Aerospace
Defense
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Maintenance Manual

WATER SUMP CONTROL SWITCH NORMALLY CLOSED

F528/F528B Series

MMF528

Revision 2.0
24 April 2014

Meggitt Fuelling Products
Maintenance Manual (MMF528/F528B)
Water Sump Control Switch Assembly, NC – F528/F528B Series

REVISION RECORD

Keep this record in the front of the manual. When you get the revisions, put the revised pages in the manual. Write the revision number, date issued and your initials on this page.

REV NO.	PAGES AFFECTED	DESCRIPTION OF CHANGE	DATE	APPROVED BY
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1.1	ALL	-	02/01/2006	
2.0	ALL	See DCN	04/24/2014	

Meggitt Fuelling Products
Maintenance Manual (MMF528/F528B)
Water Sump Control Switch Assembly, NC – F528/F528B Series

TABLE OF CONTENTS

SUBJECT **PAGE**

IMPORTANT SAFETY INSTRUCTIONS ..... A
INTRODUCTION 1
DESCRIPTION AND OPERATION 2
FAULT ISOLATION 5
DISASSEMBLY 6
CLEANING 8
CHECK/INSPECTION 10
ASSEMBLY 11
TESTING 14
ILLUSTRATED PARTS LIST 15

LIST OF ILLUSTRATIONS

FIGURE **PAGE**

Figure 1. Water Sump Control Switch – Interface Dimensions 3
IPL Figure 1. Switch Assembly, Water Sump Control, NC 16

LIST OF TABLES

TABLE **PAGE**

Table 1. Leading Particulars 4
Table 2. Fault Isolation 5
Table 3. Recommended Cleaning Materials 8
Table 4. Component Checks 10
Table 5. Recommended Assembly Materials 11

Meggitt Fuelling Products
Maintenance Manual (MMF528/F528B)
Water Sump Control Switch Assembly, NC – F528/F528B Series

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS!

This manual contains important instructions that shall be followed during installation and maintenance of the Water Sump Control Switch (switch). The following are general safety precautions that are not related to specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during maintenance.

The switch is a mechanical device and can be dangerous if incorrectly operated or maintained.

Safety Alert Symbols

Safety alert symbols are used in this manual to identify potential or immediate personal injury hazards. The safety alert symbol words are explained below:

⚠ DANGER	- indicates an imminently hazardous situation which, if not avoided, will result in injury or serious injury.
⚠ WARNING	- indicates a potentially hazardous situation which, if not avoided, could result in injury or serious injury.
⚠ CAUTION	- indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
CAUTION	- used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

WEAR PROTECTIVE CLOTHING

- Wear protective clothing (gloves, apron, etc.) approved for the materials and tools being used.

USE APPROVED SAFETY EQUIPMENT

- Use only approved equipment and make sure firefighting equipment is readily available.

Meggitt Fuelling Products
Maintenance Manual (MMF528/F528B)
Water Sump Control Switch Assembly, NC – F528/F528B Series

GIVE CLEANERS SPECIAL CARE

- When cleaners are being used read and follow the material safety data sheet (MSDS) instructions for correct handling.

Equipment Safety Information

The following safety information briefly discusses hazards peculiar to the equipment, which are likely to be encountered during maintenance activity.

GENERAL OPERATING LOCATION PRECAUTIONS

- Use only authorized replacement parts or hardware.
- Follow Lock-Out/Tag-Out procedures when working on the switch and make sure that personnel protection equipment such as electrical grounds are installed.
- Avoid hazardous voltage situations that can result from unsafe conditions such as, but not limited, to the following:
    - Incorrect grounding.
    - Handling electrical leads or devices with wet hands or on wet ground.
    - Damaged electrical wire insulation.
    - Incorrect connection of the power terminals.
    - Short circuits to ground.

