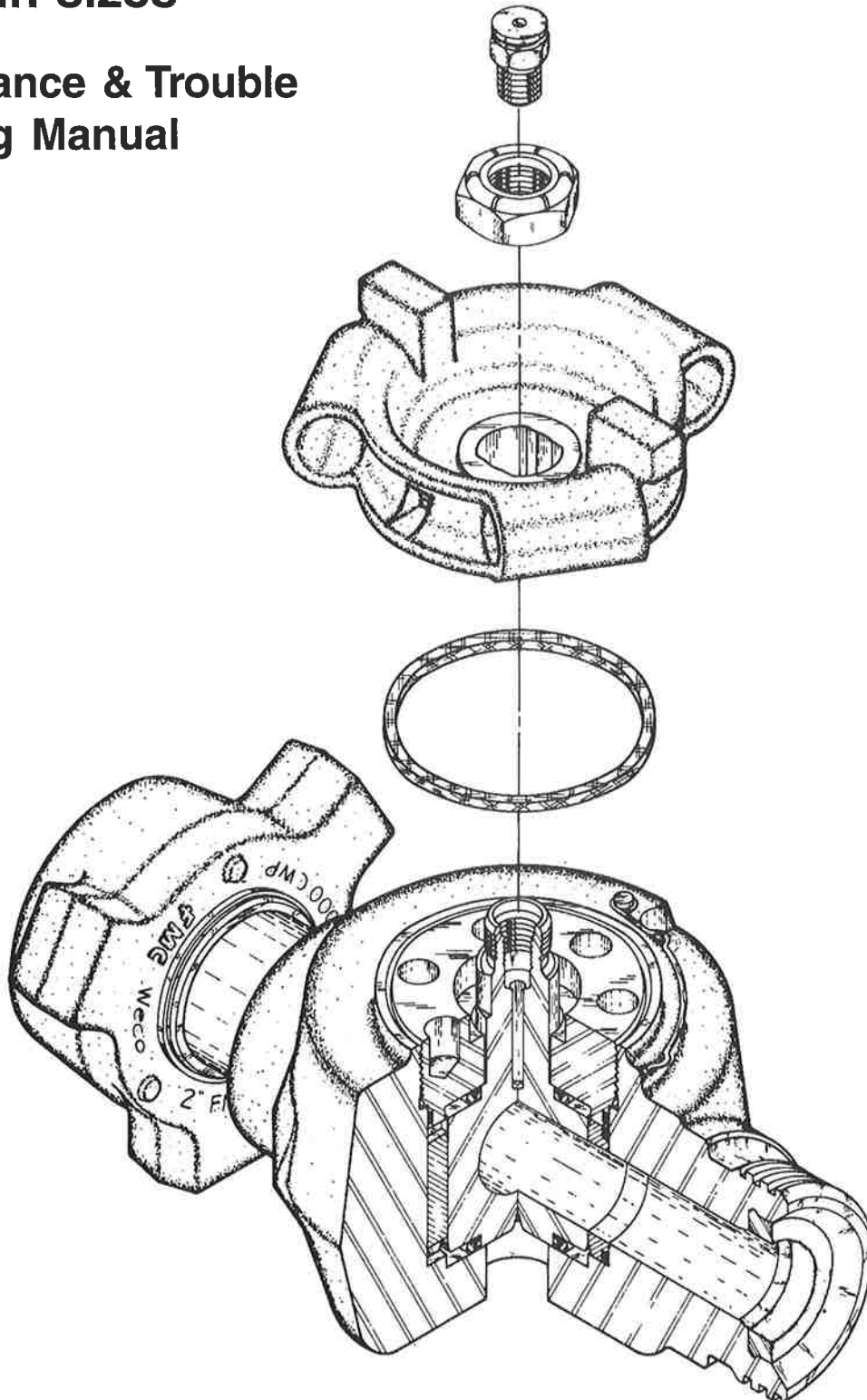


Weco[®] Plug Valves

Models DR50, DR100, DR150, DR200
1- to 3-in sizes

Maintenance & Trouble
Shooting Manual



Warnings and Safety Instructions

FMC cannot anticipate all of the situations a user may encounter while installing and using FMC products. Therefore, the user of FMC products **MUST** know and follow all applicable industry specifications on the safe installation and use of these products. Refer to FMC product catalogues, product brochures and installation, operating and maintenance manuals for additional product safety information or contact FMC at 800/772-8582.



WARNING: FAILURE TO FOLLOW THESE WARNINGS COULD RESULT IN SERIOUS INJURY OR DEATH!

