H₂, O₂

**PRESSURE, MAX**  1200 for -1, 400 psia for -2  
**MIN**  0 psia  
**PROOF**  1800 for -1, 600 psia for -2  
**BURST**  3600 for -1, 1200 psia for -2  
**MASS**  0.44 lbm  
**DIMENSIONS**  1.25 in. diam by 3.00 in. less port and connections

**MATERIAL**  
PORT, SIZE & TYPE  MS 24385-4E  
VOLTAGE, INPUT  24±0.024 Vdc  
WATTS
SIGNAL  0 to 48 mV  
**ELECTRICAL CONNECTION**  MSFC 40M39569 (Deutsch DBA51H-10-6PN)

**MOUNTING**

**OPERATING TEMPERATURE RANGE**  -125 to 225 °F

**VIBRATION, RANDOM**
**SINE**
**ACCELERATION**  
**SHOCK**

**LIFE, SERVICE**
**CYCLE**
**SHELF**
**RELIABILITY**
**LEAD TIME**
**COST**
**REMARKS**

**DATA SOURCE**  Consolidated controls drawing R41SG51 - 1985
MANUFACTURER_ Consolidated Controls Corporation
PART NUMBER_ 41SG78-7
DESCRIPTION
QUALIFICATION STATUS_ Space shuttle RCS (Marquardt)

PROPELLANT/FLUID_ NTO, MMH, He

PRESSURE, MAX_ 200 psia
MIN_ 0 psia
PROOF_ 3000 psia
BURST_ 10,000 psia

MASS_ 0.4 lbm

DIMENSIONS_ 2.27 in. by 1.00 in. diam plus base

MATERIAL

PORT, SIZE & TYPE_ At mount
VOLTAGE, INPUT
WATTS

SIGNAL_ 300 mV/V sensitivity; 1000 Ω

ELECTRICAL CONNECTION_ MP572-0306-0003 lead wires

MOUNTING_ Four 0.205-in.-diam holes at 0.45 by 1.375-in. flange mount

OPERATING TEMPERATURE RANGE_ 30 to 300 °F

VIBRATION, RANDOM
SINE

ACCELERATION
SHOCK

LIFE, SERVICE

CYCLE
SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE_ Consolidated Controls drawing R41SG78-7 - 1985
PRESSURE TRANSDUCER/GAGE

MANUFACTURER  Consolidated Controls Corporation
PART NUMBER  41SG85-21 to -75
DESCRIPTION
QUALIFICATION STATUS  SSME (Rocketdyne)

PROPELLANT/FLUID

PRESSURE, MAX  300 to 9500 psia
MIN  0 psia
PROOF  150 percent of max.
BURST  300 percent of max. (20,000 psi max.)

MASS
DIMENSIONS  3.500 by 1.62 by 2.25 in.

MATERIAL
PORT, SIZE & TYPE  At mount
VOLTAGE, INPUT
WATTS
SIGNAL  1500 Q, 3.0 mV/V sensitivity
ELECTRICAL CONNECTION  RES1231-E100 5N (2 required)

MOUNTING  Flange; 0.28-in.-diam holes EQ SP on 1.50-in.-diam BC

OPERATING TEMPERATURE RANGE  -65 to 165 °F compensated

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Consolidated Controls drawing R415685 - 1985
**PRESSURE TRANSDUCER/GAGE**

<table>
<thead>
<tr>
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<tr>
<td>PART NUMBER</td>
<td>41SG86-21,-22,-31,-32,-41,-42</td>
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<tr>
<td>DESCRIPTION</td>
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<td>QUALIFICATION STATUS</td>
<td>Space shuttle (Rocketdyne)</td>
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</table>

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th></th>
</tr>
</thead>
</table>

| PRESSURE, MAX                  | 4000 psia |
| MIN                              | 0 psia    |
| PROOF                            | 6000 psia |
| BURST                            | 12,000 psia |

<table>
<thead>
<tr>
<th>MASS</th>
<th></th>
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</thead>
</table>

| DIMENSIONS                       | 3.500 by 1.650 by 2.30 in.       |

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th></th>
</tr>
</thead>
</table>

| PORT, SIZE & TYPE                  | At mount                          |
| VOLTAGE, INPUT                     |                                   |
| WATTS                              |                                   |
| SIGNAL                            | 1500 Ω, 3.0 mV/V sensitivity     |
| ELECTRICAL CONNECTION             | RES1231-E1005N (2 required)      |

| MOUNTING                          | Flange, four 0.281-in. holes EQ SP on 1.500-in. BC |

| OPERATING TEMPERATURE RANGE       | 10 to 270 °F compensated         |

| VIBRATION, RANDOM                  |                                   |
| SINE                              |                                   |
| ACCELERATION                      |                                   |
| SHOCK                             |                                   |

| LIFE, SERVICE                     |                                   |
| CYCLE                             |                                   |
| SHELF                             |                                   |
| RELIABILITY                       |                                   |
| LEAD TIME                         |                                   |
| COST                              |                                   |
| REMARKS                           |                                   |

| DATA SOURCE                       | Consolidated Controls drawing R415686-21,-31,-41,-22,-32,-42 |

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PRESSURE TRANSDUCER/GAGE

MANUFACTURER  Consolidated Controls Corporation
PART NUMBER  41SG144 series
DESCRIPTION  Strain gage type
QUALIFICATION STATUS  Peacekeeper

PROPELLANT/FLUID

PRESSURE, MAX  300 to 5000 psia
    MIN  0 psia
    PROOF  150 percent of max.
    BURST  200 percent of max. (5000 psia min.)

MASS

DIMENSIONS  5.12 in. max. by 1.28 in. diam

MATERIAL

PORT, SIZE & TYPE  MS 33656E4
VOLTAGE, INPUT  28±4 Vdc
WATTS
SIGNAL
ELECTRICAL CONNECTION  MIL-C-38999 series IV

MOUNTING

OPERATING TEMPERATURE RANGE  -30 to 200 °F compensated

VIBRATION, RANDOM
    SINE
ACCELERATION
SHOCK

LIFE, SERVICE
    CYCLE
    SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Consolidated Controls drawing R41SG144 - 1985
PRESSURE TRANSDUCER/GAGE

MANUFACTURER  Consolidated Controls Corporation
PART NUMBER  41SG149-2500Al
DESCRIPTION  Strain gage type
QUALIFICATION STATUS  Peacekeeper (Hercules)

PROPELLANT/FLUID

PRESSURE, MAX  2500 psia
  MIN  0 psia
  PROOF  3750 psia
  BURST  5000 psia

MASS  0.63 lbm max.

DIMENSIONS  5.42 in. max. by 1.85 by 1.35 in.

MATERIAL

PORT, SIZE & TYPE  Special 0.394-in.-diam plug at mount

VOLTAGE, INPUT  28±4 Vdc

WATTS

SIGNAL  0 to 5 Vdc; 50-kΩ load; 1000-Ω max. impedance

ELECTRICAL CONNECTION  MIL-C-38999 series IV

MOUNTING  Three-bolt flange; 0.204-in.-diam holes EQ SP on 1.000-in.-diam BC

OPERATING TEMPERATURE RANGE  -30 to 200 °F compensated

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Consolidated Controls drawing R41SG149-1 - 1985
**PRESSURE TRANSDUCER/GAGE**

**MANUFACTURER**  Consolidated Controls Corporation  
**PART NUMBER**  41SG155-1  
**DESCRIPTION**  Strain gage type  
**QUALIFICATION STATUS**  Peacekeeper (Hercules)

**PROPELLANT/FLUID**

<table>
<thead>
<tr>
<th>PRESSURE, MAX</th>
<th>3500 psia</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN</td>
<td>0 psia</td>
</tr>
<tr>
<td>PROOF</td>
<td>5250 psia</td>
</tr>
<tr>
<td>BURST</td>
<td>7000 psia</td>
</tr>
</tbody>
</table>

**MASS**  0.56 lbm

**DIMENSIONS**  4.92 in. max. by 1.28 in. diam

**MATERIAL**

<table>
<thead>
<tr>
<th>PORT, SIZE &amp; TYPE</th>
<th>MS 33656E4</th>
</tr>
</thead>
</table>

**VOLTAGE, INPUT**  28±4 Vdc

**WATTS**

**SIGNAL**  0 to 5 Vdc; 1000-0 impedance

**ELECTRICAL CONNECTION**  MIL-C-38999 series IV

**MOUNTING**

**OPERATING TEMPERATURE RANGE**  -30 to 200 °F compensated

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE**  Consolidated Controls drawing R41SG155-1 - 1985
MANUFACTURER  Consolidated Controls Corporation
PART NUMBER  41SG156-1700A1
DESCRIPTION  Strain gage type
QUALIFICATION STATUS  Peacekeeper (Hercules)

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
</tr>
</thead>
</table>

| PRESSURE, MAX  1700 psia |
| MIN  0 psia |
| PROOF  2550 psia |
| BURST  5000 psia |

| MASS  0.56 lbm |
| DIMENSIONS  4.94 in. max. by 1.28 in. diam |

| MATERIAL |
| PORT, SIZE & TYPE  MS 33656E2 |
| VOLTAGE, INPUT  28±4 Vdc |
| WATTS |
| SIGNAL  0 to 5 Vdc; 1000-0 max. impedance |
| ELECTRICAL CONNECTION  MIL-C-38999 series IV |

| MOUNTING |

| OPERATING TEMPERATURE RANGE  -30 to 200 °F compensated |
| VIBRATION, RANDOM |
| SINE |
| ACCELERATION |
| SHOCK |

| LIFE, SERVICE |
| CYCLE |
| SHELF |
| RELIABILITY |
| LEAD TIME |
| COST |
| REMARKS |

| DATA SOURCE  Consolidated Controls drawing R41SG156 - 1985 |
**PRESSURE TRANSDUCER/GAGE**

**MANUFACTURER** Consolidated Controls Corporation  
**PART NUMBER** 41SG156-3500A1, -3500A2  
**DESCRIPTION** Strain gage type  
**QUALIFICATION STATUS** Peacekeeper (Hercules)

**PROPELLANT/FLUID**

**PRESSURE, MAX** 3500 psia  
**MIN** 0 psia  
**PROOF** 5250 psia  
**BURST** 7000 psia  
**MASS** 0.56 lbm  
**DIMENSIONS** 4.94 in. max by 1.28 in. diam

**MATERIAL**  
**PORT, SIZE & TYPE** MS 33656E2  
**VOLTAGE, INPUT** 28±4 Vdc  
**WATTS**  
**SIGNAL** 0 to 5 Vdc; 1000-Ω max. impedance  
**ELECTRICAL CONNECTION** MIL-C-38999 series IV

**MOUNTING**

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Consolidated Controls drawing R41SG156 - 1985

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PRESSURE TRANSDUCER/GAGE

MANUFACTURER  Consolidated Controls Corporation
PART NUMBER  (NAVORD) 3064422
DESCRIPTION
QUALIFICATION STATUS  PBCS, Trident

PROPELLANT/FLUID

PRESSURE, MAX 150 psia
MIN 0 psia
PROOF
BURST

MASS 1.1 lbm

DIMENSIONS 4.25 in. (less port and connections) by 2.25 in. diam
(less mount)

MATERIAL
PORT, SIZE & TYPE  MS 33656E4 (modified)

VOLTAGE, INPUT
WATTS

SIGNAL
ELECTRICAL CONNECTION  Special

MOUNTING  Standoff pad; two 0.266-in. holes at 0.750 in.

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST

REMARKS

DATA SOURCE  Consolidated Controls drawing 3064422 - 1985
**PRESSURE TRANSDUCER/GAGE**

**MANUFACTURER** Paine Corporation  
**PART NUMBER** 210-75-XXX series  
**DESCRIPTION**  
**QUALIFICATION STATUS**  
**PROPELLANT/FLUID** Any fluid compatible w/17-4PH CRES

**PRESSURE, MAX** 75 to 1500 psi  
**MIN** 0 psi  
**PROOF** Up to 150 percent of max.  
**BURST** 300 percent of max.

**MASS**  
**DIMENSIONS** 1.92 in. less electrical connections by 1.004-in. hex  
(4.88 by 2.54 cm)

**MATERIAL** 17-4PH CRES  
**PORT, SIZE & TYPE** MS 33649-4  
**VOLTAGE, INPUT** 10 Vdc  
**WATTS**  
**SIGNAL**  
**ELECTRICAL CONNECTION** Mates w/MS 3115-10-68 or solder terminal

**MOUNTING**

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**  
**SINE** 20g  
**ACCELERATION** 20g  
**SHOCK** 30g

**LIFE, SERVICE**  
**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Paine product data sheet - 1986
<table>
<thead>
<tr>
<th>PRESSURE TRANSDUCER/GAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANUFACTURER: Statham Division</td>
</tr>
<tr>
<td>PART NUMBER: PA732TC</td>
</tr>
<tr>
<td>DESCRIPTION: Unbonded strain gage type</td>
</tr>
<tr>
<td>QUALIFICATION STATUS:</td>
</tr>
<tr>
<td>PROPELLANT/FLUID:</td>
</tr>
<tr>
<td>PRESSURE, MAX: 5 to 5000 psia</td>
</tr>
<tr>
<td>MIN: 0 psia</td>
</tr>
<tr>
<td>PROOF: 7500 psia</td>
</tr>
<tr>
<td>BURST:</td>
</tr>
<tr>
<td>MASS: 0.44 lbm (0.20 kg)</td>
</tr>
<tr>
<td>DIMENSIONS: 2.61 in. (less port and connections) by 1.14 in. diam</td>
</tr>
<tr>
<td>(6.63 cm by 2.90 cm diam)</td>
</tr>
<tr>
<td>MATERIAL:</td>
</tr>
<tr>
<td>PORT, SIZE &amp; TYPE: MS 33656-G4 (two for differential pressure versions)</td>
</tr>
<tr>
<td>VOLTAGE, INPUT: 7 V</td>
</tr>
<tr>
<td>WATTS:</td>
</tr>
<tr>
<td>SIGNAL: 3 mV/V sensitivity</td>
</tr>
<tr>
<td>ELECTRICAL CONNECTION: Mates w/Bendix PC06-8-4S</td>
</tr>
<tr>
<td>MOUNTING:</td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE: 75 to 600 °F compensated (24 to 315 °C)</td>
</tr>
<tr>
<td>VIBRATION, RANDOM:</td>
</tr>
<tr>
<td>SINE:</td>
</tr>
<tr>
<td>ACCELERATION:</td>
</tr>
<tr>
<td>SHOCK:</td>
</tr>
<tr>
<td>LIFE, SERVICE:</td>
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<tr>
<td>CYCLE:</td>
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<tr>
<td>SHELF:</td>
</tr>
<tr>
<td>RELIABILITY:</td>
</tr>
<tr>
<td>LEAD TIME:</td>
</tr>
<tr>
<td>COST:</td>
</tr>
<tr>
<td>REMARKS: PL732TC and PM732TC differential pressure gage versions: specifications above necessary for PA732TC only</td>
</tr>
<tr>
<td>DATA SOURCE: Statham product data sheet - 1985</td>
</tr>
</tbody>
</table>
MANUFACTURER  Statham Division
PART NUMBER  PA4088
DESCRIPTION  Thin-film strain gage; high performance
QUALIFICATION STATUS

PROPELLANT/FLUID

PRESSURE, MAX 15 to 5000 psia
   MIN 0 psia
   PROOF 7500 psia
   BURST

MASS 0.53 lbm (0.24 kg)
DIMENSIONS 1.25 in. diam (3.18 cm diam)

MATERIAL

PORT, SIZE & TYPE  MS 33656-E4
VOLTAGE, INPUT  28 Vdc
WATTS

SIGNAL  5 V
ELECTRICAL CONNECTION  Mates w/Bendix PTO6-10-6S

MOUNTING

OPERATING TEMPERATURE RANGE  0 to 200 °F compensated (-17 to 93 °C)

VIBRATION, RANDOM
SINE

ACCELERATION
SHOCK

LIFE, SERVICE
   CYCLE
   SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Statham product data sheet - 1985
PRESSURE TRANSDUCER/GAGE

MANUFACTURER  Systron Donner, Edcliff
PART NUMBER  2-201
DESCRIPTION  Potentiometric, capsule sensor
QUALIFICATION STATUS

PROPELLANT/FLUID

PRESSURE, MAX  5 to 350 psig/psia
  MIN  0 psig/psia
  PROOF  150 percent of max.
BURST
MASS  0.19 lbm (0.09 kg)
DIMENSIONS  1.00 in. diam by 2.27 in. plus connections (2.54 by 5.77 cm)
MATERIAL  NiSpan-C, 17-7PH CRES
PORT, SIZE & TYPE  MS 33656-4 or optional
VOLTAGE, INPUT
WATTS
SIGNAL  500 to 10,000 Ω
ELECTRICAL CONNECTION  PTIH-8-4P

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
  SINE  20g to 65g at 55 to 2000 Hz
ACCELERATION  100g
SHOCK  100g for 11 ms

LIFE, SERVICE
  CYCLE
  SHELF
RELIABILITY
LEAD TIME
COST

REMARKS  Options available; welded construction

DATA SOURCE  Systron Donner product data sheet - 1986
PRESSURE TRANSDUCER/GAGE

MANUFACTURER  Systron Donner, Edcliff

PART NUMBER  2-400

DESCRIPTION  Potentiometric, helical Bourdon tube

QUALIFICATION STATUS

PROPELLANT/FLUID

PRESSURE, MAX 300 to 5000 psia/psig
MIN 0 psia/psig

PROOF 150 percent of max.

BURST 200 percent of max.

MASS 0.25 lbm (0.11 kg)

DIMENSIONS 2.812 in. by 1.125 in. diam (7.14 by 2.86 cm)

MATERIAL  NiSpan-C, 17-7PH CRES

PORT, SIZE & TYPE  MS 33656E2 or optional

VOLTAGE, INPUT

WATTS

SIGNAL 500 to 10,000 Ω

ELECTRICAL CONNECTION  MS 3116-8-45

MOUNTING  Two-hole mounting base optional

OPERATING TEMPERATURE RANGE  -58 to 302 °F (-50 to 150 °C)

VIBRATION, RANDOM

SINE 35g at 55 to 2000 Hz for ±1 percent FS error

ACCELERATION  30g

SPOCK  50g for 11 ms half sine wave

LIFE, SERVICE 100,000 full cycles; 1,000,000 dit..er cycles

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS  Optional differential pressure models, segmented switches, other

DATA SOURCE  Systron Donner product data sheet - 1986

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<table>
<thead>
<tr>
<th><strong>PRESSURE TRANSDUCER/GAGE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MANUFACTURER</strong></td>
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<tr>
<td><strong>PART NUMBER</strong></td>
</tr>
<tr>
<td><strong>DESCRIPTION</strong></td>
</tr>
<tr>
<td><strong>QUALIFICATION STATUS</strong></td>
</tr>
<tr>
<td><strong>PROPELLANT/FLUID</strong></td>
</tr>
<tr>
<td><strong>PRESSURE, MAX</strong></td>
</tr>
<tr>
<td><strong>MIN</strong></td>
</tr>
<tr>
<td><strong>PROOF</strong></td>
</tr>
<tr>
<td><strong>BURST</strong></td>
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<tr>
<td><strong>MASS</strong></td>
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<tr>
<td><strong>DIMENSIONS</strong></td>
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<tr>
<td><strong>MATERIAL</strong></td>
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<tr>
<td><strong>PORT, SIZE &amp; TYPE</strong></td>
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<tr>
<td><strong>VOLTAGE, INPUT</strong></td>
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<tr>
<td><strong>WATTS</strong></td>
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<tr>
<td><strong>SIGNAL</strong></td>
</tr>
<tr>
<td><strong>ELECTRICAL CONNECTION</strong></td>
</tr>
<tr>
<td><strong>MOUNTING</strong></td>
</tr>
<tr>
<td><strong>OPERATING TEMPERATURE RANGE</strong></td>
</tr>
<tr>
<td><strong>VIBRATION, RANDOM</strong></td>
</tr>
<tr>
<td><strong>SINE</strong></td>
</tr>
<tr>
<td><strong>ACCELERATION</strong></td>
</tr>
<tr>
<td><strong>SHOCK</strong></td>
</tr>
<tr>
<td><strong>LIFE, SERVICE</strong></td>
</tr>
<tr>
<td><strong>CYCLE</strong></td>
</tr>
<tr>
<td><strong>SHELF</strong></td>
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<tr>
<td><strong>RELIABILITY</strong></td>
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<tr>
<td><strong>LEAD TIME</strong></td>
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<tr>
<td><strong>COST</strong></td>
</tr>
<tr>
<td><strong>REMARKS</strong></td>
</tr>
<tr>
<td><strong>DATA SOURCE</strong></td>
</tr>
</tbody>
</table>

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PRESSURE TRANSDUCER/GAGE

MANUFACTURER  Systron Donner, Edcliff
PART NUMBER  4-910
DESCRIPTION  Solid state strain gage
QUALIFICATION STATUS

PROPELLANT/FLUID  Compatible with 17-7PH CRES

PRESSURE, MAX  16 to 2000 psia/psig
MIN  0 psia/psig
PROOF  500 percent of max.
BURST  1000 percent of max.

MASS  0.75 lbm (0.34 kg)
DIMENSIONS  4.85 in. by 1.38 in. diam (12.32 by 3.51 cm)

MATERIAL
PORT, SIZE & TYPE  MS 33656E4
VOLTAGE, INPUT  28±4 Vdc
WATTS
SIGNAL  0 to 5±0.05 Vdc at FS
ELECTRICAL CONNECTION  PTIH-8-4P

MOUNTING

OPERATING TEMPERATURE RANGE  -58 to 248 °F (-50 to 120 °C)

VIBRATION, RANDOM
SINE  50g to 2000 Hz
ACCELERATION  100g
SHOCK  100g for 11 ms

LIFE, SERVICE
CYCLE
RELIABILITY
SHELF
LEAD TIME
COST
REMARKS

DATA SOURCE  Systron Donner product data sheet - 1986

236
PRESSURE TRANSDUCER/GAGE

MANUFACTURER  Systron Donner, Edcliff
PART NUMBER  4-930
DESCRIPTION  Differential pressure, strain-gaged diaphragm
QUALIFICATION STATUS

PROPELLENT/FLUID  Compatible with 17-7PH CRES

PRESSURE, MAX  15 to 100 psid
MIN  0 psid
PROOF
BURST

MASS

DIMENSIONS  4.24 in. by 1.50 in. diam (10.80 by 3.81 cm)

MATERIAL  17-7PH CRES
PORT, SIZE & TYPE  MS 33656-E4 modified and -E2
VOLTAGE, INPUT  28±4 Vdc
WATTS
SIGNAL  0 to 5±0.5 Vdc at FC
ELECTRICAL CONNECTION  PTIH-8-4P

MOUNTING

OPERATING TEMPERATURE RANGE  -58 to 248 °F (-50 to 120 °C)

VIBRATION, RANDOM
SINE  50g peak to 2000 Hz
ACCELERATION  100g
SHOCK  100g for 11 ms

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Systron Donner product data sheet - 1986
MANUFACTURER  Systron Donner, Edcliff
PART NUMBER  4-931
DESCRIPTION  Differential pressure, strain-gaged diaphragm

PROPELLANT/FLUID

PRESSURE, MAX  15 to 100 psia
  MIN  0 psia
  PROOF  1.5X max.
  BURST  3X max.
MASS  1.0 lbm (0.45 kg)
DIMENSIONS  5.31 in. by 2.00 in. diam (13.49 by 5.08 cm)

MATERIAL  17-7PH CRES
PORT, SIZE & TYPE  MS 33657S3 and MS 33657S4
VOLTAGE, INPUT  28±4 Vdc
WATTS
SIGNAL  0 to 5±0.5 Vdc at FS
ELECTRICAL CONNECTION  PT1H-10-6P

MOUNTING

OPERATING TEMPERATURE RANGE  -58 to 248 °F (-50 to 120 °C)

VIBRATION, RANDOM
  SINE  50g peak to 2000 Hz
ACCELERATION  100g
SHOCK  100g for 11 ms

LIFE, SERVICE
  CYCLE
  SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Systron Donner product data sheet - 1986
## RELIEF VALVE

**MANUFACTURER**  Aerodyne Controls Corporation  
**PART NUMBER**  3895  
**DESCRIPTION**  Miniature, adjustable  
**QUALIFICATION STATUS**  DOD flight qualified  

### PROPELLANT/FLUID

<table>
<thead>
<tr>
<th>Pressure, Relief</th>
<th>3 to 200 psig</th>
<th>Reset</th>
<th>90 percent of relief setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leakage, Internal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>0.56 lbm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>0.72 in. by 0.44 in. hex</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MATERIAL, BODY

<table>
<thead>
<tr>
<th>Body/CRES</th>
<th>Cres</th>
<th>Seat/Seal</th>
<th>Cres</th>
<th>Spring</th>
<th>Ports, Size &amp; Type</th>
<th>1/4-28 UNF-3A per MIL-S-7742</th>
</tr>
</thead>
</table>

### MOUNTING

<table>
<thead>
<tr>
<th>Mounting</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

### OPERATING TEMPERATURE RANGE

-65 to 165 °F

### VIBRATION, RANDOM

SINE

### ACCELERATION

SINE

### SHOCK

SINE

### LIFE, SERVICE

<table>
<thead>
<tr>
<th>Cycle</th>
<th>Shelf</th>
<th>Reliability</th>
<th>Lead Time</th>
<th>Cost</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Proof pressure, 350 psig; burst pressure, 450 psig</td>
</tr>
</tbody>
</table>
RELIEF VALVE

MANUFACTURER  Carleton Technologies, Inc.
PART NUMBER  2655-0001-5
DESCRIPTION  Cabin relief, motor driven

QUALIFICATION STATUS  Space shuttle ARPCS

PROPELLANT/FLUID  O₂, N₂

PRESSURE, RELIEF  16 psi
RESET  15.5 psi

RATED FLOW  0 to 150 lbm/hr at 16 psig

LEAKAGE, INTERNAL  15 SCCM at 15 psid

MASS  2.20 lbm

DIMENSIONS

MATERIAL, BODY

SEAT/SEAL

SPRING

PORTS, SIZE & TYPE

MOUNTING

OPERATING TEMPERATURE RANGE  -65 to 200 °F

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE  
CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS  18 to 32 Vdc motor - 6.7 W running, 32.2 W stalled (w/position indicator)

DATA SOURCE  Carleton product data sheet - 1987
<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Carleton Technologies, Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>3111-0001-15 (model number R217-050)</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td></td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Rocketdyne program</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td>He</td>
</tr>
<tr>
<td>PRESSURE, RELIEF</td>
<td>320 to 330 psig</td>
</tr>
<tr>
<td>RESET</td>
<td>300 psia min.</td>
</tr>
<tr>
<td>RATED FLOW</td>
<td>0.19 lbm/s at 350 psig max.</td>
</tr>
<tr>
<td>LEAKAGE, INTERNAL</td>
<td>500 SCCM</td>
</tr>
<tr>
<td>MASS</td>
<td></td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td>3.580 in. by 3.150 in. diam</td>
</tr>
<tr>
<td>MATERIAL, BODY</td>
<td>304L, 304 CRES</td>
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<td>SEAT/SEAL</td>
<td></td>
</tr>
<tr>
<td>SPRING</td>
<td></td>
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<tr>
<td>PORTS, SIZE &amp; TYPE</td>
<td>5/8-in. tube</td>
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<tr>
<td>MOUNTING</td>
<td></td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td></td>
</tr>
<tr>
<td>VIBRATION, RANDOM</td>
<td></td>
</tr>
<tr>
<td>SINE</td>
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<tr>
<td>ACCELERATION</td>
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<td>SHOCK</td>
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<td>LIFE, SERVICE</td>
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<td>RELIABILITY</td>
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<td>LEAD TIME</td>
<td></td>
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<tr>
<td>COST</td>
<td></td>
</tr>
<tr>
<td>REMARKS</td>
<td></td>
</tr>
<tr>
<td>DATA SOURCE</td>
<td>Carleton drawing 3111-0001-15 - 1985</td>
</tr>
</tbody>
</table>

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**RELIEF VALVE**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Circle Seal Controls, Brunswick</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>D500T series (Gen. Dyn. P/N 55-02957)</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td></td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Centaur (General Dynamics)</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td></td>
</tr>
<tr>
<td>PRESSURE, RELIEF</td>
<td>150 psig</td>
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<tr>
<td>RESET</td>
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</tr>
<tr>
<td>RATED FLOW</td>
<td></td>
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<tr>
<td>LEAKAGE, INTERNAL</td>
<td></td>
</tr>
<tr>
<td>MASS</td>
<td></td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td></td>
</tr>
<tr>
<td>MATERIAL, BODY</td>
<td>303 CRES</td>
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<tr>
<td>SEAT/SEAL</td>
<td>Various</td>
</tr>
<tr>
<td>SPRING</td>
<td>302 CRES</td>
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<tr>
<td>PORTS, SIZE &amp; TYPE</td>
<td>Various</td>
</tr>
<tr>
<td>MOUNTING</td>
<td></td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td>Various</td>
</tr>
<tr>
<td>VIBRATION, RANDOM</td>
<td></td>
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<td>SINE</td>
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<td>ACCELERATION</td>
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<td>LIFE, SERVICE</td>
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<td>CYCLE</td>
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<td>SHELF</td>
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<tr>
<td>RELIABILITY</td>
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<tr>
<td>LEAD TIME</td>
<td></td>
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<tr>
<td>COST</td>
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<td>REMARKS</td>
<td></td>
</tr>
<tr>
<td>DATA SOURCE</td>
<td>Circle Seal Controls list (ref. 10)</td>
</tr>
</tbody>
</table>

242
## RELIEF VALVE

**MANUFACTURER**  Circle Seal Controls, Brunswick  
**PART NUMBER**  P13-533  

**DESCRIPTION**  

**QUALIFICATION STATUS**  Apollo (Martin Marietta)  

**PROPELLANT/FLUID**  

**PRESSURE, RELIEF**  15 psi  
**RESET**  

**RATED FLOW**  

**LEAKAGE, INTERNAL**  

**MASS**  

**DIMENSIONS**  

**MATERIAL, BODY**  2024-T351  
**SEAT/SEAL**  Buna-N  
**SPRING**  17-7PH CRES  

**PORTS, SIZE & TYPE**  MS 33656-16  

**MOUNTING**  

**OPERATING TEMPERATURE RANGE**  70 to 165 °F  

**VIBRATION, RANDOM**  
**SINE**  
**ACCELERATION**  
**SHOCK**  

**LIFE, SERVICE**  
**CYCLE**  
**SHELF**  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS**  

**DATA SOURCE**  Circle Seal Controls list (ref. 10)  

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<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Circle Seal Controls, Brunswick</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>P27-673 (M.M. P/N SK808D04206-001)</td>
</tr>
<tr>
<td>DESCRIPTION</td>
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</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Viking (Martin Marietta)</td>
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<tr>
<td>PROPELLANT/FLUID</td>
<td>H₂</td>
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<tr>
<td>PRESSURE, RELIEF</td>
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<td>RESET</td>
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<tr>
<td>RATED FLOW</td>
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<td>LEAKAGE, INTERNAL</td>
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<td>MASS</td>
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<tr>
<td>MATERIAL, BODY</td>
<td>2024-T351 Al alloy</td>
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<tr>
<td>SEAT/SEAL</td>
<td>Teflon</td>
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<tr>
<td>SPRING</td>
<td>17-7PH CRES</td>
</tr>
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<td>PORTS, SIZE &amp; TYPE</td>
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<td>MOUNTING</td>
<td></td>
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<tr>
<td>OPERATING TEMPERATURE RANGE</td>
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<tr>
<td>VIBRATION, RANDOM</td>
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<td>ACCELERATION</td>
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<td>SINE</td>
<td></td>
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<tr>
<td>LIFE, SERVICE</td>
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<td>CYCLE</td>
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<td>COST</td>
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<td>REMARKS</td>
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<td>DATA SOURCE</td>
<td>Circle Seal Controls list (ref. 10)</td>
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<td>Manufacurator</td>
<td>Circle Seal Controls, Brunswick</td>
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<tr>
<td>Part Number</td>
<td>P68-344</td>
</tr>
<tr>
<td>Description</td>
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</tr>
</tbody>
</table>

