Aerospace
Defense
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Maintenance Manual

SERVO ASSEMBLY

4631050 Series

MM4631050

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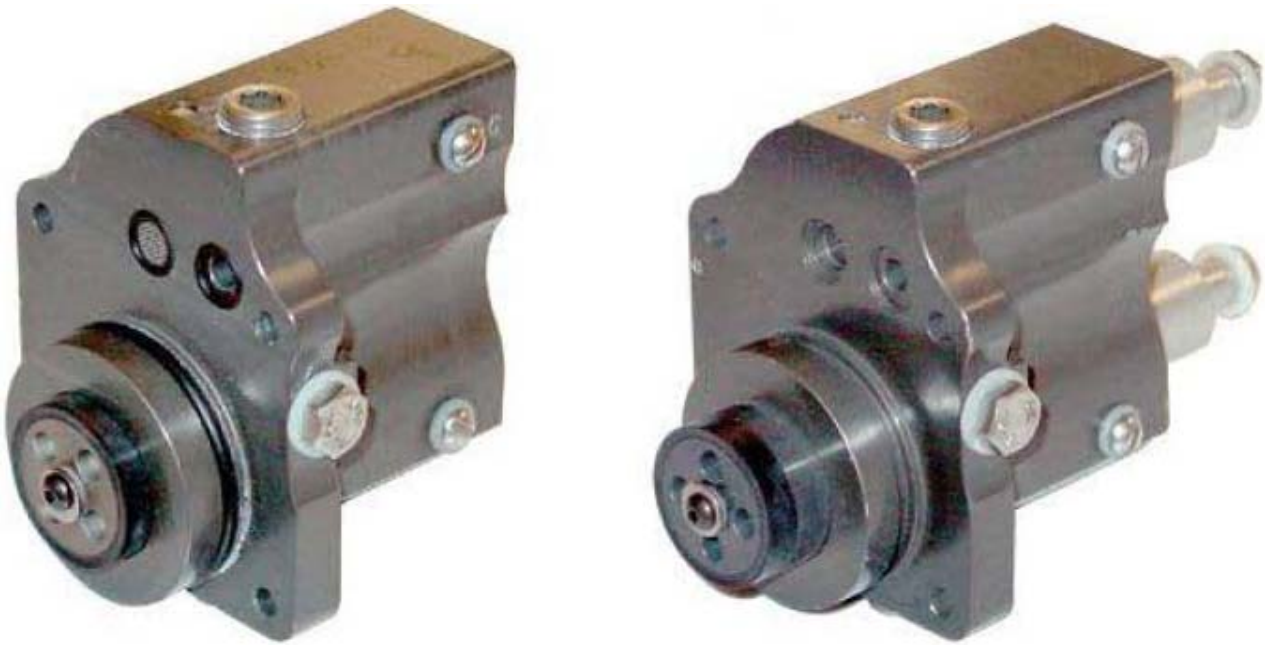

Meggitt Fuelling Products
Maintenance Manual (MM4631050)
Servo Assembly – 4631050 Series

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
1.0	ALL	Initial Release	12/01/1994	
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Meggitt Fuelling Products
Maintenance Manual (MM4631050)
Servo Assembly – 4631050 Series

TABLE OF CONTENTS

SUBJECT **PAGE**

IMPORTANT SAFETY INSTRUCTIONS ..... A
INTRODUCTION 1
DESCRIPTION AND OPERATION 2
FAULT ISOLATION 7
DISASSEMBLY 10
CLEANING 13
CHECK/INSPECTION 15
REPAIR 18
ASSEMBLY 19
ILLUSTRATED PARTS LIST 26

LIST OF ILLUSTRATIONS

FIGURE **PAGE**

Figure 1. Servo Assembly 3
IPL Figure 1. Air-Set Servo Assembly 27
IPL Figure 2. Spring-Set Servo Assembly 31

LIST OF TABLES

TABLE **PAGE**

Table 1. Leading Particulars 5
Table 2. 4631050 Air-Set Servo Variations 6
Table 3. 4631050G Spring-Set Servo Variations 6
Table 4. Fault Isolation 7
Table 5. Recommended Cleaning Materials 13
Table 6. Component Checks 15
Table 7. Recommended Repair Materials 18
Table 8. Recommended Assembly Materials 19

Meggitt Fuelling Products
Maintenance Manual (MM4631050)
Servo Assembly – 4631050 Series

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS!

This manual contains important instructions that should be followed during installation and maintenance of the Servo Assembly. 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 Servo Assembly is a mechanical device and can be dangerous if not correctly 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 as follows:

- indicates an imminently hazardous situation which, if not avoided, will result in injury or serious injury.

- indicates a potentially hazardous situation which, if not avoided, could result in injury or serious injury.

- indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

- 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 (MM4631050)
Servo Assembly – 4631050 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 valve.

OPERATION AND MAINTENANCE OF FUEL SYSTEMS

- Protect all fuel lines from damage or puncture. Do not operate the valve 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 valve from the system without first isolating it from the line pressure and venting all of the trapped internal pressure.

Meggitt Fuelling Products
Maintenance Manual (MM4631050)
Servo Assembly – 4631050 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 Servo Assembly. The instructions provide information necessary to accomplish maintenance functions. The Servo Assembly 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 (MM4631050)
Servo Assembly – 4631050 Series

DESCRIPTION AND OPERATION

1. Description

The Servo Assembly (servo) (see Figure 1) provides the means of controlling a fuel valve for regulation of the fuel sense port pressure to a preset value. The major functional components of the basic servo are the pressure control section, the surge control section, the opening time adjustment (needle valve) and the servo body. The major versions are the air-set or reference pressure controlled, and the spring-set for regulation of the downstream fuel pressure.

2. Operation - Air-Set Servo

A. Main Valve Closed

With reference air pressure less than the bias pressure (16 psi [1.1 bar] or 25 psi [1.7 bar]) the control poppet is closed, shutting off downstream flow through the servo. The quick-dump poppet is open, allowing upstream pressure into the main valve piston chamber, which, together with the spring force, keeps the main valve piston closed.

B. Main Valve Opening

When reference air pressure is applied to the AIR port, the quick-dump poppet closes, shutting off upstream pressure from the main valve piston. The control poppet opens, allowing fuel to bleed downstream, from the main valve piston through the opening speed adjustment screw, allowing it to open at a controlled rate.

C. Controlling Main Valve

As the main valve piston opens, flow increases and the pressure at the downstream pressure sense point increases. When the downstream sense port pressure increases to the preset value, the control poppet throttles the flow through the inlet orifice to control the main valve piston pressure and its position, to regulate the flow through the main valve.

D. Surge Control

If, due to changes in downstream conditions, the pressure at the downstream sense port increases faster than the control piston can regulate, the quick-dump piston will lift the quick-dump poppet, causing the main valve piston to close very rapidly. In this way, surge pressures are controlled.