OPERATION AND MAINTENANCE OF FUEL SYSTEMS

- Protect all fuel lines from damage or puncture. Do not operate the switch if a fuel leak is detected.
- Do not use flammable solvents for cleaning parts.
- Check for tools, rags, or loose parts left in the area before resuming operation.
- Do not attempt to remove the switch from the system without first isolating it from the line pressure and venting all of the trapped internal pressure.

Meggitt Fuelling Products
Maintenance Manual (MMF528/F528B)
Water Sump Control Switch Assembly, NC – F528/F528B Series

INTRODUCTION

1. General

The information and procedures contained in this manual have been prepared to assist qualified repair personnel in off-aircraft maintenance of the Water Sump Control Switch. The instructions provide information necessary to perform maintenance functions. The switch is manufactured by Meggitt (North Hollywood), Inc., 12838 Saticoy Street, North Hollywood, California 91605.

2. Scope

The instructions contained in this manual do not claim to cover all details or variations in equipment. They do not provide for every problem that could occur during installation, operation, or maintenance. If further information is required, contact Meggitt (North Hollywood), Inc., Product Support Department.

3. Standard Shop Practices

Use approved procedures and safety precautions to prevent damage to the equipment and injury to personnel.

4. Weights and Measurements

Weights and measurements in this manual are expressed in both English (U.S. customary) and Metric (SI) units.

5. Revision Service

This manual will be revised, as necessary, to reflect current information.

Meggitt Fuelling Products
Maintenance Manual (MMF528/F528B)
Water Sump Control Switch Assembly, NC – F528/F528B Series

DESCRIPTION AND OPERATION

1. Description

The Water Sump Control Switch (switch) (see IPL Figure 1) provides the means of detecting free water accumulation in filter/separators, storage tanks and other refueling system components. The major functional components of the switch are the float, switch, switch actuating mechanism, sump and plunger assembly.

2. Operation

A. Negligible Free Water Accumulation

When the accumulated free water in the sump is negligible, the specific gravity of the float is sufficient to keep it from floating, and the refueling system operates normally.

B. Excessive Free Water Accumulation

As free water accumulates, its higher specific gravity causes the float to move upward. When the free water accumulation is sufficient, float movement actuates its normally closed switch contacts to their open position, interrupting the circuit path for the control signal. When this occurs, the refueling system shuts down.

C. Refueling System Start

When the refueling system has been shut down due to excessive free water accumulation in the water sump, operator action is required to drain the water. When the water sump has drained, the float will sink, the switch will close and complete the control signal, path and normal operation will resume.

D. Plunger Assembly

The plunger assembly provides the means to make sure correct operation of the switch. When the plunger is pushed inward, it manually lifts the float and actuates the switch, causing its normally closed contacts to open. An audible click is produced when the switch is actuated. The plunger assembly should be used periodically, in accordance with the operator's established operating procedures.

Meggitt Fuelling Products
Maintenance Manual (MMF528/F528B)
Water Sump Control Switch Assembly, NC – F528/F528B Series

