COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST

WASTE WATER DRAIN MAST ASSEMBLY

PART NUMBER 417N2117–1, –2, –4, –5, –6, –7, –8, –9, 417T2093–1, –10, –11, –14, –2, –8, 478W1610–4, –6, –7

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COMPONENT MAINTENANCE MANUAL

Revision No. 15
Jul 01/2009

To: All holders of WASTE WATER DRAIN MAST ASSEMBLY 38-31-01.

Attached is the current revision to this COMPONENT MAINTENANCE MANUAL

The COMPONENT MAINTENANCE MANUAL is furnished either as a printed manual, on microfilm, or digital products, or any combination of the three. This revision replaces all previous microfilm cartridges or digital products. All microfilm and digital products are reissued with all obsolete data deleted and all updated pages added.

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Location of Change	Description of Change
38-31-01 ASSEMBLY	Changed the data in the Consumable Materials list. Changed consumable from ''DC3145 adhesive, A00281'' to ''Dow Corning 3145 RTV adhesive, A00281''

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A = Added, R = Revised, D = Deleted, O = Overflow

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TEMPORARY REVISION AND SERVICE BULLETIN RECORD

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVE	DATE OF INCORPORATION INTO MANUAL
		PRR B10814	JAN 10/84
		PRR N52875	JAN 10/84
		PRR B12429	SEP 01/95
		PRR 61552	NOV 01/00

All revisions to this manual will be accompanied by transmittal sheet bearing the revision number. Enter the revision number in numerical order, together with the revision date, the date filed and the initials of the person filing.

Revision		Filed		Revision		Filed	
Number	Date	Date	Initials	Number	Date	Date	Initials

Revision		Filed	
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Temporary Revision		Inserted		Removed	
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Temporary Revision		Inserted		Removed	
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INTRODUCTION

1. General

A. The instructions in this manual supply the data necessary to do the maintenance functions together with the test, fault isolation, repair, and replacement of the defective parts.

B. This manual is divided into different parts:

(1) Title Page

(2) Transmittal Letter

(3) Highlights

(4) List of Effective Pages

(5) Table of Contents

(6) Temporary Revision & Service Bulletin Record

(7) Record of Revisions

(8) Record of Temporary Revisions

(9) Introduction

(10) Procedures & IPL Sections

C. Components that can be repaired have a different repair number for each specified repair. To find the repair number location of a component, look in the Repair-General procedure at the beginning of the REPAIR section. The Repair-General procedure also has an explanation of the True Position Dimension symbols used.

D. All dimensions, measures, quantities and weights included are in English units. When metric equivalents are given they will be in the parentheses that follow the English units.

E. The introduction to the Illustrated Parts List (IPL) shows how the IPL data is used.

F. Design changes, optional parts, configuration differences and Service Bulletin modifications may cause different part numbers. These part numbers are identified in the IPL with an alphabetical letter which is added to the end of the basic item number. This new item number is referred to as an alpha-variant. Throughout the manual, IPL basic item number references also apply to alpha-variants unless shown differently.

G. The tool reference numbers found in the individual procedures and in the Special Tools, Fixtures, and Equipment section are used to identify if a tool is a standard tool (STD-XXXX), a commercial tool (COM-XXXX), or a Special Tool (SPL-XXXX). This reference number is also used to distinguish between tools with similar names in the same procedure. These reference numbers are for use in the documentation only. They are not to be used for ordering tools.

WASTE WATER DRAIN MAST ASSEMBLY - DESCRIPTION AND OPERATION

1. Description

A. The Wastewater Drain Mast Assembly (DESCRIPTION AND OPERATION, Figure 1), is a drainage system that removes wastewater from the airplane.

B. The drain mast assembly has these components:

(1) Two assembly halves

(2) Heater assembly with drainage system

(3) Extension adapter (478W1610-6 only)

(4) Silicone rubber seal

C. The two assembly halves keep aerodynamic smoothness around the heater assembly.

D. The heater assembly will make sure that the wastewater does not freeze while the airplane is in flight.

2. Operation

A. The drain mast assembly drains the wastewater from the airplane during normal flight operations.

B. The heater assembly heats the wastewater as the water flows through the drain mast assembly.

C. The heated wastewater then drains out into the air stream and away from the airplane.

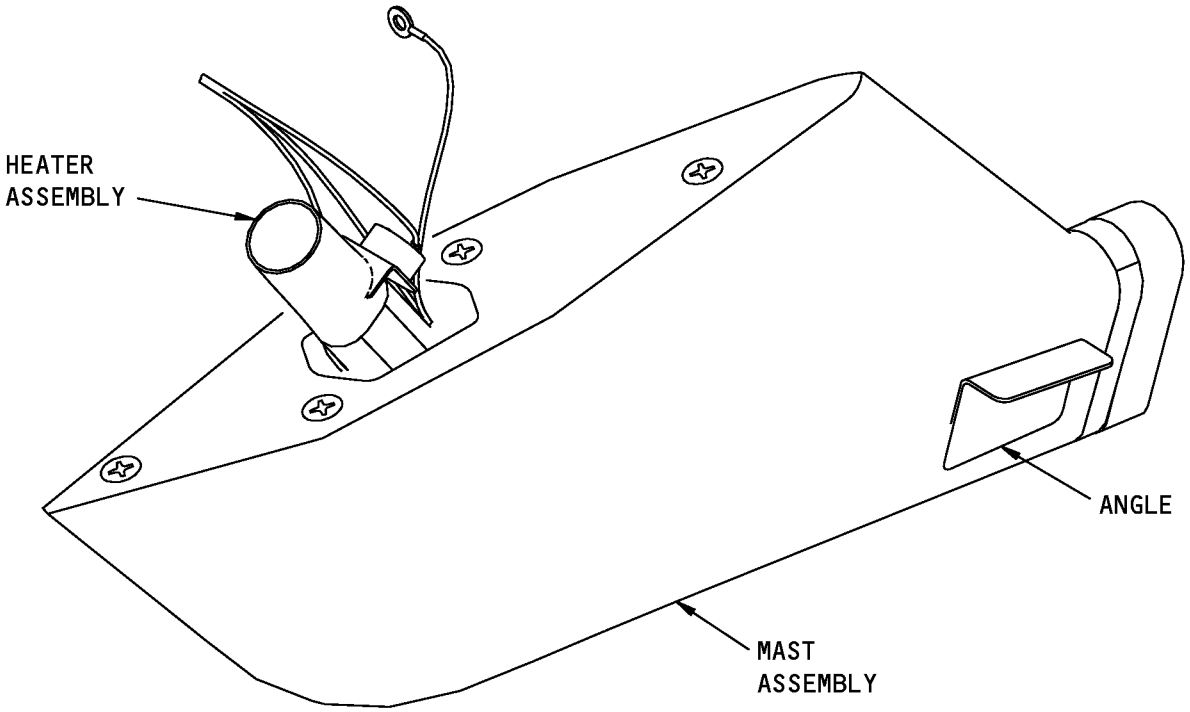
3. Leading Particulars (Approximate)

A. Length – 19 inches

B. Width – 2 inches

C. Height – 11 inches

D. Weight – 2 pounds



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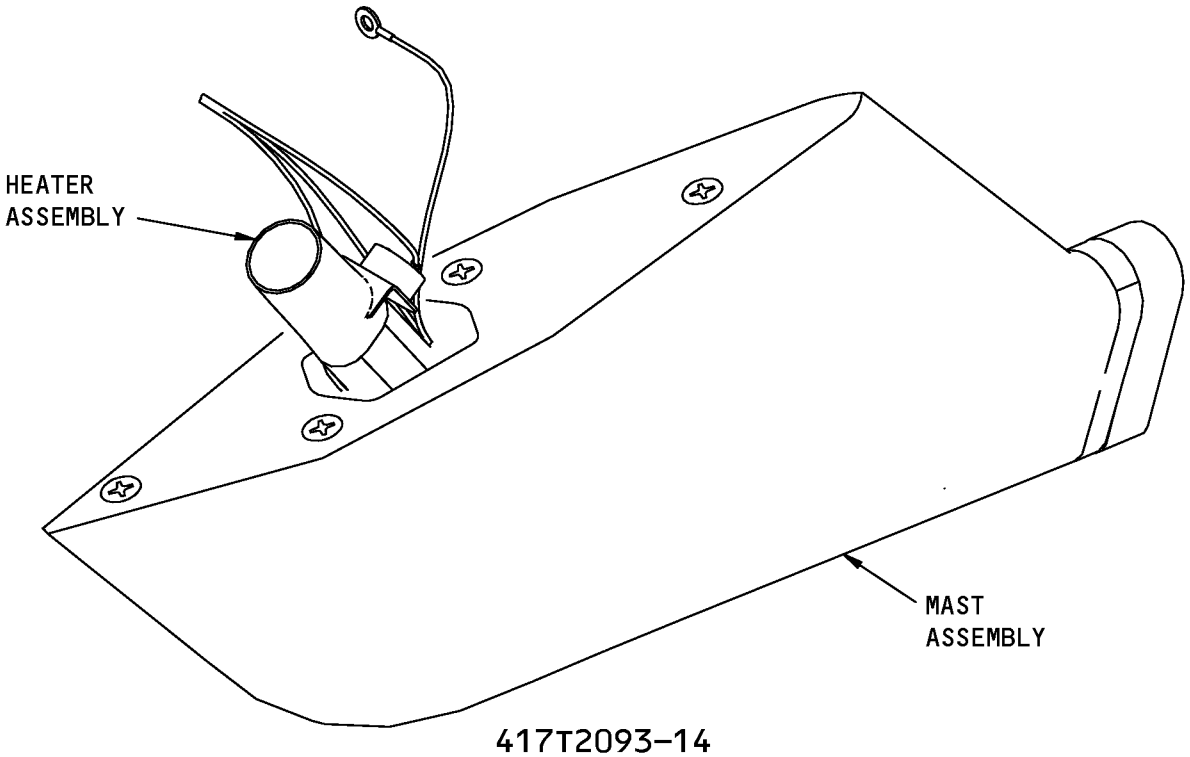

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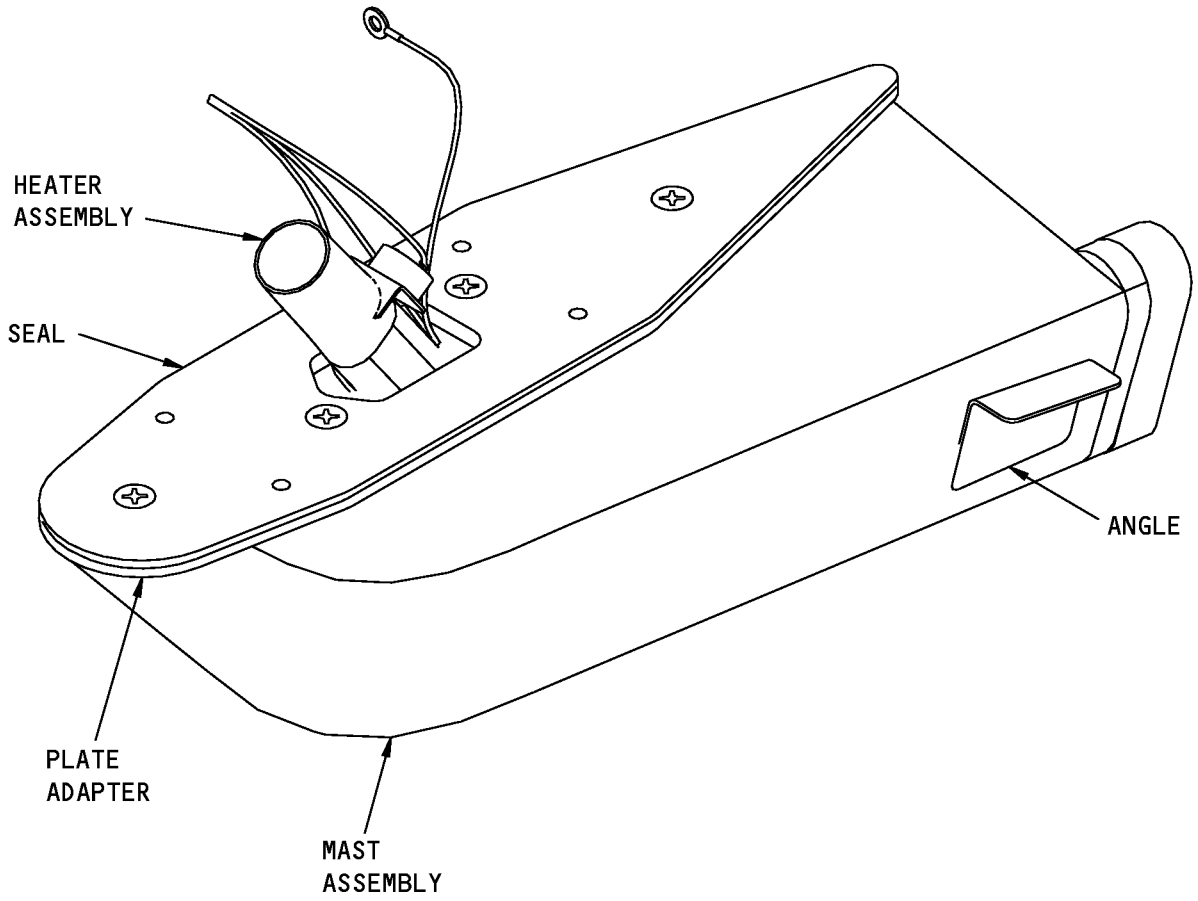
Waste Water Drain Mast Assembly
Figure 1 (Sheet 1 of 5)



