

ESSEX CRYOGENICS INDUSTRIES

8213 GRAVOIS AVE.

ST. LOUIS, MISSOURI 63123

To: HOLDERS OF HYDRAULIC PULSATION DAMPENER 485000  
COMPONENT MAINTENANCE MANUAL

REVISION No. 1 DATED NOVEMBER 1, 1972

### HIGHLIGHTS

Pages which have been revised are outlined below together with the highlights of the revision. Please delete the affected pages and enter Revision No. 1 dated November 1, 1972 to the Record of Revision Sheet.

Chapter/Section/Page	Description of Change	Effectivity
29 - 12 - 01 All pages	Revised in its entirety to delete 485000-7 and add 485000-9 and 485000-12	All Models



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**COMPONENT MAINTENANCE MANUAL**  
**HYDRAULIC PULSATION DAMPNER**

PART NUMBER

**485000-3**

**485000-4**

**485000-5**

**485000-9**

**485000-12**

**29-12-01**

NOV 1/71

Revised NOV 1/72



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**SERVICE BULLETIN LIST**

Service Bulletin	Incorp.	Service Bulletin	Incorp.
485000-29-1			

**29-12-01**

Service Bulletin List

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## ESSEX CRYOGENICS INDUSTRIES

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#### 1. DESCRIPTION and OPERATION

##### A. Description (See Figure 6)

- (1) Hydraulic Pulsation Dampeners, part numbers 485000-3, 485000-4, 485000-5, 485000-9 and 485000-12 are designed for installation on aircraft (Skydrol) hydraulic systems. The units are interchangeable, identical in function and performance and similar in construction. The only differences are as follows:
  - (a) The 485000-3 and 485000-5 Dampeners have titanium studs with fitting ends per Douglas DAC 7922771-16 which provide a metal to metal sealing surface.
  - (b) The 485000-4 and 485000-9 Dampeners have 17-4PH CRES studs with fitting ends per MS33514-16. These studs require a boss packing for sealing with mating fitting.
  - (c) The 485000-12 Dampeners have 17-4PH CRES studs with fitting ends per Boeing BACD 2037-16. These studs require a boss packing for sealing with mating fitting.
  - (d) The 485000-4, 485000-5, 485000-9 and 485000-12 Dampeners have fusion welding in addition to electron beam welding in the junction of the fitting and the dome.
- (2) Each dampener consists of a dome and fitting assembly (10), stud (8), nut (3), nameplate (9) and appropriately sized packings and retainers. The 485000-4, 485000-9 and 485000-12 also require a boss packing (2).

##### B. Operation

- (1) The Hydraulic Pulsation Dampeners provide a liquid filled surge chamber for absorbing and dampening high frequency pulses from the Skydrol transmission system pump. The studs are cross drilled with eight .375 diameter ports, providing 1.69 times the area of the .813 diameter inlet and outlet ports for optimum flow versus pressure drop characteristics.

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**C. Leading Particulars**

Length —	from inlet to opposite end	
	485000-3, 485000-4, 485000-5, 485000-9	5.6 in.
	485000-12	6.25 in.
Length —	from dome centerline to outlet	3.8 in.
Dome diameter		3.6 in.
Weight —	485000-4 or 485000-9	2.8 lb.
Weight —	485000-3 or 485000-5	2.4 lb.
Weight	485000-12	3.0 lb.
Fluid capacity		19.5 cu. in. min.

**FLUIDS**

Operating Fire Resistant Hydraulic Fluid of the following types:

Monsanto Chemical Co.  
St. Louis, Mo.

- Skydrol 500A
- Skydrol 500B
- Skydrol 500C
- Skydrol LD
- Skydrol 7000

Stauffer Chemical Co.  
New York, N.Y.

- Aerosafe 2300
- Aerosafe 2300W

Chevron Chemical Co.  
San Francisco, Calif.