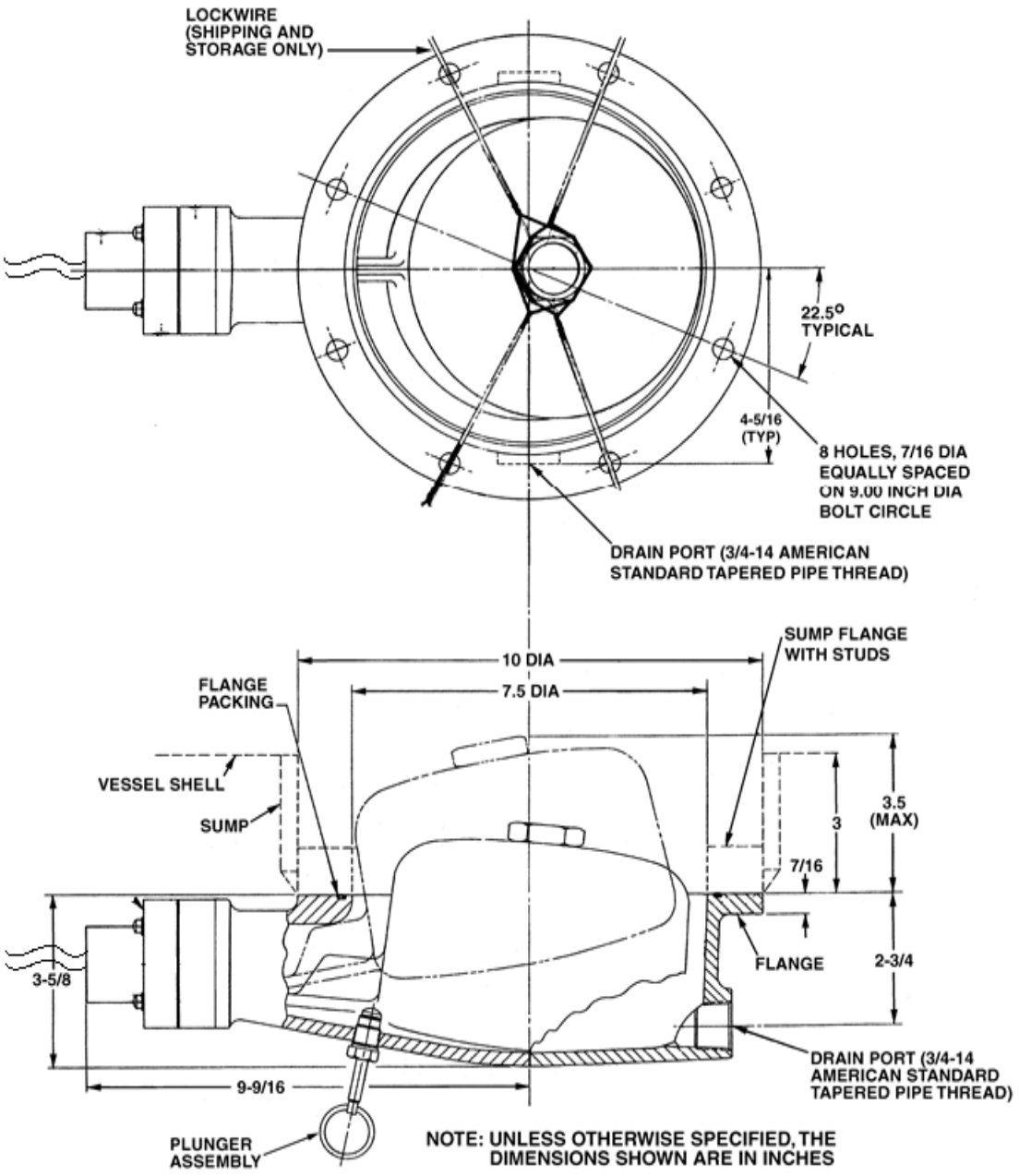

Figure 1. Water Sump Control Switch – Interface Dimensions

3. Leading Particulars

For the leading particulars refer to Table 1.

Table 1. Leading Particulars

Service	Automotive and Aviation Fuels and Water (Specific gravity: 0.83 maximum)
Operating Pressure (maximum)	0 to 200 psi (0 to 1380 kPaG)
Pressures:	
Voltage (6 to 30 Volts DC)	
Current	
Resistive	5 amperes
Inductive	3 amperes
In-Rush	24 amperes
Voltage (125 to 250 Volts AC)	
Current	
Resistive	5 amperes
Inductive	5 amperes
Temperature:	
Ambient	-65 to 160°F (-54 to 71°C)
Fluid	-32 to 135°F (-35 to 57°C)
Weight (approximate)	15 pounds (6.8 kg)

Meggitt Fuelling Products
Maintenance Manual (MMF528/F528B)
Water Sump Control Switch Assembly, NC – F528/F528B Series

FAULT ISOLATION

1. General

This section contains fault isolation procedures for the switch. Operate the valve in accordance with the Operation section, if the switch fails to operate correctly refer to Table 2 and select the appropriate action. Table 2 identifies the Fault, Probable Cause and Corrective Action.

