



Facet Filter No: 048580

Boeing Part No: 10-60550-2

**Service and Technical Manual
for
Filter, Hydraulic, System "A" Return
Bulletin No. FPD2100.1**

March 1996

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I. Description of Operation

The function of the filter assembly is to filter all fluid returning to the hydraulic reservoir from System A.

The unit consists of a top head casting to which a bottom bowl is attached by means of a threaded bolt. This forms a pressure vessel having an operating pressure of 100 psi and a burst pressure of 500 psi minimum.

The filter element is rated at 10 microns and consists of a pleated stainless steel filtering medium which is bonded to stainless steel end caps and a perforated core by means of an epoxy resin.

All materials and fluid seals in the filter assembly are compatible with Skydrol 500 hydraulic fluid.

The head casting has four ports which are identified as follows:

Function	Port Number
Fluid Inlet	1
To Case Drain	2
Outlet to Reservoir	3
To Thermoswitch	4

Two cartridge type check valves are installed in the top head casting which prevent back flow along with a mechanical shutoff valve which seals off the hydraulic system when the filter bowl is removed for element servicing. A relief valve is provided which allows the hydraulic fluid to bypass the filter element should it become clogged prior to regular servicing. The cracking pressure of this valve is 100 psi.

The fluid flow and valve functions are described schematically in Section V.

II. General Procedures

A. Cleaning and Preparation of Parts Prior to Reassembly

Note: The following procedures, while routine in manner, should be performed carefully since the inadequate cleaning of filter components could introduce contaminants into the hydraulic system and hence affect its operation.

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1. **Cleaning of Metal Parts**

All metals parts should be washed with a suitable solvent such as trichloroethylene, carbon tetrachloride, or stoddard solvent prior to reassembly. After washing, the parts should be dried with a lint-free cloth or by blowing out with prefiltered air and then suitably protected from contamination (lint, fibers, etc.) until they are reassembled into the unit.

2. **Preparation of Metal Parts and Fluid Seals for Assembly**

Fluid seals or O-rings should be blown clean with prefiltered air and coated with Skydrol 500 hydraulic fluid or a thin film of HI-LO MS No.1 lubricant (Allube Corp, Glendale, CA) prior to assembly.

The mating or locating surfaces and threaded sections of metal parts should also be lubricated in a similar manner prior to reassembly.

B. Test Fluids

Fluids other than Skydrol 500 should not be allowed to contact fluid or O-ring seals, nor should they be introduced into the filter assembly since their compatibility with the elastomeric seals contained therein is not guaranteed.

C. Inspection of Parts

The threaded sections of metallic parts should be examined carefully prior to reassembly for wear, scoring, or mutilation. All parts with damaged threads should be replaced.

Fluid seals or O-rings should not be reused after disassembly regardless of condition, but should be replaced unless otherwise specified.

Scored, nicked, or otherwise damaged valve seats or sealing surfaces may be repaired by careful refinishing. Reworked components must pass the component test specified in Section IV.

Respective portions of the filter assembly which have undergone servicing should be tested according to the procedures in Section IV.

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III. Maintenance and Overhaul Procedure

Note: The parts referred to below by number (Plug No. 9 for example) are identified in Section V in the component diagrams.

A. Filter Element and Bowl Removal

To remove the filter bowl and element, unscrew plug No. 9 and lower to the stop position to drain the filter bowl. Unscrew tie-bolt No. 34 and remove bowl and element by pulling down on bowl. Do not pry or otherwise try to force the filter bowl.

Remove element, gasket No. 4 and O-ring No. 5 from bowl. Remove gasket No. 4 from filter head.

Remove pin No. 25 and locknut No. 26 from tie-bolt assembly. Remove plug No. 9 and tie-bolt No. 34 from filter bowl and remove O-rings No. 7, O-ring No. 11, and O-ring No. 10.

Remove retainer No. 6 and spring No. 8 from filter bowl.

Reassemble in reverse order, torquing tie-bolt No. 34 and plug No. 9 to the values shown in Section V. Lockwire components securely using lockwire No. 17 and lockwire seal No. 18.

