Component Data Base for Space Station
Resistojet Auxiliary Propulsion

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Cleveland, Ohio

January 1988

Prepared for
Lewis Research Center
Under Contract NAS3-24105

NASA
National Aeronautics and
Space Administration
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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 WFM 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.
AirResearch 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
Iexair 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) 999-6400
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 Bertra 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.
Roslend, 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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| COST |
| REMARKS |

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48
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| PART NUMBER |                        |
| DESCRIPTION |                        |

| QUALIFICATION STATUS |                        |
| PROPELLANT/FLUID |                        |

| PRESSURE, RELIEF |                        |
| RESET |                        |
| RATED FLOW |                        |
| LEAKAGE, INTERNAL |                        |
| MASS |                        |
| DIMENSIONS |                        |

| MATERIAL, BODY |                        |
| SEAT/SEAL |                        |
| SPRING |                        |

| PORTS, SIZE & TYPE |                        |

| MOUNTING |                        |

| OPERATING TEMPERATURE RANGE |                        |

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

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

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

| REMARKS |                        |

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>CYCLE</td>
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<tr>
<td>SHELF</td>
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<thead>
<tr>
<th>RELIABILITY</th>
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<tbody>
<tr>
<td>LEAD TIME</td>
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<tr>
<td>COST</td>
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<tr>
<td>REMARKS</td>
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<tr>
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<tbody>
<tr>
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<th>MIN</th>
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<th>PROOF</th>
<th>BURST</th>
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<tr>
<th>VIBRATION, RANDOM</th>
<th>SINE</th>
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<th>LIFE, SERVICE</th>
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<tr>
<th>CYCLE</th>
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<th>LEAD TIME</th>
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<table>
<thead>
<tr>
<th>COST</th>
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<th>REMARKS</th>
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<thead>
<tr>
<th>DATA SOURCE</th>
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<tbody>
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</tbody>
</table>

54
**Fitting/Connector**

**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 |

<table>
<thead>
<tr>
<th><strong>Pressure, Operating</strong></th>
<th>1000 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proof</strong></td>
<td>1500 psi</td>
</tr>
<tr>
<td><strong>Burst</strong></td>
<td>2500 psi</td>
</tr>
<tr>
<td><strong>Mass</strong></td>
<td>0.15 lbm for 3900-4</td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th><strong>Sine</strong></th>
<th>_______________</th>
</tr>
</thead>
</table>

### Shock

- _______________

### Life, Service

- _______________

### Cycle

- _______________

### Shelf

- _______________

### Reliability

- _______________

### Lead Time

- _______________

### Cost

- _______________

### Remarks

- Ball and race lock

### Data Source

- Aeroquip catalog - 1985
MANUFACTURER  Cajon Company
PART NUMBER (SERIES)  VCO series

DESCRIPTION  Threaded locking nut connection, O-ring face seal

CONFIGURATIONS  Union, T, elbow, reducer, accessory adapters, bullhead 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. st1 sizes

MATERIAL, BODY  316 CRES (steel and brass also available);
SEAL  Viton, Buna-N, TFE

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

MASS

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

CONFIGURATIONS

QUALIFICATION STATUS

PROPELLANT/FLUID

PRESSURF, 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)

**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
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

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<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Resistoflex Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER (SERIES)</td>
<td>R44XXX, R45XXX series &quot;Dynatube&quot;</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Screw-together coupling</td>
</tr>
<tr>
<td>CONFIGURATIONS</td>
<td>T, union, elbow, cross, reducer, etc.</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Gemini, Apollo, space shuttle</td>
</tr>
</tbody>
</table>

**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

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)

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:

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  
PROOF  
BURST  13,500 psi (1/4 in.), 4000 psi (2 in.)  

MASS  

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

DIMENSIONS  

MATERIAL, BODY  CRES, Al  
SEAL  

TUBE-FITTING ATTACHMENT  Dog latch  

OPERATING TEMPERATURE RANGE  -65 to 275 °F  

VIBRATION, RANDOM  
SINE  
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  

<table>
<thead>
<tr>
<th>Configurations</th>
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</table>

**Qualification Status**  
**Propellant/Fluid**  

<table>
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<tr>
<th>Pressure, Operating</th>
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<tbody>
<tr>
<td>Proof</td>
</tr>
<tr>
<td>Burst: To 3000 psi</td>
</tr>
<tr>
<td>Mass: 0.041 lbm for -10A, 0.118 lbm for -10 (5/8)</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Tube Size(s), O.D.</th>
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<tbody>
<tr>
<td>1/4- to 6-1/2-in. std sizes</td>
</tr>
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</table>

**Dimensions**  
**Material, Body** Al or CRES  
**Seal** O-ring and ARP568-110 to -439  
**Tube-Fitting Attachment** Threaded sleeves

<table>
<thead>
<tr>
<th>Operating Temperature Range</th>
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<thead>
<tr>
<th>Vibration, Random</th>
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<tbody>
<tr>
<td>Sine</td>
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<tr>
<td>Acceleration</td>
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<tr>
<td>Shock</td>
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<thead>
<tr>
<th>Life, Service</th>
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<tbody>
<tr>
<td>Cycle</td>
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<tr>
<td>Shelf</td>
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<tr>
<td>Reliability</td>
</tr>
<tr>
<td>Lead Time</td>
</tr>
<tr>
<td>Cost</td>
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**Remarks** Tube ends require swaged-on ferrule (part numbers 63052 and 63152)

**Data Source** Wiggins catalog - 1985
**TANK/ACCUMULATOR**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Brunswick Defense Division</th>
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<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>
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**PROPELLANT/FLUID** He

<table>
<thead>
<tr>
<th>VOLUME</th>
<th>30,033 in.³</th>
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<tbody>
<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>
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<tr>
<td>MASS</td>
<td>277.5 lb</td>
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<tr>
<td>DIMENSIONS</td>
<td>38.28 in. i.d.</td>
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**MATERIAL** 6Al-4V Ti liner; Kevlar 49 and LRF-092 resin

<table>
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<tr>
<th>PORT(S), SIZE &amp; TYPE</th>
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<tbody>
<tr>
<td>MOUNTING</td>
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<tr>
<td>EXPULSION METHOD</td>
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**OPERATING TEMPERATURE RANGE**

<table>
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<tr>
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<th>SINE</th>
<th>ACCELERATION</th>
<th>SHOCK</th>
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<table>
<thead>
<tr>
<th>LIFE, SERVICE</th>
<th>CYCLE</th>
<th>1000</th>
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<tbody>
<tr>
<td>SHELF</td>
<td></td>
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<tr>
<td>RELIABILITY</td>
<td></td>
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<tr>
<td>LEAD TIME</td>
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<tr>
<td>COST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REMARKS</td>
<td></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 lb
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
TANK/ACCUMULATOR

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  6A1-4V 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 999040

**DESCRIPTION** Filament-wound shell, over liner

**QUALIFICATION STATUS** Space shuttle RCS

**PROPELLANT/FLUID** He

<table>
<thead>
<tr>
<th>VOLUME</th>
<th>3008 in.³</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESSURE, OPERATING</td>
<td>4000 psig</td>
</tr>
<tr>
<td>PROOF</td>
<td>5270 psig</td>
</tr>
<tr>
<td>BURST</td>
<td>6000 psig</td>
</tr>
</tbody>
</table>

**MASS** 26.3 lbm

**DIMENSIONS** 17.91 in. i.d. by 0.351 in. wall

**MATERIAL** 6A1-4V Ti liner; Kevlar 49 and LRF-092 resin

**VIBRATION, RANDOM**

**SINE**

<table>
<thead>
<tr>
<th>ACCELERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHOCK</td>
</tr>
</tbody>
</table>

**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 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  6A1-4V 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><strong>TANK/ACCUMULATOR</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MANUFACTURER</strong> Brunswick Defense Division</td>
</tr>
<tr>
<td><strong>PART NUMBER</strong> BLD 999060</td>
</tr>
<tr>
<td><strong>DESCRIPTION</strong> Filament-wound shell over liner</td>
</tr>
<tr>
<td><strong>QUALIFICATION STATUS</strong> Space shuttle ARPCS</td>
</tr>
<tr>
<td><strong>PROPELLANT/FLUID</strong> O₂</td>
</tr>
</tbody>
</table>

| **VOLUME** | 8181 in.³ |
| **PRESSURE** | 3300 psig PROOF 4225 psig BURST 4950 psig |
| **MASS** | 66.6 lbm |
| **DIMENSIONS** | 25 in. i.d. by 0.388 wall |
| **MATERIAL** | Inconel 718 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  Fansteel, Inc.
PART NUMBER  942-D-03
DESCRIPTION  Spherical
QUALIFICATION STATUS

PROPELLANT/FLUID  Liquid

<table>
<thead>
<tr>
<th>VOLUME</th>
<th>13,478 in.³ (0.2209 m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESSURE, OPERATING</td>
<td>700 psig (482 N/cm²)</td>
</tr>
<tr>
<td>PROOF</td>
<td>1,100 psig (758.4 N/cm²)</td>
</tr>
<tr>
<td>BURST</td>
<td>1,465 psig (1010 N/cm²)</td>
</tr>
<tr>
<td>MASS</td>
<td>71.0 lbm (32.2 kg)</td>
</tr>
</tbody>
</table>

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)
<table>
<thead>
<tr>
<th><strong>MANUFACTURER</strong></th>
<th>Garrett Corp, AiResearch</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PART NUMBER</strong></td>
<td>851240</td>
</tr>
<tr>
<td><strong>DESCRIPTION</strong></td>
<td>Spherical</td>
</tr>
<tr>
<td><strong>QUALIFICATION STATUS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>PROPELLANT/FLUID</strong></td>
<td>Gas</td>
</tr>
</tbody>
</table>

| **VOLUME** | 34,560 in.³ (0.56643 m³) |
| **PRESSURE, OPERATING** | 320 psig (220 N/cm²) |
| **PROOF** | |
| **BURST** | |
| **MASS** | 160 lbm (72 kg) |
| **DIMENSIONS** | 43.3 in. o.d. (109 cm) |
| **MATERIAL** | 5A1-2.5Sn Ti |
| **PORT(S), SIZE & TYPE** | |
| **MOUNTING** | |
| **EXPULSION METHOD** | |

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

| **LIFE, SERVICE** | |
| **CYCLE** | |
| **SHELF** | |
| **RELIABILITY** | |
| **LEAD TIME** | 10 to 12 months in 1974 |
| **COST** | |
| **REMARKS** | |

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

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 m³)
PRESSURE, OPERATING  1,500 psi (1068 N/cm²)
PROOF  2274 psi (1567 N/cm²)
BURST  3,420 psi design (2358 N/cm²)
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)

76
TANK/ACCUMULATOR

MANUFACTURER  Martin Marietta Corporation
PART NUMBER  80801B36220-049
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

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 m³)
PRESSURE, OPERATING  3000 psi (2068 N/cm²)
   PROOF  5000 psi (3,447 N/cm²)
   BURST  6660 psi (4591 N/cm²)
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

VOLUME  35,300 in.\(^3\) (0.57856 m\(^3\))

PRESSURE, OPERATING  890 psig (613 N/cm\(^2\))

PROOF  1335 psig (920 N/cm\(^2\))

BURST  1780 psig (1227 N/cm\(^2\))

MASS  255 lbm (115 kg)

DIMENSIONS  40.74 in. o.d. by 0.282 in. wall (103.4 by 0.716 cm)

MATERIAL  6A1-4V Ti

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)
<table>
<thead>
<tr>
<th><strong>TANK/ACCUMULATOR</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>
</tbody>
</table>

| **VOLUME** | 13,442 in.\(^3\) (0.22031 m\(^3\)) |
| **PRESSURE, OPERATING** | 300 psig (206 N/cm\(^2\)) |
| **PROOF** | 600 psig (413 N/cm\(^2\)) |
| **BURST** | 750 psig (517 N/cm\(^2\)) |
| **MASS** | 22.5 lbm (1.02 kg) |
| **DIMENSIONS** | 29.5 in. i.d. by 0.031 in. wall (749 by 0.078 cm) |
| **MATERIAL** | Al-4V Ti |
| **PORT(S), SIZE & TYPE** | Two, polar |
| **MOUNTING** | Four equatorial lugs |
| **EXPULSION METHOD** | Teflon bladder FED-TFE |

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

**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 H₂O₂

VOLUME  17,300 in.³ (0.283 m³)
PRESSURE, OPERATING  600 psi (413 N/cm²)
    PROOF  900 psi (620 N/cm²)
    BURST  975 psi (672 N/cm²)
MASS  64 lbm (29 kg)

VOLUME  17,300 in.³ (0.283 m³)
PRESSURE, OPERATING  600 psi (413 N/cm²)
    PROOF  900 psi (620 N/cm²)
    BURST  975 psi (672 N/cm²)
MASS  64 lbm (29 kg)

DIMENSIONS

MATERIAL  350 CRES

PORT(S), SIZE & TYPE

MOUNTING

EXPULSION METHOD

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
    SINE
ACCELERATION
SHOCK

LIFE, SERVICE
    CYCLE
    SHELF
RELIABILITY
LEAD TIME
COST

DATA SOURCE  NASA CR-142666 and NASA CR-142531 (ref. 5)
**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><strong>VOLUME</strong></th>
<th>1631 in.³ (0.0267 m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRESSURE, OPERATING</strong></td>
<td>3600 psig</td>
</tr>
<tr>
<td><strong>PROOF</strong></td>
<td></td>
</tr>
<tr>
<td><strong>BURST</strong></td>
<td></td>
</tr>
<tr>
<td><strong>MASS</strong></td>
<td>27.5 lbm (12.5 kg)</td>
</tr>
<tr>
<td><strong>DIMENSIONS</strong></td>
<td>10 in. diam by 31 in. (25.4 by 78.7 cm)</td>
</tr>
</tbody>
</table>

**MATERIAL** 6061-T6 liner; Kevlar 49 and epoxy wrap

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

**MOUNTING**

**EXPULSION METHOD**

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS** SCI manufactures filament-wound pressure vessels from 55 to 363,000 in.³ in spheres, near-spheres, and cylinders

**DATA SOURCE** SCI product data sheets - 1985; ASME proceedings (ref. 6)
<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Structural Composite Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>Model 200</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Filament-wound composite</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td></td>
</tr>
</tbody>
</table>

**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**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**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

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>O₂</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>0 to 1250 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROOF</td>
<td>1875 psig</td>
</tr>
<tr>
<td>BURST</td>
<td>2500 psig</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RATED FLOW</th>
<th>150 lbm/hr at 300 psi</th>
</tr>
</thead>
</table>

<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>

<table>
<thead>
<tr>
<th>MASS</th>
<th>0.69 lbm</th>
</tr>
</thead>
</table>

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

| MATERIAL, BODY | |
|---------------| |
| SEAT/SEAL     | |

<table>
<thead>
<tr>
<th>CONNECTIONS, GROUND SIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPACECRAFT SIDE</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>OPERATING TEMPERATURE RANGE</th>
<th>35 to 120 °F</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>VIBRATION, RANDOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ACCELERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHOCK</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIFE, SERVICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CYCLE</td>
</tr>
</tbody>
</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>

**DATA SOURCE**  Carleton product data sheet - 1987
## SERVICE VALVE

**Manufacturer:** Carleton Technologies, Inc.  
**Part Number:** 1-4-00-51-45  
**Description:** Manual toggle valve  
**Qualification Status:** Space shuttle ARPCS

<table>
<thead>
<tr>
<th><strong>Propellant/Fluid</strong></th>
<th>O₂, N₂</th>
</tr>
</thead>
</table>

| **Pressure,** Operating | 0 to 295 psig  
PROOF | 443 psig  
BURST | 590 psig |

| **Rated Flow** | 7.0 lbm/hr at 100 psi, 1.0 psid max. |

| **Leakage,** Internal | 2.0 SCCM  
External | 0.2 SCCM |

| **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**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Consolidated Controls Corporation</th>
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<tbody>
<tr>
<td>PART NUMBER</td>
<td>71665</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Manual fill and drain</td>
</tr>
<tr>
<td>QUALIFICATION</td>
<td>USAF program</td>
</tr>
</tbody>
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**PROPELLANT/FLUID**

<table>
<thead>
<tr>
<th></th>
<th>GN₂</th>
</tr>
</thead>
</table>

**PRESSURE, OPERATING**

<p>| | |</p>
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<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
<td>3015 psia (2078 N/cm²)</td>
</tr>
<tr>
<td>Proof</td>
<td>4500 psia (3113 N/cm²)</td>
</tr>
<tr>
<td>Burst</td>
<td>6015 psia (4147 N/cm²)</td>
</tr>
</tbody>
</table>

**RATED FLOW**

**LEAKAGE, INTERNAL**

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**

CRESC

**SEAT/SEAL**

CRESC

**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**

IIIRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
**SERVICE VALVE**

<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>
</tbody>
</table>

| PROPELLANT/FLUID | N₂, N₂O₄, UDMH, H₂O |

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>3615 psia (2492 N/cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROOF</td>
<td>5415 psia (3733 N/cm²)</td>
</tr>
<tr>
<td>BURST</td>
<td>9015 psia (6215 N/cm²)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>LEAKAGE, INTERNAL</th>
<th>5 SCCH GN₂ at max. pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTERNAL</td>
<td>0.0002 SCCS GN₂</td>
</tr>
</tbody>
</table>

| MASS | 1.0 lbm (0.45 kg) |

| DIMENSIONS |

<table>
<thead>
<tr>
<th>MATERIAL, BODY</th>
<th>CRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEAT/SEAL</td>
<td>CRES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONNECTIONS, GROUND SIDE</th>
<th>MS tube fitting 0.56-18 UNF</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPACECRAFT SIDE</td>
<td>Brazed tube</td>
</tr>
</tbody>
</table>

| INTEGRAL FILTER | 200 µm abs |

| MOUNTING |

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

<table>
<thead>
<tr>
<th>VIBRATION, RANDOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINE</td>
</tr>
</tbody>
</table>

| ACCELERATION |

| SHOCK |

<table>
<thead>
<tr>
<th>LIFE, SERVICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CYCLE 100</td>
</tr>
</tbody>
</table>

| SHELF |

| RELIABILITY |

<table>
<thead>
<tr>
<th>LEAD TIME</th>
<th>180 days in 1974</th>
</tr>
</thead>
</table>

| COST      | 5 to 10 units - $2000 in 1974 |

| REMARKS |

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

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**SERVICE VALVE**

**MANUFACTURER** Consolidated Controls Corporation  
**PART NUMBER** 72855  
**DESCRIPTION** Manual fill and vent  
**QUALIFICATION STATUS** USAF P-50

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

**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 $	ext{GN}_2$  
**EXTERNAL** 0.72 SCCH $	ext{GN}_2$

**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 No.</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 $\text{GN}_2$</td>
<td>0.50-20 UNF</td>
</tr>
<tr>
<td>-3</td>
<td>0.750 in. (1.904 cm)</td>
<td>1.0 CFM $\text{H}_2\text{O}$</td>
<td>0.875-14 UNF</td>
</tr>
</tbody>
</table>

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

MANUFACTURER  Futurecraft Corporation
PART NUMBER  200791
DESCRIPTION  Solenoid, two-way, NC, fill and vent
QUALIFICATION STATUS  Space shuttle OMS (Aerojet)

PROPELLANT/FLUID  \( \text{GN}_2 \)

PRESSURE, OPERATING  0 to 1000 psig, 0 to 3000 psig reverse flow
PROOF  6000 psig
BURST  12,000 psig

RATED FLOW  \( \text{FEOD} = 0.01 \text{ min (Cp} = 0.65) \)

LEAKAGE, INTERNAL

EXTERNAL

MASS  0.38 lbm

DIMENSIONS  3.58 by 2.47 by 1.06 in.

MATERIAL  BODY  6061-T6 Al alloy
SEAT/SEAL  Buna-N 90 shore, ethylene propylene

CONNECTIONS, GROUND SIDE  0.750-16 UNJ-3B socket
SPACECRAFT SIDE  Stub in pad mount
INTEGRAL FILTER  Inlet, sintered CRES, 6 \( \mu \text{m} \) nom., 18 \( \mu \text{m} \) abs
MOUNTING  Pad; four 0.192/0.205-in.-diam holes at 0.750 by 1.20 in.

OPERATING TEMPERATURE RANGE  0 to 160 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS  23 to 32 Vdc, 63.4-W solenoid

DATA SOURCE  Futurecraft drawing 200791 - 1985
## SERVICE VALVE

**MANUFACTURER**  Futurecraft Corporation  
**PART NUMBER**  900490-2  
**DESCRIPTION**  Fill and drain  
**QUALIFICATION STATUS**  ASAT (Hamilton Standard)

**PROPELLANT/FLUID**  GHe, other compatible fluid  

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>PROOF</th>
<th>BURST</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 500 psia</td>
<td>1000 psia</td>
<td>2000 psia</td>
</tr>
</tbody>
</table>

**RATED FLOW**  

**LEAKAGE**  
- INTERNAL  
- EXTERNAL  

**MASS**  0.14 lbm  
**DIMENSIONS**  2.09 in. by 0.874 in. diam  

**MATERIAL, BODY**  17-4PH CRES  
**SEAT/SEAL**  Metal to metal seat; ethylene propylene and Kel-F seals  
**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**  Futurecraft drawing 900490 - 1985
MANUFACTURER  Futurecraft Corporation
PART NUMBER  900491-1, -2
DESCRIPTION
QUALIFICATION STATUS  ASAT (Hamilton Standard)

PROPELLANT/FLUID  N₂H₄, GN₂, GHe, 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
SERVICE VALVE

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_ Gases: GN₂, 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 GN₂ at 25 psid (8000 SCCS at 17 N/cm²)
LEAKAGE, INTERNAL_ 0.003 SCCS He
  EXTERNAL_ 0.005 SCCS He

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)
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
SHELF

RELIABILITY

LEAD TIME
COST  $1400 in 1974

REMARKS

DATA SOURCE  IITRI lists (ref. 8)
MANUFACTURER  Moog Inc.
PART NUMBER  Model 50-527
DESCRIPTION  Fill and drain
QUALIFICATION STATUS  Unknown

PROPELLANT/FLUID

PRESSURE, OPERATING  510 psig
  PROOF  950 psig
  BURST  1509 psig

RATED FLOW  0.25 lbm/min He at 4 psid

LEAKAGE, INTERNAL
  EXTERNAL  Zero liquid at 510 psig, $10^{-5}$ SCCS GHe

MASS  0.50 lbm max.