Table 2. Fault Isolation

FAULT	PROBABLE CAUSE	CORRECTIVE ACTION
Switch will not close	Switch (IPL Figure 1, 10) not adjusted correctly	Adjust the switch (Refer to ASSEMBLY section, Para. 3K).
	Defective switch (10)	Replace the switch.
	Weight of float assembly (2) is not correct	Check and correct the float weight (refer to ASSEMBLY Para. 3B).

DISASSEMBLY

Note: Before disassembly, the vessel in which the water sump control switch is installed must be drained in accordance with the applicable instructions, and the water sump control switch must be disconnected and removed from the vessel.

1. Replacement Parts Kits

Refer to the ILLUSTRATED PARTS LIST section for the Replacement Parts Kit information.

2. Disassembling the Water Sump Control Switch (See IPL Figure 1)

A. Remove and discard packing (18) from the packing groove of sump (1).

B. Remove screw (15), washers (16 and 17) and cover (14) from the switch housing (7).

C. Remove screws (12), washers (13), switch (10) and insulator (11) from the switch housing (7). Remove washer (24) and grommet (25) from the electrical wires of the switch (10).

D. Remove screw (21) (switch adjustment) from rod (20).

E. Remove screws (22), washers (23) and gently pull the switch housing (7) away from the sump (1). Using a suitable small diameter tool (a straightened large paper clip works well), push out the pin (5), and remove the switch housing (7) and associated parts.

F. Remove and discard packing (8) from the switch housing (7).

G. Remove rod (20) retaining ring (19) and packing (9) from the switch housing (7). Discard packing (9).

H. Remove float assembly (2) from sump (1). Remove pin (6) and rod (20) from sump (1). On the float assembly (2); remove plug (4) and packing (3). Discard packing (3).

Meggitt Fuelling Products
Maintenance Manual (MMF528/F528B)
Water Sump Control Switch Assembly, NC – F528/F528B Series

Note: Do not remove plug (26) (Mod A); or plunger assembly (27) (Mod B) from sump (1) unless there has been obvious leakage; if leakage is found, do as follows:

I. (Mod A) Remove plug (26) from sump (1).

(Mod B) Remove split ring (32) from plunger (29). Remove plug (28) from sump (1). Remove plunger (29), backup ring (30), and packings (31) from plug (28). Discard packings (31).

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Meggitt Fuelling Products
Maintenance Manual (MMF528/F528B)
Water Sump Control Switch Assembly, NC – F528/F528B Series

CLEANING

1. Cleaning Materials

Refer to Table 3 for recommended cleaning materials. Suitable equivalent cleaning materials may be substituted for the items listed

Table 3. Recommended Cleaning Materials

DESCRIPTION	SPECIFICATION	SOURCE
Alcohol, Isopropyl	ASTM D770	Commercially available
Bags, Plastic	-	Commercially available
Brush, Bristle, Stiff, Non-metallic	-	Commercially available
Pick, Teflon	-	Commercially available
Solvent, Dry Cleaning	P-D-680, Type 2	Commercially available
Tissues, Lint-free	-	Commercially available

2. Cleaning Procedures

⚠WARNING

DRY CLEANING SOLVENT AND ISOPROPYL ALCOHOL ARE HARZARDOUS MATERIALS. BEFORE USE, READ AND FOLLOW THE MATERIAL SAFETY DATA SHEET (MSDS) INSTRUCTIONS FOR CORRECT HANDLING. FAILURE TO FOLLOW THIS WARNING MAY RESULT IN PERSONAL INJURY, LONG TERM HEALTH HAZARDS OR DEATH.

A. Clean all metal parts by washing thoroughly in dry cleaning solvent. Remove stubborn deposits by scrubbing with a nonmetallic stiff bristle brush. Brush all threaded areas. Use a Teflon pick to remove obstructions from the ports, the seal or packing grooves and the flow passages.

