

Meggitt Fuelling Products  
Avery-Hardoll  
Whittaker Controls

## Maintenance Manual

# Bottom Loading Coupler F228 Series



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## LIST OF EFFECTIVE PAGES

On a revised page, the portion of text or illustrations affected by the change is indicated by a vertical line in the outer margin of the page. When a revision is issued, the entire document is reissued with the current revision number and date shown on all pages. For major revisions, the basic number is incremented. For minor revisions, the number following the decimal is incremented. Dates of issue for original and subsequent revisions are as follows:

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The total number of pages in this technical document is 17 consisting of the following:

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## INTRODUCTION

### 1. General

This manual provides component maintenance shop instructions for the Bottom Loading Coupler (coupler).

### 2. Revision Service

This manual will be revised as necessary to show the current information.

### 3. Weights and Measurements

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

## DESCRIPTION AND OPERATION

### 1. Description

The Bottom Loading Coupler (coupler) (see Figure 1) is a push-on pull-off one-hand operation coupler designed to mate with adapters conforming to API Standard RP1004. The major functional components of the coupler are the coupler body, the poppet, the operating handle, the bail, and the crank mechanism. A floating nose seal provides positive sealing under all normal operating conditions.

### 2. Operation

#### A. Connecting the Coupler to the Adapter

The coupler may be connected to the adapter by pressing it forward onto the adapter. This actuates the three locking lugs, and releases the spring-loaded shroud. The shroud slides forward and holds the locking lugs in their locked position.

#### B. Operating the Coupler

**CAUTION:** THE SLEEVE SEAL WILL BE DAMAGED IF THE COUPLER IS OPENED WITHOUT BEING CONNECTED TO AN ADAPTER.

When the coupler is connected to the adapter, it may be opened by rotating its operating handle to the OPEN position. To close the coupler, rotate its operating handle to the CLOSED position.

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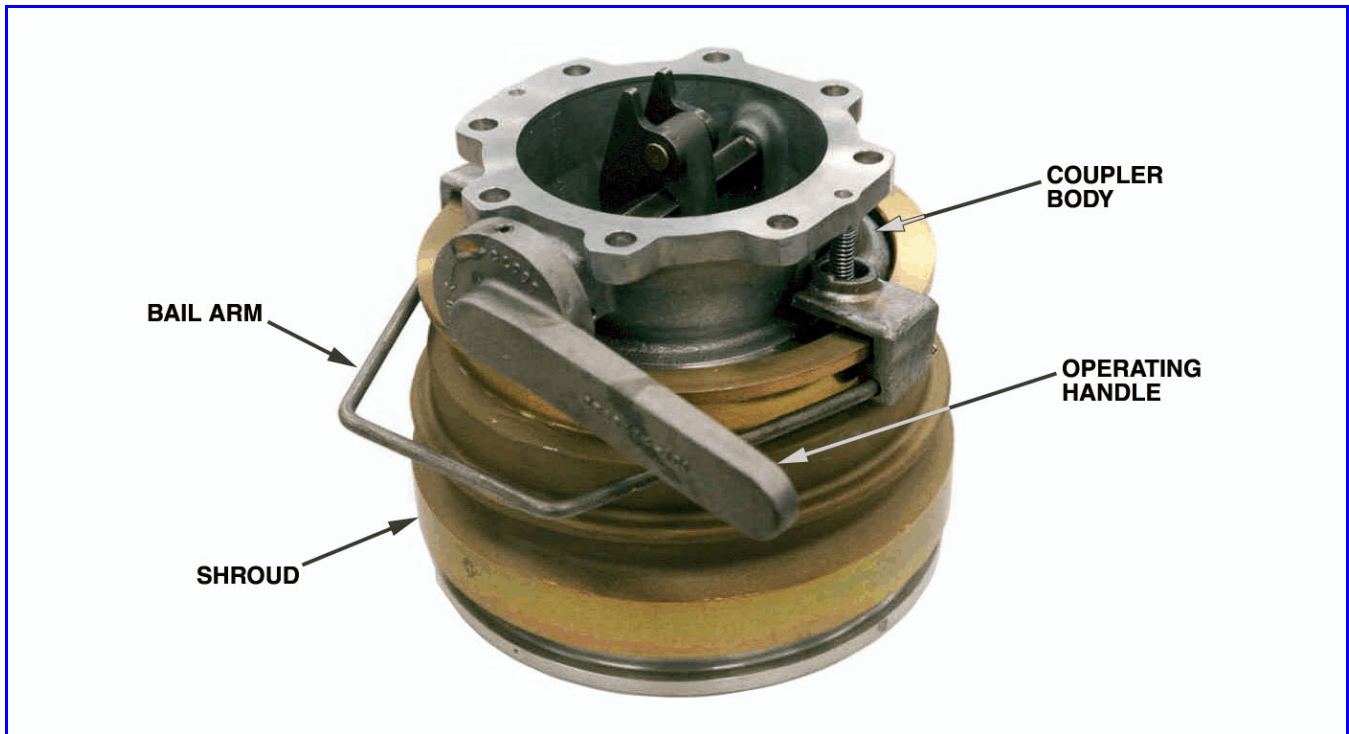