DIMENSIONS  3.48 in. by 2.79 in. diam

MATERIAL, BODY
  SEAT/SEAL

CONNECTIONS, GROUND SIDE  MS 33656-3
  SPACECRAFT SIDE  1/4-in. tube

INTEGRAL FILTER
  MOUNTING  Three 0.196-in.-diam holes on 2.321-in.-diam BC

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 A77479 - 1985
**SERVICE VALVE**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Moog Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>Model 50-528</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Fill and drain</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

**PROPELLANT/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
MANUFACTURER  Moog Inc.
PART NUMBER  Model 50-529
DESCRIPTION  Fill, drain, and vent
QUALIFICATION STATUS  Unknown

PROPELLANT/FLUID  MMH

PRESSURE, OPERATING  510 psig
PROOF  950 psig
BURST  1509 psig

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
SHOCK

LIFE, SERVICE  10 yr
CYCLE  100
SHELF  4 yr

RELIABILITY
LEAD TIME
COST

REMARKS

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)
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  N₂H₄

PRESSURE, OPERATING  535 psia (368 N/cm²)
PROOF  1100 psia (758.4 N/cm²)
BURST  2100 psia (1447 N/cm²)

RATED FLOW

LEAKAGE, INTERNAL  3x10⁻³ SCCS He at OP pressure

EXTERNAL  1x10⁻⁶ 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**  
- 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 (ref. 9)
SERVICE VALVE

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

PROPELLANT/FLUID  \( \text{GN}_2, \text{He} \)

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, HCMM

PROPELLANT/FLUID \text{GN}_2, \text{He}

PRESSURE, OPERATING 555 psia \text{(382 N/cm}^2\text{)}
PROOF 1115 psia \text{(768.7 N/cm}^2\text{)}
BURST 2195 psia \text{(1513 N/cm}^2\text{)}

RATED FLOW 0.15 lbm/s \text{H}_2\text{O at 20 psid (0.068 kg/s at 13 N/cm}^2\text{)}

LEAKAGE, INTERNAL \text{1.7} \times \text{10}^{-3} \text{ SCCH He at OP pressure}

EXTERNAL \text{1.3} \times \text{10}^{-7} \text{ SCCS He at 27 N/cm}^2\text{ (40 psia)}

MASS 0.17 lbm (0.07 kg)

DIMENSIONS

MATERIAL, BODY 304L CRES
SEAT/SEAL

CONNECTIONS, GROUND SIDE
SPACERACRAFT SIDE
INTEGRAL FILTER
MOUNTING

OPERATING TEMPERATURE RANGE \text{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$_2$H$_4$  

**PRESSURE**  
- **OPERATING**  600 psia (413 N/cm$^2$)  
- **PROOF**  900 psia (620 N/cm$^2$)  
- **BURST**  2400 psia (1654 N/cm$^2$)  

**RATED FLOW**  

**LEAKAGE**  
- **INTERNAL**  $1 \times 10^{-5}$ SCCCH He at OP pressure  
- **EXTERNAL**  $1 \times 10^{-7}$ SCCS He at OP pressure  

**MASS**  0.22 lbm (0.10 kg)  

**DIMENSIONS**  

**MATERIAL**  
- **BODY**  CRES with Al$_2$O$_3$ 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  N\textsubscript{2}H\textsubscript{4}

PRESSURE, OPERATING  0 to 350 psia (0 to 241 N/cm\textsuperscript{2})
  PROOF  615 psia (424 N/cm\textsuperscript{2})
  BURST  1215 psia (837 N/cm\textsuperscript{2})

RATED FLOW  52 SCCS He (0.156 in. diam; C\textsubscript{D} = 0.65)

LEAKAGE, INTERNAL  1.5x10^{-6} SCCS He at 79.2 N/cm\textsuperscript{2}
  EXTERNAL  1.5x10^{-6} SCCS at 79.2 N/cm\textsuperscript{2}

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)
MANUFACTURER  Wright Components, Inc.
PART NUMBER  12319
DESCRIPTION  Fill and drain, manual
QUALIFICATION STATUS  Shuttle-launched dispenser (See Remarks.)
PROPELLANT/FLUID  He, N₂, 1PA, Freon, N₂H₄, N₂O₄, H₂O
PRESSURE, OPERATING  315 psia
                      PROOF
                      BURST
RATED FLOW  100 ppm H₂O (seat diam, 0.625 in.)
LEAKAGE, INTERNAL  1x10⁻⁶ SCCS He
                    EXTERNAL  1x10⁻⁶ 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
       SHELF
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 \( \mu \text{m} \)

PRESSURE, OPERATING  3500 psia (2415 N/cm\(^2\))
PROOF
BURST
DIFFERENTIAL

RATED FLOW  0.001 lbm/s \( \text{N}_2 \) at 2 psid (0.0005 kg/s)

THROUGHPUT
LEAKAGE, EXTERNAL

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: 0.0003 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)
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 (1.7×10⁵ SCCS)

THROUGHPUT

LEAKAGE, EXTERNAL

MASS  0.38 lbm (0.17 kg)

DIMENSIONS

MATERIAL, BODY
  ELEMENT  Fiberglass

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 -- $600 in 1974

REMARKS

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

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)
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.

PRESSURE, OPERATING 80 psi
PROOF
BURST
DIFFERENTIAL 0.6 psid clean, 1.5 psid switch, 2.25 psid bypass
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
SINE
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

**PRESSURE, PROOF**: 150 psi

**PRESSURE, BURST**: 250 psi

**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**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**  Cleanable, woven element

**DATA SOURCE**  Norman Equipment product data sheet - 1986
MANUFACTURER  Pall Pneumatic Products Corporation
PART NUMBER  PCS 13501 G24
DESCRIPTION  Single cartridge, particulate or coalescing

QUALIFICATION STATUS
PROPELLANT/FLUID  Pneumatic
RATING, ABSOLUTE

PRESSURE, OPERATING  150 psig
PROOF
BURST
DIFFERENTIAL  0.3 psid clean

RATED FLOW  350 SCFM

THROUGHPUT
LEAKAGE, EXTERNAL

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
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; 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 psig 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**

<table>
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<th>MANUFACTURER</th>
<th>Vacco Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>E-81916-4-15</td>
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<tr>
<td>DESCRIPTION</td>
<td>Cartridge element, liquid-propellant filter</td>
</tr>
</tbody>
</table>

**QUALIFICATION STATUS** Titan III

**PROPELLANT/FLUID** N$_2$H$_4$

**RATING**, ABSOLUTE 15 μm

**PRESSURE**, OPERATING 400 psia (275 N/cm$^2$)
- PROOF 668 psia (460 N/cm$^2$)
- BURST 888 psia (612 N/cm$^2$)

**RATED FLOW** 0.222 lbm/s N$_2$H$_4$ at 4 psid and 75 °F (0.100 kg/s at 2 N/cm$^2$ 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  F1D10064-01
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)

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  F1D1093
DESCRIPTION  Etched-disc element, liquid filter

QUALIFICATION STATUS  Mariner, Viking
PROF.LANT/FLUID  N\textsubscript{2}H\textsubscript{4}
RATING, ABSOLUTE  35 \textmu m

PRESSURE, OPERATING  300 psia (206 N/cm\textsuperscript{2})
PROOF
BURST  1200 psia (828 N/cm\textsuperscript{2})
DIFFERENTIAL

RATED FLOW  0.44 lbm/s at 3 psid and 70 °F (0.19 kg/s at 2 N/cm\textsuperscript{2}
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 N$_2$H$_4$
RATING, ABSOLUTE 25 μm

PRESSURE, OPERATING 600 psia (413 N/cm$^2$)
PROOF 990 psia (682 N/cm$^2$)
BURST 1320 psia (910 N/cm$^2$)
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
RELIABILITY

LEAD TIME 8 to 10 weeks in 1974
COST

REMARKS

DATA SOURCE IITRI lists (ref. 8)

123
FILTER

MANUFACTURER  Vacca 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)
FILTER

MANUFACTURER Vacco Industries

PART NUMBER FID10151-01

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)
DIFFERENTIAL

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)
DIFFERENTIAL

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

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

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

PRESSURE, OPERATING  396 psia (273 N/cm²)
PROOF  594 psia (409 N/cm²)
BURST  1584 psia (1092 N/cm²)

RATED FLOW  0.025 lbm/s N₂H₄ at 5 psid and 75 °F (0.011 kg/s at
3 N/cm² and 23 °C)

THROUGHPUT
LEAKAGE, EXTERNAL  1x10⁻⁶ SCCS He at 315 psia (217 N/cm²)

MASS  0.23 lbm (0.10 kg)

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

QUALIFICATION STATUS  Apollo
PROPELLANT/FLUID  GHe
RATING, ABSOLUTE  12 μm

PRESSURE, OPERATING  1000 psia (689.4 N/cm²)
  PROOF  3500 psia (2413 N/cm²)
  BURST  7000 psia (4826 N/cm²)

RATED FLOW  40 SCFM He at 10 psid and 75 °F (1.9x10⁴ SCCS at 6.8 N/cm² and 23 °C)

THROUGHPUT

LEAKAGE, EXTERNAL

MASS  0.22 lbm (0.1 kg)

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

REMARDS

DATA SOURCE  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
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<thead>
<tr>
<th>MANUFACTURER</th>
<th>Vacco Industries</th>
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<td>PART NUMBER</td>
<td>S2-8846</td>
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<tr>
<td>DESCRIPTION</td>
<td>Inline gas filter assembly</td>
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<tr>
<td>QUALIFICATION STATUS</td>
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<tr>
<td>PROPELLANT/FLUID</td>
<td>GHe</td>
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<tr>
<td>RATING, ABSOLUTE</td>
<td>15 μm</td>
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<tr>
<td>PRESSURE, OPERATING</td>
<td>4000 psia (2757 N/cm²)</td>
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<tr>
<td>PROOF</td>
<td>5320 psia (3668 N/cm²)</td>
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<tr>
<td>BURST</td>
<td>8000 psia (5515 N/cm²)</td>
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<td>RATED FLOW</td>
<td>130 SCFM He at 2.8 psid and 65 °F (6.3x10⁴ SCCS at 1.9 N/cm² and 18 °C)</td>
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<td>THROUGHPUT</td>
<td></td>
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<td>LEAKAGE, EXTERNAL</td>
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<tr>
<td>MASS</td>
<td>0.43 lbm (0.19 kg)</td>
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<td>304 CRES, etched disc</td>
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<td>0.375-in. o.d. by 0.040-in. wall tube</td>
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<td>OPERATING TEMPERATURE RANGE</td>
<td>-65 to 160 °F (-53 to 71 °C)</td>
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<tr>
<td>VIBRATION, RANDOM</td>
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<td>SINE</td>
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<td>RELIABILITY</td>
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<tr>
<td>LEAD TIME</td>
<td>8 to 10 weeks in 1974</td>
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<td>COST</td>
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<td>REMARKS</td>
<td></td>
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</tbody>
</table>

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
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)
FILTER

MANUFACTURER  Wintec, Brunswick
PART NUMBER  11267-504
DESCRIPTION  Sintered metal-fiber element gas filter

QUALIFICATION STATUS  Viking
PROPELLANT/FLUID
RATING, ABSOLUTE  5 μm

PRESSURE, OPERATING  50 psia (35 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)
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
RELIABILITY
SHELF
LEAD TIME
COST

REMARKS

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

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

QUALIFICATION STATUS  USAF classified program
PROPELLANT/FLUID  GN₂
RATING, ABSOLUTE  25 μm (10 μm nom.)

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)
DIMENSIONS

MATERIAL, BODY 300 series CRES
    ELEMENT 300 series CRES

PORTS, INLET  MS 33656E4
    OUTLET  Same as inlet
MOUNTING

OPERATING TEMPERATURE RANGE  -100 to 160 °F

VIBRATION, RANDOM
SINE ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST

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
    AN818-12J
OUTLET

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)
| MANUFACTURER | Wintec, Brunswick |
| PART NUMBER | 14267-602 |
| DESCRIPTION | Wire-mesh element gas filter |
| QUALIFICATION STATUS | ERTS, NIMBUS |
| PROPELLANT/FLUID | |
| RATING, ABSOLUTE | 10 \( \mu \)m |
| PRESSURE, OPERATING | 2000 psia (1380 N/cm\(^2\)) |
| PROOF | |
| BURST | |
| DIFFERENTIAL | |
| RATED FLOW | 12 SCFM at 50 psia and 70 °F (5.6x10\(^3\) SCCS at 35 N/cm\(^2\) and 21 °C) |
| THROUGHPUT | |
| LEAKAGE, EXTERNAL | |
| MASS | |
| DIMENSIONS | |
| MATERIAL, BODY | |
| ELEMENT | 304 CRES wire mesh |
| PORTS, INLET | |
| | |
| 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) |
FILTER

MANUFACTURER  Wintec, Brunswick
PART NUMBER  15204-516
DESCRIPTION  Woven-wire element gas filter

QUALIFICATION STATUS  Apollo (qualified)
PROPELLANT/FLUID  GHe, NTO, Freon, other
RATING  ABSOLUTE  74 μm (33 μm nom.)

PRESSURE, OPERATING  186 psi
    PROOF  215 psi
    BURST
    DIFFERENTIAL

RATED FLOW  403 SCFM He at 186 psi and 60 °F (270 lbm/hr)
            1.9x10^5 SCCS He at 128 N/cm² and 15 °C

THROUGHPUT

LEAKAGE, EXTERNAL

MASS  1.5 lbm (0.68 kg)
DIMENSIONS

MATERIAL, BODY  300 series CRES
    ELEMENT  300 series CRES

PORTS, INLET
    OUTLET  1-in. tube

MOUNTING

OPERATING TEMPERATURE RANGE  65 to 275 °F

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYLE
SHELF
RELIABILITY
LEAD TIME
COST

REMARKS

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  N₂H₄
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 H₂O at 315 psid and 70 °F (1.04 kg/s H₂O 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)
MANUFACTURER     Wintec, Brunswick
PART NUMBER     15241-508
DESCRIPTION

QUALIFICATION STATUS     Apollo, AE
PROPELLANT/FLUID     UDMH, GN$_2$, GHe, deionized H$_2$O
RATING, ABSOLUTE     18 µm (5 µm nom.)

PRESSURE, OPERATING     250 psia (173 N/cm$^2$)
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)
**FILTER**

**MANUFACTURER**  Wintec, Brunswick
**PART NUMBER**  15241-526
**DESCRIPTION**  Woven-wire element liquid-propellant filter

**QUALIFICATION STATUS**  Apollo
**PROPELLANT/FLUID**  N₂H₄
**RATING, ABSOLUTE**  15 μm

**PRESSURE, OPERATING**  196 psia (135 N/cm²)
**PROOF**  390 psia (268 N/cm²)
**BURST**  515 psia (355 N/cm²)
**DIFFERENTIAL**

**RATED FLOW**  0.240 lbm/s (0.108 kg/s)

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

**MASS**  0.287 lbm (0.130 kg)
**DIMENSIONS**

**MATERIAL, BODY**  MC-999-0058
**ELEMENT**  300 series CRES

**PORTS, INLET**  0.631-in. o.d. tube
**OUTLET**  0.379-in. o.d. tube

**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)
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)

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
ELEMETNT  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
SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

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

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

MOUNTING

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

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<th>350 psi</th>
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<td>PROOF</td>
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<td>BURST</td>
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<tr>
<td>DIFFERENTIAL</td>
<td>0.50 psid</td>
</tr>
</tbody>
</table>

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: 15g
- SHOCK: 2500g

LIFE, SERVICE: 5 yr
CYLE
- SHELF

RELIABILITY
LEAD TIME
COST

REMARKS

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

<table>
<thead>
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<th>MANUFACTURER</th>
<th>Wintec, Brunswick</th>
</tr>
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<tbody>
<tr>
<td>PART NUMBER</td>
<td>15267-602</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td></td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Classified program</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td>Aerozine 50, GN₂, GHe, alcohol, Freon</td>
</tr>
<tr>
<td>RATING, ABSOLUTE</td>
<td>10 μm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>400 psia (276 N/cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>DIFFERENTIAL</td>
<td>2.00 psid</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RATED FLOW</th>
<th>2520 lbm/hr</th>
</tr>
</thead>
</table>

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

<p>| MASS |</p>
<table>
<thead>
<tr>
<th>DIMENSIONS</th>
</tr>
</thead>
</table>

| MATERIAL, BODY |
| ELEMENT |

| PORTS, INLET |
| OUTLET 0.50-in. tube |

| MOUNTING |

<table>
<thead>
<tr>
<th>OPERATING TEMPERATURE RANGE</th>
<th>40 to 140 °F</th>
</tr>
</thead>
</table>

| 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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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)
FILTER

MANUFACTURER Wirtec, Brunswick
PART NUMBER 15312-501-1
DESCRIPTION Woven-wire element liquid-propellant filter

QUALIFICATION STATUS USAF P95 satellite
PROPELLANT/FLUID N$_2$H$_4$
RATING, ABSOLUTE 25 µm

PRESSURE, OPERATING 415 psia (286 N/cm$^2$)
PROOF 915 psia (630 N/cm$^2$)
BURST 1215 psia (837 N/cm$^2$)
Differential

RATED FLOW 0.075 lbm/s N$_2$H$_4$ at 2 psid and 70 °F (0.034 kg/s at 1 N/cm$^2$ and 21 °C)

THROUGHPUT
LEAKAGE, EXTERNAL No GN$_2$ bubbles at 415 psia (286 N/cm$^2$) 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)
**DIFFERENTIAL**

**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

**OPERATING TEMPERATURE RANGE**

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

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

**DATA SOURCE**  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
| MANUFACTURER | Abex Corporation |
| PART NUMBER | AM3C |
| DESCRIPTION | Hydraulic pump |
| QUALIFICATION STATUS | Space shuttle (rudder/speed brake) |

| PROPELLANT/FLUID |
| PRESSURE, MAX INLET |
| MAX Outlet |
| RATIO |
| 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
<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Abex Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>AP05VC</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Multiple axial piston, single-stage, variable-volume pump</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Aircraft - Boeing 707, 727, 737; McDAC DC8; SNIAS A300, A310; etc.</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td>Hydraulic phosphate ester, MIL-H-5606, MIL-L-7808, MIL-H-83282</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRESSURE, MAX INLET</th>
<th>30 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX OUTLET</td>
<td>3000 psig</td>
</tr>
<tr>
<td>RATIO</td>
<td>100:1</td>
</tr>
<tr>
<td>KTED FLOW</td>
<td>4.4 GPM (16.7 L/min)</td>
</tr>
<tr>
<td>LE:KAGE, INTERNAL</td>
<td></td>
</tr>
<tr>
<td>MASS</td>
<td>1.9 lbm (0.86 kg)</td>
</tr>
<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 |

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<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Abex Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>AP27V</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Multiple axial piston, single-stage pump</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Shuttle orbiter and SRB</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td>Phosphate esters, MIL-H-560&lt;, MIL-L-7808, MIL-H-83282</td>
</tr>
<tr>
<td>PRESSURE, MAX INLET</td>
<td>50 psi</td>
</tr>
<tr>
<td>MAX OUTLET</td>
<td>3000 psi</td>
</tr>
<tr>
<td>RATIO</td>
<td>60:1</td>
</tr>
<tr>
<td>RATED FLOW</td>
<td>90 GPM (341 L/min)</td>
</tr>
<tr>
<td>LEAKAGE, INTERNAL</td>
<td></td>
</tr>
<tr>
<td>MASS</td>
<td>29.75 lbm (13.49 kg)</td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td>9.8 in. approximate length (25 cm)</td>
</tr>
<tr>
<td>MATERIAL, BODY</td>
<td></td>
</tr>
<tr>
<td>SEALS</td>
<td>INTEGRAL CHECK VALVE</td>
</tr>
<tr>
<td>PORTS, SIZE &amp; TYPE</td>
<td>MS 33649-20 (suction), -16 (outlet), -8 (case drain)</td>
</tr>
<tr>
<td>MOTOR, VOLTS</td>
<td>MS 33649-20</td>
</tr>
<tr>
<td>WATTS</td>
<td>POWER OUTPUT</td>
</tr>
<tr>
<td>ELECTRICAL CONNECTION</td>
<td>RPM 5000</td>
</tr>
<tr>
<td>RPM</td>
<td>5000</td>
</tr>
<tr>
<td>DUTY CYCLE</td>
<td></td>
</tr>
<tr>
<td>COOLING METHOD</td>
<td></td>
</tr>
<tr>
<td>MOUNTING</td>
<td>OPERATING TEMPERATURE RANGE</td>
</tr>
<tr>
<td>VIBRATION, RANDOM</td>
<td></td>
</tr>
<tr>
<td>SINE</td>
<td>ACCELERATION</td>
</tr>
<tr>
<td>SHOCK</td>
<td></td>
</tr>
<tr>
<td>LIFE, SERVICE</td>
<td>CYCLE</td>
</tr>
<tr>
<td>SHelf</td>
<td>RELIABILITY</td>
</tr>
<tr>
<td>LEAD TIME</td>
<td>COST</td>
</tr>
<tr>
<td>REMARKS</td>
<td>Motor is a separate item</td>
</tr>
</tbody>
</table>

