

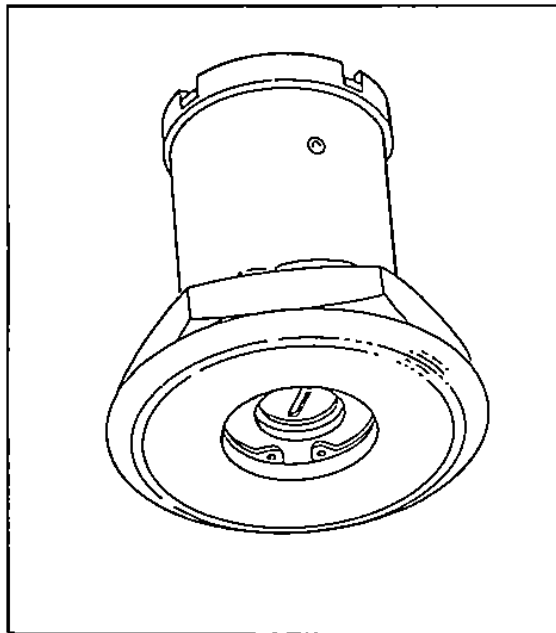


Essex Industries, Inc.
7700 GRAVOIS AVE. ● ST. LOUIS, MO. 63123

**OVERHAUL MANUAL
WITH
ILLUSTRATED PARTS LIST**

SUMP DRAIN VALVE

Part Number 0330010200-1



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SERVICE BULLETIN LIST

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INTRODUCTION

The instructions contained in this manual provide information necessary to understand the valve operation and allow the mechanic to perform maintenance functions consisting of: testing, disassembly, assembly, inspection and complete shop-type repair.

The manual is divided into separate sections. Refer to the Table of Contents for the page location of a particular section.

Some assembly tools are special in nature and are listed by part number in the Assembly section of this manual. The balance of assembly tools and all test equipment are universally applicable and are commercially available. Where a particular item of non-special equipment includes a manufacturer and model number, equal or better equipment may be substituted.

An explanation of the use of the Illustrated Parts List is provided in the Introduction to that section.

The manual will be revised as necessary to reflect current information.

Testing	Verified	<u>11/23/88</u>
Disassembly	Verified	<u>11/23/88</u>
Assembly	Verified	<u>11/23/88</u>



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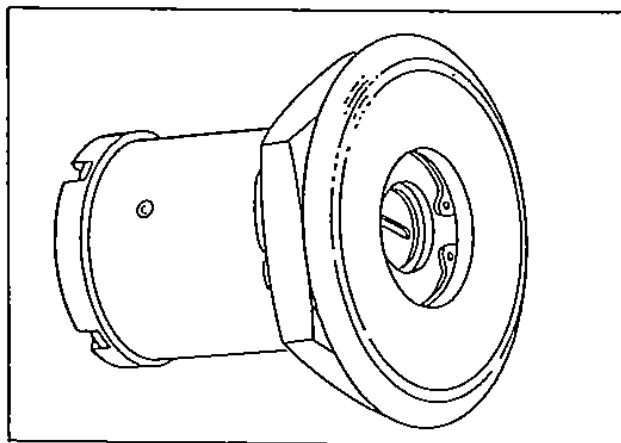
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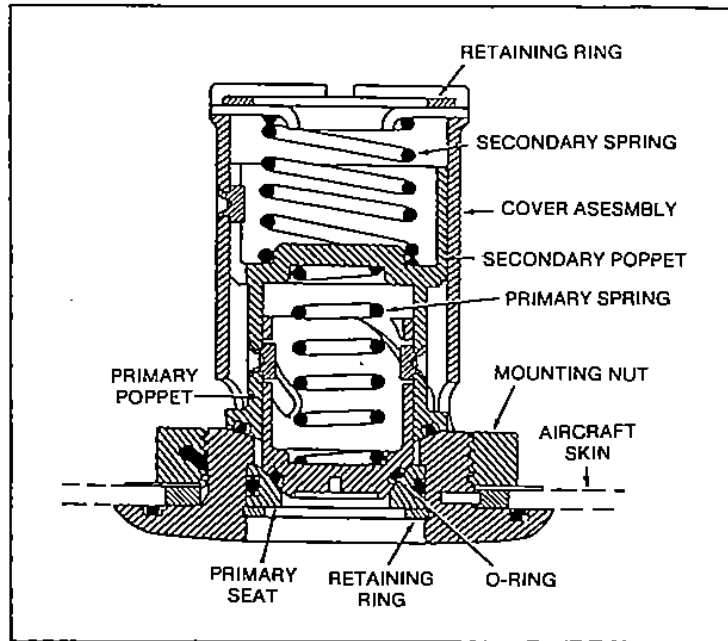
I. DESCRIPTION AND OPERATION