Figure 1. Bottom Loading Coupler

**C. Disconnecting the Coupler from the Adapter**

The coupler may be disengaged from the adapter by rotating its operating handle to the CLOSED position and pulling back on the bail arm to disengage the locking lugs.

**3. Leading Particulars (Refer to Table 1)**

**4. Model Variations**

A. The basic F228 series coupler is equipped with standard seals. The Mod C variation utilizes Viton seals. The Mod E variation adds a stainless steel insert for heavy duty service (see Figure 2). Refer to the **ILLUSTRATED PARTS LIST** section for additional details.

**B. Viton Seal Notes (Mod C Only)**

- 1) Viton seals are not recommended for use in areas where the ambient temperature falls below 0°F (-18°C).
- 2) Viton seals are not recommended for use with diesel fuel because of the peroxides it contains.

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Table 1. Leading Particulars

Service .....	Automotive and Aviation Fuels
Line Size .....	4-inch
Operating Pressure	
Working .....	0 to 120 psi (0 to 827 kPa)
Peak Surge .....	350 psi (2 400 kPa)
Pressure Drop .....	4.7 psi through F228/F433 at 1000 gpm ( )
Fluid Temperature .....	-65 to 125°F (-54 to 71°C)
Ambient Temperature .....	-65 to 160°F (-54 to 71°C)
Key Dimensions .....	See Figure 3
Weight (approximate) .....	13.6 pounds (6,2 kg)

