TO: ALL HOLDERS OF RETURN FILTER MODULE ASSEMBLY COMPONENT MAINTENANCE MANUAL 29-11-35

REVISION NO. 4 DATED JUN 01/95

HIGHLIGHTS

Pages which have been added or revised are outlined below together with the highlights of the revision. Remove and insert the affected pages as listed and enter Revision No. and date on the Record of Revision Sheet.

| CHAPTER/SECTION AND PAGE NO. | DESCRIPTION OF CHANGE |
|---|---|
| 103-104<br>301<br>702<br>801 | Edited without technical change. |
| 104-105 | Updated testing and trouble shooting for valve assembly item 70. |
| 702 | Update torque range for differential pressure indicator, part number S271T005-2. |

BOEING

COMPONENT
MAINTENANCE MANUAL

# RETURN FILTER MODULE ASSEMBLY

# PART NUMBERS 271T0001-1,-2,-3

COMPONENT MAINTENANCE MANUAL
WITH
ILLUSTRATED PARTS LIST

43928

BOEING
COMPONENT
MAINTENANCE MANUAL

REVISION RECORD

- Retain this record in front of manual. On receipt of revision, insert revised pages in the manual, and enter revision number, date inserted and initial.

| REVISION NUMBER | REVISION DATE | DATE FILED | BY | REVISION NUMBER | REVISION DATE | DATE FILED | BY |
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TEMPORARY REVISION AND SERVICE BULLETIN RECORD

| BOEING SERVICE BULLETIN | BOEING TEMPORARY REVISION | OTHER DIRECTIVE | DATE OF INCORPORATION INTO MANUAL |
|---|---|---|---|
| | | PRR B10605 | JUL 10/82 |

| PAGE | DATE | CODE |
|---|---|---|
| 29-11-35 | | |
| TITLE PAGE | | |
| 1 | JUL 10/83 | 01 |
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| *103 | JUN 01/95 | 01.1 |
| *104 | JUN 01/95 | 01.1 |
| *105 | JUN 01/95 | 01.1 |
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| DISASSEMBLY | | |
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| 602 | BLANK | |
| REPAIR 1-1 | | |
| 601 | JAN 10/84 | 01.1 |
| 602 | BLANK | |
| REPAIR 2-1 | | |
| 601 | JAN 10/84 | 01.1 |
| 602 | BLANK | |
| ASSEMBLY | | |
| 701 | OCT 01/91 | 01.1 |
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| FITS AND CLEARANCES | | |
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| ILLUSTRATED PARTS LIST | | |
| 1001 | JUL 10/83 | 01 |
| 1002 | JUL 10/83 | 01 |
| 1003 | OCT 01/91 | 01.1 |
| 1004 | OCT 01/91 | 01.1 |
| 1005 | OCT 01/91 | 01.1 |
| 1006 | JAN 10/84 | 01.1 |

* = REVISED, ADDED OR DELETED

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*[1] Special instructions not required. Use standard industry practices.

# INTRODUCTION

The instructions in this manual provide the information necessary to perform maintenance functions ranging from simple checks and replacement to complete shop-type repair.

This manual is divided into separate sections:

1. Title Page
2. Record of Revisions
3. Temporary Revision & Service Bulletin Record
4. List of Effective Pages
5. Table of Contents
6. Introduction
7. Procedures & IPL Sections

Refer to the Table of Contents for the page location of applicable sections. An asterisked flagnote *[ ] in place of the page number indicates that no special instructions are provided since the function can be performed using standard industry practices.

The beginning of the REPAIR section includes a list of the separate repairs, a list of applicable standard Boeing practices, and an explanation of the True Position Dimensioning symbols used.

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

All weights and measurements used in the manual are in English units, unless otherwise stated. When metric equivalents are given they will be in parentheses following the English units.

Design changes, optional parts, configuration differences and Service Bulletin modifications create alternate part numbers. These are identified in the Illustrated Parts List (IPL) by adding an alphabetical character to the basic item number. The resulting item number is called an alpha-variant. Throughout the manual, IPL basic item number references also apply to alpha-variants unless otherwise indicated.

Verification:

Testing/TS
Disassembly
Assembly

# RETURN FILTER MODULE ASSEMBLY

## DESCRIPTION AND OPERATION

1. The return filter module assembly consists of a head assembly, a filter element, a case, a relief valve, a differential pressure indicator and two check valves.

2. Operation

   A. Hydraulic fluid enters the module thru the IN port and passes thru the filter element. The filtered fluid is then discharged thru the OUT port.