B. Element Cleaning and Servicing

Seal off one end of the filter element with a suitable cover. Place the filter element upright in a pan of solvent (trichloroethylene, etc) with the open end above the fluid level. After 15 minutes of soaking, lift out and rinse the outer surface with clean solvent. Do not brush or wipe element surfaces. Do not allow dirty solvent to get inside of the element. Other methods include slush-vapor degreasing or boiling in a solution of one pound of sodium hydroxide to one gallon of clean water followed by thorough water rinsing. After visible soil has been removed, the element should be placed in a fixture and reverse flushed (flow from inside to outside) with fluid prefiltered to 5 microns under pressure (not excessive) with a series of abrupt bursts of flow ending with a blast of clean air. Air should be prefiltered to 5 microns.

After cleaning, suitably protect the filter element from contamination until reinstallation.

C. Mechanical Shutoff Valve Removal and Servicing

Remove filter element and bowl according to Section IIIA.

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Remove nuts No. 29 and remove seat assembly No. 27 from the head casting.

Remove O-ring No. 37 from the seat assembly flapper and inspect the flapper O-ring groove and sealing faces for imperfections and foreign matter.

Replace O-ring No. 37 if defective and reassemble seat assembly No. 27 into the filter in reverse order.

Nuts No. 29 should be torqued to the value shown in Section V.

D. Relief Valve Removal and Servicing

Remove valve cap No. 21 from head casting.

Remove O-ring No. 33 and O-ring No. 36 from valve cap.

Remove spring No. 32 and relief valve No. 30 from relief valve cavity in head casting.

Inspect relief valve sealing faces and relief valve seat in head casting for imperfections or foreign matter. Replace or rework components as required.

Reassemble in reverse order replacing O-ring No. 33. Replace O-ring No. 36 if defective.

The valve cap No. 31 should be torqued to the value specified in Section V and lockwired securely using lockwire No. 17 and lockwire seal No. 18.

E. Check Valve (Large) Removal and Servicing

Remove screws No. 16 and withdraw check valve No. 19 from check valve cavity in head casting.

Remove O-ring No. 23 from check valve and replace. Remove O-ring No. 22 and replace if defective.

Inspect check valve flapper seal for imperfections or foreign matter. Replace check valve assembly if flapper seal is defective.

Reassemble in reverse order, torquing screws No. 16 to the value specified in Section V. Lockwire screws No. 16 using lockwire No. 17 and lockwire seal No. 18.

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F. Check Valve (Small) Removal and Servicing

Remove screws No. 16 and withdraw check valve No. 12 from check valve cavity in head casting.

Remove O-ring No. 13 from check valve and replace. Remove O-ring No. 14 and replace if defective.

Inspect check valve flapper seal for imperfections or foreign matter. Replace check valve assembly if flapper seal is defective.

Reassemble in reverse order, torquing screws No. 16 to the value specified in Section V. Lockwire screws No. 16 using lockwire No. 17 and lockwire seal No. 18.

G. Bracket Removal and Replacement

To remove bracket No. 15 and bracket No. 20, remove bolts No. 21. Reassemble in reverse order, torquing bolts No. 21 to the value shown in Section V. Lockwire bolts No. 21 securely using lockwire No. 17.

IV. Component Test Procedures and Inspection

Note: Skydrol 500 hydraulic fluid must be used for the following test and should be held at a temperature of $80^{\circ}\text{F} \pm 10^{\circ}\text{F}$ during testing unless otherwise noted.

A. Filter Assembly

If any component in the filter assembly has been removed for servicing, the following test should be performed prior to the reinstallation of the assembly into the aircraft.

With all other fluid ports suitably plugged and trapped air bled off from the filter assembly, a fluid pressure of 250 psi should be applied to inlet port No. 1 in the head casting. This pressure should be held for a period of two minutes, reduced to zero, and then reapplied for another two minutes.

This procedure should then be repeated again except that the fluid pressure should be 2 psi.

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If leakage occurs during the above test, the leaking component should be removed from the filter and its respective O-ring or fluid seal and sealing surfaces inspected for imperfections or foreign matter.

After reassembly, the above pressure test should be repeated.