**Qualification Status**

Apollo cryopump booster (Martin Marietta)

**Propellant/Fluid**

**Pressure, Relief**

250 psi

**Rated Flow**

**Leakage, Internal**

**Mass**

**Dimensions**

**Material, Body**

303 CRES

**Seat/Seal**

Teflon

**Spring**

302 CRES

**Ports, Size & Type**

AND10050-6

**Mounting**

**Operating Temperature Range**

-300 to 155 °F

**Vibration, Random**

**Sine**

**Acceleration**

**Shock**

**Life, Service**

**Cycle**

**Shelf**

**Reliability**

**Lead Time**

**Cost**

**Remarks**

**Data Source**

Circle Seal Controls list (ref. 10)
MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  520T1-8D-175 (Gen. Dyn. P/N 57-02913)
DESCRIPTION

QUALIFICATION STATUS  Atlas (General Dynamics)

PROPELLANT/FLUID  H_2O_2

PRESSURE, RELIEF  400 psig
RESET
RATED FLOW
LEAKAGE, INTERNAL

MASS
DIMENSIONS

MATERIAL, BODY  316 CRES
SEAT/SEAL  Teflon
SPRING  302 CRES

PORTS, SIZE & TYPE  MS 33656-8 flare cone removed

MOUNTING

OPERATING TEMPERATURE RANGE  -320 to 400 °F

VIBRATION, RANDOM

ACCELERATION
SHOCK

LIFE, SERVICE

CYCLE

RELIABILITY

SHELF

LEAD TIME

COST

REMARKS

DATA SOURCE  Circle Seal Controls list (ref. 10)
RELIEF VALVE

MANUFACTURER Circle Seal Controls, Brunswick
PART NUMBER 524T-2MP-7
DESCRIPTION

QUALIFICATION STATUS Apollo (Martin Marietta)

PROPELLANT/FLUID

PRESSURE, RELIEF 200 psig
RESET

RATED FLOW

LEAKAGE, INTERNAL

MASS

DIMENSIONS

MATERIAL, BODY 303 CRES
SEAT/SEAL Silicone
SPRING 302 CRES

PORTS, SIZE & TYPE 1/4-in. NPT

MOUNTING

OPERATING TEMPERATURE RANGE -70 to 500 °F

VIBRATION, RANDOM

SINE ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE Circle Seal Controls list (ref. 10)
RELIEF VALVE

MANUFACTURER  Circle Seal Controls, Brunswick

PART NUMBER  532T-3D-5 (VAR-1)

DESCRIPTION

QUALIFICATION STATUS  Viking VTS telescope (Martin Marietta)

PROPELLANT/FLUID

PRESSURE, RELIEF  150 psi

RESET

RATED FLOW

LEAKAGE, INTERNAL

MASS

DIMENSIONS

MATERIAL, BODY  303 CRES

SEAT/SEAL  Viton

SPRING  302 CRES

PORTS, SIZE & TYPE  MS 33656-5 w/flare cone removed

MOUNTING

OPERATING TEMPERATURE RANGE  -20 to 400 °F

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Circle Seal Controls list (ref. 10)
<table>
<thead>
<tr>
<th>RELIEF VALVE</th>
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<tbody>
<tr>
<td>MANUFACTURER</td>
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<tr>
<td>PART NUMBER</td>
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<tr>
<td>DESCRIPTION</td>
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<tr>
<td>QUALIFICATION STATUS</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
</tr>
<tr>
<td>PRESSURE, RELIEF</td>
</tr>
<tr>
<td>RESET</td>
</tr>
<tr>
<td>RATED FLOW</td>
</tr>
<tr>
<td>LEAKAGE, INTERNAL</td>
</tr>
<tr>
<td>MASS</td>
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<tr>
<td>DIMENSIONS</td>
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<tr>
<td>MATERIAL, BODY</td>
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<td>SEAT/SEAL</td>
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<tr>
<td>SPRING</td>
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<tr>
<td>PORTS, SIZE &amp; TYPE</td>
</tr>
<tr>
<td>MOUNTING</td>
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<tr>
<td>OPERATING TEMPERATURE RANGE</td>
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<tr>
<td>VIBRATION, RANDOM</td>
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<tr>
<td>SINE</td>
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<td>SHOCK</td>
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<td>REMARKS</td>
</tr>
<tr>
<td>DATA SOURCE</td>
</tr>
<tr>
<td></td>
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</tbody>
</table>
## RELIEF VALVE

**MANUFACTURER**  Circle Seal Controls, Brunswick

**PART NUMBER**  559B-X (Army P/N 11241398)

**DESCRIPTION**

**QUALIFICATION STATUS**  Nike-A

**PROPELLANT/FLUID**

**PRESSURE, RELIEF**  150 psig

**RESET**

**RATED FLOW**

**LEAKAGE, INTERNAL**

**MASS DIMENSIONS**

**MATERIAL, BODY**  Brass

**SEAT/SEAL**  Buna-N

**SPRING**  302 CRES

**PORTS, SIZE & TYPE**  *Various

**MOUNTING**

**OPERATING TEMPERATURE RANGE**  -40 to 260 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE**  Circle Seal Controls list (ref. 10)
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<th>Circle Seal Controls, Brunswick</th>
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<tbody>
<tr>
<td><strong>PART NUMBER</strong></td>
<td>559T-6D-18.8 (GE P/N 47B113135P4)</td>
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<td><strong>DESCRIPTION</strong></td>
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<td><strong>QUALIFICATION STATUS</strong></td>
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<td><strong>RESET</strong></td>
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<td><strong>RATED FLOW</strong></td>
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<tr>
<td><strong>LEAKAGE, INTERNAL</strong></td>
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<tr>
<td><strong>DIMENSIONS</strong></td>
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<tr>
<td><strong>MATERIAL, BODY</strong></td>
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<tr>
<td>SEAT/SEAL</td>
<td>Buna-N</td>
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<tr>
<td>SPRING</td>
<td>302 CRES</td>
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<tr>
<td><strong>PORTS, SIZE &amp; TYPE</strong></td>
<td>MS 33656-6 w/flare cone removed</td>
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<td><strong>MOUNTING</strong></td>
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<td><strong>OPERATING TEMPERATURE RANGE</strong></td>
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<td><strong>SHOCK</strong></td>
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<td>SHELF</td>
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<td><strong>LEAD TIME</strong></td>
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<td><strong>COST</strong></td>
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<td><strong>REMARKS</strong></td>
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**DATA SOURCE** Circle Seal Controls list (ref. 10)
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<td>PART NUMBER</td>
<td>5159T-4TT-155, 5159T-2MP-200</td>
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<td>DESCRIPTION</td>
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<td>QUALIFICATION STATUS</td>
<td>Apollo (Martin Marietta)</td>
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<td>PROPELLANT/FLUID</td>
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<td>PRESSURE, RELIEF</td>
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<td>RESET</td>
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<td>RATED FLOW</td>
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<td>LEAKAGE, INTERNAL</td>
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<tr>
<td>MASS</td>
<td></td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td></td>
</tr>
<tr>
<td>MATERIAL, BODY</td>
<td>303 CRES</td>
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<tr>
<td>SEAT/SEAL</td>
<td>Buna-N</td>
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<td>SPRING</td>
<td>17-7PH CRES</td>
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<tr>
<td>PORTS, SIZE &amp; TYPE</td>
<td>MS 33656-4 (for 4TT) 1/4-in. NPT (for 2MP)</td>
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<td>MOUNTING</td>
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<td>OPERATING TEMPERATURE RANGE</td>
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<td>ACCELERATION</td>
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<td>SHOCK</td>
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<td>LIFE, SERVICE</td>
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<td>COST</td>
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<td>REMARKS</td>
<td></td>
</tr>
<tr>
<td>DATA SOURCE</td>
<td>Circle Seal Controls list (ref. 10)</td>
</tr>
</tbody>
</table>
RELIEF VALVE

MANUFACTURER  Futurecraft Corporation
PART NUMBER  400214
DESCRIPTION  Spring loaded, interval piston guide and stop

QUALIFICATION STATUS  Minuteman reentry stage (Avco)

PROPELLANT/FLUID

PRESSURE, RELIEF  540±15 psia
RESET  475 psia min.

RATED FLOW

LEAKAGE, INTERNAL  Zero at 450 psia

MASS  0.13 lbm

DIMENSIONS  2.30 in. by 0.81 in. hex

MATERIAL, BODY  2024-T4 Al alloy, 303 CRES poppet
SEAT/SEAL  Fluorosilicone O-ring
SPRING CRES

PORTS, SIZE & TYPE  MS 33656-4 modified

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE

ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY

LEAD TIME

COST

REMARKS  Proof pressure, 1200 psia; burst pressure, 2400 psia

DATA SOURCE  Futurecraft drawing 400214 - 1985
<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Futurecraft Corporation</th>
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<td>PART NUMBER</td>
<td>400233</td>
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<tr>
<td>DESCRIPTION</td>
<td>Spring and poppet w/inlet filter</td>
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<tr>
<td>QUALIFICATION STATUS</td>
<td>Teal Ruby</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td>GN2</td>
</tr>
</tbody>
</table>

| PRESSURE, RELIEF  | 75 to 85 psia (60 to 75 psig) |
| RESET             | 75 to 85 psia                |
| LEAKAGE, INTERNAL |                          |
| MASS              |                          |
| DIMENSIONS        | 4.15 by 2.50 by 1.19 in.   |

| MATERIAL, BODY   | 304L CRES                |
| SEAT/SEAL        |                          |
| SPRING           | 302 CRES                 |
| PORTS, SIZE & TYPE | 0.250-in. tube (inlet and outlet); 0.028-in. wall |
| MOUNTING         | Two 0.209-in.-diam holes, 0.940-in. apart |

| OPERATING TEMPERATURE RANGE | -22 to 160 °F |

| VIBRATION, RANDOM | SINE |
| ACCELERATION     |      |
| SHOCK            |      |

| LIFE, SERVICE    | CYCLE |
| RELIABILITY      |      |
| LEAD TIME        |      |
| COST             |      |
| REMARKS          | Proof pressure, 105 psig; burst pressure, 280 psig; inlet filter, 30 to 55 μm |

<table>
<thead>
<tr>
<th>DATA SOURCE</th>
<th>Futurecraft drawing 400233 - 1985</th>
</tr>
</thead>
</table>

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## PRESSURE REGULATOR 3

**MANUFACTURER** Carleton Technologies, Inc.
**PART NUMBER** 1-4-00-58-11
**DESCRIPTION** w/integral relief
**QUALIFICATION STATUS** Space shuttle ARPCS

**PROPELLANT/FLUID** $O_2$

<table>
<thead>
<tr>
<th>Pressure, Range, Inlet</th>
<th>900 to 600 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulated</td>
<td>100 psi</td>
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<tr>
<td>Outlet-Lockup</td>
<td>100 psi</td>
</tr>
<tr>
<td>Proof, Inlet</td>
<td>1875 psig</td>
</tr>
<tr>
<td>Proof, Outlet</td>
<td>190 psig</td>
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<tr>
<td>Burst, Inlet</td>
<td>2500 psig</td>
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<tr>
<td>Burst, Outlet</td>
<td>250 psig</td>
</tr>
<tr>
<td>Drop</td>
<td></td>
</tr>
</tbody>
</table>

**RATED FLOW** 0 to 50 lbm/hr

**LEAKAGE, INTERNAL-MAX INLET PRESS** 2.0 SCCM

**EXTERNAL-MAX INLET PRESS** 0.7 SCCM

**MASS** 2.5 lbm

**DIMENSIONS**

**MATERIAL, BODY**

**SEAT/SEAL**

**SPRING**

**PORTS, SIZE & TYPE, INLET**

**OUTLET**

**INTEGRAL RELIEF** 125 psi open, 105 psi reseat

**INTEGRAL FILTER**

**MOUNTING**

**OPERATING TEMPERATURE RANGE** 35 to 120 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Carleton product data sheet - 1987

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**PRESSURE REGULATOR**

**MANUFACTURER** Carleton Technologies, Inc.

**PART NUMBER** 1-4-00-58-13

**DESCRIPTION** w/Integral relief

**QUALIFICATION STATUS** Space shuttle ARPCS

**PROPELLANT/FLUID** $O_2$

**PRESSURE, RANGE, INLET** 1250 to 300 psig

**REGULATED** 100±10 psig

**OUTLET-LOCKUP** 125 psi

**PROOF, INLET** 1875 psig

**PROOF, OUTLET** 370 psig

**BURST, INLET** 2500 psig

**BURST, OUTLET** 490 psig

**DROP**

**RATED FLOW** 0 to 75 lbm/hr

**LEAKAGE, INTERNAL-MAX INLET PRESS.** 2.0 SCCM at lockup

**EXTERNAL-MAX INLET PRESS.** 0.6 SCCM

**MASS** 4.70 lbm

**DIMENSIONS**

**MATERIAL, BODY**

**SEAT/SEAL**

**SPRING**

**PORTS, SIZE & TYPE, INLET**

**OUTLET**

**INTEGRAL RELIEF** 245 psig, 215 reseat

**INTEGRAL FILTER**

**MOUNTING**

**OPERATING TEMPERATURE RANGE** 35 to 120 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Carleton product data sheet - 1987
### PRESSURE REGULATOR

**MANUFACTURER** Carleton Technologies, Inc.  
**PART NUMBER** 1-4-00-58-15  
**DESCRIPTION**  
**QUALIFICATION STATUS** Space shuttle ARPCS  

**PROPELLANT/FLUID** \( \text{O}_2 \)  
**PRESSURE, RANGE, INLET** 900 to 300 psig  
  **REGULATED** 100±10 psig  
  **OUTLET-LOCKUP** 245 psi  
  **PROOF, INLET** 1875 psig  
  **PROOF, OUTLET** 370 psig  
  **BURST, INLET** 2500 psig  
  **BURST, OUTLET** 490 psig  
**DROP**  
**RATED FLOW** 0 to 50 lbm/hr  
**LEAKAGE, INTERNAL** MAX INLET PRESS 10 SCCM at lockup  
**EXTERNAL** MAX INLET PRESS 1.0 SCCM  
**MASS** 4.7 lbm  
**DIMENSIONS**  

**MATERIAL, BODY**  
**SEAT/SEAL**  
**SPRING**  
**PORTS, SIZE & TYPE, INLET**  
**OUTLET**  
**INTEGRAL RELIEF**  
**INTEGRAL FILTER**  
**MOUNTING**  
**OPERATING TEMPERATURE RANGE** 35 to 120 °F  
**VIBRATION, RANDOM**  
**SINE**  
**ACCELERATION**  
**SHOCK**  
**LIFE, SERVICE**  
**SHELF**  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
** REMARKS**  

**DATA SOURCE** Carleton product data sheet - 1987
<table>
<thead>
<tr>
<th><strong>DESCRIPTION</strong></th>
<th><strong>Diaphragm</strong></th>
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<tbody>
<tr>
<td><strong>QUALIFICATION STATUS</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>PROPELLANT/FLUID</strong></td>
<td><strong>GH₂</strong></td>
</tr>
<tr>
<td><strong>PRESSURE, RANGE, INLET</strong></td>
<td><strong>5000 to 150 psi</strong></td>
</tr>
<tr>
<td><strong>REGULATED</strong></td>
<td><strong>0.5 to 1.2 psi</strong></td>
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<tr>
<td><strong>OUTLET-LOCKUP</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>PROOF, INLET</strong></td>
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<tr>
<td><strong>PROOF, OUTLET</strong></td>
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<tr>
<td><strong>BURST, INLET</strong></td>
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<tr>
<td><strong>BURST, OUTLET</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>DROP</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>RATED FLOW</strong></td>
<td><strong>0.07 SCFN</strong></td>
</tr>
<tr>
<td><strong>LEAKAGE, INTERNAL-MAX INLET PRESS</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>EXTERNAL-MAX INLET PRESS</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>MASS</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>DIMENSIONS</strong></td>
<td><strong>3.50 in. diam by 1.72 in. (8.89 by 4.37 cm)</strong></td>
</tr>
<tr>
<td><strong>MATERIAL, BODY</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>SEAT/SEAL</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>SPRING</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>PORTS, SIZE &amp; TYPE, INLET</strong></td>
<td><strong>AND10050-4</strong></td>
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<tr>
<td><strong>OUTLET</strong></td>
<td><strong>AND10050-4</strong></td>
</tr>
<tr>
<td><strong>INTEGRAL RELIEF</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>INTEGRAL FILTER</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>MOUNTING</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>OPERATING TEMPERATURE RANGE</strong></td>
<td><strong>-65 to 160 °F</strong></td>
</tr>
<tr>
<td><strong>VIBRATION, RANDOM</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>SINE</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>ACCELERATION</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>SHOCK</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>LIFE, SERVICE</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>SHELF</strong></td>
<td><strong>---</strong></td>
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<tr>
<td><strong>RELIABILITY</strong></td>
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<tr>
<td><strong>LEAD TIME</strong></td>
<td><strong>---</strong></td>
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<tr>
<td><strong>COST</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>REMARKS</strong></td>
<td><strong>---</strong></td>
</tr>
<tr>
<td><strong>DATA SOURCE</strong></td>
<td><strong>Carleton drawing 1-29-00 - 1985</strong></td>
</tr>
</tbody>
</table>
PRESSURE REGULATOR

MANUFACTURER Carleton Technologies, Inc.
PART NUMBER 1-59-00-3
DESCRIPTION Diaphragm w/relief
QUALIFICATION STATUS

PROPELLANT/FLUID GO2
PRESSURE, RANGE, INLET 1300 to 300 psig
REGULATED 10 psig
OUTLET-LOCKUP
PROOF, INLET
PROOF, OUTLET
BURST, INLET
BURST, OUTLET
DROP

RATED FLOW 0.4 lbm/hr min.
LEAKAGE, INTERNAL-MAX INLET PRESS

EXTERNAL-MAX INLET PRESS

MASS
DIMENSIONS 3.406 by 2.688 by 2.125 in.

MATERIAL, BODY
SEAT/SEAL

SPRING

PORTS, SIZE & TYPE, INLET MS 2435-4

OUTLET Outlet and relief same as inlet

INTEGRAL RELIEF 39 psia crack; 30 psia reset, 0.2 lbm/hr at 40 psia
INTEGRAL FILTER
MOUNTING

OPERATING TEMPERATURE RANGE -35 to 125 °F
VIBRATION, RANDOM SINE
ACCELERATION
SHOCK

LIFE, SERVICE
SHELF
RELIABILITY
LEAD TIME
COST

REMARKS Similar models: 1-59-00-1 and -2

DATA SOURCE Carleton drawing 1-59-00-3 - 1985
PRESSURE REGULATOR

MANUFACTURER Carleton Technologies, Inc.
PART NUMBER 1-59-00-5
DESCRIPTION Diaphragm w/relief
QUALIFICATION STATUS Unknown

PROPELLANT/FLUID GN₂
PRESSURE, RANGE, INLET 1800 to 300 psig
REGULATED 37 to 43 psig
OUTLET-LOCKUP 4E.0 psig max.
PROOF, INLET 2700 psig
PROOF, OUTLET
BURST, INLET
BURST, OUTLET
DROP

RATED FLOW 0.83 SCFM (393 SCCS)
LEAKAGE, INTERNAL-MAX INLET PRESS 1.0 SCC:

EXTERNAL-MAX INLET PRESS 1.8 SCCH
MASS 0.45 lbm (0.2 kg)
DIMENSIONS 3.400 by 3.844 by 2.14 in.

MATERIAL, BODY
SEAT/SEAL

SPRING
PORTS, SIZE & TYPE, INLET MS 33514E-4 line and relief

OUTLET MS 33514E-4; MS 24385-4C relief

INTEGRAL RELIEF 56 psia crack, 48 psia reset

INTEGRAL FILTER
MOUNTING Two 8-32 holes at 1.562 in. (3.967 cm)

OPERATING TEMPERATURE RANGE 10 to 125 °F
VIBRATION, RANDOM

SINE

ACCELERATION
SHOCK

LIFE, SERVICE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE Carleton drawing 1-59-00-5 - 1985

260
### PRESSURE REGULATOR

**MANUFACTURER**  Carleton Technologies, Inc.

**PART NUMBER**  2144-0001-31

**DESCRIPTION**  Cabin pressure regulator

**QUALIFICATION STATUS**  Space shuttle ARPCS

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>O2, N2</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PRESSURE, RANGE, INLET</th>
<th>295 to 90 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>REGULATED</td>
<td>14.7 to 0.2 psig</td>
</tr>
<tr>
<td>OUTLET-LOCKUP</td>
<td>15.0 psia</td>
</tr>
<tr>
<td>PROOF, INLET</td>
<td>443 psig</td>
</tr>
<tr>
<td>PROOF, OUTLET</td>
<td>45 psig</td>
</tr>
<tr>
<td>BURST, INLET</td>
<td>590 psig</td>
</tr>
<tr>
<td>BURST, OUTLET</td>
<td>80 psig</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>DROP</th>
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</thead>
</table>

| RATED FLOW | 0 to 75 lbm/hr |

<table>
<thead>
<tr>
<th>LEAKAGE, INTERNAL MAX INLET PRESS</th>
<th>7.0 SCCM at lockup</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTERNAL-MAX INLET PRESS</td>
<td>1.0 SCCM</td>
</tr>
</tbody>
</table>

| MASS | 6.221 lbm |

### MATERIAL

<table>
<thead>
<tr>
<th>INTERNAL SEAT/SEAL</th>
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<tr>
<th>SPRING</th>
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<tr>
<th>PORTS, SIZE &amp; TYPE, INLET</th>
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<tbody>
<tr>
<td>OUTLET</td>
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<table>
<thead>
<tr>
<th>INTEGRAL RELIEF</th>
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<thead>
<tr>
<th>INTEGRAL FILTER</th>
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<tr>
<th>MOUNTING</th>
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<table>
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<tr>
<th>OPERATING TEMPERATURE RANGE</th>
<th>35 to 120 °F</th>
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</thead>
<tbody>
<tr>
<td>VIBRATION, RANDOM SINE</td>
<td></td>
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<tr>
<td>ACCELERATION</td>
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<td>SHOCK</td>
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<tr>
<th>LIFE, SERVICE</th>
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<tr>
<td>SHELF</td>
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<tr>
<td>RELIABILITY</td>
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<tr>
<td>LEAD TIME</td>
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<tr>
<td>COST</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>REMARKS</th>
</tr>
</thead>
</table>

**DATA SOURCE**  Carleton product data sheet - 1987
PRESSURE REGULATOR

MANUFACTURER  Carleton Technologies, Inc.
PART NUMBER  2144-0001-33
DESCRIPTION  Cabin pressure regulator
QUALIFICATION STATUS  Space shuttle ARPCS

PROPELLANT/FLUID  O₂, N₂
PRESSURE, RANGE, INLET  295 to 0 psig
  REGULATED  8±0.2 psig
  OUTLET-LOCKUP  8.3 psig
  PROOF, INLET  443 psig
  PROOF, OUTLET  45 psig
  BURST, INLET  590 psig
  BURST, OUTLET  60 psig
DROP

RATED FLOW  0 to 75 lbrm/hr
LEAKAGE, INTERNAL-MAX INLET PRESS  7.0 SCCM at lockup

EXTERNAL-MAX INLET PRESS  0.2 SCCM

MASS
DIMENSIONS

MATERIAL, BODY
  SEAT/SEAL
  SPRING
PORTS, SIZE & TYPE, INLET
  OUTLET

INTEGRAL RELIEF

INTEGRAL FILTER

MOUNTING

OPERATING TEMPERATURE RANGE  35 to 120 °F
VIBRATION, RANDOM
  ACCELERATION
  SHOCK

LIFE, SERVICE
  SHELF
RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Carleton product data sheet - 1987
<table>
<thead>
<tr>
<th><strong>PRESSURE REGULATOR</strong></th>
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<tbody>
<tr>
<td><strong>MANUFACTURER</strong></td>
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<tr>
<td><strong>PART NUMBER</strong></td>
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<tr>
<td><strong>DESCRIPTION</strong></td>
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<td><strong>QUALIFICATION STATUS</strong></td>
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<td><strong>PROPELLANT/FLUID</strong></td>
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<td><strong>PRESSURE, RANGE, INLET</strong></td>
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<tr>
<td><strong>RATED FLOW</strong></td>
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<tr>
<td><strong>LEAKAGE, INTERNAL-MAX INLET PRESS</strong></td>
</tr>
<tr>
<td><strong>EXTERNAL-MAX INLET PRESS</strong></td>
</tr>
<tr>
<td><strong>MASS</strong></td>
</tr>
<tr>
<td><strong>DIMENSIONS</strong></td>
</tr>
<tr>
<td><strong>MATERIAL, BODY</strong></td>
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<tr>
<td><strong>SEAT/SEAL</strong></td>
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<tr>
<td><strong>SPRING</strong></td>
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<tr>
<td><strong>PORTS, SIZE &amp; TYPE, INLET</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>INTEGRAL RELIEF</strong></td>
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<tr>
<td><strong>INTEGRAL FILTER</strong></td>
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<tr>
<td><strong>MOUNTING</strong></td>
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<tr>
<td><strong>OPERATING TEMPERATURE RANGE</strong></td>
</tr>
<tr>
<td><strong>VIBRATION, RANDOM</strong></td>
</tr>
<tr>
<td><strong>SINE</strong></td>
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<tr>
<td><strong>ACCELERATION</strong></td>
</tr>
<tr>
<td><strong>SHOCK</strong></td>
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<tr>
<td><strong>LIFE, SERVICE</strong></td>
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<tr>
<td><strong>SHELF</strong></td>
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<tr>
<td><strong>RELIABILITY</strong></td>
</tr>
<tr>
<td><strong>LEAD TIME</strong></td>
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<tr>
<td><strong>COST</strong></td>
</tr>
<tr>
<td><strong>REMARKS</strong></td>
</tr>
<tr>
<td><strong>DATA SOURCE</strong></td>
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<table>
<thead>
<tr>
<th><strong>PRESSURE REGULATOR</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>MANUFACTURER</strong> Carleton Technologies, Inc.</td>
</tr>
<tr>
<td><strong>PART NUMBER</strong> 2566</td>
</tr>
<tr>
<td><strong>DESCRIPTION</strong> Single-stage pneumatic</td>
</tr>
<tr>
<td><strong>QUALIFICATION STATUS</strong> OSO</td>
</tr>
<tr>
<td><strong>PROPELLANT/FLUID</strong> N₂, He</td>
</tr>
<tr>
<td><strong>PRESSURE, RANGE, INLET</strong> 4015 psia (2770 N/cm²) max.</td>
</tr>
<tr>
<td><strong>REGULATED</strong> 220 psia (152 N/cm²)</td>
</tr>
<tr>
<td><strong>OUTLET-LOCKUP</strong></td>
</tr>
<tr>
<td><strong>PROOF, INLET</strong></td>
</tr>
<tr>
<td><strong>PROOF, OUTLET</strong></td>
</tr>
<tr>
<td><strong>BURST, INLET</strong></td>
</tr>
<tr>
<td><strong>BURST, OUTLET</strong></td>
</tr>
<tr>
<td><strong>DROP</strong></td>
</tr>
<tr>
<td><strong>RATED FLOW</strong></td>
</tr>
<tr>
<td><strong>LEAKAGE, INTERNAL-MAX INLET PRESS</strong></td>
</tr>
<tr>
<td><strong>EXTERNAL-MAX INLET PRESS</strong></td>
</tr>
<tr>
<td><strong>MASS</strong> 1.2 lbm (0.55 kg)</td>
</tr>
<tr>
<td><strong>DIMENSIONS</strong></td>
</tr>
<tr>
<td><strong>MATERIAL, BODY</strong></td>
</tr>
<tr>
<td><strong>SEAT/SEAL</strong></td>
</tr>
<tr>
<td><strong>SPRING</strong></td>
</tr>
<tr>
<td><strong>PORTS, SIZE &amp; TYPE, INLET</strong></td>
</tr>
<tr>
<td><strong>OUTLET</strong> 0.25-in. tube (0.635 cm)</td>
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<tr>
<td><strong>INTEGRAL RELIEF</strong></td>
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<tr>
<td><strong>INTEGRAL FILTER</strong></td>
</tr>
<tr>
<td><strong>MOUNTING</strong></td>
</tr>
<tr>
<td><strong>OPERATING TEMPERATURE RANGE</strong> 5 to 140 °F (-29 to 60 °C)</td>
</tr>
<tr>
<td><strong>VIBRATION, RANDOM</strong> 18.6g rms</td>
</tr>
<tr>
<td><strong>SINE</strong> 12g</td>
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<tr>
<td><strong>ACCELERATION</strong> 18g</td>
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<tr>
<td><strong>SHOCK</strong></td>
</tr>
<tr>
<td><strong>LIFE, SERVICE</strong> 1 yr (100,000 cycles)</td>
</tr>
<tr>
<td><strong>SHELF</strong> 2 yr</td>
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<tr>
<td><strong>RELIABILITY</strong></td>
</tr>
<tr>
<td><strong>LEAD TIME</strong></td>
</tr>
<tr>
<td><strong>COST</strong></td>
</tr>
<tr>
<td><strong>REMARKS</strong></td>
</tr>
<tr>
<td><strong>DATA SOURCE</strong> Aerospace Corporation report (ref. 9)</td>
</tr>
</tbody>
</table>
**PRESSURE REGULATOR**

**MANUFACTURER**  Carleton Technologies, Inc.

**PART NUMBER**  2566-0002-1

**DESCRIPTION**  Single stage

**QUALIFICATION STATUS**  Space shuttle ARPCS

**PROPELLANT/FLUID**  GN₂, CH₄

**PRESSURE, RANGE, INLET**  4000 to 300 psig

| REGULATED | 220 psig |
| OUTLET-LOCKUP | 260 psig |
| PROOF, INLET | 6000 psig |
| PROOF, OUTLET | 6000 psig |
| BURST, INLET | 8000 psig |
| BURST, OUTLET | 8000 psig |