- Hyjet
- Hyjet W
- Hyjet III

Test Any of the above fluids

Normal Operating System Pressure	3000 psig
Proof Pressure	4500 psig
Burst Pressure	7500 psig
External Leakage	None
Note:	
485000-5	Supersedes 485000-3
485000-9	Supersedes 485000-4
485000-12	Supersedes 485000-9
485000-12	Shall be used for all spares

**LEADING PARTICULARS  
FIGURE 1**



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**2. DISASSEMBLY (See Figure 6)**

**NOTE:** See Testing, for operational test and trouble shooting to establish the condition of unit or most probable cause of malfunction. This is to determine the extent of disassembly required without completely tearing down and rebuilding the unit. If unit checks OK, return unit to service.

- A. Remove hex nut (3)
- B. Remove stud (8) from dome and fitting assembly (10).
- C. Remove all O'Rings, retainers and boss packing from stud (8).
- D. Discard all used O'Rings, retainers and boss packings.

**3. CLEANING**

- A. Remove dirt, metal particles and other contamination from all metal parts by washing with clean Stoddard Solvent per Federal Specification P-D-680 or clean Skydrol per Douglas DMS2014, filtered to 14 microns or better.
- B. Use a stiff, natural bristle brush to remove stubborn accumulations of dirt or other foreign matter.
- C. Dry parts with clean, dry, filtered shop air at 20 psig maximum, filtered to 15 microns or better.

**CAUTION: EXERCISE CARE DURING CLEANING AND HANDLING PARTS TO AVOID DAMAGE TO THE STUD (8) SEALING SURFACE.**

**NOTE:** Equivalent substitutes may be used for listed items.

Stoddard Solvent	Federal Spec P-D-680
Hydraulic Fluid, Fire Resistant	Douglas DMS 2014
Brush, stiff natural bristle	Commercially available

**CLEANING MATERIALS**

**FIGURE 2**

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- D. Immediately after cleaning, coat all external bare metallic surfaces, tube fittings, with a light film of clean fingerprint neutralizer, per MIL-C-15074, Douglas DPM 673, to prevent corrosion during handling. Acceptable types may be found in Qualified Products List QPL-15074.

**CAUTION: DRAIN ALL PARTS THOROUGHLY AND DRY WITH CLEAN, DRY SHOP AIR (FILTERED TO 15 MICRONS OR BETTER) PRIOR TO ASSEMBLY TO PREVENT THE ACCUMULATION OF FINGERPRINT NEUTRALIZER WHICH IS DAMAGING TO RUBBER.**

**4. CHECK**

- A. Visually check all metal parts under a strong light for cracks or corrosion. No cracks are allowed.
- B. Visually check the O'Ring grooves in the stud (8) and the sealing surfaces of the stud (8).
- C. Visually check all threads for cross-threading, stripped threads or dirt accumulations.

**5. REPAIR**

- A. Any minor nicks, scratches or corrosion may be polished out of metal parts with an abrasive cloth 220 grit or finer. Refinish any polished parts as required for corrosion protection.
- B. Chase or file minor thread damage, using a thread chaser or small triangular file, if necessary, on any threaded areas.
- C. Replace all O'Ring packings and boss packings. Replace all O'Ring retainers.
- D. Replace any metallic part which is damaged to the point of being unserviceable or damaged beyond simple repair.

**6. ASSEMBLY (see Figure 6)**

**NOTE:** Immediately prior to assembly, clean all metallic parts by vapor degreasing. Dry with clean, dry, filtered shop air at 20 psig maximum. Assembly shall be accomplished in a clean area. Shop air shall be filtered to 15 microns or better.