B. Clean all of the non-metallic parts by wiping them with clean lint-free tissues slightly moistened with isopropyl alcohol.

Note: All parts must be free of corrosion, dirt, grease, oil or any other foreign matter.

WARNING

WEAR EYE PROTECTION WHEN USING COMPRESSED AIR. DO NOT DIRECT AIRSTREAM AT PERSONNEL OR LIGHT METAL PARTS.

C. Dry the parts with clean lint-free tissues or clean, dry, compressed air.

D. Package all of the clean parts in plastic bags.

Meggitt Fuelling Products
Maintenance Manual (MMF528/F528B)
Water Sump Control Switch Assembly, NC – F528/F528B Series

CHECK/INSPECTION

1. General

Under strong light and magnification, look at all parts in accordance with the general criteria specified in Table 4.

Repair minor damage in accordance with local directives. If damage is major or beyond simple repair, replace the part.

2. Component Checks (Refer to Table 4)

Table 4. Component Checks

DESCRIPTION (IPL Figure 1 Item Number)	INSPECTION CRITERIA
General	Look at all parts as applicable for nicks, cracks, cuts, burrs, corrosion, breaks, scoring, chafing, scarring, deformation, dents, thread damage, or any other obvious defects. Make sure the ports, passages, recesses and sealing grooves are clean and not blocked. Make sure all sealing and seating surfaces are free from damage or corrosion. Look at the ports, passages, recesses and sealing grooves, to make sure they are clean and not blocked.
Float Assembly (IPL Figure 1, 2)	Make sure the float assembly (2); including packing (3), plug (4) and clean tap water weight is; 4.15 (±0.05) lbs (1.86 to 1.90 kg)
Switch (9)	Make sure there is positive 'make-and-break' continuity when the switch is actuated.

ASSEMBLY

1. Overhaul and Seal Replacement Parts Kits

Refer to the ILLUSTRATED PARTS LIST section for recommended seal and overhaul replacements parts kit information.

2. Assembly Materials

Refer to Table 5 for recommended assembly materials. Suitable equivalent materials may be substituted for the items listed.

Table 5. Recommended Assembly Materials

DESCRIPTION	SPECIFICATION	SOURCE
Clean Tap Water	--	--
Petroleum jelly	--	Commercially available
Thread Sealing Compound	Loctite Grade HV	Loctite (Commercially available)

3. Water Sump Control Switch Assembly (See IPL Figure 1)

A. Lubrication

Before assembly, lightly lubricate all of the packings, seals and screw threads with petroleum jelly.

B. Float Assembly

1. Fill the float assembly (2) with clean tap water, put new packing (3) on float assembly (2); apply thread sealant (Loctite Grade HV) to the threads of the plug (4) and install plug (4) on float assembly (2).

   Note: Make sure total weight of float assembly (2) including plug (4) and packing (3) is 4.15 (±0.05) pounds (1.86 to 1.90 kg).

C. Put rod (20) on float assembly (2); align the hole on the rod (20) to the top pilot hole on the arm of the float assembly (2) and install pin (5).

D. Put assembled float assembly (2) in the sump (1).

E. Put new packing (9) and retaining ring (19) (prongs outward) in the switch housing (7). Put packing (8) in the packing groove of the switch housing (7).

F. Insert rod (20) on float assembly (2) through retaining ring (19) and packing (9) in the switch housing (7). Line up the pivot pin hole of the switch housing (7) with the bottom holes in the arm of the float assembly (2) and install pin (6).

CAUTION MAKE SURE THE PACKING (8) IS CORRECTLY SEATED IN ITS GROOVE ON THE SWITCH HOUSING (7).

G. Secure the switch housing (7) to the sump with screws (22) and washers (23).

H. Thread the screw (21) (switch adjustment) into the rod (20), so that its head is approximately 0.14 inch (3.5 mm) from the end of the rod (20).