**DROP**

**RATED FLOW**  1 to 7 SCFM

**LEAKAGE, INTERNAL**

**MAX INLET PRESS**  10 SCCH N₂

**EXTERNAL-MAX INLET PRESS**  1x10⁻⁶ SCCS He

**MASS**  1.75 lbm

**DIMENSIONS**  5.37 by 3.45 by 2.50 in.

**MATERIAL, BODY**

| SEAT/SEAL |
| SPRING |

**PORTS, SIZE & TYPE, INLET**  Tube

| OUTLET | Tube |

**INTEGRAL RELIEF**

**INTEGRAL FILTER**

**MOUNTING**

**OPERATING TEMPERATURE RANGE**  -40 to 160 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE**  Carleton drawing 2566-0002 - 1985
<table>
<thead>
<tr>
<th><strong>DESCRIPTION</strong></th>
<th>Two-stage w/integral relief</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>QUALIFICATION STATUS</strong></td>
<td>Space shuttle ARPCS</td>
</tr>
<tr>
<td><strong>PROPPELLANT/FLUID</strong></td>
<td>N₂</td>
</tr>
<tr>
<td><strong>PRESSURE, RANGE, INLET</strong></td>
<td>3300 to 200 psig</td>
</tr>
<tr>
<td><strong>REGULATED</strong></td>
<td>400±50 psig 1st stage, 200±15 psig 2nd stage</td>
</tr>
<tr>
<td><strong>OUTLET-LOCKUP</strong></td>
<td>240 psig</td>
</tr>
<tr>
<td><strong>PROOF, INLET</strong></td>
<td>4950 psig</td>
</tr>
<tr>
<td><strong>PROOF, OUTLET</strong></td>
<td>443 psig</td>
</tr>
<tr>
<td><strong>BURST, INLET</strong></td>
<td>6600 psig</td>
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<tr>
<td><strong>BURST, OUTLET</strong></td>
<td>590 psig</td>
</tr>
<tr>
<td><strong>RATED FLOW</strong></td>
<td>0 to 75 lbm/hr</td>
</tr>
<tr>
<td><strong>LEAKAGE, INTERNAL-MAX INLET PRESS</strong></td>
<td>2.5 SCCM at lockup</td>
</tr>
<tr>
<td><strong>EXTERNAL-MAX INLET PRESS</strong></td>
<td>1.0 SCCM</td>
</tr>
<tr>
<td><strong>MASS</strong></td>
<td>2.98 lbm</td>
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<tr>
<td><strong>MATERIAL, BODY</strong></td>
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<tr>
<td><strong>SEAT/SEAL</strong></td>
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<td><strong>SPRING</strong></td>
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<tr>
<td><strong>PORTS, SIZE &amp; TYPE, INLET</strong></td>
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</tr>
<tr>
<td><strong>OUTLET</strong></td>
<td></td>
</tr>
<tr>
<td><strong>INTEGRAL RELIEF</strong></td>
<td>295 psig open, 245 psig reseat</td>
</tr>
<tr>
<td><strong>INTEGRAL FILTER</strong></td>
<td></td>
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<tr>
<td><strong>MOUNTING</strong></td>
<td></td>
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<tr>
<td><strong>OPERATING TEMPERATURE RANGE</strong></td>
<td>-65 to 200 °F</td>
</tr>
<tr>
<td><strong>VIBRATION, RANDOM</strong></td>
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<td><strong>COST</strong></td>
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<tr>
<td><strong>REMARKS</strong></td>
<td></td>
</tr>
</tbody>
</table>

**DATA SOURCE** Carleton product data sheet - 1987
MANUFACTURER  Carleton Technologies, Inc.
PART NUMBER  2729-0001-9
DESCRIPTION  Two-stage w/integral relief
QUALIFICATION STATUS  Space shuttle ARPCS

PROPELLANT/FLUID  O₂
PRESSURE, RANGE, INLET  3300 to 300 psig
REGULATED  400±50 psig 1st stage, 300±15 psig 2nd stage
OUTLET-LOCKUP  340 psig
PROOF, INLET  4950 psig
PROOF, OUTLET  1875 psig
BURST, INLET  6600 psig
BURST, OUTLET  2500 psig
DROP

RATED FLOW  0 to 150 lbm/hr
LEAKAGE, INTERNAL-MAX INLET PRESS  2.5 SCCM at lockup
EXTERNAL-MAX INLET PRESS  1.05 SCCM

MASS
DIMENSIONS

MATERIAL, BODY
SEAT/SEAL
SPRING

PORTS, SIZE & TYPE, INLET

OUTLET

INTEGRAL RELIEF  1250 psig open, 1075 psig reseat

INTEGRAL FILTER
MOUNTING

OPERATING TEMPERATURE RANGE  -65 to 200 °F
VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
SHELF
RELIABILITY

LEAD TIME
COST
REMARKS

DATA SOURCE  Carleton product data sheet - 1987
**PRESSURE REGULATOR**

MANUFACTURER  Carleton Technologies, Inc.

PART NUMBER  1826001-19

DESCRIPTION

QUALIFICATION STATUS  Unknown

PROPELLANT/FLUID  90 percent Ar, 10 percent CH₄

PRESSURE, RANGE, INLET  2500 to 500 psig

  - REGULATED  16 psia
  - OUTLET-LOCKUP
  - PROOF, INLET  3750 psig
  - PROOF, OUTLET  50 psig
  - BURST, INLET  6250 psig
  - BURST, OUTLET  100 psig

DROP

RATED FLOW  0.018 to 0.0004 SCFM (8.33 to 0.167 SCCS)

LEAKAGE, INTERNAL-MAX INLET PRESS

EXTERNAL-MAX INLET PRESS

MASS  0.9 lbm (0.4 kg)

DIMENSIONS  3.59 by 2.41 by 2.63 in.

MATERIAL, BODY

SEAT/SEAL

SPRING

PORTS, SIZE & TYPE, INLET  MS 24385-4

OUTLET  MS 24385-4

INTEGRAL RELIEF

INTEGRAL FILTER  10 μm abs inlet, 14 μm abs outlet

MOUNTING

OPERATING TEMPERATURE RANGE  -25 to 174 °F

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Carleton drawing 1826001-19 - 1985
PRESSURE REGULATOR

MANUFACTURER Consolidated Controls, Inc.

PART NUMBER 6890

DESCRIPTION Single stage

QUALIFICATION STATUS Minuteman III

PROPELLANT/FLUID He, N2

PRESSURE, RANGE, INLET 3655 to 415 psia (2520 to 286 N/cm²)
REGULATED 247 psia (170 N/cm²)
OUTLET-LOCKUP 262 psia (180 N/cm²)
PROOF, INLET 6015 psia (4147 N/cm²)
PROOF, OUTLET 390 psia (268 N/cm²)
BURST, INLET 9015 psia (6215 N/cm²)
BURST, OUTLET 615 psia (424 N/cm²)

RATED FLOW 26 SCFM (12,200 SCCS)

LEAKAGE, INTERNAL-MAX INLET PRESS 10 SCCH He

EXTERNAL-MAX INLET PRESS

MASS 1.5 lbm (0.7 kg)

DIMENSIONS 5.16 in. length by 1.84 in. diam (13.1 by 4.7 cm)

MATERIAL, BODY 304L CRES

SEAT/SEAL 440A

SPRING

PORTS, SIZE & TYPE, INLET MS 24385-4E

OUTLET Same as inlet

INTEGRAL RELIEF

INTEGRAL FILTER 10 µm abs

MOUNTING

OPERATING TEMPERATURE RANGE -19 to 90 °F (-28 to 32 °C)

VIBRATION, RANDOM 22g rms

SINE 20g

ACCELERATION 14g

SHOCK 100g

LIFE, SERVICE 10,000 cycles

SHELF 10 yr

RELIABILITY

LEAD TIME 180 days in 1974

COST 5 to 10 units - $12,000 in 1974

REMARKS Pressure drop 165 psid (114 N/cm²) 2.7x10⁻⁴ SCCS He

DATA SOURCE IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
PRESSURE REGULATOR

MANUFACTURER  Consolidated Controls, Inc.
PART NUMBER  6894
DESCRIPTION  Single-stage pneumatic
QUALIFICATION STATUS  Mariner 1971, Viking orbiter 1975

PROPELLANT/FLUID  N₂, He
PRESSURE, RANGE, INLET  4015 to 475 psia (2770 to 328 N/cm²)
REGULATED  255 psia (175 N/cm²)
OUTLET-LOCKUP  280 psia (193 N/cm²)
PROOF, INLET  6015 psia (4147 N/cm²)
PROOF, OUTLET  420 psia (289 N/cm²)
BURST, INLET  8815 psia (6077 N/cm²)
BURST, OUTLET  615 psia (424 N/cm²)
DROP  200 psid (140 N/cm²)
RATED FLOW  16.3 SCFM (7693 SCCS)

LEAKAGE, INTERNAL-MAX INLET PRESS  0.017 SCCM He
EXTERNAL-MAX INLET PRESS  1 x 10⁻⁶ SCCS He

MASS  1.84 lbm (0.83 kg)
DIMENSIONS  5.16 in. length by 1.84 in diam (13.1 by 4.7 cm)

MATERIAL, BODY  304L
SEAT/SEAL  440A
SPRING

PORTS, SIZE & TYPE, INLET  0.375-in.-diam 304L CRES tube
OUTLET  Same as inlet

INTEGRAL RELIEF  No

INTEGRAL FILTER  10-µm abs
MOUNTING  Al alloy bracket

OPERATING TEMPERATURE RANGE  27 to 117 °F (-3 to 47 °C)
VIBRATION, RANDOM  15.6g rms
SINE  15g
ACCELERATION  6g X Y Z
SHOCK  200g

LIFE, SERVICE  5 yr; 20,000 cycles
SHELF  5 yr

RELIABILITY
LEAD TIME  180 days in 1974
COST  5 to 10 units - $12,000 in 1974

REMARKS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
PRESSURE REGULATOR

MANUFACTURER  Fairchild Control Systems Company
PART NUMBER  63-036
DESCRIPTION  Pilot-loaded, series redundant seals
QUALIFICATION STATUS  Apollo Command Module RCS, LM RCS

PROPELLANT/FLUID  He
PRESSURE, RANGE, INLET 4515 to 280 psia (3113 to 193 N/cm²)
    REGULATED  291 psia (201 N/cm²)
    OUTLET-LOCKUP  203/313 psia (139/215 N/cm²)
    PROOF, INLET  6780 psia (4674 N/cm²)
    PROOF, OUTLET  405 psia (279 N/cm²)
    BURST, INLET  9015 psia (6215 N/cm²)
    BURST, OUTLET  515 psia (355 N/cm²)
DROP

RATED FLOW  3 SCFM (1416 SCCS)
LEAKAGE, INTERNAL-MAX INLET PRESS  17 SCCH

    EXTERNAL-MAX INLET PRESS  5x10⁻⁵ SCCS

MASS  2.9 lbm (1.3 kg)
DIMENSIONS

MATERIAL, BODY  17-4PH, 300 series CRES
    SEAT/SEAL  Kynar

SPRING

PORTS, SIZE & TYPE, INLET  0.25-in. tube
    OUTLET  Same as inlet

INTEGRAL RELIEF
INTEGRAL FILTER
MOUNTING

OPERATING TEMPERATURE RANGE  -85 to 160 °F (-65 to 71 °C)
VIBRATION, RANDOM
    SINE
ACCELERATION
SHOCK

LIFE, SERVICE  7000 cycles
SHELF
RELIABILITY
LEAD TIME
COST  $6000 to $9000 in 1974
REMARKS  Not in production. Available by special order.

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
PRESSURE REGULATOR

MANUFACTURER  Fairchild Control Systems Company
PART NUMBER  65-168
DESCRIPTION  Pilot-loaded, series redundant seals
QUALIFICATION STATUS  Saturn IV-B

PROPELLANT/FLUID  N₂, He
PRESSURE, RANGE, INLET  3215 to 365 psia (2216 to 251 N/cm²)
  REGULATED  200 psia (138 N/cm²)
  OUTLET-LOCKUP  218 psia (150 N/cm²)
PROOF, INLET  4815 psia (3319 N/cm²)
PROOF, OUTLET  390 psia (268 N/cm²)
BURST, INLET  8015 psia (5526 N/cm²)
BURST, OUTLET  640 psia (441 N/cm²)
DROP

RATED FLOW  15 SCFM (7080 SCCS)
LEAKAGE, INTERNAL-MAX INLET PRESS  149 SCCH
  EXTERNAL-MAX INLET PRESS  2x10⁻⁴ SCCS

MASS  3.0 lbm (1.3 kg)
DIMENSIONS

MATERIAL, BODY  17-4PH
  SEAT/SEAL  Kynar
  SPRING

PORTS, SIZE & TYPE, INLET  MC 124-C4
  OUTLET  Same as inlet

INTEGRAL RELIEF

INTEGRAL FILTER
MOUNTING

OPERATING TEMPERATURE RANGE  -10 to 124 °F (-23 to 51 °C)
VIBRATION, RANDOM
  SINE
ACCELERATION
SHOCK

LIFE, SERVICE  5000 cycles
SHELF
RELIABILITY
LED TIME
COST  $6000 to $9000 in 1974
REMARKS  Not in production. Available by special order.

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
**PRESSURE REGULATOR**

**MANUFACTURER**  Fairchild Control Systems Company  
**PART NUMBER**  332000  
**DESCRIPTION**  Pilot-loaded, single stage  
**QUALIFICATION STATUS**  Minuteman III (Bell Aerospace)

**PROPELLANT/FLUID**  N₂, He  
**PRESSURE, RANGE, INLET**  3515 to 415 psia (2423 to 286 N/cm²)  
**REGULATED**  240 psia (165 N/cm²)  
**OUTLET-LOCKUP**  262 psia (180 N/cm²)  
**PROOF, INLET**  5240 psia (3512 N/cm²)  
**PROOF, OUTLET**  315 psia (217 N/cm²)  
**BURST, INLET**  6985 psia (4816 N/cm²)  
**BURST, OUTLET**  615 psia (424 N/cm²)  
**DROP**  160 psid (110 N/cm²)  

**RATED FLOW**  25 SCFM (11,800 SCCS)  
**LEAKAGE, INTERNAL-MAX INLET PRESS**  0.017 SCCS He  
**EXTERNAL-MAX INLET PRESS**  0.0041 SCCS  

**MASS**  1.2 lbm (0.54 kg)  
**DIMENSIONS**  4.85 in. length by 3.46 in. width (12.3 by 8.8 cm)  

**MATERIAL, BODY**  17-4PH, 300 series CRES  
**SEAT/SEAL**  Kynar  

**SPRING**  

**PORTS, SIZE & TYPE, INLET**  MS 24385-4  
**OUTLET**  MS 24385-1  

**INTEGRAL RELIEF**  No  

**INTEGRAL FILTER**  25 µm abs  
**MOUNTING**  Bracket  

**OPERATING TEMPERATURE RANGE**  20 to 150 °F (-7 to 65 °C)  
**VIBRATION, RANDOM**  
**SINE**  20g  
**ACCELERATION**  21g X Y Z  
**SHOCK**  

**LIFE, SERVICE**  3 yr; 5000 cycles  
**RELIABILITY**  
**SHELF**  3 yr  
**LEAD TIME**  
**COST**  $4000 to $6000 in 1974  
**REMARKS**  

**DATA SOURCE**  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)  

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## PRESSURE REGULATOR

**MANUFACTURER**  Fairchild Control Systems Company  
**PART NUMBER**  385000  
**DESCRIPTION**  Pilot-loaded, series redundant seals  
**QUALIFICATION STATUS**  Apollo LM ascent engine tank pressure  

### PROPellant/FLUID  He  
### PRESSURE, RANGE, INLET  3515 to 415 psia (2423 to 286 N/cm²)  
- **REGULATED**  182 psia (126 N/cm²)  
- **OUTLET-LOCKUP**  188 psia  
- **PROOF, INLET**  5335 psia (~678 N/cm²)  
- **PROOF, OUTLET**  340 psia (~4 N/cm²)  
- **BURST, INLET**  8015 psia (~26 N/cm²)  
- **BURST, OUTLET**  515 psia (~35 N/cm²)  
- **DROP**  218 psid (~130 N/cm²)  

**PROOF**  OUTLET  340 psia  
**BURST**  INLET  8015 psia  
**BURST**  OUTLET  515 psia  
**DROP**  218 psid  

### RATED FLOW  140 SCFM (66,080 SCCS)  
### LEAKAGE, INTERNAL-MAX INLET PRESS  101 SCCH  
### EXTERNAL-MAX INLET PRESS  3.3x10⁻⁶ SCCS  
### MASS  2.85 lbm (1.3 kg)  
### DIMENSIONS  7.62 by 5.10 in. (19.4 by 13 cm)  
### MATERIAL, BODY  17-4PH, 300 series CRES  
### SEAT/SEAL  Kynar  
### SPRING  
### PORTS, SIZE & TYPE, INLET  3/8-in. tube  
- **OUTLET**  1/2-in. tube  

### INTEGRAL RELIEF  
### INTEGRAL FILTER  25 µm abs  
### MOUNTING  

### OPERATING TEMPERATURE RANGE  -85 to 160 °F (-65 to 72 °C)  
### VIBRATION, RANDOM  
- **SINE**  5g  
- **ACCELERATION**  13.5g X Y Z  
- **SHOCK**  50g  

### LIFE, SERVICE  1 yr; 5000 cycles  
- **SHELF**  5 yr  
### REliability  
### LEAD TIME  
### COST  
### REMARKS  Not in production. Available by special order.  

### DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
PRESSURE REGULATOR

MANUFACTURER  Fairchild Control Systems Company
PART NUMBER  601000
DESCRIPTION  Pneumatic, single direct acting
QUALIFICATION STATUS  OAO

PROPELLANT/FLUID  GN2
PRESSURE, RANGE, INLET  3261 to 64.7 psia (2248 to 44.6 N/cm²)
REGULATED  5 psig (3 N/cm²)
OUTLET-LOCKUP  21.2 psia (14.6 N/cm²)
PROOF, INLET  4890 psia (3371 N/cm²)
PROOF, OUTLET  25.7 psia (17.7 N/cm²)
BURST, INLET  8140 psia (5612 N/cm²)
BURST, OUTLET  32.7 psia (22.5 N/cm²)
DROP

RATED FLOW  0.1 SCFM (47 SCCS)
LEAKAGE, INTERNAL-MAX INLET PRESS  10 SCCH
EXTERNAL-MAX INLET PRESS  5x10⁻⁴ SCCS

MASS  0.9 lbm (0.4 kg)

DIMENSIONS

MATERIAL, BODY  17-4PH, 300 series CRES
SEAT/SEAL

SPRING

PORTS, SIZE & TYPE, INLET  MS 33514-4
OUTLET  Same as inlet

INTEGRAL RELIEF

INTEGRAL FILTER

MOUNTING

OPERATING TEMPERATURE RANGE  -30 to 150 °F (-34 to 65.5 °C)
VIBRATION, RANDOM
SINE

ACCELERATION

SHOCK

LIFE, SERVICE  10,000 cycles

RELIABILITY

LEAD TIME

COST  $4000 to $6000 in 1974

REMARKS  Not in production. Available by special order.

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
PRESSURE REGULATOR

MANUFACTURER  Fairchild Control Systems Company
PART NUMBER  617000
DESCRIPTION  Pneumatic, single stage, pilot loaded
QUALIFICATION STATUS  OAO

PROPELLANT/FLUID  N2
PRESSURE, RANGE, INLET  3915 to 165 psia (2699 to 114 N/cm²)
  REGULATED  38 psia (26 N/cm²)
  OUTLET-LOCKUP  44 psia (30 N/cm²)
PROOF, INLET
PROOF, OUTLET
BURST, INLET  8125 psia (5606 N/cm²)
BURST, OUTLET  175 psia (121 N/cm²)
DROP  115 psid at max. flow
RATED FLOW  1 to 5 SCFM (472 to 2360 SCCS)
LEAKAGE, INTERNAL-MAX INLET PRESS  10 SCCH

EXTERNAL-MAX INLET PRESS  5x10⁻⁴ SCCS

MASS  1.2 lbm (0.54 kg)
DIMENSIONS  3.46 by 3.76 in. (8.8 by 9.6 cm)

MATERIAL, BODY  17-4PH, 300 series CRES
SEAT/SEAL  Kynar, polyimide

SPRING

PORTS, SIZE & TYPE, INLET  MS 33514-4
  OUTLET  Same as inlet

INTEGRAL RELIEF  Yes

INTEGRAL FILTER  25 µm abs
MOUNTING  Bracket

OPERATING TEMPERATURE RANGE  -30 to 150 °F (-34 to 65.5 °C)
VIBRATION, RANDOM  12.7g rms
  SINE  15g
ACCELERATION  11.5g
SHOCK  30g

LIFE, SERVICE  5000 cycles; 1 yr
SHELF  2 yr
RELIABILITY
LEAD TIME
COST

REMARKS  Not in production. Available by special order.

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
PRESSURE REGULATOR

MANUFACTURER  Fairchild Control Systems Company
PART NUMBER  679000
DESCRIPTION  Pilot-loaded, series redundant seals, pneumatic
QUALIFICATION STATUS  Saturn IV B

PROPELLANT/FLUID  N₂, He
PRESSURE, RANGE, INLET  3215 to 615 psia (2216 to 424 N/cm²)
REGULATED  470 to 500 psia (324 to 344 N/cm²)
OUTLET-LOCKUP  484 psia primary (333 N/cm²)
PROOF, INLET  4800 psia (3309 N/cm²)
PROOF, OUTLET  780 psia (537 N/cm²)
BURST, INLET  8000 psia (5515 N/cm²)
BURST, OUTLET  1300 psia (896 N/cm²)
DROP  190 psid (131 N/cm²)
RATED FLOW  30 SCFM (14,160 SCCS)
LEAKAGE, INTERNAL-MAX INLET PRESS  405 SCCS He

EXTERNAL-MAX INLET PRESS
MASS  2.6 lbm (1.1 kg)
DIMENSIONS  6.87 in. length by 4.85 in. width (17.5 by 12.3 cm)

MATERIAL, BODY  17-4PH, 300 series CRES
SEAT/SEAL  Kynar, polyimide

SPRING
PORTS, SIZE & TYPE, INLET  MC 223 fitting w/MC-124-C4
OUTLET  Same as inlet

INTEGRAL RELIEF  No
INTEGRAL FILTER  25 μm abs
MOUNTING  Bracket

OPERATING TEMPERATURE RANGE  -85 to 160 °F (-65 to 72 °C)
VIBRATION, RANDOM
SINE  20g
ACCELERATION  8g X Y Z
SHOCK

LIFE, SERVICE  1 yr; 5000 cycles
SHELF  2 yr
RELIABILITY
LEAD TIME
COST  $6000 to $9000 in 1974
REMARKS  Not in production. Available by special order.

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
PRESSURE REGULATOR

MANUFACTURER    Fairchild Control Systems Company
PART NUMBER  994000
DESCRIPTION Single stage, pneumatic
QUALIFICATION STATUS Japanese L.V.

PROPELLANT/GLUd _ N2
PRESSURE, RANGE, INLET  3515 psia (2423 N/cm²) max.
  REGULATED  285 psia (197 N/cm²)
  OUTLET-LOCKUP  302 psia (208 N/cm²)
PROOF, INLET
PROOF, OUTLET
BURST, INLET  7000 psia (4830 N/cm²)
BURST, OUTLET  800 psia (560 N/cm²)
DROP
RATED FLOW  1.2 to 10 SCFM (566 to 4720 SCCS)
LEAKAGE, INTERNAL—MAX INLET PRESS 0.2 SCCS He
(dieuut not specifed)

EXTERNAL—MAX INLET PRESS
MASS  1.5 lbm (0.7 kg)
DIMENSIONS  7.45 in. length by 3.46 in. width (18.9 by 8.6 cm)

MATERIAL, BODY  17-4PH CRES
  SEAT/SEAL Kynar

SPRING
PORTS, SIZE & TYPE, INLET MS 24385
  OUTLET Same as inlet

INTEGRAL RELIEF Yes

INTEGRAL FILTER  15 µm abs
MOUNTING  Bracket

OPERATING TEMPERATURE RANGE  40 to 160 °F (3 to 72 °C)
VIBRATION, RANDOM  33g rms
  SINE 6g
ACCELERATION  16g X Y Z
SHOCK

LIFE, SERVICE  1 yr; 15,000 cycles
  SHELF  3 yr
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Aerospace Corporation report (ref. 9)
# PRESSURE REGULATOR

**MANUFACTURER**  Futurecraft Corporation  
**PART NUMBER**  400176  
**DESCRIPTION**  Pneumatic, spring referenced piston  
**QUALIFICATION STATUS**  MIPDS

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<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>N₂</th>
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<tbody>
<tr>
<td>PRESSURE, RANGE, INLET</td>
<td>3515 psia (2425 N/cm²)</td>
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<tr>
<td>REGULATED</td>
<td>450 psig (311 N/cm²)</td>
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<td>OUTLET-LOCKUP</td>
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<td>PROOF, OUTLET</td>
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<td>BURST, OUTLET</td>
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<td>DROP</td>
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<td>RATED FLOW</td>
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<td>LEAKAGE, INTERNAL-MAX INLET PRESS</td>
<td>0.017 SCCM He</td>
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<td>EXTERNAL-MAX INLET PRESS</td>
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<tr>
<td>MASS</td>
<td>2.5 lbm (1.13 kg)</td>
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<td>DIMENSIONS</td>
<td>4.13 in. length by 2.63 in. diam (10.5 by 6.7 cm)</td>
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<td>INTEGRAL FILTER</td>
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<td>MOUNTING</td>
<td>Bracket; two holes</td>
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<td>OPERATING TEMPERATURE RANGE</td>
<td>-36 to 125 °F (-38 to 52 °C)</td>
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<td>VIBRATION, RANDOM</td>
<td>36.2g rms</td>
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<td>ACCELERATION</td>
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<td>SHOCK</td>
<td>2500g</td>
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<td>LIFE, SERVICE</td>
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<td>RELIABILITY</td>
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<td>LEAD TIME</td>
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<td>COST</td>
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<td>REMARKS</td>
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</table>

**SOURCE**  Aerospace Corporation report (ref. 9)
PRESSURE REGULATOR

MANUFACTURER  Futurecraft Corporation
PART NUMBER  400210
DESCRIPTION  Adjustable, high flow capacity
QUALIFICATION STATUS  Minuteman reentry stage (AVCO)

PROPPELLANT/FLUID  N₂
PRESSURE, RANGE, INLET  5000 to 750 psig
               REGULATED  265±15 psig
               OUTLET-LOCKUP  500 psi max.
               PROOF, INLET  7500 psi
               PROOF, OUTLET  1200 psi
               BURST, INLET  11,000 psi w/outlet plugged
               BURST, OUTLET
               DROP
RATED FLOW  1.02 lbm/s
LEAKAGE, INTERNAL-MAX INLET PRESS  Bubble-tight in lockup
               EXTERNAL-MAX INLET PRESS
MATERIAL, BODY  7075T6 and 2024T4 or T351
               SEAT/SEAL  Kel-F and Teflon backup rings; ethylene
               propylene O-ring
               SPRING  Ni-plated spring steel
PORTS, SIZE & TYPE, INLET  MS 33656-8
               OUTLET  Flange, 0.265- and 0.290-in.-diam holes
               at 1.250 by 1.875 in.

INTEGRAL RELIEF

INTEGRAL FILTER  Sintered CRES 85 μm nom., 130 μm abs
MOUNTING  Port flange

OPERATING TEMPERATURE RANGE
VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Futurecraft drawing 400210 - 1985
PRESSURE REGULATOR

MANUFACTURER  Futurecraft Corporation
PART NUMBER  400236
DESCRIPTION  Two stage, series redundant 2nd stage
QUALIFICATION STATUS  P80-1 Teal Ruby (Rockwell)

PROPELLANT/FLUID  GN₂
PRESSURE, RANGE, INLET  3700 to 500 psia
REGULATED  60±4 psia
OUTLET-LOCKUP  74 psig
PROOF, INLET  5550 psig
PROOF, OUTLET  3578 psi
BURST, INLET  9540 psig
BURST, OUTLET  9540 psig
DROP

RATED FLOW  0.0031 to 0.0093 lbm/s
LEAKAGE, INTERNAL-MAX INLET PRESS

EXTERNAL-MAX INLET PRESS

MASS  1.8 lbm
DIMENSIONS  9.25 by 2.63 by 1.75 in.

MATERIAL, BODY  2024-T351 Al alloy, 304L CRES
SEAT/SEAL  EP, fluorosilicone, Teflon

SPRING  17-7 CRES

PORTS, SIZE & TYPE, INLET  1/4-in. tube
test port; four-bolt flange
OUTLET  3/8-in. tube

INTEGRAL RELIEF

INTEGRAL FILTER  Inlet and test port 304 CRES 30 to 55 μm
MOUNTING

OPERATING TEMPERATURE RANGE  -22 to 160 °F
VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS  Pressure transducer on -2 model

DATA SOURCE  Futurecraft drawing 400236 - 1985

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PRESSURE REGULATOR

MANUFACTURER  Futurecraft Corporation
PART NUMBER  400294
DESCRIPTION  Precision, high flow capacity, adjustable
QUALIFICATION STATUS  Minuteman reentry vehicle (Ball Aerospace)

PROPELLANT/FLUID  GN₂
PRESSURE, RANGE, INLET  3600 psia max.
REGULATED  425/475 psia
OUTLET-LOCKUP
PROOF, INLET  5400 psia
PROOF, OUTLET  743 psia
BURST, INLET  7200 psia
BURST, OUTLET  3600 psia
DROP
RATED FLOW  6 SCFM min.
LEAKAGE, INTERNAL-MAX INLET PRESS
EXTERNAL-MAX INLET PRESS
MASS  0.40 lbm
DIMENSIONS  1.87 in. (less fitting) by 1.56 in. (less flange) by 1.13 in.
MATERIAL, BODY  2024-T351 Al alloy
SEAT/SEAL
SPRING  Spring steel or CrV alloy
PORTS, SIZE & TYPE, INLET  per MS 16142-1/4 modified
OUTLET  MS 33656E-3

INTEGRAL RELIEF

INTEGRAL FILTER  Vent screen, CRES
MOUNTING  Four 8-32 holes on a 0.8125 in. square

OPERATING TEMPERATURE RANGE
VIBRATION, RANDOM  SINE
ACCELERATION
SHOCK

LIFE, SERVICE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Futurecraft drawing 400294 - 1985

282
PRESSURE REGULATOR

MANUFACTURER    HTL Industries, Inc.
PART NUMBER    146650-10, 146931
DESCRIPTION    Single stage, pneumatic
QUALIFICATION STATUS    Centaur

PROPELLANT/FLUID    He, N₂
PRESSURE, RANGE, INLET  490 to 455 psia (337 to 313 N/cm²)
REGULATED   297 to 315 psia (204 to 213 N/cm²)
OUTLET-LOCKUP  312 to 330 psia (215 to 227 N/cm²)
PROOF, INLET
PROOF, OUTLET  435 psia (299 N/cm²)
BURST, INLET
BURST, OUTLET
DROP

RATED FLOW    8.9 SCFM He (4200 SCCS)
LEAKAGE, INTERNAL-MAX INLET PRESS

MASS 2.5 lbm (1.1 kg)
DIMENSIONS

MATERIAL, BODY    Al alloy and CRES
SEAT/SEAL
SPRING
PORTS, SIZE & TYPE, INLET
OUTLET

INTEGRAL RELIEF    No
INTEGRAL FILTER    5 μm nom.
MOUNTING

OPERATING TEMPERATURE RANGE    -100 to 125 °F (-73 to 52 °C)
VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE    200 cycles
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE    IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
MANUFACTURER   HTL Industries, Inc.
PART NUMBER   146650-11, 146709
DESCRIPTION   Single stage, pneumatic
QUALIFICATION STATUS   Centaur

PROPELLANT/FLUID   He, N₂
PRESSURE, RANGE, INLET   3375 to 715 psia (2326 to 492 N/cm²)
REGULATED   475 psig (327 N/cm²)
OUTLET-LOCKUP   455 to 490 psia (313 to 337 N/cm²)
PROOF, INLET
PROOF, OUTLET   640 psia
BURST, INLET
BURST, OUTLET
DROP

RATED FLOW   8.9 SCFM He (4200 SCCS)

LEAKAGE, INTERNAL-MAX INLET PRESS

EXTERNAL-MAX INLET PRESS

MASS   2.5 lbm (1.1 kg)

DIMENSIONS

MATERIAL, BODY
SEAT/SEAL
SPRING
PORTS, SIZE & TYPE, INLET
OUTLET

INTEGRAL RELIEF

INTEGRAL FILTER   5 μm nom.