Meggitt Fuelling Products
Maintenance Manual (MM4631050)
Servo Assembly – 4631050 Series

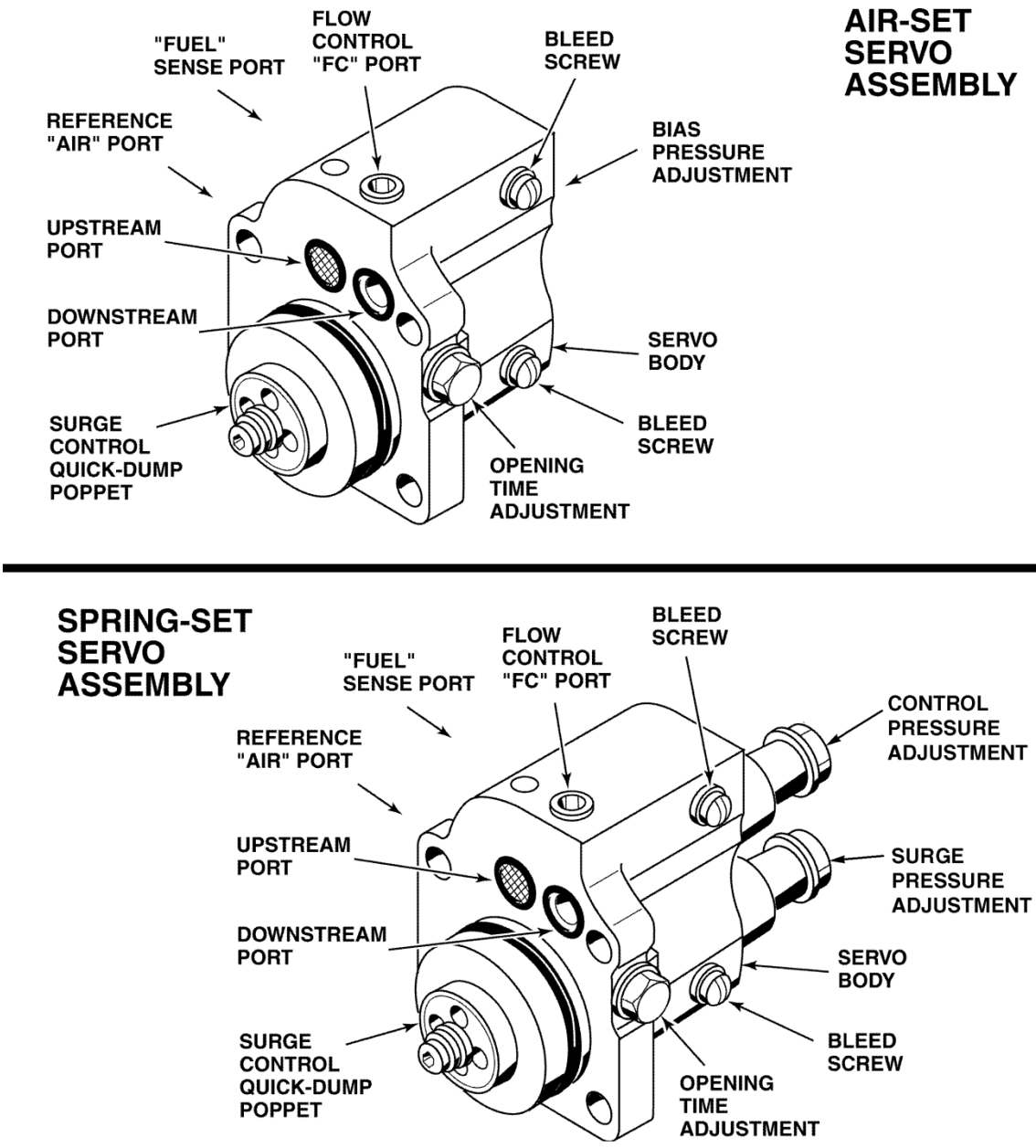


Figure 1. Servo Assembly

E. Main Valve Closing

When the reference air pressure is released, two actions take place. First, the control poppet closes, shutting off flow through the servo. Second, the quick-dump poppet opens, allowing upstream pressure into the main valve piston, causing rapid closure.

3. Operation – Spring-Set Servo

The spring-set servo is normally open. It requires an external control to close the main valve. In the closed condition the pressure in the sense port will be low, causing the quick-dump poppet to be closed and the control poppet to be open. To close the main valve, the downstream port of the servo must be plugged and the flow control (FC) port must be connected downstream through an external on/off valve. Actuation of the external valve can be manual, electrical, hydraulic or pneumatic.

A. Main Valve Closed

With the external on/off valve closed, the quick-dump poppet will be closed and the control poppet will be open. Upstream pressure will enter the main valve piston chamber through the inlet orifice. The drain through the control poppet will be shut off by the external on/off valve. The main valve piston will be closed by upstream pressure and spring force.

B. Main Valve Opening

When the external on/off valve is opened, pressure on the main valve piston will be allowed to bleed downstream through the open control poppet and the opening speed adjusting needle valve screw. This will allow the piston to open at a controlled rate.

C. Controlling Main Valve

As the main valve piston opens, flow increases and the pressure at the downstream pressure sense point increases. When the downstream sense port pressure increases to the preset value, the control poppet throttles the flow through the inlet orifice to control the main valve piston pressure and its position, to regulate the flow through the main valve.

D. Surge Control

If, due to changes in downstream conditions, the pressure at the downstream sense port increases faster than the control piston can regulate, the quick-dump piston will lift the quick-dump poppet, causing the main valve piston to close very rapidly. In this way, surge pressures are controlled.

E. Main Valve Closing

When the external on/off valve is closed the downstream bleed will be shut off, allowing the pressure to build up in the main valve piston chamber. This will force the piston onto its seat, shutting off flow.

4. Leading Particulars

For the leading particulars refer to Table 1.

Table 1. Leading Particulars

Service	Automotive and Aviation Fuels
Operating Pressure (maximum)	200 psi (13.7 bar)
Fluid Temperature	–40 to 165°F (–40 to 74°C)
Ambient Temperature	–40 to 165°F (–40 to 74°C)
Weight (approximate)	
Stainless Steel Body	4.4 pounds (2.0 kg)
Aluminum Alloy Body (Mod C)	1.3 pounds (0.6 kg)

5. Model Variations

A. Air-Set Servo

The basic 4631050 series air-set servo has a stainless steel body and provides for air-set control with 25 psi (1.72 bar) control pressure bias. Refer to Table 2 for the available 4631050 series air-set servo variations.

B. Spring-Set Servo

The basic 4631050G series air-set servo has a stainless steel body and provides for spring-set control. Refer to Table 3 for the available 4631050G series spring-set servo variations.

Table 2. 4631050 Air-Set Servo Variations

SERVO MOD LETTERS	DESCRIPTION
Basic	Air-set regulation, control pressure bias of 25 psi (172.37 kPa), stainless steel body
A	Changes control pressure bias to 16 psi (110.31 kPa)
C	Changes body to aluminum alloy
P	Adds closing time adjustment
D	Adds flow blocking disk for use with F540-1 flow control (not included) (plug removed from flow control port)

Table 3. 4631050G Spring-Set Servo Variations

SERVO MOD LETTERS	DESCRIPTION
Basic G	Spring-set regulation (35 to 70 psi [241.31 to 482.63 kPa])
C	Changes body to aluminum alloy
D	Adds flow blocking disk for use with F540-1 flow control (not included) (plug removed from flow control port)
R	Adds hydraulic deadman control
X	Spring-set regulation (70 to 110 psi [482.63 to 758.42 kPa])

Note: For information on non-standard variations not covered in this manual (F, FM, FMX, GN, NX, etc.), contact Meggitt (North Hollywood), Inc., Ground Fuelling Group.