   B. The shut off valve is in the open position whenever the filter element is installed. Removal of filter element closes the shutoff valve, preventing hydraulic fluid loss.

   C. The check valve downstream of the filter element opens whenever there is pressure and flow thru filter element. The valve closes when there is no flow or pressure, preventing backflow thru filter element.

   D. The differential pressure indicator actuates and produces visual indication whenever pressure drop across the filter element exceeds 60 psi. This indicates dirty or clogged filter element.

   E. The relief valve relieves the system and allows fluid to bypass the filter element if the differential pressure exceeds 165 psi. The valve reseats when the differential pressure drops below 120 psi. The relief valve also has visual indicators to warn of bypass condition.

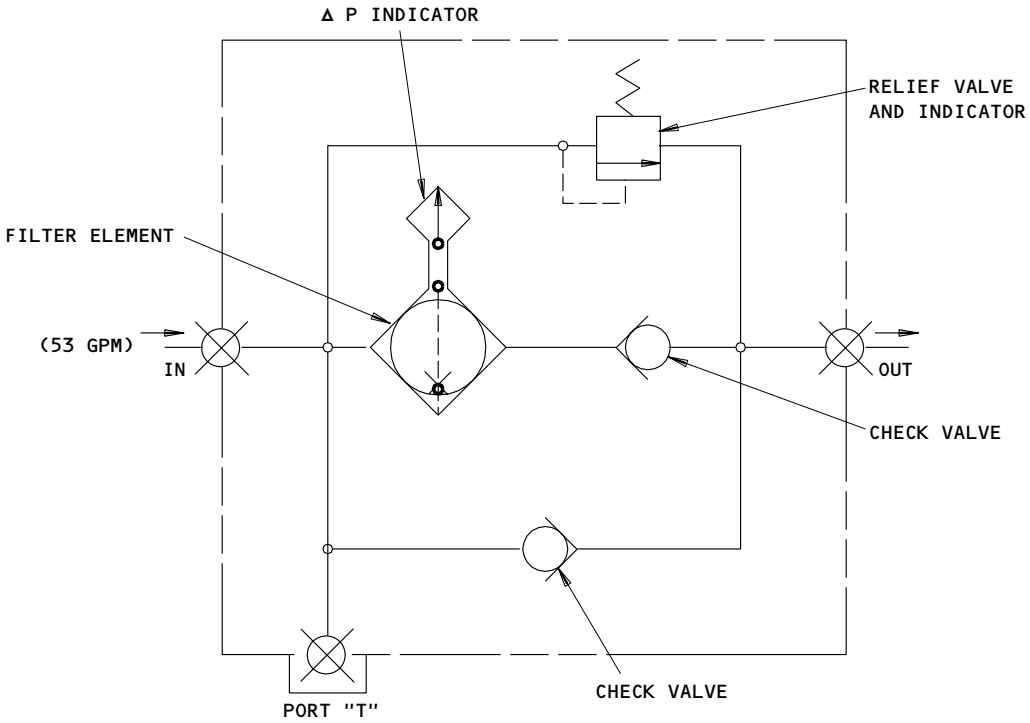
   F. Another check valve permits back flow thru the case when the OUT port pressure is at least 4 psi above the IN port.