1. Do not mix or assemble components, parts or end connections with different pressure ratings. Mismatched parts may fail under pressure.
2. Do not use or substitute non FMC components or parts in FMC products and assemblies.
3. Do not strike, tighten or loosen pressurized components or connections.
4. Do not exceed the rated working pressure of the product.
5. Complete and proper make-up of components and connections is required to attain rated working pressure.
6. Do not use severely worn, eroded or corroded products. Contact FMC for more information on how to identify the limits of erosion and corrosion.
7. Follow safe practices when using products in overhead applications. Products not properly secured could fall.
8. Select only appropriate product and materials for the intended service:
 - Do not expose standard service products to sour gas fluids. (Refer to NACE MR0175). Do not interchange sour gas with standard service components.
 - Use appropriate safety precautions when working with ferrous products in below freezing temperatures. Freezing temperatures lower the impact strength of ferrous materials.
9. Follow manufacturers instructions and Material Safety Data Sheet directions when using solvents.
10. Make certain that personnel and facilities are protected from residual hazardous fluids before disassembly of any product.
11. If any leakage is detected from FMC products, remove them from service immediately to prevent potential damage and personal injury.

SAFETY INSTRUCTIONS: The applications of FMC products are in working environments where general personnel safety procedures and policies **MUST** be followed. Always use appropriate protective equipment in high pressure, extreme temperature or severe service applications.

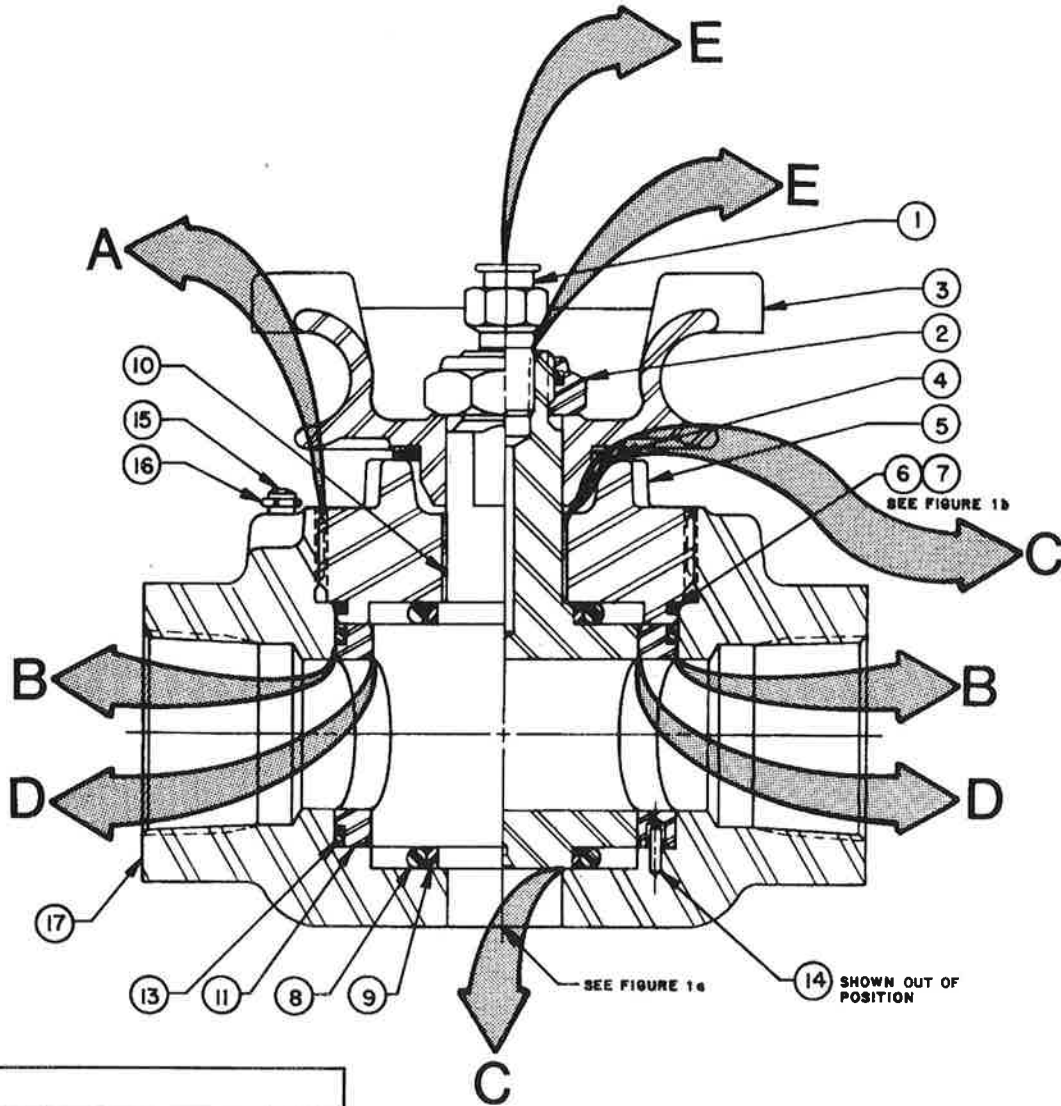
RECOMMENDED ROUTINE MAINTENANCE

1. Grease valves after each use with FMC approved Plug Valve grease.
 - Between 32°F and 250°F use Weco® plug valve lubricant and sealant No. 3256666.
 - Between -20°F and 50°F use Weco® plug valve lubricant and sealant No. 3251968.