FAULT ISOLATION

1. General

A. Look at the servo to make sure completeness of assembly, cleanliness, correct identification, and that no obvious damage is evident.

B. Make sure the nomenclature on the markings are complete and can be read.

C. Refer to Table 4 for fault isolation information. Locate suspected faulty component and take corrective action.

D. All normal rules and procedures associated with good safety practices during accomplishment of fault isolation shall be followed.

Table 4. Fault Isolation

FAULT	PROBABLE CAUSE	CORRECTIVE ACTION
Main valve will not open	Insufficient air pressure	Check for the correct pressure at the servo AIR port.
	Fuel sense line blocked	Remove the blockage.
	Disk (IPL Figure 1, 54) installed with no auxiliary servo used	Remove the disk.
	Disk (54) and auxiliary servo installed	Check the auxiliary servo for correct operation.
	Opening time adjustment shut off	Adjust the opening time adjustment screw (34) to the correct setting.
	Main valve seat for quick-dump poppet (3) contaminated or damaged	Cycle the valve to remove the contamination.
		Remove the servo and service the main valve.

Table 4. Fault Isolation – (cont.)

FAULT	PROBABLE CAUSE	CORRECTIVE ACTION
Main valve will not open *(continued)*	Screw (IPL Figure 1, 4) too tight	Tighten the screw until it is bottomed out. Then, back the screw out 1/8 to 1/4 turn. Make sure the washers can rotate freely.
	Poppets jammed by contamination	Overhaul the servo.
Main valve is partially open and will not regulate	Opening time adjustment shut off	Adjust the opening time adjustment screw (18) to the correct setting.
	Main valve seat for quick-dump poppet (3) contaminated or damaged	Cycle the valve to remove the contamination.
		Remove the servo and service the main valve.
	Screw (4) too tight	Tighten the screw until it is bottomed out. Then, back the screw out 1/8 to 1/4 turn. Make sure the washers can rotate freely.
	Disk (54) and auxiliary servo installed	Check the auxiliary servo for correct operation.
	Main valve contaminated	Service the main valve.
	Poppets jammed by contamination	Overhaul the servo.
Main valve open but regulated pressure is high	Fuel sense line leakage	Locate and repair the leak.
	Bias pressure setscrew (26) incorrectly adjusted	Adjust the bias pressure to the correct setting.
Main valve open but regulated pressure is low	Bias pressure setscrew (IPL Figure 1, 26) incorrectly adjusted	Adjust the bias pressure to the correct setting.
	Insufficient pump pressure	Check pump capacity.

Table 4. Fault Isolation – (cont.)

FAULT	PROBABLE CAUSE	CORRECTIVE ACTION
Air-to-fuel or fuel to air contamination	Worn or damaged packings or seals	Overhaul the servo.
	Other contamination sources in system	Check and correct as necessary.
Leakage at servo/main valve interface	Mounting screws loose	Tighten the screws evenly and securely.
	Damaged or missing packings (IPL Figure 1, 7 or 11)	Replace the packings.
	Incorrectly installed packings (7 or 11) or screen (21)	Replace the packings and the screen.
	Leakage from the bolt (20) or the plugs (24 or 56)	Tighten the bolt or the plugs. If necessary, remove and reseal the plugs.
Leakage at top of servo	Worn or damaged packing (12)	Replace the packing.
	Bolt (20) loose	Tighten the bolt securely.
Servo will not operate	Damaged spring or piston	Overhaul the servo. Replace the damaged parts.

DISASSEMBLY

1. Replacement Parts Kits

Refer to the IPL section for information on the replacement parts kits.

2. Disassembling the Air-Set Servo Assembly (See IPL Figure 1)

A. Remove the retaining ring (17) and the cap (13 or 13A) from the servo body (1).

Note: If it is important to retain the closing time setting, skip step B and do step C.

B. (Mod P) Remove the bolt (20A), the washer (19A) and the setscrew (26A) from the cap (13A).

C. (Mod P) Remove the packing (36), the seat (35) and the spring (34) from the servo body (1).

D. Use a screwdriver in the slot of the piston (9) to prevent it from rotating. Remove the screw (4) and the washers (2 and 33) from the opposite end of the piston (9).

(Mod P) Remove poppet (37) from the opposite end of the piston (9).

E. Remove the quick dump poppet (3), the packing (5) and the slipper seal (6) from the servo body (1).

F. Remove the piston (9) and the spring (25) from the servo body (1). Remove the packings (5 and 12) from the packing grooves of the servo body.

G. Using retaining ring pliers, remove the retaining ring (32) from the servo body (1).

H. Remove the seal retainer (31) and the packing (8) from the servo body (1).

Note: If it is important to retain the bias pressure setting, skip step I and do step J.

I. Remove the bolt (20) and the washer (19) from the cap (27). Using an Allen wrench, remove the setscrew (26) from the cap.

J. Remove the retaining ring (17), the cap (27), the spring retainer (28) and the spring (14) from the servo body (1).

K. Remove the poppet (16) from the servo body (1). Remove the packings (5 and 12) from the packing grooves of the servo body.

L. Using retaining ring pliers, remove the retaining ring (32) from the servo body (1).

M. Remove the seal retainer (30) and the packing (15) from the servo body (1).

N. Remove the bolt (20) and the washer (19) from the side of the servo body (1).

O. Remove the needle valve setscrew (18) from the servo body (1).

P. Remove the two screws (23) and the washers (22) from the servo body (1).

Q. Do not remove the plugs (24 and 56) from the servo body (1) unless there has been leakage around it.

R. If installed, remove the packings (7 and 11), the screen (21) and the disk (54) from the servo body (1).

3. Disassembling the Spring-Set Servo Assembly (See IPL Figure 2)

A. Remove the retaining ring (17) and the cap (13) from the servo body (1).

Note: If it is important to retain the surge pressure setting, skip step B and do step C.

B. Remove the bolt (20), the washer (19) and the setscrew (41) from the cap (13).

C. Remove the spring retainer (52) and the spring (47) from the servo body (1).

D. Use long nose pliers to hold the head of the rod (49) to prevent it from rotating. Remove the screw (4) and the washers (2 and 33) from the opposite end of the rod (49).

E. Remove the poppet (3), the packing (5) and the slipper seal (6) from the servo body (1).

F. Remove the piston (48) and the rod (49) from the servo body (1). Remove the packings (5 and 12) from the packing grooves of the servo body.

G. Remove the retaining ring (51) from the rod (49). Separate the rod (49) and the piston (48). Remove the packing (50).

H. Using retaining ring pliers, remove the retaining ring (32) from the servo body (1).

I. Remove the seal retainer (31) and the packing (8) from the servo body (1).

Note: If it is important to retain the pressure setting, skip step J and do step K.