A. Physical Description. (See figures 1 and 2.)

1. The Sump Drain Valve (figure 1) is a dual poppet valve, designed for operation by the ground crew using a special drain tool (Part No. M-429B-2, manufactured by Roylyn Division, Rucker Company). The valve mounts at the lowest point in the fuel tank sump where impurities and foreign material settles out of the fuel in the tank.
2. The cover assembly (12, figure 10) consists of the integral, outer shell and mounting flange. (See figure 2.) The area just above the mounting flange is threaded to accommodate a large hex nut (13, figure 10) which secures the unit in the tank. An O-ring (15) provides a seal between the flange and tank opening. A secondary poppet is an inseparable component of the cover assembly (12) and is held on its seat by the secondary spring (11).
3. The primary poppet (6) fits inside the lower end of the secondary poppet and seats on the primary seat (4) which is removable, as it is secured by a retaining ring (2). This poppet (6) contains two helical slots 180-degrees apart that accommodate two pins riveted to the secondary poppet. When the primary poppet (6) is rotated 35° counterclockwise, the helical slot action raises the secondary poppet to a positive stop and fully off its seat. (See figure 2.) When released, the secondary poppet returns to its seat automatically. Rotation of the primary poppet (6, figure 10) 60° clockwise raises it against the primary spring (8) to a positive stop and fully off the primary seat (4). While maintaining the 60° clockwise position and then pushing the primary poppet (6) upward, fuel will drain rapidly from the sump as long as it is held open. (Figure 2 is a sectional view which shows all components of the valve.)
4. Both secondary and primary poppets seal on O-rings.



Sump Drain Valve
Figure 1



**Cross-Section View of Sump Drain Valve
Figure 2**

B. Operation. (See figure 2.)

1. The two (primary and secondary) seats provide a double seal against any possibility of leakage. Since the primary seat (4, figure 10) is located inside the secondary seat, when the primary poppet (6) is rotated clockwise to raise the poppet, any leakage from a damaged secondary seat can be observed. Also, when the primary poppet (6) is rotated counterclockwise it raises the secondary poppet off its seat while maintaining the primary poppet firmly seated, thus enabling the operator to observe whether or not the primary seal is leaking.
2. After draining the sump, or checking for leakage, the primary poppet (6) should be positioned so that it remains seated. The primary poppet (6) can be removed without draining the fuel tank.

C. Leading Particulars

Figure 3 lists principal characteristics of the sump drain valve.



Fluids

Operating	Turbine fuel, JP-4, per MIL-T-5624G. Commercial turbine fuel, per ASTM-D1655 Fuels A or B with BIOBOR-J F additives of 270 PPM. Aviation gasoline with up to 30% aromatics.
Test Fluid	Stoddard Solvent, per Federal Spec. P-D-680.
Ambient Temperature	-65°F to +160°F
Shock	15G (any direction)
Altitude	-1000 ft. to 42,000 ft.
Acceleration	12G

Pressures

Operating (tank side)	0 to 30 psig
Proof (tank side)	100 psig
Burst (tank side)	150 psig

Leakage

Internal	Zero at 0 to 30 psig or at 60-inch fuel head and 11G vert. accel.
External	Zero (at 5 psig to 60 psig)
Flow Rate	5 Gal/min (of JP-4 fuel at 60°F and 15 inches fuel head.)