DATA SOURCE  Abex product data sheet - 1984
<table>
<thead>
<tr>
<th><strong>COMPRESSOR/PUMP</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MANUFACTURER</strong> Bendix Fluid Power Division</td>
</tr>
<tr>
<td><strong>PART NUMBER</strong> 33E08-1</td>
</tr>
<tr>
<td><strong>DESCRIPTION</strong> Motor-driven, double-ended, nonlubricated piston</td>
</tr>
<tr>
<td><strong>QUALIFICATION STATUS</strong></td>
</tr>
<tr>
<td><strong>PROPELLANT/FLUID</strong> Air</td>
</tr>
<tr>
<td><strong>PRESSURE, MAX INLET</strong> 1 atm</td>
</tr>
<tr>
<td><strong>MAX OUTLET</strong> 20 psig</td>
</tr>
<tr>
<td><strong>RATIO</strong> 2.36:1</td>
</tr>
<tr>
<td><strong>RATED FLOW</strong> 3 CFM</td>
</tr>
<tr>
<td><strong>LEAKAGE, INTERNAL</strong></td>
</tr>
<tr>
<td><strong>MASS</strong> 13 lbm</td>
</tr>
<tr>
<td><strong>DIMENSIONS</strong></td>
</tr>
<tr>
<td><strong>MATERIAL, BODY</strong></td>
</tr>
<tr>
<td><strong>SEALS</strong> TFE (piston)</td>
</tr>
<tr>
<td><strong>INTEGRAL CHECK VALVE</strong></td>
</tr>
<tr>
<td><strong>PORTS, SIZE &amp; TYPE</strong></td>
</tr>
<tr>
<td><strong>MOTOR, VOLTS</strong> 25 to 31 Vdc</td>
</tr>
<tr>
<td><strong>WATTS</strong> 527</td>
</tr>
<tr>
<td><strong>POWER OUTPUT</strong></td>
</tr>
<tr>
<td><strong>ELECTRICAL CONNECTION</strong></td>
</tr>
<tr>
<td><strong>RPM</strong></td>
</tr>
<tr>
<td><strong>DUTY CYCLE</strong> Continuous</td>
</tr>
<tr>
<td><strong>COOLING METHOD</strong></td>
</tr>
<tr>
<td><strong>MOUNTING</strong></td>
</tr>
<tr>
<td><strong>OPERATING TEMPERATURE RANGE</strong> -25 to 125 °F</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> 1000 hr</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> Designed for operation at 10,000-ft altitude max.,</td>
</tr>
<tr>
<td>integral relief 15 to 25 psi</td>
</tr>
<tr>
<td><strong>DATA SOURCE</strong> Bendix product data sheet - 1985</td>
</tr>
<tr>
<td><strong>COMPRESSOR/PUMP</strong></td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<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>
</tbody>
</table>

| **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 |

<p>| <strong>DATA SOURCE</strong> | Lexair product data sheet - 1985 |</p>
<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Metal Bellows Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>DX27312</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Three-stage bellows gas compressor</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Not qualified; MORL research</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td></td>
</tr>
<tr>
<td>PRESSURE, MAX INLET</td>
<td>30 psia</td>
</tr>
<tr>
<td></td>
<td>MAX OUTLET 300 psia</td>
</tr>
<tr>
<td>RATIO</td>
<td>10:1</td>
</tr>
<tr>
<td>RATED FLOW</td>
<td>0.5 SCFM min.</td>
</tr>
<tr>
<td>LEAKAGE, INTERNAL</td>
<td></td>
</tr>
<tr>
<td>MASS</td>
<td>25 lbm</td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td></td>
</tr>
<tr>
<td>MATERIAL, BODY</td>
<td></td>
</tr>
<tr>
<td>SEALS</td>
<td></td>
</tr>
<tr>
<td>INTEGRAL CHECK VALVE</td>
<td></td>
</tr>
<tr>
<td>PORTS, SIZE &amp; TYPE</td>
<td></td>
</tr>
<tr>
<td>MOTOR, VOLTS</td>
<td>200 V (three phase)</td>
</tr>
<tr>
<td>WATTS</td>
<td>700 max.</td>
</tr>
<tr>
<td>POWER OUTPUT</td>
<td>0.38 hp</td>
</tr>
<tr>
<td>ELECTRICAL CONNECTION</td>
<td></td>
</tr>
<tr>
<td>RPM</td>
<td>3700</td>
</tr>
<tr>
<td>DUTY CYCLE</td>
<td></td>
</tr>
<tr>
<td>COOLING METHOD</td>
<td></td>
</tr>
<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>
<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>Four units $39,175 in 1972 (including $22,500 engineering)</td>
</tr>
<tr>
<td>REMARKS</td>
<td>Motors are no longer available; design modification necessary</td>
</tr>
<tr>
<td>DATA SOURCE</td>
<td>Metal Bellows drawing DX27312 - 1973</td>
</tr>
</tbody>
</table>
**COMPRESSOR/PUMP**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Metal Bellows Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>D41609</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Single-stage, bellows gas pump</td>
</tr>
</tbody>
</table>

**QUALIFICATION STATUS**

| PROPELLANT/FLUID    | neon                   |

**PRESSURE, MAX INLET**

| MAX OUTLET          |                         |
| RATIO               | 2.6:1 (estimated based on 24 psid) |

**RATED FLOW LEAKAGE, INTERNAL**

| MASS                | 7 lbm                  |

**DIMENSIONS**

| MATERIAL, BODY      |                         |
| SEALS               |                         |
| INTEGRAL CHECK VALVE|                         |
| PORTS, SIZE & TYPE  | SS-400-1-2 (inlet); SS-400-2-2 (outlet) |

**MOTOR, VOLTS**

| WATTS               | 12 max. average         |
| ELECTRICAL CONNECTION|                       |
| RPM                 | 0 to 3000               |

**DUTY CYCLE**

| CONTINUOUS/24 hr; 1000 cycles |

**COOLING METHOD**

| OPERATING TEMPERATURE RANGE | -20 to 70 °C (-4 to 158 °F) |

**VIBRATION, RANDOM**

| SINE ACCELERATION       | ±15g                    |
| SHOCK                   |                         |

**LIFE, SERVICE**

| 2 to 4 yr |

**CYCLE**

| SHELFL |

**RELIABILITY**

| LEAD TIME |

**COST**

| REMARKS |

**DATA SOURCE**

| Metal Bellows drawing D41609 - 1985 |
COMPRESSOR/PUMP

MANUFACTURER  Moog Inc.
PART NUMBER  Model 50-503
DESCRIPTION  Circulator pump

QUALIFICATION STATUS  Peacekeeper - inertial measurement unit

PROPELLANT/FLUID  FC-77

PRESSURE, MAX INLET
   MAX OUTLET (Rise) 19 psid
   RATIO  2.3:1 (from 1 atm)

RATED FLOW  1.0 GPM at 19 psid

LEAKAGE, INTERNAL

MASS

DIMENSIONS  2.726 by 2.001 by 2.59 in.

MATERIAL, BODY  Al alloy
   SEALS  Viton
   INTEGRAL CHECK VALVE

PORTS, SIZE & TYPE

MOTOR, VOLTS  40
   WATTS  110
   POWER OUTPUT
   ELECTRICAL CONNECTION
   RPM  24,000

DUTY CYCLE

COOLING METHOD

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
   SINE

SHOCK

LIFE, SERVICE  10 yr
   CYCLE  4000
   SHELF

RELIABILITY  40 failures per million operating hours

LEAD TIME

COST

REMARKS  Alternative motor possible

DATA SOURCE  Moog Model 50-503 Circulator Pump Rev A
             (Product description report) - 1985
**PRESSURE SWITCH**

**MANUFACTURER** Consolidated Controls Corporation

**PART NUMBER** 21SN04-22

**DESCRIPTION**

**QUALIFICATION STATUS** Satellite (Walter Kidde)

**PROPELLANT/FLUID**

<table>
<thead>
<tr>
<th>PRESSURE, OFF</th>
<th>18±2 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESET</td>
<td>12 psig min.</td>
</tr>
</tbody>
</table>

**MAX OPERATING**

<table>
<thead>
<tr>
<th>PROOF</th>
<th>50 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>BURST</td>
<td>75 psig</td>
</tr>
</tbody>
</table>

**DUTY CYCLE**

**MASS**

**DIMENSIONS**

**MATERIAL**

<table>
<thead>
<tr>
<th>PORT, SIZE &amp; TYPE</th>
<th>0.736-in.-diam special plug</th>
</tr>
</thead>
</table>

**VOLTAGE**

<table>
<thead>
<tr>
<th>VOLTAGE</th>
<th>28±5 to 5.5 Vdc</th>
</tr>
</thead>
</table>

**WATTS**

<table>
<thead>
<tr>
<th>WATTS</th>
<th>66</th>
</tr>
</thead>
</table>

**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**

<table>
<thead>
<tr>
<th>CYCLE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SHELF</td>
<td></td>
</tr>
</tbody>
</table>

**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

---

---

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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
SHELF
RELIABILITY
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**

<table>
<thead>
<tr>
<th>PRESSURE, OFF</th>
<th>0.75 to 40 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESET</td>
<td></td>
</tr>
<tr>
<td>MAX OPERATING</td>
<td>80 psig</td>
</tr>
<tr>
<td>PROOF</td>
<td>120 psig</td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
</tbody>
</table>

**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
## PRESSURE SWITCH

**MANUFACTURER** Consolidated Controls Corporation

**PART NUMBER** 212C50-54H

**DESCRIPTION**

**QUALIFICATION STATUS** Peacekeeper (United Technologies Chemical Systems Division)

**PROPELLANT/FLUID** Freon 12

<table>
<thead>
<tr>
<th>PRESSURE, OFF</th>
<th>9.25 psia</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESET</td>
<td>0.5 psia min.</td>
</tr>
<tr>
<td>MAX OPERATING</td>
<td>220 psia</td>
</tr>
<tr>
<td>PROF</td>
<td>300 psia</td>
</tr>
<tr>
<td>BURST</td>
<td>485 psia</td>
</tr>
</tbody>
</table>

**DUTY CYCLE**

**MASS**

**DIMENSIONS** 4.38 by 2.25 by 1.28 in.

**MATERIAL**

**PORT, SIZE & TYPE**

**VOLTAGE** 28 Vdc

**WATTS** 112

**ELECTRICAL CONNECTION** Mates w/ G&H Technology P/N BLG6F11-5SN

**MOUNTING**

**OPERATING TEMPERATURE RANGE** 23 to 121 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE** 100 min

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS** $1 \times 10^{-7}$ SCCS He at 220 psia leakage

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

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>ITT Neo-Dyn</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>1103P, 1173P, and 1193P</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Welded diaphragm type, pneumatic, hydraulic</td>
</tr>
</tbody>
</table>

**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 MAX</td>
<td>OPERATING PROOF 300 psig for 1103P and 1193P, 100 psig for 1173P</td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
</tbody>
</table>

**DUTY CYCLE**

<table>
<thead>
<tr>
<th>MASS</th>
<th>0.13 lbm</th>
</tr>
</thead>
</table>

**DIMENSIONS**

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>CRES PORT, SIZE &amp; TYPE MS 33656E4</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLTAGE</td>
<td>28 Vdc rated</td>
</tr>
<tr>
<td>WATTS</td>
<td>196 (28 for 1193P)</td>
</tr>
</tbody>
</table>

**ELECTRICAL CONNECTION**

**MOUNTING**

**OPERATING TEMPERATURE RANGE**

| -65 to 275 °F ambient |

**VIBRATION, RANDOM**

| SINE | j to 2000 Hz; 0 to 15g |

**ACCELERATION**

| 25 to 50g |

**LIFE, SERVICE**

<table>
<thead>
<tr>
<th>CYCLE</th>
<th>75,000 to 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHELF</td>
<td></td>
</tr>
</tbody>
</table>

**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 electricals

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
SHELFD
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE_ Systron Donner product data sheet - 1986
## PRESSURE SWITCH

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Systron Donner, Edcliff</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>4-902</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Strain gage, N.O.</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td></td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td></td>
</tr>
<tr>
<td>PRESSURE, OFF</td>
<td>0 to 5000 psia/psig</td>
</tr>
<tr>
<td>RESET</td>
<td></td>
</tr>
<tr>
<td>MAX OPERATING</td>
<td>0 to 5000 psia/psig</td>
</tr>
<tr>
<td>PROOF</td>
<td>2X max.</td>
</tr>
<tr>
<td>BURST</td>
<td>5X max.</td>
</tr>
<tr>
<td>DUTY CYCLE</td>
<td></td>
</tr>
<tr>
<td>MASS</td>
<td>0.75 lbm (0.34 kg)</td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td>1.50-in. hex by 3.60 in. less port (3.81 by 9.14 cm)</td>
</tr>
<tr>
<td>MATERIAL</td>
<td>17-7PH CRES</td>
</tr>
<tr>
<td>PORT, SIZE &amp; TYPE</td>
<td>AN893-4S modified</td>
</tr>
<tr>
<td>VOLTAGE</td>
<td>32 Vdc; 28 Vdc nom.</td>
</tr>
<tr>
<td>WATTS</td>
<td></td>
</tr>
<tr>
<td>ELECTRICAL CONNECTION</td>
<td>PT1H-8-4P</td>
</tr>
<tr>
<td>MOUNTING</td>
<td></td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td>-58 to 248 °F (-50 to 120 °C)</td>
</tr>
<tr>
<td>VIBRATION, RANDOM</td>
<td></td>
</tr>
<tr>
<td>SINE</td>
<td>50g peak to 2000 Hz</td>
</tr>
<tr>
<td>ACCELERATION</td>
<td>100g</td>
</tr>
<tr>
<td>SHOCK</td>
<td>100g for 11 ms</td>
</tr>
<tr>
<td>LIFE, SERVICE</td>
<td></td>
</tr>
<tr>
<td>CYCLE</td>
<td>1x10⁹</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>Systron Donner product data sheet - 1936</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>Inline</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUALIFICATION STATUS</td>
<td>DOD qualified</td>
</tr>
<tr>
<td><strong>PROPELLANT/FLUID</strong></td>
<td>Pneumatic</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PRESSURE, OPERATING</strong></th>
<th>300 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CRACKING</strong></td>
<td>1.0 psid min.</td>
</tr>
<tr>
<td><strong>PROOF</strong></td>
<td>750 psig</td>
</tr>
<tr>
<td><strong>BURST</strong></td>
<td>1500 psig</td>
</tr>
<tr>
<td><strong>RATED FLOW</strong></td>
<td>4.0 SCFM (FEOD - 0.11 in.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>LEAKAGE</strong>, INTERNAL</th>
<th>Zero at 2.5 to 750 psid</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXTERNAL</strong></td>
<td>Zero at 300 psig</td>
</tr>
<tr>
<td><strong>MASS</strong></td>
<td>0.88 lbm</td>
</tr>
<tr>
<td><strong>DIMENSIONS</strong></td>
<td>1.54 by 0.68 in. hex</td>
</tr>
<tr>
<td><strong>MATERIAL, BODY</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SEAT/SEAL</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SPRING</strong></td>
<td></td>
</tr>
<tr>
<td><strong>PORTS, SIZE &amp; TYPE</strong></td>
<td>MS 3365G4 (inlet)</td>
</tr>
</tbody>
</table>

| **MOUNTING** |  |

<table>
<thead>
<tr>
<th><strong>OPERATING TEMPERATURE RANGE</strong></th>
<th>-65 to 185 °F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VIBRATION, RANDOM</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SINE</strong></td>
<td></td>
</tr>
<tr>
<td><strong>ACCELERATION</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SHOCK</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>LIFE, SERVICE</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CYCLE</strong></td>
<td>50,000 min</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></td>
</tr>
<tr>
<td><strong>COST</strong></td>
<td></td>
</tr>
<tr>
<td><strong>REMARKS</strong></td>
<td></td>
</tr>
</tbody>
</table>

**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** $O_2, N_2$

**PRESSURE, OPERATING** 0 to 1250 psig

**CRACKING**

**PROOF** 1875 psig

**BURST** 2500 psig

**RATED FLOW** 75 lbm/hr at 100 psig, at 2 psid

**LEAKAGE, INTERNAL** 0.2 SCCM at 10 to 1250 psid

**EXTERNAL** 0.2 SCCM

**MASS** 0.184 lbm

**DIMENSIONS**

**MATERIAL, BODY**

**SEAT/SEAL**

**SPRING**

**PORTS, SIZE & TYPE**

**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

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CHECK VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  H249T1-4TT(L)

DESCRIPTION
QUALIFICATION STATUS  Saturn V (Martin Marietta)

PROPELLANT/FLUID

PRESSURE, OPERATING  6000 psi
CRACKING
PROOF
BURST

RATED FLOW

LEAKAGE, INTERNAL
EXTERNAL

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 AND10050-16

MOUNTING

OPERATING TEMPERATURE RANGE -65 to 250 °F

VIBRATION, RANDOM SINE

ACCELERATION SHOCK

LIFE, SERVICE CYCLE

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE Aerospace Corporation report (ref. 10)
**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>
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</thead>
<tbody>
<tr>
<td>CRACKING</td>
<td></td>
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<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
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</tr>
</tbody>
</table>

**RATED FLOW**

**LEAKAGE, INTERNAL**

**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 33656-8 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)  

177
**CHECK VALVE**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Circle Seal Controls, Brunswick</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>HP280T-4TF4 (Aerojet P/N 1159059)</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td></td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Delta/E, Delta/F (Aerojet)</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td></td>
</tr>
<tr>
<td>PRESSURE, OPERATING</td>
<td>4500 psi</td>
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<td>CRACKING</td>
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<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
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</tr>
<tr>
<td>RATED FLOW</td>
<td></td>
</tr>
<tr>
<td>LEAKAGE, INTERNAL</td>
<td></td>
</tr>
<tr>
<td>EXTERNAL</td>
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<tr>
<td>MASS</td>
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</tr>
<tr>
<td>DIMENSIONS</td>
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</tr>
<tr>
<td>MATERIAL, BODY</td>
<td>303 CRES</td>
</tr>
<tr>
<td>BODY/SEAL/SPRING</td>
<td>Teflon/302 CRES</td>
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<tr>
<td>PORTS, SIZE &amp; TYPE</td>
<td>MS 33656-4</td>
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<tr>
<td>MOUNTING</td>
<td></td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td>-320 to 400 °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>
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<tr>
<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>
<td></td>
</tr>
<tr>
<td>DATA SOURCE</td>
<td>Aerospace Corporation report (ref. 10)</td>
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</table>

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## CHECK VALVE

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

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>QUALIFICATION STATUS  Atlas propulsion control box (General Dynamics)</td>
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**PROPELLANT/FLUID**

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<th>PRESSURE, OPERATING 3000 psi</th>
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<td>BURST</td>
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**RATED FLOW**

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

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

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

**MOUNTING**

| OPERATING TEMPERATURE RANGE -320 to 400 °F |

**VIBRATION, RANDOM SINE**

<table>
<thead>
<tr>
<th>ACCELERATION</th>
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<tr>
<td>SHOCK</td>
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**LIFE, SERVICE CYCLE**

<table>
<thead>
<tr>
<th>RELIABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEAD TIME</td>
</tr>
<tr>
<td>COST</td>
</tr>
</tbody>
</table>

**REMARKS**

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

179
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

PRESSURE, OPERATING  2500 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 33656-16

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)
**CHECK VALVE**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Circle Seal Controls, Brunswick</th>
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</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>P1-602, P2-602 (Bell P/N 8247-472065, -472070)</td>
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</table>

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>QUALIFICATION STATUS</th>
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<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
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<table>
<thead>
<tr>
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<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>RATED FLOW</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEAKAGE, INTERNAL</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTERNAL</td>
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<table>
<thead>
<tr>
<th>MASS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DIMENSIONS</td>
<td></td>
</tr>
<tr>
<td>MATERIAL, BODY</td>
<td>347 CRES (for P1), 2024-T351 (for P2)</td>
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<tr>
<td>SEAT/SEAL</td>
<td>Teflon (for P1), Butyl (for P2)</td>
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<tr>
<td>SPRING</td>
<td>302 CRES</td>
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<table>
<thead>
<tr>
<th>PORTS, SIZE &amp; TYPE</th>
<th>MS 24385-5, MS 24385-4, MS 24386-4</th>
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<table>
<thead>
<tr>
<th>MOUNTING</th>
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<table>
<thead>
<tr>
<th>OPERATING TEMPERATURE RANGE</th>
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<table>
<thead>
<tr>
<th>VIBRATION, RANDOM</th>
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</thead>
<tbody>
<tr>
<td>SINE</td>
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<table>
<thead>
<tr>
<th>ACCELERATION</th>
<th></th>
</tr>
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<tbody>
<tr>
<td>SHOCK</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>LIFE, SERVICE</th>
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</tr>
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<tbody>
<tr>
<td>CYCLE</td>
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<tr>
<td>SHELF</td>
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<td>RELIABILITY</td>
<td></td>
</tr>
<tr>
<td>LEAD TIME</td>
<td></td>
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<tr>
<td>COST</td>
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<table>
<thead>
<tr>
<th>REMARKS</th>
<th></th>
</tr>
</thead>
</table>

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

**MANUFACTURER**  Circle Seal Controls, Brunswick  
**PART NUMBER**  P3-319 (Gen. Dyn. P/N GD/A27-08565-1)

**DESCRIPTION**

**QUALIFICATION STATUS**  Atlas vernier solo system (General Dynamics)

**PROPELLANT/FLUID**

**PRESSURE, OPERATING**  120 psig

**CRACKING**

**PROOF**

**BURST**

**RATED FLOW**

**LEAKAGE, INTERNAL**

**EXTERNAL**

**MASS**

**DIMENSIONS**

**MATERIAL, BODY**  2024-T351

**SEAT/SEAL**  Buna-N

**SPRING**  302 CRES

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

**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)
**CHECK VALVE**

**Manufacturers**
- 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**
- 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
EXTERNAL

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
CYCLE
SHELF
RELIABILITY
LEAD TIME
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**

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<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>1000 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRACKING</td>
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</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, AND10050-8  

**MOUNTING**

**OPERATING TEMPERATURE RANGE**  -100 to 165 °F  

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

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

186
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 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)

187
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

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
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<tbody>
<tr>
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<tr>
<td>BURST</td>
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</table>

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)
**CHECK VALVE**

**MANUFACTURER** Circle Seal Controls, Brunswick

**PART NUMBER** P24-698 (Aerojet P/N 1181725)

**DESCRIPTION**

**QUALIFICATION STATUS** Space shuttle OMS

**PROPELLANT/FLUID**

**PRESSURE, OPERATING** 500 psig

**CRACKING**

**PROOF**

**BURST**

**RATED FLOW**

**LEAKAGE, INTERNAL**

**EXTERNAL**

**MASS**

**DIMENSIONS**

**MATERIAL, BODY** 304 CRES

**SEAT/SEAL** Butyl

**SPRING** 302 CRES

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

**MOUNTING**

**OPERATING TEMPERATURE RANGE** -65 to 280 °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**  P25-180 (Gen. Dyn. P/N 55-02446)

**DESCRIPTION**

**QUALIFICATION STATUS**  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)
**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

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<tbody>
<tr>
<td>PART NUMBER</td>
<td>P45-220 (Hughes P/N 287278, 254207)</td>
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**DESCRIPTION**