J. Remove the bolt (20) and the washer (19) from the cap (27). Using an Allen wrench, remove the setscrew (42) from the cap.

K. Remove the retaining ring (17), the cap (27), the spring retainer (43) and the spring (44) from the servo body (1).

L. Remove the piston (45) and the spring (46) from the servo body (1). Remove the packings (5 and 12) from the packing grooves of the servo body.

M. Using retaining ring pliers, remove the retaining ring (32) from the servo body (1).

N. Remove the seal retainer (30) and the packing (15) from the servo body (1).

O. Remove the bolt (20) and the washer (19) from the side of the servo body (1).

P. Remove the needle valve setscrew (18) from the servo body (1).

Q. Remove the two screws (23) and the washers (22) from the servo body (1).

R. Do not remove the plugs (24 and 56) from the servo body (1) unless there has been leakage around it.

S. If installed, remove the packings (7 and 11), the screen (21) and the disk (54) from the servo body (1).

CLEANING

1. Cleaning Materials

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

Table 5. Recommended Cleaning Materials

DESCRIPTION	SPECIFICATION	SOURCE
Alcohol, Isopropyl	ASTM D770	Commercially available
Bags, Plastic	-	Commercially available
Brush, Bristle, Stiff, Nonmetallic	-	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. Use a Teflon® pick to remove any blockage from ports, grooves and 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 DRYING PARTS WITH 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.

CHECK/INSPECTION

1. General

A. Under strong light and magnification, Look at all the parts in accordance with the general criteria specified in paragraph 2.

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

2. Component Checks (Refer to Table 6)

Table 6. Component Checks

DESCRIPTION (IPL Figure and Item No.)	CHECK CRITERIA
General	Look at all parts as applicable; for nicks, cracks, cuts, burrs, corrosion, breaks, scoring, deformation, dents, thread damage, or any other obvious defects. Make sure the ports, passages, recesses and sealing grooves are clean and not blocked. Check all sealing and seating surfaces for damage or corrosion.
Servo Body (IPL Figure 1, 1 and IPL Figure 2, 1) (stainless steel)	Check for scoring on the inside diameters of the two large bores. Check for damage to the seat at the bottom of the control pressure bore. Check for damage to the seat or the threads for the opening time adjustment screw. Check for raised burrs on the seating surface for the main valve. The surface must be flat (may be repaired). Check for scoring on the seal groove surfaces for the packings. Check for contamination in the orifice at the bottom of the control pressure bore. The orifice must be clean. Check for minor damage may be repaired. Replace the body if there is extensive scoring, corrosion, or other damage.

Table 6 Component Checks – (cont.)

DESCRIPTION (IPL Figure and Item No.)	CHECK CRITERIA
Servo Body (IPL Figure 1, 1 and IPL Figure 2, 1) (aluminum alloy)	Check for scoring on the inside diameters of the two large bores. Check for damage to the seat at the bottom of the control pressure bore. Check for damage to the seat or the threads for the opening time adjustment screw. Check for raised burrs on the seating surface for the main valve. The surface must be flat (may be repaired). Check for scoring on the seal groove surfaces for the packings. Check for contamination in the orifice at the bottom of the control pressure bore. The orifice must be clean. Replace the body if bare metal shows through the anodized surface. Replace the body if there is extensive scoring, corrosion, or other damage.
Quick Dump Poppet (IPL Figure 1, 3 and IPL Figure 2, 3)	Replace the poppet if there is scoring on the outside diameter which would scratch or damage the slipper seal. Replace the poppet if bare metal shows through the anodized surface.
Quick Dump Piston (IPL Figure 1, 9 and IPL Figure 2, 48)	Replace the piston if there is scoring on the outside diameters of the piston body. Replace the piston if bare metal shows through the anodized surface.
Compression Spring (IPL Figure 1, 14)	Check for deformation or permanent set. Check for free length of approximately 0.80 inch (20.3 mm).
Pressure Control Poppet (16)	Check the ports in the poppet are clear between the stem and the piston. Replace the poppet if there is scoring on the outside diameters of the piston body or the piston shaft. Replace the poppet if bare metal shows through the anodized surface.

Table 6 Component Checks – (cont.)

DESCRIPTION (IPL Figure and Item No.)	CHECK CRITERIA
Compression Spring (IPL Figure 1, 25) (Wire size: 0.075 inch [1.91 mm] diameter)	Check for deformation or permanent set. Check for free length of approximately 2.29 inch (58.2 mm).
Compression Spring (25) (Wire size: 0.058 inch [1.47 mm] diameter)	Check for deformation or permanent set. Free length of approximately 2.48 inch (63.0 mm).
Compression Spring (IPL Figure 2. 44) (Wire size: 0.125 inch [3.17 mm] diameter)	Check for deformation or permanent set. Free length of approximately 1.31 inch (33.3 mm).
Compression Spring (44) (Wire size: 0.135 inch [3.43 mm] diameter)	Check for deformation or permanent set. Check for free length of approximately 1.24 inch (31.5 mm).
Compression Spring (46) (Wire size: 0.087 inch [2.21 mm] diameter)	Check for deformation or permanent set. Check for free length of approximately 1.21 inch (30.7 mm).
Compression Spring (47) (Wire size: 0.105 inch [2.67 mm] diameter)	Check for deformation or permanent set. Check for free length of approximately 1.84 inch (46.7 mm).
Compression Spring (47) (Wire size: 0.120 inch [3.05 mm] diameter)	Check for deformation or permanent set. Check for free length of approximately 1.62 inch (41.1 mm).

REPAIR

1. General

Repairs normally will consist of replacing damaged or malfunctioning parts with new parts, however, this section outlines minor repair procedures permissible for component parts, and specifies mandatory replacement parts.

2. Repair Procedures

Refer to Table 7 for recommended repair materials. Suitable equivalent repair materials may be substituted for the items listed.

Table 7. Recommended Repair Materials

DESCRIPTION	SPECIFICATION	SOURCE
Cloth, Abrasive, Crocus, 600-grit	P-C-458	Commercially available

3. Repair or Replacement

A. Replace all parts which are obviously cracked, worn, deformed, damaged beyond repair, or which do not meet check requirements and cannot be restored to serviceable condition by allowable repair.

B. Polish out minor corrosion and surface damage on stainless steel parts with crocus abrasive cloth.

C. Polish out minor scoring on the quick-dump poppet (IPL Figure 1 or IPL Figure 2, 3), the quick-dump piston (IPL Figure 1, 9) and the pressure control poppet (16) with crocus abrasive cloth.

D. After polishing, clean all parts as specified in the CLEANING section.

E. Clear minor thread damage with a thread restoring tool; replace all threaded components having crossed or stripped threads.

ASSEMBLY

1. Replacement Parts

Refer to the IPL section for information on the replacement parts kits.

2. Assembly Materials

Refer to Table 8 for recommended assembly materials. Suitable equivalent materials may be substituted for the items listed.