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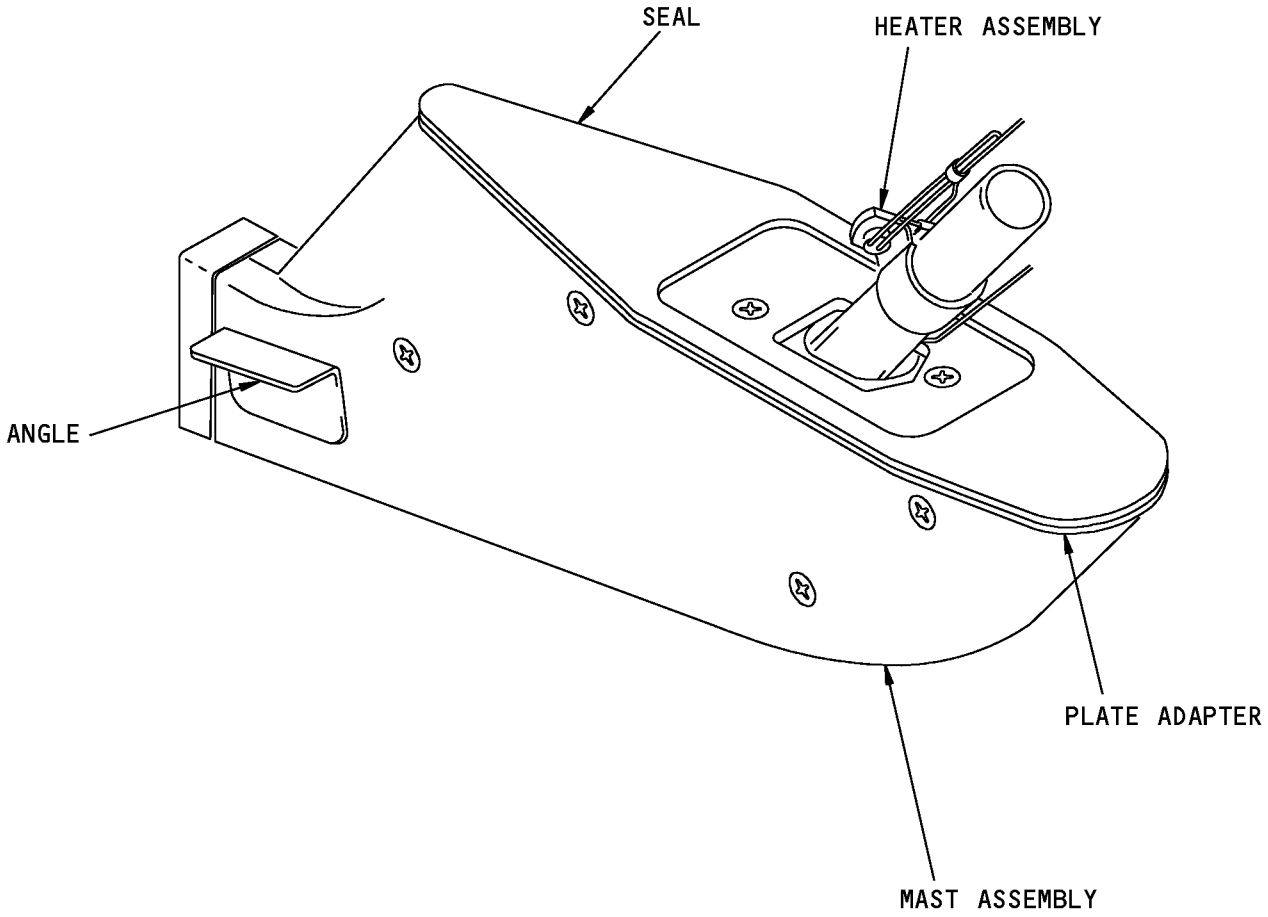
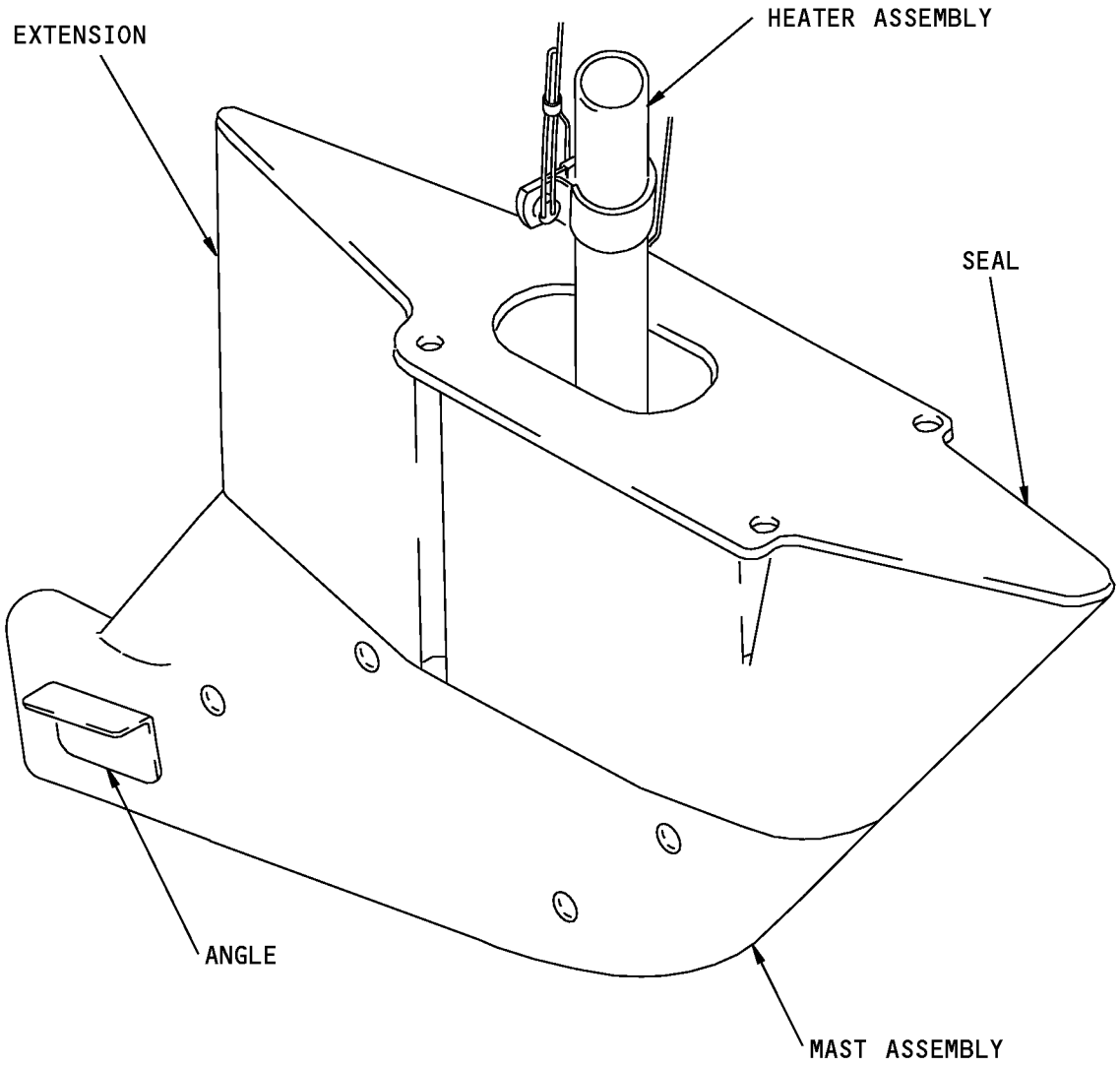
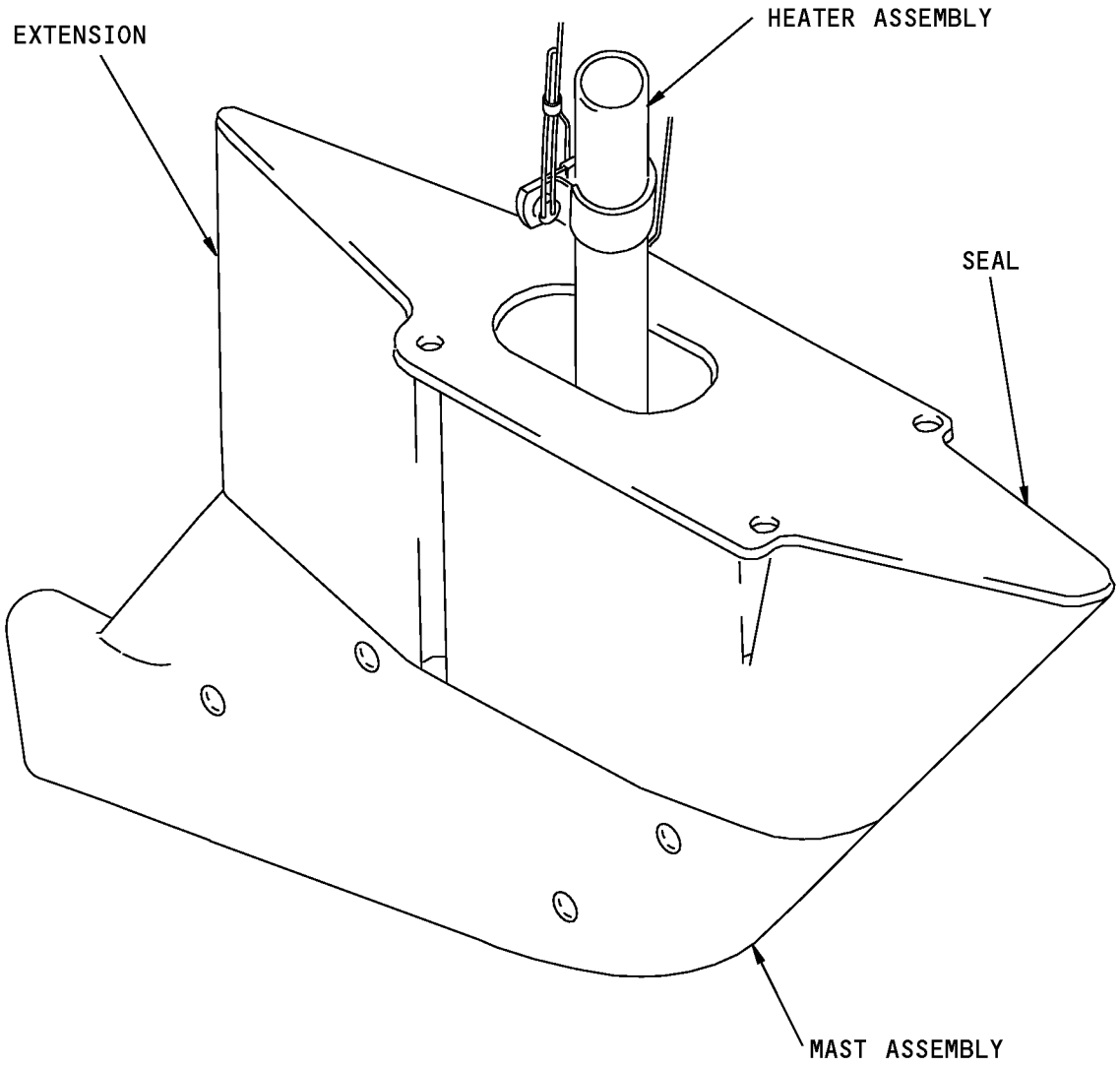
Waste Water Drain Mast Assembly
Figure 1 (Sheet 2 of 5)



Waste Water Drain Mast Assembly
Figure 1 (Sheet 3 of 5)



Waste Water Drain Mast Assembly
Figure 1 (Sheet 4 of 5)



Waste Water Drain Mast Assembly
Figure 1 (Sheet 5 of 5)

TESTING AND FAULT ISOLATION

1. General

A. This procedure contains the data necessary to do an electrical test.

B. Refer to the Standard Overhaul Practices Manual (SOPM) for the standard practices identified in this procedure.

C. Refer to IPL Figure 1, IPL Figure 2 or IPL Figure 3 as applicable for item numbers.

2. Heater Tests

A. Tools/Equipment

NOTE: Equivalent substitutes may be used.

Reference	Description
SPL-6784	Ohmmeter - Resistance Measuring or equivalent
STD-5511	Wattmeter

B. General

(1) The heater assembly must be held in a set-up stand to do these tests because the heater gets very hot during the tests.

(2) Do these tests when the heater is fully dry, at ambient room temperature, and at ground level air pressure.

WARNING: THE HEATER ASSEMBLY IS VERY HOT DURING OPERATION. BE SURE TO KEEP ALL PERSONNEL AND COMBUSTIBLE MATERIALS AWAY FROM THE HEATER ASSEMBLY DURING THE TEST. AFTER THE TESTS ARE COMPLETED, MAKE SURE THAT THE HEATER ASSEMBLY IS FULLY COOLED BEFORE YOU TOUCH IT.

(3) Do an electrical test of the drain mast heater assemblies (IPL Figure 1, 25A series, 130B series; IPL Figure 2 and IPL Figure 3, 100).

(a) Put the heater assembly on the metal mounting stand (TESTING AND FAULT ISOLATION, Figure 101) during the power test. Keep the heater assembly in the vertical position, with the outlet end of the drain tube in the UP or DOWN position.

(b) Connect the heater assembly to a single-phase alternating current voltage supply source with 113-117 volts, RMS at 375-425 Hertz.

(c) Use a wattmeter, STD-5511 that can measure 200-500 watts.

(d) Do the heater assembly power test (TESTING AND FAULT ISOLATION, Table 101)

1) Apply the voltage only for the time period shown.

2) Measure the power during the time period shown.

3) The power must be within the limits shown.

(e) After you measure the power, use an ammeter with a full-scale range of at least 10 milliamperes to measure the amperage loss of the heater assembly insulation.

1) Immediately after you de-energize the power to the heater, make sure that the heater is still at test temperature.

2) Apply 500 volts, RMS at 60 Hertz, between one of the two leads and the bonding strap for approximately 1 minute.

