

MR 22

DEALER  
MANUAL

# FIRST STAGE

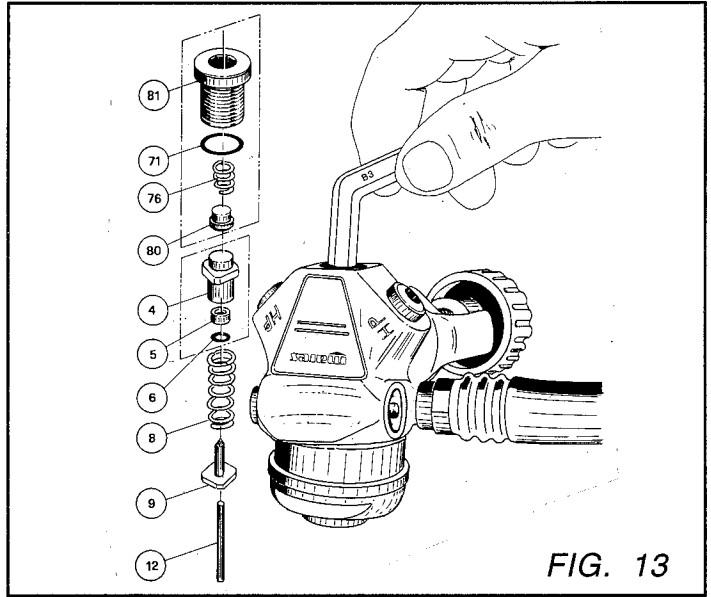
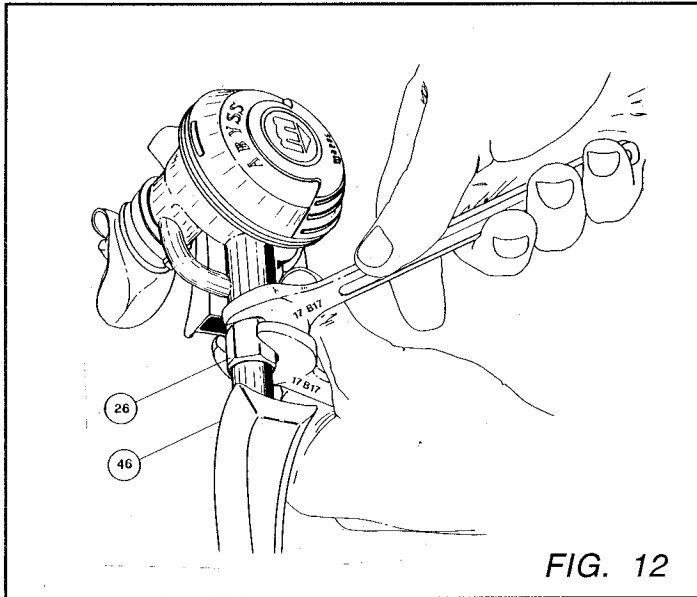


**mares**<sup>®</sup>

## □ MR 22 FIRST STAGE SERVICE

### • Disassembly

1. Remove all hoses from the first stage except the hose attached to the DFC port (port equipped with depressor) and replace with port plugs.
2. Remove the hose protector (46) using two wrenches (B17) unscrew the hose (26) from the second stage (Fig 12).



3. Remove the first stage cover (81-71-76-80) using hex wrench (B3) (Fig. 13).

### NOTE

**THERE WILL BE LIGHT SPRING TENSION AGAINST THE FIRST STAGE COVER. MAINTAIN A LIGHT GRIP ON THE FIRST STAGE COVER DURING REMOVAL.**

4. Remove locking head (80) and spring (76) from the first stage cover.
5. Remove poppet retainer assembly (4-5-6), spring (8), poppet (9) and poppet pin (12) from the first stage body (Fig. 13).
6. Remove o-ring (6) from poppet retainer.
7. Remove backup ring (5) from poppet retainer.
8. Place tool (B21) over the first stage poppet seat (75). While maintaining light pressure against the tool, pressurize the second stage hose with low pressure air (below 100 psi) (Fig. 14).