NOTE: Consult factory for approval of alternate grease.

 - a. Grease valve in open position until grease can be seen through the bore of the valve.
 - b. Cycle valve closed to open and pump a little more grease into valve while valve is in the open position.
 - c. If valve is in line, grease valve a moderate amount until maximum grease pressure is attained during greasing, then cycle valve and re-grease.
2. Regrease valves immediately after pumping solvents through them.
3. Thoroughly flush valves with clean water after each use to wash away any cement or acids that may have been left in the valve (where applicable).
4. Spray rust preventative oil over exposed threads on valve to prevent rusting during storage.
5. Replace grease fittings that become damaged to prevent leaks and to allow proper greasing of the valve.
6. Disassemble plug valves and replace worn parts on a routine basis to prevent corrosion and erosion of the valve body and remove old grease.

NOTE: Typical grease gun pressures attained during greasing of valve range from 6,000 PSI to 20,000 PSI.



ITEM	QTY	DESCRIPTION
1	1	FITTING: GREASE
2	1	NUT: LOCK, HEX
3	1	PLUG CAP:
4	1	GREASE RETAINER RING:
5	1	BODY CAP:
6	1	BACK-UP RING: (2" DR150, ONLY)
7	1	O-RING:
8	2	O-RING: PLUG STEM SEAL
9	2	PACKING: F/PLUG STEM SEAL
10	1	PLUG:
11	2	SEAL SEGMENT:
12	2	SIDE SEGMENT: (NOT SHOWN)
13	2	SEAL: F/SEAL SEGMENT
14	2	PIN: DRIVE
15	2	PIN: GROOVE-PIN
16	1	SPRING: DETENT
17	1	BODY:

Figure 1

POSSIBLE LEAK PATHS

- A** LEAK AT BODY CAP THREADS
- B** LEAK BETWEEN SEAL SEGMENT & BODY
- C** LEAK AT TOP OR BOTTOM OF VALVE PAST PLUG STEM SEALS
- D** LEAK BETWEEN SEAL SEGMENT & PLUG
- E** LEAK AT GREASE FITTING

TROUBLE SHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	RECOMMENDED REPAIR
<p>Leak at body cap threads. Fig. 1 leak path "A"</p>	<p>Damaged body cap o-ring. Incorrect installation of backup ring (where applicable)</p>	<p>Remove body cap. Replace cap o-ring and backup ring*. Verify the backup ring is installed with the concave side toward the o-ring*. The o-ring should be located in the groove furthest from the threads*. Fully grease and pressure test the valve to full working pressure prior to returning to service. (* if applicable)</p>
	<p>Dents or deep scratches in the body cavity, body cap seal area</p>	<p>Disassemble valve. Inspect body cavity for scratches, dents or corrosion in the body cap sealing area. Repair minor scratches and corrosion with 400 grit WETORDRY. Deep dents or gouges may require the body to be replaced. Fully grease and pressure test the valve to full working pressure prior to returning to service.</p>
<p>Leak between seal segment and body. Fig 1 leak path "B"</p>	<p>Contamination between the seal segment and body</p>	<p>Cycle valve open and close several times. Fully grease valve and cycle several more times.</p>
	<p>Damaged or aged seal segment face seals</p>	<p>Disassemble valve. Replace seal segment face seals. Fully grease and pressure test the valve to full working pressure prior to returning to service.</p>
	<p>Damaged seal segment seal area due to scratches, corrosion or erosion</p>	<p>Disassemble valve. Inspect the seal segment for scratches, dents or corrosion of the OD sealing area and seal grooves. Repair minor scratches and corrosion with 400 grit WETORDRY. Deep dents or gouges may require the seal segment to be replaced. Fully grease and pressure test the valve to full working pressure prior to returning to service.</p>
	<p>Damaged body seal segment sealing surface due to scratches, corrosion or erosion</p>	<p>Disassemble valve. Inspect the body to seal segment seal area for scratches, dents or corrosion. Repair minor scratches and corrosion with 400 grit WETORDRY. Deep dents or gouges may require the body to be replaced. Fully grease and pressure test the valve to full working pressure prior to returning to service.</p>