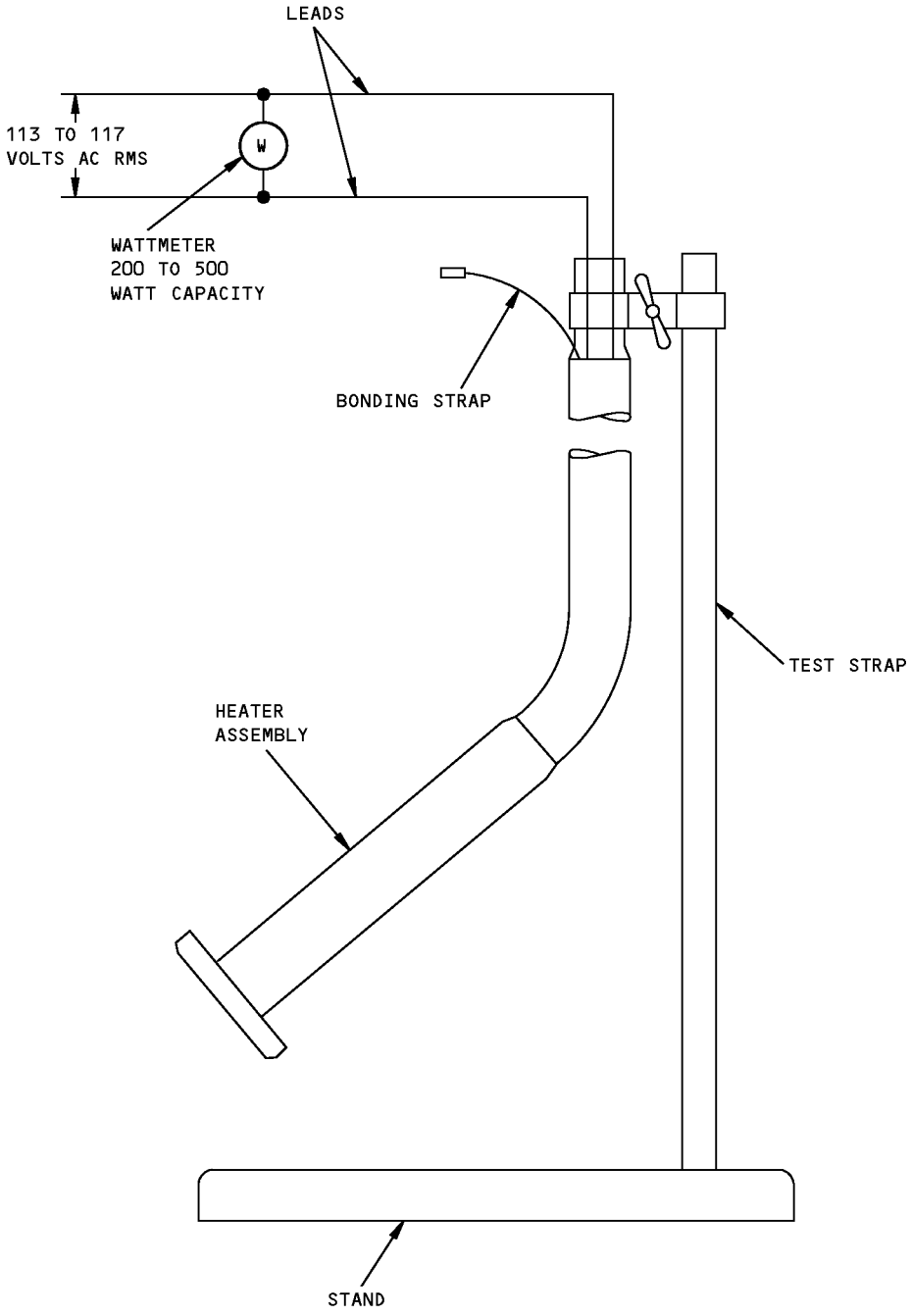
3) Refer to TESTING AND FAULT ISOLATION, Table 101 for the maximum amperage loss permitted.

(f) If necessary, you can also use standard industry practices, and an ohmmeter, SPL-6784 to find the insulation resistance of the heater assembly.

1) Apply 500 volts dc between mutually insulated parts for 15 seconds minimum. The resistance must not be less than 100 megohms. Use the ohmmeter, SPL-6784 to look for defects in the heater assembly and the insulation.

Table 101: Heater Power Table

DRAIN MAST HEATER ASSEMBLY PART NUMBER	POWER		AMPERAGE
	TIME PERIOD TO MEASURE POWER (MINUTES)	POWER (WATTS)	PERMITTED LOSS OF AMPERAGE (MILLIAMPS)
10-61434-2, -5	3.0 - 3.5	259 - 311	2
10-61434-4, -6, -7	3.0 - 3.5	286 - 336	2



Electrical Operational Test Setup
Figure 101

DISASSEMBLY

1. General

A. This procedure has the data to disassemble the waste water drain mast assembly.

B. The Boeing Company recommends that you disassemble the drain mast only when necessary, to complete fault isolation, determine the serviceability of parts, to make any necessary repairs to the drain mast, and restore the unit to serviceable condition.

C. When disassembly is necessary, use standard industry practices to disassemble the drain mast assembly.

D. Refer to IPL Figure 1, IPL Figure 2 and IPL Figure 3 for item numbers.

2. Disassembly

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
A00247	Sealant - Pressure And Environmental - Chromate Type	BMS 5-95

B. Procedure

NOTE: Do not disassemble the heater assembly (25, IPL Figure 1; 100, IPL Figure 2 and IPL Figure 3) unless a repair or replacement of the complete assembly is necessary.

(1) The data that follows is for the drain mast assemblies, 417T2093-1, 417T2093-2, 417T2093-8, 417T2093-10, 417T2093-11, 417T2093-14 (IPL Figure 1) and 417N2117-1, 417N2117-2, 417N2117-4 thru 417N2117-9 (IPL Figure 1):

(a) The four bolts (90) that attach the adapter plates (95, 100, 102) to the drain mast assembly (110) are installed with sealant, A00247. Refer to ASSEMBLY, Figure 702 for the correct bolt locations.

NOTE: For drain mast assemblies (P/N 417N2117-1, 417N2117-2, 417N2117-4 thru 417N2117-9 only), the four bolts (105) are installed with sealant, A00247. Refer to ASSEMBLY, Figure 702 for the correct bolt locations.

(b) The four screws (5, 10, 15) that fasten the two drain mast halves (45, 70, 150, 175) together are installed with sealant, A00247. Refer to ASSEMBLY, Figure 701 for the correct screw locations.

(2) The data that follows is for the drain mast assembly 478W1610-4 (IPL Figure 2):

(a) The four screws (25, 30, 35) that fasten the two drain mast halves (40, 65) together are installed with sealant, A00247.

(3) The data that follows is for the drain mast assembly 478W1610-6, 478W1610-7 (IPL Figure 3):

(a) The four screws (35) that fasten the two drain mast halves (40, 65) together are installed with sealant, A00247.

(b) Refer to ASSEMBLY, Figure 701 for the correct screw locations.

(NOT APPLICABLE)

CHECK

1. General

A. This procedure has the data necessary to find defects in the material of the specified parts.

B. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to IPL Figure 1, IPL Figure 2 and IPL Figure 3 for item numbers.

2. Check

A. References

Reference	Title
SOPM 20-20-02	PENETRANT METHODS OF INSPECTION

B. Procedure

(1) Examine the component parts for defects by standard industry practices.

(2) Do a penetrant inspection (SOPM 20-20-02) of these parts:

(a) Drain half (IPL Figure 1, 45, 70, 150, 175; IPL Figure 2 and IPL Figure 3, 60, 95)

(b) Angle (IPL Figure 1, 40, 65A, 145, 170; IPL Figure 2 and IPL Figure 3, 50, 75)

REPAIR

1. Content

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

Table 601:

P/N	NAME	REPAIRS
417T2093 417N2117	MAST ASSEMBLY	1-1
478W1610	MAST ASSEMBLY	1-2
- - - - -	MISCELLANEOUS PARTS REFINISH	2-1

2. Standard Practices

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

(1) SOPM 20-20-02 Penetrant Methods of Inspection

(2) SOPM 20-30-02 Stripping of Protective Finishes

(3) SOPM 20-41-01 Decoding Table for Boeing Finish Codes

(4) SOPM 20-41-02 Application of Chemical and Solvent Resistant Finishes

(5) SOPM 20-60-02 Finishing Materials

3. Materials

NOTE: If necessary, you can use an equivalent substitute.

A. Enamel – coating, C00033 BMS 10-60 type 2 red gloss (SOPM 20-60-02)

B. Enamel – coating, C50075 BMS 10-60 type 2 gray gloss (SOPM 20-60-02)

C. Primer – primer, C00259 BMS 10-11 type 1 (SOPM 20-60-02)

D. Primer – primer, C00175 BMS 10-79 type 3 (SOPM 20-60-02)

MAST ASSEMBLY - REPAIR 1-1

417T2093–1, –2, –8, –10, –11, –14, 417N2117–1, –2, –4, –5, –6, –7, –8, –9

1. General

A. This procedure gives the data that is necessary to repair and refinish the mast assembly.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to IPL Figure 1 for item numbers.

2. Insert and Sleeve Replacement

A. Remove inserts (50, 75, 80, 155, 180, 185) and sleeves (85, 190).

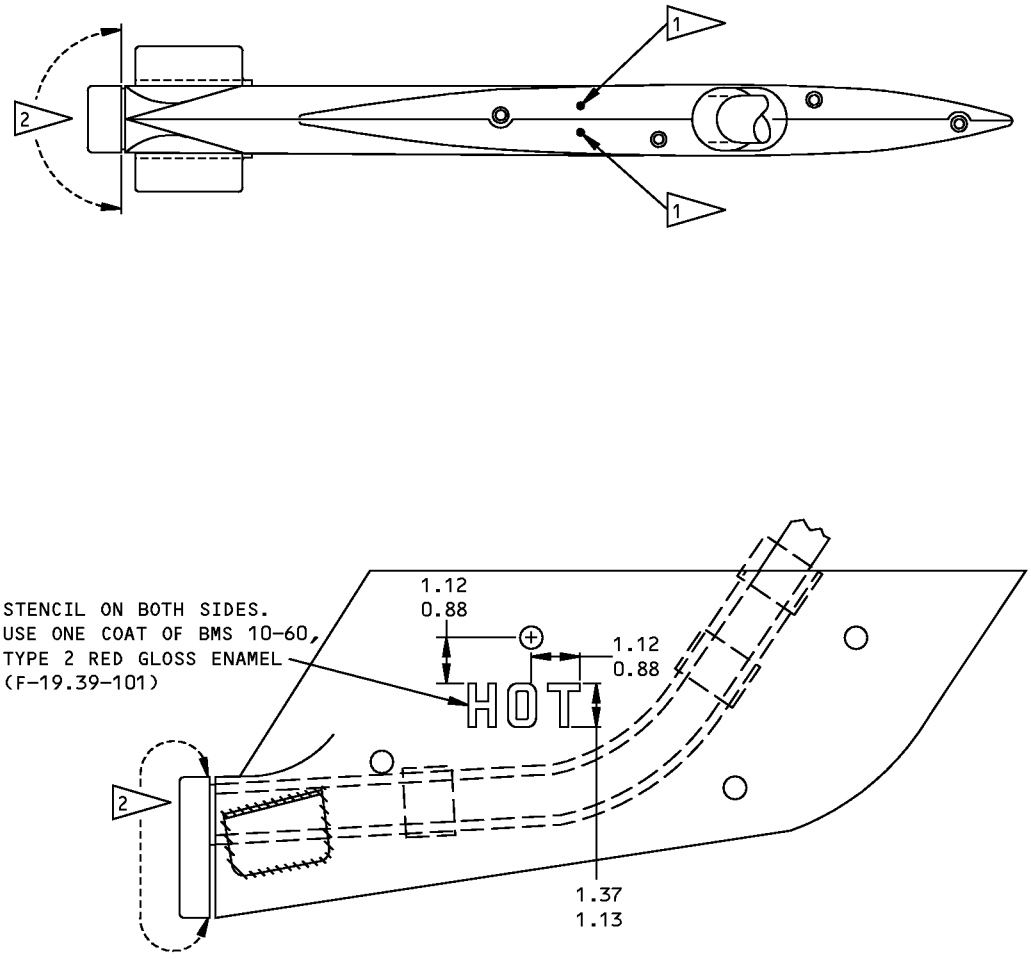
B. Coat all of the areas of the hole along with the countersink. Use primer, C00259 (SRF-12.40).

C. After the holes are coated, immediately install the new inserts (50, 75, 80, 155, 180, 185) and sleeves (85, 190) into the mast half (45, 70, 150, 175).

NOTE: Make sure that replacement parts are installed with one-quarter to one-half turn below the countersink of the hole. Also remove the tang.

3. Refinish

A. Refer to the Refinish Instructions shown in REPAIR 1-1, Figure 601.



REFINISH

APPLY ONE COAT BMS 10-60, TYPE 2 GRAY GLOSS ENAMEL (F-19.39-707) ON THE OUTSIDE SURFACES EXCEPT THE SURFACES NOTED IN 1 2

1 APPLY A COLORED CHEMICAL COATING (F-17.10) MANUALLY TO THE NOTED SURFACES

2 NO FINISH (F-25.01)

ALL DIMENSIONS ARE IN INCHES

417T2093 Drain Mast Assembly Refinish
Figure 601

MAST ASSEMBLY - REPAIR 1-2

478W1610–4, –6, –7

1. General

A. This procedure gives the data that is necessary to repair and refinish the mast assembly.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to IPL Figure 2 and IPL Figure 3 for item numbers.

2. Insert and Sleeve Replacement

A. Remove inserts (55, 85, 90) and sleeve (80).

B. Coat all of the areas of the hole along with the countersink. Use primer, C00259 (SRF-12.40).

C. After the holes are coated, immediately install the new inserts (55, 80, 90) and sleeve (80) into the drain mast half (60, 95).

(1) Make sure that replacement parts are installed with one-quarter to one-half turn below the countersink of the hole.

(2) Remove the tang.