MOUNTING

OPERATING TEMPERATURE RANGE   -100 to 125 °F (-73 to 52 °C)

VIBRATION, RANDOM
SINE

ACCELERATION
SHOCK

LIFE, SERVICE   200 cycles

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE   IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
### PRESSURE REGULATOR

**MANUFACTURER**  Marotta Scientific Controls, Inc.
**PART NUMBER**  226154, model number RV74A
**DESCRIPTION**  Pneumatic
**QUALIFICATION STATUS**  Apollo, DMSP

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>Air, N₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESSURE, RANGE, INLET</td>
<td>4500 to 800 psia (3102 to 551 N/cm²)</td>
</tr>
<tr>
<td>REGULATED</td>
<td>35 to 630 psig (24 to 434 N/cm²)</td>
</tr>
<tr>
<td>OUTLET-LOCKUP</td>
<td>500 psia (344 N/cm²)</td>
</tr>
<tr>
<td>PROOF, INLET</td>
<td>6765 psia (4664 N/cm²)</td>
</tr>
<tr>
<td>PROOF, OUTLET</td>
<td>500 psia (344 N/cm²)</td>
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<tr>
<td>BURST, INLET</td>
<td>11,265 psia (7766.9 N/cm²)</td>
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<td>BURST, OUTLET</td>
<td></td>
</tr>
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</table>

**RATED FLOW**  
**LEAKAGE, INTERNAL-MAX INLET PRESS**  
**EXTERNAL-MAX INLET PRESS**  
**MASS**  2.0 lbm (0.91 kg)

**DIMENSIONS**  
**MATERIAL, BODY**  
**SEAT/SEAL**  
**SPRING**  
**PORTS, SIZE & TYPE, INLET**  
**OUTLET**  

**INTEGRAL RELIEF**  Yes
**INTEGRAL FILTER**  
**MOUNTING**  
**OPERATING TEMPERATURE RANGE**  0 to 160 °F (-18 to 72 °C)
**VIBRATION, RANDOM**  
**ACCELERATION**  
**SHOCK**  

**LIFE, SERVICE**  
**SHELF**  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS**  

**DATA SOURCE**  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)

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<table>
<thead>
<tr>
<th><strong>MANUFACTURER</strong></th>
<th>Marotta Scientific Controls, Inc.</th>
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<tbody>
<tr>
<td><strong>PART NUMBER</strong></td>
<td>280601, model number RS572VB</td>
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<tr>
<td><strong>DESCRIPTION</strong></td>
<td>Pneumatic</td>
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<tr>
<td><strong>QUALIFICATION STATUS</strong></td>
<td>Safeguard</td>
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<table>
<thead>
<tr>
<th><strong>PROPELLANT/FLUID</strong></th>
<th>Inert gas</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th><strong>PRESSURE, RANGE, INLET</strong></th>
<th>3015 to 565 psia (2080 to 390 N/cm²)</th>
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</thead>
<tbody>
<tr>
<td><strong>REGULATED</strong></td>
<td>250 psig (172 N/cm²)</td>
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<tr>
<td><strong>OUTLET-LOCKUP</strong></td>
<td>315 psia (217 N/cm²)</td>
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<tr>
<td><strong>PROOF, INLET</strong></td>
<td>7515 psia (5181 N/cm²)</td>
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<td><strong>PROOF, OUTLET</strong></td>
<td></td>
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<tr>
<td><strong>BURST, INLET</strong></td>
<td>20,015 psia (13,800 N/cm²)</td>
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<tr>
<td><strong>BURST, OUTLET</strong></td>
<td></td>
</tr>
<tr>
<td><strong>DROP</strong></td>
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</table>

<table>
<thead>
<tr>
<th><strong>RATED FLOW</strong></th>
<th>420 SCFM (198,240 SCCS)</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th><strong>LEAKAGE, INTERNAL-MAX INLET PRESS</strong></th>
<th></th>
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</thead>
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<table>
<thead>
<tr>
<th><strong>EXTERNAL-MAX INLET PRESS</strong></th>
<th></th>
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</table>

<table>
<thead>
<tr>
<th><strong>MASS</strong></th>
<th>3.8 lbm (1.7 kg)</th>
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<table>
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<tr>
<th><strong>DIMENSIONS</strong></th>
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<tr>
<th><strong>MATERIAL, BODY</strong></th>
<th>Al alloy</th>
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<tr>
<td><strong>SEAT/SEAL</strong></td>
<td>Nylon</td>
</tr>
<tr>
<td><strong>SPRING</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PORTS, SIZE &amp; TYPE</strong></th>
<th><strong>INLET</strong></th>
<th><strong>OUTLET</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>INTEGRAL RELIEF</strong></th>
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</table>

<table>
<thead>
<tr>
<th><strong>INTEGRAL FILTER</strong></th>
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</table>

<table>
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<tr>
<th><strong>MOUNTING</strong></th>
<th></th>
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</table>

<table>
<thead>
<tr>
<th><strong>OPERATING TEMPERATURE RANGE</strong></th>
<th>45 to 160 °F (7 to 72 °C)</th>
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</table>

<table>
<thead>
<tr>
<th><strong>VIBRATION, RANDOM</strong></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>SINE</strong></td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th><strong>ACCELERATION</strong></th>
<th></th>
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<table>
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<tr>
<th><strong>SHOCK</strong></th>
<th></th>
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</table>

<table>
<thead>
<tr>
<th><strong>LIFE, SERVICE</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SHELF</strong></td>
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<tr>
<td><strong>RELIABILITY</strong></td>
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<td><strong>LEAD TIME</strong></td>
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<td><strong>COST</strong></td>
<td></td>
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<tr>
<td><strong>REMARKS</strong></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>DATA SOURCE</strong></th>
<th>IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)</th>
</tr>
</thead>
</table>

| **286** | |
**PRESSURE REGULATOR**

MANUFACTURER  Marotta Scientific Controls, Inc.

PART NUMBER  280778, model number RV99A

DESCRIPTION  Two-stage reducer

QUALIFICATION STATUS  Qualified

PROPELLANT/FLUID  He, N₂, Air

PRESSURE, RANGE, INLET  3015 to 615 psia (2080 to 424 N/cm²)

REGULATED  470 psig (324 N/cm²)

OUTLET-LOCKUP  525 psia (361 N/cm²)

PROOF, INLET  4515 psia (3113 N/cm²)

PROOF, OUTLET  4515 psia (3113 N/cm²)

BURST, INLET  5015 psia (4147 N/cm²)

BURST, OUTLET  6015 psia (4147 N/cm²)

DROP

RATED FLOW  3.3 SCFM (1558 SCCS)

LEAKAGE, INTERNAL-MAX INLET PRESS

EXTERNAL-MAX INLET PRESS

MASS  10 lbm (4.5 kg)

DIMENSIONS

MATERIAL, BODY  300 series CRES

SEAT/SEAL  Nylon

SPRING

PORTS, SIZE & TYPE, INLET  MS 33649-6

OUTLET  Same as inlet

INTEGRAL RELIEF

INTEGRAL FILTER

MOUNTING

OPERATING TEMPERATURE RANGE  20 to 120 °F (-8 to 47 °C)

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
**PRESSURE REGULATOR**

**MANUFACTURER** Parker Hannifin

**PART NUMBER** 5660048

**DESCRIPTION** Pneumatic

**QUALIFICATION STATUS** LEM descent

**PROPELLANT/FLUID**

**PRESSURE, RANGE, INLET** 1750 psia (1208 N/cm²)

**REGULATED** 246 psia (170 N/cm²)

**OUTLET-LOCKUP**

**PROOF, INLET**

**PROOF, OUTLET**

**BURST, INLET**

**BURST, OUTLET**

**DROP**

**RATED FLOW**

**LEAKAGE, INTERNAL-MAX INLET PRESS**

**EXTERNAL-MAX INLET PRESS**

**MASS**

**DIMENSIONS**

**MATERIAL, BODY**

**SEAT/SEAL**

**SPRING**

**PORTS, SIZE & TYPE, INLET**

**OUTLET**

**INTEGRAL RELIEF**

**INTEGRAL FILTER**

**MOUNTING**

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Aerospace Corporation report (ref. 9)

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<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>[\text{PRESSURE, RANGE, INLET} \ 500 \text{ psia (345 N/cm}^2, \text{max.}}]</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>[\text{REGULATED} \ 100 \text{ psia (69 N/cm}^2)]</td>
</tr>
<tr>
<td></td>
<td>[\text{OUTLET-LOCKUP} ]</td>
</tr>
<tr>
<td></td>
<td>[\text{PROOF, INLET} ]</td>
</tr>
<tr>
<td></td>
<td>[\text{PROOF, OUTLET} ]</td>
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<tr>
<td></td>
<td>[\text{BURST, INLET} ]</td>
</tr>
<tr>
<td></td>
<td>[\text{BURST, OUTLET} ]</td>
</tr>
<tr>
<td></td>
<td>[\text{DROP} ]</td>
</tr>
<tr>
<td>RATED FLOW</td>
<td>[\text{LEAKAGE, INTERNAL-MAX INLET PRESS} ]</td>
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<tr>
<td></td>
<td>[\text{EXTERNAL-MAX INLET PRESS} ]</td>
</tr>
<tr>
<td>MASSES</td>
<td>[\text{DIMENSIONS} ]</td>
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<tr>
<td>MATERIAL, BODY</td>
<td>[\text{SEAT/SEAL} ]</td>
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<tr>
<td></td>
<td>[\text{SPRING} ]</td>
</tr>
<tr>
<td>PORTS, SIZE &amp; TYPE, INLET</td>
<td>[\text{OUTLET} ]</td>
</tr>
<tr>
<td>INTEGRAL RELIEF</td>
<td>[\text{INTEGRAL FILTER} ]</td>
</tr>
<tr>
<td>MOUNTING</td>
<td>[\text{OPERATING TEMPERATURE RANGE} ]</td>
</tr>
<tr>
<td></td>
<td>[\text{VIBRATION, RANDOM} ]</td>
</tr>
<tr>
<td></td>
<td>[\text{SINE} ]</td>
</tr>
<tr>
<td></td>
<td>[\text{ACCELERATION} ]</td>
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<td></td>
<td>[\text{SHOCK} ]</td>
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<tr>
<td>LIFE, SERVICE</td>
<td>[\text{SHELF} ]</td>
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<td></td>
<td>[\text{RELIABILITY} ]</td>
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<td>[\text{LEAD TIME} ]</td>
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<td>[\text{COST} ]</td>
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<td></td>
<td>[\text{REMARKS} ]</td>
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</table>

DATA SOURCE: Aerospace Corporation report (ref. 9)
**PRESSURE REGULATOR**

MANUFACTURER  Pyronetics Devices, Inc.
PART NUMBER  2828-0
DESCRIPTION  Pneumatic
QUALIFICATION STATUS  Sandia (classified)

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>PRESSURE, RANGE, INLET  4000 psia (2760 N/cm²) max.</td>
<td></td>
</tr>
<tr>
<td>REGULATED  500 psia (345 N/cm²)</td>
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<tr>
<td>OUTLET-LOCKUP</td>
<td></td>
</tr>
<tr>
<td>PROOF, INLET</td>
<td></td>
</tr>
<tr>
<td>PROOF, OUTLET</td>
<td></td>
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<tr>
<td>BURST, INLET</td>
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<tr>
<td>BURST, OUTLET</td>
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<tr>
<td>DROP</td>
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<tr>
<td>RATED FLOW</td>
<td></td>
</tr>
<tr>
<td>LEAKAGE, INTERNAL-MAX INLET PRESS</td>
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</tr>
<tr>
<td>EXTERNAL-MAX INLET PRESS</td>
<td></td>
</tr>
<tr>
<td>MASS</td>
<td></td>
</tr>
<tr>
<td>DIMENSIONS</td>
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</tr>
<tr>
<td>MATERIAL, BODY</td>
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<tr>
<td>SEAT/SEAL</td>
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<td>SPRING</td>
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<tr>
<td>PORTS, SIZE &amp; TYPE, INLET</td>
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</tr>
<tr>
<td>OUTLET</td>
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<tr>
<td>INTEGRAL RELIEF</td>
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</tr>
<tr>
<td>INTEGRAL FILTER MOUNTING</td>
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<tr>
<td>OPERATING TEMPERATURE RANGE</td>
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<tr>
<td>VIBRATION, RANDOM</td>
<td></td>
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<tr>
<td>SINE</td>
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<tr>
<td>ACCELERATION</td>
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<tr>
<td>SHOCK</td>
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<td>LIFE, SERVICE</td>
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<td>SHELF</td>
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<td>RELIABILITY</td>
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<td>LEAD TIME</td>
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<td>REMARKS</td>
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<tr>
<td>DATA SOURCE  Aerospace Corporation report (ref. 9)</td>
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</tr>
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</table>
### PRESSURE REGULATOR

**MANUFACTURER** Pyronetics Devices, Inc.

**PART NUMBER** 2832

**DESCRIPTION** Pneumatic

**QUALIFICATION STATUS** Sandia (classified)

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<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>PRESSURE, RANGE, INLET 2000 psia (1380 N/cm²) max.</th>
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<tbody>
<tr>
<td></td>
<td>REGULATED 12 psia (8.3 N/cm²)</td>
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<tr>
<td></td>
<td>OUTLET-LOCKUP</td>
</tr>
<tr>
<td></td>
<td>PROOF, INLET</td>
</tr>
<tr>
<td></td>
<td>PROOF, OUTLET</td>
</tr>
<tr>
<td></td>
<td>BURST, INLET</td>
</tr>
<tr>
<td></td>
<td>BURST, OUTLET DROP</td>
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</tbody>
</table>

**RATED FLOW**

**LEAKAGE, INTERNAL-MAX INLET PRESS**

**EXTERNAL-MAX INLET PRESS**

**MASS**

**DIMENSIONS**

<table>
<thead>
<tr>
<th>MATERIAL, BODY</th>
<th>SEAT/SEAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPRING</td>
<td></td>
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</tbody>
</table>

| PORTS, SIZE & TYPE, INLET | OUTLET |

**INTEGRAL RELIEF**

**INTEGRAL FILTER**

**MOUNTING**

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Aerospace Corporation report (ref. 9)
<table>
<thead>
<tr>
<th><strong>MANUFACTURER</strong></th>
<th>Pyronetics Devices, Inc.</th>
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<tbody>
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<td><strong>QUALIFICATION STATUS</strong></td>
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**PROPELLANT/FLUID**

<table>
<thead>
<tr>
<th>PRESSURE, RANGE, INLET</th>
<th>515 psia (355 N/cm²) max.</th>
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<tbody>
<tr>
<td>REGULATED</td>
<td>35 psia (24 N/cm²)</td>
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**PRESSURE, LOCKUP**

<table>
<thead>
<tr>
<th>INLET</th>
<th>PROOF</th>
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</thead>
<tbody>
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</tbody>
</table>

**BURST**

<table>
<thead>
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<th>OUTLET</th>
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**DROP**

**RATED FLOW**

**LEAKAGE**

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<th>INTERNAL</th>
<th>MAX INLET PRESS</th>
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<table>
<thead>
<tr>
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<th>MAX INLET PRESS</th>
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</thead>
<tbody>
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</table>

**MASS**

**DIMENSIONS**

**MATERIAL, BODY**

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<tr>
<th>SEAT/SEAL</th>
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</thead>
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<table>
<thead>
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<th>SPRING</th>
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**PORTS, SIZE & TYPE, INLET**

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**INTEGRAL RELIEF**

**INTEGRAL FILTER**

**MOUNTING**

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

<table>
<thead>
<tr>
<th>SINE</th>
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</table>

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Aerospace Corporation report (ref. 9)
**PRESSURE REGULATOR**

MANUFACTURER  Sterer Engineering & Manufacturing Company

PART NUMBER  25210-1

DESCRIPTION  Pneumatic

QUALIFICATION STATUS  Mariner Mars 1971

PROPELLANT/FLUID  N₂

PRESSURE, RANGE, INLET  3015 to 0 psia (2078 to 0 N/cm²)
  REGULATED  15 psig (10 N/cm²)
  OUTLET-LOCKUP  16.2 psig
  PROOF, INLET  4515 psia (3113 N/cm²)
  PROOF, OUTLET
  BURST, IN ET  6615 psia (4564 N/cm²)
  BURST, OUTLET
  DROP

RATED FLOW  1.13 SCFM (533 SCCS)

LEAKAGE,
  INTERNAL-MAX INLET PRESS  0.017 SCCS He
  EXTERNAL-MAX INLET PRESS  Zero

MASS  0.617 lbm (0.279 kg)

DIMENSIONS

MATERIAL, BODY  17-4PH CRES
  SEAT/SEAL
  SPRING

PORTS, SIZE & TYPE, INLET  0.246 in.
  OUTLET  Same as inlet

INTEGRAL RELIEF

INTEGRAL FILTER

MOUNTING

OPERATING TEMPERATURE RANGE  -4 to 167 °F (-20 to 75 °C)

VIBRATION, RANDOM
  SINE

ACCELERATION

SHOCK

LIFE, SERVICE  2x10⁶ cycles
  SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
PRESSURE REGULATOR

MANUFACTURER  Sterer Engineering & Manufacturing Company
PART NUMBER  33120-1
DESCRIPTION  Pneumatic
QUALIFICATION STATUS  ERTS

PROPELLANT/FLUID  Freon 14
PRESSURE, RANGE, INLET  2015 psia (1390 N/cm²)
  REGULATED  55 to 60 psig (37 to 41 N/cm²)
  OUTLET-LOCKUP
PROOF, INLET  3015 psia (2078 N/cm²)
PROOF, OUTLET
BURST, INLET  8015 psia (5526 N/cm²)
BURST, OUTLET
DROP
RATED FLOW  8.3 SCFM (3900 SCCS)
LEAKAGE, INTERNAL-MAX INLET PRESS  0.017 SCCS He
  EXTERNAL-MAX INLET PRESS  2x10⁻⁵ SCCS
MASS  1.3 lbm (0.58 kg)
DIMENSIONS

MATERIAL, BODY  6Al-4V Ti
  SEAT/SEAL  Delrin
SPRING
PORTS, SIZE & TYPE, INLET
  OUTLET  MS 33656-4
INTEGRAL RELIEF
INTEGRAL FILTER
MOUNTING

OPERATING TEMPERATURE RANGE  20 to 125 °F (-7 to 107 °C)
VIBRATION, RANDOM
  SINE
ACCELERATION
SHOCK

LIFE, SERVICE  10⁶ cycles
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
PRESSURE REGULATOR

MANUFACTURER  Sterer Engineering & Manufacturing Company
PART NUMBER  34810
DESCRIPTION  Pneumatic, series redundant stages
QUALIFICATION STATUS  Project 169

PROPELLANT/FLUID  N₂
PRESSURE, RANGE, INLET  365 psia (252 N/cm²) max.
  REGULATED  50 psig (34 N/cm²)
  OUTLET-LOCKUP  52.2 psia (36.1 N/cm²)
  PROOF, INLET  90 psia (62 N/cm²)
  PROOF, OUTLET  1015 psia (700 N/cm²)
  BURST, INLET  1015 psia (700 N/cm²)
  BURST, OUTLET  335 psia (231 N/cm²)
  DROP
RATED FLOW  2.5 SCFM (1100 SCCS)
LEAKAGE, INTERNAL-MAX INLET PRESS  0.017 SCCS He

EXTERNAL-MAX INLET PRESS

MASS
DIMENSIONS

MATERIAL, BODY  6Al-4V Ti
  SEAT/SEAL  Kynar

SPRING
PORTS, SIZE & TYPE, INLET  MS 33656-4
  OUTLET  Same as inlet

INTEGRAL RELIEF

INTEGRAL FILTER
MOUNTING

OPERATING TEMPERATURE RANGE  -50 to 200 °F (-45 to 93 °C)
VIBRATION, RANDOM
  SINE
ACCELERATION
SHOCK

LIFE, SERVICE  500,000 cycles

SHELF
RELIABILITY
LEAD TIME
COST

REMARKS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)

295
PRESSURE REGULATOR

MANUFACTURER  Sterer Engineering & Manufacturing Company
PART NUMBER  46240
DESCRIPTION  Pneumatic
QUALIFICATION STATUS  Viking orbiter 1975

PROPELLANT/FLUID  GN2
PRESSURE, RANGE, INLET  4515 to 515 psia (3113 to 355 N/cm²)
   REGULATED  25 psig (17 N/cm²)
   OUTLET-LOCKUP
   PROOF, INLET  6765 psia (4664 N/cm²)
   PROOF, OUTLET  105 psia (72.3 N/cm²)
   BURST, INLET  9015 psia (6215 N/cm²)
   BURST, OUTLET  135 psia (93 N/cm²)
   DROP
   RATED FLOW  0 to 65 SCFM (0 to 3000 SCCS)
   LEAKAGE, INTERNAL-MAX INLET PRESS  0.017 SCCS He (1.0 SCCH N₂ at
   2768 N/cm²)
   EXTERNAL-MAX INLET PRESS  1.39x10⁻⁵ SCCS GN₂
   MASS  0.88 lbm (0.39 kg)
DIMENSIONS

MATERIAL, BODY  347 CRES, 7075-T73 Al alloy
   SEAT/SEAL  Vespel
   SPRING

PORTS, SIZE & TYPE, INLET  0.25-in. 347 CRES tube
   OUTLET  0.312-in. 347 CRES tube

INTEGRAL RELIEF

INTEGRAL FILTER

MOUNTING

OPERATING TEMPERATURE RANGE  32 to 160 °F (0 to 72 °C)
VIBRATION, RANDOM
   SINE
ACCELERATION
SHOCK

LIFE, SERVICE  10⁶ cycles
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report
   (ref. 9)

296
**PRESSURE REGULATOR**

**MANUFACTURER** Sterer Engineering & Manufacturing Company  
**PART NUMBER** 50750  
**DESCRIPTION** Pneumatic  
**QUALIFICATION STATUS** Delta, P72-2

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>N₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESSURE, RANGE, INLET</td>
<td>2015 psia (1390 N/cm²)</td>
</tr>
<tr>
<td>REGULATED</td>
<td>215 to 255 psig (148 to 176 N/cm²)</td>
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<tr>
<td>OUTLET-LOCKUP</td>
<td></td>
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<tr>
<td>PROOF, INLET</td>
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<tr>
<td>PROOF, OUTLET</td>
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<tr>
<td>BURST, INLET</td>
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<tr>
<td>BURST, OUTLET</td>
<td></td>
</tr>
<tr>
<td>DROP</td>
<td></td>
</tr>
</tbody>
</table>

**RATED FLOW**  
**LEAKAGE, INTERNAL-MAX INLET PRESS**  
**EXTERNAL-MAX INLET PRESS**  
**MASS**  
**DIMENSIONS**  

**MATERIAL, BODY**  
**SEAT/SEAL**  
**SPRING**  
**PORTS, SIZE & TYPE, INLET**  
**OUTLET**  

**INTEGRAL RELIEF**  

**INTEGRAL FILTER**  
**MOUNTING**  

**OPERATING TEMPERATURE RANGE**  

**VIBRATION, RANDOM**  
**SINE**  

**ACCELERATION**  
**SHOCK**  

**LIFE, SERVICE**  
**SHELF**  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS**

**DATA SOURCE** Aerospace Corporation report (ref. 9)

297
**PRESSURE REGULATOR**

**MANUFACTURER** Tavco, Inc.

**PART NUMBER** 234635

**DESCRIPTION** Pneumatic

**QUALIFICATION STATUS** Qualified

**PROPELLANT/FLUID** Air, N$_2$

**PRESSURE, RANGE, INLET** 3015 to 1015 psia (2078 to 700 N/cm$^2$)

**REGULATED** 200 to 375 psia (137 to 258 N/cm$^2$)

**OUTLET-LOCKUP**

**PROOF, INLET**

**PROOF, OUTLET**

**BURST, INLET**

**BURST, OUTLET**

**DROP**

**RATED FLOW** 10 SCFM (4720 SCCS)

**LEAKAGE, INTERNAL-MAX INLET PRESS**

**EXTERNAL-MAX INLET PRESS** Zero

**MASS** 0.6 lbm (0.27 kg)

**DIMENSIONS**

**MATERIAL, BODY**

**SEAT/SEAL**

**SPRING**

**PORTS, SIZE & TYPE, INLET**

**OUTLET**

**INTEGRAL RELIEF**

**INTEGRAL FILTER**

**MOUNTING**

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
PRESSURE REGULATOR

MANUFACTURER  Tavco, Inc.
PART NUMBER  2344344
DESCRIPTION  Pneumatic
QUALIFICATION STATUS  Qualified

PROPELLANT/FLUID  Air, N2
PRESSURE, RANGE, INLET  215 to 165 psia (148 to 113 N/cm²)
REGULATED  100 psia (69 N/cm²)
OUTLET-LockUP
PROOF, INLET
PROOF, OUTLET
BURST, INLET
BURST, OUTLET
DROP
RATED FLOW  20 SCFM (9440 SCCS)
LEAKAGE, INTERNAL-MAX INLET PRESS  0.017 SCCM He
EXTERNAL-MAX INLET PRESS  Zero
MASS  0.7 lbm (0.32 kg)
DIMENSIONS

MATERIAL, BODY
SEAT/SEAL
SPRING
PORTS, SIZE & TYPE, INLET

OUTLET

INTEGRAL RELIEF

INTEGRAL FILTER
MOUNTING

OPERATING TEMPERATURE RANGE
VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE

SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
**PRESSURE REGULATOR**

**MANUFACTURER** Tavco, Inc.
**PART NUMBER** 2346334
**DESCRIPTION** Pneumatic
**QUALIFICATION STATUS** Qualified

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<thead>
<tr>
<th>PROPPELLANT/FLUID</th>
<th>PRESSURE, RANGE</th>
<th>INLET 3815 to 915 psia (2630 to 630 N/cm²)</th>
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<tr>
<td></td>
<td>REGULATED</td>
<td>700 psia (482 N/cm²)</td>
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<td>OUTLET-LOCKUP</td>
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<td>PROOF, INLET</td>
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<td>PROOF, OUTLET</td>
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<td>BURST, INLET</td>
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<td>BURST, OUTLET</td>
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<td>DROP</td>
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<td></td>
<td>RATED FLOW</td>
<td>4.33 SCFM (2044 SCCS)</td>
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<td>LEAKAGE, INTERNAL-MAX INLET PRESS</td>
<td>0.1 SCCH</td>
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<td>EXTERNAL-MAX INLET PRESS</td>
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<td></td>
<td>MASS</td>
<td>1.8 lbm (0.81 kg)</td>
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<td>DIMENSIONS</td>
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<td>MATERIAL, BODY</td>
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<td>SPRING</td>
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<td>PORTS, SIZE &amp; TYPE, INLET</td>
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<td>OUTLET</td>
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<td>INTEGRAL RELIEF</td>
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<td>INTEGRAL FILTER</td>
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<td>MOUNTING</td>
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<td>OPERATING TEMPERATURE RANGE</td>
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<td>VIBRATION, RANDOM</td>
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<td>SINE</td>
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<td>SHOCK</td>
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<td>LIFE, SERVICE</td>
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<td>SHELF</td>
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<td>RELIABILITY</td>
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<td>LEAD TIME</td>
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<td>COST</td>
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<td>REMARKS</td>
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</tr>
</tbody>
</table>

**DATA SOURCE** IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)

300
**PRESSURE REGULATOR**

**MANUFACTURER** Tavco, Inc.

**PART NUMBER** 2346340

**DESCRIPTION** Pneumatic

**QUALIFICATION STATUS** Qualified

**PROPELLANT/FLUID** Air, N₂

**PRESSURE, RANGE, INLET** 665 to 140 psia (458 to 96.5 N/cm²)

**REGULATED** 7.5 psia (5.1 N/cm²)

**OUTLET-LOCKUP**

**PROOF, INLET**

**PROOF, OUTLET**

**BURST, INLET**

**BURST, OUTLET**

**DROP**

**RATED FLOW** 1.6 SCFM (755 SCCS)

**LEAKAGE, INTERNAL-MAX INLET PRESS** 0.025 lb/min

**EXTERNAL-MAX INLET PRESS** Zero

**MASS** 1.3 lbm (0.59 kg)

**DIMENSIONS**

**MATERIAL, BODY**

**SEAT/SEAL**

**SPRING**

**PORTS, SIZE & TYPE, INLET**

**OUTLET**

**INTEGRAL RELIEF**

**INTEGRAL FILTER**

**MOUNTING**

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
**PRESSURE REGULATOR**

**MANUFACTURER** TRW  
**PART NUMBER** JPL 10000055  
**DESCRIPTION** Single stage, direct acting  
**QUALIFICATION STATUS** Mariner 1964, 1969