### NOTE

**WHEN THE POPPET SEAT IS DISPLACED BY THE LOW PRESSURE AIR, GRADUALLY DECREASE PRESSURE ON TOOL (B21).**



### WARNING

**NEVER ATTEMPT TO REMOVE THE POPPET SEAT WITH POINTED OR SHARP TOOLS. ANY SCRATCHES ON THE SURFACE OF THE POPPET SEAT MAY IMPAIR OPERATION. THE USE OF HIGH PRESSURE AIR (OVER 100 PSI) COULD CAUSE PARTS TO BE EXPELLED FROM THE REGULATOR. ALWAYS POINT THE REGULATOR AWAY FROM YOURSELF OR ANYONE ELSE WHILE REMOVING THE POPPET SEAT WITH PRESSURIZED AIR.**

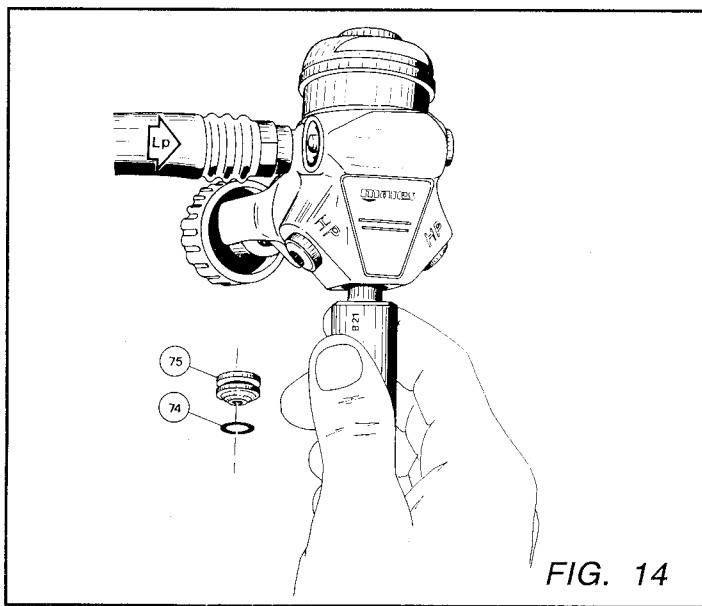


FIG. 14

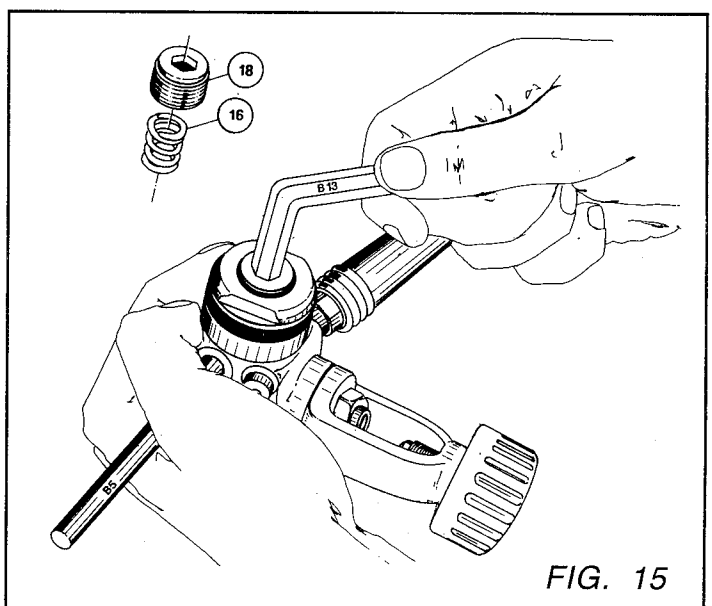


FIG. 15

9. Remove the poppet seat (75) from first stage.
10. Remove o-ring (74) from poppet seat.
11. Reinstall the first stage cover (81) and o-ring (71) into the first stage body using hex wrench (B3).
12. Remove one 3/8" LP port and insert first stage disassembly tool (B5).
13. Remove regulating nut (18) with hex wrench (B13) and remove diaphragm spring (16) (Fig. 15).
14. Remove retaining nut (17) with wrench (B16) and remove spring base plate (15) (Fig. 16).