3. Refinish

A. Refer to the Refinish Instructions shown in REPAIR 2-1, Table 601.

MISCELLANEOUS PARTS REFINISH - REPAIR 2-1

1. **General**

   A. This repair has the data that is necessary to refinish the parts which are not given in the specific repairs.

   B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

   C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

   D. Refer to IPL Figure 1, IPL Figure 2 and IPL Figure 3 for item numbers.

2. **Procedure**

   A. Repair of parts listed in REPAIR 2-1, Table 601 consists of restoration of the original finish.

Table 601: Refinish Details

IPL FIG. & ITEM	MATERIAL	FINISH
Fig. 1 Angle (40, 145, 65A, 170)	Al alloy	Chromic acid anodize (F-2.26) and apply primer, C00175 (F-19.47).
Drain half (45, 70, 150, 175)	Al alloy	Sulfuric acid anodize (F-17.03) and apply primer, C00175 (F-19.47) all over, except mounting surfaces common to fuselage.
Fig. 2 and 3 Angle (50, 75)	Al alloy	Chromic acid anodize (F-2.26) and apply primer, C00175 (F-19.47).
Drain main half (60, 95)	Al alloy	Sulfuric acid anodize (F-17.03) and apply primer, C00175 (F-19.47) all over, except mounting surfaces common to fuselage.

ASSEMBLY

1. General

A. This procedure contains the data necessary to assemble the waste water drain mast assembly.

B. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to IPL Figure 1, IPL Figure 2 and IPL Figure 3 for the item numbers.

2. Assembly

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
A00247	Sealant - Pressure And Environmental - Chromate Type	BMS 5-95
A00281	Adhesive - Dow Corning 3145 RTV	MIL-A-46146 (BAC5010, Type 79)
F00005	Solder - Electronic, Tin Alloy, Tin-Lead Alloy, Lead Alloy	QQ-S-571
G00148	Tape - Silicone - Permacel 2650	
G50536	tape - 3M No. 474 plastic film	

B. References

Reference	Title
SOPM 20-11-03	REPAIR OF ELECTRICAL TERMINATIONS AND ELECTRICAL BONDING AREAS
SOPM 20-43-03	CHEMICAL CONVERSION COATINGS FOR ALUMINUM
SOPM 20-50-11	APPLICATION OF AERODYNAMIC SMOOTHING SEALANT
SOPM 20-50-12	APPLICATION OF ADHESIVES
SOPM 20-60-04	MISCELLANEOUS MATERIALS

C. To assemble drain mast assemblies (P/N 417T2093-1, 417T2093-2, 417T2093-8, 417T2093-10, 417T2093-11), do the steps that follow: (IPL Figure 1)

(1) Wrap heater assembly (25) with Permacel 2650 tape, G00148 (0.06 inch maximum thickness X 1.00 inch wide) (SOPM 20-60-04), in locations shown in ASSEMBLY, Figure 701 to clamp heater firmly in place when screws (5, 10, 15) are installed. The Permacel 2650 tape, G00148 should not compress more than 0.040 inch when screws are tightened.

(2) Position heater assembly (25) between mast halves (30, 55) and install screws (5, 10, 15).

CAUTION: EXERCISE CARE WHEN TRIMMING TAPE TO AVOID DAMAGE TO HEATER (25) OR TUBE (27).

(3) Trim off tape that extends above upper surface of mast halves.

(4) On mast assemblies 417T2093-1 and 417T2093-2, trim upper edge of heater assembly (25) to dimension shown in ASSEMBLY, Figure 701.

(5) On mast assembly 417T2093-2:

NOTE: Heater assembly (25), tube (27) and heater tape (22) may be replaced with heater assembly (25A).

(a) Braze tube (27) onto replacement heater assembly (25) using filler metal (Easy-Flo per QQ-S-561, class 4, AWS BAG-1A. Optional: solder, F00005) as shown in ASSEMBLY, Figure 701. Ensure that solder seal is complete over entire circumference of joint.

WARNING: OVERLAPPING TURNS OF HEATER TAPE CAN RESULT IN AN OVERHEAT CONDITION CAPABLE OF CHARRING HEATER INSULATION.

(b) Spirally wrap heater tape (22) around tube (27) as shown in ASSEMBLY, Figure 701. Ensure that tape does not contact heating elements. Secure tape to tube with a continuous spiral wrap of tape, G50536 flame-resistant adhesive tape (SOPM 20-60-04).

(6) Apply aerodynamic smoother as given in SOPM 20-50-11 to both ends of screws (5, 10, 15) to obtain flush surface on both sides of mast.

(7) Apply aerodynamic smoother as given in SOPM 20-50-11 to faying surfaces of mast halves and to edges of angles (40, 65A, 150, 170) as shown in ASSEMBLY, Figure 701. Drain holes at lower surface of mast assembly must be free of aerodynamic smoother.

D. To assemble drain mast assemblies (P/N 417N2117-1, 417N2117-2, 417N2117-4, 417N2117-5, 417N2117-6, 417N2117-7, 417N2117-8, 417N2117-9), do the steps that follow: (IPL Figure 1)

(1) If the drain mast (P/N 417T2093-1, or 417T2093-10) was disassembled and repaired, then do the steps given in ASSEMBLY, Paragraph 2.C.(1) thru ASSEMBLY, Paragraph 2.C.(4), ASSEMBLY, Paragraph 2.C.(6) and ASSEMBLY, Paragraph 2.C.(7) to assemble the part.

NOTE: If the drain mast was not disassembled or repaired, then ignore ASSEMBLY, Paragraph 2.D.(1) and begin with ASSEMBLY, Paragraph 2.D.(2).

(2) Prepare the mating surfaces of the adapter plate (95, 100, 102), and the drain mast assembly (110) as given in SOPM 20-11-03, cleaning method number 1.

(3) After the surface has been cleaned, alodize the area as given in SOPM 20-43-03, type 2, class A.

(4) For the drain mast assembly (P/N 417N2117-1 only), place screws (105) into the holes of adapter plate (95, 100, 102). Fillet seal the head of the bolts (105) with sealant, A00247 (SOPM 20-60-04).

(5) After the adapter plate (95, 100, 102) has been alodized, then attach the adapter plate to the drain mast assembly (110) with bolts (90).

(6) For the drain mast assembly (P/N 417N2117-9 only), bond the seal (195) to the adapter plate (102). Use Dow Corning 3145 RTV adhesive, A00281 to bond the seal as given in SOPM 20-50-12.

(7) After the adapter plate (95, 100, 102) has been attached to the drain mast assembly (110), then apply sealant, A00247 (SOPM 20-60-04) to both ends of the bolts (90) as shown in ASSEMBLY, Figure 702. Also apply sealant, A00247 (SOPM 20-60-04) to the edges of the mating surfaces of the adapter plate and to the drain mast assembly.

NOTE: The total resistance across each of the sealed surfaces must be maximum of 0.0025 ohms.

E. To assemble drain mast assemblies (P/N 478W1610-4), do the steps that follow: (IPL Figure 2)

(1) If the drain mast (P/N 417T2093-10) was disassembled and repaired, then do the steps given in ASSEMBLY, Paragraph 2.C.(1) thru ASSEMBLY, Paragraph 2.C.(4), ASSEMBLY, Paragraph 2.C.(6) and ASSEMBLY, Paragraph 2.C.(7) to assemble the part.

NOTE: If the drain mast was not disassembled or repaired, then ignore ASSEMBLY, Paragraph 2.E.(1) and begin with ASSEMBLY, Paragraph 2.E.(2).

(2) Prepare the mating surfaces of the adapter plate (15), and the drain mast assembly (20) as given in SOPM 20-11-03, cleaning method number 1.

(3) After the surface has been cleaned, alodize the area as given in SOPM 20-43-03, type 2, class A.

(4) After the adapter plate (15) has been alodized, then attach the adapter plate to the drain mast assembly (20) with bolts (5).

(5) After the adapter plate (15) has been attached to the drain mast assembly (20), then apply sealant, A00247 (SOPM 20-60-04) to both ends of the bolts (5) as shown in ASSEMBLY, Figure 702. Also, apply sealant, A00247 (SOPM 20-60-04) to the edges of the mating surfaces of the adapter plate and to the drain mast assembly.

NOTE: The total resistance across each of the sealed surfaces must be a maximum of 0.0025 ohm.

(6) Bond the seal (10) to the adapter plate (15). Use Dow Corning 3145 RTV adhesive, A00281 to bond the seal as given in SOPM 20-50-12.

F. To assemble drain mast assemblies (P/N 478W1610-6, 478W1610-7), do the steps that follow: (IPL Figure 3)

(1) If the drain mast (P/N 417T2093-11) was disassembled and repaired, then do the steps given in ASSEMBLY, Paragraph 2.C.(1) thru ASSEMBLY, Paragraph 2.C.(4), ASSEMBLY, Paragraph 2.C.(6) and ASSEMBLY, Paragraph 2.C.(7) to assemble the part.

NOTE: If the drain mast was not disassembled or repaired, then ignore ASSEMBLY, Paragraph 2.F.(1) and begin with ASSEMBLY, Paragraph 2.F.(2).

(2) Prepare the mating surfaces of the extension-adapter (15), and the drain mast assembly (20) as given in SOPM 20-11-03, cleaning method number 1.

(3) After the surface has been cleaned, alodize the area as given in SOPM 20-43-03, type 2, class A.

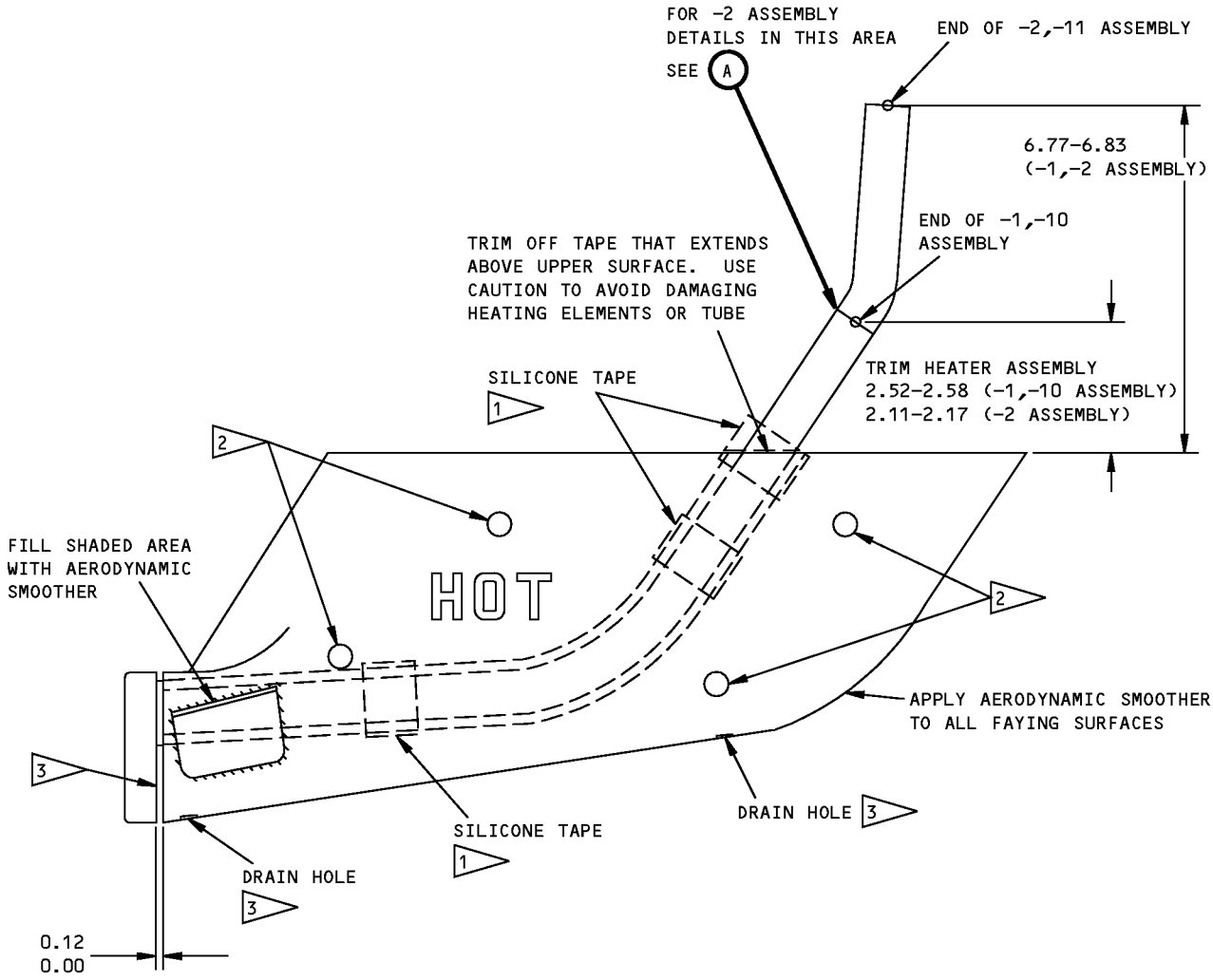
(4) After the extension-adapter (15) has been alodized, then attach the extension-adapter to the drain mast assembly (20) with bolts (10).

(5) After the extension-adapter (15) has been attached to the drain mast assembly (20), then apply sealant, A00247 (SOPM 20-60-04) to both ends of the bolts (10) as shown in ASSEMBLY, Figure 702.

(a) Apply sealant, A00247 (SOPM 20-60-04) to the edges of the mating surfaces of the extension-adapter and to the drain mast assembly.