**PROPELLANT/FLUID** GN₂  
**PRESSURE, RANGE, INLET** 3600 to 360 psia (2482 to 248 N/cm²)  
**REGULATED** 283 psig (195 N/cm²)  
**OUTLET-LOCKUP** 316 psia (217 N/cm²)  
**PROOF, INLET** 5400 psia (3723 N/cm²)  
**PROOF, OUTLET** 2700 psia (1861 N/cm²)  
**BURST, INLET** 7920 psia (5460 N/cm²)  
**BURST, OUTLET** 3960 psia (2730 N/cm²)

**RATED FLOW** 0.12 SCFM at 308 psia (56 SCCS at 212 N/cm²)  
**LEAKAGE, INTERNAL-MAX INLET PRESS** 4.0 SCCH GN₂ at 308 psia (212 N/cm²)  
**EXTERNAL-MAX INLET PRESS** 2.7x10⁻⁴ SCCS N₂ at 212 N/cm²  
**MASS** 1.4 lbm (0.63 kg)

**DIMENSIONS**

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<tr>
<th>MATERIAL</th>
<th>BODY</th>
<th>SEAT/SEAL</th>
<th>SPRING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6061-T651 Al alloy</td>
<td>6061-T651 Al alloy</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PORTS, SIZE &amp; TYPE</th>
<th>INLET 0.25-in. tube (welded)</th>
<th>OUTLET 0.25-in. tube (bolt flange)</th>
</tr>
</thead>
</table>

**INTEGRAL RELIEF**

**INTEGRAL FILTER**

**MOUNTING**

**OPERATING TEMPERATURE RANGE** 14 to 167 °F (-10 to 75 °C)

**VIBRATION, RANDOM SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE** Limited  
**SHELF**

**RELIABILITY**

**LEAD TIME** Not in manufacture  
**COST**

**REMARKS**

**DATA SOURCE** IITRI lists (ref. 8)
PRESSURE REGULATOR

MANUFACTURER  Whittaker Controls Division
PART NUMBER  123035
DESCRIPTION  Single stage, pressure balanced gage
QUALIFICATION STATUS  Agena

PROPELLANT/FLUID  He
PRESSURE, RANGE, INLET  3015 psia (2080 N/cm²)
                 REGULATED  50 psia max. (35 N/cm²)
                 OUTLET-LOCKUP
                 PROOF, INLET  4015 psia (2813 N/cm²)
                 PROOF, OUTLET  100 psia (69 N/cm²)
                 BURST, INLET  6015 psia (4147 N/cm²)
                 BURST, OUTLET  125 psia (86 N/cm²)

RATED FLOW

LEAKAGE, INTERNAL-MAX INLET PRESS  12,000 SCCH

EXTERNAL-MAX INLET PRESS  Zero

MASS  1.6 lbm (0.72 kg)

DIMENSIONS

MATERIAL, BODY  Al alloy
SEAT/SEAL
SPRING
PORTS, SIZE & TYPE, INLET  AND10050-8
OUTLET  MS 24386-8

INTEGRAL RELIEF

INTEGRAL FILTER

MOUNTING

OPERATING TEMPERATURE RANGE  -100 to 100 °F (-73 to 38 °C)
VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
| MANUFACTURER | Whittaker Controls Division |
| PART NUMBER  | 227705                      |
| DESCRIPTION  | Pneumatic                   |
| QUALIFICATION STATUS | Shuttle                |

| PROPELLANT/FLUID |                  |
| FREQUENCY, RANGE, INLET | 865 psia (597 N/cm²) |
| REGULATED           | 20 psia (14 N/cm²)  |
| OUTLET-LOCKUP       |                   |
| PROOF, INLET        |                   |
| PROOF, OUTLET       |                   |
| BURST, INLET        |                   |
| BURST, OUTLET       |                   |
| DROP                |                   |

| RATED FLOW | 1170 SCFM (5.5x10⁵ SCCS) |
| LEAKAGE, INTERNAL-MAX INLET PRESS |                   |
| EXTERNAL-MAX INLET PRESS |                   |

| MASS |                  |
| DIMENSIONS |               |

| MATERIAL, BODY |                  |
| SEAT/SEAL      |                   |

| SPRING |                  |

| PORTS, SIZE & TYPE, INLET |               |
| OUTLET                       |               |
| INTEGRAL RELIEF             |               |
| INTEGRAL FILTER             |               |
| MOUNTING                     |               |

| OPERATING TEMPERATURE RANGE |                |
| VIBRATION, RANDOM SINE ACCELERATION |               |
| SHOCK                         |               |

| LIFE, SERVICE |                  |
| SHELF |                   |
| RELIABILITY |                |
| LEAD TIME |                |
| COST |                |

| REMARKS |                  |

| DATA SOURCE | Aerospace Corporation report (ref. 9) |
**PRESSURE REGULATOR**

**MANUFACTURER**  Whittaker Controls Division  
**PART NUMBER**  228045  
**DESCRIPTION**  Pneumatic  
**QUALIFICATION STATUS**  Shuttle

**PROPELLANT/FLUID**  
**PRESSURE, RANGE, INLET**  4515 psia (3115 N/cm²) max.  
**REGULATED**  750 psia (518 N/cm²)  
**OUTLET-LOCKUP**  
**PROOF, INLET**  
**PROOF, OUTLET**  
**BURST, INLET**  
**BURST, OUTLET**  
**DROP**  
**RATED FLOW**  470 SCFM (2.2×10⁵ SCCS)  
**LEAKAGE, INTERNAL-MAX INLET PRESS**  
**EXTERNAL-MAX INLET PRESS**  

**MASS, DIMENSIONS**  
**MATERIAL, BODY**  
**SEAT/SEAL**  
**SPRING**  
**PORTS, SIZE & TYPE, INLET**  
**OUTLET**  
**INTEGRAL RELIEF**  Yes  
**INTEGRAL FILTER**  
**MOUNTING**  

**OPERATING TEMPERATURE RANGE**  
**VIBRATION, RANDOM**  
**SINE**  
**ACCELERATION**  
**SHOCK**  

**LIFE, SERVICE**  
**SHELF**  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS**  

**DATA SOURCE**  Aerospace Corporation report (ref. 9)
HEATER/HEAT EXCHANGER

No data have been obtained for this section.
LINE/THRUSTER VALVE

MANUFACTURER  Abex Corporation
PART NUMBER  Model 403
DESCRIPTION  Four-way or three-way miniature servo valve
QUALIFICATION STATUS

PROPELLANT/FLUID  Hydraulic

PRESSURE, OPERATING 300 to 4500 psi
PROOF
BURST
DROP 1000 psi
RATED FLOW 0.1 to 1.8 GPM

LEAKAGE, INTERNAL 0.08 GPM at 3000 psi
EXTERNAL

MASS 0.36 lbm

DIMENSIONS 2.20 by 1.54 by 1.28 in.

MATERIAL, BODY
SEAT/SEAL

PORTS, SIZE & TYPE  In base mount

INTEGRAL FILTER 20 μm

RESPONSE TIME, OPEN/CLOSE

VOLTAGE, OPERATING
PULL IN/DROP OUT

WATTS

ELECTRICAL CONNECTION

MOUNTING Base; four 0.149/0.154-in.-diam holes on 0.938- by 1.032-in. rectangle

OPERATING TEMPERATURE RANGE -65 to 275 °F

VIBRATION, RANDOM
SINE

ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Abex product data sheet - 1986
### LINE/THRUSTER VALVE

**MANUFACTURER** Carleton Technologies, Inc.

**PART NUMBER** 2665-0001-31

**DESCRIPTION** Control valve, solenoid

**QUALIFICATION STATUS** Space shuttle ARPCS

**PROPELLANT/FLUID** \( N_2 \)

**PRESSURE, OPERATING** 0 to 295 psig

- **PROOF** 430 psig
- **BURST** 590 psig
- **DROP** 2 psid at 200 psi

**RATED FLOW** 75 lbm/hr at 200 psi

**LEAKAGE, INTERNAL** 0.5 SCCH at 200 psi

- **EXTERNAL** 0.2 SCCM

**MASS** 0.48 lbm

**DIMENSIONS**

**MATERIAL, BODY**

**SEAT/SEAL**

**PORTS, SIZE & TYPE**

**INTEGRAL FILTER**

**RESPONSE TIME, OPEN/CLOSE**

**VOLTAGE, OPERATING** 18 to 32 Vdc

- **PULL IN/DROP OUT**

**WATTS** 9.8 max.

**ELECTRICAL CONNECTION**

**MOUNTING**

**OPERATING TEMPERATURE RANGE** 35 to 120 °F

**VIBRATION, RANDOM**

- **SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

- **CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS** w/position indicator

**DATA SOURCE** Carleton product data sheet - 1987
**LINE/THRUSTER VALVE**

**MANUFACTURER** Carleton Technologies, Inc.

**PART NUMBER** 2666-0001-23

**DESCRIPTION** Motor-operated latching valve

**QUALIFICATION STATUS** Space shuttle ARPCS

**PROPELLANT/FLUID** N₂

**PRESSURE, OPERATING** 0 to 3300 psig
- **PROOF** 4950 psig
- **BURST** 6600 psig
- **DROP** 10 psid max.

**RATED FLOW** 0 to 75 lbm/hr

**LEAKAGE, INTERNAL** 2.5 SCCM max. at max. inlet
**EXTERNAL** 0.3 SCCM

**MASS** 2.21 lbm

**DIMENSIONS**

**MATERIAL, BODY**
- **SEAT/SEAL**

**PORTS, SIZE & TYPE**

**INTEGRAL FILTER**

**RESPONSE TIME, OPEN/CLOSE**

**VOLTAGE, OPERATING** 24 to 32 Vdc
- **PULL IN/DROP OUT**

**WATTS** 4.4 max.

**ELECTRICAL CONNECTION**

**MOUNTING**

**OPERATING TEMPERATURE RANGE** -65 to 200 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS** w/microswitch position indicator

**DATA SOURCE** Carleton product data sheet - 1987

309
**MANUFACTURER** Carleton Technologies, Inc.  
**PART NUMBER** 2666-0001-25  
**DESCRIPTION** Motor-operated latching valve  
**QUALIFICATION STATUS** Space shuttle ARPCS  

**PROPELLANT/FLUID** O₂  

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<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>0 to 3300 psig</th>
<th>PROOF</th>
<th>4950 psig</th>
<th>BURST</th>
<th>6600 psig</th>
<th>DROP</th>
<th>30 psid at 200 psi</th>
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</thead>
<tbody>
<tr>
<td>RATED FLOW</td>
<td>150 lbm/hr at 200 psi</td>
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<tr>
<td>LEAKAGE, INTERNAL</td>
<td>2.5 SCCM max. at max. inlet</td>
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<tr>
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**DIMENSIONS**  

**MATERIAL, BODY**  
**SEAT/SEAL**  
**PORTS, SIZE & TYPE**  
**INTEGRAL FILTER**  
**RESPONSE TIME, OPEN/CLOSE**  
**VOLTAGE, OPERATING** 24 to 32 Vdc  
**PULL IN/DROP OUT**  
**WATTS** 4.4 max.  
**ELECTRICAL CONNECTION**  
**MOUNTING**  

**OPERATING TEMPERATURE RANGE** -65 to 200 °F  

**VIBRATION, RANDOM**  
**SINE**  
**ACCELERATION**  
**SHOCK**  

**LIFE, SERVICE**  
**CYCLE**  
**SHELF**  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS** w/microswitch position indicator  

**DATA SOURCE** Carleton product data sheet - 1987
# LINE/THRUSTER VALVE

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<tr>
<td>DESCRIPTION</td>
<td>Airlock isolation valve</td>
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<table>
<thead>
<tr>
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<table>
<thead>
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<th>PRESSURE, OPERATING</th>
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<td>PROOF</td>
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<tr>
<td>BURST</td>
<td>32 psig</td>
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<tr>
<td>DROP</td>
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<table>
<thead>
<tr>
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<table>
<thead>
<tr>
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<table>
<thead>
<tr>
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<th>MATERIAL, BODY</th>
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<td>SEAT/SEAL</td>
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<thead>
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<th>PORTS, SIZE &amp; TYPE</th>
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<tr>
<th>INTEGRAL FILTER</th>
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<table>
<thead>
<tr>
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<table>
<thead>
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<tr>
<td>PULL IN/DROP OUT</td>
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<table>
<thead>
<tr>
<th>WATTS</th>
<th>5.5, motor running; 14, motor stalled</th>
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<table>
<thead>
<tr>
<th>ELECTRICAL CONNECTION</th>
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<table>
<thead>
<tr>
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<table>
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<table>
<thead>
<tr>
<th>VIBRATION, RANDOM</th>
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<tbody>
<tr>
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</tr>
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</table>

<table>
<thead>
<tr>
<th>ACCELERATION</th>
<th></th>
</tr>
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<tbody>
<tr>
<td>SHOCK</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIFE, SERVICE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CYCLE</td>
<td></td>
</tr>
<tr>
<td>SHELF</td>
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<table>
<thead>
<tr>
<th>RELIABILITY</th>
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<tbody>
<tr>
<td>LEAD TIME</td>
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</tr>
<tr>
<td>COST</td>
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<table>
<thead>
<tr>
<th>REMARKS</th>
<th>w/microswitch position indicator</th>
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</table>

<table>
<thead>
<tr>
<th>DATA SOURCE</th>
<th>Carleton product data sheet - 1987</th>
</tr>
</thead>
</table>

311
MANUFACTURER  Carleton Technologies, Inc.
PART NUMBER  2722-0001-9
DESCRIPTION  Solenoid valve
QUALIFICATION STATUS

PROPELLANT/FLUID  O₂

PRESSURE, OPERATING  0 to 1250 psig
  PROOF  1875 psig
  BURST  2500 psig
  DROP  4 psid at 200 psi
RATED FLOW  75 lbm/hr at 200 psi

LEAKAGE, INTERNAL  1.0 SCCM at 900 psi inlet
  EXTERNAL  0.2 SCCM
MASS  1.367 lbm (valve), 0.8 lbm (power saver 2928-0001-5)

DIMENSIONS

MATERIAL, BODY
  SEAT/SEAL
PORTS, SIZE & TYPE

INTEGRAL FILTER

RESPONSE TIME, OPEN/CLOSE

VOLTAGE, OPERATING  18 to 32 Vdc
  PULL IN/DROP OUT
WATTS  11.2 max.

ELECTRICAL CONNECTION

MOUNTING

OPERATING TEMPERATURE RANGE  35 to 120 °F

VIBRATION, RANDOM
  SINE
ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS  w/position indicator

DATA SOURCE  Carleton product data sheet - 1987
MANUFACTURER  Carleton Technologies, Inc.
PART NUMBER  2724-0001-3
DESCRIPTION  Solenoid valve
QUALIFICATION STATUS  Space shuttle ARPCS

PROPELLANT/FLUID  O₂, N₂

PRESSURE, OPERATING  0 to 20 psig
PROOF  30 psig
BURST  45 psig
DROP

RATED FLOW  0.5 lbm/hr

LEAKAGE, INTERNAL  5 SCCH at 20 psig
EXTERNAL  0.2 SCCM

MASS  0.42 lbm

DIMENSIONS

MATERIAL, BODY
SEAT/SEAL

PORTS, SIZE & TYPE

INTEGRAL FILTER

RESPONSE TIME, OPEN/CLOSE

VOLTAGE, OPERATING  18 to 32 Vdc
PULL IN/DROP OUT

WATTS  9.2

ELECTRICAL CONNECTION
MOUNTING

OPERATING TEMPERATURE RANGE  35 to 120 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF

RELIABILITY

LEAD TIME

COST

REMARKS  w/position indicator

DATA SOURCE  Carleton product data sheet - 1987
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<td>DESCRIPTION</td>
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<td>QUALIFICATION STATUS</td>
<td>Space shuttle ARPCS</td>
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<tr>
<td>PROPELLANT/FLUID</td>
<td>Air, O₂</td>
</tr>
<tr>
<td>PRESSURE, OPERATING</td>
<td>14.7 psig</td>
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<td>PROOF</td>
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<tr>
<td>BURST</td>
<td>29.4 psig</td>
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<td>DROP</td>
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</tr>
<tr>
<td>RATED FLOW</td>
<td>0.1, 0.5 psi/s</td>
</tr>
<tr>
<td>LEAKAGE, INTERNAL</td>
<td>5.0 SCCM max.</td>
</tr>
<tr>
<td>EXTERNAL</td>
<td>5.0 SCCM max.</td>
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<tr>
<td>MASS</td>
<td>1.09 lbm</td>
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<td>DIMENSIONS</td>
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</tr>
<tr>
<td>MATERIAL, BODY</td>
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<tr>
<td>SEAT/SEAL</td>
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<tr>
<td>PORTS, SIZE &amp; TYPE</td>
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<tr>
<td>INTEGRAL FILTER</td>
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<tr>
<td>RESPONSE TIME, OPEN/CLOSE</td>
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<tr>
<td>VOLTAGE, OPERATING</td>
<td></td>
</tr>
<tr>
<td>PULL IN/DROP OUT</td>
<td></td>
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<tr>
<td>WATTS</td>
<td></td>
</tr>
<tr>
<td>ELECTRICAL CONNECTION</td>
<td></td>
</tr>
<tr>
<td>MOUNTING</td>
<td></td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td>-100 to 160 °F</td>
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<tr>
<td>VIBRATION, RANDOM</td>
<td></td>
</tr>
<tr>
<td>SINE</td>
<td></td>
</tr>
<tr>
<td>ACCELERATION</td>
<td></td>
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<tr>
<td>SHOCK</td>
<td></td>
</tr>
<tr>
<td>LIFE, SERVICE CYCLE</td>
<td></td>
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<tr>
<td>SHELF</td>
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<tr>
<td>RELIABILITY</td>
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<tr>
<td>LEAD TIME</td>
<td></td>
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<tr>
<td>COST</td>
<td></td>
</tr>
<tr>
<td>REMARKS</td>
<td></td>
</tr>
<tr>
<td>DATA SOURCE</td>
<td>Carleton product data sheet - 1987</td>
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</table>
LINE/THRUSTER VALVE

MANUFACTURER Carleton Technologies, Inc.
PART NUMBER 2874-0001-3
DESCRIPTION Cabin pressure bleed valve, motor operated
QUALIFICATION STATUS Space shuttle ARPCS

PROPELLENT/FLUID O₂, N₂

PRESSURE, OPERATING 16.7 psig
  PROOF 24 psig
  BURST 32 psig
  DROP
RATED FLOW 15±1 lbm/min at 2 psid

LEAKAGE, INTERNAL 1 SCCM
  EXTERNAL

MASS 2.39 lbm

DIMENSIONS

MATERIAL, BODY
  SEAT/SEAL

PORTS, SIZE & TYPE

INTEGRAL FILTER

RESPONSE TIME, OPEN/CLOSE

VOLTAGE, OPERATING 24 to 32 Vdc
  PULL IN/DROP OUT

WATTS 6.72 motor running, 32.2 motor stalled

ELECTRICAL CONNECTION

MOUNTING

OPERATING TEMPERATURE RANGE -65 to 200 °F

VIBRATION, RANDOM
  SINE

ACCELERATION

SHOCK

LIFE, SERVICE
  CYCLE
  SHELF

RELIABILITY

LEAD TIME

COST

REMARKS w/microswitch position indicator

DATA SOURCE Carleton product data sheet - 1987
**Line/Thruster Valve**

**Manufacturer**: Circle Seal Controls, Brunswick

**Part Number**: P9-649 (Gen. Dyn. P/N GD/C27-08250-1)

**Description**: Bleed valve

**Qualification Status**: Atlas staging (General Dynamics Convair)

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<tr>
<th><strong>Propellant/Fluid</strong></th>
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<tbody>
<tr>
<td><strong>Pressure, Operating</strong></td>
<td>3000 psig</td>
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<tr>
<td><strong>Proof</strong></td>
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<tr>
<td><strong>Burst</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Drop</strong></td>
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</tr>
</tbody>
</table>

**Rated Flow**

**Leakage, Internal**

**Leakage, External**

**Mass**

**Dimensions**

**Material, Body**: 2024-T351 Al alloy

**Seat/Seal**: Teflon

**Ports, Size & Type**

**Integral Filter**

**Response Time, Open/Close**

**Voltage, Operating**

**Watts**

**Electrical Connection**

**Mounting**

**Operating Temperature Range**: -200 to 160 °F

**Vibration, Random**

**Vibration, Sine**

**Acceleration**

**Shock**

**Life, Service**

**Cycle**

**Shelf**

**Reliability**

**Lead Time**

**Cost**

**Remarks**

**Data Source**: Circle Seal Controls list (ref. 10)
# LINE/THRUSTER VALVE

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Circle Seal Controls, Brunswick</th>
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<tbody>
<tr>
<td>PART NUMBER</td>
<td>P22-406 (Ham. Stan. SV701612)</td>
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<tr>
<td>DESCRIPTION</td>
<td>Shutoff valve</td>
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<tr>
<td>QUALIFICATION STATUS</td>
<td>Gemini backpack (Hamilton Standard)</td>
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## PROPELLANT/FLUID

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<tr>
<td>BURST</td>
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</tr>
<tr>
<td>DROP</td>
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## RATED FLOW

<table>
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<tr>
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<tr>
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<td>EXTERNAL</td>
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## MASS

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## MATERIAL

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## PORTS, SIZE & TYPE

| AND10050-4 |

## INTEGRAL FILTER

<table>
<thead>
<tr>
<th>RESPONSE TIME, OPEN/CLOSE</th>
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<tbody>
<tr>
<td>VOLTAGE, OPERATING</td>
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<tr>
<td>PULL IN/DROP OUT</td>
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## WATTS

<table>
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## MOUNTING

| OPERATING TEMPERATURE RANGE | -65 to 175 °F |

## VIBRATION

<table>
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## SHOCK

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## LIFE, SERVICE

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<tbody>
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## RELIABILITY

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## REMARKS

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<tr>
<th>DATA SOURCE</th>
<th>Circle Seal Controls list (ref. 10)</th>
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</thead>
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317
**LINE/THRUSTER VALVE**

**MANUFACTURER**  Circle Seal Controls, Brunswick  
**PART NUMBER**  P38-717 (Bell P/N 8250-472095)  
**DESCRIPTION**  Shutoff valve  
**QUALIFICATION STATUS**  Gemini, Agena engine (Bell Aerospace)

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<td>BURST</td>
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<td>DROP</td>
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<th>RATED FLOW</th>
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<table>
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<th>LEAKAGE, INTERNAL</th>
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<tbody>
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<tr>
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<table>
<thead>
<tr>
<th>VOLTAGE, OPERATING</th>
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<tbody>
<tr>
<td>PULL IN/DROP OUT</td>
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<table>
<thead>
<tr>
<th>WATTS</th>
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<tr>
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<table>
<thead>
<tr>
<th>MOUNTING</th>
<th></th>
</tr>
</thead>
</table>

| OPERATING TEMPERATURE RANGE | -65 to 160 °F |

<table>
<thead>
<tr>
<th>VIBRATION, RANDOM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
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<table>
<thead>
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</table>

<table>
<thead>
<tr>
<th>RELIABILITY</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>SERVICE LIFE</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>LEAD TIME</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>COST</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>REMARKS</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>DATA SOURCE</th>
<th>Circle Seal Controls list (ref. 10)</th>
</tr>
</thead>
</table>

318
**LINE/THRUSTER VALVE**

**MANUFACTURER** Circle Seal Controls, Brunswick

**PART NUMBER** P54-717

**DESCRIPTION** Shutoff valve

**QUALIFICATION STATUS** Gemini O₂ and H₂ system (AirResearch)

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRESSURE, OPERATING</strong></td>
</tr>
<tr>
<td><strong>PROOF</strong></td>
</tr>
<tr>
<td><strong>BURST</strong></td>
</tr>
<tr>
<td><strong>DROP</strong></td>
</tr>
</tbody>
</table>

**RATED FLOW**

**LEAKAGE, INTERNAL**

**EXTERNAL**

**MASS DIMENSIONS**

**MATERIAL, BODY** 2024-T351 Al alloy

**SEAT/SEAL** Ethylene propylene

**PORTS, SIZE & TYPE** MS 24386-4, MS 24385-4

**INTEGRAL FILTER**

**RESPONSE TIME, OPEN/CLOSE**

**VOLTAGE, OPERATING**

**PULL IN/DROP OUT**

**WATTS**

**ELECTRICAL CONNECTION**

**MOUNTING**

**OPERATING TEMPERATURE RANGE** -20 to 160 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Circle Seal Controls list (ref. 10)
MANUFACTURER: Circle Seal Controls, Brunswick
PART NUMBER: P58-717 (GE P/N 47C14003)
DESCRIPTION: Shutoff valve
QUALIFICATION STATUS: Biosatellite capsule (General Electric)

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>DESCRIPTION</th>
<th>PRESSURE, OPERATING</th>
<th>PROOF</th>
<th>BURST</th>
<th>DROP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shutoff valve</td>
<td>20 psig</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRESSURE, PROOF</th>
<th>BURST</th>
<th>DROP</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 psig</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEAKAGE, INTERNAL</th>
<th>EXTERNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RATED FLOW</th>
<th>LEAKAGE, INTERNAL</th>
<th>EXTERNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MASS</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MATERIAL, BODY</th>
<th>SEAT/SEAL</th>
<th>PORTS, SIZE &amp; TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2024-T351 Al alloy</td>
<td>Buna-N</td>
<td>MS 24385-4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INTEGRAL FILTER</th>
<th>RESPONSE TIME, OPEN/CLOSE</th>
<th>VOLTAGE, OPERATING</th>
<th>PULL IN/DROP OUT</th>
<th>WATTS</th>
<th>ELECTRICAL CONNECTION</th>
<th>MOUNTING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPERATING TEMPERATURE RANGE</th>
<th>-30 to 125 °F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VIBRATION, RANDOM</th>
<th>ACCELERATION</th>
<th>SHOCK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIFE, SERVICE</th>
<th>CYCLE</th>
<th>SHELF</th>
<th>RELIABILITY</th>
<th>LEAD TIME</th>
<th>COST</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>DATA SOURCE</th>
<th>Circle Seal Controls list (ref. 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

320
**LINE/THRUSTER VALVE**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Circle Seal Controls, Brunswick</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>P76-717 (GE P/N 47C145477)</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td></td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>BIOSAT capsule reentry system (General Electric)</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td></td>
</tr>
<tr>
<td>PRESSURE, OPERATING</td>
<td>20 psig</td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>DROP</td>
<td></td>
</tr>
<tr>
<td>RATED FLOW</td>
<td></td>
</tr>
<tr>
<td>LEAKAGE, INTERNAL</td>
<td></td>
</tr>
<tr>
<td>EXTERNAL</td>
<td></td>
</tr>
<tr>
<td>MASS</td>
<td></td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td></td>
</tr>
<tr>
<td>MATERIAL, BODY</td>
<td>303 CRES</td>
</tr>
<tr>
<td>SEAT/SEAL</td>
<td>Buna-N</td>
</tr>
<tr>
<td>PORTS, SIZE &amp; TYPE</td>
<td>MS 24385-4</td>
</tr>
<tr>
<td>INTEGRAL FILTER</td>
<td></td>
</tr>
<tr>
<td>RESPONSE TIME, OPEN/CLOSE</td>
<td></td>
</tr>
<tr>
<td>VOLTAGE, OPERATING</td>
<td></td>
</tr>
<tr>
<td>PULL IN/DROP OUT</td>
<td></td>
</tr>
<tr>
<td>WATTS</td>
<td></td>
</tr>
<tr>
<td>ELECTRICAL CONNECTION</td>
<td></td>
</tr>
<tr>
<td>MOUNTING</td>
<td></td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td>35 to 120 °F</td>
</tr>
<tr>
<td>VIBRATION, RANDOM</td>
<td></td>
</tr>
<tr>
<td>SINE</td>
<td></td>
</tr>
<tr>
<td>ACCELERATION</td>
<td></td>
</tr>
<tr>
<td>SHOCK</td>
<td></td>
</tr>
<tr>
<td>LIFE, SERVICE</td>
<td></td>
</tr>
<tr>
<td>CYCLE</td>
<td></td>
</tr>
<tr>
<td>SHELF</td>
<td></td>
</tr>
<tr>
<td>RELIABILITY</td>
<td></td>
</tr>
<tr>
<td>LEAD TIME</td>
<td></td>
</tr>
<tr>
<td>COST</td>
<td></td>
</tr>
<tr>
<td>REMARKS</td>
<td></td>
</tr>
<tr>
<td>DATA SOURCE</td>
<td>Circle Seal Controls list (ref. 10)</td>
</tr>
</tbody>
</table>

321
**LINE/THRUSTER VALVE**

MANUFACTURER  Circle Seal Controls, Brunswick  
PART NUMBER  P79-717 (AiResearch P/N 630226)  
DESCRIPTION  Shutoff valve  
QUALIFICATION STATUS  Mercury ECS Airlock (AiResearch)  

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
</tr>
</thead>
</table>

| PRESSURE, OPERATING 250 psig |
| PROOF |
| BURST |
| DROP |

| RATED FLOW |
| LEAKAGE, INTERNAL |
| EXTERNAL |

| MASS |
| DIMENSIONS |

| MATERIAL, BODY 303 CRES |
| SEAT/SEAL  Viton |
| PORTS, SIZE & TYPE  AND10050-4 |

| INTEGRAL FILTER |
| RESPONSE TIME, OPEN/CLOSE |
| VOLTAGE, OPERATING |
| PULL IN/DROP OUT |

| WATTS |
| ELECTRICAL CONNECTION |
| MOUNTING |

| OPERATING TEMPERATURE RANGE -20 to 200 °F |

| VIBRATION, RANDOM |
| SINE |
| ACCELERATION |
| SHOCK |

| LIFE, SERVICE |
| CYCLE |
| SHELF |

| RELIABILITY |
| LEAD TIME |
| COST |
| REMARKS |

**DATA SOURCE**  Circle Seal Controls list (ref. 10)
LINE/THRUSTER VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  9213T-2PP
DESCRIPTION  Shutoff valve
QUALIFICATION STATUS  Apollo (Martin Marietta)

PROPELLANT/FLUID

PRESSURE, OPERATING  150 psi
PROOF
BURST
DROP

RATED FLOW

LEAKAGE, INTERNAL
EXTERNAL

MASS
DIMENSIONS

MATERIAL, BODY  303 CRES
SEAT/SEAL  Neoprene
PORTS, SIZE & TYPE  1/4-in. NPT

INTEGRAL FILTER
RESPONSE TIME, OPEN/CLOSE
VOLTAGE, OPERATING
PULL IN/DROP OUT

WATTS
ELECTRICAL CONNECTION
MOUNTING

OPERATING TEMPERATURE RANGE  0 to 240 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Circle Seal Controls list (ref. 10)
**LINE/THRUSTER VALVE**

**MANUFACTURER**  Consolidated Controls Corporation  
**PART NUMBER**  
**DESCRIPTION**  Low flow, torque motor, latching  
**QUALIFICATION STATUS**  Intelsat IV and V, ETS-III, MOS-I, Westar, SynCom, FLTSATCOM, TDRSS, Tiros-N, etc.  
**PROPELLANT/FLUID**  N₂H₄, NTO, GN₂  