PROBLEM	POSSIBLE CAUSE	RECOMMENDED REPAIR
<p>Leak at top or bottom of valve past plug stem seals. Fig. 1 leak path "C"</p>	<p>Damaged plug o-rings or backups</p>	<p>Disassemble valve. Inspect the plug o-rings and backup rings for age cracks or damage. Replace any damaged o-rings or backups. Fully grease and pressure test the valve to full working pressure prior to returning to service.</p>
	<p>Damaged or contaminated plug to body cap seal surfaces.</p>	<p>Disassemble valve. Inspect the plug to body cap seal area for scratches, dents or corrosion. Repair minor scratches and corrosion with 400 grit WETORDRY. Deep dents or gouges may require the plug or body cap to be replaced. Fully grease and pressure test the valve to full working pressure prior to returning to service.</p>
	<p>Damaged or contaminated body to plug seal surfaces.</p>	<p>Disassemble valve. Inspect the body seal area for scratches, dents or corrosion. Repair minor scratches and corrosion with 400 grit WETORDRY. Deep dents or gouges may require the body to be replaced. Fully grease and pressure test the valve to full working pressure prior to returning to service.</p>
<p>Leak between seal segment and plug. Fig. 1 leak path "D"</p>	<p>Damaged seal segment due to scratches, corrosion or erosion</p>	<p>Disassemble valve. Inspect the seal segment for scratches, dents or corrosion on the I.D. sealing area. Repair minor scratches and corrosion with 400 grit WETORDRY. Because this is a metal seal surface it is sensitive to surface defects. Deep dents or gouges require the seal segments to be replaced. Fully grease and pressure test the valve to full working pressure prior to returning to service.</p>
	<p>Damaged plug sealing surface due to scratches, corrosion, erosion, chipped or damaged plating</p>	<p>Disassemble valve. Inspect the plug for scratches, dents or corrosion in the sealing area. Repair minor scratches and corrosion with 400 grit WETORDRY. Because this is a metal seal surface it is sensitive to surface defects. Deep dents or gouges require the plug to be replaced. Fully grease and pressure test the valve to full working pressure prior to returning to service.</p>

PROBLEM	POSSIBLE CAUSE	RECOMMENDED REPAIR
Leak at grease fitting. Fig 1 leak path "E"	Loose grease fitting	Relieve line pressure and tighten grease fitting. Fully grease and pressure test the valve to full working pressure prior to returning to service.
	Damaged or contaminated grease fitting	Relieve line pressure and remove grease fitting and replace with a new grease fitting using Teflon tape on threads. Fully grease and pressure test the valve to full working pressure prior to returning to service.
	Damaged or contaminated grease fitting threads	Relieve line pressure and remove grease fitting. Clean and inspect threads. If threads are intact wrap grease fitting threads with new Teflon tape and install back in the body. If threads are damaged replace the grease fitting with a new grease fitting using Teflon tape on threads. Fully grease and pressure test the valve to full working pressure prior to returning to service.
	Damaged plug grease fitting threads	Relieve line pressure and remove grease fitting. Clean and inspect plug threads. If threads are intact replace the Teflon tape on the grease fitting and install in the body. If threads are damaged replace the plug and grease fitting. Fully grease and pressure test the valve to full working pressure prior to returning to service.

DISASSEMBLY AND REPAIR

Tools Required:

- Body Cap Wrench
- 400 grit sandpaper
- Soft face mallet

Disassembly



WARNING: REMOVE ALL PRESSURE FROM THE SYSTEM AND VALVE BEFORE BEGINNING ANY MAINTENANCE.

1. Remove plug cap or actuator/operator and mounting bracket.
2. Using the appropriate body cap wrench, remove body cap.

NOTE: If the top of the plug is threaded, the body cap wrench can be held in place using a large washer and lock nut.

3. Remove plug by lifting while twisting it back and forth with the wrench.

NOTE: If necessary, hammer plug out using a punch placed through the bottom hole in the valve body (fig. 1A). Be careful not to damage plug.

4. Remove side segments by prying them away from body cavity wall.
5. Remove seal segments.

NOTE: If seal segments must be pried loose, be careful not to score or dent body cavity wall.

6. Remove grease fittings and seals.

NOTE: Do not soak elastomeric seals in solvents.

7. Remove grease from all valve components.

NOTE: Some solvents and some detergent solutions will soften or partially dissolve the grease, allowing it to be wiped away with a rag.

Repair

1. After degreasing parts, visually inspect them for wear and corrosion.

NOTE: The portions of the body cavity that are contacted by the segment seals, plug, and lower and upper stem seals must be smooth.

2. Use sandpaper to remove dents and rust from side segments and rust from center portion of seal segments that contact the body. Sandpaper rust from body surfaces touching center portion of seal segments.
3. Using 400 grit sandpaper, clean all other seal surfaces.