Weight 0.19 pounds (-1); 0.20 Pounds (-2)

Dimensions

Length (overall)	2.05 inches (-1); 0.25 inches (-2)
Length (mounting surface to end of valve)	1.9 inches (-1); 0.20 inches (-2)
Mounting flange diameter	2.00 inches
Drain opening diameter	0.515 inches
Mounting hole diameter (req'd.)	1.271 to 1.285 in.
Diameter of threaded body	1.250 in.
Mounting nut	1.625 inches (across faces)

NOTE: 0330010200-1 Valves, Serial Nos. 101 and up manufactured by Essex Industries, Inc. (formely Essex Cryogenics Industries, Inc.) St. Louis, Missouri, Prior units manufactured by Harris Manufacturing Company, Inc., St. Louis, Missouri are interchangeable.

Leading Particulars
 Figure 3

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II. TESTING AND TROUBLESHOOTING

A. Test Equipment

Equipment/Materials	Description
Pressure Test Chamber	Capable of subjecting an air pressure in excess of 105 psig on Stoddard solvent. (See figure 5.)
Transparent Vacuum test chamber	Capable of withstanding a negative pressure in excess of 5 psig (10.2 inches Hg.) (See figure 6.)
Gages	Pressure gage capable of reading in excess of 105 psig. (120 to 125 psig desirable). Vacuum gage.
Valves	Needle valve for controlled bleed (figure 6).
Air pressure source	A pressure regulated air source capable of holding up to 105 psig.
Vacuum source (pump)	A vacuum source capable of holding in excess of 10.2 inches Hg below atmosphere. (See figure 6.)
Regulator	A pressure regulator capable of maintaining constant pressures of 100 psig and 30 psig. (See figure 5.)
Test fluid	Stoddard solvent (Spec. P-D-680).

**Test Equipment and Materials
Figure 4**

B. Test the sump drain valve for leaks and proof pressure as outlined in the following instructions.

C. Leak Test — Secondary Seal. (See figure 5.)

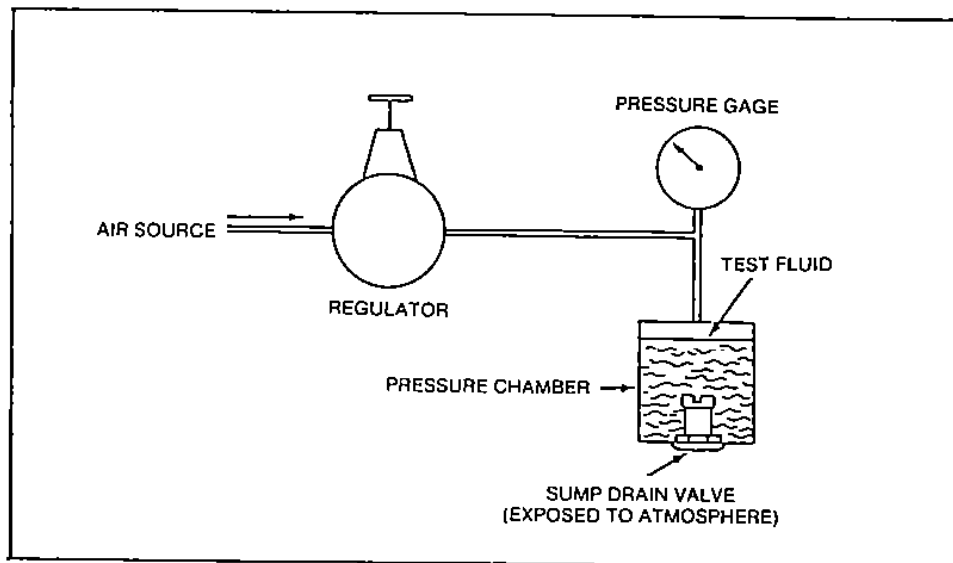
1. Using a pressure chamber of the type shown in figure 5, invert the chamber and fill 2/3 full with Stoddard solvent (Specification P-D-680.)
2. Screw the test valve into the chamber hand tight, making sure the O-ring (15, figure 10) is in place in groove of mounting flange (12).
3. Place the test chamber in the upright position and connect a pressure gage, regulator and filtered compressed air source, as shown in figure 5.
4. With the regulator, adjust the air pressure to between 30 and 32 psig.
5. Using a screwdriver, rotate the primary poppet (6, figure 10) approximately 35° clockwise to a positive stop.