### NOTE

**LIGHT PRESSURE IS ALL THAT IS REQUIRED TO REMOVE THE SHOCK RING (69) FROM THE RETAINING NUT.**

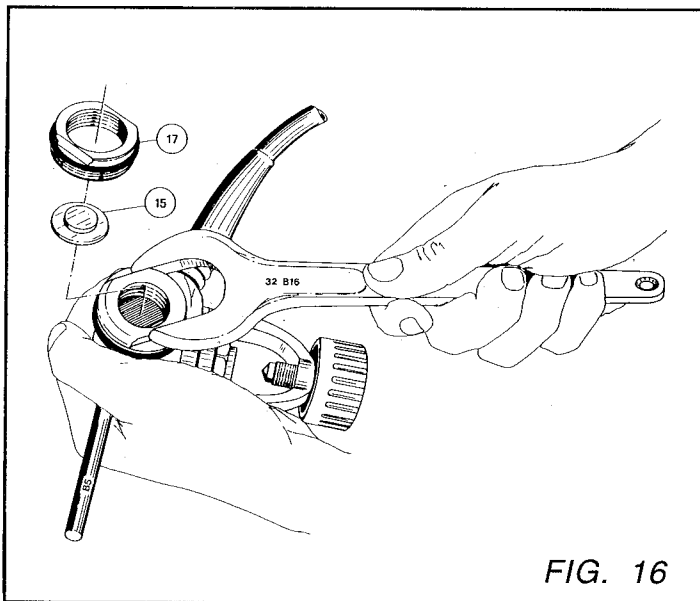


FIG. 16

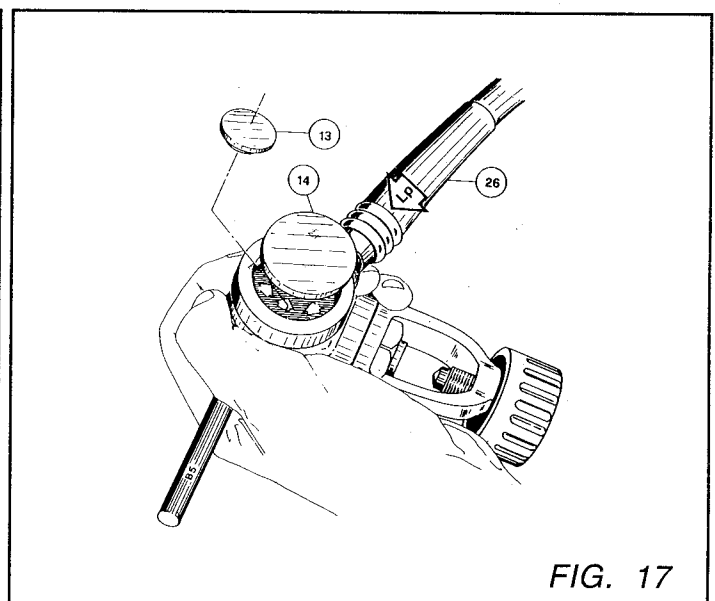


FIG. 17

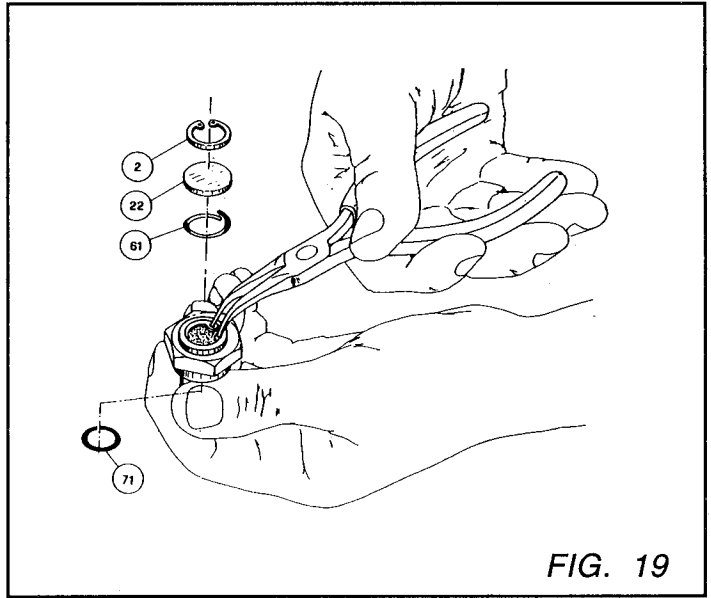
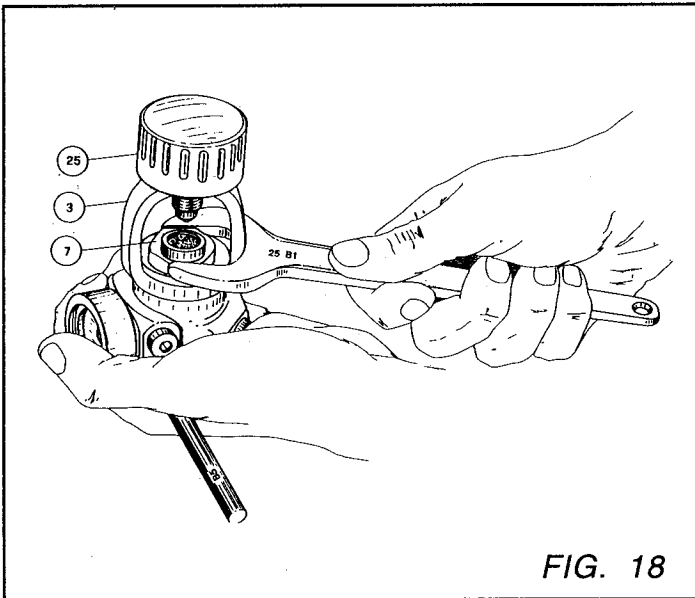
15. While introducing low pressure air (below 100 psi) through the second stage hose, remove diaphragm (14) and poppet button (13) (Fig. 17).
16. Remove the first stage cover (81) and o-ring (71) from the first stage body using hex wrench (B3).
17. Remove o-ring (71) from first stage cover.
18. Remove second stage hose (26) using wrench (B17).



## WARNING

**DO NOT ATTEMPT TO REMOVE THE DIAPHRAGM WITH ANY SHARP TOOLS. SCRATCHING OF THE DIAPHRAGM SEATING SURFACE COULD CAUSE LEAKAGE. THE USE OF HIGH PRESSURE AIR (OVER 100 PSI) COULD CAUSE PARTS TO BE EXPELLED FROM THE REGULATOR. ALWAYS POINT THE REGULATOR AWAY FROM YOURSELF OR ANYONE ELSE WHILE REMOVING THE DIAPHRAGM WITH PRESSURIZED AIR.**

19. Remove yoke retainer nut (7) with wrench (B1) then remove yoke (3) and yoke knob (25) (Fig. 18).
20. Remove o-ring (71) from yoke retainer nut.
21. Remove filter retaining ring (2) with snap ring pliers (Fig. 19).