IMPORTANT: Parts with sealing surfaces that cannot be made smooth should be replaced

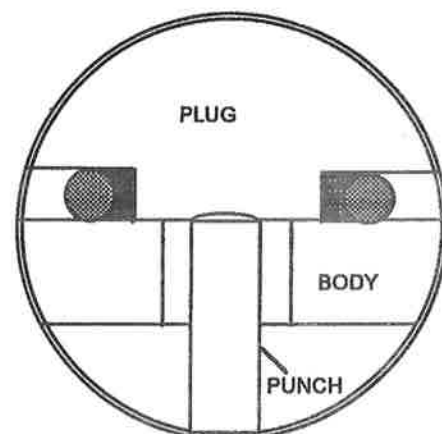


Figure 1A

ASSEMBLY

1. Visually inspect all new and used parts and remove all dirt and rust.
2. Apply a very thin film of plug valve grease to surface of seal segments that contact the body cavity and to matching surface inside body cavity.
3. Install segment seals in seal segment grooves and install both seal segments in valve body.
4. Apply a liberal amount of plug valve grease to exposed surface of seal segments and to exposed portion of body cavity which will contact side segments.
5. On valves with grease fitting in plug, install grease fitting into plug and pump grease into plug until clean grease exits grease passage. (Tighten 3/8-inch NPT fitting to 50-60 ft-lbs, 1/2-inch NPT fittings to 80-90 ft-lbs.)
6. Apply liberal amount of plug valve grease to outside diameter of plug.
7. Place plug stem seals and nylon packing on top and bottom of plug.
8. Apply liberal amount of plug valve grease to side segments and install the segments so that half their height remains above the top of the body cavity.
9. Install plug using the side segments as a guide.

NOTE: Apply firm pressure to plug after aligning chamfers on the plug and seal segments. After the plug is partially installed by hand, a soft face mallet may be used to drive plug the remaining distance into the valve.

CAUTION: Hammering plug before it is properly started will chip leading edge of plug and score seal segments.

10. Inspect segment seals to make sure they are still in the seal segment grooves.

NOTE: Too much grease between the seal segments and body will cause the segments to pop out of their grooves. If a seal pops out, remove plug and some of the grease behind seal segment. Reinstall plug.

11. Push side segments into body cavity until they touch bottom.

12. Install o-ring on body cap.

NOTE: O-ring should fit firmly in groove in body cap. Swelled or stretched o-rings should be replaced. On 2-inch DR150 valves, install the backup ring above the o-ring with its concave surface touching the o-ring (fig. 1B).

13. Remove excess grease and any foreign particles from body cap shoulder area of body.

14. Apply antiseize compound to body cap threads and install body cap into body.

15. Replace plug cap and tighten stop nut until snug.

16. If valve has an actuator or operator instead of a plug cap, bolt it back on valve and make sure valve fully opens and closes. Adjust limit stops if necessary.

17. Regrease valve in open position until grease flows into through bore.

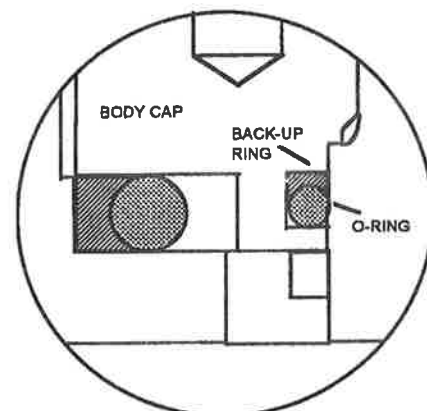
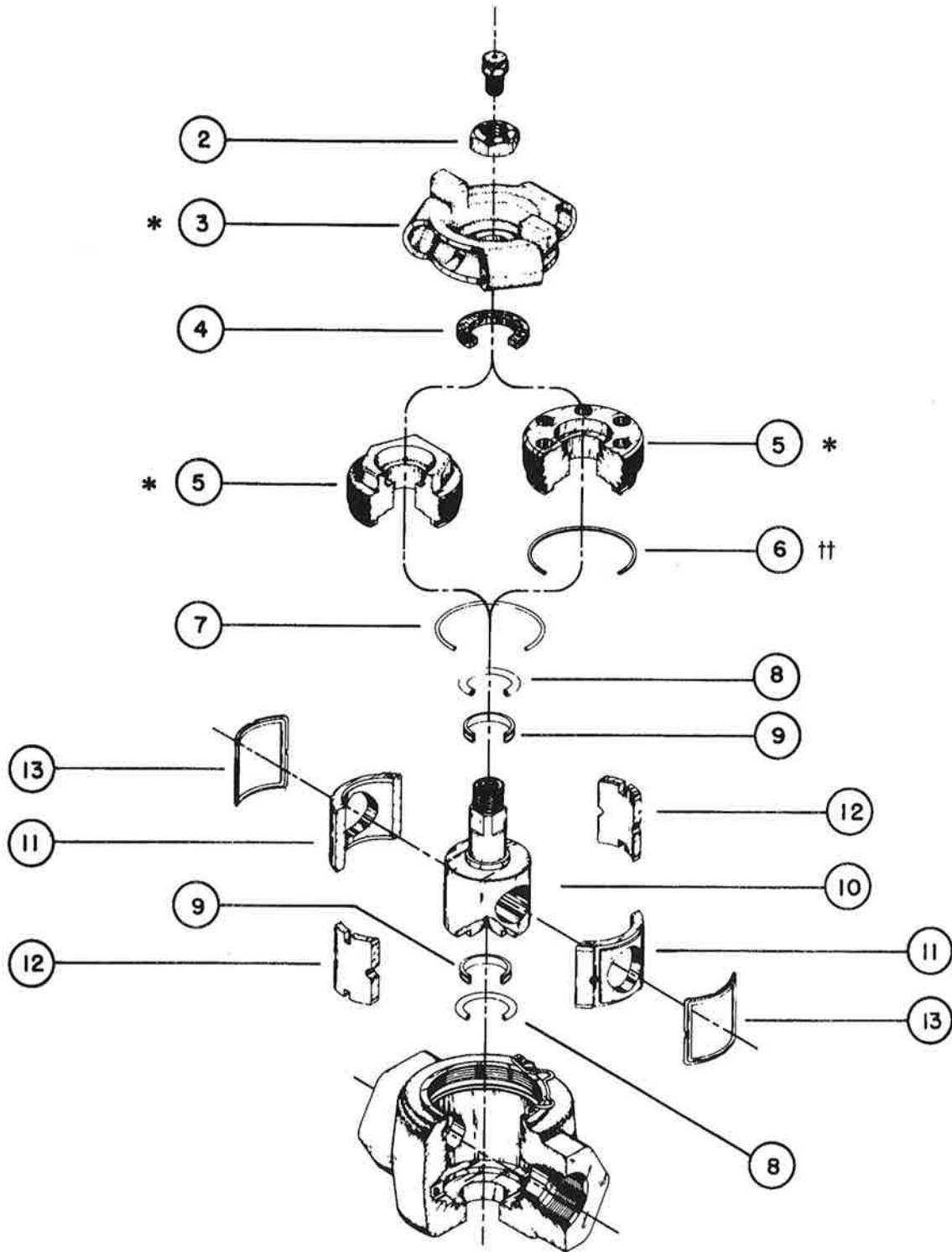