3. Leading Particulars (Approximate)

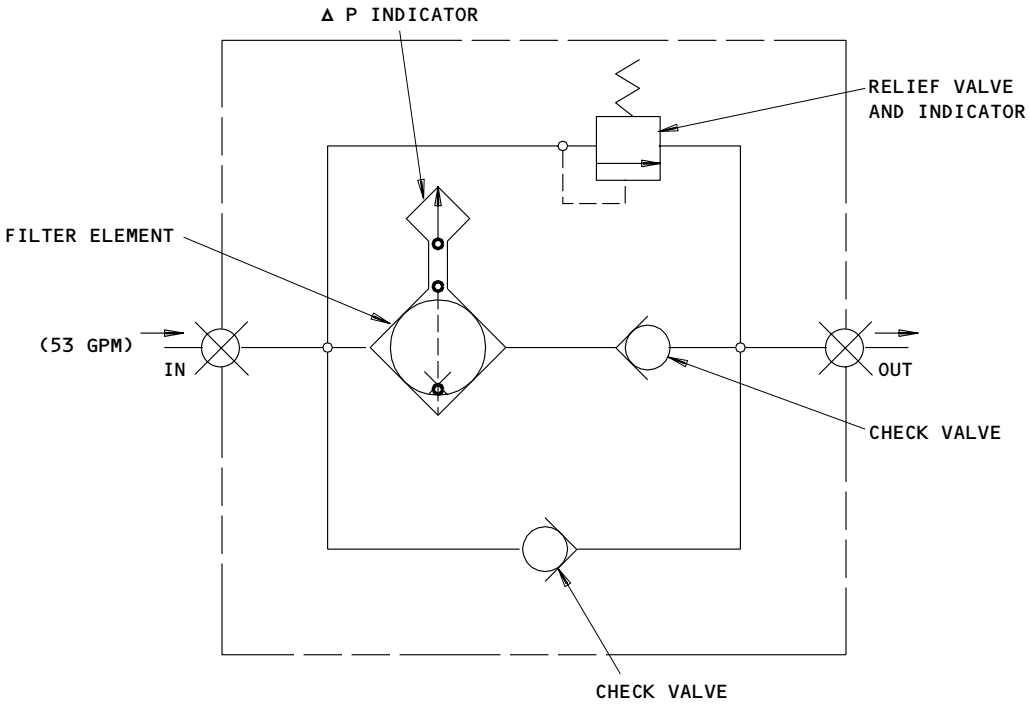
   A. Height -- 11 inches

   B. Case diameter -- 5 inches

   C. Weight -- 10-12 pounds




271T0001-1,-3 ASSEMBLIES




271T0001-2 ASSY

Hydraulic Schematic
Figure 1

TESTING/TROUBLE SHOOTING

1. Equipment

A. Hydraulic test stand capable of supplying hydraulic fluid, BMS 3-11, at a variable flow rate up to 53 gpm.

B. Dummy filter plug -- A29004-8

C. Plug -- AN814-20DL (used on 271T0001-1, -3 only)

D. Packing -- NAS1612-20 (used on 271T0001-1, -3 only)

2. Test

A. Relief valve test

(1) Remove case (55, IPL Fig. 1) and filter (65) and install plug A29004-8. Reinstall case (55).

(2) Install an AN814-20DL plug and a NAS1612-20 packing in port T.

(3) Apply hydraulic pressure to the inlet port (T with port capped) and slowly increase pressure until the relief valve cracks open. (Hydraulic fluid flow from outlet port indicates valve opening.) Check that the differential pressure at which the valve opens is 165 psi maximum, at a minimum leakage rate of 20 cc per minute. Also check that the red colored plunger on the relief valve pops open.

(4) Increase hydraulic pressure to establish steady flow.

(5) Slowly reduce pressure and note the pressure at which the relief valve reseats. The differential pressure must be 120 psi minimum at a leakage rate of 20 cc per minute.

(6) Check that leakage rate after 5 minutes of reseat does not exceed 40 drops per minute.

(7) On 271T0001-2 assembly, increase the flow at the outlet of the filter to 45 gpm. Check that the pressure drop across the filter does not exceed 230 psi.

B. Differential pressure indicator test

NOTE: This test shall be conducted with fluid temperature at 80°-110°F.

(1) Make sure plug A29004-8 and case (55) are installed.

(2) Apply 46-48 psi hydraulic pressure to the inlet port with the outlet port open and port T plugged. Maintain the pressure for 5 seconds. Check that the indicator does not actuate.

(3) Increase pressure from 46-48 psi to 60 psi at a rate of 200 psi per second. Maintain the pressure for one second. Check that the indicator actuates within one second after the pressure reaches 60 psi.

C. Shutoff valve leakage and reverse flow test.

(1) Remove plug A29004-8 and case (55) from unit.

(2) Apply 5 psi hydraulic pressure to the inlet port and outlet port simultaneously. Maintain the pressure for a minimum of 2 minutes. Check that leakage does not exceed 20 drops per minute.

(3) Apply 5 psi pressure to the outlet port with inlet port open to atmosphere. Maintain pressure for 2 minutes. Check that hydraulic fluid flows from the inlet port.

WARNING: HYDRAULIC PRESSURE MUST BE REDUCED TO ZERO PRIOR TO LOOSENING OUTPUT PLUGS OR DAMAGE TO EQUIPMENT AND INJURY MAY RESULT.

D. Proof Pressure Test

(1) Install filter element (65) and case (55) per ASSEMBLY 3.C.

(2) Make sure port T is plugged with an AN814-20DL plug and NAS1612-20 packing. Install a bleed valve in the outlet port.

(3) Fill the module assembly with hydraulic fluid. Make sure that air is removed from inside the assembly. Close the bleed valve.

(4) Increase the hydraulic pressure to the inlet port to 900 psi. Hold pressure for 2 minutes. There shall be no evidence of external leakage, failure, distortion, or permanent set.