B. Filter Element

After cleaning, the filter element should be closely inspected for damage or punctures. If no damage is apparent, the element may be reassembled into the filter housing as noted in Section IIIA. After reassembly, the filter assembly should be flow tested on a suitable test stand at a fluid flow rate of 20 gpm from port No. 1 to port No. 3. The pressure drop across the filter assembly should not exceed 20 psi when measured according to ARP 24A.

If the pressure drop is in excess of 20 psi, the element should be removed and recleaned, and then retested. The element should be replaced if the pressure drop cannot be brought below 20 psi after two successive element cleanings.

C. Mechanical Shutoff Valve

With the filter bowl and element removed, fluid ports No. 2 and No. 4 blocked, and all trapped air removed from the downstream region of the head casting, apply a fluid pressure of 2 psi to port No. 3 for three minutes. Inspect seat assembly No. 27 for leakage.

If leakage is in excess of 20 drops per minute, the seat assembly should be removed and inspected according to Section IIIC making the necessary repairs.

The seat assembly should then be retested as outlined above.

D. Relief Valve

With the filter bowl, element and seat assembly No. 27 removed, install a plugged check valve in place of check valve No. 12. Block fluid flow from the upstream region of the head casting to the bowl region.

Bleed off all trapped air and apply a fluid pressure of 50 psi to inlet port No. 1. Gradually increase this pressure until a fluid flow of 3 cc per minute (60 drops per minute) is established through the relief valve. The pressure at which this occurs is the relief valve cracking pressure and should be 100 ± 5 psi.

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The fluid pressure should then be increased until a substantial flow (4 gpm minimum) is obtained. The inlet pressure should then be gradually reduced until a fluid flow of 2 cc per minute (40 drops per minute) appears. The pressure at which this occurs is the relief valve reseating pressure and should be no lower than 90 psi.

If the relief valve does not operate within the specifications listed above, all relief valve components should be removed and inspected according to Section IIID, replacing the necessary components. The relief valve should then be retested after reassembly.

E. Check Valve (Large)

With a plugged check valve installed in place of downstream check valve No. 12, apply a fluid pressure of 2 psi to the flow passage in the head casting which is directly downstream of check valve No. 19 and leads to the bowl region. The pressure should be held for two minutes and reduced to zero. This test should then be repeated, except with a fluid pressure of 50 psi.

If leakage appears at inlet port No. 1 in excess of 20 drops per minute, check valve No. 19 should be removed and inspected according to Section IIIE. The check valve should then be retested after reinstallation.

F. Check Valve (Small)

Install a plugged check valve in place of check valve No. 19 and apply a fluid pressure of 2 psi to the fluid passage in the head casting. This pressure should be held for a period of two minutes and reduced to zero. The test should then be repeated except with a fluid pressure of 50 psi.

If leakage in excess of 20 drops per minute appears at inlet port No. 1, check valve No. 12 should be removed and inspected according to Section IIIF.