6. Hold the primary poppet (6) against the stop for a minimum of 10 seconds and check for leakage past the secondary poppet seat.
7. If leakage is present, disassemble the valve for a recheck and test as outlined above. If no leakage occurs, proceed with the test.
8. Release the primary poppet and notice that it returns promptly to its seat.
9. Record the results of the test.

D. Leak Test — Primary Seal (See figure 5.)

1. With the valve still in the pressure chamber and air pressure still adjusted to between 30 and 32 psig, rotate the primary poppet (6, figure 10) approximately 60 degrees counterclockwise to a positive stop.
2. Hold this position for a minimum of 10 seconds and check for leakage past the primary poppet seal. If leakage occurs, repair the valve and perform all tests. If no leakage is present, proceed with the tests.
3. Record the results of this test.



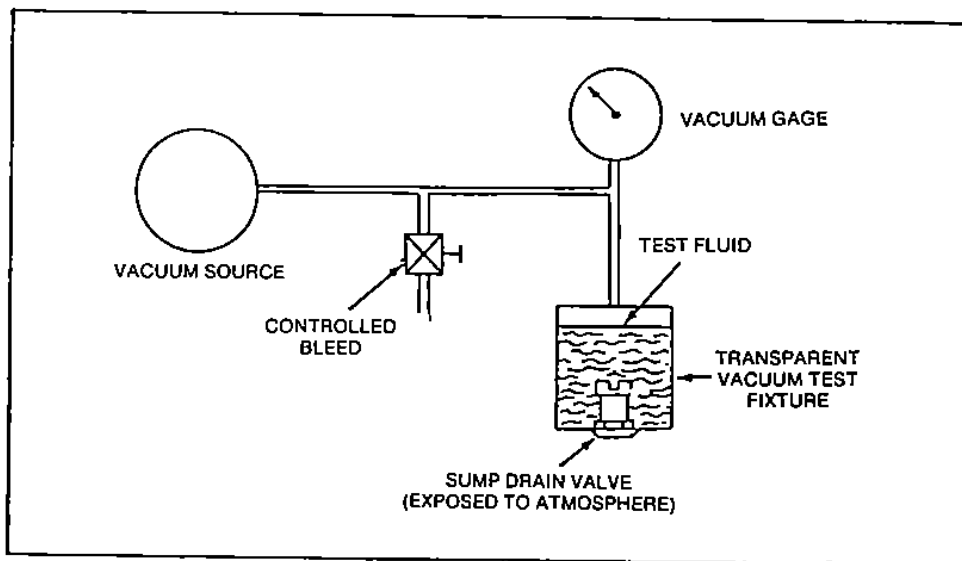
Leakage & Proof Pressure Test Setup
Figure 5



E. Proof Test (See figure 5.)

1. With the valve still in the pressure chamber, raise the pressure (by adjusting the regulator) to between 100 to 105 psig. Hold this pressure for a minimum of 10 seconds.
2. Check carefully for leaks and any sign of deformation. If leakage or deformation occurs, disassemble and repair the valve and perform all tests.
3. Release the pressure on pressure chamber.
4. Invert the pressure chamber and, with a screwdriver, check for free movement of both poppets. If any binding is present, disassemble the valve, replace damaged parts and perform all tests.
5. Record the results of this test.

F. Leak Test — External Pressure. (See figure 6.)



Vacuum Test Setup
Figure 6

1. Remove the valve from the original pressure test fixture and install it (finger tight) in the transparent, vacuum test chamber as shown in figure 6. Fill 2/3 full of Stoddard solvent.
2. Apply a negative pressure from the vacuum source of five psig (10.2 inches Hg.) on the transparent test chamber.
3. Observe carefully through the transparent chamber for any bubbles which would indicate leakage. If leakage occurs, disassemble and repair the valve and perform all tests.