(5) Slowly open the bleed valve to reduce pressure. Decrease the hydraulic pressure to 0 psi.

(6) Repeat steps (3) thru (5) using 5 psi.

E. Post test procedures

(1) Remove hydraulic pressure and disconnect module assembly from test stand.

(2) Remove the AN814-20DL plug and NAS1612-20 packing from port T.

(3) Lockwire parts per ASSEMBLY step 3.H.

(4) Prepare for storage using standard industry practices.

| TROUBLE | POSSIBLE CAUSES | CORRECTION |
|---|---|---|
| Step 2.A. | Defective relief valve (25) | Replace relief valve per step 3.A. |
| Step 2.B. | Defective indicator (40) | Replace defective part per step 3.C. |
| Step 2.C.(2) - Fluid leaks between sleeve (75) and valve assembly (70) | Defective spring sleeve (75) or spring (80) | Replace defective parts per step 3.B. |
| Step 2.C.(2) - Fluid leaks between housing (105) and sleeve (75) | Defective packing (90) or sleeve (75) | Examine sleeve (75) for nicks and replace packing (90) per step 3.B. |
| Step 2.C.(2) - Fluid leaks from center of valve assembly (70) | Worn or damaged shutoff valve assembly (70) | Replace valve assembly (70) per step 3.D. |
| Step 2.C.(3) - Hydraulic fluid does not flow out of inlet port | Defective check valve (95) | Replace defective check valve per step 3.B. |

NOTE: Trouble shooting is keyed to the steps of the test procedures. Correction reflects Assembly referenced steps.

Trouble Shooting Chart
Figure 101

3. Corrective Procedures

A. Relief Valve (25) Replacement

(1) Remove screws (20) and remove valve (25) and packings (30, 35).

(2) Lubricate new packings (30, 35) with hydraulic fluid and install on replacement relief valve (25).

(3) Install relief valve (25) on head assembly (105) and secure with screws (20). Tighten screws to 20-30 lb-in.

(4) Retest unit per step 2.

B. Sleeve (75), Spring (80), Check Valve (95) Replacement

(1) Disassemble parts per DISASSEMBLY step 3.C. thru 3.F., as applicable.

(2) Install replacement parts per ASSEMBLY step 3.A. thru 3.C.

(3) Retest unit per step 2.

C. Indicator (40) Replacement

(1) Unscrew indicator (40) from head assembly (105). Remove packings (45A, 50).

(2) Lubricate new packings (45A, 50) with hydraulic fluid and install on replacement indicator (40).

(3) Screw indicator (40) into head assembly (105) and tighten to 80-100 lb-ins.

(4) Retest per step 2.

(5) After completing the test, lockwire indicator per ASSEMBLY par. 3.H.

D. Valve Assembly (70) Replacement

(1) Disassemble parts per DISASSEMBLY step 3.C. thru 3.F., as applicable.

(2) Install parts per ASSEMBLY step 3.A. thru 3.C.

(3) Retest unit per step 2.

## DISASSEMBLY

NOTE: Refer to TESTING/TROUBLE SHOOTING to establish condition or probable cause of any malfunction and to determine extent of disassembly and repair.

1. Equipment

   NOTE: Equivalent substitutes may be used.

   A. Wrench Assembly -- A29004-4

   B. Check Valve Wrench -- A29004-5

   C. Sleeve Retainer -- A29004-2

2. Parts Replacement

   NOTE: The following parts are recommended for replacement. Unless otherwise specified, actual replacement of parts may be based on in-service experience.

   A. Packings

   B. Filter

   C. Lockwire

3. Disassembly (IPL Fig. 1)

   A. Remove screws (20) and relief valve assembly (25) from head assembly (105). Remove packings (30, 35) from relief valve assembly (25).

   B. Remove lockwire and remove indicator (40) from head assembly (105). Remove packings (45A, 50) from indicator (40).

   C. Remove lockwire and unscrew case (55) from head assembly (105). Remove packing (60) from case.

   D. Remove filter (65) by pulling filter straight out of head assembly (105).

WARNING: SPRING (80) IS PRELOADED WHEN INSTALLED. SLEEVE (75) SHOULD BE RETAINED WHILE REMOVING VALVE ASSEMBLY (70) TO PREVENT INJURY TO PERSONNEL

E. Screw retainer A29004-2 into head assembly (105) to secure sleeve (75). Remove valve assembly (70) using wrench A29004-4. Slowly unscrew retainer A29004-2 out of head assembly and remove sleeve (75) and spring (80). Remove packings (85, 90).