Figure 1B

PLUG VALVE REPLACEMENT PART



Item Number	Part Name	Number Required	1" DR50, 1" & 1" x 2" DR150	1" & 1" x 2" DR150 Sour Gas	1" x 2" DR150 w/Plug Lock	1" DR150-200 .38 Bore
	Repair Kit		3208507	3256745	3221802	3231666
1'	Grease Fitting	1	3226457	3262409	CF	CF
2	Nut: Lock, Hex	1	3226654	3226654		3226654
3'	Plug Cap	1	3217019	3217019	3217019	3223399
4	Grs Retainer Ring	1	3230039	3230039	3230039	3235985
5'	Body Cap	1	3248654	3252283	3248654	3223401
6	Back-Up Ring					
7	O-Ring	1	3226703	3233600	3226703	3226703
8	O-Ring /Plug	2	3226712	3233676	3226712 ³	3226712
9	Packing	2	3217027	3217027	3217027 ³	3217027
10	Plug	1	3261403	3261403	3261403	3261404
11	Seal Segment	2	3217023	3247509	3217023	3224677
12	Side Segment	2	3261456	3261456	3261456	3261456
13	Seal	2	3217024	3233071	3217024	3217024

Item Number	Part Name	Number Required	1-1/2" DR150	2" DR50 & DR100	2" DR150	2" DR150 Sour Gas
	Repair Kit		3255093	3208508	3208508	3248745
1'	Grease Fitting	1	3226457	3226457	3226457	3256539 ⁴
2	Nut: Lock, Hex	1	3226656	3226656	3226656	3226656
3'	Plug Cap	1	3217003	3217003	3247198	3247198
4	Grs Retainer Ring	1	3230039	3230039	3235174	3235174
5'	Body Cap	1	3255047	3248616	3247522	3248715
6 ²	Back-Up Ring	1			3255223	3255628
7	O-Ring	1	3255092	3226706	3226706	3233599
8	O-Ring /Plug	2	3217008	3217008	3217008	3237995
9	Packing	2	3217010	3217010	3217010	3217010
10	Plug	1	3255046	3261405	3261405	3261405
11	Seal Segment	2	3255043	3217007	3217007	3248809
12	Side Segment	2	3261454	3261457	3261457	3261457
13	Seal	2	3255811	3217011	3217011	3251527