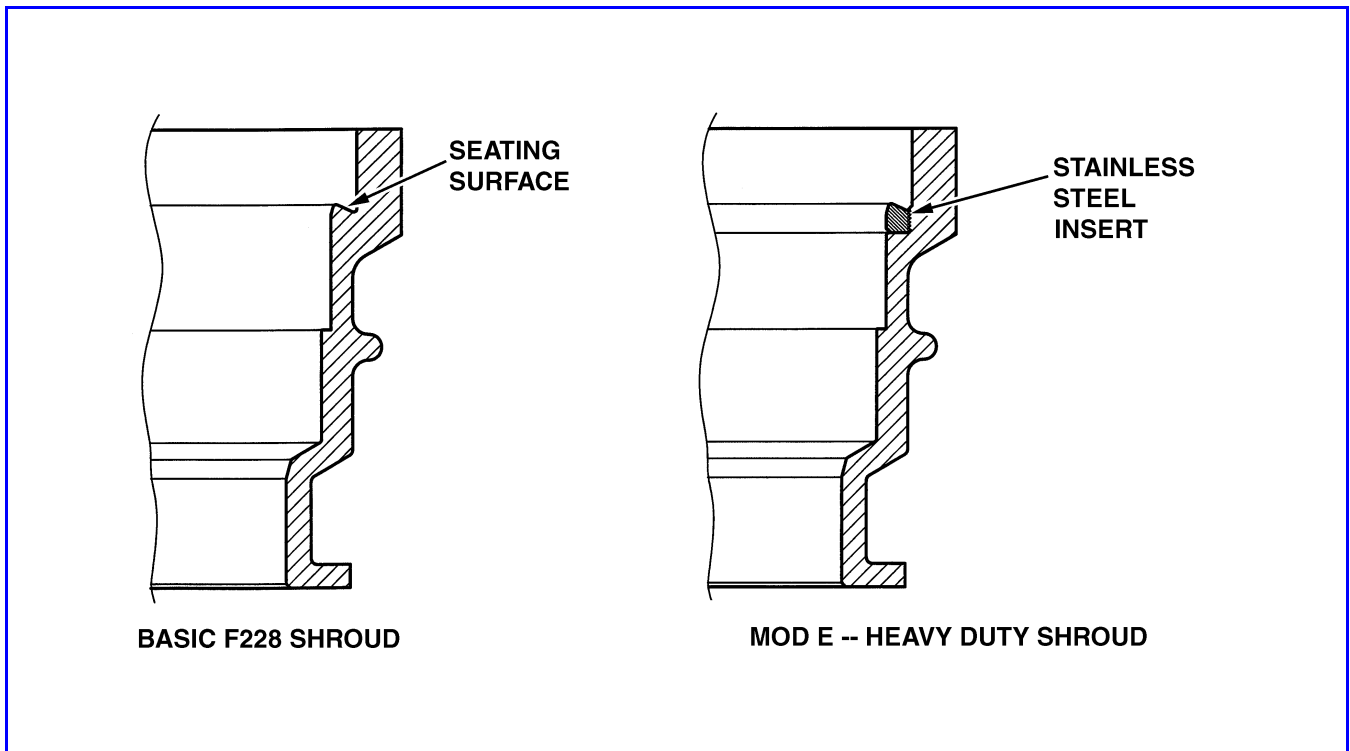
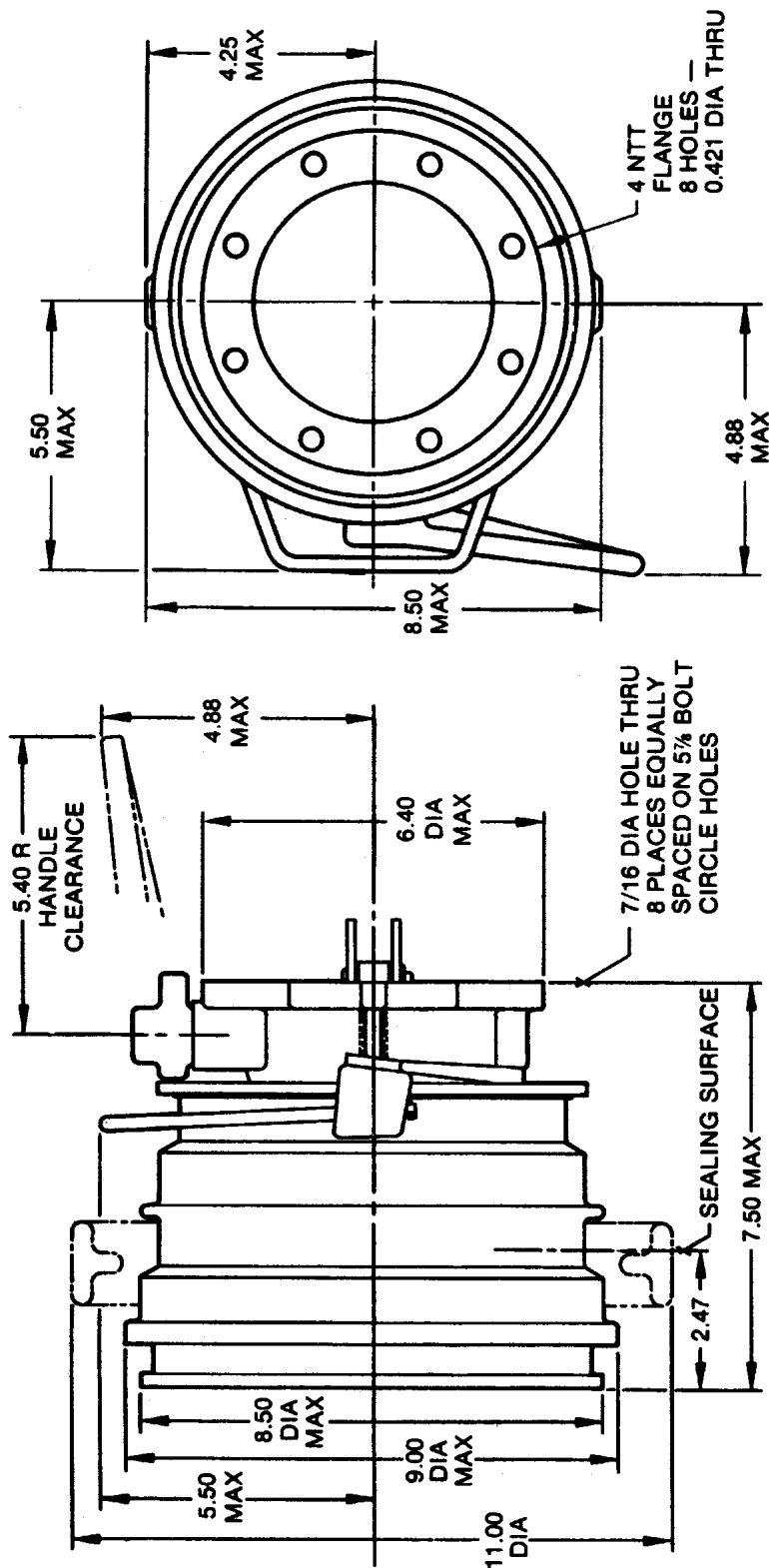