22. Lift out sintered filter (22) and filter spring (61).
23. Remove disassembly tool (B5) from LP port.
24. Remove low (20) and high pressure (53) port plugs. Remove o-rings (19) and (52).



### • Cleaning

Cleaning requires all reusable rubber and plastic parts to be carefully cleaned by scrubbing with a soft brush in a mild detergent and water solution. Do not use solvents or acids on rubber or plastic parts. Metal parts should be cleaned in an ultrasonic cleaner with fresh water or a mild acid solution. (White vinegar diluted with warm water is recommended). Before reassembly make sure all parts have been carefully rinsed and dried.



## WARNING

**THE FIRST STAGE POPPET AND SINTERED FILTER MAY BE DAMAGED BY ACID OR ULTRASONIC CLEANING. DO NOT SOAK FIRST STAGE POPPET AND SINTERED FILTER IN ACID OR AN ULTRASONIC CLEANER. THIS MAY LEAD TO REGULATOR FAILURE RESULTING IN SERIOUS INJURY OR DEATH.**



## WARNING

**PROTECT EYES AND SKIN ADEQUATELY WHEN WORKING WITH ANY KIND OF ACID. BEFORE CLEANING METAL PARTS, MAKE SURE THAT ALL RUBBER AND PLASTIC PARTS HAVE BEEN REMOVED. ACIDS OR OTHER SOLVENTS MAY DAMAGE RUBBER AND PLASTIC PARTS.**