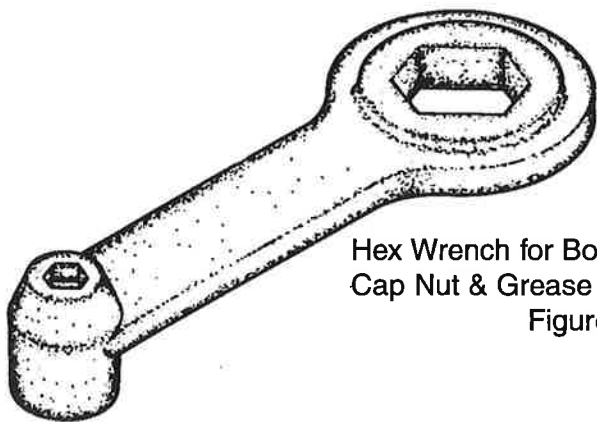
Item Number	Part Name	Number Required	2" DR200 1.3 Bore	2" DR200 Sour Gas	2-1/2" DR50	3" DR50
	Repair Kit		3231667	3237634	3208509	3208510
1'	Grease Fitting	1	3228137 ¹	3256539 ⁴	3226457	3226457
2	Nut: Lock, Hex	1	3228139	3228139	3226656	3226655
3'	Plug Cap	1	3222903	3222903	3217045	CF
4	Grs Retainer Ring	1	3235174	3235175	3230039	3230018
5'	Body Cap	1	3223036	3234204	3248768	CF
6	Back-Up Ring					
7	O-Ring	1	3226706	3233599	3226708	3226710
8	O-Ring /Plug	2	3226717	3233601	3217008	3217026
9	Packing	2	3222904	3222904	3217010	3217041
10	Plug	1	3260852	3260852	3217046	3260706
11	Seal Segment	2	3222906	3253270	3217048	3217037
12	Side Segment	2	3261457	3261457	3261463	3261458
13	Seal	2	3217011	3251527	3217050	3217038

CF = Consult Factory

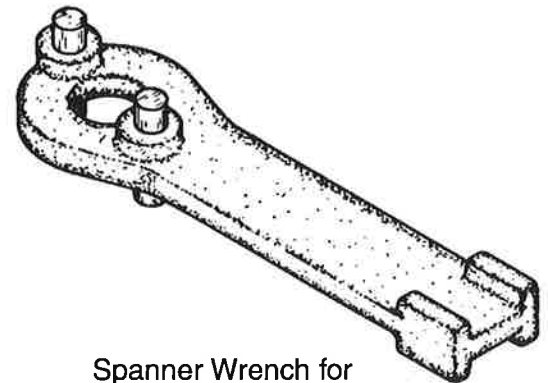
- Not included in repair kit or replacement set.
- For use ONLY with 2" DR150 with acme threaded body and cap.
- For 1" x 2" DR150 with plug lock ONLY, repair kit consists of one o-ring and packing part number as given plus o-ring (3226713) and thrusting ring (3221799) for top of plug.
- Quantity of 2 required.

TOOLS

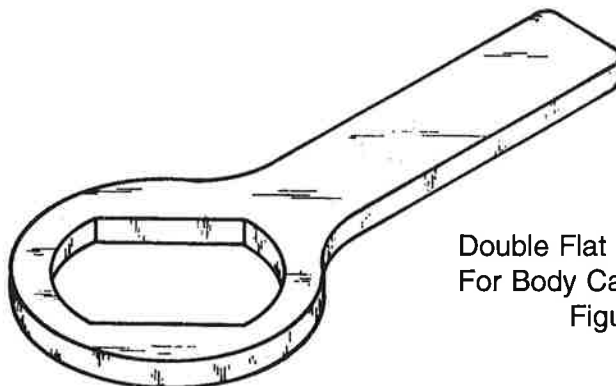
3236521	Wrench 1" & 1" x 2" DR50 & 150 Body Cap, Plug Cap Nut, Grease Fitting	(See Fig. 2)
3236522	Wrench 1½" DR150 & 2" DR50-100 Body Cap, Plug Cap Nut, Grease Fitting	(See Fig. 2)
3222907	Wrench 1½" DR200 & 2" DR150-200 Body Cap Only	(See Fig. 3)
3220778	Wrench 2½" DR50-100	(See Fig. 4)
3251654	Wrench 3" DR50-150 Body Cap Only	(See Fig. 3)
3256567	Wrench 1" DR200 Body Cap Only	
3251969	Hi-pressure Grease Gun with Pressure Gage (Uses "K" size sticks of grease)	
3251970	Grease Gun Head and Handle assembly	
3251971	Giant Button Head Coupler	
3251972	Giant Button Head to Vent Cap Adapter	



Hex Wrench for Body Cap, Plug
Cap Nut & Grease Ftg.
Figure 2



Spanner Wrench for
Body Cap Only
Figure 3



Double Flat Box Wrench
For Body Cap Only
Figure 4

PLUG VALVE GREASE FITTINGS

GIANT BUTTON HEAD GREASE FITTING (See Fig. 5)

Std. Service, 3/8 NPT3226457

VENT CAP GREASE FITTING (See Fig. 6)