<table>
<thead>
<tr>
<th>QUALIFICATION STATUS</th>
<th>Surveyor satellite vernier engine (Hughes Aircraft)</th>
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<tbody>
<tr>
<td>PROPELLANT/FLUID</td>
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</table>

**PRESSURE, OPERATING 1150 psig**

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**RATED FLOW**

<table>
<thead>
<tr>
<th>LEAKAGE, INTERNAL</th>
<th>EXTERNAL</th>
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**MASS**

<table>
<thead>
<tr>
<th>DIMENSIONS</th>
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<th>MATERIAL, BODY</th>
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<td>302 CRES</td>
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</table>

<table>
<thead>
<tr>
<th>PORTS, SIZE &amp; TYPE</th>
</tr>
</thead>
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**MOUNTING**

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

<table>
<thead>
<tr>
<th>ACCELERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHOCK</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>LIFE, SERVICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CYCLE</td>
</tr>
<tr>
<td>SHELF</td>
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</table>

<table>
<thead>
<tr>
<th>RELIABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEAD TIME</td>
</tr>
<tr>
<td>COST</td>
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<table>
<thead>
<tr>
<th>REMARKS</th>
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**DATA SOURCE** Aerospace Corporation report (ref. 10)
<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
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<tbody>
<tr>
<td>MANUFACTURER</td>
<td>Circle Seal Controls, Brunswick</td>
</tr>
<tr>
<td>PART NUMBER</td>
<td>P64-344 (Boeing P/N 10-20387)</td>
</tr>
<tr>
<td>DESCRIPTION</td>
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<tr>
<td>QUALIFICATION STATUS</td>
<td>Boeing project</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td>LH₂</td>
</tr>
<tr>
<td>PRESSURE, OPERATING</td>
<td>130 psi</td>
</tr>
<tr>
<td>CRACKING</td>
<td></td>
</tr>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</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>Teflon</td>
</tr>
<tr>
<td>SPRING</td>
<td>17-7PH CRES</td>
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<tr>
<td>PORTS, SIZE &amp; TYPE</td>
<td>MS 33656-6</td>
</tr>
<tr>
<td>MOUNTING</td>
<td></td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td>-424 to 160 °F</td>
</tr>
<tr>
<td>VIBRATION, RANDOM</td>
<td></td>
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<tr>
<td>SINE</td>
<td></td>
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<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>
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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></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>75 psi</th>
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</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, EXTERNAL

MASS

DIMENSIONS

<table>
<thead>
<tr>
<th>MATERIAL, BODY</th>
<th>Al alloy</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>

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  119T1-1PP-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)
MANUFACTURER: Circle Seal Controls, Brunswick  

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: 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**: 3000 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 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)
CHECK VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  264T2-8TT-25, -16TT-5 (Bell P/N 7161-472070, -25)

DESCRIPTION

QUALIFICATION STATUS  Lunar Landing Research Vehicle
(Bell Aerospace)

PROPELLANT/FLUID  H2O2

PRESSURE, OPERATING  3000 psig
CRACKING
PROOF
BURST

RATED FLOW

LEAKAGE, INTERNAL
EXTERNAL

MASS

DIMENSIONS

MATERIAL, BODY  347 CRES
SEAT/SEAL  Fluorosilicone
SPRING  302 CRES

PORTS, SIZE & TYPE  MS 336565-8, -16

MOUNTING

OPERATING TEMPERATURE RANGE  -80 to 350 °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  859T-8TT

DESCRIPTION

QUALIFICATION STATUS  Apollo (Martin Marietta)

PROPELLANT/FLUID

PRESSURE, OPERATING  600 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  MS 336565-8

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** 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 33656-8, -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)

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>QUALIFICATION STATUS</th>
<th>PROPELLANT/FLUID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nike</td>
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<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>250 psig</th>
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<tbody>
<tr>
<td>CRACKING</td>
<td></td>
</tr>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>RATED FLOW</td>
<td></td>
</tr>
</tbody>
</table>

| LEAKAGE, INTERNAL    |          |
| EXTERNAL             |          |

| MASS |
| DIMENSIONS |
| MATERIAL, BODY  Brass |
| SEAT/SEAL  Buna-N |
| SPRING  302 CRES |

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

| MOUNTING |

<table>
<thead>
<tr>
<th>OPERATING TEMPERATURE RANGE</th>
<th>-65 to 260 °F</th>
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</table>

<table>
<thead>
<tr>
<th>VIBRATION, RANDOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINE</td>
</tr>
</tbody>
</table>

| SHOCK |

<table>
<thead>
<tr>
<th>LIFE, SERVICE</th>
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<tbody>
<tr>
<td>CYCLE</td>
</tr>
<tr>
<td>SHELF</td>
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<table>
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<tr>
<th>RELIABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEAD TIME</td>
</tr>
<tr>
<td>COST</td>
</tr>
<tr>
<td>REMARKS</td>
</tr>
</tbody>
</table>

DATA SOURCE  Aerospace Corporation report (ref. 10)

203
CHECK VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  2633A-4TT (GE P/N R3447)

DESCRIPTION

QUALIFICATION STATUS  BIOSAT capsule reentry system (General Electric)

PROPELLANT/FLUID

PRESSURE, OPERATING  3000 psig
CRACKING
PROOF
BURST

RATED FLOW

LEAKAGE, INTERNAL
EXTERNAL

MASS
DIMENSIONS

MATERIAL, BODY  2024-T4 Al alloy
SEAT/SEAL  Neoprene
SPRING  302 CRES

PORTS, SIZE & TYPE  MS 33656-4

MOUNTING

OPERATING TEMPERATURE RANGE  -40 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**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Circle Seal Controls, Brunswick</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>8524T-6BB (Ham. Stan. P/N SVK85341-1)</td>
</tr>
</tbody>
</table>

**DESCRIPTION**

**QUALIFICATION STATUS** Space shuttle ECS (Hamilton Standard)

**PROPELLANT/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)
CHECK VALVE

MANUFACTURER: Circle Seal Controls, Brunswick
PART NUMBER: 8538A-16BB-9 (M.M. P/N 47E368-1)

DESCRIPTION
QUALIFICATION STATUS: Viking (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: Butyl
SPRING: 302 CRES

PORTS, SIZE & TYPE: AND10050-16

MOUNTING

OPERATING TEMPERATURE RANGE: -40 to 100 °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>
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<tbody>
<tr>
<td><strong>MANUFACTURER</strong> Futurecraft Corporation</td>
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<tr>
<td><strong>PART NUMBER</strong> 60616-19A</td>
</tr>
<tr>
<td><strong>DESCRIPTION</strong> Pneumatic, cartridge</td>
</tr>
<tr>
<td><strong>QUALIFICATION STATUS</strong> Space shuttle OMS engine (Aerojet)</td>
</tr>
<tr>
<td><strong>PROPELLANT/FLUID</strong> N₂ or MMH</td>
</tr>
<tr>
<td><strong>PRESSURE, OPERATING</strong> 0 to 450 psig</td>
</tr>
<tr>
<td><strong>CRACKING</strong> 6.0 psig max. (reseat, 1.0 psig min.)</td>
</tr>
<tr>
<td><strong>PROOF</strong> 900 psig</td>
</tr>
<tr>
<td><strong>BURST</strong> 1800 psig</td>
</tr>
<tr>
<td><strong>RATED FLOW</strong> 0.02 to 0.05 lbm/s min. FEOD = 0.135 in. diam</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> 0.845 in. by 0.499 in. diam</td>
</tr>
<tr>
<td><strong>MATERIAL, BODY</strong> 304L CRES</td>
</tr>
<tr>
<td><strong>SEAT/SEAL</strong> Butyl</td>
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<tr>
<td><strong>SPRING</strong> 302/304 CRES</td>
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<tr>
<td><strong>PORTS, SIZE &amp; TYPE</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>
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<td><strong>SHOCK</strong></td>
</tr>
<tr>
<td><strong>LIFE, SERVICE</strong></td>
</tr>
<tr>
<td><strong>CYCLE</strong></td>
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<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> Futurecraft drawing 60616 - 1985</td>
</tr>
</tbody>
</table>

207
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  O2

PRESSURE, MAX  5 psia  O2 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

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**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Carleton Technologies, Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>2664-0001-11</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Cabin pressure decay sensor</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Space shuttle ARPCS</td>
</tr>
</tbody>
</table>

**PROPELLANT/FLUID**  Air

**PRESSURE, MAX** 18 psia  
**MIN** 8 psia  
**PROOF** 24 psia  
**BURST** 36 psia

**MASS** 3.64 D  
**DIMENSIONS**

**MATERIAL**

<table>
<thead>
<tr>
<th>PORT, SIZE &amp; TYPE</th>
<th>VOLTAGE, INPUT 24 to 32 Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WATTS 1.96 at 28 Vdc</td>
</tr>
</tbody>
</table>

**SIGNAL ELECTRICAL CONNECTION**

**MOUNTING**

**OPERATING TEMPERATURE RANGE** 35 to 120 °F

**VIBRATION, RANDOM**

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

**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>
</table>

**DATA SOURCE** Carleton product data sheet - 1987

210
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

PRESSURE, MAX 20 psig
MIN 0 psig
PROOF 30 psig
BURST 60 psig
MASS 0.89 lbm

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
MANUFACTURER  Carleton Technologies, Inc.
PART NUMBER  2732-0001-1
DESCRIPTION
QUALIFICATION STATUS  Space shuttle ARPCS
PROPELLANT/FLUID  O₂

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
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

SUCCESSORS

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**

**MANUFACTURER** Carleton Technologies, Inc.

**PART NUMBER** 2767-0001-1

**DESCRIPTION** Pressure gauge

**QUALIFICATION STATUS** Space shuttle ARPCS

**PROPELLANT/FLUID** O₂, air

<table>
<thead>
<tr>
<th>PRESSURE, MAX</th>
<th>20 psid</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN</td>
<td>0 psid</td>
</tr>
</tbody>
</table>

**PROOF**

**BURST**

**MASS** 1.0 lbm

**DIMENSIONS**

**MATERIAL, PORT, SIZE & TYPE**

**VOLTAGE, INPUT**

**WATTS**

**SIGNAL**

**ELECTRICAL CONNECTION**

**MOUNTING**

**OPERATING TEMPERATURE RANGE** -65 to 120 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS** Leakage, 5.0 SCCM max.

**DATA SOURCE** Carleton product data sheet - 1987

---

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**PRESSURE TRANSDUCER/GAGE**

**MANUFACTURER**  CEC Instruments, Transamerica Delaval  
**PART NUMBER**  CEC 1000 series  
**DESCRIPTION**  Sputtered thin film  
**QUALIFICATION STATUS**  
**PROPELLANT/FLUID**  

<table>
<thead>
<tr>
<th>PRESSURE, MAX</th>
<th>15 to 10,000 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>
</tbody>
</table>

| 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

MANUFACTURER CEC Instruments, Transamerica Delaval
PART NUMBER CEC 2200 A/G
DESCRIPTION Diffused semiconductor type
QUALIFICATION STATUS

PROPELLANT/FLUID

PRESSURE, MAX 15 to 6000 psi
MIN 0 psi
PROOF 2X rated max.
BURST 3X rated max.

MASS 0.38 lbm
DIMENSIONS 3.87 in. (less connect) by 1.01 in. diam (9.81 cm by 2.57 cm diam)
MATERIAL 17-4PH CRES
PORT, SIZE & TYPE 1/4-18 NPT male
VOLTAGE, INPUT 40 mV full range
WATT'
SIGNAL ELECTRICAL CONNECTION PT1H-10-6P
MOUNTING

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**

**MANUFACTURER**  CEC Instruments, Transamerica Delaval  
**PART NUMBER**  CEC 3000 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**  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  PTIH-10-6P (101) (Bendix)

MOUNTING

OPERATING TEMPERATURE RANGE  -65 to 250 °F

VIBRATION, RANDOM
  SINE  35g peak at 5 to 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
<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Consolidated Controls Corporation</th>
</tr>
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<tbody>
<tr>
<td>PART NUMBER</td>
<td>41SG78-7</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td></td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Space shuttle RCS (Marquardt)</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td>NTO, MMH, He</td>
</tr>
<tr>
<td>PRESSURE, MAX</td>
<td>200 psia</td>
</tr>
<tr>
<td>MIN</td>
<td>0 psia</td>
</tr>
<tr>
<td>PROOF</td>
<td>3000 psia</td>
</tr>
<tr>
<td>BURST</td>
<td>10,000 psia</td>
</tr>
<tr>
<td>MASS</td>
<td>0.4 lbm</td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td>2.27 in. by 1.00 in. diam plus base</td>
</tr>
<tr>
<td>MATERIAL</td>
<td></td>
</tr>
<tr>
<td>PORT, SIZE &amp; TYPE</td>
<td>At mount</td>
</tr>
<tr>
<td>VOLTAGE, INPUT</td>
<td></td>
</tr>
<tr>
<td>WATTS</td>
<td></td>
</tr>
<tr>
<td>SIGNAL</td>
<td>300 mV/V sensitivity; 1000 Ω</td>
</tr>
<tr>
<td>ELECTRICAL CONNECTION</td>
<td>MP572-0306-0003 lead wires</td>
</tr>
<tr>
<td>MOUNTING</td>
<td>Four 0.205-in.-diam holes at 0.45 by 1.375-in. flange mount</td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td>30 to 300 °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>
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<tr>
<td>CYCLE</td>
<td></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>
<tr>
<td>DATA SOURCE</td>
<td>Consolidated Controls drawing R41SG78-7 - 1985</td>
</tr>
</tbody>
</table>
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
<table>
<thead>
<tr>
<th><strong>PART NUMBER</strong></th>
<th>41SG86-21,-22,-31,-32,-41,-42</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MANUFACTURER</strong></td>
<td>Consolidated Controls Corporation</td>
</tr>
<tr>
<td><strong>DESCRIPTION</strong></td>
<td>Space shuttle (Rocketdyne)</td>
</tr>
</tbody>
</table>

**QUALIFICATION STATUS**

**PROPELLANT/FLUID**

**PRESSURE, MAX** 4000 psia
**MIN** 0 psia
**PROOF** 6000 psia
**BURST** 12,000 psia

**MASS**

**DIMENSIONS** 3.500 by 1.650 by 2.30 in.

**MATERIAL**

**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
<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
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<tbody>
<tr>
<td>MANUFACTURER</td>
<td>Consolidated Controls Corporation</td>
</tr>
<tr>
<td>PART NUMBER</td>
<td>41SG144 series</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Strain gage type</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Peacekeeper</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td>________________</td>
</tr>
<tr>
<td>PRESSURE, MAX</td>
<td>300 to 5000 psia</td>
</tr>
<tr>
<td>MIN</td>
<td>0 psia</td>
</tr>
<tr>
<td>PROOF</td>
<td>150 percent of max.</td>
</tr>
<tr>
<td>BURST</td>
<td>200 percent of max. (5000 psia min.)</td>
</tr>
<tr>
<td>MASS</td>
<td>_____________</td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td>5.12 in. max. by 1.28 in. diam</td>
</tr>
<tr>
<td>MATERIAL</td>
<td>_____________</td>
</tr>
<tr>
<td>PORT, SIZE &amp; TYPE</td>
<td>MS 33656E4</td>
</tr>
<tr>
<td>VOLTAGE, INPUT</td>
<td>28±4 Vdc</td>
</tr>
<tr>
<td>WATTS</td>
<td>___________</td>
</tr>
<tr>
<td>SIGNAL</td>
<td>___________</td>
</tr>
<tr>
<td>ELECTRICAL CONNECTION</td>
<td>MIL-C-38999 series IV</td>
</tr>
<tr>
<td>MOUNTING</td>
<td>___________</td>
</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td>-30 to 200 °F compensated</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>
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<tr>
<td>SHELF</td>
<td>___________</td>
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<td>RELIABILITY</td>
<td>___________</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>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>PRESSURE, MAX</th>
<th>2500 psia</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN</td>
<td>0 psia</td>
</tr>
<tr>
<td>PROOF</td>
<td>3750 psia</td>
</tr>
<tr>
<td>BURST</td>
<td>5000 psia</td>
</tr>
</tbody>
</table>

**MASS** 0.63 lbm max.  
**DIMENSIONS** 5.42 in. max. by 1.85 by 1.35 in.

**MASS**

<table>
<thead>
<tr>
<th>PORT, SIZE &amp; TYPE</th>
<th>Special 0.394-in.-diam plug at mount</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLTAGE, INPUT</td>
<td>28±4 Vdc</td>
</tr>
<tr>
<td>WATTS</td>
<td>0 to 5 Vdc; 50-kΩ load; 1000-Ω max. impedance</td>
</tr>
<tr>
<td>ELECTRICAL CONNECTION</td>
<td>MIL-C-38999 series IV</td>
</tr>
<tr>
<td>MOUNTING</td>
<td>Three-bolt flange; 0.204-in.-diam holes EQ SP on 1.000-in.-diam BC</td>
</tr>
</tbody>
</table>

**OPERATING TEMPERATURE RANGE** -30 to 200 °F compensated

**VIBRATION, RANDOM**

<table>
<thead>
<tr>
<th>SINE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCELERATION</td>
<td></td>
</tr>
<tr>
<td>SHOCK</td>
<td></td>
</tr>
</tbody>
</table>

**LIFE, SERVICE**

<table>
<thead>
<tr>
<th>CYCLE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SHELF</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>
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**REMARKS**

<table>
<thead>
<tr>
<th>DATA SOURCE</th>
<th>Consolidated Controls drawing R41SG149-1 - 1985</th>
</tr>
</thead>
</table>

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**PRESSURE TRANSDUCER/GAGE**

| MANUFACTURER | Consolidated Controls Corporation |
| PART NUMBER | 41SG155-1 |
| 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: 4.92 in. max. by 1.28 in. diam

**MATERIAL**

- PORT, SIZE & TYPE: MS 33656E4
- VOLTAGE, INPUT: 28±4 Vdc
- WATTS
- SIGNAL: 0 to 5 Vdc; 1000-0 impedance
- ELECTRICAL CONNECTION: MIL-C-38999 series IV

**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

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**PRESSURE TRANSDUCER/GAGE**

**MANUFACTURER** Consolidated Controls Corporation  
**PART NUMBER** 41SG156-1700A1  
**DESCRIPTION** Strain gage type  
**QUALIFICATION STATUS** Peacekeeper (Hercules)

**PROPELLANT/FLUID**

**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**

**ACCELERATION** SINE  
**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)  

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

<table>
<thead>
<tr>
<th>PRESSURE, MAX</th>
<th>3500 psia</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN</td>
<td>0 psia</td>
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<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      | 4.94 in. max by 1.28 in. diam |

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PORT, SIZE &amp; TYPE</td>
<td>MS 33656E2</td>
</tr>
</tbody>
</table>

| VOLTAGE, INPUT | 28±4 Vdc |
| WATTS          |          |

| SIGNAL | 0 to 5 Vdc; 1000-Ω max. impedance |
| ELETRICAL CONNECTION | MIL-C-38999 series IV |

**OPERATING TEMPERATURE RANGE**  

**VIBRATION, RANDOM**  
SINE  
ACCELERATION  
SHOCK  

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

**DATA SOURCE** Consolidated Controls drawing R41SG156 - 1985
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 3115-10-6S 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>MANUFACTURER</th>
<th>Statham Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>PA732TC</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Unbonded strain gage type</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td></td>
</tr>
</tbody>
</table>

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

| PRESSURE, MAX    | 5 to 5000 psia |
| MIN             | 0 psia        |
| PROOF           | 7500 psia     |
| BURST           |               |
| MASS            | 0.44 lbm (0.20 kg) |
| DIMENSIONS      | 2.61 in. (less port and connections) by 1.14 in. diam |
|                 | (6.63 cm by 2.90 cm diam) |
| MATERIAL        |               |
| PORT, SIZE & TYPE | MS 33656-G4 (two for differential pressure versions) |
| VOLTAGE, INPUT  | 7 V           |
| WATTS           |               |
| SIGNAL          | 3 mV/V sensitivity |
| ELECTRICAL CONNECTION | Mates w/Bendix PC06-8-4S |
| MOUNTING        |               |

| OPERATING TEMPERATURE RANGE | 75 to 600 °F compensated (24 to 315 °C) |
| VIBRATION, RANDOM           | SINE                                       |
| ACCELERATION                |                                           |
| SHOCK                       |                                           |
| LIFE, SERVICE               |                                           |
| CYCLE                       |                                           |
| SHELF                       |                                           |
| RELIABILITY                 |                                           |
| LEAD TIME                   |                                           |
| COST                        |                                           |
| REMARKS                     | PL732TC and PM732TC differential pressure gage versions: specifications above necessary for PA732TC only |

| DATA SOURCE | Statham product data sheet - 1985 |

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PRESSURE TRANSDUCER/GAGE

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 PT06-10-6S

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** PT1H-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
PRESSURE TRANSDUCER/GAGE

MANUFACTURER  Systron Donner, Edcliff
PART NUMBER  4-901
DESCRIPTION  Solid state strain gage
QUALIFICATION STATUS

PROPELLANT/FLUID  Compatible with 17-7PH CRES

PRESSURE, MAX  200 to 5000 psia/psig
    MIN  0 psia/psig
    PROOF  200 percent of max.
    BURST  500 percent of max.
MASS  0.38 lbm (0.17 kg)
DIMENSIONS  1.12 in. hex by 3.0 in. plus fittings (2.84 by 7.62 cm)

MATERIAL  17-7PH CRES
PORT, SIZE & TYPE  MS 33656-4 modified
VOLTAGE, INPUT  28±4 Vdc
WATTS
SIGNAL  0 to 5±0.05 Vdc at FS
ELECTRICAL CONNECTION  PT1H-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
    SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Systron Donner product data sheet - 1986
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  PT1H-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 10 ms

LIFE, SERVICE
CYCLE
RELIABILITY
SHELF
LEAD TIME
COST
REMARKS

DATA SOURCE  Systron Donner product data sheet - 1986
### PRESSURE TRANSDUCER/GAGE

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<thead>
<tr>
<th>MANUFACTURER</th>
<th>Systron Donner, Edcliff</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>4-930</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Differential pressure, strain-gaged diaphragm</td>
</tr>
</tbody>
</table>