<table>
<thead>
<tr>
<th><strong>PRESSURE, OPERATING</strong></th>
<th>300 to 600 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROOF</strong></td>
<td></td>
</tr>
<tr>
<td><strong>BURST</strong></td>
<td></td>
</tr>
<tr>
<td><strong>DROP</strong></td>
<td>3 to 85 psid</td>
</tr>
<tr>
<td><strong>RATED FLOW</strong></td>
<td>0.015 to 0.06 lbm/s</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>LEAKAGE, INTERNAL</strong></th>
<th>1.0 SCCH GN₂</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXTERNAL</strong></td>
<td></td>
</tr>
<tr>
<td><strong>MASS</strong></td>
<td>0.5 to 1.0 lbm</td>
</tr>
</tbody>
</table>

**DIMENSIONS**  
**MATERIAL, BODY**  
**SEAT/SEAL**  
**PORTS, SIZE & TYPE**  Tube, colinear inlet and outlet  
**INTEGRAL FILTER**  
**RESPONSE TIME, OPEN/CLOSE**  8/50 ms  
**VOLTAGE, OPERATING**  28 Vdc  
**PULL IN/DROP OUT**  
**WATTS**  5 to 18  
**ELECTRICAL CONNECTION**  
**MOUNTING**  
**OPERATING TEMPERATURE RANGE**  
**VIBRATION, RANDOM**  
**SINE**  
**ACCELERATION**  
**SHOCK**  
**LIFE, SERVICE**  
**CYCLE**  
**SHELF**  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS**  N.C. or N.O. available  

**DATA SOURCE**  Consolidated Controls product data booklet - 1986
**LINE/THRUSTER VALVE**

MANUFACTURER: Consolidated Controls Corporation  
PART NUMBER: 
DESCRIPTION: Dual-solenoid thruster valve  
QUALIFICATION STATUS: Intelsat IV and VI, space shuttle, MMS

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>N₂H₄, NTO, MMH, GN₂, H₂O</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESSURE, OPERATING</td>
<td>200 to 400 psig</td>
</tr>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>DROP</td>
<td>3 to 30 psid</td>
</tr>
</tbody>
</table>

| PRESSURE, OPERATING | 200 to 400 psig |
| PROOF               |                           |
| BURST               |                           |
| DROP                | 3 to 30 psid |

| PRESSURE, OPERATING | 200 to 400 psig |
| PROOF               |                           |
| BURST               |                           |
| DROP                | 3 to 30 psid |

| LEAKAGE, INTERNAL | 0.5 to 1.0 SCCH GN₂ |
| LEAKAGE, EXTERNAL|                           |
| MASS              | 0.2 to 1.0 lbm |

| DIMENSIONS         |                           |
| MATERIAL, BODY     | CRES                      |
| SEAT/SEAL          |                           |
| PORTS, SIZE & TYPE | Flange mount; tube |

| INTEGRAL FILTER    |                           |
| RESPONSE TIME, OPEN/CLOSE | 5/20 ms |
| VOLTAGE, OPERATING | 28 Vdc |
| PULL IN/DROP OUT   |                           |
| WATTS              | 5 to 30 |

| ELECTRICAL CONNECTION |                           |
| MOUNTING             |                           |

| OPERATING TEMPERATURE RANGE | 20 to 250 °F |
| VIBRATION, RANDOM           |                           |
| ACCELERATION                |                           |
| SHOCK                        |                           |

| LIFE, SERVICE               |                           |
| CYCLE                        |                           |
| SHELF                        |                           |
| RELIABILITY                 |                           |
| LEAD TIME                    |                           |
| COST                         |                           |

| REMARKS | N.C. or N.O. available; clapper-type valve, series solenoids |

| DATA SOURCE | Consolidated Controls product data booklet - 1986 |
**LINE/THRUSTER VALVE**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Consolidated Controls Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td></td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Medium-flow torque motor, latching</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Tiros-N, DMSP, COBE</td>
</tr>
</tbody>
</table>

**PROPELLANT/FLUID** N$_2$H$_4$, NTO, GN$_2$

**PRESSURE, OPERATING** 300 to 600 psi
- **PROOF**
- **BURST**
- **DROP** 8 to 30 psid
**RATED FLOW** 0.05 to 0.30 lbm/s

**LEAKAGE, INTERNAL** 1.0 to 5.0 SCCH GN$_2$

**EXTERNAL**
- **MASS** 1.2 to 1.5 lbm

**DIMENSIONS**

**MATERIAL, BODY**
- **SEAT/SEAL**

**PORTS, SIZE & TYPE** Tube; colinear inlet and outlet

**INTEGRAL FILTER**

**RESPONSE TIME, OPEN/CLOSE** 20/50 ms
**VOLTAGE, OPERATING** 28 Vdc
- **PULL IN/DROP OUT**
**WATTS** 24 to 50
**ELECTRICAL CONNECTION**
- **MOUNTIN**

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**
- **SINE**
**ACCELERATION**
- **SHOCK**

**LIFE, SERVICE**
- **CYCLE**
- **SHELF**
**RELIABILITY**
**LEAD TIME**
**COST**
**REMARKS** N.C. or N.O. available

**DATA SOURCE** Consolidated Controls product data booklet - 1986
**MANUFACTURER**  Consolidated Controls Corporation  
**DESCRIPTION**  Single-solenoid thruster valve  
**QUALIFICATION STATUS**  Space shuttle, GRO, Intelsat IV and VI, Peace and Courage  
**PROPELLANT/FLUID**  N$_2$H$_4$, NTO, MMH, GN$_2$, H$_2$O  
**PRESSURE, OPERATING**  200 to 400 psig  
**PRESSURE, PROOF**  
**BURST**  
**DROP**  1.5 to 300 psid  
**RATED FLOW**  0.001 to 0.30 lbm/s  
**LEAKAGE, INTERNAL**  0.5 to 1.0 SCCH GN$_2$  
**MASS**  0.2 to 0.51 lbm  
**DIMENSIONS**  
**MATERIAL, BODY, CRES**  
**SEAT/SEAL**  
**PORTS, SIZE & TYPE**  Flange mount, tube  
**INTEGRAL FILTER**  
**RESPONSE TIME, OPEN/CLOSE**  5/20 ms  
**VOLTAGE, OPERATING**  28 Vdc  
**WATTS**  5 to 30  
**ELECTRICAL CONNECTION**  
**MOUNTING**  
**OPERATING TEMPERATURE RANGE**  20 to 250 °F  
**VIBRATION, RANDOM**  SINE  
**ACCELERATION**  SHOCK  
**LIFE, SERVICE**  CYCLE  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS**  N.C. or N.O. available; clapper type valve  

**DATA SOURCE**  Consolidated Controls product data booklet - 1986
LINE/THRUSTER VALVE

MANUFACTURER: Consolidated Controls Corporation

PART NUMBER

DESCRIPTION: Gas generator valve module

QUALIFICATION STATUS: Space shuttle APU

PROPELLANT/FLUID: N₂H₄

PRESSURE, OPERATING: 0 to 2000 psig
- PROOF
- BURST
- DROP: 0 to 500 psid

RATED FLOW: 0 to 0.3 lbm/s

LEAKAGE, INTERNAL: 18 to 180 SCCH He at 400 psid

EXTERNAL MASS: 2.5 lbm

DIMENSIONS

MATERIAL, BODY

SEAT/SEAL PORTS, SIZE & TYPE

INTEGRAL FILTER

RESPONSE TIME, OPEN/CLOSE: 20/40 ms

VOLTAGE, OPERATING: 28 Vdc

PULL IN/DROP OUT

WATTS: 25 steady state

ELECTRICAL CONNECTION

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
- SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS: Torque-motor actuated, dual w/bypass

DATA SOURCE: Consolidated Controls product data booklet - 1986
LINE/THRUSTER VALVE

MANUFACTURER  Futurecraft Corporation  
PART NUMBER  200787-39  
DESCRIPTION  Solenoid, dual-coil, two-way  
QUALIFICATION STATUS  Space shuttle OMS (Aerojet)  

PROPELLANT/FLUID  GN2  

PRESSURE, OPERATING  3000 psig  
PROOF  6000 psig  
BURST  12,000 psig  

RATED FLOW  ESEOD = 0.08 in. min. (Cf = 0.65)  

LEAKAGE, INTERNAL  
EXTERNAL  

MASS  1.25 lbm  
DIMENSIONS  5.20 by 3.52 by 1.75 in.  

MATERIAL, BODY  6061-T6 Al alloy  
SEAT/SEAL  Ethylene propylene, Teflon  

PORTS, SIZE & TYPE  Stub in pad mount  

INTEGRAL FILTER  Inlet sintered CRES wire; 6 µm nom., 18 µm abs  

RESPONSE TIME, OPEN/CLOSE  
VOLTAGE, OPERATING  23 to 32 Vdc  
PULL IN/DROP OUT  18/2 Vdc  

WATTS  40  
ELECTRICAL CONNECTION  1186680-1, -2, -5 (Aerojet)  
MOUNTING  Pad; four 0.218/0.228-in.-diam holes on 0.750- by 
1.375-in. rectangle  

OPERATING TEMPERATURE RANGE  -40 to 160 °F  

VIBRATION, RANDOM  
SINE  
SHOCK  

LIFE, SERVICE  
CYCLE  
SHELF  
RELIABILITY  
LEAD TIME  
COST  
REMARKS  

DATA SOURCE  Futurecraft drawing 200787 - 1985  

329
**LINE/THRUSTER VALVE**

**MANUFACTURER** Futurecraft Corporation
**PART NUMBER** 200788-59, -69
**DESCRIPTION** Dual coil, three-way
**QUALIFICATION STATUS** Space shuttle OMS (Aerojet)

**PROPELLANT/FLUID** Gln

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>450 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC.</td>
<td>1000 psig</td>
</tr>
<tr>
<td>BURST</td>
<td>2000 psig</td>
</tr>
</tbody>
</table>

**RATED FLOW** ESEOD = 0.035 and 0.070 in. min. (Cp = 0.60)

**LEAKAGE**

<table>
<thead>
<tr>
<th>INTERNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTERNAL</td>
</tr>
</tbody>
</table>

**MASS** 1.4 lbm
**DIMENSIONS** 5.60 in. less inlet by 3.12 by 2.47 in.

**MATERIAL**

| BODY | 6061-T6 Al alloy |
| SEAT/SEAL | Ethylene propylene, Teflon |

**PORTS, SIZE & TYPE** 1/4-in.-tube inlet, pad-mounted stub outlet, threaded vent port

**INTEGRAL FILTER** Inlet - CRES sintered wire; 6 μm nom., 18 μm abs

**RESPONSE TIME, OPEN/CLOSE**

| VOLTAGE, OPERATING | 23 to 32 Vdc |
| PULL IN/DROP OUT | 18/2 Vdc |

**WATTS** 40
**ELECTRICAL CONNECTION** 1186680-3, -4, -5, -6, -8 (Aerojet)
**MOUNTING** Pad; four 0.155-in.-diam holes at 1.000 by 1.250 in.

**OPERATING TEMPERATURE RANGE** 0 to 160 °F

**VIBRATION, RANDOM**

| SINE |
| ACCELERATION |
| SHOCK |

**LIFE, SERVICE**

| CYCLE |
| SHELF |

**RELIABILITY**

| LEAD TIME |
| COST |

**REMARKS** -69 RH, -59 LH; has position indicator

**DATA SOURCE** Futurecraft drawing 200788 - 1985
| MANUFACTURER | Futurecraft Corporation |
| PART NUMBER | 200851 |
| DESCRIPTION | Solenoid, dual, two-way, N.C. |
| QUALIFICATION STATUS | Space shuttle OMS (Aerojet) |

| PROPELLANT/FLUID | GN₂ |
| PRESSURE, OPERATING | 450 psig |
| PROOF | 900 psig |
| BURST | 1800 psig min. |
| DROP |
| RATED FLOW | ESEOD = 0.08 in. min. (Cₚ = 0.65) |

| LEAKAGE, INTERNAL | |
| EXTERNAL | |
| MASS | 2.13 lbm |
| DIMENSIONS | 5.56 by 1.79 by 6.5 in. |

| MATERIAL, BODY | 6061-T₆ Al alloy |
| SEAT/SEAL | Ethylene propylene, Teflon |
| PORTS, SIZE & TYPE | Redundant sealed bayonet inlet, four-bolt flange outlet |
| INTEGRAL FILTER | Inlet sintered CRES wire; 6 µm nom., 18 µm abs |
| RESPONSE TIME, OPEN/CLOSE |
| VOLTAGE, OPERATING | 23 to 32 Vdc |
| FULL IN/DROP OUT | 18/2 Vdc |
| WATTS | 40 |
| ELECTRICAL CONNECTION | 1186680-2, -5 (Aerojet) |
| MOUNTING | Pad; four 0.218/0.228-in.-diam holes on 1.625- by 3.500-in. rectangle |

| OPERATING TEMPERATURE RANGE | -40 to 160 °F |
| VIBRATION, RANDOM | |
| SINE |
| ACCELERATION |
| SHOCK |

| LIFE, SERVICE |
| CYCLE |
| SHELF |
| RELIABILITY |
| LEAD TIME |
| COST |
| MARKS |

| DATA SOURCE | Futurecraft drawing 200851 - 1985 |
MANUFACTURER: Futurecraft Corporation

PART NUMBER: 200916

DESCRIPTION: Latching, solenoid

QUALIFICATION STATUS: Teal Ruby (Rockwell)

PROPELLANT/FLUID: GN₂, GHe, others

PRESSURE, OPERATING: 85 psig
PROOF: 128 psig
BURST: 9555 psia
DROP:

RATED FLOW: 0.0093 lbm/s GN₂

LEAKAGE, INTERNAL:
EXTERNAL:

MASS: 2.63 lbm

DIMENSIONS: 5.31 by 4.28 by 1.88 in.

MATERIAL, BODY: 304L CRES
SEAT/SEAL: Teflon

PORTS, SIZE & TYPE: 3/8-in. tubes

INTEGRAL FILTER: 304 CRES RIGIMESH 30 to 55 μm

RESPONSE TIME, OPEN/CLOSE: 1/2 cycle; 80 ms max.

VOLTAGE, OPERATING: 28 Vdc
PULL IN/DROP OUT: 18/18 Vdc

WATTS: 52.3 max.

ELECTRICAL CONNECTION: Number-22 M81044/12 lead wires

MOUNTING: Clamp

OPERATING TEMPERATURE RANGE: -22 to 160 °F

VIBRATION, RANDOM:
SINE:

ACCELERATION:
SHOCK:

LIFE, SERVICE: 5000 min.

CYCLE:
SHELF:

RELIABILITY:

LEAD TIME:

COST:

REMARKS:

DATA SOURCE: Futurecraft drawing 200916 - 1985
**LINE/THRUSTER VALVE**

**MANUFACTURER** The Marquardt Company  
**PART NUMBER** 234883-502, 234884-502  
**DESCRIPTION** Solenoid open, spring return, thruster  
**QUALIFICATION STATUS** Space shuttle vernier thrusters  

<table>
<thead>
<tr>
<th><strong>PROPELLANT/FLUID</strong></th>
<th>NTO, MMH</th>
</tr>
</thead>
</table>

| **PRESSURE, OPERATING** | 264 psig |
| **PROOF** | |
| **BURST** | |
| **DROP** | 40 psid max. |

**RATED FLOW**

**LEAKAGE, INTERNAL** 50 SCCH max. He  
**EXTERNAL**

| **MASS** | 0.65 lbm |
| **DIMENSIONS** | 3.12 in. by 1.38 in. diam |

| **MATERIAL, BODY** |
| **SEAT/SEAL** |

| **PORTS, SIZE & TYPE** |
| **INTEGRAL FILTER** | 25 μm abs |

| **RESPONSE TIME, OPEN/CLOSE** | 12/7 ms nom. |
| **VOLTAGE, OPERATING** | 18 to 32 Vdc |
| **PULL IN/DROP OUT** | |
| **WATTS** | 16.5 nom. |

| **ELECTRICAL CONNECTION** |
| **MOUNTING** |

| **OPERATING TEMPERATURE RANGE** | To 225 °F |

| **VIBRATION, RANDOM** | 28g rms |
| **SINE** |
| **ACCELERATION** | 5g |
| **SHOCK** | 1.5g |

| **LIFE, SERVICE** | 10 yr |
| **CYCLE** | 500,000 min. |

| **RELIABILITY** |
| **LEAD TIME** |
| **COST** |

<p>| <strong>REMARKS</strong> |
| <strong>DATA SOURCE</strong> | Marquardt report (ref. 12) |</p>
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<thead>
<tr>
<th>MANUFACTURER</th>
<th>Moog Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>50-383</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Redundant seat, torque motor, thruster valve</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Moog R&amp;D, none known</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>N₂H₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESSURE, OPERATING</td>
<td>250 psig</td>
</tr>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>DROP</td>
<td>16 psid</td>
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<tr>
<td>RATED FLOW</td>
<td>0.025 lb/s</td>
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<tr>
<td>LEAKAGE, INTERNAL</td>
<td>1.0 SCCH max.</td>
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<tr>
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<tr>
<td>MASS</td>
<td>0.82 lbm</td>
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<tr>
<td>DIMENSIONS</td>
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</tr>
<tr>
<td>MATERIAL, BODY</td>
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</tr>
<tr>
<td>SEAT/SEAL</td>
<td>Teflon</td>
</tr>
<tr>
<td>PORTS, SIZE &amp; TYPE</td>
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</tr>
<tr>
<td>INTEGRAL FILTER</td>
<td>20 μm nom., 35 μm abs</td>
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<tr>
<td>RESPONSE TIME, OPEN/CLOSE</td>
<td>5.5/5.5 ms</td>
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<tr>
<td>VOLTAGE, OPERATING</td>
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<tr>
<td>PULL IN/DROP OUT</td>
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</tr>
<tr>
<td>WATTS</td>
<td>21.3 max.</td>
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<tr>
<td>ELECTRICAL CONNECTION</td>
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<tr>
<td>MOUNTING</td>
<td></td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td></td>
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<tr>
<td>VIBRATION, RANDOM</td>
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<td>SINÉ</td>
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<tr>
<td>ACCELERATION</td>
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<tr>
<td>SHOCK</td>
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<tr>
<td>LIFE, SERVICE</td>
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<td>RELIABILITY</td>
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<td>LEAD TIME</td>
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<tr>
<td>COST</td>
<td></td>
</tr>
<tr>
<td>REMARKS</td>
<td>5-lbf thruster</td>
</tr>
</tbody>
</table>

DATA SOURCE Moog catalog - 1984
# LINE/THRUSTER VALVE

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<thead>
<tr>
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</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>DESCRIPTION</td>
<td>Torque motor, thruster valve</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
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<tr>
<td>PROPELLANT/FLUID</td>
<td>N₂H₄</td>
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<tr>
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<td>BURST DROP</td>
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<tr>
<td>RATED FLOW</td>
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<tr>
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<td>Teflon</td>
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<td>PORTS, SIZE &amp; TYPE</td>
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<td>INTEGRAL FILTER</td>
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<tr>
<td>RESPONSE TIME, OPEN/CLOSE</td>
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</tr>
<tr>
<td>WATTS</td>
<td>7.9</td>
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<td>OPERATING TEMPERATURE RANGE</td>
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<tr>
<td>VIBRATION, RANDOM</td>
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<tr>
<td>SINE</td>
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<td>SHOCK</td>
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<tr>
<td>COST</td>
<td></td>
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<tr>
<td>REMARKS</td>
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**DATA SOURCE** Moog catalog - 1984
**LINE/THRUSTER VALVE**

<table>
<thead>
<tr>
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<tr>
<td>DESCRIPTION</td>
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<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>N₂H₄</th>
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<tr>
<td>PRESSURE, OPERATING</td>
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<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>DROP</td>
<td>5 psid</td>
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<tr>
<td>RATED FLOW</td>
<td>0.0005 lb/s</td>
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<td>1.0 SCCH max.</td>
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<tr>
<td>EXTERNAL</td>
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<tr>
<td>MASS</td>
<td>0.20 lbm</td>
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<td>DIMENSIONS</td>
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<table>
<thead>
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<th>MATERIAL, BODY</th>
<th>SEAT/SEAL</th>
<th>Teflon</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>INTEGRAL FILTER</th>
<th>5 μm nom., 15 μm abs</th>
</tr>
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<tr>
<td>RESPONSE TIME, OPEN/CLOSE</td>
<td>10/10 ms</td>
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<tr>
<td>VOLTAGE, OPERATING</td>
<td>24 to 32 Vdc</td>
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<td>PULL IN/DROP OUT</td>
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<tr>
<td>WATTS</td>
<td>10 max.</td>
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<tr>
<td>ELECTRICAL CONNECTION</td>
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<tr>
<td>MOUNTING</td>
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<thead>
<tr>
<th>OPERATING TEMPERATURE RANGE</th>
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</table>

<table>
<thead>
<tr>
<th>VIBRATION, RANDOM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SINE</td>
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</tr>
<tr>
<td>ACCELERATION</td>
<td></td>
</tr>
<tr>
<td>SHOCK</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>LIFE, SERVICE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CYCLE</td>
<td></td>
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<tr>
<td>SHELF</td>
<td></td>
</tr>
<tr>
<td>RELIABILITY</td>
<td></td>
</tr>
<tr>
<td>LEAD TIME</td>
<td></td>
</tr>
<tr>
<td>COST</td>
<td></td>
</tr>
<tr>
<td>REMARKS</td>
<td>0.1-lbf thruster</td>
</tr>
</tbody>
</table>

**DATA SOURCE** Moog catalog - 1984
LINE/THRUSTER VALVE

MANUFACTURER  Moog Inc.
PART NUMBER  50-438
DESCRIPTION  Redundant solenoid thruster valve
QUALIFICATION STATUS  FLTSATCOM (Hamilton Standard)

PROPELLANT/FLUID  N₂H₄

PRESSURE, OPERATING  210 psig
PROOF
BURST
DROP  4 psid
RATED FLOW  0.0005 lb/s

LEAKAGE, INTERNAL  5.0 SCCH max.
EXTERNAL
MASS  0.80 lbm

DIMENSIONS

MATERIAL, BODY
SEAT/SEAL  Teflon

PORTS, SIZE & TYPE

INTEGRAL FILTER  10 μm nom., 25 μm abs
RESPONSE TIME, OPEN/CLOSE  12/17 ns
VOLTAGE, OPERATING  18 to 28 Vdc
PULL IN/DROP OUT
WATTS  8.43 max.

ELECTRICAL CONNECTION

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS  0.1-lbf thruster

DATA SOURCE  Moog catalog - 1984
**LINE/THRUSTER VALVE**

**MANUFACTURER** Moog Inc.  
**PART NUMBER** 51-109  
**DESCRIPTION** Solenoid thruster valve  
**QUALIFICATION STATUS** MJS (Rocket Research)

**PROPELLANT/FLUID** $\text{N}_2\text{H}_4$

<table>
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<tr>
<th>PRESSURE, OPERATING</th>
<th>420 psig</th>
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<tbody>
<tr>
<td>PROOF</td>
<td></td>
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<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>DROP 5 psid</td>
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</table>

**RATED FLOW** 0.0009 lb/s

<table>
<thead>
<tr>
<th>LEAKAGE, INTERNAL</th>
<th>2 SCCH</th>
</tr>
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<tbody>
<tr>
<td>EXTERNAL</td>
<td></td>
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**MASS** 0.24 lbm

**DIMENSIONS**

<table>
<thead>
<tr>
<th>MATERIAL, BODY</th>
<th>SEAT/SEAL</th>
<th>AFE-411</th>
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</table>

**PORTS, SIZE & TYPE**

<table>
<thead>
<tr>
<th>INTEGRAL FILTER</th>
<th>25 $\mu$m abs</th>
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</thead>
<tbody>
<tr>
<td>RESPONSE TIME, OPEN/CLOSE</td>
<td>8/6 ms</td>
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<tr>
<td>VOLTAGE, OPERATING</td>
<td>24 to 34 Vdc</td>
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<tr>
<td>PULL IN/DROP OUT</td>
<td></td>
</tr>
</tbody>
</table>

**WATTS** 5.4 max.

**ELECTRICAL CONNECTION**

**MOUNTING**

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

<table>
<thead>
<tr>
<th>SINE</th>
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**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

<table>
<thead>
<tr>
<th>CYCLE</th>
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</table>

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS** 0.2-lbf thruster

**DATA SOURCE** Moog catalog - 1984
**LINE/THRUSTER VALVE**

**MANUFACTURER** Moog Inc.
**PART NUMBER** 51E110
**DESCRIPTION** Solenoid thruster valve
**QUALIFICATION STATUS** MJS (Bell)

**PROPELLANT/FLUID** N₂H₄

**PRESSURE, OPERATING** 420 psig  
**PROOF**  
**FURTHER**  
**DROP** 5 psid  
**RATED FLOW** 0.0009 lb/s

**LEAKAGE, INTERNAL** 2 SCCH  
**EXTERNAL**
**MASS** 0.24 lbm

**DIMENSIONS**

**MATERIAL, BODY**
**SEAT/SEAL** AFE-411

**PORTS, SIZE & TYPE**

**INTEGRAL FILTER** 25 μm abs

**RESPONSE TIME, OPEN/CLOSE** 8/6 ms

**VOLTAGE, OPERATING** 24 to 34 Vdc  
**PULL IN/DROP OUT**

**WATTS** 5.4 max.

**ELECTRICAL CONNECTION**

**MOUNTING**

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**
**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**
**CYCLE**
**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS** 0.2-lbf thruster

**DATA SOURCE** Moog catalog - 1984
<table>
<thead>
<tr>
<th><strong>LINE/THRUSTER VALVE</strong></th>
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<table>
<thead>
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<td>PART NUMBER</td>
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<th>PROPELLANT/FLUID</th>
<th>N₂H₄</th>
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<th>PRESSURE, OPERATING</th>
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<td>DROP</td>
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<tr>
<td>RATED FLOW</td>
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<table>
<thead>
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<th>LEAKAGE, INTERNAL</th>
<th>0.5 SCCH</th>
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<tr>
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<tr>
<td>MASS</td>
<td>0.54 lbm</td>
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<td>DIMENSIONS</td>
<td></td>
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</tbody>
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| MATERIAL, BODY     | SEAT/SEAL_ AFE-411 |
| PORTS, SIZE & TYPE |          |

| INTEGRAL FILTER    | 10 μm nom., 15 μm abs |
| RESPONSE TIME, OPEN/CLOSE | 37/20 ms |
| VOLTAGE, OPERATING | 22 to 38 Vdc |
| PULL IN/DROP OUT   |          |
| WATTS              | 12 max.  |
| ELECTRICAL CONNECTION |          |
| MOUNTING           |          |

<table>
<thead>
<tr>
<th>OPERATING TEMPERATURE RANGE</th>
</tr>
</thead>
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<tr>
<th>VIBRATION, RANDOM</th>
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<tr>
<td>SINE</td>
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<td>ACCELERATION</td>
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<td>SHOCK</td>
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<table>
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<th>LIFE, SERVICE</th>
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<tbody>
<tr>
<td>CYCLE</td>
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<td>LEAD TIME</td>
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<tr>
<td>COST</td>
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<tr>
<td>REMARKS</td>
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</table>

| DATA SOURCE | Moog catalog - 1984 |
LINE/THRUSTER VALVE

MANUFACTURER  Moog Inc.
PART NUMBER  51-128
DESCRIPTION  Series redundant
QUALIFICATION STATUS

PROPELLANT/FLUID  N₂H₄

PRESSURE, OPERATING  350 psig
  PROOF  1150 psig
  BURST  1700 psig
  DROP  30 psid
RATED FLOW  0.0027 lb/s

LEAKAGE, INTERNAL  3.0 SCCCH GN₂ max.
  EXTERNAL  1x10⁻⁶ SCCS GHe
MASS  0.45 lbm max.

DIMENSIONS  3.29 in. LOA; 0.88 in. diam plus flange, inlet, and wires
MATERIAL, BODY
  SEAT/SEAL
PORTS, SIZE & TYPE  Inlet, 0.25-in. diam tube; outlet, three-bolt flange
INTEGRAL FILTER  20 μm abs
RESPONSE TIME, OPEN/CLOSE  10/10 ms
VOLTAGE, OPERATING  22 to 34 Vdc
  PULL IN/DROP OUT  16/1.5
WATTS  15.46 max.

ELECTRICAL CONNECTION  Free leads
MOUNTING  Three-bolt flange; 1.0-in.-diam BC, EQ SP holes

OPERATING TEMPERATURE RANGE  Fluid, 40 to 140 °F; ambient, 40 to 300 °F
VIBRATION, RANDOM  No GN₂ leakage at 43g rms w/50 psi inlet SINE
ACCELERATION
SHOCK

LIFE, SERVICE
  CYCLE  1,000,000
  SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Moog catalog - 1984
LINE/THRUSTER VALVE

MANUFACTURER_ Parker Hannifin
PART NUMBER_ 5720002
DESCRIPTION_ Solenoid, 0.5 lbf thruster valve, N.C.
QUALIFICATION STATUS_ Classified program

PROPELLANT/FLUID_ N₂H₄

PRESSURE, OPERATING_ 255 psig
Pressure Proof
BURST
DROP

RATED FLOW_ Effective flow area, 0.0000131 in.²

LEAKAGE, INTERNAL
EXTERNAL

MASS_ 0.21 lbm

DIMENSIONS

MATERIAL, BODY_ CRES
SEAT/SEAL_ Teflon

PORTS, SIZE & TYPE

INTEGRAL FILTER

RESPONSE TIME, OPEN/CLOSE_ 4.2/3.0 ms at 170 psig and 70 °F
VOLTAGE, OPERATING_ 21 Vdc min.
PULL IN, DROP OUT_ 3 Vdc drop out

WATTS_ 4.6 min.

ELECTRICAL CONNECTION

MOUNTING

OPERATING TEMPERATURE RANGE_ Fluid, 35 °F min.; ambient, 250 °F max.

VIBRATION, RANDOM_ 18.8g rms
SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE_ 1,500,000 min.