• **INSPECTION**

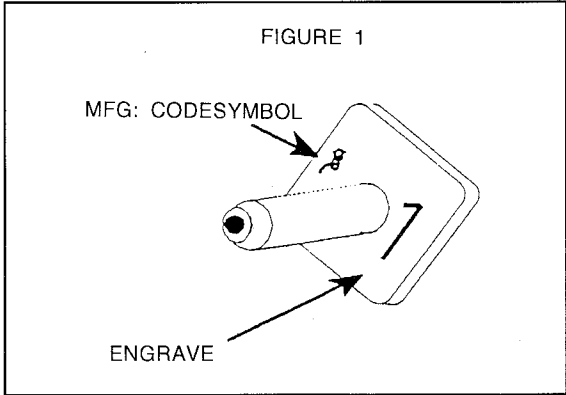
The following first stage components should be replaced during routine service.

Description	Part Number
Retaining ring	185015
Filter	185014
Poppet	185002
O-ring LP ports	110106
O-ring DFC port	110215
O-ring HP ports	110108
O-ring first stage cover	110211
O-ring yoke retainer nut	110211
O-ring poppet seat	110107
O-ring poppet retainer	110101
Backup ring	185038

**(REPLACEMENT RECOMMENDED EVERY TWO YEARS OR EVERY 200 DIVING HOURS AT LEAST)**

**IMPORTANT! HIGH PRESSURE POPPET MARKING**

With the introduction of the new "200 hour" Nickel-Plated high pressure poppet there may not be the need to replace this part during the service. Simple inspection, cleaning and reassembly is all that is required. There is a need however to indicate that the poppet has gone through an inspection as an aid for the repairman performing the next service. To indicate that a poppet has been through one service, use a dental pick or metal scribe on the back (stem) side of the poppet to inscribe a "1". If you encounter a "1" during service of a Mares regulator with a new poppet you will know that it has been through a service previously and therefore should be replaced.



If the following parts are not replaced, they should be inspected with a jeweler's loop for the flaws listed below. Replace any part with these flaws.

*Poppet:* Inspect for cuts, nicks, rubber abrasion and separation of rubber from metal. Make sure that the hole through the poppet stem is open and not clogged with foreign matter.

*Poppet seat:* Inspect the tapered surface of the seat for any chipping and/or deep scratches. If the poppet seat is damaged replace it.

**NOTE**

**A SLIGHTLY ABRASIVE RUBBER (SUCH AS A CLEAN PENCIL ERASER) MAY BE USED TO CLEAN THE SEAT**

*Poppet retainer:* Inspect for any entrapped foreign matter.

*Backup ring:* Make sure that it is properly positioned within the poppet retainer. Inspect its surface for cuts or contamination.

**NOTE**

**AFTER REMOVAL THE BACKUP RING SHOULD ALWAYS BE REPLACED.**

*Filter:* Inspect for sedimentation and rust. Rust deposits may indicate a deteriorated diving cylinder.  
*Retaining ring:* Inspect for any distortion, cracks or damaged edges.

## NOTE

**THE FILTER RETAINING RING SHOULD BE REPLACED EVERY TIME IT IS REMOVED FROM THE FIRST STAGE.**

*First stage diaphragm:* Inspect for cracking, brittleness and tears.

*Springs:* Inspect for cracking or broken coils.

*O-rings:* Inspect for cuts, tears, flat spots or contamination. The presence of any of these flaws may cause leakage.

*First stage body:* Inspect the depressor in the DFC port. Make sure that it is properly positioned and not deformed.

*O-ring seats:* Inspect all surfaces in contact with o-rings and other seals for chipping, scratches, deteriorated plating or contamination.

### • Reassembly

Before reassembly, lightly lubricate all o-rings with silicone grease (General Electric, Versalube G-322 or equivalent). Lubricating the o-rings before reassembly will minimize the risk of damage during reassembly.

1. Place o-ring (74) on poppet seat (75).
2. Place poppet seat onto tool (B21).

## NOTE

**MAKE SURE THE TAPERED SURFACE OF THE POPPET SEAT IS FACING TOWARDS TOOL (B21).**

3. Using light pressure, press the poppet seat into position in the first stage body (Fig 20).
4. Insert poppet (9) into first stage body.
5. Place the poppet spring (8) over the poppet stem.
6. Insert new backup ring (5) into poppet retainer (4).
7. Insert o-ring (6) into poppet retainer (4).
8. Place poppet retainer (4-5-6) in position over spring.
9. Place o-ring (71) on first stage cover (81).
10. Press locking head (80) into spring (76).
11. Insert the locking head and spring in the first stage cover.