Figure 2. Shroud Variations

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NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES.

Figure 3. Envelope Dimensions

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## FAULT ISOLATION

### 1. General

Refer to Table 2 for fault isolation information. Locate suspected faulty component and take appropriate remedial action.

Table 2. Fault Isolation

FAULT	POSSIBLE CAUSE	CORRECTIVE ACTION
Leakage past poppet when closed	Damaged or worn seat (bonded) on sleeve (5)	Replace the sleeve.
Nose seal leakage	Damaged or worn nose seal (3)	Replace the nose seal.
Leakage past sleeve	Damaged or worn packing (6)	Replace the packing.
Leakage around operating handle shaft	Damaged or worn packing (15)	Replace the packing.

## SPECIAL TOOLS

### 1. General

Refer to Table 3 for the special tools recommended for maintenance of the coupler. Equivalent tools may be substituted for the items listed.

Table 3. Recommended Special Tools

PART NUMBER	DESCRIPTION	APPLICATION
2702058	Adapter (API RP1004)	To drain the coupler/hose before removal.

## DISASSEMBLY

### 1. Replacement Parts Kits

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

### 2. Disassembling the Coupler

- A. Using an API-style adapter (PN 2702058, or equivalent) without a poppet, release the locking lugs (24) and drain the product.
- B. Unbolt the coupler from the adapter or hose connection. Remove the API-style adapter from the coupler.
- C. Manually release the locking lugs (24). The sleeve assembly (2) should slide forward.
- D. Rotate the operating handle (10) to its OPEN position to release the spring force on the sleeve assembly (5).

**WARNING: THE SLEEVE ASSEMBLY IS SPRING-LOADED. BE CAREFUL WHEN RELEASING THE SPRING FORCE.**

- E. Remove the pin (23), the washer (20), the clevis pin (21) and to release the poppet (17). Remove the poppet from the coupler body (1).
- F. If the sleeve assembly (5) did not come out of the coupler body (1) when the poppet (17) was removed, place the coupler body face down and gently tap out the sleeve assembly from the inlet side. Remove the wave washers (7) from the coupler body.
- G. Pry the retainer (4) off of the sleeve assembly (5). Remove the nose seal (3) from the sleeve assembly. Remove the wiper (32) and the packing (6) from the sleeve assembly.
- H. Pull back on the bail arm (27), rotate the operating handle (10) to its CLOSED position, and loosen the setscrew (25) in the crank (16).
- I. Note the relative positions of the crank (16) and the links (18) for reassembly reference. Drive the pin (8) out of the coupler body (1). Remove the operating handle assembly from the coupler body (1).
- J. Drive the pin (11) out of the operating handle (10). Remove the operating handle, the washer (35), felt wiper (12), the bushing (13), the washers (14) and the packing (15) from the shaft (9).
- K. Remove the cotter pin (34), the washer (20) and the clevis pin (21) from the crank (16) and the links (18).
- L. Remove the cotter pins (28) to remove the bail arm (27) from the bail.

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- M. Remove the retaining rings (33), the pins (30), the springs (31) and the washers (29) from the coupler body (1).
- N. Remove the bail (26) from the coupler body (1).
- O. Remove the shroud (2) and the wiper (19) from the coupler body (1).
- P. Remove the springs (22) and the locking lugs (24) from the coupler body (1).

## CLEANING

### 1. Cleaning Materials

Refer to Table 4 for recommended cleaning materials. Suitable equivalent cleaning materials may be substituted for the items listed.