3. Assembling the Air-Set Servo Assembly (See IPL Figure 1)

A. Lubrication

Before assembly; lightly lubricate all of the packings and seals with petroleum jelly.

CAUTION DO NOT USE PTFE TAPE ON THE THREADS OF THE PLUG.

Table 8. Recommended Assembly Materials

DESCRIPTION	SPECIFICATION	SOURCE
Masking Tape	–	Commercially available
Petroleum Jelly	–	Commercially available
Sealant, Pipe Thread	SWAK	Swagelok Corporation 29500 Solon Road, Solon, Ohio 44139

B. Installing the Body Plugs and the Bleed Screws

1. If plug (24 or 56) has been removed, apply a small bead of pipe thread sealant (SWAK) around the threads at the small end of the plug, approximately 1/16-inch (1.5 mm) from the end. Apply a bead of sealant along the length of the threaded hole on the servo body (1). Install the plug in the servo body and tighten it securely.

2. Install the screws (23) and the washers (22) in the bleed ports of the servo body (1). Tighten the screws securely.

C. Installing the Opening Time Adjustment Section

1. Install the opening time needle valve screw (18) in the servo body (1). Tighten the screw until it is bottomed out, and then back it out approximately 1/8 – 1/4 turns.

   Note: Adjustment of the opening time will be accomplished during installation of the servo assembly in the fueling system.

2. Install the bolt (20) and the washer (19) in the servo body (1).

D. Installing the Pressure Control Section Components

1. Install the packing (15) and the packing retainer (30) in the servo body (1).

2. Secure the packing retainer (30) in the servo body (1) by installing the retaining ring (32), using retaining ring pliers. Make sure the retaining ring is correctly seated in its groove.

3. Install the packings (5 and 12) in the packing grooves of the servo body (1). Install the poppet (16) in the servo body.

   Note: The retaining ring (17) must be installed with its sharp edge facing outward from the servo body (1).

4. Install the spring (14), the spring retainer (28) and the cap (27) in the servo body (1). Secure the parts with the retaining ring (17).

   Note: If the bolt (20), the washer (19) and the setscrew (26) have not been removed from the cap (27), skip steps 5 and 6 and do paragraph E.

5. Install the setscrew (26) in the cap (27). Tighten the setscrew until it contacts the spring retainer (28) without compressing the spring (14). Tighten the setscrew (against the spring force) an additional 3-1/2 turns (Mod A; 2-1/2 turns).

   Note: This is the initial adjustment. Further adjustment of the pressure control setscrew may be required during installation of the servo assembly in the fueling system.

6. Install the bolt (20) and the washer (19) in the cap (28). Tighten the bolt securely.

E. Installing the Surge Control Section Components

Note: For Mod P servos; do paragraph F.

1. Install the packing (8) and the retainer (31) in the servo body (1).
2. Secure the retainer (31) in the servo body (1) by installing the retaining ring (32), using retaining ring pliers. Make sure the retaining ring is correctly seated in its groove.
3. Install the packing (5) and the slipper seal (6) in the servo body (1).
4. Install the packings (5 and 12) in the packing grooves of the servo body (1).
5. Install the spring (25) and the piston (9) in the servo body (1).
6. Install the poppet (3) in the servo body (1). Make sure the poppet slides freely in the slipper seal (6).
7. Use a screwdriver in the slot of the piston (9) to prevent it from rotating. Install the screw (4) and the washers (2 and 33) in the end of the piston. Tighten the screw until it is bottomed out. Then, back the screw out 1/8 to 1/4 turn. Make sure the washers can rotate freely.

   Note: The retaining ring (17) must be installed with its sharp edge facing outward from the servo body (1).
8. Install the cap (13) in the servo body (1) and secure it with the retaining ring (17).
9. Install the screen (21), the disk (54) (if applicable) and the packing (11) on the face of the servo body (1) and use masking tape to retain them. Install the packing (7) in the packing groove of the servo body.

F. (Mod P) Installing the Surge Control Section Components

1. Install the packing (8) and the retainer (31) in the servo body (1).
2. Secure the retainer (31) in the servo body (1) by installing the retaining ring (32), using retaining ring pliers. Make sure the retaining ring is correctly seated in its groove.
3. Install the packing (5) and the slipper seal (6) in the servo body (1).

4. Install the packings (5 and 12) in the packing grooves of the servo body (1).

5. Install the spring (25) and the piston (9) in the servo body (1).

6. Install the seat (35) on the shaft of the piston (9).

7. Use a screwdriver in the slot of the piston (9) to prevent it from rotating. Install the screw (4) and the washers (2 and 33) in the end of the piston. Tighten the screw until it is bottomed out. Then, back the screw out 1/8 to 1/4 turn. Make sure the washers can rotate freely.

   Note: The retaining ring (17) must be installed with its sharp edge facing outward from the servo body (1).

8. Install the cap (13A) in the servo body (1) and secure it with the retaining ring (17).

   Note: If the bolt (20A), the washer (19A) and the setscrew (26A) have not been removed from the cap (13A), skip step 9 and do step10.

9. Install the setscrew (26A) in the cap (13A). Tighten the setscrew until it contacts the piston (9) without compressing the spring (25).

   Note: This is the initial adjustment. Further adjustment of the surge pressure control setscrew may be required during installation of the servo assembly in the fueling system.

10. Install the bolt (20A) and the washer (19A) in the cap (13A). Tighten the bolt securely.

11. Install the screen (21), the disk (54) (if applicable) and the packing (11) on the face of the servo body (1) and use masking tape to retain them. Install the packing (7) in the packing groove of the servo body.

12. Install the spring (34), the packing (36) and the poppet (37) in the servo body (1). Make sure the poppet slides freely in the slipper seal (6). Use masking tape to retain the parts.

4. Assembling the Spring-Set Servo Assembly (See IPL Figure 2)

A. Lubrication

Before assembly; lightly lubricate all of the packings and seals with petroleum jelly.

CAUTION DO NOT USE PTFE TAPE ON THE THREADS OF THE PLUGS.

B. Installing the Body Plugs and the Bleed Screws

1. If plug (24 or 56) has been removed, apply a small bead of pipe thread sealant (SWAK) around the threads at the small end of the plug, approximately 1/16-inch (1.5 mm) from the end. Apply a bead of sealant along the length of the threaded hole on the servo body (1). Install the plug in the servo body and tighten it securely.

2. Install the screws (23) and the washers (22) in the bleed ports of the servo body (1). Tighten the screws securely.

C. Installing the Opening Time Adjustment Section

1. Install the opening time needle valve screw (18) in the servo body (1). Tighten the screw until it is bottomed out, and then back it out approximately 1/2 to 3/4 turns.

   Note: Adjustment of the opening time will be accomplished during installation of the servo assembly in the fueling system.

2. Install the bolt (20) and the washer (19) in the servo body (1).

D. Installing the Pressure Control Section Components

1. Install the packing (15) and the packing retainer (30) in the servo body (1).

2. Secure the packing retainer (30) in the servo body (1) by installing the retaining ring (32), using retaining ring pliers. Make sure the retaining ring is correctly seated in its groove.