I. Install grommet (25) in the hole of washer (24). Insert the electrical wires of the switch (10) through the grommet (25). Install washer (24), grommet (25) and electrical wires of the switch (10) in the switch housing (7).

J. Install insulator (11) and switch (10) in the switch housing (7) and secure them with screws (12) and washers (13).

K. Adjust the Switch (10)

1. Connect a test light and voltage source (0.5 ampere maximum) between in series with the switch.

2. Raise the float assembly (2) to within 1/4-inch (6 mm) of its upper limit of travel. The test light shall come on.

   Note: A wire inserted into the hole in the head of the screw (21) can be used to turn it.

3. Adjust the screw (21) outward (counterclockwise) until the test light goes off.

4. Lower the float assembly (2) and look at the test light. The light shall come on before the float reaches its lower travel limit.

5. Slowly raise the float until the test light goes off. The float shall be within 1/4-inch (6 mm) of its upper travel limit.

6. Repeat the adjustment until the requirements are satisfied.

K. Put cover (14) on switch housing (7) and install screw (15) and washers (16 and 17).

L. Put new packing (18) in the packing groove of sump (1).

M. (Mod A) Install plug (26) in the sump (1), as necessary.

N. (Mod B) Assembly the plunger assembly (27) and install; as follows (as necessary);

1. Put new packings (31) on plunger (29); and put assembled plunger (29) in plug (28) and install new backup ring (30).

2. Put assembled plunger (29) in sump (1) and secure with plug (28); put split ring (32) on plunger (29).

Meggitt Fuelling Products
Maintenance Manual (MMF528/F528B)
Water Sump Control Switch Assembly, NC – F528/F528B Series

TESTING

Note: Before testing, the vessel in which the water sump control switch is installed must be drained in accordance with the applicable instructions, and the entire assembly must be disconnected and removed from the vessel.

1. Leakage and Functional Test

A. Connect a test light and voltage source (0.5 ampere maximum) between in series with the switch electrical wires. The test light shall come on.

⚠WARNING

AVIATION FUEL IS A HARZARDOUS MATERIAL. BEFORE USE, READ AND FOLLOW THE MATERIAL SAFETY DATA SHEET (MSDS) INSTRUCTIONS FOR CORRECT HANDLING. FAILURE TO FOLLOW THIS WARNING MAY RESULT IN PERSONAL INJURY, LONG TERM HEALTH HAZARDS OR DEATH.

MAKE SURE THE SWITCH DOES NOT COME IN CONTACT WITH FUEL.

B. Put the sump in a test tank or container with its mounting flange horizontal and facing upward. Fill the tank/container with aviation fuel.

C. The float shall remain at its lower travel limit. The test light shall remain on.

D. Turn off the voltage source.

E. Remove the aviation fuel from the container. Fill the container with water. Turn on the voltage source.

F. The float shall rise to its upper travel limit. The test light shall go off.

G. Manually push the float to its lower travel limit and hold it down. The test light shall come on.

H. Release the float. The float shall rise to its upper travel limit. The test light shall go off.

I. Manually push the float to its fully down position and hold it down. The test light shall come on.

J. Remove the test voltage and disconnect the test light circuit. Remove the sump from the container and thoroughly dry it with shop air.

Meggitt Fuelling Products
Maintenance Manual (MMF528/F528B)
Water Sump Control Switch Assembly, NC – F528/F528B Series

ILLUSTRATED PARTS LIST

1. General

This section lists, describes, and illustrates all detail parts required for maintenance support of the Water Sump Control Switch.

2. Scope of Information

The parts list is arranged in the general order of disassembly. The listing is indented to show the relationship between each part and its next higher assembly. Item numbers used in the parts list are keyed to the corresponding numbers of the accompanying illustration.

A. MODIFICATION CODE

The modification code indicates the parts usage with respect to the end item. When the MOD column is blank, the part usage is applicable to all versions unless otherwise specified in the DESCRIPTION column.