F. Using wrench A29004-5, remove check valve assembly (95) from head assembly (105). Remove packing (100).

NOTE: Do not disassemble head assembly unless necessary for repair or replacement.

CHECK

1. Check all parts for obvious defects in accordance with standard industry practices.

2. Penetrant check per 20-20-02 -- Case (55, IPL Fig. 1), head (115).

## REPAIR - GENERAL

1. Content

   A. Repair, refinish and replacement procedures are included in separate repair section as follows:

| P/N | NAME | REPAIR |
|---|---|---|
| 7585484 | NAMEPLATE | 1-1 |
| 7585859 | NAMEPLATE | 1-1 |
| 7586688 | NAMEPLATE | 1-1 |
| - - - - | MISC. PARTS REFINISH | 2-1 |

2. Standard Practices

   A. Refer to the following standard practices as applicable, for details of procedures in individual repairs.

      20-50-12 Application of Adhesive

3. Material

   NOTE: Equivalent substitutes may be used.

   A. Adhesive -- Type 75 (Ref 20-50-12)

NAMEPLATE - REPAIR 1-1

7585484
7585459
7586688

1. Nameplate Replacement

NOTE: Refer to REPAIR-GEN for list of applicable standard practices.

A. Remove existing nameplate (15, IPL Fig. 1) from head assembly (105).

B. Transfer informations on existing nameplate to the replacement one.

C. Install replacement nameplate on head assembly (105) with adhesive. Crimp tab of nameplate over and apply adhesive under and over crimp.

MISCELLANEOUS PARTS REFINISH - REPAIR 2-1

1. Repair of parts listed in Fig. 601 consists of restoration of the original finish.

| IPL FIG. & ITEM | MATERIAL | FINISH |
|---|---|---|
| Fig. 1<br><br>Case (55), head (115) | Al alloy | Anodize per MIL-A-8625, type 1, class 1, clear. |

Refinish Details
Figure 601

ASSEMBLY

1. Equipments and Materials

NOTE: Equivalent substitutes may be used.

A. Check Valve Wrench -- A29004-5

B. Valve Wrench -- A29004-4

C. Sleeve Retainer -- A29004-2

D. Lockwire -- MS20995C32

E. Hydraulic Fluid -- BMS 3-11 (Ref 20-60-03)

2. Lubrication

A. Lubricate all packings with hydraulic fluid, BMS 3-11 before installation.

3. Assembly (IPL Fig. 1)

A. Install packing (100) on check valve assembly (95) and install check valve assembly in head assembly (105). Tighten check valve assembly to 80-100 lb-in. using wrench A29004-5.

B. Install packings (85, 90). Install spring (80) and sleeve (75) in head assembly (105). Make sure the sleeve is centered on retainer A29004-2 to prevent packing (90) from being cut. Screw in retainer A29004-2 to secure parts.

CAUTION: Make sure retainer A29004-2 is installed sufficiently to prevent wear to valve assembly (70) and sleeve (75).

C. Install valve assembly (70) in head assembly (105) and tighten to 180-240 lb-in. using wrench A29004-4. Unscrew and remove retainer A29004-2 from head assembly (105).

D. Install filter (65). Install packing (60) on case (55) and screw case into head assembly (105). Tighten case to 420-480 lb-in.

E. Install packings (45A, 50) on indicator (40) and install indicator in head assembly (105). Tighten indicator to 80-100 lb-ins.

F. Install packings (30, 35) on relief valve assembly (25) and insert relief valve assembly in head assembly (105). Secure relief valve assembly with screws (20). Tighten screws to 20-30 lb-in.

G. Test unit per TESTING/TROUBLE SHOOTING.

H. After testing, lockwire case (55) and indicator (40) to head assembly (105) and cap ports with plugs (5, 10).

4. Use standard industry practices to store this component.

FITS AND CLEARANCES

| FOR TORQUE VALUES OF STANDARD FASTENERS, REFER TO 20-50-01 | | | |
|---|---|---|---|
| ITEM NO. FIG. 1 | NAME | TORQUE | |
| | | POUND-INCHES | POUND-FEET |
| 20 | Screw | 20-30 | |
| 40 | Indicator, Diff. Press. | 80-100 | |
| 55 | Case | 420-480 | |
| 70 | Valve Assembly | 180-240 | |
| 95 | Check Valve Assembly | 80-100 | |

Torque Table
Figure 801

SPECIAL TOOLS, FIXTURES AND EQUIPMENT

NOTE: Equivalent substitutes may be used.