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE_ Parker Aerospace product data sheet – 1984
**LINE/THRUSTER VALVE**

**MANUFACTURER** Parker Hannifin

**PART NUMBER** 5720004 "Peanut valve"

**DESCRIPTION** Miniature latching solenoid

**QUALIFICATION STATUS** Viking Lander Biology Experiment (flown)
  HEAO-B, HPG8DA (flown)

**PROPELLANT/FLUID**

**PRESSURE, OPERATING** 0 to 175 psig
  **PROOF**
  **BURST**
  **DROP**

**RATED FLOW** Effective flow area, 0.000148 in.$^2$

**LEAKAGE, INTERNAL** $1 \times 10^{-6}$ SCCH He

**EXTERNAL**

**MASS** 0.018 lbm

**DIMENSION** 0.8 in. length by 0.5 in. diam

**MATERIAL, BODY**
  **SEAT/SEAL** Ethylene propylene

**PORTS, SIZE & TYPE**

**INTEGRAL FILTER**

**RESPONSE TIME, OPEN/CLOSE** 1.5/1.5 ms

**VOLTAGE, OPERATING** 28 to 32 Vdc
  **PULL IN/DROP OUT**

**WATTS** 9 max.

**ELECTRICAL CONNECTION**

**MOUNTING** Bolt to manifold, valve seat in manifold

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM** 700g peak to unlatch
  **SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**
  **CYCLE**
  **SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS** Latch magnetically in both directions; polarity shift to open/close

**DATA SOURCE** Parker Aerospace product data sheet - 1984
LINE/THRUSTER VALVE

MANUFACTURER_ Parker Hannifin
PART NUMBER_ 5720048 "Walnut valve"
DESCRIPTION_ Miniature latching solenoid
QUALIFICATION STATUS_ Viking GCMS

PROPELLANT/FLUID

PRESSURE, OPERATING_ 0 to 1000 psig
PROOF
BURST
DROP
RATED FLOW_ Effective flow area, 0.000198 in.$^2$

LEAKAGE, INTERNAL_ $1x10^{-6}$ SCCH He
EXTERNAL

MASS_ 0.090 lbm
DIMENSIONS_ ≈ 1.25 in. length by 0.5 in. diam by 0.8 in. wide

MATERIAL, BODY
SEAT/SEAL

PORTS, SIZE & TYPE

INTEGRAL FILTER

RESPONSE TIME, OPEN/CLOSE_ 1 to 2/1 to 2 ms

VOLTAGE, OPERATING_ 8 Vdc nom., current driver
PULL IN/DROP OUT

WATTS_ 20 max.

ELECTRICAL CONNECTION

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM_ 400g peak to unlatch
SINE

ACCELERATION
SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS_ Latches magnetically in both directions; polarity reversal for open/open

DATA SOURCE_ Parker Aerospace product data sheet - 1984
LINE/THRUSTER VALVE

MANUFACTURER  Valcor Engineering Corporation
PART NUMBER  V27200-195
DESCRIPTION  Isolation valve
QUALIFICATION STATUS  USAF classified reentry vehicle

PROPELLANT/FLUID  N₂H₄, NTO

PRESSURE, OPERATING  295 psia (203 N/cm²)
PROOF  615 psia (424 N/cm²)
BURST  915 psia (630 N/cm²)

RATED FLOW

LEAKAGE, INTERNAL  0.15 SCCH N₂H₄ at 295 psia
EXTERNAL  Zero
MASS  0.5 lbm (0.2 kg)

DIMENSIONS

MATERIAL, BODY  CRES
SEAT/SEAL  CRES/Teflon

PORTS, SIZE & TYPE  1/4 in.

INTEGRAL FILTER

RESPONSE TIME, OPEN/CLOSE  10/10 ms

VOLTAGE, OPERATING  28 Vdc
PULL IN/DROP OUT

WATTS  56 at 28 Vdc and 70 °F

ELECTRICAL CONNECTION

MOUNTING

OPERATING TEMPERATURE RANGE  -20 to 165 °F (-28 to 73.8 °C)

VIBRATION, RANDOM
SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  IITRI lists (ref. 8)
LINE/THRUSTER VALVE

MANUFACTURER Valcor Engineering Corporation
PART NUMBER V27200-411
DESCRIPTION Propellant isolation
QUALIFICATION STATUS USAF classified project (Hamilton Standard)

PROPELLANT/FLUID N₂H₄

PRESSURE, OPERATING 576 psia (397 N/cm²)
PROOF 857 psia (590 N/cm²)
BURST 1193 psia (822 N/cm²)

RATED FLOW

LEAKAGE, INTERNAL 20 SCCH N₂ at 561 psia
EXTERNAL 5×10⁻⁶ SCCH He at 561 psia

MASS 0.6 lbm (0.2 kg)

DIMENSIONS

MATERIAL, BODY 304 CRES
SEAT/SEAL Teflon

PORTS, SIZE & TYPE Face seals

INTEGRAL FILTER
RESPONSE TIME, OPEN/CLOSE 15/15 ms

VOLTAGE, OPERATING
PULL IN/DROP OUT

WATTS

ELECTRICAL CONNECTION

MOUNTING

OPERATING TEMPERATURE RANGE 40 to 160 °F (4 to 71 °C)

VIBRATION, RANDOM
SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE IITRI lists (ref. 8)
**LINE/THRUSTER VALVE**

**MANUFACTURER** Valcor Engineering Corporation  
**PART NUMBER** V27200-520  
**DESCRIPTION** Coaxial solenoid isolation valve  
**QUALIFICATION STATUS** Apollo, shuttle

**PROPELLANT/FLUID** Pneumatic, water

**PRESSURE, OPERATING** 43 psia (29 N/cm²)  
**PROOF**  
**BURST** 90 psia (62 N/cm²)  
**DROP**

**RATED FLOW**

**LEAKAGE, INTERNAL**
**EXTERNAL**

**MASS** 0.35 lbm (0.15 kg)

**DIMENSIONS**

**MATERIAL, BODY**
**SEAT/SEAL** Buna-N

**PORTS, SIZE & TYPE**

**INTEGRAL FILTER**

**RESPONSE TIME, OPEN/CLOSE** 20/15 ms

**VOLTAGE, OPERATING** 22 to 32 Vdc  
**PULL IN/DROP OUT**

**WATTS** 20

**ELECTRICAL CONNECTION**

**MOUNTING**

**OPERATING TEMPERATURE RANGE** 0 to 150 °F (255 to 338 K)

**VIBRATION, RANDOM**
**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**  
**CYCLE** 100,000

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Aerospace Corporation report (ref. 9)
**LINE/THRUSTER VALVE**

**MANUFACTURER**  Wright Components, Inc.

**PART NUMBER**  12240

**DESCRIPTION**  Solenoid, two-way N.C.

**QUALIFICATION STATUS**  Shuttle APU (Sunstrand), flown

**PROPELLANT/FLUID**  
- **G**MN₂

**PRESSURE, OPERATING**  
- 0 to 315 psia; 315 to 340 psia nonoperating
- **PROOF**  600 psig
- **BURST**  1200 psig
- **DROP**  0.8 psid

**RATED FLOW**  
- **FEOD**  0.19 to 0.23 in.;  \( C_n = 0.61 \) at 70 °F

**L opción**
- **INTERNAL**  1x10⁻⁶ SCCH He
- **EXTERNAL**  1x10⁻⁶ SCCH He

**MASS**  0.43 lbm

**DIMENSIONS**  
- 3.655 by 1.02 by 1.02 in.; body, 0.880 in. diam

**MATERIAL**
- **BODY**  430 and 304 CRES
- **SEAT/SEAL**  Viton

**PORTS, SIZE & TYPE**  Special coaxial inlet and outlet

**INTEGRAL FILTER**

**RESPONSE TIME, OPEN/CLOSE**  40/40 ms

**VOLTAGE, OPERATING**  21.3 to 31 V

**PULL IN/DROP OUT**  18/1.0 Vdc

**WATTS**  3.4

**ELECTRICAL CONNECTION**  NB3H8-98N/MSFC40M39569C

**MOUNTING**  Four EQ SP holes on 0.79-in. square

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**
- **SINE**
- **ACCELERATION**
- **SHOCK**

**LIFE, SERVICE**
- **CYCLE**  250,000
- **SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**  Duty cycle - 30 s on, 5 min off (continuous)

**DATA SOURCE**  Wright Components catalog - 1984
**LINE/THRUSTER VALVE**

**MANUFACTURER** Wright Components, Inc.

**PART NUMBER** 15398-1, -2, -3, -4  

**DESCRIPTION** Pulse coaxial solenoid, N.C.  

**QUALIFICATION STATUS** ATS (Avco), flown  

**PROPELLANT/FLUID** NH₃

**PRESSURE, OPERATING** 0 to 300 psig  
**PROOF** 450 psig  
**BURST** 750 psig  
**DROP**

**RATED FLOW** 10⁻⁵ lbm/s gas at 8 psia (-1, -3), 10⁻⁶ lbm/s at 50 psia (-2, -4)

**LEAKAGE, INTERNAL** 6x10⁻⁶ SCCS He  
**EXTERNAL** 1x10⁻⁶ SCCS He

**MASS** 0.34 lbm  
**DIMENSIONS** 2.00 in. LOA, 0.96 in. height and width

**MATERIAL, BODY**  
**SEAT/SEAL** Ethylene propylene 515-8

**PORTS, SIZE & TYPE** Four-bolt flange mount, both ends

**INTEGRAL FILTER**

**RESPONSE TIME, OPEN/CLOSE** 15/15 ms  
**VOLTAGE, OPERATING** 24 (18 to 28) Vdc  
**PULL IN/DROP OUT** 18/6 Vdc  
**WATTS** 1 at 24 Vdc and 70 °F

**ELECTRICAL CONNECTION** Free leads  
**MOUNTING** 0.128/0.133-in.-diam holes, four each EQ SP on 1.045-in. BC, both ends

**OPERATING TEMPERATURE RANGE** Fluid, 95 to 125 °F; ambient, 0 to 125 °F

**VIBRATION, RANDOM** 45g sustained

**SINE**

**ACCELERATION** 30g  
**SHOCK**

**LIFE, SERVICE** 2000 hr or 5 yr  
**CYCLE** 25,000,000

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS** Seat diam, 0.018 in. (for -1, -3); 0.01 in. (for -2, -4)

**DATA SOURCE** Wright Components catalog - 1984
**LINE/THRUSTER VALVE**

**MANUFACTURER** Wright Components, Inc.
**PART NUMBER** 15447
**DESCRIPTION** Pulse coaxial solenoid, N.C.
**QUALIFICATION STATUS** NRL Radiation (NRL), flown

**PROPELLANT/FLUID** GNH₃

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESSURE, OPERATING</td>
<td>350 psig</td>
</tr>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>DROP</td>
<td></td>
</tr>
<tr>
<td>RATED FLOW</td>
<td>0.2 SCFM air</td>
</tr>
</tbody>
</table>

**LEAKAGE, INTERNAL** 2x10⁻⁶ SCCS He
**EXTERNAL** 2x10⁻⁶ SCCS He

**MASS** 0.35 lbm

**DIMENSIONS**

**MATERIAL, BODY** 303 CRES
**SEAT/SEAL** EPR 515-8

**PORTS, SIZE & TYPE**

**INTEGRAL FILTER**

**RESPONSE TIME, OPEN/CLOSE** 15/15 ms
**VOLTAGE, OPERATING** 24
  **PULL IN/DROP OUT** 12/6 Vdc

**WATTS** 3

**ELECTRICAL CONNECTION** PT1H-8-2P

**MOUNTING**

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**
**SINE**

**ACCELERATION**
**SHOCK**

**LIFE, SERVICE**
  **CYCLE** 2,000,000
  **SHELF**

**RELIABILITY**
**LEAD TIME**
**COST**
**REMARKS**

**DATA SOURCE** Wright Components catalog - 1984
LINE/THRUSTER VALVE

MANUFACTURER Wright Components, Inc.
PART NUMBER 15457 (-2, -5)
DESCRIPTION Pulse coaxial solenoid, N.C.
QUALIFICATION STATUS IMP (NASA), flown; NRL Radiation (Avco), flown
PROPELLANT/FLUID CF₄ (-2), NH₃ (-5)

PRESSURE, OPERATING 60 psig
PROOF
BURST
DROP
RATED FLOW 1.4 SCFM air

LEAKAGE, INTERNAL 6x10⁻⁵ SCCS He
EXTERNAL Same as internal
MASS 0.25 lbm

DIMENSIONS

MATERIAL, BODY 300 series CRES
SEAT/SEAL Neoprene (for -2), EPR 515-8 (for -5)

PORTS, SIZE & TYPE

INTEGRAL FILTER Yes; 300 series CRES

RESPONSE TIME, OPEN/CLOSE 15/15 ms
VOLTAGE, OPERATING 26 Vdc
PULL IN/DROP OUT 20/5 Vdc
WATTS 2

ELECTRICAL CONNECTION Free leads

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE

ACCELERATION

SHOCK

LIFE, SERVICE CYCLE 25,000,000

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE Wright Components catalog - 1984
MANUFACTURER  Wright Components, Inc.
PART NUMBER  15548
DESCRIPTION  Pulse coaxial solenoid, N.C.
QUALIFICATION STATUS  NRL Radiation (JPL), flown

PROPELLANT/FLUID  NH₃

PRESSURE, OPERATING  0 to 350 psig
   PROOF  450 psig
   BURST  750 psig
   DROP

RATED FLOW  0.2 SCFM air

LEAKAGE, INTERNAL  2x10⁻⁶ SCCS He
   EXTERNAL  Same as internal

MASS  0.27 lbm
DIMENSIONS  1.625 by 0.95 by 1.854 in.

MATERIAL, BODY  302, 304, 347, 430 CRES
   SEAT/SEAL  Ethylene propylene 515-8

PORTS, SIZE & TYPE  Flanges

INTEGRAL FILTER

RESPONSE TIME, OPEN/CLOSE  15/15 ms

VOLTAGE, OPERATING  24 Vdc (22 to 26 Vdc)
   PULL IN/DROP OUT  16/5 Vdc

WATTS  3

ELECTRICAL CONNECTION  PTDH-8-2P

MOUNTING  Two flanges; 4-40 UNC-2B holes on 1.000-in. BC
   (inlet and outlet)

OPERATING TEMPERATURE RANGE  32 to 140 °F

VIBRATION, RANDOM
   SINE

ACCELERATION

SHOCK

LIFE, SERVICE  5 yr
   CYCLE  2,000,000
   SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Wright Components catalog - 1984
LINE/THRUSTER VALVE

MANUFACTURER Wright Components, Inc.
PART NUMBER 15548-2
DESCRIPTION Pulse coaxial solenoid, N.C.
CERTIFICATION STATUS Solrad-X (NRL), flown

PROPELLANT/FLUID N₂H₄

PRESSURE, OPERATING 0 to 350 psig
PROOF 450 psig
BURST 750 psig
DROP

RATED FLOW 0.2 SCFM air

LEAKAGE, INTERNAL 2x10⁻⁶ SCCS He
EXTERNAL Same as internal

MASS 0.30 lbm

DIMENSIONS 1.625 by 0.95 by 1.854 in.

MATERIAL, BODY 302, 304, 347, 430 CRES
SEAT/SEAL Ethylene propylene 515-8

PORTS, SIZE & TYPE Flanges

INTEGRAL FILTER

RESPONSE TIME, OPEN/CLOSE 15/15 ms

VOLTAGE, OPERATING 24 Vdc (22 to 26 Vdc)
PULL IN/DROP OUT 16/4 Vdc

WATTS 3

ELECTRICAL CONNECTION PT1H-8-2P

MOUNTING Two flanges; 4-40 UNC-2B holes on 1.000-in. BC
(inlet and outlet)

OPERATING TEMPERATURE RANGE 32 to 140 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE 5 yr
CYCLE 2,000,000

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE Wright Components catalog - 1984

353
LINE/THRUSTER VALVE

MANUFACTURER Wright Components, Inc.
PART NUMBER 15554
DESCRIPTION Pulse coaxial solenoid
QUALIFICATION STATUS DISCOS (Avco), flown

PROPELLANT/FLUID CF$_4$ (Freon 14), GN$_2$

PRESSURE, OPERATING 0 to 45 psig
   PROOF 68 psig
   BURST 180 psig
   DROP 1 psid at 15 psia
RATED FLOW 2.3x10$^{-5}$ lb/s Freon 14

LEAKAGE, INTERNAL 3x10$^{-5}$ SCCS GN$_2$
   EXTERNAL Same as internal
MASS 0.28 lbm
DIMENSIONS 1.656 by 0.952 by 1.360 in.

MATERIAL, BODY 300 and 400 series CRES
   SEAT/SEAL Ethylene propylene 515-8
PORTS, SIZE & TYPE Four-bolt flanges

INTEGRAL FILTER 5 µm nom. at inlet and outlet
RESPONSE TIME, OPEN/CLOSE 50/50 ms
VOLTAGE, OPERATING 20 to 31 Vdc
   PULL IN/DROP OUT 16/1.5 Vdc
WATTS 1.12 at 28 Vdc
ELECTRICAL CONNECTION Free leads
MOUNTING Four 0.12-in.-diam holes on 1.172 by 1.469-in. base

OPERATING TEMPERATURE RANGE -20 to 120 °F

VIBRATION, RANDOM
   SINE
ACCELERATION
SHOCK

LIFE, SERVICE 2 yr
   CYCLE 3,000,000
   SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE Wright Components catalog - 1984
LINE/THRUSTER VALVE

MANUFACTURER  Wright Components, Inc.
PART NUMBER  15607-2
DESCRIPTION  Pulse coaxial solenoid, pneumatic N.C.
QUALIFICATION STATUS  LES 8/9 (TRW), flown

PROPELLANT/FLUID  NH₃

PRESSURE, OPERATING  225 psig

PRESSURE, PROOF
PRESSURE, BURST
PRESSURE, DROP

Rated Flow

Leakage, Internal  1x10⁻⁶ SCCS He
Leakage, External  8x10⁻⁶ SCCS He

Mass  0.25 lbm

Dimensions  2.03 in. by 0.96 in.²

Material, Body
Seat/Seal  AF-E-102

Ports, Size & Type  0.343 in. o.d.

Integral Filter  50 µm nom. inlet and outlet

Response Time, Open/Close

Voltage, Operating  28 Vdc
Pull In/Drop Out  20/5 Vdc

Watts  2 at 26 Vdc

Electrical Connection  Free leads

Mounting  Four 0.13-in.-diam holes EQ SP on 1.045-in. diam. BC
at both ends

Operating Temperature Range

Vibration, Random
Sine

Acceleration
Shock

Life, Service  5 yr w/2000 hr powered
Cycle  2,000,000

Shelf

Reliability

Lead Time

Cost

Remarks

Data Source  Wright Components catalog - 1984
**LINE/THRUSTER VALVE**

**MANUFACTURER** Wright Components, Inc.

**PART NUMBER** 15607-3

**DESCRIPTION** Pulse coaxial solenoid, pneumatic, N.C.

**QUALIFICATION STATUS** HEAO (NASA)

**PROPELLANT/FLUID** Propane

**PRESSURE, OPERATING** 280 psig

**PROOF**

**BURST**

**DROP**

**RATED FLOW** $1.2 \times 10^{-4}$ lbm/s

**LEAKAGE, INTERNAL** $1 \times 10^{-6}$ SCCS He

**EXTERNAL** Same as internal

**MASS** 0.25 lbm

**DIMENSIONS** 2.03 by 0.96 by 0.96 in.

**MATERIAL, BODY**

**SEAT/SEAL** Fluorosilicone

**PORTS, SIZE & TYPE** 0.343 in. o.d.

**INTEGRAL FILTER** 50 μm nom., inlet and outlet

**RESPONSE TIME, OPEN/CLOSE**

**VOLTAGE, OPERATING** 28 Vdc

**PULL IN/DROP OUT** 20/5 Vdc

**WATTS** 2 at 26 Vdc

**ELECTRICAL CONNECTION** Free leads

**MOUNTING** Four 0.13-in.-diam holes EQ SP on 1.045-in.-diam BC at both ends

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE** 5 yr w/2000 hr powered

**CYCLE** 350,000

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Wright Components catalog - 1984

356
**LINE/THRUSTER VALVE**

**MANUFACTURER** Wright Components, Inc.

**PART NUMBER** 15607-4

**DESCRIPTION** Pulse coaxial solenoid, pneumatic, N.C.

**QUALIFICATION STATUS** HEAO (NASA), flown

**PROPELLANT/FLUID** Propane

**PRESSURE, OPERATING** 40 psig

**PROOF**

**BURST**

**DROP**

**RATED FLOW**

**LEAKAGE, INTERNAL** $1 \times 10^{-6}$ SCCS He

**EXTERNAL** Same as internal

**MASS** 0.25 lbm

**DIMENSIONS** 2.03 by 0.96 by 0.96 in.

**MATERIAL, BODY** Seat/Seal Fluorosilicone

**PORTS, SIZE & TYPE** 0.343 in. o.d.

**INTEGRAL FILTER** 50 µm nom., inlet and outlet

**RESPONSE TIME, OPEN/CLOSE**

**VOLTAGE, OPERATING** 28 Vdc

**PULL IN/DROP OUT** 20/5 Vdc

**WATTS** 2 at 26 Vdc

**ELECTRICAL CONNECTION** Free leads

**MOUNTING** Four 0.13-in. -diam holes EQ SP on 1.045-in. -diam BC at both ends

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE** 5 yr w/2000 hr powered

**CYCLE** 250,000

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Wright Components catalog - 1984

357
LINE/THRUSTER VALVE

MANUFACTURER Wright Components, Inc.
PART NUMBER 15617-3
DESCRIPTION Pulse coaxial solenoid
QUALIFICATION STATUS CTS (Hamilton Standard), flown

PROPELLANT/FLUID N₂H₄

PRESSURE, OPERATING 396 psig
PROOF 594 psig
BURST 1584 psig
DROP
RATED FLOW 0.0005 lbm/s

LEAKAGE, INTERNAL 2x10⁻⁶ SCCS He
EXTERNAL 1x10⁻⁶ SCCS He
MASS 0.17 lbm (not including lead wires)
DIMENSIONS 2.51 in. by 0.875 in. diam

MATERIAL, BODY 302, 304, 347, or 430 CRES
SEAT/SEAL AF-E-102

PORTS, SIZE & TYPE

INTEGRAL FILTER

RESPONSE TIME, OPEN/CLOSE 8/10 ms
VOLTAGE, OPERATING 28 Vdc (25 to 29 Vdc)
PULL IN/DROP OUT 16/2 Vdc

WATTS 5
ELECTRICAL CONNECTION Free leads
MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE 3 yr
CYCLE 1,000,000
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE Wright Components catalog - 1984
**LINE/THRUSTER VALVE**

MANUFACTURER: Wright Components, Inc.  
PART NUMBER: 15617-5  
DESCRIPTION: Pulse coaxial solenoid  
QUALIFICATION STATUS: BSE (Hamilton Standard), flown

PROPELLANT/FLUID: N₂H₄

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESSURE, OPERATING</td>
<td>400 psig</td>
</tr>
<tr>
<td>PROOF</td>
<td>594 psig</td>
</tr>
<tr>
<td>BURST</td>
<td>1584 psig</td>
</tr>
<tr>
<td>DROP</td>
<td></td>
</tr>
<tr>
<td>RATED FLOW</td>
<td>0.0005 lbm/s</td>
</tr>
<tr>
<td>LEAKAGE, INTERNAL</td>
<td>2x10⁻⁶ SCCS He</td>
</tr>
<tr>
<td>EXTERNAL</td>
<td>1x10⁻⁶ SCCS He</td>
</tr>
<tr>
<td>MASS</td>
<td>0.17 lbm (not including lead wire)</td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td>2.5 in. by 0.875 in. diam</td>
</tr>
<tr>
<td>MATERIAL, BODY</td>
<td>302, 304, 347, or 430 CRES</td>
</tr>
<tr>
<td>SEAT/SEAL</td>
<td>AF-E-102 PCRTS, SIZE &amp; TYPE</td>
</tr>
<tr>
<td>INTEGRAL FILTER</td>
<td></td>
</tr>
<tr>
<td>RESPONSE TIME, OPEN/CLOSE</td>
<td>8/10 ms</td>
</tr>
<tr>
<td>VOLTAGE, OPERATING</td>
<td>28 Vdc (25 to 29 Vdc)</td>
</tr>
<tr>
<td>PULL IN/DROP OUT</td>
<td>1½/2 Vdc</td>
</tr>
<tr>
<td>WATTS</td>
<td>5.7</td>
</tr>
<tr>
<td>ELECTRICAL CONNECTION</td>
<td>Free leads</td>
</tr>
<tr>
<td>MOUNTING</td>
<td></td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td></td>
</tr>
<tr>
<td>VIBRATION, RANDOM</td>
<td>SINE</td>
</tr>
<tr>
<td>ACCELERATION</td>
<td></td>
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<tr>
<td>SHOCK</td>
<td></td>
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<tr>
<td>LIFE, SERVICE</td>
<td>3 yr</td>
</tr>
<tr>
<td>CYCLE</td>
<td>500,000</td>
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<tr>
<td>SHELF RELIABILITY</td>
<td></td>
</tr>
<tr>
<td>LEAD TIME</td>
<td></td>
</tr>
<tr>
<td>COST</td>
<td></td>
</tr>
<tr>
<td>REMARKS</td>
<td></td>
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</table>

DATA SOURCE: Wright Components catalog - 1984
**LINE/THRUSTER VALVE**

**MANUFACTURER** Wright Components, Inc.
**PART NUMBER** 15626-2
**DESCRIPTION** Pulse coaxial solenoid, N.C.
**QUALIFICATION STATUS** Solrad X1, classified program (Hamilton Standard), flown
**PROPELLANT/FLUID** $\text{N}_2\text{H}_4$ (per MIL-P-26536)

<table>
<thead>
<tr>
<th>PRESSURE</th>
<th>OPERATING 250 psig, 300 max. psig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PROOF 600 psig</td>
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<tr>
<td></td>
<td>BURST 1200 psig</td>
</tr>
<tr>
<td></td>
<td>DROP 40 psid</td>
</tr>
</tbody>
</table>

| RATED FLOW | 0.0009 lbm/s |

<table>
<thead>
<tr>
<th>LEAKAGE, INTERNAL</th>
<th>$1.5 \times 10^{-6}$ SCCS He</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTERNAL</td>
<td>$1.0 \times 10^{-6}$ SCCS He</td>
</tr>
</tbody>
</table>

| MASS | 0.28 lbm |

| DIMENSIONS | 0.018-in.-seat diam, 0.962 in. width less case, 1.627 in. length, 2.01 in. height |

| MATERIAL, BODY | 304 CRES, 430 CRES spool |
| SEAT/SEAL     | AF-E-102                  |

<table>
<thead>
<tr>
<th>PORTS, SIZE &amp; TYPE</th>
<th>INTEGRAL FILTER</th>
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</thead>
<tbody>
<tr>
<td>RESPONSE TIME, OPEN/CLOSE</td>
<td>10/10 ms</td>
</tr>
<tr>
<td>VOLTAGE, OPERATING</td>
<td>24 to 32 Vdc</td>
</tr>
<tr>
<td>PULL IN/DROP OUT</td>
<td>16/4 Vdc</td>
</tr>
<tr>
<td>WATTS</td>
<td>5</td>
</tr>
</tbody>
</table>

**ELECTRICAL CONNECTION** JT1H-8-3P-(101)
**MOUNTING** Two 0.120/0.130-in.-diam holes spaced at 1.176/1.168 in.

**OPERATING TEMPERATURE RANGE** 40 to 160 °F
**VIBRATION, RANDOM**
**SINE**
**ACCELERATION**
**SHOCK**

**LIFE, SERVICE**
**CYCLE** 500,000
**SHELF**
**RELIABILITY**
**LEAD TIME**
**COST**
**REMARKS** Ref. P/N 15626-4

**DATA SOURCE** Wright Components catalog - 1984
MANUFACTURER Wright Components, Inc.
PART NUMBER 15626-4
DESCRIPTION Pulse coaxial
QUALIFICATION STATUS Classified (Hamilton Standard), flown

PROPELLANT/FLUID N₂H₄
PRESSURE, OPERATING 250 psig
PROOF
BURST
DROP
RATED FLOW 0.0009 lbm/s

LEAKAGE, INTERNAL 1x10⁻⁶ SCCS He
EXTERNAL Same as internal

MASS 0.28 lbm
DIMENSIONS 0.018-in.-seat diam

MATERIAL, BODY
SEAT/SEAL AF-E-411

PORTS, SIZE & TYPE

INTEGRAL FILTER
RESOLUTION TIME, OPEN/CLOSE 10/8 ms
VOLTAGE, OPERATING 24 to 32 Vdc
PULL IN/DROP OUT 12.6/1.0
WATTS 5
ELECTRICAL CONNECTION JT1H-8-3P-(101)

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE 500,000
SHELF
RELIABILITY

LEAD TIME

COST

REMARKS Ref. P/N 15626-2

DATA SOURCE Wright Components catalog - 1984
**LINE/THRUSTER VALVE**

**MANUFACTURER** Wright Components, Inc.

**PART NUMBER** 15637

**DESCRIPTION** Pulse coaxial solenoid, two-way, N.C.

**QUALIFICATION STATUS** X-ray experiment (Univ. of Wisconsin), flown

**PROPELLANT/FLUID** Methane, propane, N₂

**PRESSURE, OPERATING** 5 to 50 psia  
PROOF 100 psia  
BURST 200 psia  
DROP 15 psia

**RATED FLOW** 15 to 20 SCCS

**LEAKAGE, INTERNAL** 1 x 10⁻⁵ SCCS N₂  
**EXTERNAL** Same as internal

**MASS** 0.32 lbm

**DIMENSIONS** 2.48 in. LOA, 1.58 in. body length, 1.00 in. diam

**MATERIAL, BODY** 430 and 300 series CRES  
**SEAT/SEAL** Nitrile

**PORTS, SIZE & TYPE** MS 24385-2 (both ends)

**INTEGRAL FILTER**

**RESPONSE TIME, OPEN/CLOSE** 15/10 ms

**VOLTAGE, OPERATING** 28 Vdc (23 to 33 Vdc)  
**PULL IN/DROP OUT** 16/4 Vdc

**WATTS** 5.6

**ELECTRICAL CONNECTION** Free leads

**MOUNTING** Port

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE** 2,000,000

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS** Continuous duty cycle

**DATA SOURCE** Wright Components catalog - 1984
**LINE/THRUSTER VALVE**

**MANUFACTURER** Wright Components, Inc.

**PART NUMBER** 15726-4

**DESCRIPTION** Dual coaxial

**QUALIFICATION STATUS** DSCS III (Hamilton Standard), flown

**PROPELLANT/FLUID** N$_2$H$_4$

**PRESSURE, OPERATING** 0 to 400 psig

- **PROOF**
- **BURST**
- **DROP**

**RATED FLOW** 0.0010 lbm/s

**LEAKAGE, INTERNAL** 1x10$^{-6}$ SCCS N$_2$

**EXTERNAL** Same as internal

**MASS** 0.44 lbm

**DIMENSIONS** 0.015-in. seat diam

**MATERIAL, BODY**

**SEAT/SEAL** AF-E-411

**PORTS, SIZE & TYPE**

**INTEGRAL FILTER**

**RESPONSE TIME, OPEN/CLOSE** 10/10 ms

**VOLTAGE, OPERATING** 24 to 32 Vdc

- **PULL IN/DROP OUT** 12/1.7 Vdc

**WATTS** 10

**ELECTRICAL CONNECTION** Free leads

**MOUNTING**

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

- **SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

- **CYCLE** 500,000

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS** Ref. P/N 15726-5, 15726-7