B. How to Identify a Part

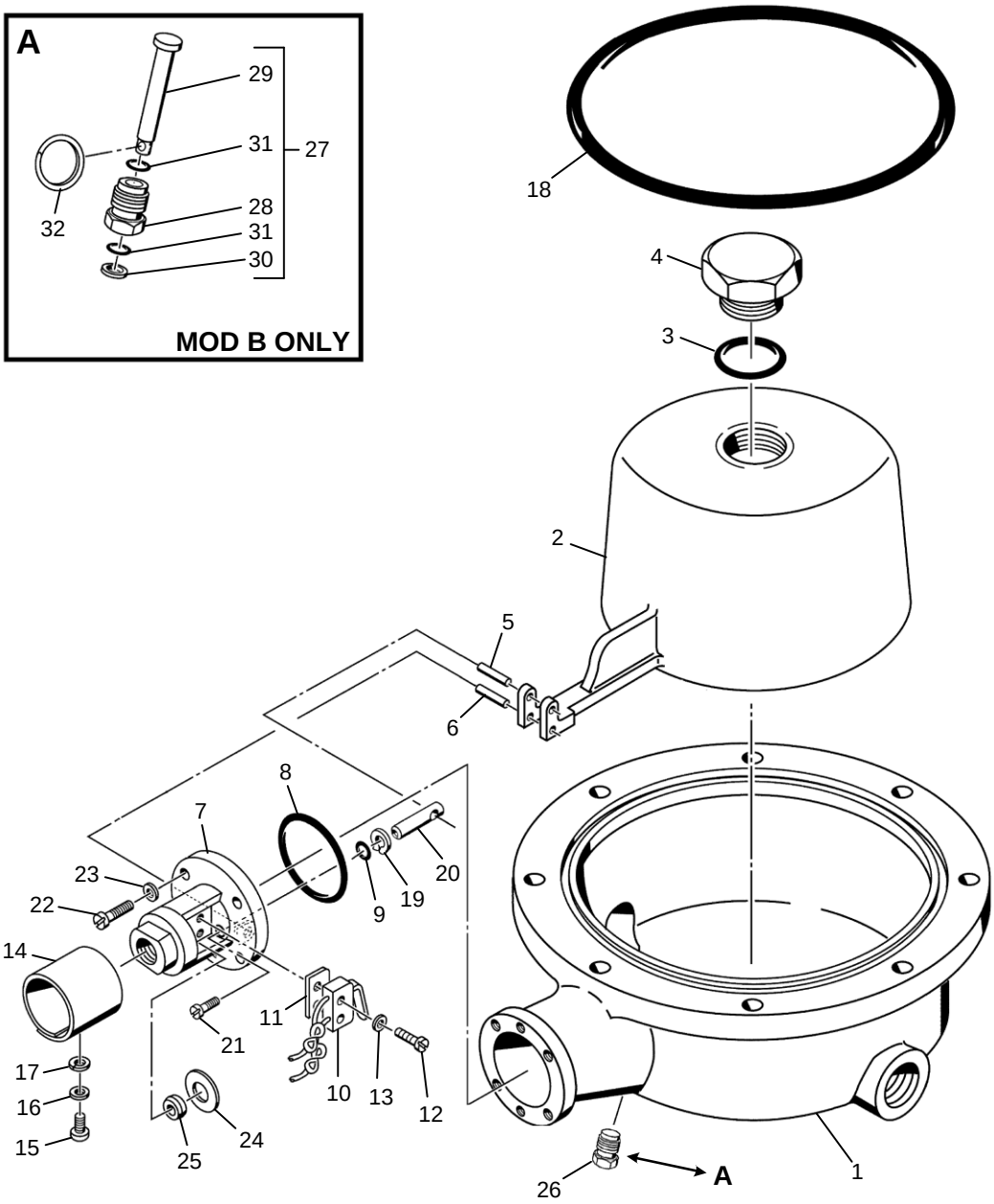
When the part number is known: Refer to the parts list for the item number, description, modification codes, and quantity. Refer to the illustration to make sure of the physical appearance and location of the part.