Table 4. Recommended Cleaning Materials

DESCRIPTION	SPECIFICATION	SOURCE
Brush, Bristle, stiff, nonmetallic	--	Commercially available
Dry Cleaning Solvent	P-D-680, Type 2	Commercially available
Pick, Teflon	--	Commercially available
Plastic Bags	--	Commercially available
Tissues, lint-free	--	Commercially available

### 2. Cleaning Procedures

**WARNING:** DRY CLEANING SOLVENT IS FLAMMABLE AND TOXIC TO EYES, SKIN, AND RESPIRATORY TRACT. SKIN/EYE PROTECTION REQUIRED. AVOID REPEATED/PROLONGED CONTACT. USE ONLY IN WELL VENTILATED AREAS. GOOD GENERAL VENTILATION IS NORMALLY ADEQUATE. KEEP AWAY FROM OPEN FLAMES OR OTHER IGNITION SOURCES.

- 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 obstructions from ports, grooves and passages.

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

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**WARNING: WEAR EYE PROTECTION WHEN DRYING PARTS WITH COMPRESSED AIR. DO NOT DIRECT AIRSTREAM AT PERSONNEL OR LIGHT METAL PARTS.**

- B. Dry parts with clean lint-free tissues or clean, dry compressed air.
- C. Package clean parts in plastic bags.

## **INSPECTION**

### **1. General**

- A. Under strong light and magnification, visually check all parts in accordance with the general criteria specified in paragraph 2 below.
- B. Repair minor damage in accordance with local directives. If damage is major or beyond simple repair, replace the part rather than attempt extensive repairs.

### **2. Component Checks (Refer to Table 5)**

Table 5. Component Checks

DESCRIPTION	CHECK CRITERIA
General	Visually check 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 that the ports, passages, recesses and sealing grooves are clean and unobstructed.  Check all sealing and seating surfaces for damage or corrosion that would affect sealing.
Nose Seal (3)	Check for any damage or excessive wear that would affect sealing.
Sleeve Assembly (5)	Check the bonded seal on the sleeve assembly for any damage or excessive wear that would affect sealing.
Clevis Pins (21)	There must not be any wear grooving from contact with the links (18).

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## **ASSEMBLY**

### **1. Replacement Parts Kits**

Refer to the **ILLUSTRATED PARTS LIST** section for recommended replacements parts information.

### **2. Assembly Materials**

Refer to Table 6 for recommended assembly materials. Suitable equivalent materials may be substituted for the items listed.

Table 6. Recommended Assembly Materials

DESCRIPTION	SPECIFICATION	SOURCE
Thread Locking Compound	Loctite, Grade 242	Commercially available
Petrolatum	–	Commercially available

### **3. Assembling the Coupler**

#### **A. Lubrication**

Prior to assembly, lightly lubricate all of the packings and seals with petrolatum.

#### **B. Assembly Procedure** (Refer to IPL Figure 1)

- 1) Refer to Figure 4 and install the springs (22) and the locking lugs (24) in the coupler body (1) as follows:

**NOTE:** Long nose pliers can be used to close the spring loop during installation of a spring in the body, but be careful to avoid damaging the spring. The wire should not be marked or scratched.

- a) Push the loop of the spring (22) into the hole in the body (1), with the two tangs resting on the top surface. Push the spring in as far as possible, so that the two tangs contact the body surface. The loop of the spring should be a tight press fit in the hole.
- b) Position the locking lug (24) in its groove of the body (1), spring anchor end inward to contact the ends of the two tangs of the spring (22). Lift and place the ends of the spring tangs into the groove of the locking lug. Press the locking lug inward and rotate it into position. Make sure that both of the spring tangs are still in their correct positions and that the locking lug rotates freely.