**QUALIFICATION STATUS**

**PROPELLANT/FLUID** Compatible with 17-7PH CRES

**PRESSURE, MAX** 15 ± 0 100 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** 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**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Systron Donner product data sheet - 1986
**PRESSURE TRANSDUCER/GAGE**

MANUFACTURER  Systron Donner, Edcliff  
PART NUMBER  4-931  
DESCRIPTION  Differential pressure, strain-gaged diaphragm  
QUALIFICATION STATUS  
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

PRESSURE, RELIEF  3 to 200 psig
RESET  90 percent of relief setting

RATED FLOW

LEAKAGE, INTERNAL

MASS  0.56 lbm

DIMENSIONS  0.72 in. by 0.44 in. hex

MATERIAL, BODY  CRES
SEAT/SEAL
SPRING

PORTS, SIZE & TYPE  1/4-28 UNF-3A per MIL-S-7742

MOUNTING

OPERATING TEMPERATURE RANGE  -65 to 165 °F

VIBRATION, RANDOM

SINE

ACCELERATION

SHOCK

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS  Proof pressure, 350 psig; burst pressure, 450 psig

DATA SOURCE  Aerodyne product data sheet - 1985
### RELIEF VALVE

**MANUFACTURER**  Carleton Technologies, Inc.  
**PART NUMBER**  2655-0001-5  
**DESCRIPTION**  Cabin relief, motor driven  

**QUALIFICATION STATUS**  Space shuttle ARPCS  

**PROPELLANT/FLUID**  $O_2, N_2$  

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRESSURE, RELIEF</strong></td>
<td>16 psi</td>
</tr>
<tr>
<td><strong>RESET</strong></td>
<td>15.5 psi</td>
</tr>
<tr>
<td><strong>RATED FLOW</strong></td>
<td>0 to 150 lbm/hr at 16 psig</td>
</tr>
<tr>
<td><strong>LEAKAGE, INTERNAL</strong></td>
<td>15 SCCM at 15 psid</td>
</tr>
<tr>
<td><strong>MASS</strong></td>
<td>2.20 lbm</td>
</tr>
</tbody>
</table>

**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
RELIEF VALVE

MANUFACTURER Carleton Technologies, Inc.
PART NUMBER 3111-0001-15 (model number R217-050)

DESCRIPTION

QUALIFICATION STATUS Rocketdyne program

PROPELLANT/FLUID He

PRESSURE, RELIEF 320 to 330 psig
RESET 300 psia min.
RATED FLOW 0.19 lbm/s at 350 psig max.
LEAKAGE, INTERNAL 500 SCCM

MASS
DIMENSIONS 3.580 in. by 3.150 in. diam

MATERIAL, BODY 304L, 304 CRES
SEAT/SEAL
SPRING

PORTS, SIZE & TYPE 5/8-in. tube

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE Carleton drawing 3111-0001-15 - 1985

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## RELIEF VALVE

**MANUFACTURER** Circle Seal Controls, Brunswick  
**PART NUMBER** D500T series (Gen. Dyn. P/N 55-02957)  
**DESCRIPTION**  
**QUALIFICATION STATUS** Centaur (General Dynamics)  
**PROPELLANT/FLUID**  
**PRESSURE, RELIEF** 150 psig  
**RESET**  
**RATED FLOW**  
**LEAKAGE, INTERNAL**  
**MASS**  
**DIMENSIONS**  
**MATERIAL, BODY** 303 CRES  
**SEAT/SEAL** Various  
**SPRING** 302 CRES  
**PORTS, SIZE & TYPE** Various  
**MOUNTING**  
**OPERATING TEMPERATURE RANGE** Various  
**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>MANUFACTURER</th>
<th>Circle Seal Controls, Brunswick</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>P13-533</td>
</tr>
</tbody>
</table>

**DESCRIPTION**

**QUALIFICATION STATUS** Apollo (Martin Marietta)

**PROPELLANT/FLUID**

**PRESSURE, RELIEF** 15 psi

**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**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Circle Seal Controls list (ref. 10)

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RELIEF VALVE

MANUFACTURER  Circle Seal Controls, Brunswick

PART NUMBER  P27-673 (M.M. P/N SK808D04206-001)

DESCRIPTION

QUALIFICATION STATUS  Viking (Martin Marietta)

PROPELLANT/FI. ID  H2

PRESSURE, RELIEF  150 psig

RESET

RATED FLOW

LEAKAGE, INTERNAL

MASS

DIMENSIONS

MATERIAL, BODY  2024-T351 Al alloy

SEAT/SEAL  Teflon

SPRING  17-7PH CRES

PORTS, SIZE & TYPE

MOUNTING

OPERATING TEMPERATURE RANGE  -100 to 150 °F

VIBRATION, RANDOM

SINE

ACCELERATION

SINE

LIFE, SERVICE

CYCLE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Circle Seal Controls list (ref. 10)
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<th>RELIEF VALVE</th>
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<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>
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<tr>
<td>PROPELLANT/FLUID</td>
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<tr>
<td>PRESSURE, RELIEF</td>
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<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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<tr>
<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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<tr>
<td>SINE</td>
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<td>ACCELERATION</td>
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<tr>
<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>
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<tr>
<td>DATA SOURCE</td>
</tr>
</tbody>
</table>

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### Relief Valve

**Manufacturer:** Circle Seal Controls, Brunswick  
**Part Number:** 520T1-8D-175 (Gen. Dyn. P/N 57-02913)  
**Description:**

<table>
<thead>
<tr>
<th>Qualification Status</th>
<th>Atlas (General Dynamics)</th>
</tr>
</thead>
</table>

**Propellant/Fluid:** H$_2$O$_2$

**Pressure, Relief:** 400 psig  
**Reset:**

**Leakage, Internal:**

**Mass:**

**Dimensions:**

<table>
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<tr>
<th>Material, Body</th>
<th>316 CRES</th>
</tr>
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<tbody>
<tr>
<td>Seat/Seal</td>
<td>Teflon</td>
</tr>
<tr>
<td>Spring</td>
<td>202 CRES</td>
</tr>
</tbody>
</table>

**Ports, Size & Type:** MS 33656-8 flare cone removed

**Mounting:**

**Operating Temperature Range:** -320 to 400 °F

**Vibration, Random:**

<table>
<thead>
<tr>
<th>Sine Acceleration</th>
</tr>
</thead>
</table>

**Shock:**

**Cycle Life:**

**Service Life:**

**Reliability:**

**Shelf Life:**

**Lead Time:**

**Cost:**

**Remarks:**

**Data Source:** Circle Seal Controls list (ref. 10)
<table>
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<th><strong>Relief Valve</strong></th>
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<tr>
<td><strong>Manufacturer</strong></td>
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<td><strong>Part Number</strong></td>
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<td><strong>Description</strong></td>
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<tr>
<td><strong>Qualification Status</strong></td>
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<tr>
<td><strong>Propellant/Fluid</strong></td>
</tr>
<tr>
<td><strong>Pressure, Relief</strong></td>
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<tr>
<td><strong>Rated Flow</strong></td>
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<tr>
<td><strong>Leakage, Internal</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>
</tr>
<tr>
<td><strong>Spring</strong></td>
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<tr>
<td><strong>Ports, Size &amp; Type</strong></td>
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<tr>
<td><strong>Mounting</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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<tr>
<td><strong>Sine Acceleration</strong></td>
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<tr>
<td><strong>Shock</strong></td>
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<tr>
<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>Reliability</strong></td>
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<td><strong>Lead Time</strong></td>
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<tr>
<td><strong>Cost</strong></td>
</tr>
<tr>
<td><strong>Remarks</strong></td>
</tr>
</tbody>
</table>

**Data Source**  
Circle Seal Controls list (ref. 10)
RELIEF VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  532T-ID-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>MANUFACTURER</th>
<th>Circle Seal Controls, Brunswick</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>559A-1M-X</td>
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<tr>
<td>DESCRIPTION</td>
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<tr>
<td>QUALIFICATION STATUS</td>
<td>Mercury life support (AirResearch)</td>
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<tr>
<td>PROPELLANT/FLUID</td>
<td>O₂</td>
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<tr>
<td>PRESSURE, RELIEF</td>
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<tr>
<td>RESET</td>
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<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>DIMENSIONS</td>
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<tr>
<td>MATERIAL, BODY</td>
<td>2024-T4 Al alloy</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>
</tr>
<tr>
<td>PORTS, SIZE &amp; TYPE</td>
<td>1/8-in. NPT</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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<tr>
<td>VIBRATION, RANDOM</td>
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<td>SINE</td>
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<td>SHOCK</td>
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<td>COST</td>
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<td>REMARKS</td>
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<tr>
<td>DATA SOURCE</td>
<td>Circle Seal Controls list (ref. 10)</td>
</tr>
<tr>
<td></td>
<td>249</td>
</tr>
</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)
RELIEF VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  559T-6D-18.8 (GE P/N 47B113135P4)
DESCRIPTION

QUALIFICATION STATUS  Bio-satellite, capsule relief (GE)

PROPELLANT/FLUID

PRESSURE, RELIEF  150 psig
RESET

RATED FLOW

LEAKAGE, INTERNAL

MASS

DIMENSIONS

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

PORTS, SIZE & TYPE  MS 33656-6 w/flare cone removed

MOUNTING

OPERATING TEMPERATURE RANGE  -40 to 250 °F

VIBRATION, RANDOM
SINE

SHOCK

LIFE, SERVICE
CYCLE

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Circle Seal Controls list (ref. 10)
**RELIEF VALVE**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Circle Seal Controls, Brunswick</th>
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<tbody>
<tr>
<td>PART NUMBER</td>
<td>5159T-4TT-155, 5159T-2MP-200</td>
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<tr>
<td>DESCRIPTION</td>
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<td>QUALIFICATION STATUS</td>
<td>Apollo (Martin Marietta)</td>
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<tr>
<td>PRESSURE, RELIEF</td>
<td>2500 psi</td>
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<td>RESET</td>
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<td>MASS</td>
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<td>DIMENSIONS</td>
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<td>MATERIAL, BODY</td>
<td>303 CRES</td>
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<td>SEAT/SEAL</td>
<td>Buna-N</td>
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<td>SPRING</td>
<td>17-7PH CRES</td>
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<td>PORTS, SIZE &amp; TYPE</td>
<td>MS 33656-4 (for 4TT) 1/4-in. NPT (for 2MP)</td>
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<tr>
<td>OPERATING TEMPERATURE RANGE</td>
<td>-65 to 275 °F</td>
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<td>REMARKS</td>
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**DATA SOURCE** Circle Seal Controls list (ref. 10)

252
<table>
<thead>
<tr>
<th>RELIEF VALVE</th>
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</thead>
</table>

**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  

**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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<tbody>
<tr>
<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>
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<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

**Rated Flow**

**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

**Data Source** Futurecraft drawing 400233 - 1985
PRESSURE REGULATOR 2

MANUFACTURER  Carleton Technologies, Inc.
PART NUMBER  1-4-00-58-11
DESCRIPTION  w/integral relief
QUALIFICATION STATUS  Space shuttle ARPCS

PROPELLANT/FLUID  O₂

PRESSURE, RANGE, INLET  900 to 600 psig
REGULATED  100 psi
OUTLET-LOCKUP  100 psi
PROOF, INLET  1875 psig
PROOF, OUTLET  190 psig
BURST, INLET  2500 psig
BURST, OUTLET  250 psig
DROP

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
PRESSURE REGULATOR

MANUFACTURER  Carleton Technologies, Inc.
PART NUMBER  1-4-00-58-13
DESCRIPTION  w/integral relief
QUALIFICATION STATUS  Space shuttle ARPCS

PROPELLANT/FLUID  O₂
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
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**  $O_2$

**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

**RATED FLOW**  0 to 50 lbm/hr

**LEAKAGE, INTERNAL**  MAX INLET PRESS 1.0 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
PRESSURE REGULATOR

MANUFACTURER  Carleton Technologies, Inc.
PART NUMBER  1-29-00
DESCRIPTION  Diaphragm
QUALIFICATION STATUS

PROPELLANT/FLUID  \( \text{GH}_2 \)
PRESSURE, RANGE, INLET  5000 to 150 psi
REGULATED  0.5 to 1.2 psi
OUTLET-LOCKUP
PROOF, INLET
PROOF, OUTLET
BURST, INLET
BURST, OUTLET
DROP
RATED FLOW  0.07 SCFN
LEAKAGE, INTERNAL-MAX INLET PRESS
EXTERNAL-MAX INLET PRESS

MASS
DIMENSIONS  3.50 in. diam by 1.72 in. (8.89 by 4.37 cm)

MATERIAL, BODY
SEAT/SEAL
SPRING

PORTS, SIZE & TYPE, INLET  AND10050-4
OUTLET  AND10050-4

INTEGRAL RELIEF

INTEGRAL FILTER
MOUNTING

OPERATING TEMPERATURE RANGE  -65 to 160 °F
VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
SHelf
RELIABILITY
LEAD TIME
COST
REMARKS

DATA SOURCE  Carleton drawing 1-29-00 - 1985
# 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:**

**Mass:**

**Dimensions:** 3.406 by 2.688 by 2.125 in.

**Material, Body:**
- **Seat/Seal:**

**Springs:**

**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

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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 45.0 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
MANUFACTURER    Carleton Technologies, Inc.
PART NUMBER  2144-0001-31
DESCRIPTION    Cabin pressure regulator
QUALIFICATION STATUS  Space shuttle ARPCS

PROPELLANT/FLUID    O₂, N₂
PRESSURE, RANGE, INLET   295 to 90 psig
                      REGULATED   14.7 to 0.2 psia
                      OUTLET-LOCKUP  15.0 psia
                      PROOF, INLET    443 psig
                      PROOF, OUTLET   45 psig
                      BURST, INLET    590 psig
                      BURST, OUTLET   80 psig
DROP

RATED FLOW  0 to 75 lbm/hr
LEAKAGE, INTERNAL MAX INLET PRESS  7.0 SCCM at lockup

EXTERNAL-MAX INLET PRESS  1.0 SCCM
MASS   6.221 lbm

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
**PRESSURE REGULATOR**

**MANUFACTURER** Carleton Technologies, Inc.

**PART NUMBER** 2144-0001-33

**DESCRIPTION** Cabin pressure regulator

**QUALIFICATION STATUS** Space shuttle ARPCS

**PROPELLANT/FLUID** O₃, 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 lbfm/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**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Carleton product data sheet - 1987

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262
MANUFACTURER  Carleton Technologies, Inc.
PART NUMBER  2362-0001-11
DESCRIPTION  Water tank pressure regulator w/relief
QUALIFICATION STATUS  Space shuttle ARPCS

PROPELLANT/FLUID  N₂
PRESSURE, RANGE, INLET  295 to 0 psig
  REGULATED  16.25±0.75 psig
  OUTLET-LOCKUP  17 psig
PROOF, INLET  443 psig
PROOF, OUTLET  27 psig
BURST, INLET  590 psig
BURST, OUTLET  36 psig
DROP
RATED FLOW  1 to 1.0 lbm/hr
LEAKAGE, INTERNAL-MAX INLET PRESS  2 SCCM at 215 psig
  EXTERNAL-MAX INLET PRESS  0.6 SCCM
MASS  3.528 lbm
DIMENSIONS

MATERIAL, BODY
  SEAT/SEAL
  SPRING
PORTS, SIZE & TYPE, INLET
  OUTLET
INTEGRAL RELIEF  20 psig at 0.5 lbm/hr, 17 psig 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**  2566
**DESCRIPTION**  Single-stage pneumatic
**QUALIFICATION STATUS**  OSO

**PROPELLANT/FLUID**  N₂, He

**PRESSURE, RANGE, INLET**  4015 psia (2770 N/cm²) max.
**REGULATED**  220 psia (152 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**  1.2 lbm (0.55 kg)

**DIMENSIONS**  
**MATERIAL, BODY**  
**SEAT/SEAL**  
**SPRING**  
**PORTS, SIZE & TYPE, INLET**  
**OUTLET 0.25-in. tube (0.635 cm)**

**INTEGRAL RELIEF**  
**INTEGRAL FILTER**  
**MOUNTING**  

**OPERATING TEMPERATURE RANGE**  5 to 140 °F (-29 to 60 °C)
**VIBRATION, RANDOM**  18.6g rms
**SINE**  12g
**ACCELERATION**  18g
**SHOCK**  

**LIFE, SERVICE**  1 yr (100,000 cycles)
**SHELF**  2 yr

**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS**  

**DATA SOURCE**  Aerospace Corporation report (ref. 9)
**PRESSURE REGULATOR**

**MANUFACTURER**  Carleton Technologies, Inc.

**PART NUMBER**  2566-0002-1

**DESCRIPTION**  Single stage

**QUALIFICATION STATUS**  Space shuttle ARPCS

**PROPELLANT/FLUID**  \( \text{GN}_2, \text{CH}_4 \)

**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 \( \text{N}_2 \)

**EXTERNAL-MAX INLET PRESS**  \( 1 \times 10^{-6} \) 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
MANUFACTURER  Carleton Technologies, Inc.
PART NUMBER  2726-0001-7
DESCRIPTION  Two-stage w/integral relief
QUALIFICATION STATUS  Space shuttle ARPCS

PROPELLANT/FLUID  N₂
PRESSURE, RANGE, INLET  3300 to 200 psig
  REGULATED  400±50 psig 1st stage, 200±15 psig 2nd stage
OUTLET-LOCKUP  240 psig
PROOF, INLET  4950 psig
PROOF, OUTLET  443 psig
BURST, INLET  6600 psig
BURST, OUTLET  590 psig
DROP

RATED FLOW  0 to 75 lbm/hr
LEAKAGE, INTERNAL-MAX INLET PRESS  2.5 SCCM at lockup
  EXTERNAL-MAX INLET PRESS  1.0 SCCM

MASS  2.98 lbm

MATERIAL, BODY
SEAT/SEAL
SPRING

PORTS, SIZE & TYPE, INLET
OUTLET

INTEGRAL RELIEF  295 psig open, 245 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 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

SHOCK

LIFE, SERVICE

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE Carleton drawing 1826001-19 - 1985

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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)
DROP
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  1x10⁻⁶ 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)

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
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  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 (3612 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
  SHELF  3 yr
RELIABILITY
LEAD TIME
COST  $4000 to $6000 in 1974
REMARKS

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

**RATED FLOW**  140 SCFM (66,080 SCCS)

**LEAKAGE, INTERNAL-MAX INLET PRESS**  101 SCCH

**EXTERNAL-MAX INLET PRESS**  3.3x10⁻⁴ 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  QA0

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 SCCCH
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
SHELF
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

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<th>PROPELLANT/FLUID</th>
<th>N₂</th>
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| 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 | 10-⁴ 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 (2212 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/FLUID  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 (5.66 to 4720 SCCS)
LEAKAGE, INTERNAL—MAX INLET PRESS  0.2 SCCS He

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

PROPELLANT/FLUID  N₂
PRESSURE, RANGE, INLET  3515 psia (2425 N/cm²)
REGULATED  450 psig (311 N/cm²)
OUTLET-LOCKUP
PROOF, INLET
PROOF, OUTLET
BURST, INLET
BURST, OUTLET
DROP
RATED FLOW  1.75 lb/s
LEAKAGE, INTERNAL-MAX INLET PRESS  0.017 SCCM He

EXTERNAL-MAX INLET PRESS

MASS  2.5 lbm (1.13 kg)
DIMENSIONS  4.13 in. length by 2.63 in. diam (10.5 by 6.7 cm)

MATERIAL, BODY  2024-T351 Al alloy
SEAT/SEAL  EPR
SPRING
PORTS, SIZE & TYPE, INLET  MS 33649-16
OUTLET  Same as inlet

INTEGRAL RELIEF  Yes

INTEGRAL FILTER  Bracket; two holes

OPERATING TEMPERATURE RANGE  -36 to 125 °F (-38 to 52 °C)
VIBRATION, RANDOM  36.2g rms
SINE  2.5g
ACCELERATION  14g X Y Z
SHOCK  2500g

LIFE, SERVICE
SHELF
RELIABILITY
LEAD TIME  4 months
COST
REMARKS  Five delivered

SOURCE  Aerospace Corporation report (ref. 9)
MANUFACTURER  Futurecraft Corporation
PART NUMBER  400210
DESCRIPTION  Adjustable, high flow capacity
QUALIFICATION STATUS  Minuteman reentry stage (AVCO)

PROPELLANT/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
MASS  2.2 lbm
DIMENSIONS  4.500 by 2.38 by 3.63 in. nom.