## NOTE

**THE LOCKING HEAD MUST BE FACING THE OPEN END OF THE FIRST STAGE COVER. A SMALL PLASTIC ROD CAN BE USED TO PRESS THE LOCKING HEAD AND SPRING INTO THE FIRST STAGE COVER (FIG 21).**

12. Install first stage cover and tighten with hex wrench (B3).
13. Insert the poppet pin (12) through the center hole in the first stage body.
14. Place the poppet button (13) over the poppet pin and depress it a few times to ensure that the poppet will move freely.
15. Install first stage diaphragm (14).
16. Insert first stage disassembly tool (B5) into a 3/8" LP port.
17. Place spring base plate (15) on diaphragm.
18. Place shock ring (69) onto retaining nut (17).

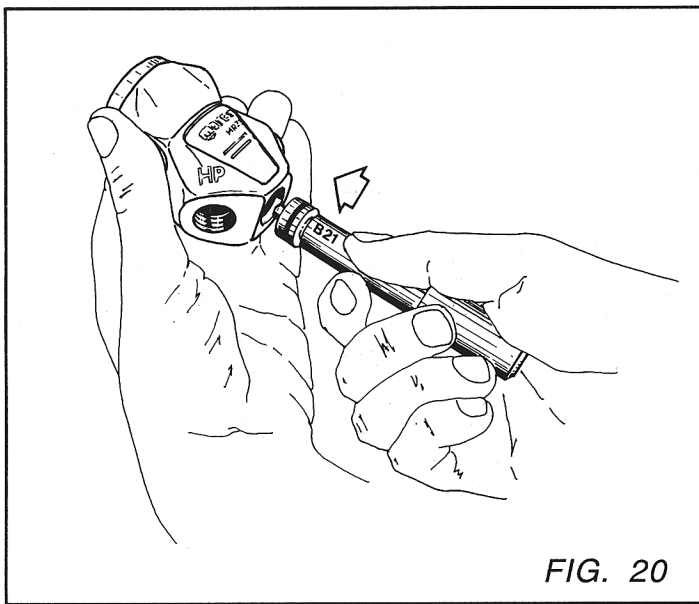


FIG. 20

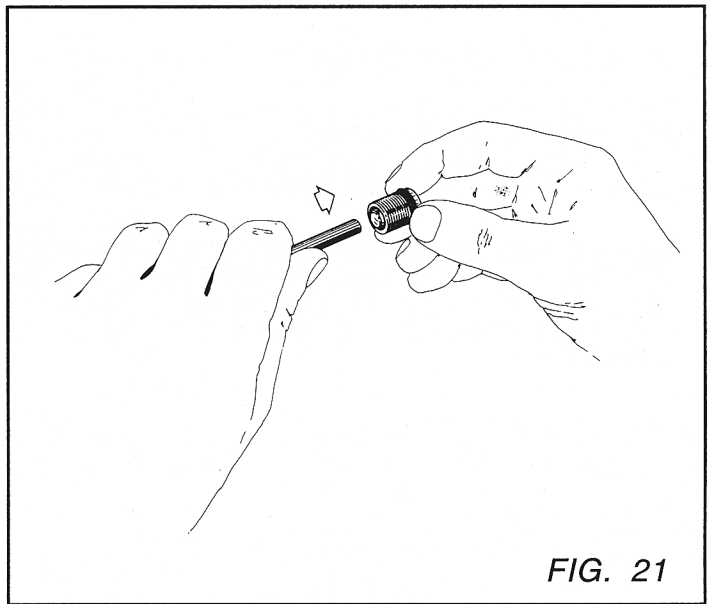


FIG. 21

19. Lightly lubricate the sealing edge of retaining nut (17) and tighten into the first stage body until snug (19-22 Ft/lb. 25-30 N/m.).
20. Lightly lubricate the base of the diaphragm spring (16) then place it on the base plate.
21. Place the regulating nut (18) over the diaphragm spring. Using tool (B13) tighten regulating nut 2-3 turns.