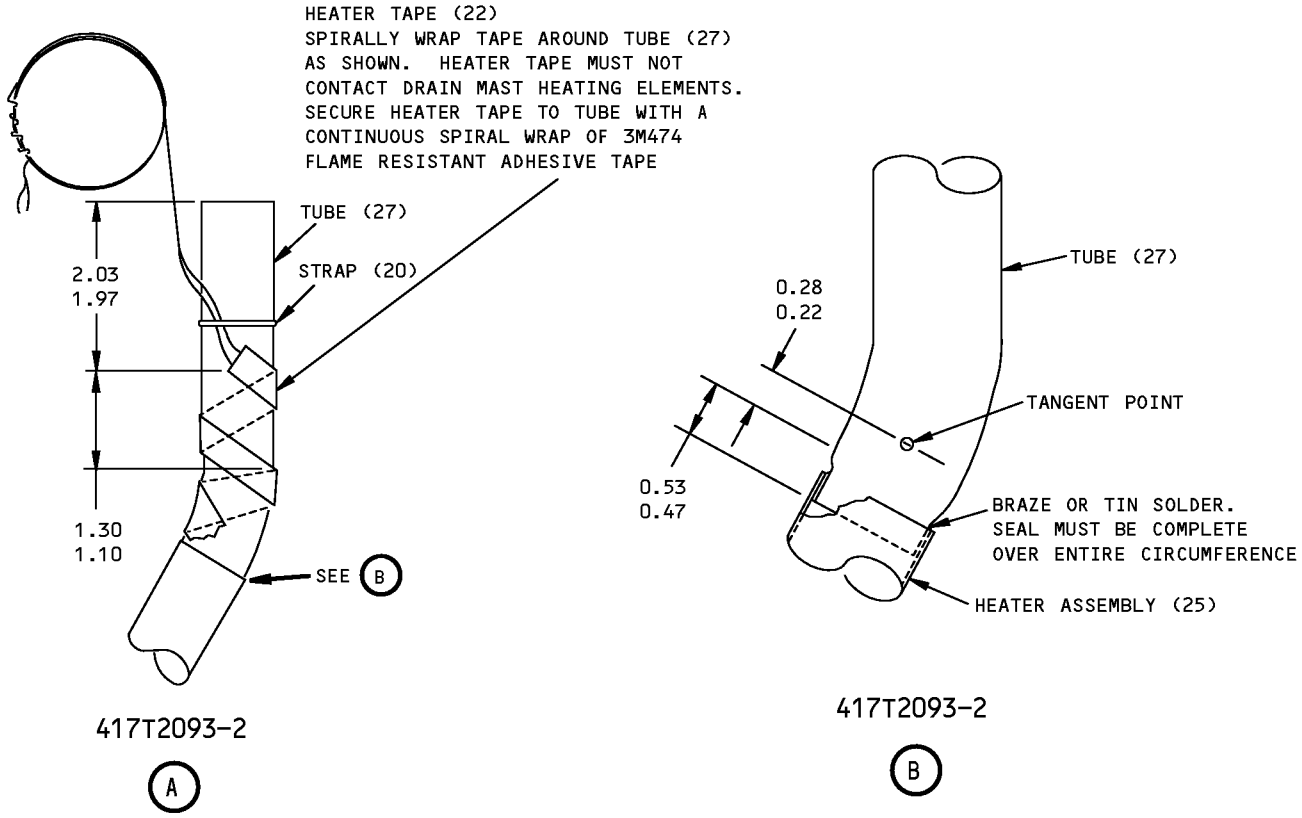
(b) The total resistance across each of the sealed surfaces must be a maximum of 0.0025 ohm.

(6) Bond the seal (5) to the extension-adapter (15). Use Dow Corning 3145 RTV adhesive, A00281 to bond the seal as given in SOPM 20-50-12.



ASSEMBLIES 471T2093-1,-2,-10,-11,-14

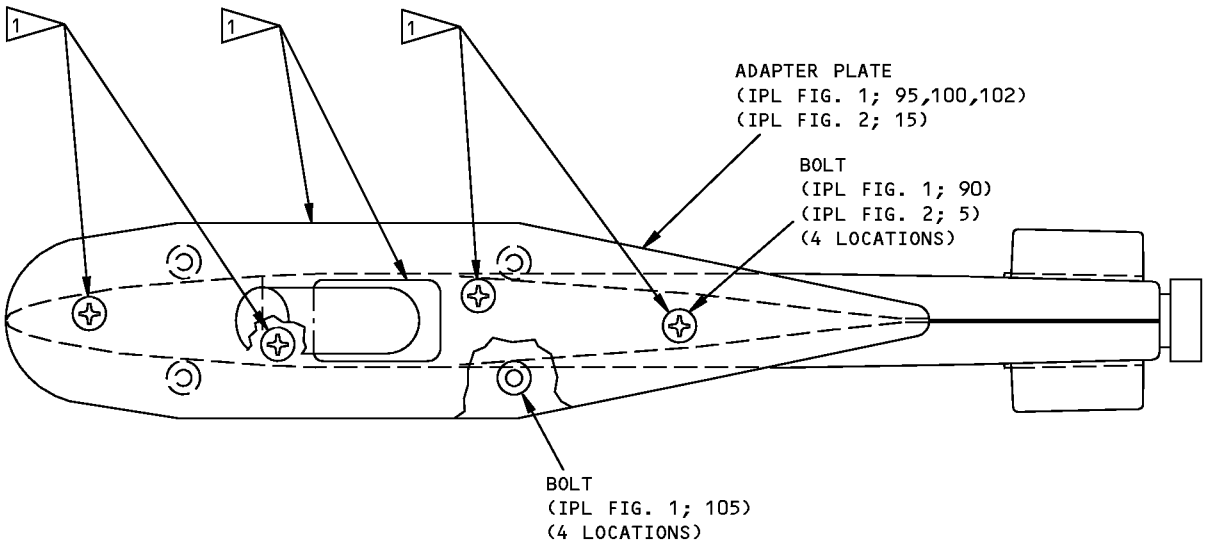
Assembly Details
Figure 701 (Sheet 1 of 2)



1. WRAP TAPE AROUND HEATER ASSEMBLY TO A THICKNESS THAT CLAMPS HEATER FIRMLY IN PLACE WHEN FASTENERS ARE INSTALLED. DO NOT COMPRESS SILICONE RUBBER TAPE MORE THAN 0.040 INCH WHEN TIGHTENING SCREWS
2. FILL HEAD AND TAIL END OF ALL FASTENERS FLUSH WITH MAST SURFACES WITH AERODYNAMIC SMOOTHER
3. THIS AREA TO BE FREE OF AERODYNAMIC SMOOTHER

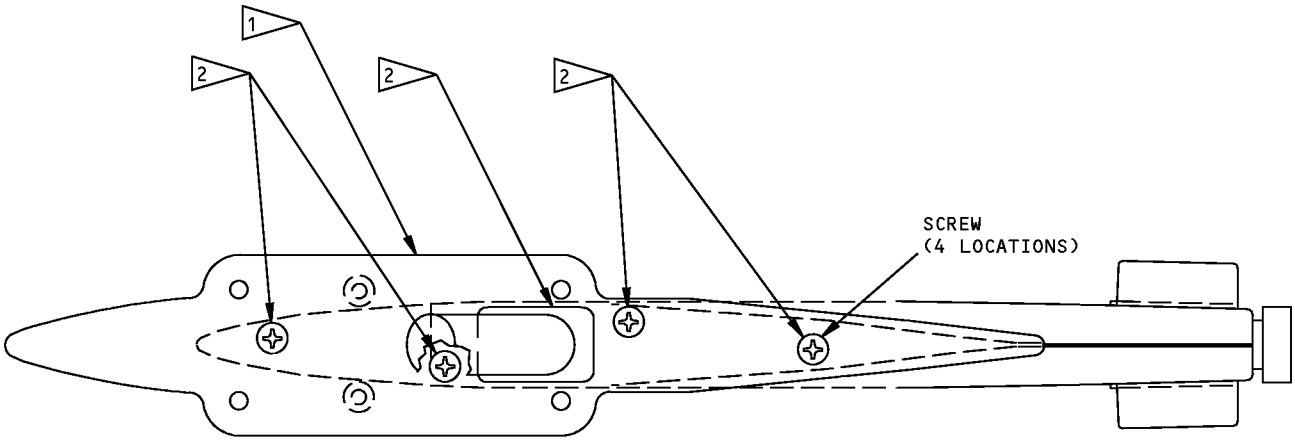
ALL DIMENSIONS ARE IN INCHES

Assembly Details
Figure 701 (Sheet 2 of 2)



ASSEMBLIES 417T2093-1,-2,-8,-10,-11,-14
417N2117-1,-2,-4 THRU -9
478W1610-4

Assembly Details
Figure 702 (Sheet 1 of 2)



ASSEMBLY 478W1610-6 ONLY

1 APPLY BMS 5-95 SEALANT TO BOTH ENDS OF THE BOLTS AT THE LOCATIONS SHOWN IN THE FIGURE. ALSO APPLY SEALANT TO THE EDGES OF THE MATING SURFACES OF THE ADAPTER PLATE AND TO THE DRAIN MAST ASSEMBLY

2 APPLY BMS 5-95 SEALANT TO BOTH ENDS OF THE BOLTS AT THE LOCATIONS SHOWN IN THE FIGURE. ALSO APPLY SEALANT TO THE EDGES OF THE MATING SURFACES OF THE EXTENSION-ADAPTER AND TO THE DRAIN MAST ASSEMBLY

Assembly Details
Figure 702 (Sheet 2 of 2)

BOEING®

COMPONENT MAINTENANCE MANUAL

FITS AND CLEARANCES

(NOT APPLICABLE)

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

1. General

A. This section lists the special tools, fixtures, and equipment necessary for maintenance.

NOTE: Equivalent substitutes may be used.

Special Tools

Reference	Description	Part Number	Supplier
SPL-6784	Ohmmeter - Resistance Measuring or equivalent		

ILLUSTRATED PARTS LIST

1. Introduction

A. The Illustrated Parts List (IPL) contains an illustration and a list of component parts you can repair or replace. The Illustrated Parts Catalog (IPC) shows how to use the Boeing part number system.

B. This shows how parts are related: The relation of each item to its next higher assembly (NHA) is shown in the NOMENCLATURE column. Use the indenture system that follows:

1 2 3 4 5 6 7

. Assembly

. Attaching parts for assembly

. . Detail parts for assembly

. . Subassembly

. . Attaching parts for subassembly

. . . Detail parts for subassembly

. . . Sub-subassembly

. . . Attaching parts for subassembly

. . . . . Details parts for sub-subassembly

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

C. Each top assembly is given one use code letter (A, B, C, etc.) in the USAGE CODE column. All subsequent component parts in the list can have one or more of the use code letters to show effectivity to top assemblies. A component part without a use code applies to all top assemblies.

D. An alphabetical letter is added after the item number for optional parts, parts changed by a Service Bulletin, configuration differences (except left-handed and right-handed parts), last engineering releases, and parts added between item numbers in a sequence. The alphabetical letter will not be shown on the illustration for equivalent parts of the same part number.

E. Color-coded parts are identified with a single digit alpha following the dash number or with ''SP'' suffix. If the ''SP'' suffix is used, it represents consolidation of all color codes applicable for a given usage which are not separately listed. Orders for color-coded parts should include the registry number of the airplane for which the parts are ordered.

F. If a part number is 15 characters long but will not fit in the part number column, the part number will be displayed with a ''~'' at the end of the line and will be continued on the next line. The ''~'' denotes that the part number continues on the next line.

G. Parts changed by a Service Bulletin are shown by PRE SB XXXX and POST SB XXXX added to the NOMENCLATURE column.

(1) When a new top assembly is added by a Service Bulletin, PRE SB XXXX and POST SB XXXX will be added at the top assembly level only. The configuration differences at the detail part level are shown by use code letters.

(2) When the top assembly part number is not changed by the Service Bulletin, PRE SB XXXX and POST SB XXXX will be added at the detail level.

H. Interchangeable Parts

Optional (OPT)	The part is optional to and interchangeable with other parts that have the same item number.
Replaces, Replaced by and not interchangeable with (REPLACES, REPLACED BY AND NOT INTCHG/W)	The part replaces and is not interchangeable with the initial part.
Replaces, Replaced by (REPLACES, REPLACED BY)	The part replaces and is interchangeable with, or is an alternative to, the initial part.

VENDOR CODES

Code	Name
04849	ARI INDUSTRIES INC 381 ARI COURT ADDISON, ILLINOIS 60101-4329 FORMERLY AERO RESEARCH INST CO V04849 AND VB0003 FORMERLY AMERICAN-STANDARD AERO RESEARCH INST DEPT FORMERLY IN FRANKLIN PARK, ILLINOIS
13535	METAL MADE PRODUCTS CO 1616 HYDE PARK AVE HYDE PARK, MASSACHUSETTS 02136-2458
13545	GENERAL ELECTRIC CO AVIATION SERVICES SEATTLE OF AVIATION SEATTLE, WASHINGTON 98168-1978 OBSOLETE RECORD
26344	NEW HAVEN MFG CORP 446 BLAKE STREET NEW HAVEN, CONNECTICUT 06515-1238 OBSOLETE RECORD
98085	COX AND COMPANY, INCORPORATED 200 VARICK STREET NEW YORK, NEW YORK 10014-4810