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**6. Assembly – Cont'd.**

- A. Lubricate all O'Ring packings with Monsanto Chemical Company MCS352 Skydrol Assembly Lubricant. If this lubricant is not available, use clean Skydrol. Never use petrolatum or any other lubricant.
- B. For 485000-3, 485000-4, 485000-5, and 485000-9:
  - (1) Install retainer (7) on stud (8)
  - (2) Install O'Ring (6) on stud (8)
  - (3) Install O'Ring (5) on stud (8)
  - (4) Install retainer (4) on stud (8)
- C. For 485000-12:
  - (1) Install retainer (14), O'Ring (15) and retainer (14) on stud (8).
  - (2) Install retainer (12), O'Ring (13) and retainer (12) on stud (8).
  - (3) Install retainer (16), O'Ring (17) and retainer (16) on stud (8).
- D. Install boss packing (2) on stud (8) (485000-4, -9 and -12 only).
- E. Insert stud (8) into dome and fitting assembly (10).
- F. Install hex nut (3) on stud (8) and tighten finger tight. The nut (3) is torqued and safety wired on installation in the system to prevent rotation of the fitting and dome assembly (8) with respect to the stud (10).

**7. FITS and CLEARANCES – Not Applicable**

**8. TESTING (Operational Test and Trouble Shooting)**

**A. Equipment and Materials for Testing.**

**NOTE:** Equivalent substitutes may be used for listed items

Equipment/Materials	Description
Fluid Pressure Source (filtered to 15 microns or better)	Regulated Skydrol supply capable of supplying a pressure up to 4500 psig.
Valves	As required to control the source of test fluid
Gage	A pressure gage to read in excess of 4500 psig.
Fitting	As required to connect dampener to pressure source.

**TEST EQUIPMENT and MATERIALS  
FIGURE 3**

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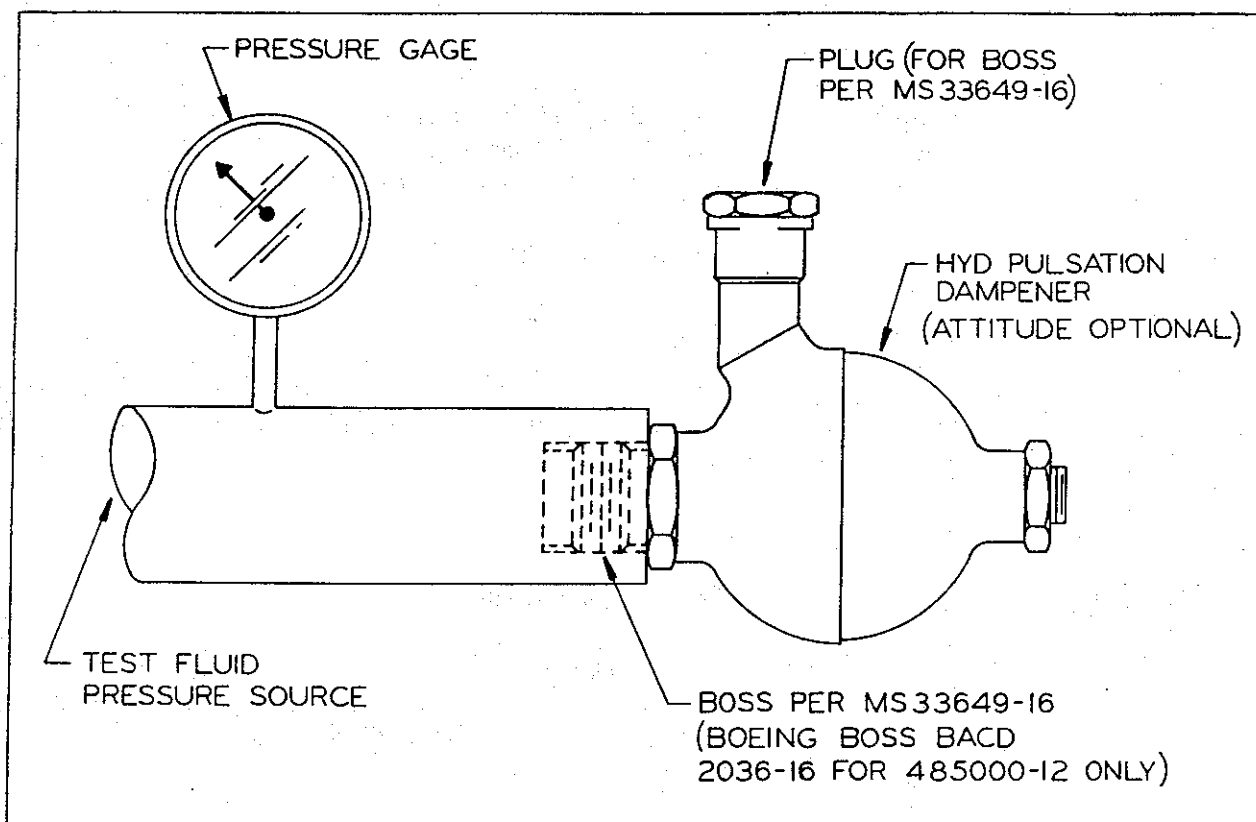
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**CAUTION:** TEST OR FLUSH THE UNIT WITH CLEAN SKYDROL, FILTERED TO 15 MICRONS OR BETTER, WITHIN 24 HOURS AFTER ASSEMBLY.