When the part number is not known: Examine the illustrations to identify the part by physical appearance and location. Refer to the accompanying parts list to get the part number, nomenclature, modification codes, quantity, etc.

C. Abbreviations

AA	Aluminum Alloy
ASSY	Assembly
FIG.	Figure
RF	Reference Item
IPL	Illustrated Parts List
MOD	Modification

Meggitt Fuelling Products
Maintenance Manual (MMF528/F528B)
Water Sump Control Switch Assembly, NC – F528/F528B Series



IPL Figure 1. Switch Assembly, Water Sump Control, NC

Meggitt Fuelling Products
Maintenance Manual (MMF528/F528B)
Water Sump Control Switch Assembly, NC – F528/F528B Series

FIG. ITEM	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	MOD CODES	UNITS PER ASSY
SWITCH ASSY, WATER SUMP CONTROL F528/F528B SERIES				
1	F528	SWITCH ASSY, WATER SUMP CONTROL, NC	A	RF
	F528B	SWITCH ASSY, WATER SUMP CONTROL, NC	B	RF
1	F60W1622-2	. SUMP (AA) (ALT 931021-102).....		1
	931021-102	. SUMP (AA) (ALT TO F60W1622-2)		RF
2	F60W1757	. FLOAT ASSEMBLY.....		1
3	CMS29512-16	. . PACKING, PREFORMED		1
4	CAN814-16D	. . PLUG		1
5	79-012-062-0687	. PIN, SPRING		1
6	F60W1627	. PIN, HINGE		1
7	F60W1760	. HOUSING, SWITCH.....		1
8	2661058A133	. PACKING, PREFORMED		1
9	2661058BD007	. PACKING, PREFORMED		1
10	F60W1761	. SWITCH.....		1
11	AT10063	. INSULATOR		2
12	CAN515B2-8	. SCREW, MACHINE.....		2
13	CAN935B2	. WASHER, LOCK		2
14	F60W1763	. COVER		1
15	CAN515-6-5	. SCREW, MACHINE.....		1
16	CAN960C6	. WASHER, FLAT		1
17	CAN935-6	. WASHER, LOCK		1
18	2661058A266	. PACKING, PREFORMED		1
19	5005-37H	. RING, RETAINING		1
20	F60W1758	. ROD.....		1
21	NK500A2-8	. SCREW, SELF-LOCKING.....		1
22	CAN503-10-10	. SCREW, MACHINE.....		4
23	CMS35333-39	. WASHER, LOCK		4
24	F60W1958	. WASHER, FLAT		1

- Not Illustrated

Meggitt Fuelling Products
Maintenance Manual (MMF528/F528B)
Water Sump Control Switch Assembly, NC – F528/F528B Series

FIG. ITEM	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	MOD CODES	UNITS PER ASSY
SWITCH ASSY, WATER SUMP CONTROL F528/F528B SERIES				
25	CMS35489-4	. GROMMET		1
26	CAN932-4	. PLUG	A	1
27	2691216	. PLUNGER ASSEMBLY	B	1
28	2691215	. . PLUG	B	1
29	2691214	. . PLUNGER	B	1
30	CMS28774-011	. . RING, BACKUP	B	1
31	2661058BD011	. . PACKING, PREFORMED	B	2
32	1X3/32	. . RING, SPLIT (ALT RR138)	B	1
	RR138	. . RING, SPLIT (ALT TO 1X3/32)	B	RF

- Not Illustrated

REPLACEMENT PARTS KITS AVAILABLE		
KIT PART NUMBER	**DESCRIPTION**	**ITEMS IN KIT (IPL Figure 1)**
KITF528-1	Seal Replacement	5, 8, 9, 18, 30 and 31
KITF528-2	Overhaul	5, 8, 9, 18, 19, 30 and 31
KITF528-101	Switch Replacement	8, 9, 10, 12, 13, 19, 20, 21, 24 and 25