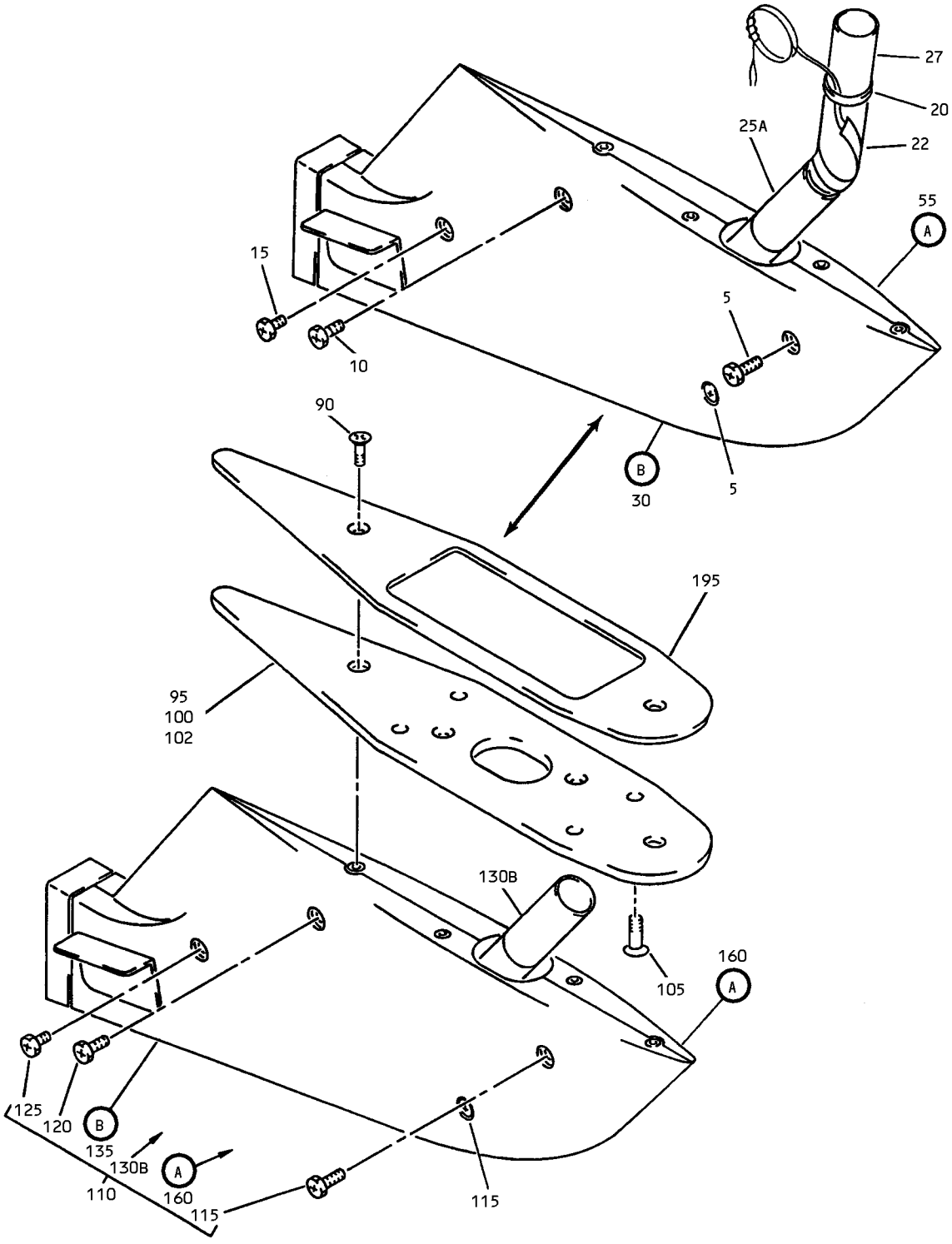
NUMERICAL INDEX

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
10-61434-2		1	25G	1
		1	130B	1
10-61434-4		1	25A	1
		1	25C	1
10-61434-5		1	25D	1
		1	130C	1
		2	100	1
10-61434-6		1	25E	1
		1	25F	1
		3	100	1
2372-24		1	22	1
3591-3CN0190		1	85	1
		1	190	1
		2	80	1
		3	80	1
417N2117-1		1	2	RF
417N2117-2		1	2A	RF
417N2117-3		1	95	1
417N2117-4		1	2B	RF
417N2117-5		1	2C	RF
417N2117-6		1	2D	RF
417N2117-7		1	2E	RF
417N2117-8		1	2F	RF
417N2117-9		1	2G	RF
417N2118-1		1	100A	1
417N2118-2		1	100	1
417N2118-3		1	102A	1
		2	15	1
417N2118-4		1	102	1
417N2119-1		2	10	1
417N2119-3		1	195	1
417T2093-1		1	1	RF
		1	110	1
417T2093-10		1	1D	RF

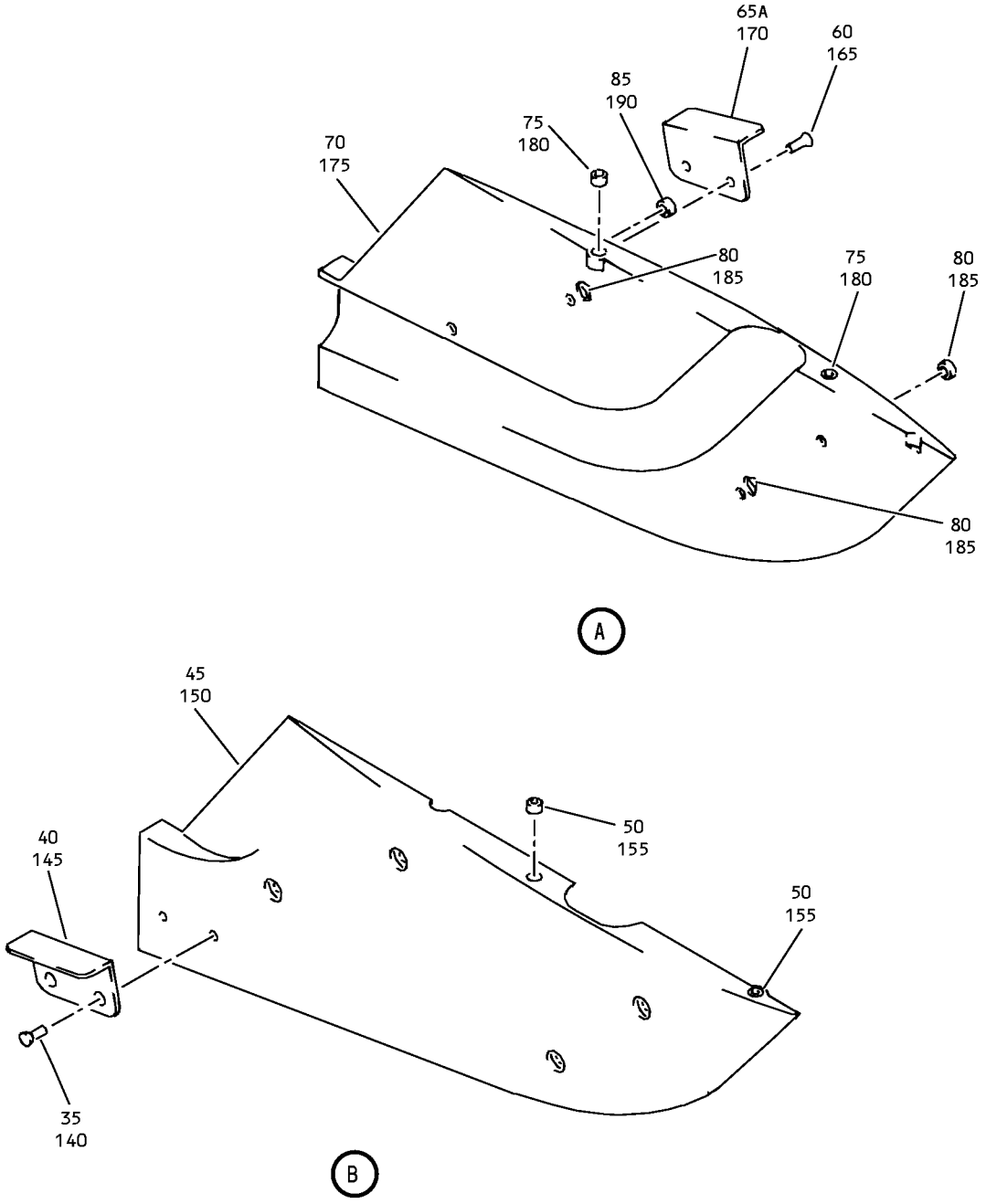
PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
		1	110A	1
		2	20	1
417T2093-11		1	1E	RF
		3	20	1
417T2093-12		1	30A	1
		3	42	1
417T2093-13		1	55A	1
		3	67	1
417T2093-14		1	1F	RF
		3	22	1
417T2093-2		1	1A	RF
417T2093-4		1	30	1
		1	135	1
		2	40	1
		3	40	1
417T2093-5		1	55	1
		1	160	1
		2	65	1
		3	65	1
417T2093-7		1	27	1
417T2093-8		1	1C	RF
417T2111-3		1	95A	1
417T2111-8		3	15	1
478W1610-4		1	3C	RF
		2	1A	RF
478W1610-6		1	3D	RF
		3	1A	RF
478W1610-7		1	3E	RF
		3	1B	RF
478W1612-2		3	5A	1
478W1612-3		3	5	1
65-14036-12		1	45	1
		1	150	1
		2	60	1
		3	60	1

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
65-14036-13		1	70	1
		1	175	1
		2	95	1
		3	95	1
69-56298-1		1	65A	1
		1	170	1
		2	75	1
		3	75	1
69-56298-2		1	40	1
		1	145	1
		2	50	1
		3	50	1
8921536G2		1	25G	1
		1	130B	1
8921536G4		1	25A	1
		1	25C	1
8921536G5		1	25D	1
		1	130C	1
		2	100	1
8921536G6		1	25E	1
		1	25F	1
		3	100	1
90234-2		1	25G	1
		1	130B	1
90234-4		1	25A	1
		1	25C	1
90234-5		1	25D	1
		1	130C	1
		2	100	1
90234-6		1	25E	1
		1	25F	1
		3	100	1
BACB30LU4P4		1	90	4
		2	5	4
BACB30LU5-8		1	105	4

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
BACR15BA6D		1	35	2
		1	60	2
		1	140	2
		1	165	2
		2	45	2
		2	70	2
		3	45	2
		3	70	2
MS21209F1-20		1	80	3
		1	185	3
		2	85	3
		3	85	3
MS21209F4-20		1	50	2
		1	75	2
		1	155	2
		1	180	2
		2	55	2
		2	90	2
		3	55	2
		3	90	2
MS3367-1-9		1	20	1
NAS1351-4-12P		3	10	4
NAS1351N4-12P		3	10A	4
NAS1801-3-10		1	10	1
		1	120	1
		2	30	1
		3	30	1
NAS1801-3-14		1	5	2
		1	115	2
		2	35	2
		3	35	2
NAS1801-3-5		1	15	1
		1	125	1
		2	25	1
		3	25	1



Waste Water Drain Mast Assembly
IPL Figure 1 (Sheet 1 of 2)



Waste Water Drain Mast Assembly
IPL Figure 1 (Sheet 2 of 2)

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
–1	417T2093-1		MAST ASSY-WASTE WATER DRAIN	A	RF
–1A	417T2093-2		MAST ASSY-WASTE WATER DRAIN	B	RF
–1B	417T2093-3		DELETED		
–1C	417T2093-8		MAST ASSY-WASTE WATER DRAIN	C	RF
–1D	417T2093-10		MAST ASSY-WASTE WATER DRAIN	P	RF
–1E	417T2093-11		MAST ASSY-WASTE WATER DRAIN	Q	RF
–1F	417T2093-14		MAST ASSY-WASTE WATER DRAIN	M	RF
–2	417N2117-1		MAST ASSY-WASTE WATER DRAIN	D	RF
–2A	417N2117-2		MAST ASSY-WASTE WATER DRAIN	E	RF
–2B	417N2117-4		MAST ASSY-WASTE WATER DRAIN	F	RF
–2C	417N2117-5		MAST ASSY-WASTE WATER DRAIN	G	RF
–2D	417N2117-6		MAST ASSY-WASTE WATER DRAIN	H	RF
–2E	417N2117-7		MAST ASSY-WASTE WATER DRAIN	J	RF
–2F	417N2117-8		MAST ASSY-WASTE WATER DRAIN	K	RF
–2G	417N2117-9		MAST ASSY-WASTE WATER DRAIN	L	RF
–3	478W1610-1		DELETED		
–3A	478W1610-2		DELETED		
–3B	478W1610-3		DELETED		
–3C	478W1610-4		MAST ASSY-WASTE WATER DRAIN (FOR DETAILS SEE FIG. 2)	N	RF
–3D	478W1610-6		MAST ASSY-WASTE WATER DRAIN (PRE SB 777-38-0013) (FOR DETAILS SEE FIG. 3)	R	RF
–3E	478W1610-7		MAST ASSY-WASTE WATER DRAIN (POST SB 777-38-0013) (FOR DETAILS SEE FIG. 3)	S	RF
5	NAS1801-3-14		. SCREW	A-C, M, P, Q	2
10	NAS1801-3-10		. SCREW	A-C, M, P, Q	1
15	NAS1801-3-5		. SCREW	A-C, M, P, Q	1
20	MS3367-1-9		. STRAP	B	1

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
22	2372-24		. TAPE-HEATER (V98085)	B	1
25	8921536G2		DELETED		
25A	8921536G4		. HEATER ASSY (V13545) (SPEC 10-61434-4) (OPT 90234-4 (V04849))	C	1
–25B	10-61434-4		DELETED		
–25C	90234-4		. HEATER ASSY (V04849) (SPEC 10-61434-4) (OPT 8921536G4 (V13545))	C	1
–25D	90234-5		. HEATER ASSY (V04849) (SPEC 10-61434-5) (OPT 8921536G5 (V13545))	M, P	1
–25E	90234-6		. HEATER ASSY (V04849) (SPEC 10-61434-6) (OPT 8921536G6 (V13545))	Q	1
–25F	8921536G6		. HEATER ASSY (V13535) (SPEC 10-61434-6) (OPT 90234-6 (V04849))	Q	1
–25G	90234-2		. HEATER ASSY (V04849) (SPEC 10-61434-2) (OPT 8921536G2 (V13545))	A, B	1
27	417T2093-7		. TUBE	B	1
30	417T2093-4		. MAST ASSY-HALF	A-C, P, Q	1
–30A	417T2093-12		. MAST ASSY-HALF	M	1
35	BACR15BA6D		. . RIVET (SIZE DETERMINED ON INST)	A-C, M, P, Q	2
40	69-56298-2		. . ANGLE	A-C, P, Q	1
45	65-14036-12		. . DRAIN HALF	A-C, M, P, Q	1
50	MS21209F4-20		. . INSERT	A-C, M, P, Q	2
55	417T2093-5		. MAST ASSY-HALF	A-C, P, Q	1