1. Valve Wrench -- A29004-4 *[1]

2. Check Valve Wrench -- A29004-5 *[1]

3. Hydraulic Test Stand.

4. Dummy Filter Plug -- A29004-8 *[1]

5. Sleeve Retainer -- A29004-2 *[1]

*[1] Part of A29004-1 Overhaul Tool Set.

## ILLUSTRATED PARTS LIST

1. This section lists and illustrates replaceable or repairable component parts. The Illustrated Parts Catalog contains a complete explanation of the Boeing part numbering system.

2. Indentures show parts relationships as follows:

    Assembly
      Detail Parts for Assembly
      Subassembly
      Attaching Parts for Subassembly
        Detail Parts for Subassembly

    Detail Installation Parts (Included only if installation parts may be returned to shop as part of assembly)

3. One use code letter (A, B, C, etc.) is assigned in the EFF CODE column for each variation of top assembly. All listed parts are used on all top assemblies except when limitations are shown by use code letter opposite individual part entries.

4. Letter suffixes (alpha-variants) are added to item numbers for optional parts, Service Bulletin modification parts, configuration differences (except left- and right-hand parts), product improvement parts, and parts added between two sequential item numbers. The alpha-variant is not shown on illustrations when appearance and location of all variants of the part is the same.

5. Service Bulletin modifications are shown by the notations PRE SB XXXX and POST SB XXXX.

    A. When a new top assembly part number is assigned by Service Bulletin, the notations appear at the top assembly level only. The configuration differences at detail part level are then shown by use code letter.

    B. When the top assembly part number is not changed by the Service Bulletin, the notations appear at the detail part level.