Perform verification test of the dampener as follows:

**B. Proof Pressure and External Leakage Test (See Figure 4)**

(1) Install the dampener in test setup as shown in Figure 4.



**PROOF PRESSURE and EXTERNAL LEAKAGE TEST SETUP  
FIGURE 4**



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**8. Testing — Cont'd.**

- (2) Bleed all entrapped air from the dampener.
- (3) Apply 4500 psig Skydrol pressure to the inlet (stud) port at least two successive times. The pressure shall be maintained for two minutes for each application. There shall be no structural damage or external leakage.

**CAUTION: DO NOT ADMIT ANY OTHER TYPE OF HYDRAULIC FLUID OR PRESERVATIVE INTO A SKYDROL UNIT AT ANY TIME. DURING TESTING OR FLUSHING, MAKE CERTAIN THAT A FILM OF SKYDROL COATS ALL INTERIOR SURFACES TO PREVENT CORROSION. UPON COMPLETION OF TESTING OR FLUSHING, POUR OUT SURPLUS FLUID BUT DO NOT DRAIN TO THE DRIP POINT. INSTALL CLEAN HARD PLASTIC CLOSURES. WIPE OUTER SURFACE DRY AND REPACKAGE ALL UNITS WITHIN 48 HOURS.**

- C. If the dampener successfully passes the proof pressure and external leakage test, it may be used immediately or prepared for storage as outlined in the Storage section. If the dampener fails this test, disassemble the unit and replace any part that examination reveals to be defective. Reassemble the unit and perform the test again outlined in the Testing Section.

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Malfunction	Probable Cause	Corrective Action
Leakage in area of hex nut (3)	O'Ring (5) or (13) damaged O'Ring (5) or (13) improperly installed	Replace O'Ring (5) or (13) Disassemble and install (5) or (13) properly.
Leakage-inlet area	O'Ring (6) or (15) damaged O'Ring (6) or (15) improperly installed Damaged stud (8) Packing (2) damaged	Replace O'Ring (6) or (15) Disassemble and install (6) or (15) properly Replace or repair stud (8) Replace packing (2)
Leakage - junction of fitting and dome	Defective weld	Replace dome and fitting assy (10)
Leakage - girth weld area of dome	Defective weld	Replace dome and fitting assy (10)
Leakage - pump - dampener interface area	O'Ring (17) damaged O'Ring (17) improperly installed Damaged stud (8)	Replace O'Ring (17) Replace O'Ring (17) Replace stud (8)

TROUBLESHOOTING  
FIGURE 5

### 9. TROUBLE SHOOTING

NOTE: See Testing for Operational Test and Troubleshooting.