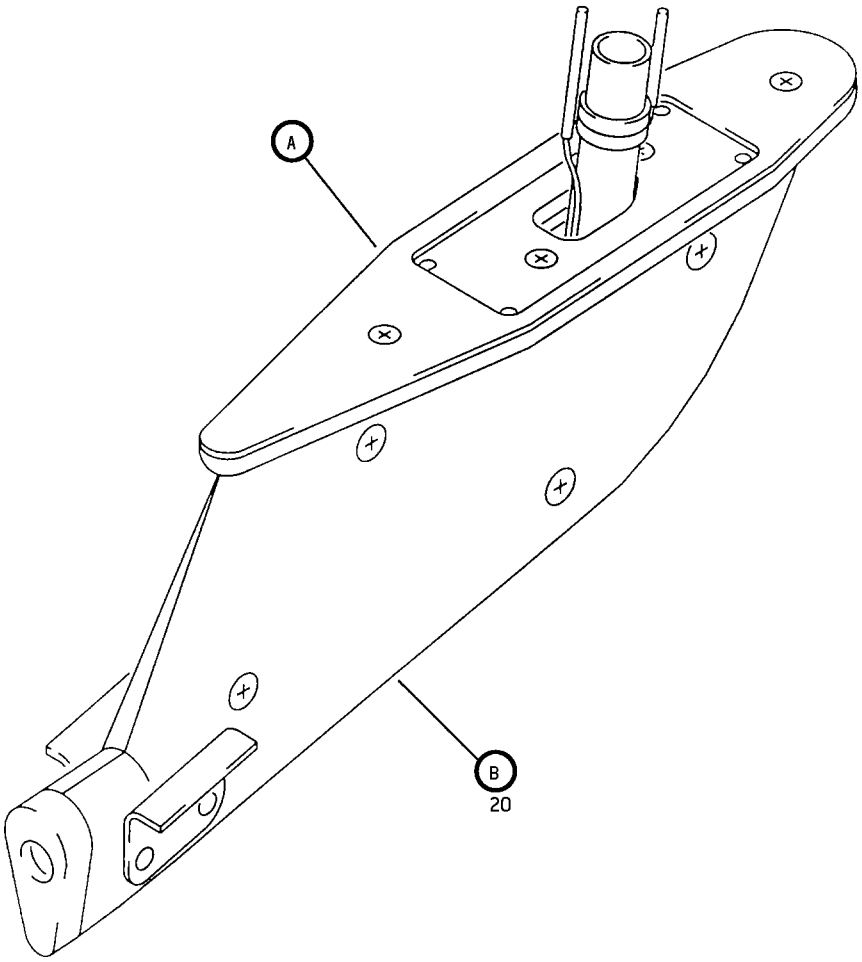
–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
–55A	417T2093-13		. MAST ASSY-HALF	M	1
60	BACR15BA6D		. . RIVET (SIZE DETERMINED ON INST)	A-C, M, P, Q	2
65	69-56298-2		DELETED		
65A	69-56298-1		. . ANGLE	A-C, P, Q	1
70	65-14036-13		. . DRAIN HALF	A-C, M, P, Q	1
75	MS21209F4-20		. . INSERT	A-C, M, P, Q	2
80	MS21209F1-20		. . INSERT	A-C, M, P, Q	3
85	3591-3CN0190		. . SLEEVE (V26344)	A-C, M, P, Q	1
90	BACB30LU4P4		. SCREW	D-L	4
–90A	BACB30LR4-4		DELETED		
95	417N2117-3		. PLATE-ADAPTER (OPT ITEM 95A)	D	1
–95A	417T2111-3		. PLATE-ADAPTER (OPT ITEM 95)	D	1
100	417N2118-2		. PLATE-ADAPTER	F, G	1
–100A	417N2118-1		. PLATE-ADAPTER	E, H	1
–100B	478W1611-1		DELETED		
–100C	417N2118-3		DELETED		
102	417N2118-4		. PLATE-ADAPTER	J, L	1
–102A	417N2118-3		. PLATE-ADAPTER	K	1
105	BACB30LU5-8		. BOLT	D	4
110	417T2093-1		. MAST ASSY-WASTE WATER DRAIN	D-K	1
–110A	417T2093-10		. MAST ASSY-WASTE WATER DRAIN	L	1
115	NAS1801-3-14		. . SCREW	D-L	2
120	NAS1801-3-10		. . SCREW	D-L	1
125	NAS1801-3-5		. . SCREW	D-L	1
130	8921536G2		DELETED		
–130A	8921536G5		DELETED		

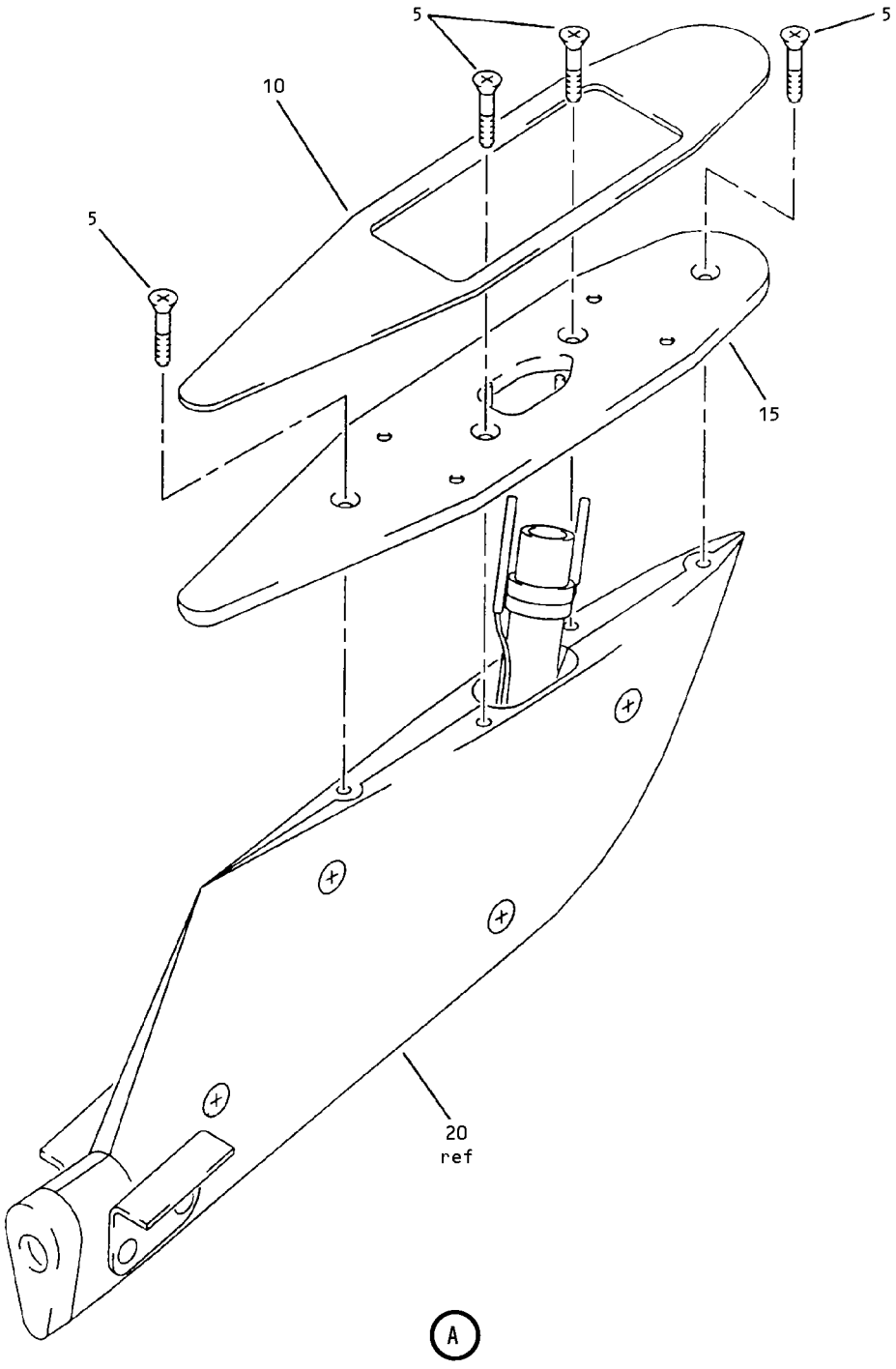
–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
130B	90234-2		. . HEATER ASSY (V04849) (SPEC 10-61434-2) (OPT 8921536G2 (V13545))	D-K	1
–130C	90234-5		. . HEATER ASSY (V04849) (SPEC 10-61434-5) (OPT 8921536G5 (V13545))	L	1
135	417T2093-4		. . MAST ASSY-HALF	D-L	1
140	BACR15BA6D		. . . RIVET (SIZE DETERMINED ON INST)	D-L	2
145	69-56298-2		. . . ANGLE	D-L	1
150	65-14036-12		. . . DRAIN HALF	D-L	1
155	MS21209F4-20		. . . INSERT	D-L	2
160	417T2093-5		. . MAST ASSY-HALF	D-L	1
165	BACR15BA6D		. . . RIVET (SIZE DETERMINED ON INST)	D-L	2
170	69-56298-1		. . . ANGLE	D-L	1
175	65-14036-13		. . . DRAIN HALF	D-L	1
180	MS21209F4-20		. . . INSERT	D-L	2
185	MS21209F1-20		. . . INSERT	D-L	3
190	3591-3CN0190		. . . SLEEVE (V26344)	D-L	1
195	417N2119-3		. SEAL	L	1

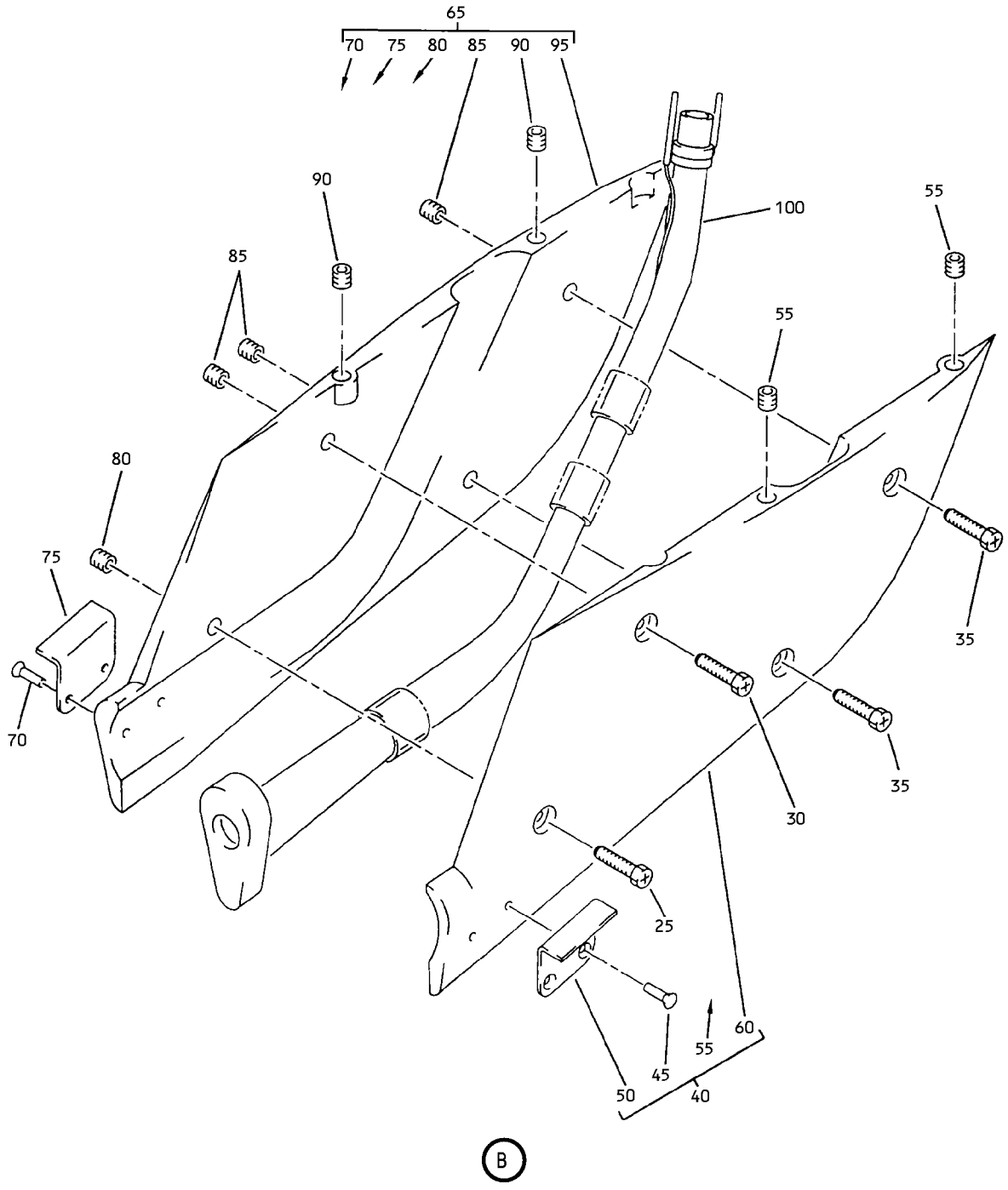
–Item not Illustrated



Waste Water Drain Mast Assembly
IPL Figure 2 (Sheet 1 of 3)