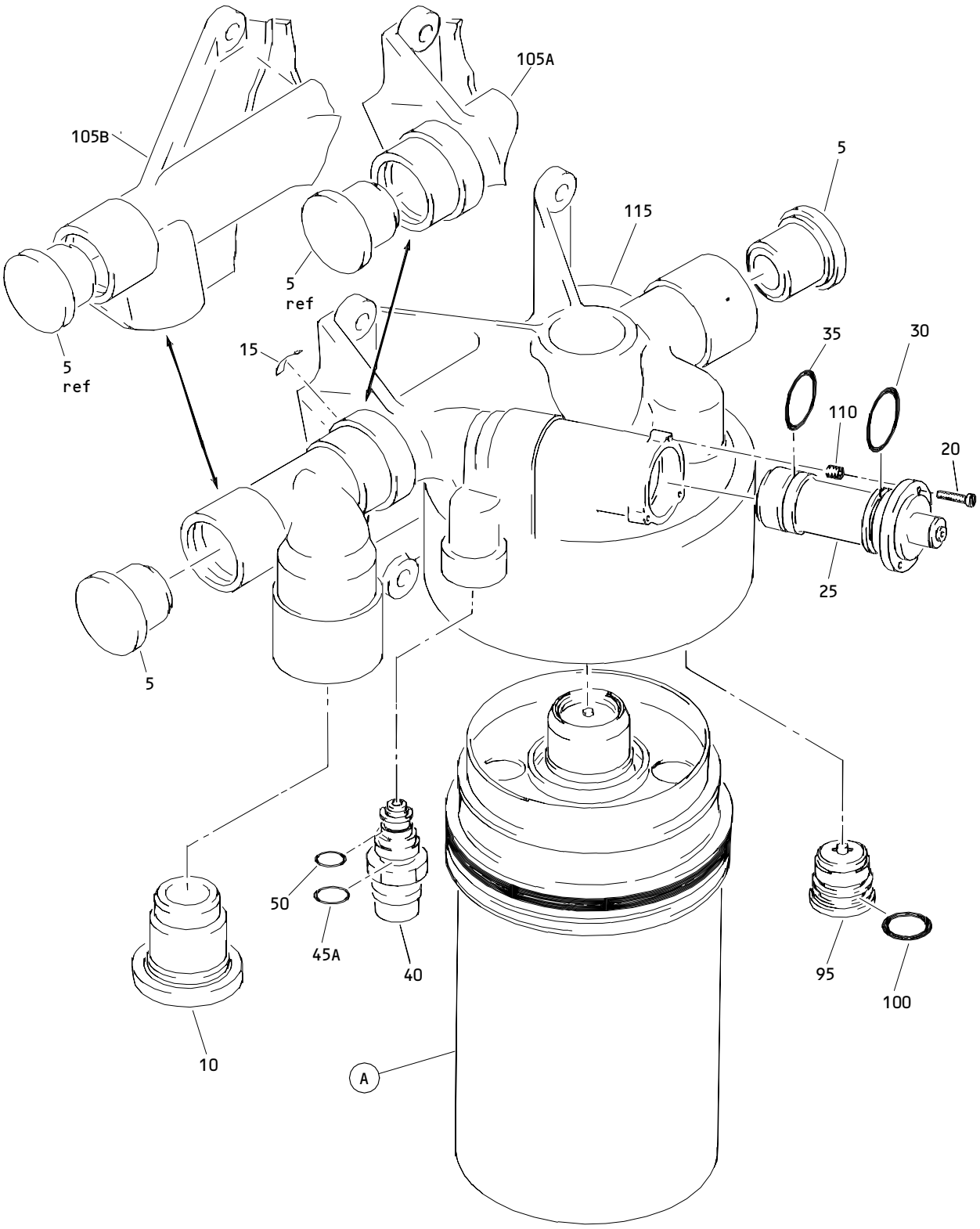
6. Parts Interchangeability

| | |
|---|---|
| Optional (OPT) | The parts are optional to and interchangeable with other parts having the same item number. |
| Supersedes, Superseded By (SUPSDS, SUPSD BY) | The part supersedes and is not interchangeable with the original part. |
| Replaces, Replaced By (REPLS, REPLD BY) | The part replaces and is interchangeable with, or is an alternate to, the original part. |

VENDORS

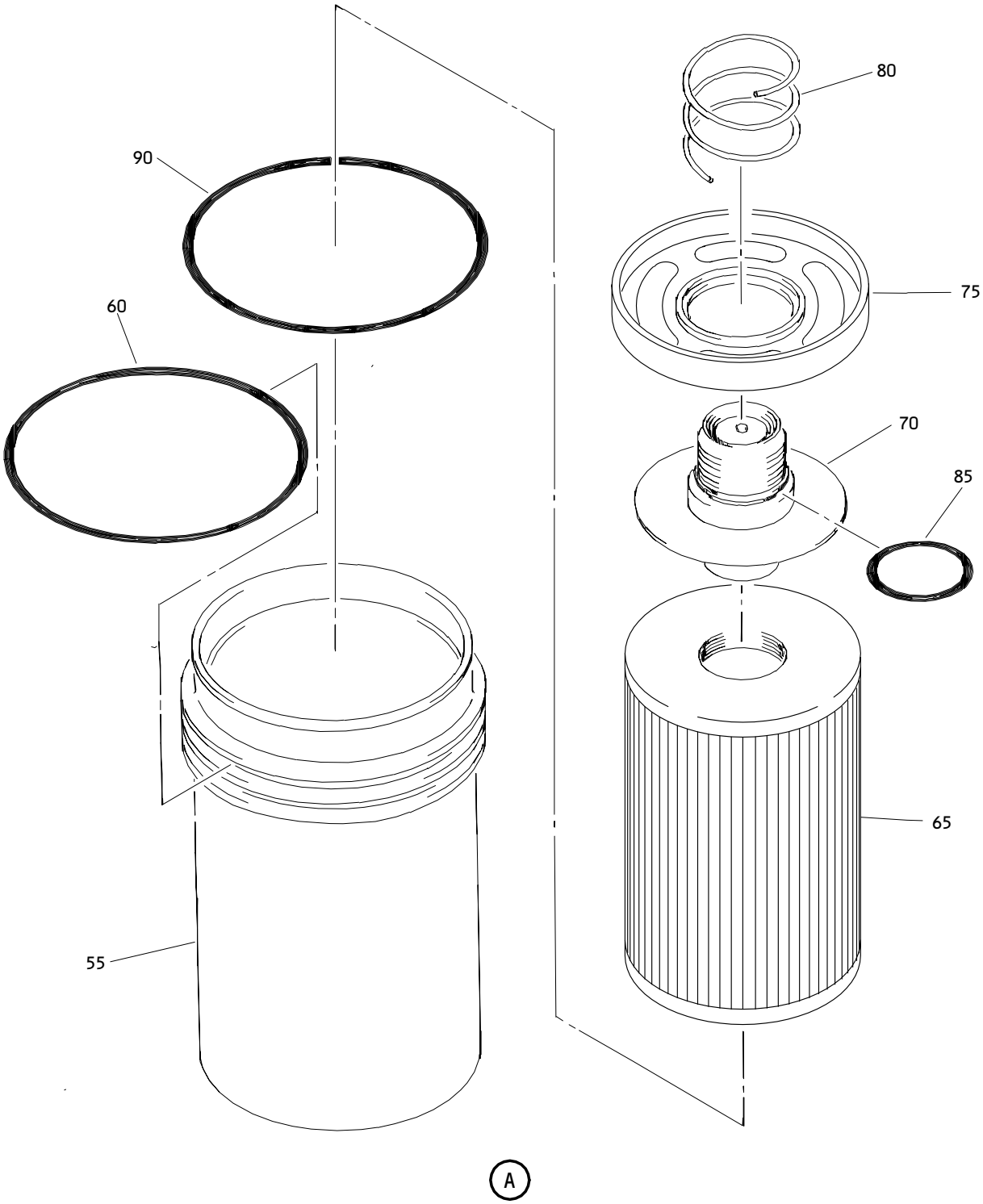
05228 PUROLATOR TECHNOLOGIES INC
950 RANCHO CONEJO BOULEVARD
NEWBURY PARK, CALIFORNIA 91320