3. Install the two packings (5 and 12) in the packing grooves of the servo body (1). Install the spring (46), the poppet (45), the spring (44) and the spring retainer (43) in the servo body.

   Note: The retaining ring (17) must be installed with its sharp edge facing outward from the servo body (1).

4. Secure the cap (27) by installing the retaining ring (17).

   Note: If the bolt (20), the washer (19) and the setscrew (42) have not been removed from the cap (27), skip step 5.

5. Install the setscrew (42) in the cap (27). Tighten the setscrew until it contacts the spring retainer (43) without compressing the spring (44).

   Note: This is the initial adjustment. Further adjustment of the pressure control setscrew may be required during installation of the servo assembly in the fueling system.

6. Install the bolt (20) and the washer (19) in the cap (27). Tighten the bolt securely.

E. Installing the Surge Control Section Components

1. Install the packing (8) and the retainer (31) in the servo body (1).

2. Secure the retainer (31) in the servo body (1) by installing the retaining ring (32), using retaining ring pliers. Make sure the retaining ring is correctly seated in its groove.

3. Install the packing (5) and the slipper seal (6) in the servo body (1).

4. Install the packings (5 and 12) in the packing grooves of the servo body (1).

5. Install the packing (50) in the packing groove of the rod (49). Install the rod in the quick dump piston (48) and secure it by installing the retaining ring (51).

   Note: Make sure the retaining ring is correctly seated in its groove.

6. Install the quick-dump piston (48) and rod (49) in the servo body (1).

7. Install the poppet (3) in the servo body (1). Make sure the poppet slides freely in the slipper seal (6).

8. Use long nose pliers to hold the head of the rod (49) to prevent it from rotating. Install the screw (4) and the washers (2 and 33) in the end of the rod. Tighten the screw until it is bottomed out. Then, back the screw out 1/8 to 1/4 turn. Make sure the washers can rotate freely.

9. Install the spring (47) and the spring retainer (52) in the servo body (1).

   Note: The retaining ring (17) must be installed with its sharp edge facing outward from the servo body (1).

10. Install the cap (13) in the servo body (1) and secure it with the retaining ring (17).

    Note: If the bolt (20), the washer (19) and the setscrew (41) have not been removed from the cap (13), skip step 11.

11. Install the setscrew (41) in the cap (13). Tighten the setscrew until it contacts the spring retainer (52) without compressing the spring (47).

    Note: This is the initial adjustment. Further adjustment of the pressure control setscrew may be required during installation of the servo assembly in the fueling system.

12. Install the bolt (20) and the washer (19) in the cap (13). Tighten the bolt securely.

13. Install the screen (21), the disk (54) (if applicable) and the packing (11) on the face of the servo body (1) and use masking tape to retain them. Install the packing (7) in the packing groove of the servo body.

Meggitt Fuelling Products
Maintenance Manual (MM4631050)
Servo Assembly – 4631050 Series

ILLUSTRATED PARTS LIST

1. General

This section lists, describes, and illustrates all detail parts required for maintenance support of the Servo Assembly.

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

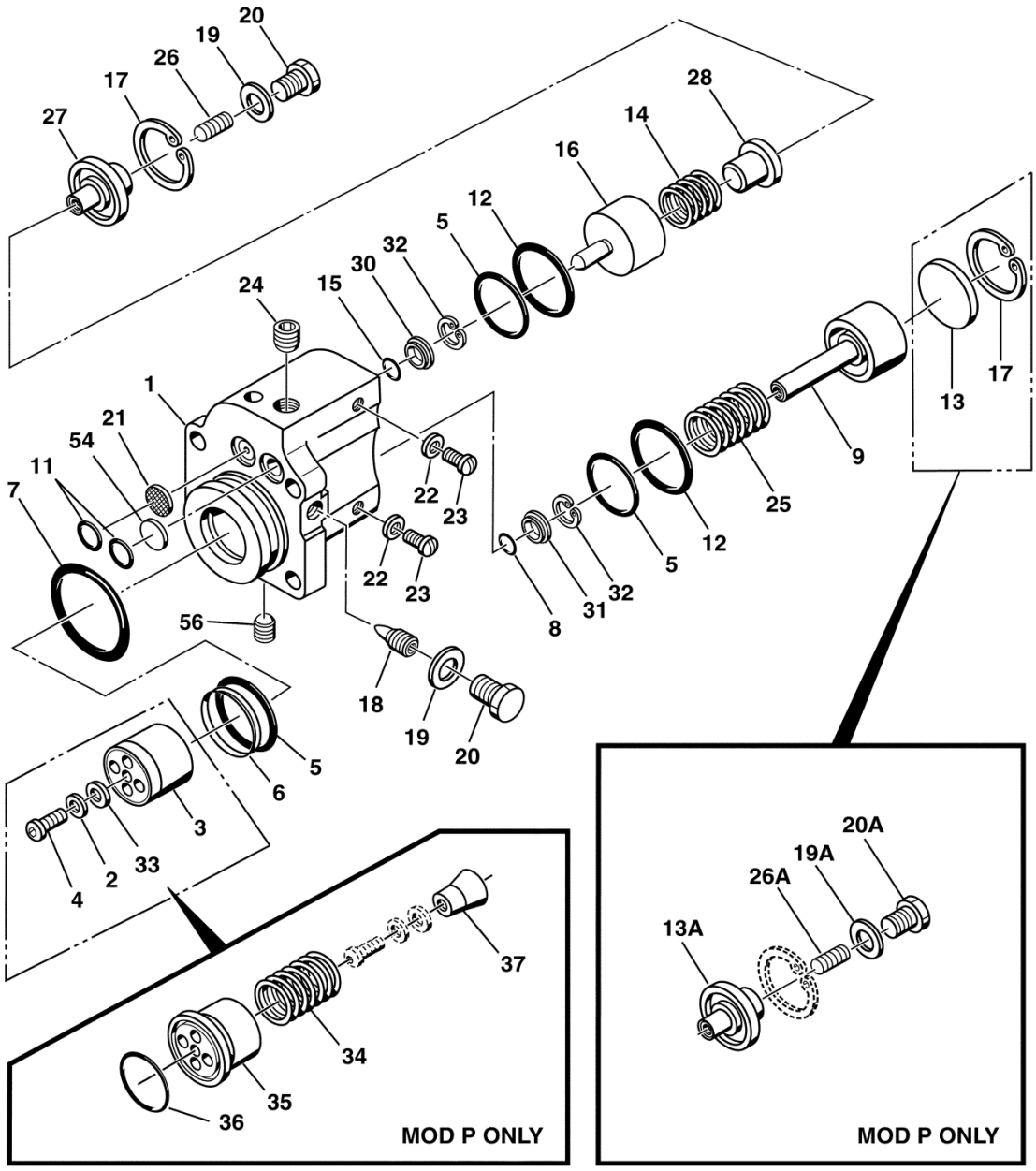
When the part number is known: Refer to the parts list for the item number, description, modification codes, and quantity. Refer to the illustration to make sure of the physical appearance and location of the part.