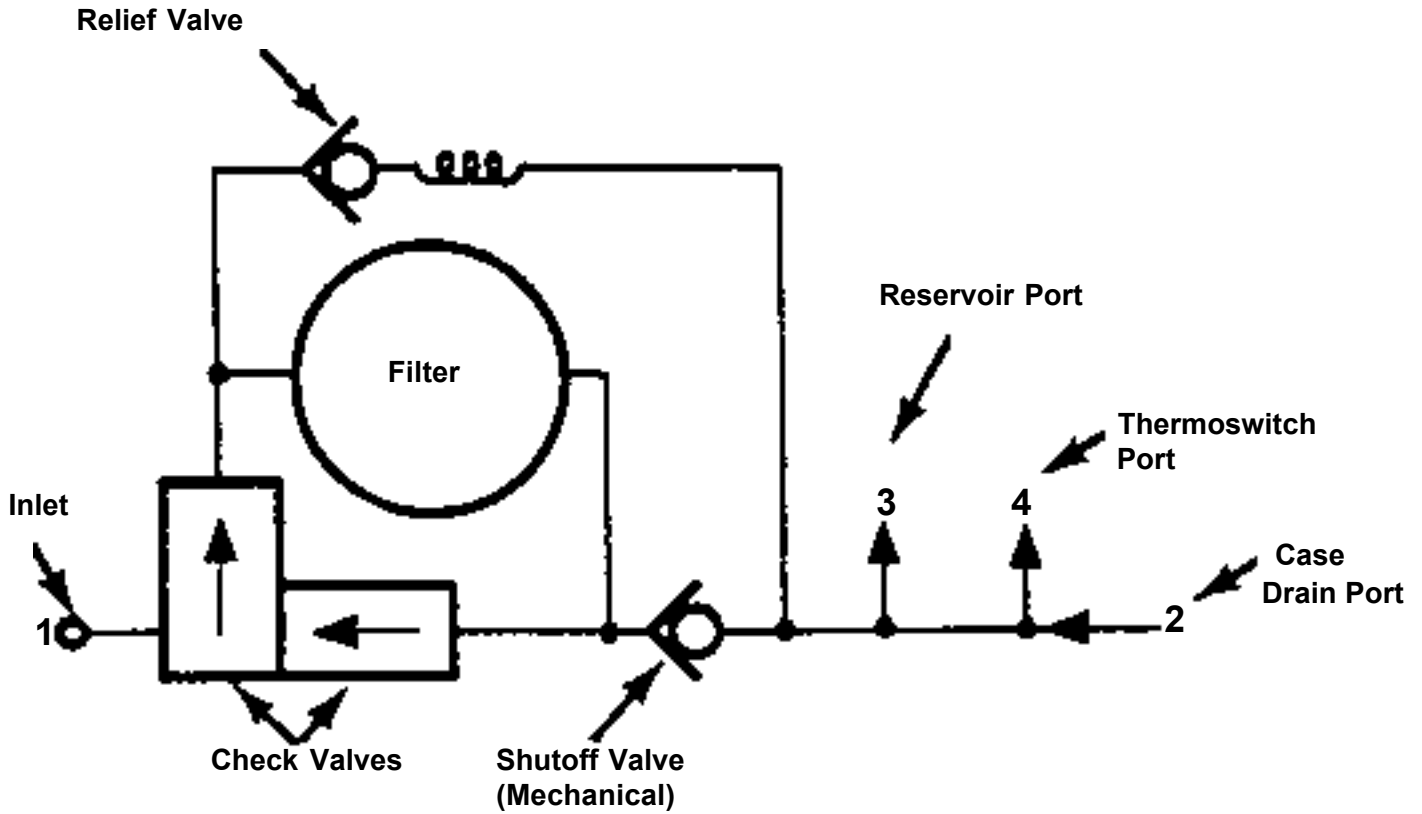
The above test should be repeated after the necessary servicing or check valve replacement.

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V. Flow Schematics
and
Component Diagrams

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**Figure A -
Fluid Flow and Valve Function Schematic Diagram**