**DATA SOURCE** Wright Components catalog - 1984
LINE/THRUSTER VALVE

MANUFACTURER Wright Components, Inc.
PART NUMBER 15726-5
DESCRIPTION Dual coaxial, solenoid
QUALIFICATION STATUS Indian Apple (Hamilton Standard), flown

PROPELLANT/FLUID N₂H₄

PRESSURE, OPERATING 0 to 400 psig
PROOF 600 psig
BURST 1600 psig
DROP

RATED FLOW 0.001 lbm/s at 5.0 psid, 0.004 lbm/s at 80 psid

LEAKAGE, INTERNAL 2x10⁻⁶ SCCS He
EXTERNAL 1x10⁻⁶ SCCS He

MASS 0.40 lbm

DIMENSIONS 0.015-in. seat diam, 3.2-in. body, 4.20 in. LOA,
1.5 in. diam

MATERIAL, BODY 430 CRES, 304 CRES, 17-7 CRES
SEAT/SEAL AF-E-411

PORTS, SIZE & TYPE 0.128/0.125 in. o.d. by 0.017/0.0145-in. wall;
304L CRES tube inlet

INTEGRAL FILTER 10 µm nom., 25 µm abs at inlet

RESPONSE TIME, OPEN/CLOSE 10/10±0.5 ms repeat

VOLTAGE, OPERATING 24 to 32 Vdc
PULL IN/DROP OUT 15/1.7

WATTS 10

ELECTRICAL CONNECTION Free leads

MOUNTING Three 4-40 UNC holes EQ SP on 1.250-in. BC (outlet port)

OPERATING TEMPERATURE RANGE Fluid, 40 to 160 °F; ambient, 40 to
200 °F

VIBRATION, RANDOM
SINE

ACCELERATION

SHOCK

LIFE, SERVICE 3 yr
CYCLE 500,000
SHELF 3 yr

RELIABILITY

LEAD TIME

COST

REMARKS Ref. P/N 15726-4, 15726-7

DATA SOURCE Wright Components catalog - 1984
MANUFACTURER  Wright Components, Inc.
PART NUMBER  15726-7
DESCRIPTION  Dual coaxial
QUALIFICATION STATUS  DSCS III (Hamilton Standard), flown

PROPELLANT/FLUID  N₂H₄

PRESSURE, OPERATING  415 psia

BURST

DROP

RATED FLOW  0.1 lb thrust

LEAKAGE, INTERNAL  1×10⁻⁵ SCCS He
EXTERNAL  1×10⁻⁶ SCCS He

MASS  0.44 lbm

DIMENSIONS  0.014-in. seat diam

MATERIAL, BODY

SEAT/SEAL  AF-E-411

PORTS, SIZE & TYPE

INTEGRAL FILTER

RESPONSE TIME, OPEN/CLOSE  12/10 ms

VOLTAGE, OPERATING  24 to 32 Vdc

FULL IN/DROP OUT  12/1.7 Vdc

WATTS  10

ELECTRICAL CONNECTION  Free leads

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE  500,000

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS  Ref. P/N 15726-4, 15726-5

DATA SOURCE  Wright Components catalog - 1984
**LINE/THRUSTER VALVE**

MANUFACTURER  Wright Components, Inc.
PART NUMBER  15750
DESCRIPTION  Pulse coaxial
QUALIFICATION STATUS  Classified (Avco), flown

**PROPELLANT/FLUID**  NH₃

PRESSURE, OPERATING  350 psig
    PROOF
    BURST
    DROP
RATED FLOW

LEAKAGE, INTERNAL  2.5x10⁻⁷ SCCS He
    EXTERNAL  5x10⁻⁷ SCCS He
MASS  0.27 lbm
DIMENSIONS  0.018-in. seat diam

MATERIAL, BODY
    SEAT/SEAL  AF-E-102
PORTS, SIZE & TYPE

INTEGRAL FILTER
RESPONSE TIME, OPEN/CLOSE  15/8 ms
VOLTAGE, OPERATING  25 Vdc
    PULL IN/DROP OUT  16/4 Vdc
WATTS  3
ELECTRICAL CONNECTION  JT1H-8-3P
MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
    SINE
ACCELERATION
SHOCK

LIFE, SERVICE
    CYCLE  1,000,000
    SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Wright Components catalog - 1984
MANUFACTURER  Wright Components, Inc.
PART NUMBER  15751
DESCRIPTION  Pulse coaxial, solenoid, N.C. w/thruster
QUALIFICATION STATUS  Earth Limb Measurement Satellite (Grumman), flown
PROPELLANT/FLUID  N₂ (clean GN₂ per MIL-P-27401B)

PRESSURE, OPERATING  15 to 75 psig
PROOF         200 psig
BURST          250 psig
DROP
RATED FLOW  0.05 lb thrust

LEAKAGE, INTERNAL  2 SCCS He
EXTERNAL    Same as internal
MASS        0.60 lb
DIMENSIONS  2.60 in. length w/o nozzle, 1.6 in. height w/o leads and mount, 1.0 in. width w/o mount
MATERIAL, BODY  430F CRES, 303 CRES
SEAT/SEAL  Fluorosilicone
PORTS, SIZE & TYPE  MS 33656-6 inlet

INTEGRAL FILTER
RESPONSE TIME, OPEN/CLOSE  20/20 ms
VOLTAGE, OPERATING  28 Vdc
WATTS  6
ELECTRICAL CONNECTION  Free leads
MOUNTING  Three 8-32 UNF2B holes EQ SP at outlet end on 1.50-in.-diam BC

OPERATING TEMPERATURE RANGE  -80 to 150 °F

VIBRATION, RANDOM
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE  500,000 min.

RELIABILITY

LEAD TIME

COST

REMARKS  Coil resistance 78±3 Ω at 75 °F; thruster may be removable. Specs: propellants per MIL-P-27401B, MIL-P-27407; test per WCI ATP 15751; environment per Grumman spec number B71P26DCV905

DATA SOURCE  Wright Components catalog - 1984
LINE/THRUSTER VALVE

MANUFACTURER  Wright Components, Inc.
PART NUMBER  15770
DESCRIPTION  Pulse coaxial, solenoid, N.C.
QUALIFICATION STATUS  International Ultraviolet Explorer Satellite (Hamilton Standard), flown
PROPELLANT/FLUID  \( \text{N}_2\text{H}_4 \) (per MIL-P-26536)

PRESSURE, OPERATING  400 psia
PROOF  600 psig
BURST  1600 psig
DROP  28 psid max.
RATED FLOW  0.0250 lb/s

LEAKAGE, INTERNAL  2x10^-6 SCCS He
EXTERNAL  1x10^-6 SCCS He
MASS  0.28 lbm (not including lead wires)
DIMENSIONS  2.87 in. LOA, 1.664 in. width, 1.211 in. height

MATERIAL, BODY
SEAT/SEAL  AF-E-102
PORTS, SIZE & TYPE  0.190/0.180-in. diam by 0.0175/0.0145-in. wall, 304L CRES tube inlet
INTEGRAL FILTER
RESPONSE TIME, OPEN/CLOSE  15/8 ms ±0.0002 s repeat
VOLTAGE, OPERATING  24 to 28 Vdc
PULL IN/DROP OUT  16/4 Vdc
WATTS  13.2
ELECTRICAL CONNECTION  Free leads
MOUNTING  Four 0.120/0.130-in.-diam holes on 1.426 by 1.312-in. rectangle (outlet)

OPERATING TEMPERATURE RANGE  Fluid, 40 to 160 °F; ambient, 40 to 200 °F
VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE  500,000 min.
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS  Ref. P/N 15770-5

DATA SOURCE  Wright Components catalog - 1984
<table>
<thead>
<tr>
<th><strong>LINE/THRUSTER VALVE</strong></th>
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<tr>
<td><strong>MANUFACTURER</strong> Wright Components, Inc.</td>
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<tr>
<td><strong>PART NUMBER</strong> 15770-5</td>
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<tr>
<td><strong>DESCRIPTION</strong> Pulse</td>
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<tr>
<td><strong>QUALIFICATION STATUS</strong> TRW, qualified</td>
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<tr>
<td><strong>PROPELLANT/FLUID</strong> N₂H₄</td>
</tr>
<tr>
<td><strong>PRESSURE, OPERATING</strong> 400 psia</td>
</tr>
<tr>
<td><strong>PROOF</strong></td>
</tr>
<tr>
<td><strong>BURST</strong></td>
</tr>
<tr>
<td><strong>DROPS</strong></td>
</tr>
<tr>
<td><strong>RATED FLOW</strong> 0.025 lb/s</td>
</tr>
<tr>
<td><strong>LEAKAGE, INTERNAL</strong> 1 SCCH GN₂</td>
</tr>
<tr>
<td><strong>EXTERNAL</strong> 1x10⁻⁶ SCCS He</td>
</tr>
<tr>
<td><strong>MASS</strong> 0.33 lbm</td>
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<tr>
<td><strong>DIMENSIONS</strong></td>
</tr>
<tr>
<td><strong>MATERIAL, BODY</strong></td>
</tr>
<tr>
<td><strong>SEAT/SEAL</strong> AF-E-411</td>
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<td><strong>PORTS, SIZE &amp; TYPE</strong></td>
</tr>
<tr>
<td><strong>INTEGRAL FILTER</strong></td>
</tr>
<tr>
<td><strong>RESPONSE TIME, OPEN/CLOSE</strong> 17/8 ms</td>
</tr>
<tr>
<td><strong>VOLTAGE, OPERATING</strong> 27 Vdc</td>
</tr>
<tr>
<td><strong>PULL IN/DROP OUT</strong> 16/2 Vdc</td>
</tr>
<tr>
<td><strong>WATTS</strong> 16.4</td>
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<tr>
<td><strong>ELECTRICAL CONNECTION</strong> Free leads</td>
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<tr>
<td><strong>MOUNTING</strong></td>
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<tr>
<td><strong>OPERATING TEMPERATURE RANGE</strong></td>
</tr>
<tr>
<td><strong>VIBRATION, RANDOM</strong></td>
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<tr>
<td><strong>SINE</strong></td>
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<tr>
<td><strong>ACCELERATION</strong></td>
</tr>
<tr>
<td><strong>SHOCK</strong></td>
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<tr>
<td><strong>LIFE, SERVICE</strong></td>
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<tr>
<td><strong>CYCLE</strong> 500,000</td>
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<tr>
<td><strong>SHELF</strong></td>
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<tr>
<td><strong>RELIABILITY</strong></td>
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<tr>
<td><strong>LEAD TIME</strong></td>
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<tr>
<td><strong>COST</strong></td>
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<tr>
<td><strong>REMARKS</strong> Ref. P/N 15770</td>
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**DATA SOURCE** Wright Components catalog - 1984
LINE/THRUSTER VALVE

MANUFACTURER  Wright Components, Inc.
PART NUMBER  15771
DESCRIPTION  Pulse coaxial
QUALIFICATION STATUS  IUE (Hamilton Standard), flown

PROPELLANT/FLUID  N₂H₄

PRESSURE, OPERATING  400 psia
       PROOF  600 psig
       BURST  1600 psig
       DROP  8.4 psid
RATED FLOW  0.0005 lb/s

LEAKAGE, INTERNAL  2x10⁻⁶ SCCS He
       EXTERNAL  1x10⁻⁶ SCCS He
MASS  0.20 lbm (not including lead wires)

DIMENSIONS  2.877 in. LOA, 1.51-in. mound diam, 0.870-in. body diam

MATERIAL, BODY
       SEAT/SEAL  AF-E-102
PORTS, SIZE & TYPE  0.128/0.125-in.-diam by 0.0175/0.0145-in.-wall, 304L CRES tube inlet

INTEGRAL FILTER
RESPONSE TIME, OPEN/CLOSE  10/5 ms
VOLTAGE, OPERATING  24 to 28 Vdc
       PULL IN/DROP OUT  16/2 Vdc
WATTS  5.4

ELECTRICAL CONNECTION  Free leads
MOUNTING  Three 4-40 UNC-2B holes on 1.25-in.-diam BC

OPERATING TEMPERATURE RANGE  Fluid, 40 to 160 °F; ambient, 40 to 200 °F
VIBRATION, RANDOM
       SINE
ACCELERATION
SHOCK

LIFE, SERVICE
       CYCLE  500,000 min.
       SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Wright Components catalog - 1984
MANUFACTURER  Hughes Aircraft Company
PART NUMBER  3354474
DESCRIPTION  Thruster assembly w/catalyst-bed gas generator and valve
QUALIFICATION STATUS  Intelsat IV A

PROPELLANT/FLUID  N₂H₄

PRESSURE, OPERATING  50 to 300 psia inlet (34 to 206 N/cm²)
CHAMBER
PROOF
BURST

RATED FLOW
TOTAL THROUGHPUT
TOTAL IMPULSE  160,000 lbf-s (711,680 N-s)

MASS
DIMENSIONS

MATERIAL, BODY
CATALYST/CORE  Shell 405ABSG; 14 to 18 or 20 to 30 mesh

PORTS, SIZE & TYPE
VOLTAGE
WATTS
ELECTRICAL CONNECTION
DUTY CYCLE  On, 40 and 117 s nom.; off, 1160 and 1083 s (pulse)

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE  2000 s max. ontime, 39,177 s total ontime
CYCLE  899 cold starts; 55,600 pulses

RELIABILITY
LEAD TIME  9 months in 1974
COST  $25,000 in 1974

REMARKS  Specification for whole assembly except as noted; catalyst bed screen retained

DATA SOURCE  IITRI lists (ref. 8)
GAS GENERATOR

MANUFACTURER The Marquardt Company
PART NUMBER T19093 (MDAC spec 029-71B)
DESCRIPTION Spiral passage, resistance heater

QUALIFICATION STATUS Developed for MORL, not qualified (McDonnell Douglas)

PROPELLANT/FLUID Water

PRESSURE, OPERATING 3 atm +2/-20 psi (44.1 psia)
CHAMBER
PROOF
BURST

RATED FLOW 0 to 0.250 g/s

TOTAL THROUGHPUT
TOTAL IMPULSE

MASS
DIMENSIONS

MATERIAL, BODY CRES shell, MIN K-503 insulation
CATALYST/CORE Chromalox CI-505R heater

PORTS, SIZE & TYPE
VOLTAGE 120 Vac
WATTS 700
ELECTRICAL CONNECTION
DUTY CYCLE

MOUNTING

OPERATING TEMPERATURE RANGE Inlet, 32 to 70 °F; outlet, 400±40 °F

VIBRATION, RANDOM SINE
ACCELERATION
SHOCK

LIFE, SERVICE CYCLE
SHELF
RELIABILITY
LEAD TIME
COST

REMARKS Includes power controller

DATA SOURCE Marquardt report (ref. 12)
GAS GENERATOR

**MANUFACTURER**  Rocket Research Corporation  
**PART NUMBER**  MR-50M  
**DESCRIPTION**  5-lbf N$_2$H$_4$ thruster w/gas generator

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>5-lbf N$_2$H$_4$ thruster w/gas generator</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Intelsat V</td>
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<tr>
<td>PROPELLANT/FLUID</td>
<td>N$_2$H$_4$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>320 to 200 psia</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAMBER</td>
<td>115 to 80 psia</td>
</tr>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
</tbody>
</table>

| RATED FLOW | 0.0271 to 0.0193 lbm/s |
| TOTAL THROUGHPUT | 225 lbm |
| TOTAL IMPULSE | |
| MASS | 0.82 lbm w/o valve (1.30 lbm w/valve) |

| MATERIAL, BODY | |
| CATALYST/CORE | |

| PORTS, SIZE & TYPE | |
| VOLTAGE | 42 Vdc (valve) |
| WATTS | 22 W (valve) |
| ELECTRICAL CONNECTION | |
| DUTY CYCLE | |

| MOUNTING | |

| OPERATING TEMPERATURE RANGE | |
| VIBRATION, RANDOM | |
| SINE | |
| ACCELERATION | |
| SHOCK | |

| LIFE, SERVICE | 1.28-hr steady state run time |
| CYCLE | |
| SHELF | |
| RELIABILITY | |
| LEAD TIME | |
| COST | |
| REMARKS | Assembled w/Parker Hannifin valve; expansion ratio, 40:1 |

**DATA SOURCE**  Rocket Research product data sheet - 1986
GAS GENERATOR

MANUFACTURER  Rocket Research Corporation
PART NUMBER  MR-74A
DESCRIPTION  N$_2$H$_4$ thruster assembly w/shell 405 catalyst gas
generator, Clayborne heater
QUALIFICATION STATUS  ATS F and G

PROPELLANT/FLUID  N$_2$H$_4$

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>395 to 125 psia inlet (272 to 86 N/cm$^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAMBER PROOF</td>
<td>600 psia (413 N/cm$^2$)</td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
</tbody>
</table>

RATED FLOW
TOTAL THROUGHPUT
TOTAL IMPULSE  18,000 lbf-s
MASS
DIMENSIONS

MATERIAL, BODY  347 CRES
CATALYST/CORE  25 to 30 mesh; shell 405

PORTS, SIZE & TYPE
VOLTAGE  28 Vdc
WATTS  1.53
ELECTRICAL CONNECTION
DUTY CYCLE

MOUNTING

OPERATING TEMPERATURE RANGE  200 to 350 °F (93 to 176 °C)
VIBRATION, RANDOM  17g rms
SINE
ACCELERATION
SHOCK

LIFE, SERVICE  1.81x10$^5$ s ontime
CYCLE  10$^5$, (2x10$^4$ for cold starts)
SHELF
RELIABILITY
LEAD TIME
COST

REMARKS  Specifications quoted for whole assembly or as noted;
screen retained catalyst bed

DATA SOURCE  IITRI lists (ref. 8)
GAS GENERATOR

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Rocket Research Corporation</th>
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<tbody>
<tr>
<td>PART NUMBER</td>
<td>MR-103C</td>
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<tr>
<td>DESCRIPTION</td>
<td>0.2 lbf thruster with shell 405 catalyst gas generator</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>SATCOM, SPACENET, G-Star (RCA)</td>
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<tr>
<td>PROPELLANT/FLUID</td>
<td>N₂H₄</td>
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<tr>
<td>PRESSURE, OPERATING</td>
<td>420 to 70 psia</td>
</tr>
<tr>
<td>CHAMBER</td>
<td>370 to 60 psia</td>
</tr>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>RATED FLOW</td>
<td>0.001 to 0.0002 lbm/s</td>
</tr>
<tr>
<td>TOTAL THROUGHPUT</td>
<td>173 lbm</td>
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<td>TOTAL IMPULSE</td>
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<td>MASS</td>
<td>0.28 lbm w/o valve (0.73 w/valve)</td>
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<td>DIMENSIONS</td>
<td>2.28 in. by 1.35 in. diam (w/o valve)</td>
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<td>MATERIAL, BODY</td>
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</tr>
<tr>
<td>CATALYST/CORE</td>
<td></td>
</tr>
<tr>
<td>PORTS, SIZE &amp; TYPE</td>
<td></td>
</tr>
<tr>
<td>VOLTAGE</td>
<td>28 Vdc (valve)</td>
</tr>
<tr>
<td>WATTS</td>
<td>9 W (valve)</td>
</tr>
<tr>
<td>ELECTRICAL CONNECTION</td>
<td></td>
</tr>
<tr>
<td>DUTY CYCLE</td>
<td></td>
</tr>
<tr>
<td>MOUNTING</td>
<td>Three-bolt flange</td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
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</tr>
<tr>
<td>VIBRATION, RANDOM</td>
<td></td>
</tr>
<tr>
<td>SINE</td>
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<tr>
<td>ACCELERATION</td>
<td></td>
</tr>
<tr>
<td>SHOCK</td>
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<tr>
<td>LIFE, SERVICE</td>
<td>18-hr steady state run time</td>
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<td>CYCLE</td>
<td>410,000</td>
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<tr>
<td>LEAD TIME</td>
<td></td>
</tr>
<tr>
<td>COST</td>
<td></td>
</tr>
<tr>
<td>REMARKS</td>
<td>Assembled with Wright dual seat valve; expansion ratio, 100:1</td>
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<td>Rocket Research product data sheet - 1986</td>
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375
**GAS GENERATOR**

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<td>DESCRIPTION</td>
<td>0.45 lbf N₂H₄ thruster w/shell 405 catalyst-bed gas generator</td>
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<td>Intelsat V (Ford)</td>
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**PROPELLANT/FLUID** N₂H₄

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<th>PRESSURE, OPERATING</th>
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<td>184 to 84 psia</td>
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<td>TOTAL THROUGHPUT</td>
<td>272 lbm</td>
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<td>0.259 lbm w/o valve (0.704 lbm w/valve)</td>
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<td>DIMENSIONS</td>
<td>3.10 in. by 1.40 in. diam (w/o valve)</td>
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</table>

**MATERIAL, BODY**

| CATALYST/CORE       |                                                     |
| PORTS, SIZE & TYPE  |                                                     |
| VOLTAGE             | 42 Vdc (valve)                                      |
| WATTS               | 12 W (valve)                                        |
| ELECTRICAL CONNECTION|                                                   |
| DUTY CYCLE          |                                                     |
| MOUNTING            | Three-bolt flange                                   |

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

| SINE                |                                                     |
| ACCELERATION        |                                                     |
| SHOCK               |                                                     |

**LIFE, SERVICE** 2.36-hr steady state run time

| CYCLE              | 420,000                                             |
|                   |                                                     |
| RELIABILITY        |                                                     |
| LEAD TIME          |                                                     |
| COST               |                                                     |
| REMARKS            | Assembled with Wright components valve; expansion ratio, 200:1 |

**DATA SOURCE** Rocket Research product data sheet - 1986

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**GAS GENERATOR**

**MANUFACTURER**  Rocket Research Corporation  
**PART NUMBER**  MR-111A  
**DESCRIPTION**  0.5 lbf thruster w/she1405 catalyst-bed gas generator  
**QUALIFICATION STATUS**  ERBS (Ball Aerospace)  

**PROPELLANT/FLUID**  \( \text{N}_2\text{H}_4 \)

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<th>VALUE</th>
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<td>MASS</td>
<td>0.28 lbm w/o valve (0.76 lbm w/valve)</td>
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<tr>
<td>DIMENSIONS</td>
<td>3.10 in. by 1.40 in. diam (w/o valve)</td>
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<td>MATERIAL, BODY</td>
<td></td>
</tr>
<tr>
<td>CATALYST/CORE</td>
<td></td>
</tr>
<tr>
<td>PORTS, SIZE &amp; TYPE</td>
<td></td>
</tr>
<tr>
<td>VOLTAGE</td>
<td>28 Vdc (valve)</td>
</tr>
<tr>
<td>WATTS</td>
<td>9 W (valve)</td>
</tr>
<tr>
<td>ELECTRICAL CONNECTION</td>
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</tr>
<tr>
<td>DUTY CYCLE</td>
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<td>MOUNTING</td>
<td>Three-bolt flange</td>
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<td>OPERATING TEMPERATURE RANGE</td>
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<td>VIBRATION, RANDOM</td>
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<td>SINE</td>
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<td>SHOCK</td>
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<td>LIFE, SERVICE</td>
<td>15-hr steady state run time</td>
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<td>15,082</td>
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<td>COST</td>
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</tr>
<tr>
<td>REMARKS</td>
<td>Assembled with Wright Components valve</td>
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</table>

**DATA SOURCE**  Rocket Research product data sheet - 1986
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<th>Rocket Research Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
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<tr>
<td>DESCRIPTION</td>
<td>Catalyst bed w/integral pressure transducer and temperature sensor</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Space shuttle orbiter and solid rocket boosters</td>
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<td>PROPELLANT/FLUID</td>
<td>$\text{N}_2\text{H}_4$</td>
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<td>PRESSURE, OPERATING</td>
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<td>PROOF</td>
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</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>RATED FLOW</td>
<td>0.265 lbm/s nom., 0.310 lbm/s max.</td>
</tr>
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<td>TOTAL IMPULSE</td>
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</tr>
<tr>
<td>MASS</td>
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<tr>
<td>DIMENSIONS</td>
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<tr>
<td>MATERIAL, BODY</td>
<td></td>
</tr>
<tr>
<td>CATALYST/CORE</td>
<td></td>
</tr>
<tr>
<td>PORTS, SIZE &amp; TYPE</td>
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</tr>
<tr>
<td>VOLTAGE</td>
<td></td>
</tr>
<tr>
<td>WATTS</td>
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</tr>
<tr>
<td>ELECTRICAL CONNECTION</td>
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</tr>
<tr>
<td>DUTY CYCLE</td>
<td></td>
</tr>
<tr>
<td>MOUNTING</td>
<td></td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td>Input, 45 to 150 °F; output 1700 °F</td>
</tr>
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<td>VIBRATION, RANDOM</td>
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<td>SINE</td>
<td></td>
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<tr>
<td>ACCELERATION</td>
<td></td>
</tr>
<tr>
<td>SHOCK</td>
<td>40g</td>
</tr>
<tr>
<td>LIFE, SERVICE</td>
<td>10 yr minimum (including storage) 60 hr</td>
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<tr>
<td>CYCLE</td>
<td>100 minimum</td>
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<td>SHELF</td>
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<tr>
<td>RELIABILITY</td>
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</tr>
<tr>
<td>LEAD TIME</td>
<td></td>
</tr>
<tr>
<td>COST</td>
<td></td>
</tr>
<tr>
<td>REMARKS</td>
<td>20 hr TBO, serviceable</td>
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<tr>
<td>DATA SOURCE</td>
<td>AIAA paper 83-1381 (ref. 13)</td>
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</table>
GAS GENERATOR

MANUFACTURER     TRW
PART NUMBER       MRE-4 series
DESCRIPTION       Thruster assembly w/catalyst-bed gas generator and Parker valve
QUALIFICATION     Intelsat III, DSCS II, Atmosphere Explorer (flown)
PROPELLANT/FLUID  N$_2$H$_4$

PRESSURE, OPERATING  600 psia inlet CHAMBER
                   PROOF  1000 psia (681 N/cm$^2$)
                   BURST  1200 psia (816 N/cm$^2$)
RATED FLOW
TOTAL THROUGHPUT  500 lbm (227 kg)
TOTAL IMPULSE     115,000 lbf-s (511,500 N-s)
MASS
DIMENSIONS        Bed, 1.06 in. length by 0.75 in. diam (2.7 by 1.9 cm)
MATERIAL, BODY    Haynes 25
                  CATALYST/CORE  Shell 405ABSG 14-18 or 20-30 mesh
PORTS, SIZE & TYPE
VOLTAGE
WATTS
ELECTRICAL CONNECTION
DUTY CYCLE       Pulse, nom. 0.883 s off, 1.7 s on
MOUNTING

OPERATING TEMPERATURE RANGE  40 to 150 °F (5 to 66 °C)
VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK
LIFE, SERVICE
    CYCLE  177 cold starts; 101,944 pulses
    SHELF
RELIABILITY
LEAD TIME     8 months for assembly in 1974
COST
REMARKS       Specifications for whole assembly except as noted; screen retained catalyst bed

DATA SOURCE    Aerospace Corporation report (ref. 9)
## TEMPERATURE TRANSDUCER

**MANUFACTURER**: Weed Instrument Company, Inc.

**PART NUMBER**: Model A9506-4

**DESCRIPTION**: Platinum resistance sensor

**QUALIFICATION STATUS**: 

**PROPELLANT/FLUID**: 

**INDICATED TEMPERATURE, MAX**

**MIN**

**PRESSURE, OPERATING**: 0 to 90 psig

**PROOF**

**BURST**

**MASS**

**DIMENSIONS**: 3.38 in. by 0.62 in. hex

**MATERIAL**: Platinum, 316 CRES

**PORT, SIZE & TYPE**: 

**VOLTAGE, INPUT**: 

**WATTS**: 

**SIGNAL**: 0.003850 Ω/Ω/°C, 100 Ω element

**ELECTRICAL CONNECTION**: Mates w/M83723/75R0803N

**MOUNTING**: MS 33656E4 modified (0.4375-20-UNJF-3A)

**OPERATING TEMPERATURE RANGE**: -65 to 500 °F

**VIBRATION, RANDOM**: 

**SINE**: 

**ACCELERATION**: 

**SHOCK**: 

**LIFE, SERVICE**: 

**CYCLE**: 

**SHELF**: 

**RELIABILITY**: 

**LEAD TIME**: 

**COST**: 

**REMARKS**: 

**DATA SOURCE**: Weed drawing 0550-009-0002T Rev. 1 - 1985
TEMPERATURE TRANSDUCER

MANUFACTURER: Weed Instrument Company, Inc.

PART NUMBER: Model A9515

DESCRIPTION: Surface sensor

QUALIFICATION STATUS: __________________________

PROPELLANT/FLUID: __________________________

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<thead>
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<th>INDICATED TEMPERATURE, MAX</th>
<th>MIN</th>
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<th>PROOF</th>
<th>BURST</th>
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<tr>
<th>MASS</th>
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<table>
<thead>
<tr>
<th>DIMENSIONS</th>
<th>0.425 by 0.425 by 0.100 in. (1.080 by 1.080 by 0.254 cm)</th>
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<table>
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<th>PORT, SIZE &amp; TYPE</th>
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<table>
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<th>VOLTAGE, INPUT</th>
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<table>
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<th>WATTS</th>
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<table>
<thead>
<tr>
<th>SIGNAL</th>
<th>0.00385±0.00003 Ω/Ω/°C; 500 Ω element</th>
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<th>Two 12-in. wire leads</th>
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<th>-67 to 311 °F (-55 to 155 °C)</th>
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<thead>
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<thead>
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<table>
<thead>
<tr>
<th>REMARKS</th>
<th>Rated current, 5 mA min.</th>
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DATA SOURCE: Weed product data sheet - 1985
REFERENCES


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FIGURE 1. Simplified Component/System Comparison
(Note: Order and number of components in system may vary, and components may be deleted.)
### Abstract

The resistojet has been baselined for Space Station auxiliary propulsion because of its operational versatility, efficiency, and durability. This report was conceived as a guide to designers and planners of the Space Station auxiliary propulsion system. It is directed to the low thrust resistojet concept, though it should have application to other station concepts or systems such as the Environmental Control and Life Support System (ECLSS), Manufacturing and Technology Laboratory (MTL), and the Waste Fluid Management System (WFMS). The report will likely be quite useful in the same capacity for other non-Space Station systems including satellites, freeflyers, explorers, and maneuvering vehicles. The report is a catalog of the most useful information for the most significant feed system components and is organized for the greatest convenience of the user.
The resistojet has been baselined for Space Station auxiliary propulsion because of its operational versatility, efficiency, and durability. This report was conceived as a guide to designers and planners of the Space Station auxiliary propulsion system. It is directed to the low thrust resistojet concept, though it should have application to other station concepts or systems such as the Environmental Control and Life Support System (ECLSS), Manufacturing and Technology Laboratory (MTL), and the Waste Fluid Management System (WFMS). The report will likely be quite useful in the same capacity for other non-Space Station systems including satellites, freeflyers, explorers, and maneuvering vehicles. The report is a catalog of the most useful information for the most significant feed system components and is organized for the greatest convenience of the user.