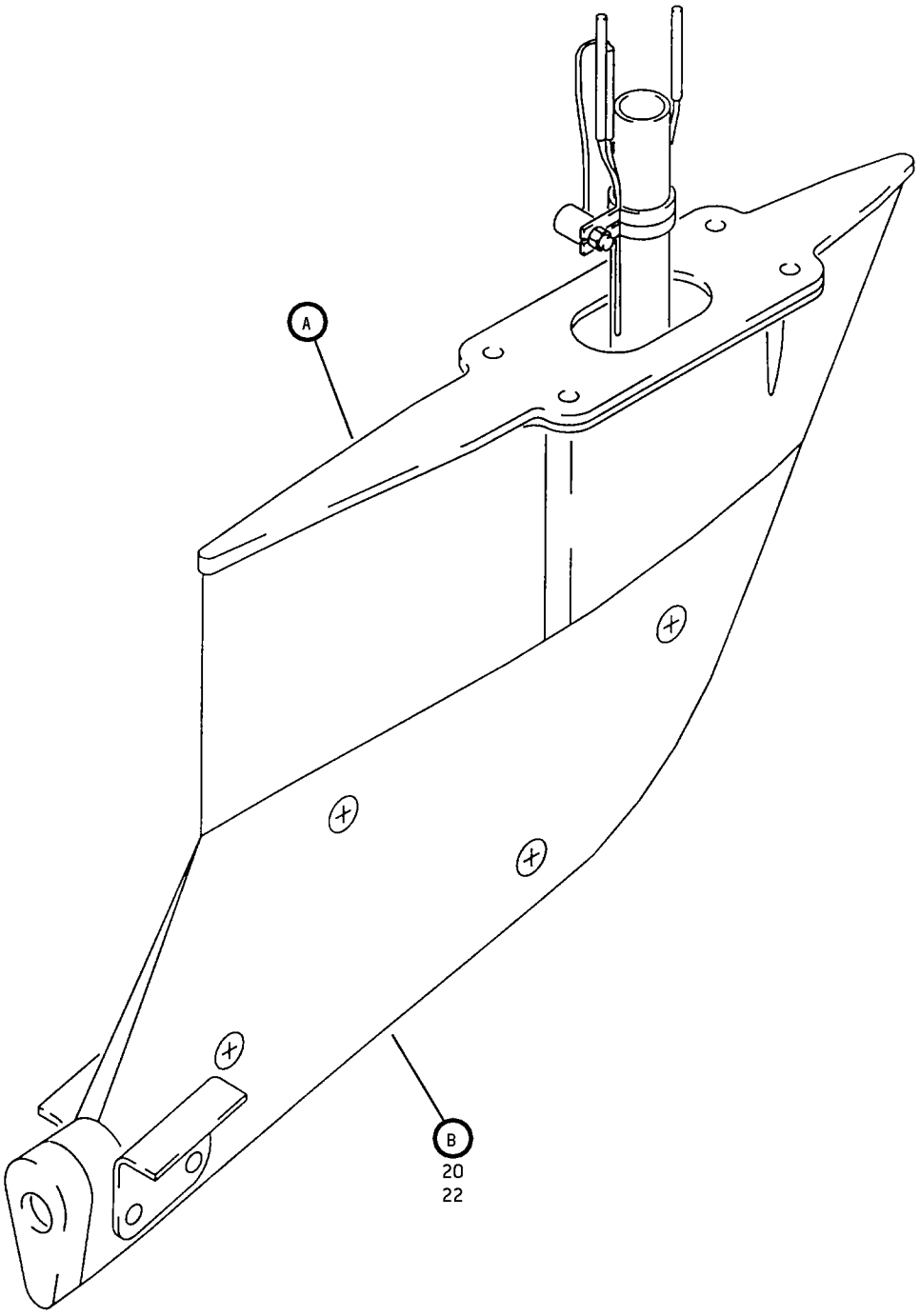
Waste Water Drain Mast Assembly
IPL Figure 2 (Sheet 2 of 3)



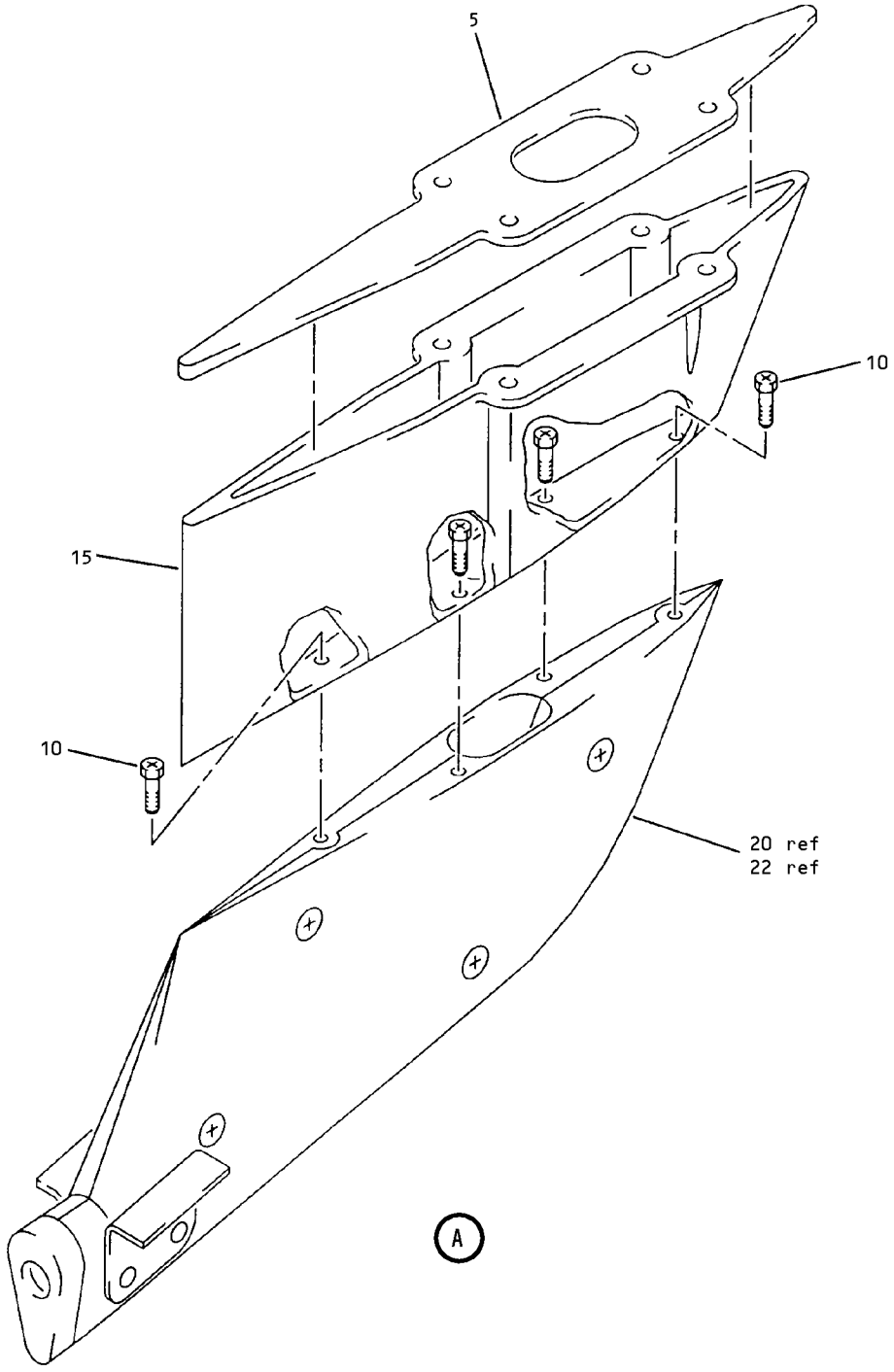
Waste Water Drain Mast Assembly
IPL Figure 2 (Sheet 3 of 3)

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
2–					
–1A	478W1610-4		MAST ASSY-WASTE WATER DRAIN	N	RF
5	BACB30LU4P4		. BOLT	N	4
10	417N2119-1		. SEAL	N	1
15	417N2118-3		. PLATE-ADPTR	N	1
20	417T2093-10		. MAST ASSY	N	1
25	NAS1801-3-5		. . SCREW	N	1
30	NAS1801-3-10		. . SCREW	N	1
35	NAS1801-3-14		. . SCREW	N	2
40	417T2093-4		. . MAST ASSY-HALF	N	1
45	BACR15BA6D		. . . RIVET (SIZE DETERMINED ON INST)	N	2
50	69-56298-2		. . . ANGLE	N	1
55	MS21209F4-20		. . . INSERT	N	2
60	65-14036-12		. . . HALF-DRAIN	N	1
65	417T2093-5		. . MAST ASSY-HALF	N	1
70	BACR15BA6D		. . . RIVET (SIZE DETERMINED ON INST)	N	2
75	69-56298-1		. . . ANGLE	N	1
80	3591-3CN0190		. . . SLEEVE (V26344)	N	1
85	MS21209F1-20		. . . INSERT	N	3
90	MS21209F4-20		. . . INSERT	N	2
95	65-14036-13		. . . HALF-DRAIN	N	1
100	90234-5		. . HEATER ASSY (V04849) (SPEC 10-61434-5) (OPT 8921536G5 (V13545))	N	1

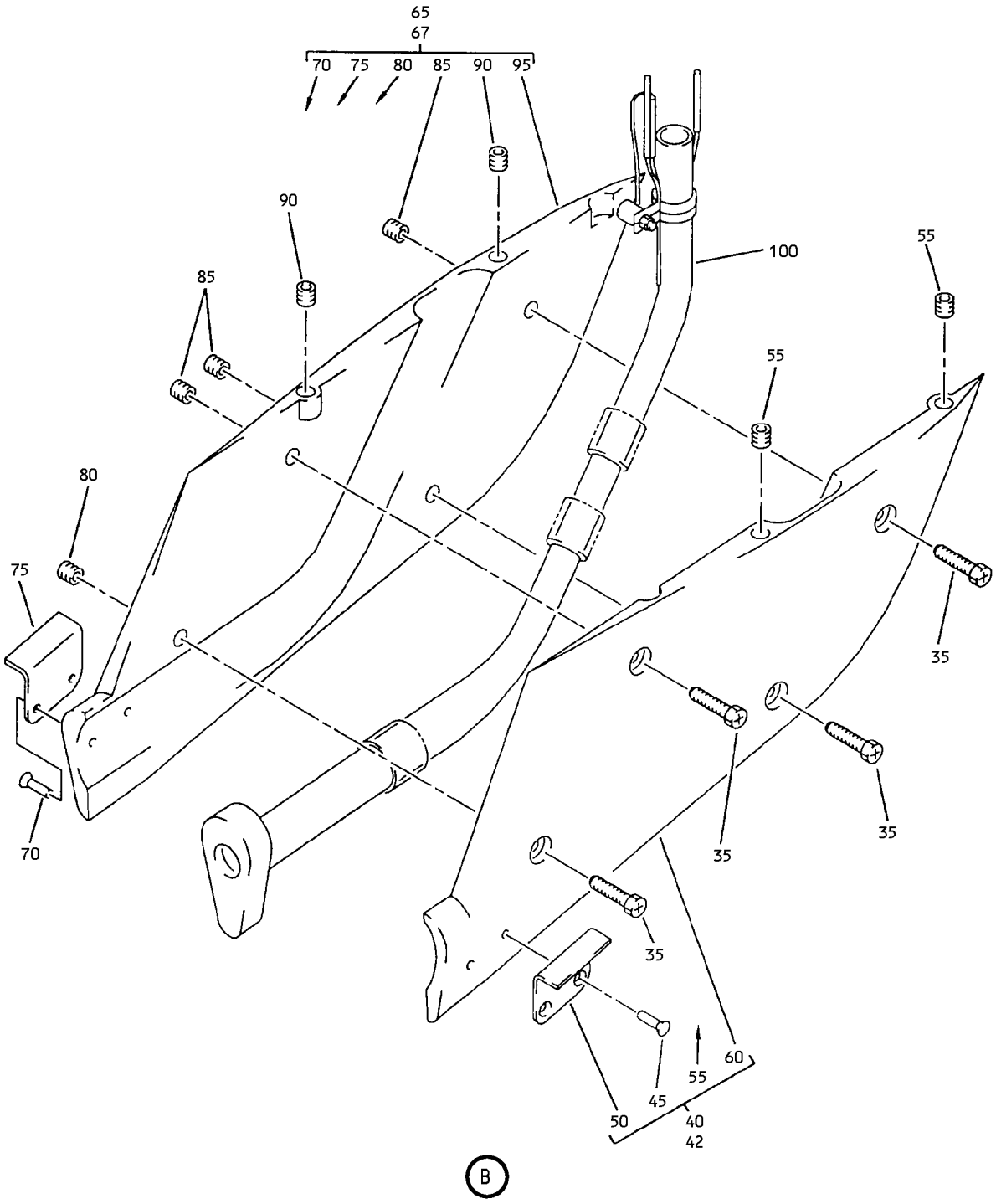
–Item not Illustrated



Waste Water Drain Mast Assembly
IPL Figure 3 (Sheet 1 of 3)



Waste Water Drain Mast Assembly
IPL Figure 3 (Sheet 2 of 3)



Waste Water Drain Mast Assembly
IPL Figure 3 (Sheet 3 of 3)

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
3–					
–1A	478W1610-6		MAST ASSY-WASTE WATER DRAIN (PRE SB 777-38-0013)	R	RF
–1B	478W1610-7		MAST ASSY-WASTE WATER DRAIN (POST SB 777-38-0013)	S	RF
5	478W1612-3		. SEAL (OPT ITEM 5A)	R, S	1
–5A	478W1612-2		. SEAL (OPT ITEM 5)	R, S	1
10	NAS1351-4-12P		. SCREW (OPT ITEM 10A)	R, S	4
–10A	NAS1351N4-12P		. SCREW (OPT ITEM 10)	R, S	4
15	417T2111-8		. EXTENSION-ADAPTOR	R, S	1
20	417T2093-11		. MAST ASSY	R	1
22	417T2093-14		. MAST ASSY	S	1
25	NAS1801-3-5		. . SCREW	R, S	1
30	NAS1801-3-10		. . SCREW	R, S	1
35	NAS1801-3-14		. . SCREW	R, S	2
40	417T2093-4		. . MAST ASSY-HALF	R	1
42	417T2093-12		. . MAST ASSY-HALF	S	1
45	BACR15BA6D		. . . RIVET (SIZE DETERMINED ON INST)	R	2
50	69-56298-2		. . . ANGLE	R	1
55	MS21209F4-20		. . . INSERT	R, S	2
60	65-14036-12		. . . HALF-DRAIN	R, S	1
65	417T2093-5		. . MAST ASSY-HALF	R	1
67	417T2093-13		. . MAST ASSY-HALF	S	1
70	BACR15BA6D		. . . RIVET (SIZE DETERMINED ON INST)	R	2
75	69-56298-1		. . . ANGLE	R	1
80	3591-3CN0190		. . . SLEEVE (V26344)	R, S	1
85	MS21209F1-20		. . . INSERT	R, S	3
90	MS21209F4-20		. . . INSERT	R, S	2

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
3–					
95	65-14036-13		. . . HALF-DRAIN	R, S	1
100	90234-6		. . HEATER ASSY (V04849) (SPEC 10-61434-6) (OPT 8921536G6 (V13545))	R, S	1

–Item not Illustrated