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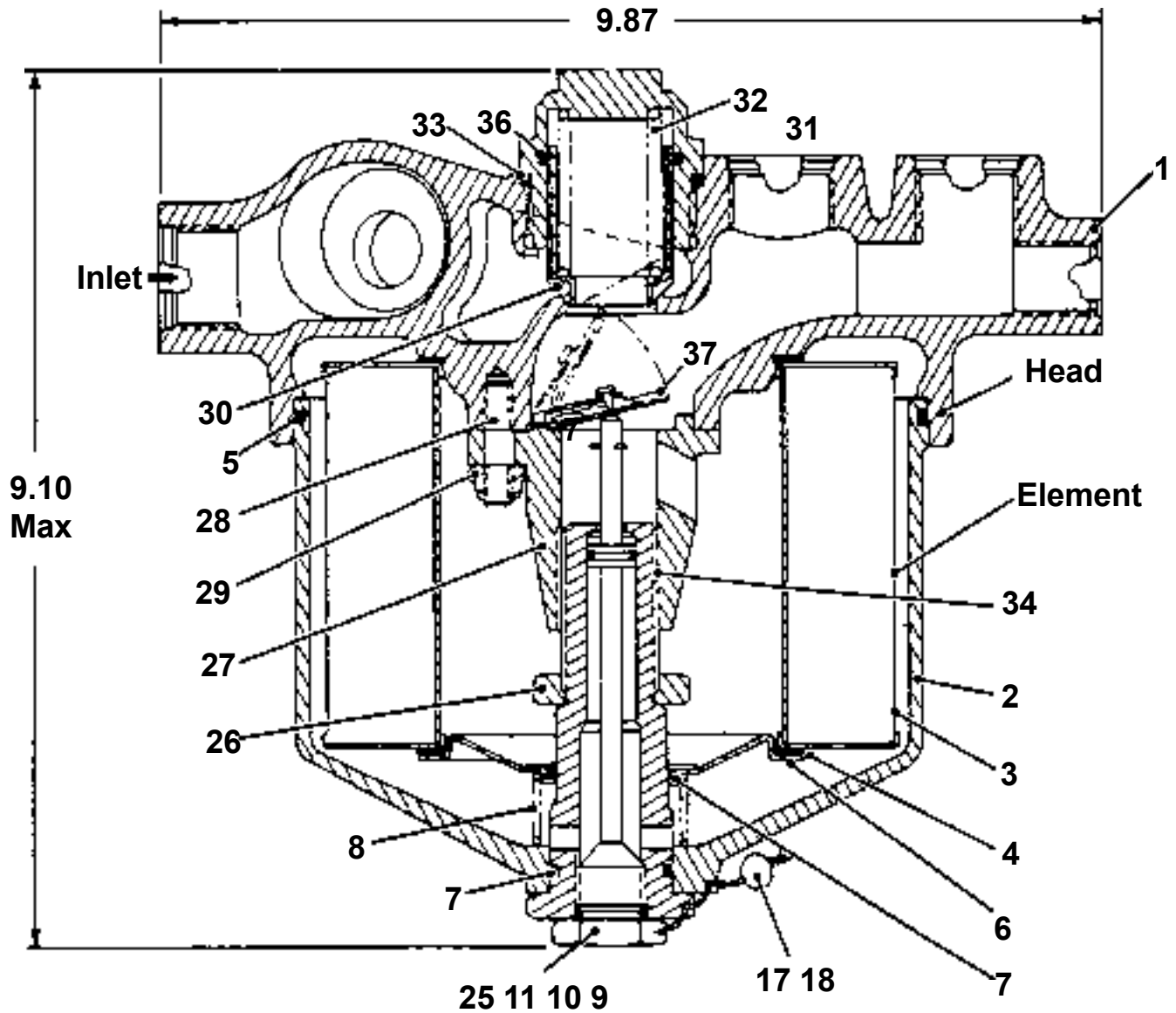