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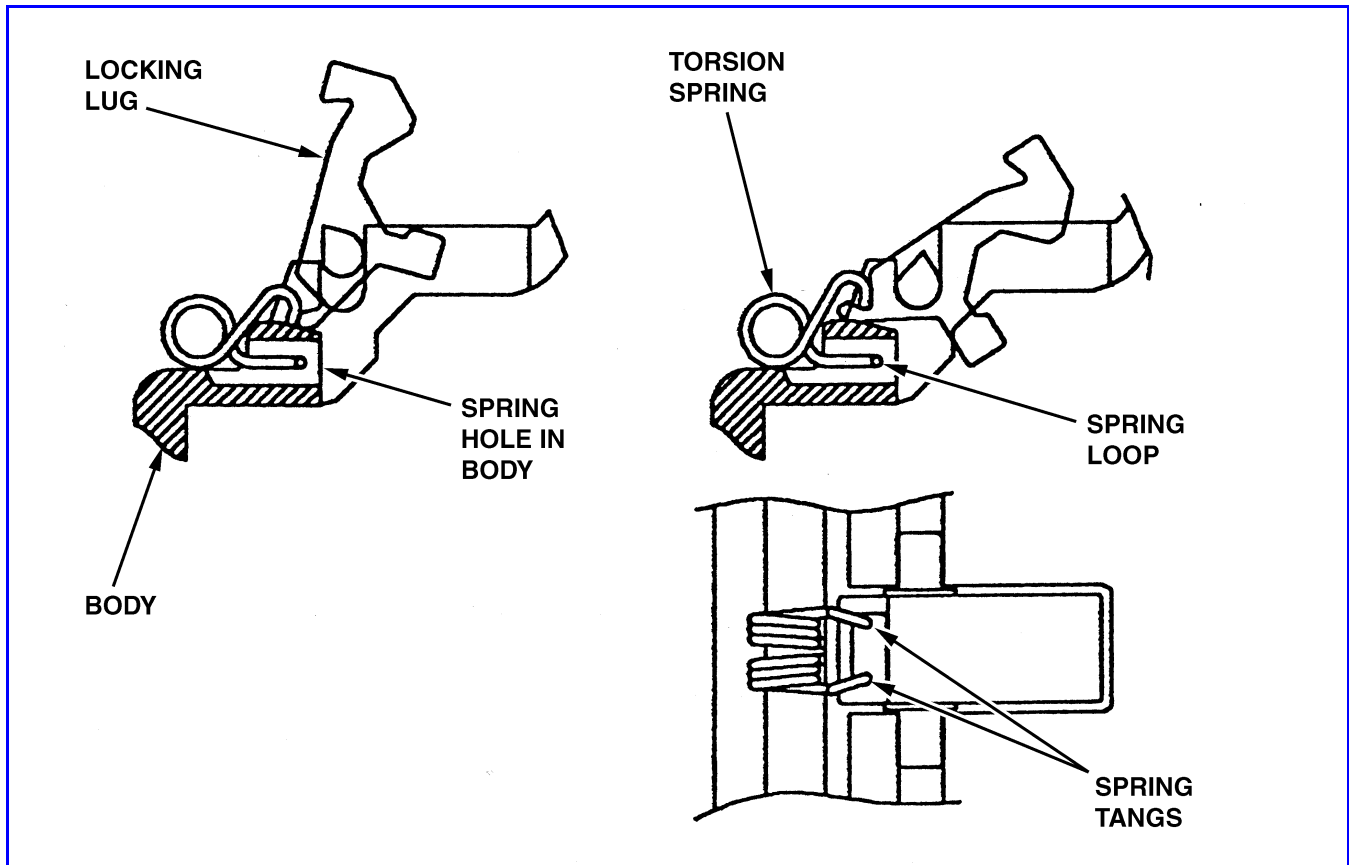


Figure 4. Installing the Springs and the Locking Lugs

- c) Repeat steps 1 and 2 above each of the remaining springs (22) and locking lugs (24).
- 4) Install the felt wiper (19) in the wiper groove of the shroud (2).
- 5) Put the coupler body (1) on the API-style adapter (PN 2702058, or equivalent) you used during disassembly of the coupler. Install the shroud (2) on the body.
- 6) Install the bail (26) on the coupler body (1).
- 7) Install the washers (29), the pins (30), the springs (31) and the retaining rings (33) on the coupler body (1).
- 8) Install the bail on (27) on the bail arm (26) and secure it with the cotter pins (28).
- 9) Install the links (18) on the crank (16) and secure them with the clevis pin (21), the washer (20) and the cotter pin (34).

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**CAUTION:** BEFORE INSTALLING THE PIN (11), MAKE SURE THAT ANY BURR CAUSED BY REMOVING IT DURING DISASSEMBLY HAS BEEN REMOVED. IF THE BURR IS NOT REMOVED, IT WILL DAMAGE THE PACKING (15) AND CAUSE LEAKAGE AROUND THE OPERATING HANDLE SHAFT DURING OPERATION.