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** \( \text{GN}_2 \)  
**PRESSURE, RANGE, INLET** \( 3700 \) to \( 500 \) psia  
**REGULATED** \( 60 \pm 4 \) 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 \( \mu \)m  
**MOUNTING**

**OPERATING TEMPERATURE RANGE** \( -22 \) to \( 160 \) \(^\circ\text{F}\)  
**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS** Pressure transducer on -2 model

**DATA SOURCE** Futurecraft drawing 400236 - 1985
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
**PRESSURE REGULATOR**

**MANUFACTURER** HTL Industries, Inc.
**PART NUMBER** 146650-10, 146931
**DESCRIPTION** Single stage, pneumatic
**QUALIFICATION STATUS** Centaur

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>He, N₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESSURE, RANGE, INLET</td>
<td>490 to 455 psia (337 to 313 N/cm²)</td>
</tr>
<tr>
<td>REGULATED</td>
<td>297 to 315 psia (204 to 213 N/cm²)</td>
</tr>
<tr>
<td>OUTLET-LOCKUP</td>
<td>312 to 330 psia (215 to 227 N/cm²)</td>
</tr>
<tr>
<td>PROOF, INLET</td>
<td>435 psia (299 N/cm²)</td>
</tr>
<tr>
<td>BURST, INLET</td>
<td>435 psia (299 N/cm²)</td>
</tr>
<tr>
<td>BURST, OUTLET</td>
<td>435 psia (299 N/cm²)</td>
</tr>
<tr>
<td>DROP</td>
<td>435 psia (299 N/cm²)</td>
</tr>
</tbody>
</table>

| 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 | 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)
<table>
<thead>
<tr>
<th><strong>MANUFACTURER</strong></th>
<th>HTL Industries, Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PART NUMBER</strong></td>
<td>146650-11, 146709</td>
</tr>
<tr>
<td><strong>DESCRIPTION</strong></td>
<td>Single stage, pneumatic</td>
</tr>
<tr>
<td><strong>QUALIFICATION STATUS</strong></td>
<td>Centaur</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PROPELLANT/FLUID</strong></th>
<th>He, N₂</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRESSURE, RANGE, INLET</strong></td>
<td>3375 to 715 psia (2326 to 492 N/cm²)</td>
</tr>
<tr>
<td><strong>REGULATED</strong></td>
<td>475 psig (327 N/cm²)</td>
</tr>
<tr>
<td><strong>OUTLET-LOCKUP</strong></td>
<td>455 to 490 psia (313 to 337 N/cm²)</td>
</tr>
<tr>
<td><strong>PROOF, INLET</strong></td>
<td></td>
</tr>
<tr>
<td><strong>PROOF, OUTLET</strong></td>
<td>640 psia</td>
</tr>
<tr>
<td><strong>BURST, INLET</strong></td>
<td></td>
</tr>
<tr>
<td><strong>BURST, OUTLET</strong></td>
<td></td>
</tr>
<tr>
<td><strong>DROP</strong></td>
<td></td>
</tr>
<tr>
<td><strong>RATED FLOW</strong></td>
<td>8.9 SCFM He (4200 SCCS)</td>
</tr>
<tr>
<td><strong>LEAKAGE, INTERNAL-MAX INLET PRESS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>EXTERNAL-MAX INLET PRESS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>MASS</strong></td>
<td>2.5 lbm (1.1 kg)</td>
</tr>
<tr>
<td><strong>DIMENSIONS</strong></td>
<td></td>
</tr>
</tbody>
</table>

| **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

**PROPELLANT/FLUID** Air, N₂

**PRESSURE, RANGE, INLET** 4500 to 800 psia (3102 to 551 N/cm²)

**REGULATED** 35 to 630 psig (24 to 434 N/cm²)

**OUTLET-LOCKUP** 500 psia (344 N/cm²)

**PROOF, INLET** 6765 psia (4664 N/cm²)

**PROOF, OUTLET**

**BURST, INLET** 11,265 psia (7766.9 N/cm²)

**BURST, OUTLET**

**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)
**PRESSURE REGULATOR**

**MANUFACTURER** Marotta Scientific Controls, Inc.

**PART NUMBER** 280601, model number RS572VB

**DESCRIPTION** Pneumatic

**QUALIFICATION STATUS** Safeguard

**PROPELLANT/FLUID** Inert gas

**PRESSURE, RANGE, INLET** 3015 to 565 psia (2080 to 390 N/cm²)

REGULATED 250 psig (172 N/cm²)

OUTLET-LOCKUP 315 psia (217 N/cm²)

PROOF, INLET 7515 psia (5181 N/cm²)

PROOF, OUTLET

BURST, INLET 20,015 psia (13,800 N/cm²)

BURST, OUTLET

**PRESSURE, RANGE, OUTLET** 250 psig (172 N/cm²)

**REGULATED**

**PRESSURE, RANGE, LOCKUP** 315 psia (217 N/cm²)

**PROOF, PRESSURE, RANGE, INLET** 7515 psia (5181 N/cm²)

**PROOF, PRESSURE, RANGE, OUTLET**

**BURST, PRESSURE, RANGE, INLET** 20,015 psia (13,800 N/cm²)

**BURST, PRESSURE, RANGE, OUTLET**

**RATED FLOW** 420 SCFM (198,240 SCCS)

**LEAKAGE, PRESSURE, INLET**

**EXTERNAL-MAX INLET PRESS**

**MASS** 3.8 lbm (1.7 kg)

**DIMENSIONS**

**MATERIAL** Body Al alloy

SEAT/SEAL Nylon

**SPRING**

**PORTS, SIZE & TYPE, PRESSURE**

INLET

OUTLET

**INTEGRAL RELIEF**

**INTEGRAL FILTER**

**MOUNTING**

**OPERATING TEMPERATURE RANGE** 45 to 160 °F (7 to 72 °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  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)

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)
**PRESSURE REGULATOR**

**MANUFACTURER**  Pyronetics Devices, Inc.
**PART NUMBER**  2328-1
**DESCRIPTION**  Pneumatic
**QUALIFICATION STATUS**  Sandia (classified)

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>PRESSURE, RANGE, INLET 500 psia (345 N/cm², max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>REGULATED 100 psia (69 N/cm²)</td>
</tr>
<tr>
<td></td>
<td>OUTLET-LOCKUP</td>
</tr>
<tr>
<td></td>
<td>PROOF, INLET</td>
</tr>
<tr>
<td></td>
<td>PROOF, OUTLET</td>
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<tr>
<td></td>
<td>BURST, INLET</td>
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<tr>
<td></td>
<td>BURST, OUTLET</td>
</tr>
<tr>
<td></td>
<td>DROP</td>
</tr>
</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>
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</thead>
<tbody>
<tr>
<td>SPRING</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PORTS, SIZE &amp; TYPE, INLET</th>
<th>OUTLET</th>
</tr>
</thead>
</table>

**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>PRESSURE REGULATOR</strong></th>
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</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>
</tbody>
</table>

**PROPELLANT/FLUID**

<table>
<thead>
<tr>
<th><strong>PRESSURE, RANGE, INLET</strong></th>
<th>4000 psia (2760 N/cm²) max.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REGULATED</strong></td>
<td>500 psia (345 N/cm²)</td>
</tr>
</tbody>
</table>

**OUTLET-LOCKUP**

<table>
<thead>
<tr>
<th><strong>PROOF, INLET</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROOF, OUTLET</strong></td>
</tr>
<tr>
<td><strong>BURST, INLET</strong></td>
</tr>
<tr>
<td><strong>BURST, OUTLET</strong></td>
</tr>
</tbody>
</table>

**RATED FLOW**

| **LEAKAGE, INTERNAL-MAX INLET PRESS** |
| **EXTERNAL-MAX INLET PRESS** |

**MASS**

<table>
<thead>
<tr>
<th><strong>DIMENSIONS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MATERIAL, BODY</strong></td>
</tr>
<tr>
<td><strong>SEAT/SEAL</strong></td>
</tr>
<tr>
<td><strong>SPRING</strong></td>
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</tbody>
</table>

**PORTS, SIZE & TYPE, INLET**

<table>
<thead>
<tr>
<th><strong>OUTLET</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTEGRAL RELIEF</strong></td>
</tr>
</tbody>
</table>

**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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290
**PRESSURE REGULATOR**

**MANUFACTURER** Pyronetics Devices, Inc.  
**PART NUMBER** 2832  
**DESCRIPTION** Pneumatic  
**QUALIFICATION STATUS** Sandia (classified)

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>PRESSURE, RANGE, INLET 2000 psia (1380 N/cm²) max.</th>
<th>REGULATED 12 psia (8.3 N/cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OUTLET-LOCKUP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PROOF, INLET</td>
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<tr>
<td></td>
<td>PROOF, OUTLET</td>
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<tr>
<td></td>
<td>BURST, INLET</td>
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</tr>
<tr>
<td></td>
<td>BURST, OUTLET DROP</td>
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<tr>
<td>RATED FLOW</td>
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<tr>
<td>LEAKAGE, INTERNAL-MAX INLET PRESS</td>
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<td>EXTERNAL-MAX INLET PRESS</td>
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<tr>
<td>MASS</td>
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<td></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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<td>SPRING</td>
<td></td>
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<tr>
<td>PORTS, SIZE &amp; TYPE, INLET</td>
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<tr>
<td></td>
<td>OUTLET</td>
<td></td>
</tr>
<tr>
<td>INTEGRAL RELIEF</td>
<td></td>
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</tr>
<tr>
<td>INTEGRAL FILTER</td>
<td></td>
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<tr>
<td>MOUNTING</td>
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</tr>
<tr>
<td>OPERATING TEMPERATURE RANGE</td>
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<td></td>
</tr>
<tr>
<td>VIBRATION, RANDOM</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>SINE</td>
<td></td>
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<tr>
<td>ACCELERATION</td>
<td></td>
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<tr>
<td>SHOCK</td>
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<tr>
<td>LIFE, SERVICE</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>
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<tr>
<td>COST</td>
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</tr>
<tr>
<td>REMARKS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DATA SOURCE** Aerospace Corporation report (ref. 9)
### PRESSURE REGULATOR

**MANUFACTURER** Pyronetics Devices, Inc.

**PART NUMBER** 2834

**DESCRIPTION** Pneumatic

**QUALIFICATION STATUS** Sandia (classified)

**PROPELLANT/FLUID**

<table>
<thead>
<tr>
<th>PRESSURE, RANGE, INLET</th>
<th>515 psia (355 N/cm²) max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>REGULATED OUTLET-LOCKUP</td>
<td>35 psia (24 N/cm²)</td>
</tr>
</tbody>
</table>

**PROOF**

<table>
<thead>
<tr>
<th>PROOF, INLET</th>
<th>PROOF, OUTLET</th>
</tr>
</thead>
</table>

**BURST**

<table>
<thead>
<tr>
<th>BURST, INLET</th>
<th>BURST, OUTLET</th>
</tr>
</thead>
</table>

**DROP**

<table>
<thead>
<tr>
<th>DROP</th>
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</table>

**RATED FLOW**

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

**LEAKAGE**

<table>
<thead>
<tr>
<th>LEAKAGE, INTERNAL-MAX INLET PRESS</th>
<th>EXTERNAL-MAX INLET PRESS</th>
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**MASS**

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

**DIMENSIONS**

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**MATERIAL, BODY**

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<table>
<thead>
<tr>
<th>SEAT/SEAL</th>
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<table>
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<tr>
<th>SPRING</th>
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**PORTS, SIZE & TYPE, INLET**

<table>
<thead>
<tr>
<th>PORTS, SIZE &amp; TYPE, INLET</th>
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<table>
<thead>
<tr>
<th>INLET</th>
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<table>
<thead>
<tr>
<th>OUTLET</th>
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**INTEGRAL RELIEF**

<table>
<thead>
<tr>
<th>INTEGRAL RELIEF</th>
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**INTEGRAL FILTER**

<table>
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<tr>
<th>INTEGRAL FILTER</th>
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**MOUNTING**

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</table>

**OPERATING TEMPERATURE RANGE**

<table>
<thead>
<tr>
<th>OPERATING TEMPERATURE RANGE</th>
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</table>

**VIBRATION, RANDOM**

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

<table>
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**SHOCK**

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**LIFE, SERVICE**

<table>
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<tr>
<th>LIFE, SERVICE</th>
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**SHELF**

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**RELIABILITY**

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**LEAD TIME**

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**COST**

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**REMARKS**

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**DATA SOURCE** Aerospace Corporation report (ref. 9)
<table>
<thead>
<tr>
<th><strong>PRESSURE REGULATOR</strong></th>
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**MANUFACTURER**  Sterer Engineering & Manufacturing Company  
**PART NUMBER**  25210-1  
**DESCRIPTION**  Pneumatic  
**QUALIFICATION STATUS**  Mariner Mars 1971

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<tr>
<th><strong>PROPELLANT/FLUID</strong></th>
<th>N₂</th>
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</table>

| **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, INLET**  | 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) |

293
### 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)
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
PROOF, OUTLET  90 psia (62 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)
**PRESSURE REGULATOR**

**MANUFACTURER**  Sterer Engineering & Manufacturing Company

**PART NUMBER**  46240

**DESCRIPTION**  Pneumatic

**QUALIFICATION STATUS**  Viking orbiter 1975

**PROPELLANT/FLUID**  \( \text{GN}_2 \)

**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 \( \text{N}_2 \) at 2768 N/cm²)

**EXTERNAL-MAX INLET PRESS**  1.39x10⁻⁵ SCCS \( \text{GN}_2 \)

**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**  \( 10^6 \) cycles

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE**  IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)
| DESCRIPTION: | Pneumatic |
| PART NUMBER | 50750 |
| QUALIFICATION STATUS | Delta, P72-2 |
| PROPELLANT/FLUID | N₂ |
| PRESSURE, RANGE, INLET | 2015 psia (1390 N/cm²) |
| REGULATED | 215 to 255 psig (148 to 176 N/cm²) |
| OUTLET-LOCKUP | |
| PROOF, INLET | |
| PROOF, OUTLET | |
| BURST, INLET | |
| BURST, OUTLET | |
| DROP | |
| RATED FLOW | |
| LEAKAGE, INTERNAL-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**  Tavco, Inc.
**PART NUMBER**  234635
**DESCRIPTION**  Pneumatic

**QUALIFICATION STATUS**  Qualified

**PROPELLANT/FLUID**  Air, N₂

**PRESSURE, RANGE, INLET**  3015 to 1015 psia (2078 to 700 N/cm²)
**REGULATED**  200 to 375 psia (137 to 258 N/cm²)

**PRESSURE, RANGE, OUTLET**

**RATED FLOW**  10 SCFM (4720 SCCS)

**LEAKAGE, INTERNAL-MAX INLET PRESS**  Zero

**LEAKAGE, 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

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>Air, N₂</th>
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<tr>
<th>PRESSURE, RANGE, INLET</th>
<th>215 to 165 psia (148 to 113 N/cm²)</th>
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<tbody>
<tr>
<td>REGULATED OUTLET-LOCKUP</td>
<td>100 psia (69 N/cm²)</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>
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<tr>
<td>DROP</td>
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| RATE, FLOW  | 20 SCFM (9440 SCCS) |
|            |                     |

| LEAKAGE, INTERNAL-MAX INLET PRESS  | 0.017 SCCM He |
| EXTERNAL-MAX INLET PRESS           | Zero |
|                                    |         |

<table>
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<tr>
<th>MASS</th>
<th>0.7 lbm (0.32 kg)</th>
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</table>

| 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      | |

<table>
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<tr>
<th>DATA SOURCE</th>
<th>IITRI lists (ref. 8) and Aerospace Corporation report (ref. 9)</th>
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### PRESSURE REGULATOR

**MANUFACTURER**  Tavco, Inc.
**PART NUMBER**  2346334
**DESCRIPTION**  Pneumatic
**QUALIFICATION STATUS**  Qualified

#### PROPELLANT/FLUID

**PRESSURE, RANGE, INLET**  3815 to 915 psia (2630 to 630 N/cm²)
**REGULATED**  700 psia (482 N/cm²)
**OUTLET-LOCKUP**
**PROOF, INLET**
**PROOF, OUTLET**
**BURST, INLET**
**BURST, OUTLET**
**DROP**

#### PROOF

<table>
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<tr>
<th>INLET</th>
<th>OUTLET</th>
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#### BURST

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#### DROP

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#### RATED FLOW

4.33 SCFM (2044 SCCS)

#### LEAKAGE

**INTERNAL-MAX INLET PRESS**  0.1 SCCH
**EXTERNAL-MAX INLET PRESS**

#### MASS

1.8 lbm (0.81 kg)

#### DIMENSIONS

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#### PORTS, SIZE & TYPE

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#### INTEGRAL RELIEF


#### INTEGRAL FILTER


#### MOUNTING


#### OPERATING TEMPERATURE RANGE

<table>
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#### VIBRATION

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#### SHOCK


#### LIFE, SERVICE

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#### LEAD TIME

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#### DATA SOURCE

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

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## 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**

- **PRESSURE, INLET**
- **PRESSURE, 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

MATERIAL, BODY  6061-T651 Al alloy
SEAT/SEAL  6061-T651 Al alloy

PORTS, SIZE & TYPE, INLET  0.25-in. tube (welded)

OUTLET  0.25-in. tube (bolt flange)

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  4515 psia (3113 N/cm²)
PROOF, OUTLET  100 psia (69 N/cm²)
BURST, INLET  6015 psia (4147 N/cm²)
BURST, OUTLET  125 psia (86 N/cm²)
DROP

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)

303
PRESSURE REGULATOR

MANUFACTURER Whittaker Controls Division
PART NUMBER 227705
DESCRIPTION Pneumatic
QUALIFICATION STATUS Shuttle

PROPELLANT/FLUID

PRESSURE, 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 (2.2x10^5 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)

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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

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

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

MANUFACTURER Carleton Technologies, Inc.
PART NUMBER 2666-0001-25
DESCRIPTION Motor-operated latching valve
QUALIFICATION STATUS Space shuttle ARPCS

PROPELLANT/FLUID O2

PRESSURE, OPERATING 0 to 3300 psig
PROOF 4950 psig
BURST 6600 psig
DROP 30 psid at 200 psi
RATED FLOW 150 lbm/hr at 200 psi

LEAKAGE, INTERNAL 2.5 SCCM max. at max. inlet
EXTERNAL 0.3 SCCM max.

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
**LINE/THRUSTER VALVE**

**MANUFACTURER** Carleton Technologies, Inc.
**PART NUMBER** 2710-0001-1
**DESCRIPTION** Airlock isolation valve
**QUALIFICATION STATUS** Space shuttle ARPCS

**PROPELLANT/FLUID** Air, O₂

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>16 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROOF</td>
<td>24 psig</td>
</tr>
<tr>
<td>BURST</td>
<td>32 psig</td>
</tr>
<tr>
<td>DROP</td>
<td></td>
</tr>
</tbody>
</table>

**RATED FLOW** 150 lbm/hr at 16 psi

**LEAKAGE, INTERNAL** 1.5 SCCM
**EXTERNAL**

**MASS** 1.25 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** 5.5, motor running; 14, 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
**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
LINE/THRUSTER VALVE

MANUFACTURER  Carleton Technologies, Inc.
PART NUMBER  2724-0001-3
DESCRIPTION  Solenoid valve
QUALIFICATION STATUS  Space shuttle ARPCS

PROPELLANT/FLUID  $O_2$, $N_2$

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
**MANUFACTURER**  Carleton Technologies, Inc.

**PART NUMBER**  2763-0001-9

**DESCRIPTION**  Equalization valve

**QUALIFICATION STATUS**  Space shuttle ARPCS

**PROPELLANT/FLUID**  Air, O₂

**PRESSURE, OPERATING**  14.7 psig

**PROOF**  22 psig

**BURST**  29.4 psig

**DROP**

**RATED FLOW**  0.1, 0.5 psi/s

**LEAKAGE, INTERNAL**  5.0 SCCM max.

**EXTERNAL**  5.0 SCCM max.

**MASS**  1.09 lbm

**DIMENSIONS**

**MATERIAL, BODY**

**SEAT/SEAL**

**PORTS, SIZE & TYPE**

**INTEGRAL FILTER**

**RESPONSE TIME, OPEN/CLOSE**

**VOLTAGE, OPERATING**

**PULL IN/DROP OUT**

**WATTS**

**ELECTRICAL CONNECTION**

**MOUNTING**

**OPERATING TEMPERATURE RANGE**  -100 to 160 °F

**VIBRATION, RANDOM**

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE**  Carleton product data sheet - 1987
LINE/THRUSTER VALVE

MANUFACTURER Carleton Technologies, Inc.
PART NUMBER 2874-0001-3
DESCRIPTION Cabin pressure bleed valve, motor operated
QUALIFICATION STATUS Space shuttle ARPCS

PROPELLANT/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)

| PROPELLANT/FLUID | ______________ |
| PRESSURE, OPERATING | 3000 psig |
| PROOF | ______________ |
| BURST | ______________ |
| DROP | ______________ |
| 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**
**PULL IN/DROP OUT**

**WATTS**

**ELECTRICAL CONNECTION**

**MOUNTING**

**OPERATING TEMPERATURE RANGE**  -200 to 160 °F

**VIBRATION, RANDOM**

**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**  P22-406 (Ham. Stan. SV701612)

**DESCRIPTION**  Shutoff valve

**QUALIFICATION STATUS**  Gemini backpack (Hamilton Standard)

### PROPELLANT/FLUID

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<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>7500 psig</th>
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<tbody>
<tr>
<td><strong>PROOF</strong></td>
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<tr>
<td><strong>BURST</strong></td>
<td>1400 psig</td>
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<tr>
<td><strong>DROP</strong></td>
<td>1300 psig</td>
</tr>
</tbody>
</table>

**RATED FLOW**

**LEAKAGE, INTERNAL**

**EXTERNAL**

**MASS DIMENSIONS**

<table>
<thead>
<tr>
<th>MATERIAL, BODY</th>
<th>303 CRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEAT/SEAL</td>
<td>Silicone, Teflon</td>
</tr>
<tr>
<td>PORTS, SIZE &amp; TYPE</td>
<td>AND10050-4</td>
</tr>
</tbody>
</table>

**INTEGRAL FILTER**

**RESPONSE TIME, OPEN/CLOSE**

**VOLTAGE, OPERATING**

**WATTS**

**ELECTRICAL CONNECTION**

**MOUNTING**

**OPERATING TEMPERATURE RANGE**  -65 to 175 °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** P38-717 (Bell P/N 8250-472095)

**DESCRIPTION** Shutoff valve

**QUALIFICATION STATUS** Gemini, Agena engine (Bell Aerospace)

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<thead>
<tr>
<th>PROPELLANT/FLUID</th>
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<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>255 psig</th>
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<tbody>
<tr>
<td>PROOF</td>
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<tr>
<td>BURST</td>
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<tr>
<td>DROP</td>
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<tr>
<th>RATED FLOW</th>
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<table>
<thead>
<tr>
<th>LEAKAGE, INTERNAL</th>
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<table>
<thead>
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<th>LEAKAGE, EXTERNAL</th>
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<tr>
<th>DIMENSIONS</th>
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<table>
<thead>
<tr>
<th>MATERIAL, BODY</th>
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<tbody>
<tr>
<td>2024-T351 Al alloy</td>
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<tr>
<th>SEAT/SEAL</th>
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<tbody>
<tr>
<td>Buna-N</td>
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<table>
<thead>
<tr>
<th>PORTS, SIZE &amp; TYPE</th>
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<tbody>
<tr>
<td>MS 24385-5</td>
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<table>
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<th>INTEGRAL FILTER</th>
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<thead>
<tr>
<th>RESPONSE TIME, OPEN/CLOSE</th>
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<thead>
<tr>
<th>VOLTAGE, OPERATING</th>
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<tr>
<td>PULL IN/DROP OUT</td>
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<thead>
<tr>
<th>WATTS</th>
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<table>
<thead>
<tr>
<th>ELECTRICAL CONNECTION</th>
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<table>
<thead>
<tr>
<th>MOUNTING</th>
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<table>
<thead>
<tr>
<th>OPERATING TEMPERATURE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>-65 to 160 °F</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>VIBRATION, RANDOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINE</td>
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<table>
<thead>
<tr>
<th>ACCELERATION</th>
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<table>
<thead>
<tr>
<th>SHOCK</th>
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<table>
<thead>
<tr>
<th>LIFE, SERVICE</th>
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<tbody>
<tr>
<td>CYCLE</td>
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<tr>
<td>SHELF</td>
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<table>
<thead>
<tr>
<th>RELIABILITY</th>
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<table>
<thead>
<tr>
<th>LEAD TIME</th>
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<table>
<thead>
<tr>
<th>COST</th>
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<table>
<thead>
<tr>
<th>REMARKS</th>
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<table>
<thead>
<tr>
<th>DATA SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circle Seal Controls list (ref. 10)</td>
</tr>
</tbody>
</table>
**LINE/THRUSTER VALVE**