Figure B -
Filter Assembly Cross Section

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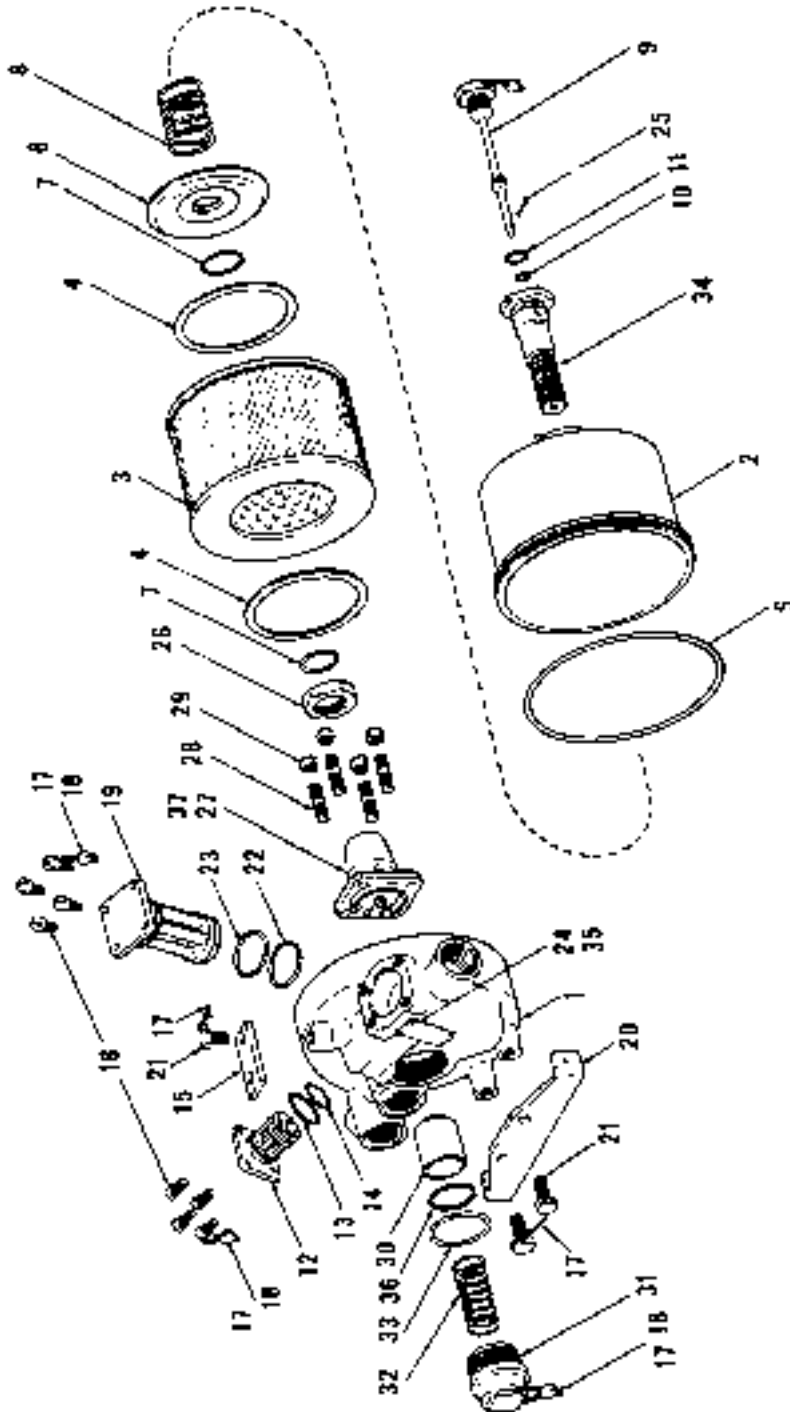


Figure C
Filter Assembly Exploded View (Component Ident)

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Parts List

Item No.	Part No.	Nomenclature	Units per Assy
1	049066	Head Assembly	1
2	049273	Bowl	1
3	044108	Element Assembly Boeing P/N 10-60566-1	1
4	049736	Gasket	2
5	049413	O-ring - Bowl NAS 1611-259	1
6	049077	Retainer Assembly	1
7	049404	O-ring - Retainer NAS1611-121	2
8	047236	Spring	1
9	047076	Plug	1
10	049403	O-ring - Plug NAS 1611-012	1
11	049414	Gasket - O-ring NAS 1612-8	1
12	045618	Valve - Check Boeing P/N 10-60567-1	1
13	049408	O-ring - Valve NAS 1611-213	1
14	049407	O-ring - Valve NAS 1611-212	1
15	051098	Bracket	1
16	049317	Screw AN 115810	8
17	568997	Lockwire	AR
18	048983	Seal - Lockwire	4
19	045619	Valve - Check Boeing P/N 10-60567-2	1
20	051099	Bracket	1
21	031683	Bolt MS 20074-06-06	3
22	049410	O-ring - Valve NAS 1611-219	1
23	049411	O-ring - Valve NAS 1611-220	1
24	049345	Name Plate	1
25	039856	Pin - Cotter	1
26	048696	Locknut	1
27	048695	Seat Assembly	1
28	049060	Stud AN 126300	4
29	049061	Nut MS 20365-524C	4
30	049202	Valve Assembly	1
31	048692	Cap - Valve	1
32	048691	Spring	1
33	049412	O-ring - Cap NAS 1611-222	1
34	047089	Bolt - Tie	1
35	29054	Drive Screw AN 535-2-2	4
36	049405	O-ring - Valve NAS-1611-125	1
37	049404	O-ring - NAS 1611-121	1