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**10. STORAGE INSTRUCTIONS**

- A. Unless the dampener is scheduled for immediate installation, it shall be preserved as follows:
- (1) Install hard plastic closures to protect inlet and outlet ports of dampener.
  - (2) Wrap or seal tested or flushed units in polyethylene bags.
  - (3) Stamp the flushing date and the words "Skydrol Flushed" on a "Corrosion Prevention Treatment Record Tag" and attach tag to part.
  - (4) Place item in a unit set-up box or corrugated paper container.
- B. Re-flush all items every year.
- (1) Examine packaged units each year for damaged containers or expired flushing dates.
  - (2) When containers are damaged or flushing date is expired, accomplish the following:
    - (a) Examine items for corrosion.
    - (b) Rework the unit, if necessary
    - (c) Reassemble and reflush the unit.
    - (d) Repackage as in paragraph 10.A.
- C. Storage.
- (1) Keep dampeners in original containers until ready for installation.
  - (2) Store units indoors, protected from extremes of temperature and moisture.

**11. SPECIAL TOOLS, FIXTURES AND EQUIPMENT — Not applicable**

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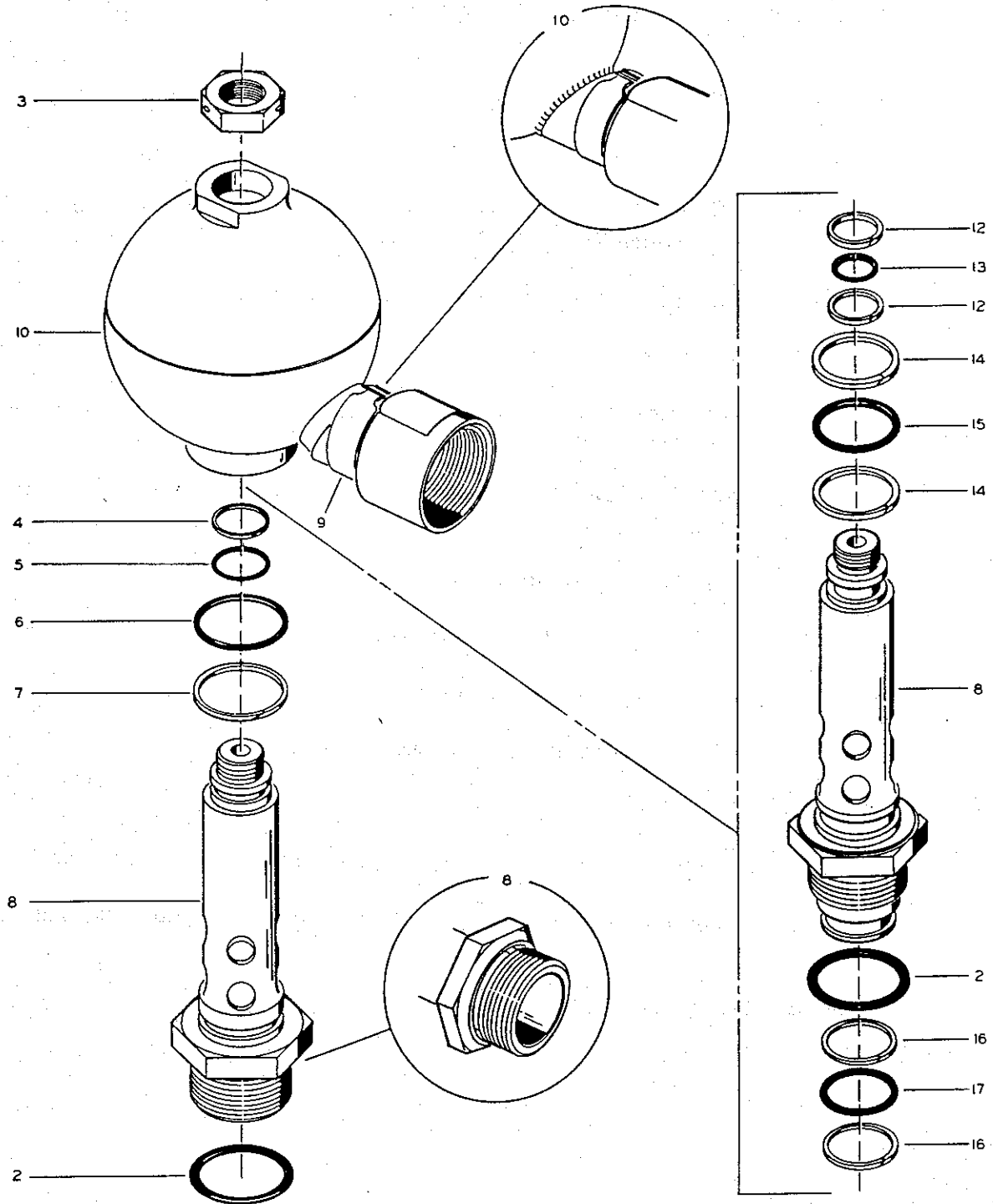