- 10) Install the washers (14), the packing (15), the bushing (13) the felt wiper (12), the washer (35) and the operating handle (10) on the shaft (9). Secure the handle by installing the pin (11). The pin must be flush or below the surface of the handle.
- 11) Assemble the crank (16) (with the links) and the operating handle assembly in the coupler body (1).
- 12) Make sure that the operating handle and the links are oriented as shown in IPL Figure 1. Apply thread locking compound (Grade 242) to the threads of the setscrew (25). Install the setscrew in the crank (16) and tighten it securely to lock its position on the shaft (9).
- 13) Drive the pin (12) into the pin bore of the body (30) to secure the shaft assembly (items 13 through 18).
- 14) Install the nose seal (3) in the nose seal groove of the sleeve assembly (5) and secure it with the retainer (4). Install the wiper (32) and the packing (6) in the grooves of the sleeve assembly.
- 15) Install the wave washers (7), the sleeve assembly (5) and the poppet (17) in the coupler body. Connect the links (18) to the poppet by installing the clevis pin (21), the washer (20) and the cotter pin (23).
- 16) Rotate the operating handle to its OPEN and CLOSED positions several times to verify proper operation.
- 17) Rotate operating handle to its CLOSED position. Slide the shroud (2) toward the operating handle until the locking lugs (24) engage.

## ILLUSTRATED PARTS LIST

### 1. General

This section lists, describes, and illustrates all detail parts required for maintenance support of the Bottom Loading Coupler.