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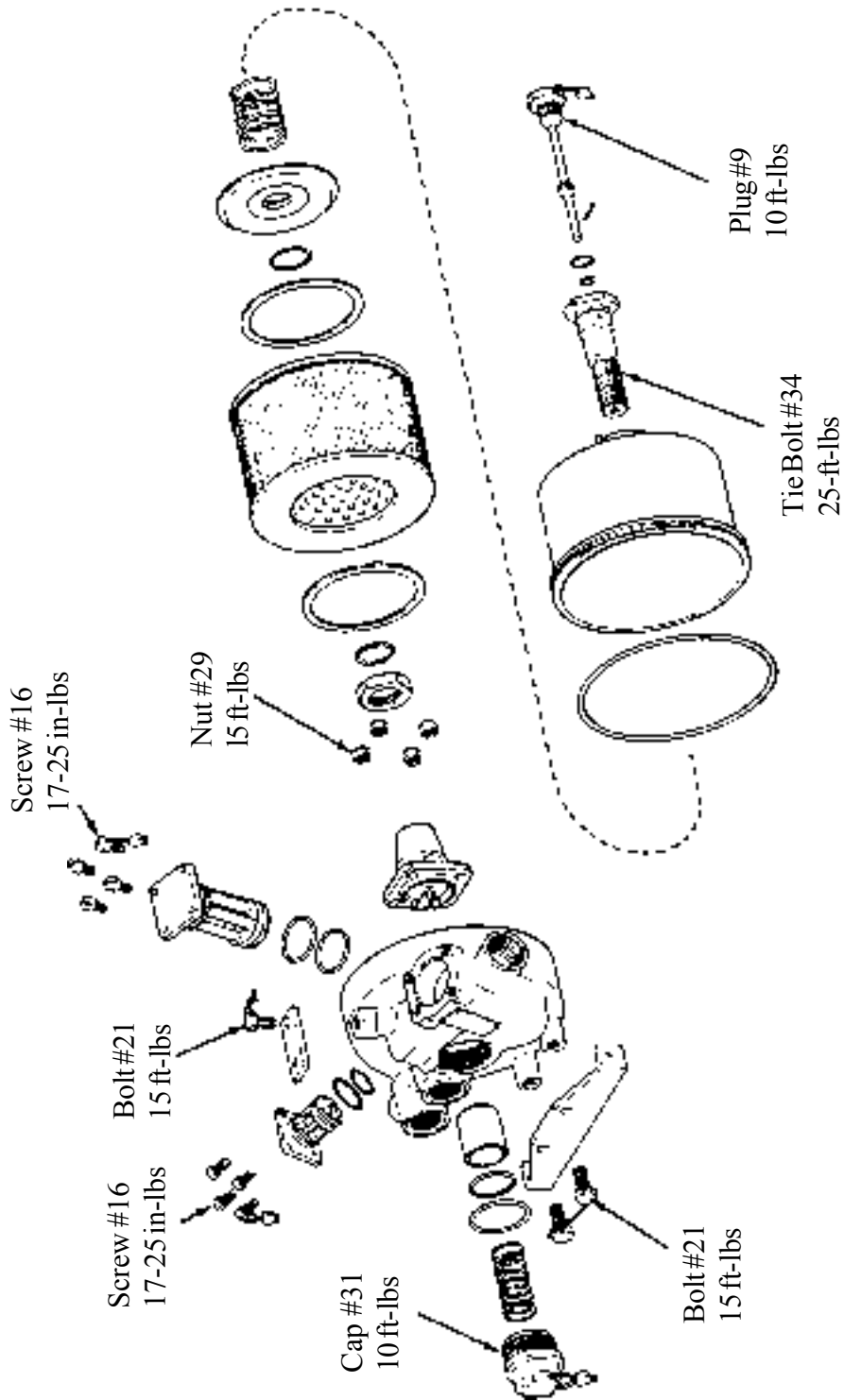


Figure D - Installation Torque Values