Std. Service, 3/8 NPT3262408

1/2 NPT3262410

Sour Gas Service, 3/8 NPT3262409

1/2 NPT3262470

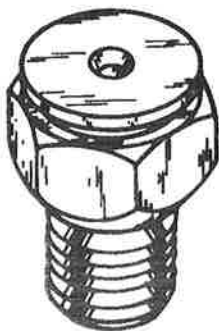
PIPE PLUG

Std. Service, 3/8 NPT3226474

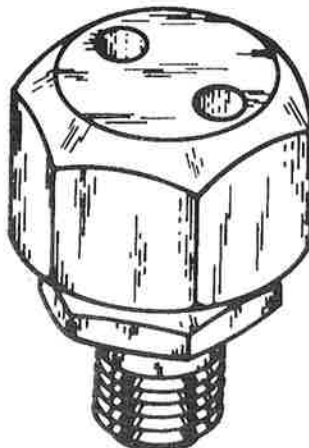
SPECIAL HEX DRIVE GREASE FITTING (See Fig. 7)

Std. Service, 3/8 NPT3214313

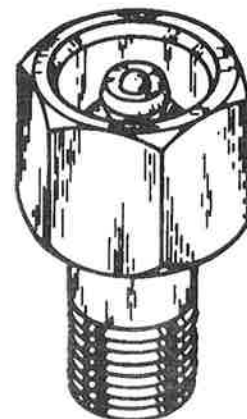
- NOTES:
- (1) Torque 3/8 NPT fittings to 50-60 ft-lbs.
 - (2) Torque 1/2 NPT fittings to 80-90 ft-lbs.
 - (3) Use vent cap fittings for all sour gas service, and all Mod 200 plug valves.



Giant Button Head
Figure 5



Vent Cap
Figure 6



Special Hex Drive
Figure 7

BODY CAP TORQUE

SIZE	SERVICE	MIN (FT-LBS)	MAX (FT-LBS)
1" DR50	STANDARD	800	2,200
1" DR150	SOUR GAS	1,000	2,700
1" DR150	STANDARD	1,000	3,500
1" DR200	STANDARD	1,000	4,800
1-1/2" DR150	STANDARD	1,000	4,400
2" DR50	STANDARD	1,000	5,200
2" DR100	STANDARD	1,000	5,500
2" DR150	SOUR GAS	1,500	5,900
2" DR150	STANDARD	1,500	7,000
2" DR200	SOUR GAS	2,000	5,900
2" DR200	STANDARD	2,000	7,000
2-1/2" DR50	STANDARD	1,500	7,800
3" DR50	STANDARD	2,500	10,000
3" DR100	SOUR GAS	2,500	10,800
3" DR100	STANDARD	2,500	12,900
3" DR150	STANDARD	3,000	23,000

NOTES



FMC Corporation
Fluid Control Division

Fluid Control Headquarters

FMC Fluid Control Division
6677 North Gessner Road
Houston, Texas 77040
Phone: 713/510-6800
Fax: 713/510-6803
E-mail: fluid_control@fmc.com
http://www.fmc.com/Eteg/

Manufacturing Facility

FMC Fluid Control Division
2825 West Washington
P.O. Box 1377
Stephenville, Texas 76401
Phone: 254/968-2181
Toll Free: 1-800-772-8582 (U.S.A.)
Fax: 254/968-5709

Louisiana

FMC Fluid Control Division
130 St. Nazaire Road
Box 51709
Broussard, Louisiana 70518
Phone: 318/837-9263
Fax: 318/837-5844

Rocky Mountains

FMC Fluid Control Division
1675 Broadway, Suite 1800
Denver, Colorado 80202
Phone: 303/623-4622
Fax: 303/623-7347

Alaska

FMC Fluid Control Division
700 W. International Airport Road
Building A-1
Anchorage, Alaska 99518
Phone: 907/563-3990
Fax: 907/563-5810

Scotland

FMC Corporation (U.K.) Ltd.
Wellington Circle
Aberdeen AB12 3JG
Scotland
Phone: (44) 1224/898-555
Fax: (44) 1224/249-460

The Netherlands

FMC Fluid Control (Nederland) B.V.
Europalaan 16
Box 757
2499 AT, Alphen a/d Rijn
The Netherlands
Phone: (31) 172/470-024
Fax: (31) 172/470-026

France

FMC Europe S.A.
Z.I. Molina LaChazotte
810 Rue George Sand
42350 La Talaudiere, France
Phone: (33) 4/7747-5015
Fax: (33) 4/7747-5014

Singapore

FMC Southeast Asia Pte. Ltd.
149 Gul Circle
Singapore 629605
Phone: (65) 862-3659
Fax: (65) 861-8251

United Arab Emirates

FMC International S.A.
Al Moosa Tower, 17th Floor
Box 3228
Dubai, United Arab Emirates
Phone: (971) 4/310-948
Fax: (971) 4/310-950

Venezuela

FMC Fluid Control de Venezuela, S.A.
Avenida Intercomunal
Frente Carretera "L"
Los Morochas, Estado Zulia
Venezuela
Phone: (58) 65/26901
Fax: (58) 65/23406