**MANUFACTURER**  
Circle Seal Controls, Brunswick

**PART NUMBER**  
P54-717

**DESCRIPTION**  
Shutoff valve

**QUALIFICATION STATUS**  
Gemini O₂ and H₂ system (AirResearch)

**PROPELLANT/FLUID**

**PRESSURE**  
OPERATING 1050 psig

**PROOF**

**BURST**

**DROP**

**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)
**LINE/THRUSTER VALVE**

**MANUFACTURER**  Circle Seal Controls, Brunswick  
**PART NUMBER**  P58-717 (GE P/N 47C14003)  
**DESCRIPTION**  Shutoff valve  
**QUALIFICATION STATUS**  Biosatellite capsule (General Electric)

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<table>
<thead>
<tr>
<th><strong>PROPELLANT/FLUID</strong></th>
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<table>
<thead>
<tr>
<th><strong>PRESSURE, OPERATING</strong></th>
<th>20 psig</th>
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<tbody>
<tr>
<td><strong>PROOF</strong></td>
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<tr>
<td><strong>BURST</strong></td>
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<td><strong>DROP</strong></td>
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<table>
<thead>
<tr>
<th><strong>RATED FLOW</strong></th>
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<table>
<thead>
<tr>
<th><strong>LEAKAGE, INTERNAL</strong></th>
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<table>
<thead>
<tr>
<th><strong>LEAKAGE, EXTERNAL</strong></th>
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<table>
<thead>
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<th><strong>MASS</strong></th>
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<table>
<thead>
<tr>
<th><strong>DIMENSIONS</strong></th>
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<table>
<thead>
<tr>
<th><strong>MATERIAL, BODY</strong></th>
<th>2024-T351 Al alloy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SEAT/SEAL</strong></td>
<td>Buna-N</td>
</tr>
<tr>
<td><strong>PORTS, SIZE &amp; TYPE</strong></td>
<td>MS 24385-4</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th><strong>INTEGRAL FILTER</strong></th>
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<table>
<thead>
<tr>
<th><strong>RESPONSE TIME, OPEN/CLOSE</strong></th>
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<table>
<thead>
<tr>
<th><strong>VOLTAGE, OPERATING</strong></th>
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<table>
<thead>
<tr>
<th><strong>PULL IN/DROP OUT</strong></th>
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<table>
<thead>
<tr>
<th><strong>WATTS</strong></th>
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<table>
<thead>
<tr>
<th><strong>ELECTRICAL CONNECTION</strong></th>
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<table>
<thead>
<tr>
<th><strong>MOUNTING</strong></th>
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<table>
<thead>
<tr>
<th><strong>OPERATING TEMPERATURE RANGE</strong></th>
<th>-30 to 125 °F</th>
</tr>
</thead>
</table>

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<table>
<thead>
<tr>
<th><strong>VIBRATION, RANDOM</strong></th>
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<tr>
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<tr>
<th><strong>REMARKS</strong></th>
</tr>
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**DATA SOURCE**  Circle Seal Controls list (ref. 10)
LINE/THRUSTER VALVE

MANUFACTURER  Circle Seal Controls, Brunswick
PART NUMBER  P76-717 (GE P/N 47C145477)
DESCRIPTION
QUALIFICATION STATUS  BIOSAT capsule reentry system (General Electric)
PROPELLANT/FLUID
PRESSURE, OPERATING  20 psig
PROOF
BURST
DROP
RATED FLOW
LEAKAGE, INTERNAL
EXTERNAL
MASS
DIMENSIONS
MATERIAL, BODY  303 CRS
SEAT/SEAL  Buna-N
PORTS, SIZE & TYPE  MS 24385-4
INTEGRAL FILTER
RESPONSE TIME, OPEN/CLOSE
VOLTAGE, OPERATING
PULL IN/DROP OUT
WATTS
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  Circle Seal Controls list (ref. 10)
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)

PROPELLANT/FLUID

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)

322
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** N$_2$H$_4$, NTO, GN$_2$  

<table>
<thead>
<tr>
<th><strong>PRESSURE</strong></th>
<th>OPERATING 300 to 600 psi</th>
<th><strong>PROOF</strong></th>
<th><strong>BURST</strong></th>
<th><strong>DROP</strong> 3 to 85 psid</th>
<th><strong>RATED FLOW</strong> 0.015 to 0.06 lbm/s</th>
</tr>
</thead>
</table>

**LEAKAGE, INTERNAL** 1.0 SCCH GN$_2$  
**EXTERNAL**  
**MASS** 0.5 to 1.0 lbm  
**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  
**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

PROPELLANT/FLUID  \( \text{N}_2\text{H}_4, \text{NTO, MMH, GN}_2, \text{H}_2\text{O} \)

PRESSURE, OPERATING  200 to 400 psig
PROOF
BURST
DROP  3 to 30 psid

RATED FLOW

LEAKAGE, INTERNAL  0.5 to 1.0 SCCH \( \text{GN}_2 \)
EXTERNAL

MASS  0.2 to 1.0 lbm

DIMENSIONS

MATERIAL, BODY  CRESC
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
SINE

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>
<tr>
<td>PROPELLANT/FLUID</td>
<td>N$_2$H$_4$, NTO, GN$_2$</td>
</tr>
<tr>
<td>PRESSURE, OPERATING</td>
<td>300 to 600 psi</td>
</tr>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>DROP</td>
<td>8 to 30 psid</td>
</tr>
<tr>
<td>RATED FLOW</td>
<td>0.05 to 0.30 lbm/s</td>
</tr>
<tr>
<td>LEAKAGE, INTERNAL</td>
<td>1.0 to 5.0 SCCH GN$_2$</td>
</tr>
<tr>
<td>EXTERNAL</td>
<td></td>
</tr>
<tr>
<td>MASS</td>
<td>1.2 to 1.5 lbm</td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td></td>
</tr>
<tr>
<td>MATERIAL, BODY</td>
<td></td>
</tr>
<tr>
<td>SEAT/SEAL</td>
<td></td>
</tr>
<tr>
<td>PORTS, SIZE &amp; TYPE</td>
<td>Tube; colinear inlet and outlet</td>
</tr>
<tr>
<td>INTEGRAL FILTER</td>
<td></td>
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<tr>
<td>RESPONSE TIME, OPEN/CLOSE</td>
<td>20/50 ms</td>
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<tr>
<td>VOLTAGE, OPERATING</td>
<td>28 Vdc</td>
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<tr>
<td>PULL IN/DROP OUT</td>
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<tr>
<td>WATTS</td>
<td>24 to 50</td>
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<tr>
<td>ELECTRICAL CONNECTION</td>
<td></td>
</tr>
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<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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<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>CYCLE</td>
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<td>RELIABILITY</td>
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<td>LEAD TIME</td>
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<td>COST</td>
<td></td>
</tr>
<tr>
<td>REMARKS</td>
<td>N.C. or N.O. available</td>
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</tbody>
</table>

**DATA SOURCE** Consolidated Controls product data booklet - 1986

326
**MANUFACTURER**  Consolidated Controls Corporation  
**PART NUMBER**  
**DESCRIPTION**  Single-solenoid thruster valve  
**QUALIFICATION STATUS**  Space shuttle, GRO, Intelsat IV and VI, Peace and Courage  
**PROPELLANT/FLUID**  N₂H₄, NTO, MMH, GN₂, H₂O  

<table>
<thead>
<tr>
<th><strong>PRESSURE, OPERATING</strong></th>
<th>200 to 400 psig</th>
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</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> 1.5 to 300 psid</td>
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</tr>
<tr>
<td><strong>RATED FLOW</strong> 0.001 to 0.30 lbm/s</td>
<td></td>
</tr>
<tr>
<td><strong>LEAKAGE, INTERNAL</strong> 0.5 to 1.0 SCCH GN₂</td>
<td></td>
</tr>
<tr>
<td><strong>EXTERNAL</strong></td>
<td></td>
</tr>
<tr>
<td><strong>MASS</strong> 0.2 to 0.5 lbm</td>
<td></td>
</tr>
</tbody>
</table>

**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**  
**SINE**  
**ACCELERATION**  
**SHOCK**  

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

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Consolidated Controls Corporation</th>
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<tbody>
<tr>
<td>PART NUMBER</td>
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<tr>
<td>DESCRIPTION</td>
<td>Gas generator valve module</td>
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<tr>
<td>QUALIFICATION STATUS</td>
<td>Space shuttle APU</td>
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<tr>
<td>PROPELLANT/FLUID</td>
<td>N₂H₄</td>
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<tr>
<td>PRESSURE, OPERATING</td>
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<tr>
<td>PROOF</td>
<td></td>
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<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>DROP</td>
<td>0 to 500 psid</td>
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<tr>
<td>RATED FLOW</td>
<td>0 to 0.3 lbm/s</td>
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<td>LEAKAGE, INTERNAL</td>
<td>18 to 180 SCCH He at 400 psid</td>
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<td>EXTERNAL</td>
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<tr>
<td>MASS</td>
<td>2.5 lbm</td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td></td>
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<tr>
<td>MATERIAL, BODY</td>
<td></td>
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<td></td>
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<td>PORTS, SIZE &amp; TYPE</td>
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<td>INTEGRAL FILTER</td>
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<td>RESPONSE TIME, OPEN/CLOSE</td>
<td>20/40 ms</td>
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<td>28 Vdc</td>
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<td>PULL IN/DROP OUT</td>
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</tr>
<tr>
<td>WATTS</td>
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<td>OPERATING TEMPERATURE RANGE</td>
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<td>SHOCK</td>
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<td>LIFE, SERVICE</td>
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<td>CYCLE</td>
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<td>RELIABILITY</td>
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<td>LEAD Ti.℃</td>
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<tr>
<td>COST</td>
<td></td>
</tr>
<tr>
<td>REMARKS</td>
<td>Torque-motor actuated, dual w/bypass</td>
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<tr>
<td>DATA SOURCE</td>
<td>Consolidated Controls product data booklet - 1986</td>
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</table>
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
DROP
RATED FLOW  ESEOD = 0.08 in. min. (Cp = 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
LEAF TIME
COST
REMARKS

DATA SOURCE  Futurecraft drawing 200787 - 1985
LINE/THRUSTER VALVE

MANUFACTURER  Futurecraft Corporation
PART NUMBER  200788-59, -69
DESCRIPTION  Dual coil, three-way
QUALIFICATION STATUS  Space shuttle OMS (Aerojet)

PROPELLANT/FLUID  GN₂

PRESSURE, OPERATING  450 psig
PROC  1000 psig
BURST  2000 psig
DROP

RATED FLOW  ESEOD = 0.035 and 0.070 in. min. (Cₚ = 0.60)

LEAKAGE, INTERNAL
EXTERNAL

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
LINE/THRUSTER VALVE

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. (CD = 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

PULL 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

REMARKS

DATA SOURCE  Futurecraft drawing 200851 - 1985
**LINE/THRUSTER VALVE**

**MANUFACTURER** Futurecraft Corporation

**PART NUMBER** 200916

**DESCRIPTION** Latching, solenoid

**QUALIFICATION STATUS** Teal Ruby (Rockwell)

**PROPELLANT/FLUID** GN₂, GHe, others

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>85 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROOF</td>
<td>128 psig</td>
</tr>
<tr>
<td>BURST</td>
<td>9555 psia</td>
</tr>
<tr>
<td>DROP</td>
<td></td>
</tr>
</tbody>
</table>

**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

PROPELLANT/FLUID  NTO, MMH

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.

SHELF

RELIABILITY

LEAD TIME

COST

REMARKS

DATA SOURCE  Marquardt report (ref. 12)
MANUFACTURER  Moog Inc.
PART NUMBER  50-353
DESCRIPTION  Redundant seat, torque motor, thruster valve
QUALIFICATION STATUS  Moog R&D, none known

PROPELLANT/FLUID  N₂H₄

PRESSURE, OPERATING  250 psig
  PROOF
  BURST
  DROP  16 psid
RATED FLOW  0.025 lb/s

LEAKAGE, INTERNAL  1.0 SCCH max.
  EXTERNAL
MASS  0.82 lbm
DIMENSIONS

MATERIAL, BODY
  SEAT/SEAL  Teflon
PORTS, SIZE & TYPE
  INTEGRAL FILTER  20 μm nom., 35 μm abs
  RESPONSE TIME, OPEN/CLOSE  5.5/5.5 ms
  VOLTAGE, OPERATING  24 to 32 Vdc
  PULL IN/DROP OUT
  WATTS  21.3 max.
  ELECTRICAL CONNECTION
  MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
  SINE
ACCELERATION
SHOCK

LIFE, SERVICE
  CYCLE
  SHELF
RELIABILITY
LEAD TIME
COST
REMARKS  5-lbf thruster

DATA SOURCE  Moog catalog - 1984
LINE/THRUSTER VALVE

MANUFACTURER  Moog Inc.
PART NUMBER 50X366
DESCRIPTION Torque motor, thruster valve
QUALIFICATION STATUS ATS - Moog

PROPELLANT/FLUID N₂H₄

PRESSURE, OPERATING 350 psig
PROOF
BURST
DROP 12 psid
RATED FLOW 0.0025 lb/s

LEAKAGE, INTERNAL 5.0 SCCH max.
EXTERNAL
MASS 0.40 lbm

DIMENSIONS

MATERIAL, BODY
SEAT/SEAL Teflon

PORTS, SIZE & TYPE

INTEGRAL FILTER 10 μm nom., 25 μm abs
RESPONSE TIME, OPEN/CLOSE 1/1 ms
VOLTAGE, OPERATING 18 to 32 Vdc
PULL IN/DROP OUT

WATTS 7.9

ELECTRICAL CONNECTION

MOUNTING

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
SINE
ACCELERATION
SHOCK

LIFE, SERVICE
CYCLE
SHELF

RELIABILITY

LEAD TIME

COST

REMARKS 0.5-lbf thruster

DATA SOURCE Moog catalog - 1984
# LINE/THRUSTER VALVE

**MANUFACTURER** Moog Inc.  
**PART NUMBER** 50-391  
**DESCRIPTION**  
**QUALIFICATION STATUS** Grand Tour (Rocket Research)  
**PROPELLANT/FLUID** N₂H₄

<table>
<thead>
<tr>
<th><strong>PRESSURE, OPERATING</strong></th>
<th>400 psig</th>
<th><strong>BURST</strong></th>
<th>5 psid</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROOF</strong></td>
<td></td>
<td><strong>DROP</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>RATED FLOW</strong></th>
<th>0.0005 lb/s</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>PRESSURE, OPERATING</strong></th>
<th>400 psig</th>
</tr>
</thead>
</table>

| **LEAKAGE, INTERNAL** | 1.0 SCCH max. | **EXTERNAL** |
|-----------------------|---------------|

<table>
<thead>
<tr>
<th><strong>MASS</strong></th>
<th>0.20 lbm</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>SEAT/SEAL Teflon</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>INTEGRAL FILTER</strong></th>
<th>5 μm nom., 15 μm abs</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>RESPONSE TIME, OPEN/CLOSE</strong></th>
<th>10/10 ms</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>VOLTAGE, OPERATING</strong></th>
<th>24 to 32 Vdc</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>PULL IN/DROP OUT</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>WATTS</strong></th>
<th>10 max.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>ELECTRICAL CONNECTION</strong></th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th><strong>OPERATING TEMPERATURE RANGE</strong></th>
</tr>
</thead>
</table>

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

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

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

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

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

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

<table>
<thead>
<tr>
<th><strong>REMARKS</strong></th>
<th>0.1-lbf thruster</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>DATA SOURCE</strong></th>
<th>Moog catalog - 1984</th>
</tr>
</thead>
</table>

336
**LINE/THRUSTER VALVE**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Moog Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>50-438</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Redundant solenoid thruster valve</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>FLTSATCOM (Hamilton Standard)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>N₂H₄</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>210 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>DROP</td>
<td>4 psid</td>
</tr>
</tbody>
</table>

| RATED FLOW | 0.0005 lb/s |

<table>
<thead>
<tr>
<th>LEAKAGE, INTERNAL</th>
<th>5.0 SCCH max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTERNAL</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MASS</th>
<th>0.80 lbm</th>
</tr>
</thead>
</table>

| DIMENSIONS | |
|------------||

<table>
<thead>
<tr>
<th>MATERIAL, BODY</th>
<th>SEAT/SEAL</th>
<th>Teflon</th>
</tr>
</thead>
</table>

| PORTS, SIZE & TYPE | |
|--------------------||

<table>
<thead>
<tr>
<th>INTEGRAL FILTER</th>
<th>10 μm nom., 25 μm abs</th>
</tr>
</thead>
</table>

| RESPONSE TIME, OPEN/CLOSE | 12/17 ns |

<table>
<thead>
<tr>
<th>VOLTAGE, OPERATING</th>
<th>18 to 28 Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td>PULL IN/DROP OUT</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WATTS</th>
<th>8.43 max.</th>
</tr>
</thead>
</table>

| ELECTRICAL CONNECTION | |
|-----------------------||

| MOUNTING | |
|----------||

| OPERATING TEMPERATURE RANGE | |
|-----------------------------||

| VIBRATION, RANDOM | |
|-------------------||
| SINE               | |
| ACCELERATION      | |
| SHOCK             | |

| LIFE, SERVICE | |
|---------------||
| CYCLE         | |
| SHELF         | |

| RELIABILITY | |
|-------------||

| LEAD TIME | |
|-----------||

| COST | |

<table>
<thead>
<tr>
<th>REMARKS</th>
<th>0.1-lbf thruster</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>DATA SOURCE</th>
<th>Moog catalog - 1984</th>
</tr>
</thead>
</table>

337
**LINE/THRUSTER VALVE**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Moog Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>51-109</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Solenoid thruster valve</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>MJS (Rocket Research)</td>
</tr>
<tr>
<td>PROPELLANT/FLUID</td>
<td>N$_2$H$_4$</td>
</tr>
<tr>
<td>PRESSURE, OPERATING</td>
<td>420 psig</td>
</tr>
<tr>
<td>PROOF</td>
<td>420 psig</td>
</tr>
<tr>
<td>BURST</td>
<td>420 psig</td>
</tr>
<tr>
<td>DROP</td>
<td>5 psid</td>
</tr>
<tr>
<td>RATED FLOW</td>
<td>0.0009 lb/s</td>
</tr>
<tr>
<td>LEAKAGE, INTERNAL</td>
<td>2 SCCH</td>
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<tr>
<td>EXTERNAL</td>
<td></td>
</tr>
<tr>
<td>MASS</td>
<td>0.24 lbm</td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td></td>
</tr>
<tr>
<td>MATERIAL, BODY</td>
<td></td>
</tr>
<tr>
<td>SEAT/SEAL</td>
<td>AFE-411</td>
</tr>
<tr>
<td>PORTS, SIZE &amp; TYPE</td>
<td></td>
</tr>
<tr>
<td>INTEGRAL FILTER</td>
<td>25 µm abs</td>
</tr>
<tr>
<td>RESPONSE TIME, OPEN/CLOSE</td>
<td>8/6 ms</td>
</tr>
<tr>
<td>VOLTAGE, OPERATING</td>
<td>24 to 34 Vdc</td>
</tr>
<tr>
<td>PULL IN/DROP OUT</td>
<td></td>
</tr>
<tr>
<td>WATTS</td>
<td>5.4 max.</td>
</tr>
<tr>
<td>ELECTRICAL CONNECTION</td>
<td></td>
</tr>
<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>
<td></td>
</tr>
<tr>
<td>ACCELERATION</td>
<td></td>
</tr>
<tr>
<td>SHOCK</td>
<td></td>
</tr>
<tr>
<td>LIFE, SERVICE</td>
<td></td>
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<tr>
<td>CYCLE</td>
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<tr>
<td>SHELF</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>0.2-lbf thruster</td>
</tr>
<tr>
<td>DATA SOURCE</td>
<td>Moog catalog - 1984</td>
</tr>
</tbody>
</table>
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
      FURST
      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
**LINE/THRUSTER VALVE**

**MANUFACTURER**  Moog Inc.  
**PART NUMBER**  51-122A  
**DESCRIPTION**  Series redundant solenoid thruster valve  
**QUALIFICATION STATUS**  8623 (TRW)  

<table>
<thead>
<tr>
<th><strong>PROPELLANT/FLUID</strong></th>
<th>N2H4</th>
</tr>
</thead>
</table>

**PRESSURE, OPERATING**  310 psig  
**PROOF**  
**BURST**  
**DROP**  10 psid  
**RATED FLOW**  0.005 lb/s  

**LEAKAGE, INTERNAL**  0.5 SCCH  
**EXTERNAL**  
**MASS**  0.54 lbm  
**DIMENSIONS**  

**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**  

**OPERATING TEMPERATURE RANGE**  

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

**LIFE, SERVICE**  
**CYCLE**  
**SHELF**  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS**  1-lbf thruster  

**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  lx10^-6 SCCS GHe
MASS  0.45 lbf 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
PROOF
BURST
DROPT
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

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  1x10⁻⁶ 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
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
**MANUFACTURER** Parker Hannifin

**PART NUMBER** 5720048 "Walnut valve"

**DESCRIPTION** Miniature latching solenoid

**QUALIFICATION STATUS** Viking GCMS

**PROPELLANT/FLUID**

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>0 to 1000 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>DROP</td>
<td></td>
</tr>
</tbody>
</table>

**RATED FLOW** Effective flow area, 0.000198 in.²

**LEAKAGE, INTERNAL** 1x10⁻⁶ SCCH He

**EXTERNAL**

<table>
<thead>
<tr>
<th>MASS</th>
<th>0.090 lbm</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIMENSIONS</td>
<td>≈ 1.25 in. length by 0.5 in. diam by 0.8 in. wide</td>
</tr>
</tbody>
</table>