4. Record the results of this test.
 5. Remove the valve from Test Chamber.
- G. Trouble Shooting (See figure 10.)

Note: For items referenced in figure 7, see figure 10.

Malfunction	Probable Cause	Corrective Action
Leakage at Primary Poppet	Damaged O-ring seals (3 or 5)	Replace the O-rings (3 and 5).
	Scored or scratched primary seat (4).	Replace the primary seat (4).
	Broken or weak primary spring (8).	Replace primary spring (8).
	Foreign material on seat (4).	Clean valve and re-test.
Leakage at Secondary Poppet.	Damaged O-ring seals (14).	Replace the O-ring (14).
	Scored or scratched secondary seat in cover assembly (12).	Replace the cover assembly (12).
	Broken or weak secondary spring (11).	Replace the secondary spring (11).
	Foreign material on secondary seat in cover assembly (12).	Clean entire valve and re-test.
Primary Poppet Binds in its Bore.	Foreign material on primary poppet (6).	Clean the entire valve and re-test.
	Distorted, scored or cracked primary poppet (6).	Replace the primary poppet (6).
	Damaged spiral grooves in primary poppet (6).	Replace primary poppet (6).
	Loose or damaged spiral guide pins in cover assembly (12).	Replace the cover assembly (12).

Trouble Shooting
Figure 7

(Sheet 1 of 2)

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Malfunction	Probable Cause	Corrective Action
Secondary Poppet Binds in its Bore.	Foreign material in valve.	Clean and re-test.
	Distorted, scored or cracked secondary poppet in cover assembly (12).	Replace the cover assembly (12).
	Loose or damaged guide pins in cover assembly (12).	Replace the cover assembly (12).
	Broken or damaged secondary spring (11).	Replace the secondary spring (11).
Valve Leaks at Mounting Flange.	Nut (13) loose inside fuel tank.	Tighten the nut (13).
	Defective O-ring seal (15).	Replace the O-ring (15).
	Distorted mounting flange on cover assembly (12).	Replace the cover assembly (12).

NOTE: After making individual repairs on the valve, be sure to perform all tests outlined in paragraph II.

Trouble Shooting
Figure 7
(Sheet 2 of 2)

III. DISASSEMBLY (See figure 10.)

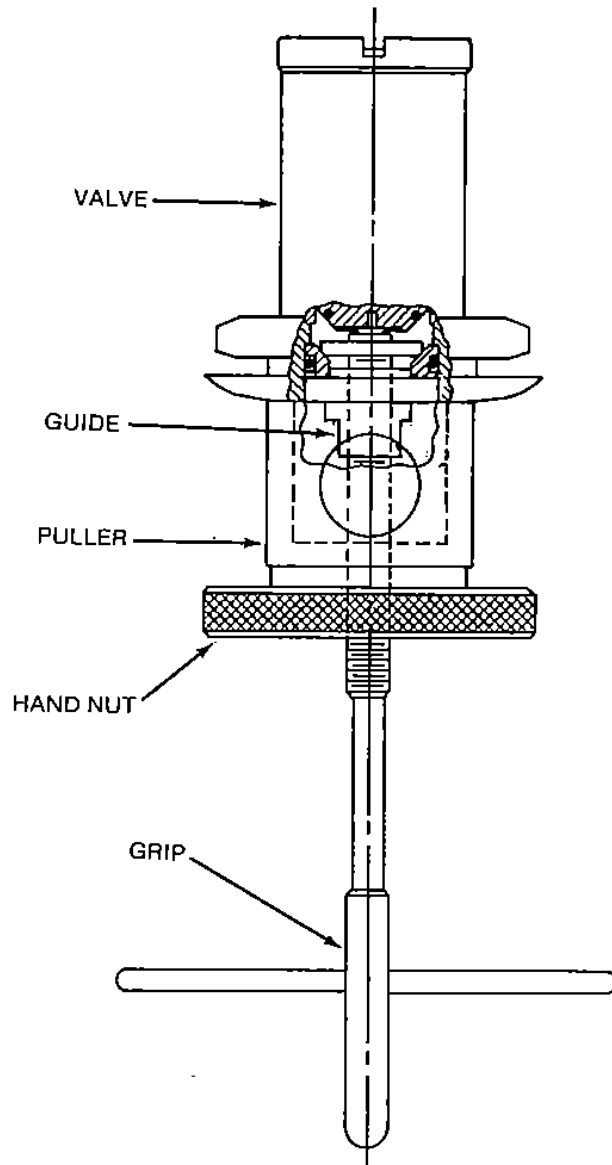
A. Disassemble the sump drain valve as follows:

1. Using the retaining-ring pliers, remove the retaining ring (2, figure 10)
2. Remove primary seat (4) as follows: (See figure 8)

NOTE: Back off hand nut and guide on extraction tool prior to inserting into valve.

- a. Insert wedge through port, unseating primary poppet (6, figure 10).
- b. Thread guide onto stem and snug against the valve seat (4).
- c. Slide the puller up the grip snug against the valve flange.
- d. Thread the hand nut snug against the puller.
- e. Hold the grip firmly and stationary while tightening the hand nut against the puller until the seat is removed. the "O" ring (3) will be sheared off during this procedure.

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Extracting Primary Seat
Figure 8



3. Use a screwdriver to rotate the primary poppet (6) counterclockwise and remove.
4. Remove and discard O-rings (3 and 5).
5. Remove the primary spring (8) from the primary poppet (6).

NOTE: Exercise care to avoid losing the spring discs (7). Normally, two discs (7) will be located at each end of the primary spring (8).

6. Using retaining-ring pliers, remove the retaining ring (9). Force of the compressed secondary spring (11) will "pop" out the cover disc (10) when retaining ring (9) is removed. Be sure to catch the cover disc (10).
7. Remove the secondary spring (11).
8. Remove the nut (13) from cover assembly (12). (This nut will have been removed when the valve was removed from the aircraft and might not be reassembled to the cover assembly.)
9. Remove and discard the O-rings (14 and 15). O-ring (15) might have been discarded already, at point of removal from aircraft.

B. The secondary poppet is an inseparable component of the cover assembly (12) and no attempt should be made to remove it.

IV. CLEANING

- A. Immerse metal parts in any one of the cleaning solvents listed in figure 9 and agitate the part or assembly until clean.
- B. Dry the parts after removing from the solvent with filtered compressed air.

Stoddard solvent	Spec. P-D-680
Jet fuel	Spec. MIL-T-5624G
Gasoline	Commercially available

Cleaning Materials
Figure 9

V. INSPECTION (See figure 10.)

- A. When inspecting any part of the sump drain valve, it should be remembered that three basic modes of failure are possible in the assembled unit.
 1. Failure of primary poppet (6, figure 10) to close or open properly.
 2. Failure of the secondary poppet to close or open properly.
 3. Leakage occurs between either primary or secondary poppet and its seat.



B. Inspect each part of the valve assembly as follows: (See figure 10.)

1. Inspect the primary poppet (6) for damage, such as score marks, tool marks and wear patterns on the sealing surface and in spiral grooves. Replace the primary poppet (6) for any of these conditions.
2. Inspect the primary seat (4) for mechanical damage, and wear patterns or score marks on the poppet seating surface. Make sure the O-ring groove is smooth.
3. Inspect both retaining rings (2 and 9) for distortion and cracks. Replace for either condition.
4. Inspect the primary spring (8) and secondary spring (11) for breaks and distortion. If the springs do not stand vertically, when placed on either end on a flat surface, they are weakened and distorted and should be replaced.
5. Inspect all spring discs (7) for distortion. Replace if damaged.
6. Inspect the cover assembly (12) as follows:
 - a. Check for cracks, mechanical damage and distortion.
 - b. Inspect threads for damage.
 - c. Feel the inside cavity of the primary poppet (6) for rough spots and loose or damaged guide pins.
 - d. Move the secondary poppet longitudinally inside the shell. It must not bind in any position.
 - e. Inspect the secondary poppet seating surfaces for mechanical damage or noticeable wear patterns.
 - f. Check the outer riveted guide pin for security. It must be tight.
7. If inspection reveals an unsatisfactory condition in any of the preceding checks, replace the cover assembly (12).
8. Inspect the cover disc (10) for evidence of damage. Replace if damaged.