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

ASSY	Assembly
FIG.	Figure
IPL	Illustrated Parts List
MOD	Modification

Meggitt Fuelling Products
Maintenance Manual (MM4631050)
Servo Assembly – 4631050 Series



IPL Figure 1. Air-Set Servo Assembly

Meggitt Fuelling Products
Maintenance Manual (MM4631050)
Servo Assembly – 4631050 Series

FIG. ITEM	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	MOD CODES	UNITS PER ASSY
SERVO ASSEMBLIES, 4631050 BASELINE – AIR-SET				
1	4631050	SERVO ASSEMBLY, AIR-SET ..... (BASELINE CONFIGURATION)		REF
1	921271-102	. BODY, SERVO (STAINLESS STEEL)		1
	921271-101	. BODY, SERVO (ALUMINUM ALLOY)	C	1
2	CAN960C8	. WASHER, FLAT		1
3	2632685	. POPPET, QUICK DUMP ..... (NOT USED ON MOD P)		1
4	6-32X1/2SCRW	. SCREW, MACHINE, HEX SOCKET, BUTTON HEAD, ... 6-32 X 1/2 INCH LONG, SELF-LOCKING, STEEL ALLOY, BLACK OXIDE		1
5	2661058BD122	. PACKING, PREFORMED		3
6	4631061-122	. SEAL (TEFLON®)		1
7	2661058A130	. PACKING, PREFORMED		1
8	2661058BD010	. PACKING, PREFORMED		1
9	2671075	. PISTON, QUICK DUMP		1
11	2661058A011	. PACKING, PREFORMED		2
12	2661058A123	. PACKING, PREFORMED		2
13	2632688-2	. CAP (STEEL)		1
	2632688-1	. CAP (ALUMINUM ALLOY)	C	1
13A	2661890-2	. CAP (STEEL)	P	1
	2661890-1	. CAP (ALUMINUM ALLOY)	CP	1
14	2803438-101	. SPRING, COMPRESSION ..... (WIRE DIAMETER: 0.100 INCH)		1
15	2661058BD009	. PACKING, PREFORMED		1
16	2661940	. POPPET, PRESSURE CONTROL		1
17	CMS16625-4118	. RING, RETAINING		2
18	2671228	. SETSCREW, NEEDLE VALVE (OPENING TIME ADJUSTMENT)		1
19	2706580-109	. WASHER, NONMETALLIC (ZYTEL®)		2

- Not Illustrated

Meggitt Fuelling Products
Maintenance Manual (MM4631050)
Servo Assembly – 4631050 Series

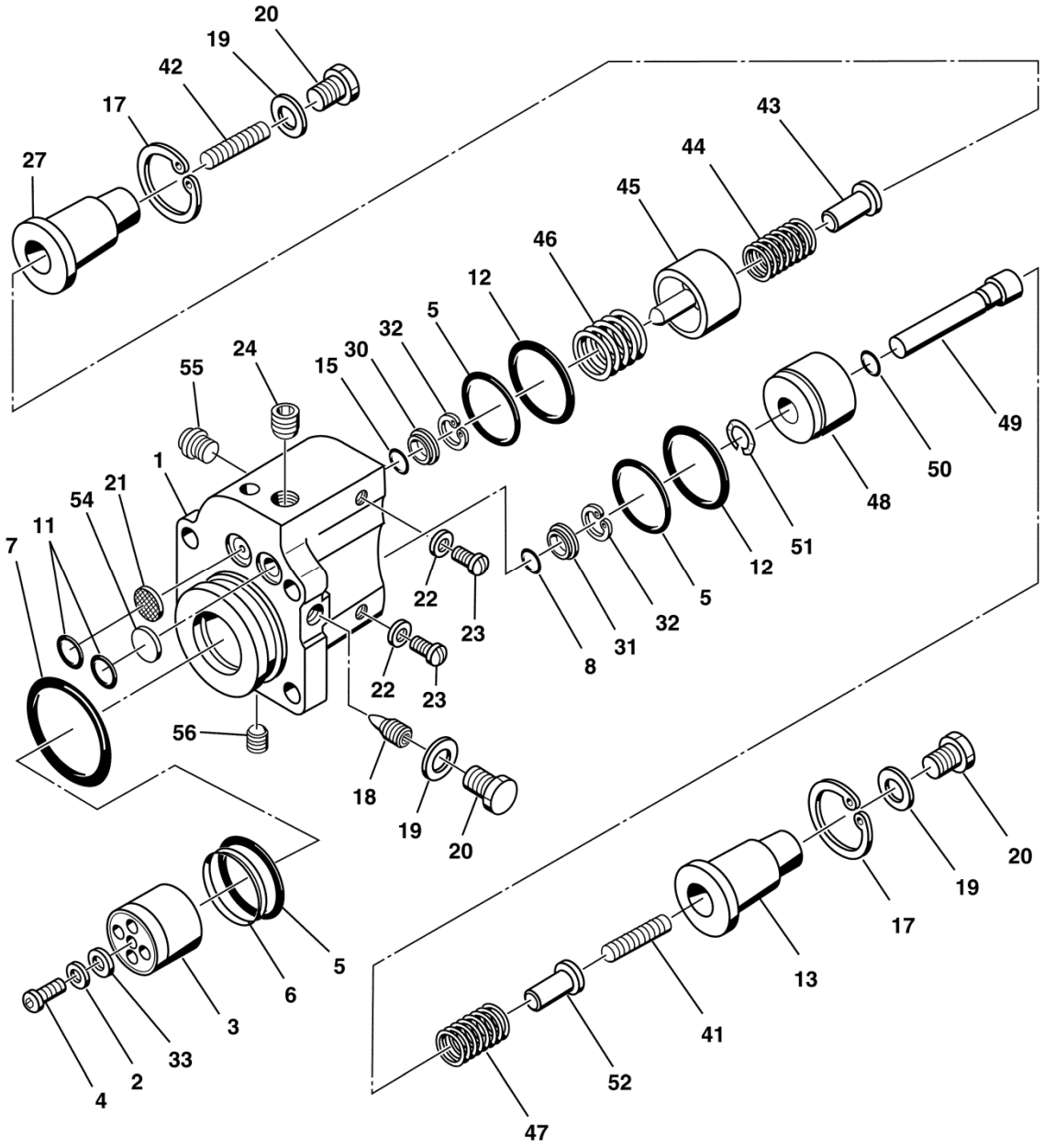
FIG. ITEM	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	MOD CODES	UNITS PER ASSY
1 19A	2706580-109	. WASHER, NON-METALLIC (ZYTEL®)	P	3
20	CMS35308-301	. BOLT, MACHINE, HEX (1/4-28UNF).....		2
20A	CMS35308-301	. BOLT, MACHINE, HEX (1/4-28UNF).....	P	3
21	2632889	. SCREEN.....		1
22	2706580-105	. WASHER, NONMETALLIC (ZYTEL®).....		2
23	8-32X1/4LG	. SCREW, MACHINE, ROUND HEAD, 8-32 X 1/4 IN. LG STAINLESS STEEL		2
24	CAN932-3S	. PLUG..... (NOT USED ON MOD D)		1
25	2803437-101	. SPRING, COMPRESSION..... (WIRE DIAMETER: 0.075 IN.)		1
	2632760	. SPRING, COMPRESSION..... (WIRE DIAMETER: 0.058 IN.)	A	1
26	CAN565F428H9	. SETSCREW		1
26A	CAN565F428H9	. SETSCREW	P	2
27	2661890-2	. CAP (STEEL)		1
	2661890-1	. CAP (ALUMINUM ALLOY).....	C	1
28	2661878	. RETAINER, SPRING		1
30	2662636	. RETAINER, PACKING (BRASS)		1
31	2662637	. RETAINER (STAINLESS STEEL).....		1
32	CMS16625-4050	. RING, RETAINING.....		2
33	2706580-103	. WASHER, NONMETALLIC (ZYTEL®).....		1
34	2803437-101	. SPRING, COMPRESSION..... (WIRE DIAMETER: 0.075 IN.)	P	1
35	2793059-101	. SEAT	P	1
36	2661058A021	. PACKING, PREFORMED	P	1
37	2793060-101	. POPPET	P	1
54	2682351-2	. DISK, 0.305 DIA, X 0.049 IN. THICK	D	1
56	CAN932-2S	. PLUG.....		1