**MATERIAL, BODY**

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

**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**

<table>
<thead>
<tr>
<th>WATTS</th>
<th>20 max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELECTRICAL CONNECTION</td>
<td></td>
</tr>
<tr>
<td>MOUNTING</td>
<td></td>
</tr>
</tbody>
</table>

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM** 400g peak to unlatch

**SINE**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

<table>
<thead>
<tr>
<th>CYCLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHELF</td>
</tr>
</tbody>
</table>

**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 0.015 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**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>Valcor Engineering Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>V27200-411</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Propellant isolation</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>USAF classified project (Hamilton Standard)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROPELLANT/FLUID</th>
<th>N₂H₄</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PRESSURE</th>
<th>OPERATING 576 psia (397 N/cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROOF</td>
<td>857 psia (590 N/cm²)</td>
</tr>
<tr>
<td>BURST</td>
<td>1193 psia (822 N/cm²)</td>
</tr>
<tr>
<td>DROP</td>
<td></td>
</tr>
</tbody>
</table>

| RATED FLOW        |                                 |

| LEAKAGE, INTERNAL | 20 SCCH N₂ at 561 psia          |
| EXTERNAL         | 5×10⁻⁶ SCCS 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** \( \text{GN}_2 \)

**Pressure, Operating** 0 to 315 psia; 315 to 340 psia nonoperating

- **Proof** 600 psig
- **Burst** 1200 psig
- **Drop** 0.8 psid

**Rated Flow** \( \text{FEOD} = 0.19 \text{ to } 0.23 \text{ in.}; C_n = 0.61 \text{ at } 70 \text{ °F} \)

**Leakage, Internal** \( 1 \times 10^{-6} \text{ SCCH He} \)

**External** \( 1 \times 10^{-6} \text{ SCCH He} \)

**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/Closed** 40/40 ms

**Voltage, Operating** 21.3 to 31

**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

349
**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

**PRESSURE**

<table>
<thead>
<tr>
<th>OPERATING</th>
<th>350 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROOF</td>
<td></td>
</tr>
<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>DROP</td>
<td></td>
</tr>
</tbody>
</table>

**RATED FLOW** 0.2 SCFM air

**LEAKAGE**

<table>
<thead>
<tr>
<th>INTERNAL</th>
<th>2x10⁻⁶ SCCS He</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTERNAL</td>
<td>2x10⁻⁶ SCCS He</td>
</tr>
</tbody>
</table>

**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 V

**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**

<table>
<thead>
<tr>
<th>CYCLE</th>
<th>2,000,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHELF</td>
<td></td>
</tr>
</tbody>
</table>

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**

**DATA SOURCE** Wright Components catalog - 1984
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  CF$_4$ (-2), NH$_3$ (-5)

PRESSURE, OPERATING  60 psig

PROOF

BURST

DROP

RATED FLOW  1.4 SCFM air

LEAKAGE, INTERNAL  6x10$^{-5}$ SCCE 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
# LINE/THRUSTER VALVE

**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

**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

**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.
CALIFICATION 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** CF₄ (Freon 14), GN₂

**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 GN₂

**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
PROOF
BURST
DROP

RATED FLOW

LEAKAGE, INTERNAL  1x10⁻⁶ SCCS He
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  1.2x10^-4 lbm/s

LEAKAGE, INTERNAL  1x10^-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
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  1x10^-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
**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

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358
**LINE/THRUSTER VALVE**

**MANUFACTURER** Wright Components, Inc.  
**PART NUMBER** 15617-5  
**DESCRIPTION** Pulse coaxial solenoid  
**QUALIFICATION STATUS** BSE (Hamilton Standard), flown

**PROPELLANT/FLUID** N$_2$H$_4$

<table>
<thead>
<tr>
<th>Pressure, Operating</th>
<th>400 psig</th>
<th>Proof</th>
<th>594 psig</th>
<th>Burst</th>
<th>1584 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proof</td>
<td>594 psig</td>
<td>Burst</td>
<td>1584 psig</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated Flow</td>
<td>0.0005 lbm/s</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Leakage, Internal** $2 \times 10^{-6}$ SCCS He  
**Leakage, External** $1 \times 10^{-6}$ SCCS He  
**Mass** 0.17 lbm (not including lead wire)  
**Dimensions** 2.5 in. by 0.875 in. diam  
**Material, Body** 302, 304, 347, or 430 CRES  
**Seals/Seals** AF-E-102  
**PCRTS, Size & Type**

**Integral Filter**

**Response Time, Open/Closed** 8/10 ms  
**Voltage, Operating** 28 Vdc (25 to 29 Vdc)  
**Watts** 5.7  
**Electrical Connection** Free leads  
**Mounting**

**Operating Temperature Range**

**Vibration, Random**

**Sine Acceleration**

**Shock**

**Life, Service** 3 yr  
**Cycle** 500,000  
**Shelf Life**

**Reliability**

**Lead Time**

**Cost**

**Remarks**

**Data Source** Wright Components catalog - 1984
LINE/THRUSTER VALVE

<table>
<thead>
<tr>
<th>ManUFACTURER</th>
<th>Wright Components, Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART NUMBER</td>
<td>15626-2</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Pulse coaxial solenoid, N.C.</td>
</tr>
<tr>
<td>QUALIFICATION STATUS</td>
<td>Solrad X1, classified program (Hamilton Standard), flown</td>
</tr>
<tr>
<td>PROPELLENT/FLUID</td>
<td>N\textsubscript{2}H\textsubscript{4} (per MIL-P-26536)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>250 psig, 300 max. psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROOF</td>
<td>600 psig</td>
</tr>
<tr>
<td>BURST</td>
<td>1200 psig</td>
</tr>
<tr>
<td>DROP</td>
<td>40 psid</td>
</tr>
</tbody>
</table>

| RATED FLOW | 0.0009 lbm/s |

<table>
<thead>
<tr>
<th>LEAKAGE, INTERNAL</th>
<th>1.5x10\textsuperscript{-6} SCCS He</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTERNAL</td>
<td>1.0x10\textsuperscript{-6} SCCS He</td>
</tr>
</tbody>
</table>

| MASS | 0.28 lbm |

<table>
<thead>
<tr>
<th>DIMENSIONS</th>
<th>0.018-in.-seat diam, 0.962 in. width less case.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.627 in. length, 2.01 in. height</td>
</tr>
</tbody>
</table>

| MATERIAL, BODY | 304 CRES, 430 CRES spool |
| SEAT/SEAL      | AF-E-102 |

<table>
<thead>
<tr>
<th>PARTS &amp; TYPE</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>INTEGRAL FILTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESPONSE TIME, OPEN/CLOSE</td>
</tr>
<tr>
<td>VOLTAGE, OPERATING</td>
</tr>
<tr>
<td>PULL IN/DROP OUT</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 |

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

<table>
<thead>
<tr>
<th>LIFE, SERVICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CYCLE</td>
</tr>
<tr>
<td>SHELF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RELIABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEAD TIME</td>
</tr>
<tr>
<td>COST</td>
</tr>
</tbody>
</table>

| REMARKS | Ref. P/N 15626-4 |

| DATA SOURCE | Wright Components catalog - 1984 |

360
**LINE/THRUSTER VALVE**

**MANUFACTURER** Wright Components, Inc.

**PART NUMBER** 15626-4

**DESCRIPTION** Pulse coaxial

**QUALIFICATION STATUS** Classified (Hamilton Standard), flown

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

**PRESSURE, OPERATING** 250 psig

**PROOF**

**BURST**

**DROP**

**RATED FLOW** 0.0009 lbm/s

**LEAKAGE, INTERNAL** $1\times10^{-6}$ 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**

**RESPONSE TIME, OPEN/CLOSE** 10/8 ms

**VOLTAGE, OPERATING** 24 to 32 Vdc

**PULL IN/DROP OUT** 12.6/1.0 Watt

**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  1x10⁻⁵ 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** $1 \times 10^{-6}$ 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

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**LINE/THRUSTER VALVE**

**MANUFACTURER** Wright Components, Inc.

**PART NUMBER** 15726-5

**DESCRIPTION** Dual coaxial, solenoid

**QUALIFICATION STATUS** Indian Apple (Hamilton Standard), flown

**PROPELLANT/FLUID** N$_2$H$_4$

**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
LINE/THRUSTER VALVE

MANUFACTURER  Wright Components, Inc.
PART NUMBER  15726-7
DESCRIPTION  Dual coaxial
QUALIFICATION STATUS  DSCE III (Hamilton Standard), flown

PROPELLANT/FLUID  N₂H₄
PRESSURE, OPERATING  415 psia
PROOF
BURST
DROP
RATED FLOW  0.1 lb thrust

LEAKAGE, INTERNAL  1x10⁻⁵ SCCS He
EXTERNAL  1x10⁻⁶ SCCS He
MASS  0.44 lb
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
LINE/THRUSTER VALVE

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
PULL IN/DROP OUT_ 16/4 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_ SINE
ACCELERATION_ SHOCK

LIFE, SERVICE
CYCLE_ 500,000 min.
SHELF
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**  N₂H₄ (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.

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**  Ref. P/N 15770-5

**DATA SOURCE**  Wright Components catalog - 1984
**LINE/THRUSTER VALVE**

**MANUFACTURER** Wright Components, Inc.
**PART NUMBER** 15770-5
**DESCRIPTION** Pulse
**QUALIFICATION STATUS** TRW, qualified

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

**PRESSURE, OPERATING** 400 psia
**PROOF**
**BURST**
**DROP**
**RATED FLOW** 0.025 lb/s

**LEAKAGE, INTERNAL** 1 SCCH GN$_2$
**EXTERNAL** $1\times10^{-6}$ SCCS He

**MASS** 0.33 lbm

**MATERIAL, BODY**
**SEAT/SEAL** AF-E-411
**PORTS, SIZE & TYPE**

**INTEGRAL FILTER**
**RESPONSE TIME, OPEN/CLOSE** 17.8 ms
**VOLTAGE, OPERATING** 27 Vdc
**PULL IN/DROP OUT** 16/2 Vdc
**WATTS** 16.4
**ELECTRICAL CONNECTION** Free leads

**OPERATING TEMPERATURE RANGE**

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

**LIFE, SERVICE**
**CYCLE** 500,000
**SHELF**
**RELIABILITY**
**LEAD TIME**
**COST**
**REMARKS** Ref. P/N 15770

**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
- **Propellant/Fluid:** \( \text{N}_2\text{H}_4 \)

### Pressure
- **Operating Pressure:** 400 psia  
- **Proof Pressure:** 600 psig  
- **Burst Pressure:** 1600 psig  
- **Drop Pressure:** 8.4 psid

### Rated Flow
- **Rated Flow:** 0.0005 lb/s

### Leakage
- **Internal Leakage:** \( 2 \times 10^{-6} \) SCCS He  
- **External Leakage:** \( 1 \times 10^{-6} \) SCCS He

### Mass
- **Mass:** 0.20 lbm (not including lead wires)

### Dimensions
- **Dimensions:** 2.877 in. LOA, 1.51-in. mound diam, 0.870-in. body diam

### Material, Body
- **Material, Body: AF-E-102**

### Ports, Size & Type
- **Ports, Size & Type:** 0.128/0.125-in.-diam by 0.0175/0.0145-in. wall, 304L CRES tube inlet

### Integral Filter
- **Integral Filter**

### Response Time
- **Response Time, Open/Close:** 10/5 ms

### Voltage
- **Operating Voltage:** 24 to 28 Vdc  
- **Pull In/Drop Out:** 16/2 Vdc

### Watts
- **Watts:** 5.4

### Electrical Connection
- **Electrical Connection:** Free leads

### Mounting
- **Mounting:** Three 4-40 UNC-2B holes on 1.25-in.-diam BC

### Operating Temperature Range
- **Operating Temperature Range:** Fluid, 40 to 160 °F; ambient, 40 to 200 °F

### Vibration
- **Vibration, Random:**
- **Acceleration:**
- **Sine:**
- **Shock:**

### Life, Service
- **Cycle:** 500,000 min.  
- **Shelf:**

### Reliability
- **Reliability:**

### Lead Time
- **Lead Time:**

### Cost
- **Cost:**

### Remarks
- **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)

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

SHELF:

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 $N_2H_4$ thruster w/gas generator

QUALIFICATION STATUS  Intelsat V

PROPELLANT/FLUID  $N_2H_4$

PRESSURE, OPERATING  320 to 200 psia
CHAMBER  115 to 80 psia
PROOF
BURST
RATED FLOW  0.0271 to 0.0193 lbm/s
TOTAL THROUGHPUT  22.5 lbm
TOTAL IMPULSE
MASS  0.82 lbm w/o valve (1.30 lbm w/valve)

DIMENSIONS

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**  $\text{N}_2\text{H}_4$ thruster assembly w/shell 405 catalyst gas generator, Clayborne heater  
**QUALIFICATION STATUS**  ATS F and G  

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

**PRESSURE, OPERATING**  395 to 125 psia inlet (272 to 86 N/cm²)  
**CHAMBER PROOF**  600 psia (413 N/cm²)  
**BURST**  600 psia (413 N/cm²)  

**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**  1.81x10⁵ s ontime  
**CYCLE**  10⁵, (2x10⁴ 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

**MANUFACTURER**  
Rocket Research Corporation

**PART NUMBER**  
MR-103C

**DESCRIPTION**  
0.2 lbf thruster with shell 405 catalyst gas generator

**QUALIFICATION STATUS**  
SATCOM, SPACENET, G-Star (RCA)

**PROPELLANT/FLUID**  
N₂H₄

**PRESSURE, OPERATING**  
420 to 70 psia

**CHAMBER**  
370 to 60 psia

**PROOF**

**BURST**

**RATED FLOW**  
0.001 to 0.0002 lbm/s

**TOTAL THROUGHPUT**  
173 lbm

**TOTAL IMPULSE**

**MASS**  
0.28 lbm w/o valve (0.73 w/valve)

**DIMENSIONS**  
2.28 in. by 1.35 in. diam (w/o valve)

**MATERIAL, BODY**

**CATALYST/CORE**

**PORTS, SIZE & TYPE**

**VOLTAGE**  
28 Vdc (valve)

**WATTS**  
9 W (valve)

**ELECTRICAL CONNECTION**

**DUTY CYCLE**

**MOUNTING**  
Three-bolt flange

**OPERATING TEMPERATURE RANGE**

**VIBRATION, RANDOM**

**SINE**

**SHOCK**

**LIFE, SERVICE**  
18-hr steady state run time

**CYCLE**  
410,000

**SHELF**

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**  
Assembled with Wright dual seat valve; expansion ratio, 100:1

**DATA SOURCE**  
Rocket Research product data sheet - 1986
GAS GENERATOR

MANUFACTURER  Rocket Research Corporation
PART NUMBER  MR-111
DESCRIPTION  0.45 lbf N$_2$H$_4$ thruster w/shell 405 catalyst-bed gas generator
QUALIFICATION STATUS  Intelsat V (Ford)

PROPELLANT/FLUID  N$_2$H$_4$

PRESSURE, OPERATING  320 to 120 psia
CHAMBER  184 to 84 psia
PROOF
BURST
RATED FLOW  0.002 to 0.0009 lbm/s
TOTAL THROUGHPUT  272 lbm
TOTAL IMPULSE
MASS  0.259 lbm w/o valve (0.704 lbm w/valve)
DIMENSIONS  3.10 in. by 1.40 in. diam (w/o valve)

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
SHELF
RELIABILITY
LEAD TIME
COST

REMARKS  Assembled with Wright components valve; expansion ratio, 200:1

DATA SOURCE  Rocket Research product data sheet - 1986
GAS GENERATOR

MANUFACTURER  Rocket Research Corporation
PART NUMBER  MR-111A
DESCRIPTION  0.5 lbf thruster w/shell 405 catalyst-bed gas generator
QUALIFICATION STATUS  ERBS (Ball Aerospace)

PROPELLANT/FLUID  N2H4

PRESSURE, OPERATING  370 to 60 psia
                      CHAMBER  204 to 45 psia
PROOF  BURST
RATED FLOW  0.00223 to 0.00047 lbm/s
TOTAL THROUGHPUT  127 lbm
TOTAL IMPULSE
MASS  0.28 lbm w/o valve (0.76 lbm w/valve)
DIMENSIONS  3.10 in. by 1.40 in. diam (w/o valve)

MATERIAL, BODY
               CATALYST/CORE

PORTS, SIZE & TYPE
VOLTAGE  28 Vdc (valve)
WATTS  9 W (valve)
ELECTRICAL CONNECTION
DUTY CYCLE
MOUNTING  Three-bolt flange

OPERATING TEMPERATURE RANGE

VIBRATION, RANDOM
               SINE
ACCELERATION
SHOCK

LIFE, SERVICE  15-hr steady state run time
               CYCLE  15,082
SHELF

RELIABILITY
LEAD TIME
COST
REMARKS  Assembled with Wright Components valve

DATA SOURCE  Rocket Research product data sheet - 1986
**GAS GENERATOR**

**MANUFACTURER**  Rocket Research Corporation  
**PART NUMBER**  
**DESCRIPTION**  Catalyst bed w/integral pressure transducer and temperature sensor  
**QUALIFICATION STATUS**  Space shuttle orbiter and solid rocket boosters  
**PROPELLANT/FLUID**  $\text{H}_2\text{H}_4$  

<table>
<thead>
<tr>
<th>PRESSURE, OPERATING</th>
<th>1300 psia</th>
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</thead>
<tbody>
<tr>
<td>CHAMBER</td>
<td></td>
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<tr>
<td>PROOF</td>
<td></td>
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<tr>
<td>BURST</td>
<td></td>
</tr>
<tr>
<td>RATED FLOW</td>
<td>0.265 lbm/s nom., 0.310 lbm/s max.</td>
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<tr>
<td>TOTAL THROUGHPUT</td>
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<tr>
<td>TOTAL IMPULSE</td>
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<td>MASS</td>
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<td>DIMENSIONS</td>
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</tbody>
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**MATERIAL, BODY**  
**CATALYST/CORE**  

**PORTS, SIZE & TYPE**  
**VOLTAGE**  
**WATTS**  
**ELECTRICAL CONNECTION**  
**DUTY CYCLE**  
**MOUNTING**  

**OPERATING TEMPERATURE RANGE**  Input, 45 to 150 °F; output 1700 °F  
**VIBRATION, RANDOM**  
**SINE**  
**ACCELERATION**  
**SHOCK**  40g  

**LIFE, SERVICE**  10 yr minimum (including storage) 60 hr  
**CYCLE**  100 minimum  
**SHELF**  
**RELIABILITY**  
**LEAD TIME**  
**COST**  
**REMARKS**  20 hr TBO, serviceable  

**DATA SOURCE**  AIAA paper 83-1381 (ref. 13)
GAS GENERATOR

MANUFACTURER  TRW
PART NUMBER  MRE-4 series
DESCRIPTION  Thruster assembly w/catalyst-bed gas generator and Parker valve
QUALIFICATION STATUS  Intelsat III, DSCS II, Atmosphere Explorer (flown)
PROPELLANT/FLUID  N₂H₄

PRESSURE, OPERATING  600 psia inlet chamber
PROOF  1000 psia (681 N/cm²)
BURST  1200 psia (816 N/cm²)

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
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

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## TEMPERATURE TRANSDUCER

**MANUFACTURER**  Weed Instrument Company, Inc.

**PART NUMBER**  Model A9515

**DESCRIPTION**  Surface sensor

**QUALIFICATION STATUS**

**PROPELLANT/FLUID**

**INDICATED TEMPERATURE, MAX**

**PRESSURE, OPERATING**

**PROOF**

**BURST**

**MASS**

**DIMENSIONS**  0.425 by 0.425 by 0.100 in. (1.080 by 1.080 by 0.254 cm)

**MATERIAL**

**PORT, SIZE & TYPE**

**VOLTAGE, INPUT**

**WATTS**

**SIGNAL**  0.00385±0.00003 °F/°C; 500 Ω element

**ELECTRICAL CONNECTION**  Two 12-in. wire leads

**MOUNTING**  Adhesive

**OPERATING TEMPERATURE RANGE**  -67 to 311 °F (-55 to 155 °C)

**VIBRATION, RANDOM**

**ACCELERATION**

**SHOCK**

**LIFE, SERVICE**

**CYCLE**

**SHELF**  5 yr

**RELIABILITY**

**LEAD TIME**

**COST**

**REMARKS**  Rated current, 5 mA min.

**DATA SOURCE**  Weed product data sheet - 1985
REFERENCES


<table>
<thead>
<tr>
<th>TABLE I</th>
<th>IOC PLUS GROWTH STATION ANNUAL WASTE GAS PRODUCTION/ BOSCH ECLSS (lbm/year)</th>
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</thead>
<tbody>
<tr>
<td>BOSCH ECLSS:</td>
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<tr>
<td>ARGON</td>
<td>1264</td>
</tr>
<tr>
<td>CO2</td>
<td>208</td>
</tr>
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<td>CO2/CH4</td>
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<td>36</td>
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<tr>
<td>HYDROGEN</td>
<td>182</td>
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<tr>
<td>NITROGEN</td>
<td>1600</td>
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<tr>
<td>OXYGEN</td>
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<tr>
<td>XENON</td>
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<tr>
<td>KRYPTON</td>
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<tr>
<td>TOTALS:</td>
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<td>---------------------</td>
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<tr>
<td>ARGON</td>
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<tr>
<td>CO2</td>
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<td>TOTALS</td>
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</table>

TABLE II 10C PLUS GROWTH STATION ANNUAL WASTE GAS PRODUCTION/SABATIER ECLSS (lbm/year)
<table>
<thead>
<tr>
<th>Component/System</th>
<th>CO₂/CH₄</th>
<th>H₂/O₂/N₂/Freon</th>
<th>H₂O</th>
<th>N₂H₄</th>
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</thead>
<tbody>
<tr>
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<td>FITTING/CONNECTOR</td>
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<tr>
<td>TANK</td>
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<tr>
<td>SERVICE VALVE</td>
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<tr>
<td>FILTER</td>
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<tr>
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<tr>
<td>RESISTOJET THRUSTER</td>
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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.
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