VI. REPAIR

- A. Repairs consist of replacement of defective parts or assemblies.
- B. Always replace O-rings when repairs are made to the valve.

VII. ASSEMBLY. (See figure 10.)

- A. Assemble the sump drain valve as follows:
 1. Coat the O-ring (14, figure 10) lightly with petrolatum (Specification VV-P-236) and carefully install it in the groove of secondary poppet seat.



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ESSEX PART NUMBER 0330010200-1

2. Place two spring discs (7) in position in the cover assembly (12).
NOTE: It is advisable to apply a light coat of petrolatum, Specification VV-P-236 to the discs in order to hold them in place during assembly.
 3. Apply a coating of Petrolatum as described above, and install the remaining two spring discs (7) in the recess of primary poppet (6).
 4. Place the O-ring (5) carefully in the groove in the seat of primary poppet (6). Use a light coating of petrolatum on the O-ring if necessary.
 5. Place the primary spring (8) inside the primary poppet (6) and insert the poppet carefully into the cover assembly (12). Rotate the poppet with a finger until the guide pins enter the helical slots in the piston.
 6. Coat the O-ring (3) lightly with petrolatum (Specification VV-P-236) and install it in the groove of primary seat (4).
 7. Carefully insert the primary seat (4) into the cover assembly (12) exercising care to avoid damaging the O-ring as it passes over the retaining ring groove.
CAUTION: MAKE SURE THE SEAT (4) IS INSTALLED WITH THE SLOPING SEATING SURFACE FACING THE PRIMARY POPPET (6).
 8. Hold the seat (4) in place and install the retaining ring (2) with correct size snap-ring pliers.
 9. Place the partially-assembled valve in an upright position and insert the secondary spring (11) into the cover assembly (12).
 10. Place the cover disc (10) on spring (11), with its shoulder facing the spring, and orient the cover disc (10) with tabs aligned with slots in cover assembly (12).
 11. Push the cover disc (10) down against spring tension, hold it in place and install the retaining ring (9) with correct size snap-ring pliers.
 12. Place the O-ring (15) in its groove and start nut (13) onto its threads (finger tight only) to secure the O-ring and nut until ready for installation.
- B. Hold the valve in one hand and, with a screwdriver, rotate the primary poppet (6) clockwise. It should raise off the seat (4) and return to the seat when released. Rotate the primary poppet (6) counterclockwise, which should raise the secondary poppet off its seat and secure it until released by clockwise rotation of the primary poppet.

VIII. FITS AND CLEARANCES — Not applicable.

IX. STORAGE INSTRUCTIONS

- A. Unless the sump drain valve is scheduled for immediate installation, the valve shall be preserved immediately after testing as follows:

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1. Flush the interior of the valve with aircraft engine corrosion preventive compound (Specification MIL-C-6529, Type III).
2. Place the valve in a polyethylene bag (Specification MIL-B-22205, Type III) and secure the bag with 2-1/2 turns of cloth-backed, waterproof adhesive tape (Specification PPP-T-0060C, Type 3, Class 1).
3. Wrap the valve in moisture-vaporproof, Kraft-foil barrier bag (Specification MIL-B-117, Type II, Class E). Heat seal the bag after wrapping.
4. Pack wrapped valves in individual boxes or padded cartons for handling and storage.

B. Storage

1. Store in original containers, indoors, protected from extremes of temperature and/or moisture.
2. Issue preserved items from stock on a first-in, first-out basis.

X. SPECIAL TOOLS, FIXTURES AND EQUIPMENT

The following tools are required for disassembly of the drain valve.