- Not Illustrated

Meggitt Fuelling Products
Maintenance Manual (MM4631050)
Servo Assembly – 4631050 Series

AIR-SET SERVO PARTS KITS AVAILABLE			
KIT PART NUMBER	**DESCRIPTION**	**APPLICATION**	**ITEMS IN KIT (IPL Figure 1)**
2KIT4631050-101	Overhaul	Air-Set, 4631050, A, C, D	5, 6, 7, 8, 11, 12, 15, 17, 19, 21, 22, 33
2KIT4631050-109	Overhaul	Air-Set, 4631050P	5, 6, 7, 8, 11, 12, 15, 17, 19, 21, 22, 33, 36

Meggitt Fuelling Products
Maintenance Manual (MM4631050)
Servo Assembly – 4631050 Series



IPL Figure 2. Spring-Set Servo Assembly

Meggitt Fuelling Products
Maintenance Manual (MM4631050)
Servo Assembly – 4631050 Series

FIG. ITEM	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	MOD CODES	UNITS PER ASSY
SERVO ASSEMBLIES, 4631050G BASELINE – SPRING-SET				
2	4631050G	SERVO ASSEMBLY, SPRING-SET ..... (BASELINE CONFIGURATION)		REF
1	921271-102	. BODY, SERVO (STAINLESS STEEL)		1
	921271-101	. BODY, SERVO (ALUMINUM ALLOY)	C	1
	2871019-101	. BODY, SERVO (ALUMINUM ALLOY)	CR	1
	2871019-105	. BODY, SERVO (STAINLESS STEEL).....	R	1
2	CAN960C8	. WASHER, FLAT.....		1
3	2632685	. POPPET, QUICK DUMP.....		1
4	6-32X1/2SCRW	. SCREW, MACHINE, HEX SOCKET, BUTTON HEAD, 6-32 X 1/2 INCH LONG, SELF-LOCKING, STEEL ALLOY, BLACK OXIDE		1
5	2661058BD122	. PACKING, PREFORMED		3
6	4631061-122	. SEAL (TEFLON®)		1
7	2661058A130	. PACKING, PREFORMED		1
8	2661058BD010	. PACKING, PREFORMED		1
11	2661058A011	. PACKING, PREFORMED		2
12	2661058A123	. PACKING, PREFORMED		2
13	2692094-2	. CAP (STEEL)		1 1
	2692094-1	. CAP (ALUMINUM ALLOY)	C	
15	2661058BD009	. PACKING, PREFORMED		1
17	CMS16625-4118	. RING, RETAINING		2
18	2671228	. SETSCREW, NEEDLE VALVE (OPENING TIME ADJUSTMENT)		1
19	2706580-109	. WASHER, NONMETALLIC (ZYTEL®).....		3
20	CMS35308-301	. BOLT, MACHINE, HEX (¼-28UNF).....		3
21	2632889	. SCREEN.....		1
22	2706580-105	. WASHER, NONMETALLIC (ZYTEL®).....		2
23	8-32X1/4LG	. SCREW, MACHINE, ROUND HEAD, 6-32 X 1/4 INCH LONG, STAINLESS STEEL.....		2

- Not Illustrated

Meggitt Fuelling Products
Maintenance Manual (MM4631050)
Servo Assembly – 4631050 Series

FIG. ITEM	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	MOD CODES	UNITS PER ASSY
2 24	CAN932-3S	. PLUG (NOT USED ON MOD P)		1
27	2692094-2	. CAP (STEEL)		1
	2692094-1	. CAP (ALUMINUM ALLOY)	C	1
30	2662636	. RETAINER, PACKING (BRASS)		1
31	2662637	. RETAINER (STAINLESS STEEL)		1
32	CMS16625-4050	. RING, RETAINING		2
33	2706580-103	. WASHER, NONMETALLIC (ZYTEL®)		1
41	10-32UNFX1-3/16LG	. SETSCREW, HEX SOCKET, LONG OVAL POINT, 10-32NF, 1-3/16 INCH LONG		1
42	10-32UNFX1-3/16LG	. SETSCREW, HEX SOCKET, LONG OVAL POINT, 10-32NF, 1-3/16 INCH LONG		1
43	2692178	. RETAINER, SPRING		1
44	2692177	. SPRING, COMPRESSION (WIRE DIAMETER: 0.087 INCH)		1
45	2692095	. POPPET		1
46	2721716	. SPRING, COMPRESSION (WIRE DIAMETER: 0.125 IN.)		1
	2712055	. SPRING, COMPRESSION (WIRE DIAMETER: 0.135 IN.)	X	1
47	2721715	. SPRING, COMPRESSION (WIRE DIAMETER: 0.105 INCH)		1
	2712054	. SPRING, COMPRESSION (WIRE DIAMETER: 0.120 INCH)	X	1
48	2692182	. PISTON, QUICK DUMP		1
49	2692181	. ROD		1
50	2661058A006	. PACKING, PREFORMED		1
51	5133-21	. RING, RETAINING		1
52	2692178	. RETAINER, SPRING		1
54	2682351-2	. DISK (0.305 DIAMETER X 0.049 IN. THICK)	D	1

- Not Illustrated

FIG. ITEM	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	MOD CODES	UNITS PER ASSY
2 55	981008-101	. PLUG, VENT.....		1
56	CAN932-2S	. PLUG.....		1

- Not Illustrated

SPRING-SET SERVO PARTS KITS AVAILABLE			
KIT PART NUMBER	**DESCRIPTION**	**APPLICATION**	**ITEMS IN KIT (IPL Figure 2)**
2KIT4631050-102	Overhaul	Spring-Set, 4631050G, X	5, 6, 7, 8, 11, 12, 15, 17, 21, 32, 50, 51
2KIT4631050-107	Overhaul	Spring-Set, 4631050CDX	5, 6, 7, 8, 11, 12, 15, 17, 21, 32, 50