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12. ILLUSTRATED PARTS LIST



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HYDRAULIC PULSATION DAMPENER  
FIGURE 6



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**HYDRAULIC PULSATION DAMPENER**

Fig.	Item	Part Number	1	2	3	4	Nomenclature	Effect Code	Units per Assy.
6	-1	485000-3					Dampener, Hydraulic Pulsation	A	RF
		485000-4					Dampener, Hydraulic Pulsation	B	RF
		485000-5					Dampener, Hydraulic Pulsation	C	RF
		485000-9					Dampener, Hydraulic Pulsation	D	RF
		485000-12					Dampener, Hydraulic Pulsation	E	RF
	2	NAS1612-16					Packing, Boss (80205)*	B,D,E	1
	3	485014-1					Nut, Hex		1
	4	MS28774-017					Retainer, Packing (96906)	A,B,C,D	1
	5	NAS1611-017					Packing, Preformed, O'Ring (80205)*	A,B,C,D	1
	6	NAS1611-023					Packing, Preformed, O'Ring (80205)*	A,B,C,D	1
	7	MS28774-023					Retainer, Packing (96906)	A,B,C,D	1
	8	485010-1					Stud (titanium) (fitting end per DAC 7922771-16)	A,C	1
	8	485010-3					Stud (17-4 PH CRES) (fitting end per MS33514-16)	B,D	1
	8	485010-5					Stud (17-4 PH CRES) (fitting end per Boeing BACD 2037-16)	E	1
	9	485011-1					Nameplate		1



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Fig.	Item	Part Number	1	2	3	4	Nomenclature	Effect Code	Units per Assy
6	10	485013-1					Dome and Fitting Assy	A	1
	10	485013-3					Dome and Fitting Assy, with fusion weld	B,C	1
	10	485013-5					Dome and Fitting Assy, with additional fusion weld	D,E	1
	-11	216					Closure, Plastic (81904)** or equal	A,B,C,D	2
	-11	216					Closure, Plastic (81904)** or equal	E	1
	-11	B-203-16					Closure, Plastic (99017)*** or equal	E	1
	12	MS28774-114					Retainer, Packing (96906)	E	1
	13	NAS1611-114					Packing, Preformed, O'Ring (80205)*	E	1
	14	MS28774-120					Retainer, Packing (96906)	E	2
	15	NAS1611-120					Packing, Preformed, O'Ring (80205)*	E	1
	16	MS28774-212					Retainer, Packing (96906)	E	2
	17	NAS1611-212					Packing, Preformed, O'Ring (80205)*	E	1

\* All packings must be per Douglas Aircraft Co., Inc., NAS1611 and NAS1612 Skydrol O'Ring Seal Procurement Specification 7912037.

\*\* For use during storage and shipment only. Mfg. by Clover Industries Div., GTI Corp.

\*\*\* For use during storage and shipment only. Mfg. by Protective Closure Co.