### 2. Scope of Information

A. 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.

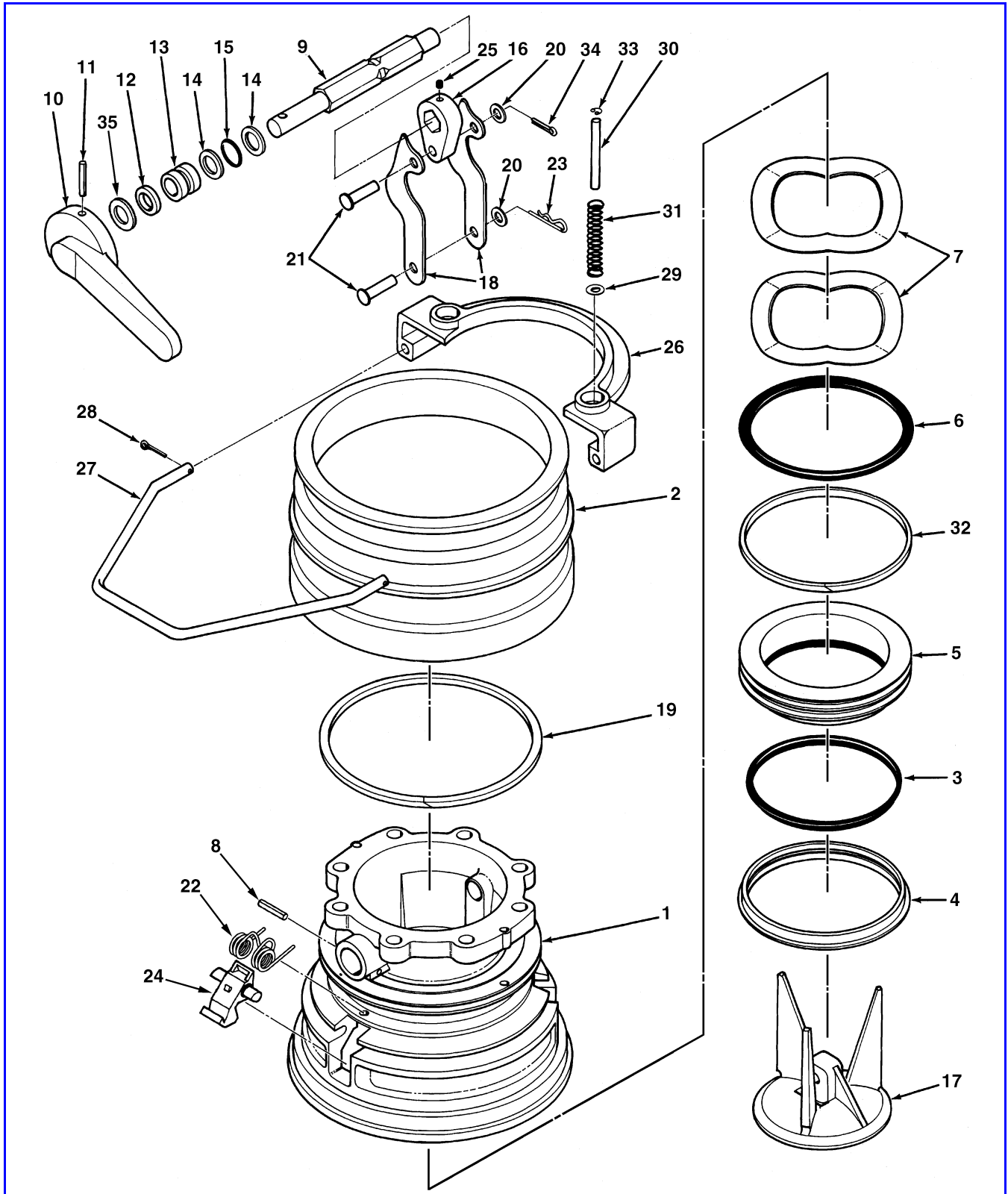
#### B. MODIFICATION CODE

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

#### C. Abbreviations

ASSY	Assembly.
FIG.	Figure.
IPL	Illustrated Parts List.
MOD	Modification.
NP	No longer available.

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IPL Figure 1. Bottom Loading Coupler

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FIG. ITEM	PART NUMBER	DESCRIPTION	MOD CODES	UNITS PER ASSY
1-	F228	COUPLER, BOTTOM LOADING		REF
1	2773209-101	• BODY, COUPLER		1
2	2773207-101	• SHROUD		1
2A	971027-101	• SHROUD (With stainless steel insert)	E	1
3	2672292-1	• SEAL, NOSE		1
3A	2672292-2	• SEAL, NOSE (Viton)	C	1
4	2672293	• RETAINER		1
5	2763489-101	• SLEEVE ASSEMBLY		1
5A	2763489-102	• SLEEVE ASSEMBLY (Viton)	C	1
6	2661058BD350	• PACKING, PREFORMED		1
6A	2661058AF350	• PACKING, PREFORMED (Viton)	C	1
7	W4997-050	• WASHER, WAVE		2
8	CMS171594	• PIN, SPRING		1
9	2763496-101	• SHAFT, HANDLE		1
10	2763484-101	• HANDLE, OPERATING		2
11	CMS171660	• PIN, SPRING		1
12	2763494-101	• WIPER		1
13	2763492-101	• BUSHING		1
14	2763493-101	• WASHER		2
15	2661058A207	• PACKING, PREFORMED		1
15A	2661058AF207	• PACKING, PREFORMED (Viton)	C	1
16	2733269-1	• CRANK		1
17	2763483-101	• POPPET		1
18	2763497-102	• LINK		2
19	CMS28932C20-8	• WIPER		1
20	CAN960-516L	• WASHER, FLAT		2
21	CMS20392-4C33	• PIN, CLEVIS		2
22	941016-101	• SPRING (See Service Bulletin 76)		3
	2763491-101	• SPRING (Replaced by PN 941016-101)		NP
23	98335A054	• PIN, STRAIGHT		1
24	2763487-101	• LUG, LOCKING		3
25	LP565A428H4	• SETSCREW		1
26	2773211-101	• BAIL		1
27	2773212-101	• ARM, BAIL		1
28	CMS24665-210	• PIN, COTTER		2
29	CAN960-416L	• WASHER, FLAT		2
30	2773214-101	• PIN		2
31	LC042E17	• SPRING, COMPRESSION		2
32	CMS28932C15-5	• WIPER		1
33	CMS16625-1025	• PIN, SPRING		2
34	CMS24665-300	• PIN, COTTER		1
35	CAN960-916L	• WASHER, FLAT		1

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<b>REPLACEMENT PARTS KITS AVAILABLE</b>		
<b>KIT PART NUMBER</b>	<b>DESCRIPTION</b>	<b>ITEMS IN KIT (IPL Figure 1)</b>
KITF228-102	Standard (Buna-N) Seals	3, 6, 15
KITF228-103	Standard (Buna-N) Overhaul	3, 5, 6, 8, 11, 12, 13, 15, 19, 21, 23, 25, 28, 30, 33
KITF228-104	Viton Conversion	3A, 5A, 6A, 15A
KITF228-106	Viton Overhaul	3A, 5A, 6A, 8, 15A 11, 12, 13, 19, 21, 23, 25, 28, 30, 33
KITF228-107	Viton Seals	3A, 6A, 15A