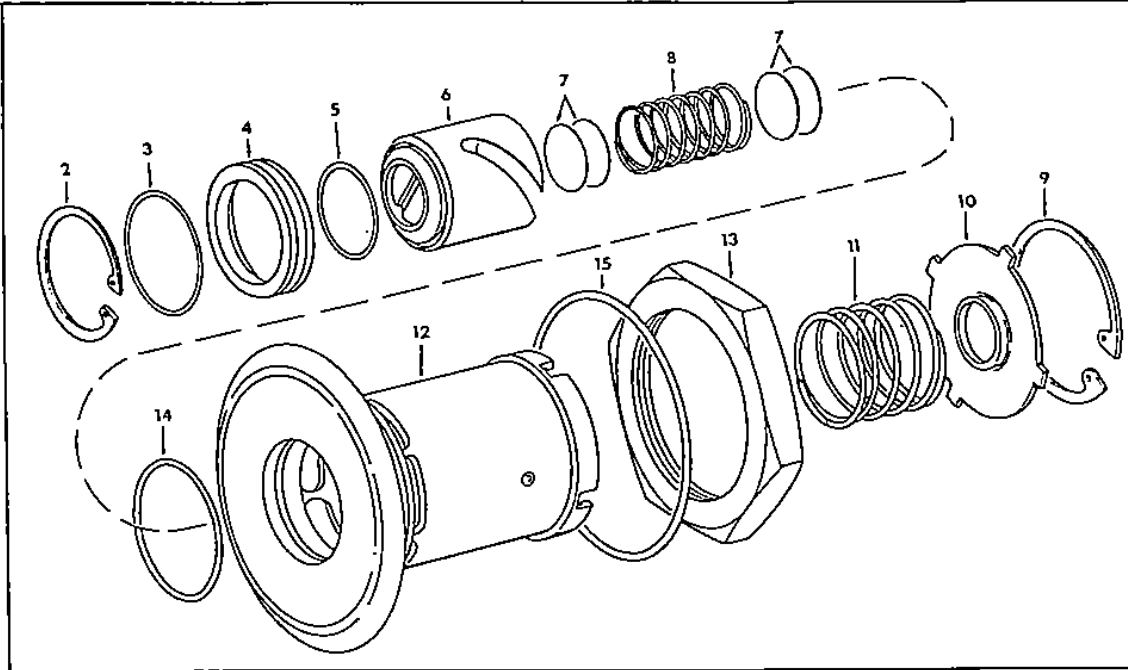
MB 0330010200-1 - Extraction tool Mfg. by Essex Industries Inc. (83533)

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XI. ILLUSTRATED PARTS LIST



Exploded View of Sump Drain Valve
 Figure 10

Fig. Item	Part Number	1 2 3 4 5 6 7 Nomenclature	Effect Code	Units Per Assy.
10-1	0330010200-1	Valve - Sump Drain	A	RF
	0330010200-2	Valve - Sump Drain	B	RF
2	MS16625-4081	Ring, Retaining		1
3	M25988/1-017	Packing, O-Ring*		1
4	0330010209	Seat, Primary		1
5	M25988/1-014	Packing, O-Ring*		1
6	0330010203-1	Poppet, Primary		1
7	0330010212-1	Disc, Spring		4
8	LCO38F5SS	Spring, Primary (Lee Spring Co.)		1
9	MS16625-4100	Ring, Retaining		1
10	0330010202-1	Disc, Cover		1
11	LCO55J3SS	Spring, Secondary (Lee Spring Co.)		1
12	03300102B2-1	Cover Assy.	A	1
	03300102B2-2	Cover Assy.	B	1
13	03300102B3-1	Nut and Insert Assy.		1
14	M25988/1-019	Packing, O-Ring*		1
15	M25988/1-030	Packing, O-Ring*		1

- Item Not Illustrated
- * Fluorosilicone rubber compound per MIL-R-25988
- Items Coded A used on 0330010200-1
- Items Coded B used on 0330010200-2
- Items Not Coded used on 0330010200-1 & -2

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