18350 AIRCRAFT POROUS MEDIA INC
6301 49TH STREET NORTH
PINELLAS PARK, FLORIDA 33565




Return Filter Module Assembly
Figure 1 (Sheet 1)

T82732




Return Filter Module Assembly
Figure 1 (Sheet 2)



T60409

| FIG. & ITEM | PART NO. | AIRLINE PART NUMBER | NOMENCLATURE 1234567 | EFF CODE | QTY PER ASSY |
|---|---|---|---|---|---|
| 01- | | | | | |
| -1 | 271T0001-1 | | MODULE ASSY-RETURN FILTER | A | RF |
| -1A | 271T0001-2 | | MODULE ASSY-RETURN FILTER | B | RF |
| -1B | 271T0001-3 | | MODULE ASSY-RETURN FILTER | C | RF |
| 5 | 7578744 | | .PLUG AND GASKET ASSY-*(1) (V05228) | | 2 |
| 10 | 7578745 | | .PLUG AND GASKET ASSY-*(1) (V05228) | AC | 1 |
| 15 | 7585484 | | .NAMEPLATE- (V05228) | A | 1 |
| -15A | 7585859 | | .NAMEPLATE- (V05228) | B | 1 |
| -15B | 7586688 | | .NAMEPLATE- (V05228) | C | 1 |
| 20 | NAS1351-3-8P | | .SCREW-CAP | | 3 |
| 25 | 7585802 | | .VALVE ASSY-RELIEF (V05228) | | 1 |
| 30 | NAS1611-125 | | .PACKING | | 1 |
| 35 | NAS1611-026 | | .PACKING | | 1 |
| 40 | TC125UK06Y | | .INDICATOR-DIFFERENTIAL PRESSURE HYDR (V18350) (SPEC S271T005-2) | | 1 |
| -40A | S271T005-5 | | .INDICATOR-DIFFERENTIAL PRESSURE HYDR (OPT TO ITEM 40) | | 1 |
| 45 | NAS1612-08 | | DELETED | | |
| 45A | NAS1612-8 | | .PACKING | | 1 |
| 50 | NAS1611-014 | | .PACKING | | 1 |
| 55 | 271T0003-1 | | .CASE- (OPT ITEM 55A) | | 1 |
| -55A | 271T0006-1 | | .CASE- (OPT ITEM 55) | | 1 |
| 60 | NAS1611-430 | | .PACKING | | 1 |
| 65 | 7585381 | | .FILTER- (V05228) (SPEC S271T006-1) | | 1 |
| 70 | 7585964 | | .VALVE ASSY- (V05228) | | 1 |
| 75 | 7554833 | | .SLEEVE- (V05228) | | 1 |
| 80 | 7554834 | | .SPRING- (V05228) | | 1 |
| 85 | NAS1612-24 | | .PACKING | | 1 |

| FIG. & ITEM | PART NO. | AIRLINE PART NUMBER | NOMENCLATURE 1234567 | EFF CODE | QTY PER ASSY |
|---|---|---|---|---|---|
| 01- | | | | | |
| 90 | NAS1611-429 | | .PACKING | | 1 |
| 95 | 7585520 | | .VALVE ASSY-CHECK (V05228) | | 1 |
| 100 | NAS1611-019 | | .PACKING | | 1 |
| 105 | 271T0002-1 | | .HEAD ASSY | A | 1 |
| 105A | 271T0004-1 | | .HEAD ASSY | B | 1 |
| 105B | 271T0008-1 | | .HEAD ASSY | C | 1 |
| 110 | MS21209F1-15P | | ..INSERT | | 3 |
| 115 | 271T002-2 | | ..HEAD | A | 1 |
| -115A | 271T004-2 | | ..HEAD | B | 1 |
| -115B | 271T008-2 | | ..HEAD | C | 1 |
| | | | *(1) USED FOR SHIPPING AND STORAGE ONLY | | |