#### NOTE

**DO NOT OVER TIGHTEN REGULATING NUT. THIS WILL CAUSE INTERMEDIATE PRESSURE TO INCREASE AND INTERFERE WITH LATER ADJUSTMENTS.**

22. Place o-ring (71) on yoke retainer nut (7).
23. Place filter spring (61) into yoke retainer nut.
24. Place the sintered filter (22) onto the filter spring.
25. Compress the retaining ring (2) with snap ring pliers and position the ring over the sintered filter. Depress the sintered filter until the snap ring fits into the groove in the yoke retainer nut.

#### NOTE

**WHEN THE FILTER RETAINING RING IS PROPERLY POSITIONED IN THE GROOVE OF THE FIRST STAGE BODY IT CAN BE ROTATED FREELY USING THE SNAP RING PLIERS**

26. Place yoke (3) with knob (25) on first stage body.
27. Install yoke retaining nut (7) and tighten in to place with wrench (B1).

#### NOTE

**TO PREVENT THE YOKE RETAINING NUT FROM BECOMING LOOSE, PLACE TWO DROPS OF THREAD COMPOUND (LOCTITE 242) ON THE THREADS OF THE NUT.**

28. Install o-rings (19) and (52) onto hoses or port plugs (20) and (53). Thread hoses and port plugs into appropriate ports and tighten.

## • Adjusting intermediate pressure

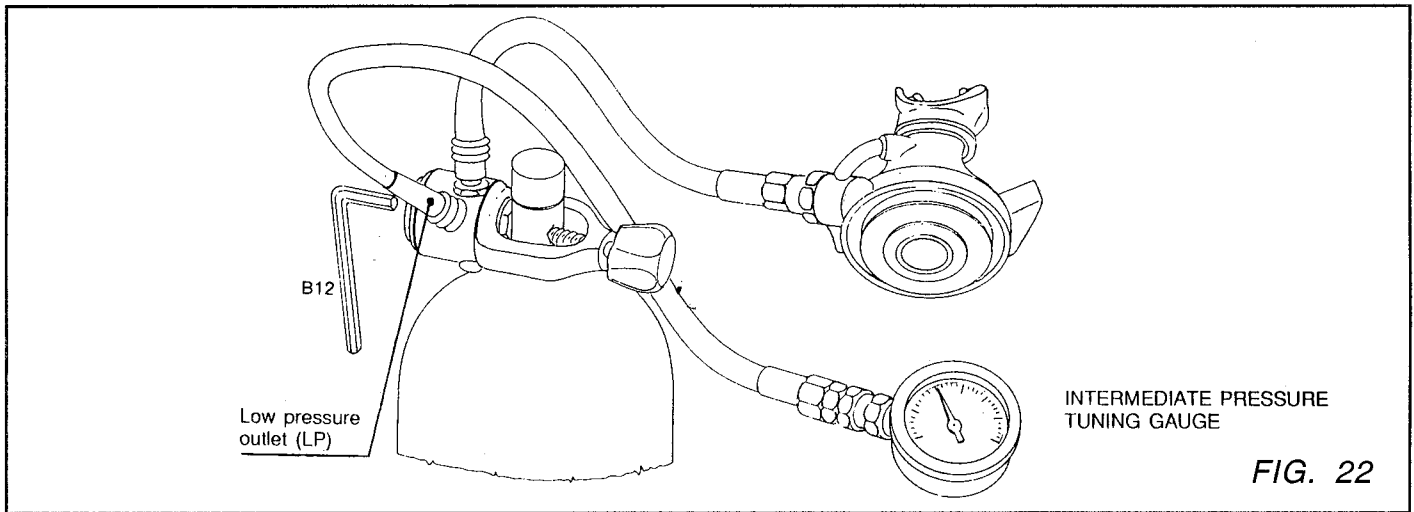


**DANGER**

### **EXPLOSION HAZARD**

**DO NOT CONNECT THE INTERMEDIATE PRESSURE GAUGE TO THE HIGH PRESSURE PORT OF THE FIRST STAGE. CONNECTING THE INTERMEDIATE PRESSURE GAUGE TO THE HIGH PRESSURE PORT OF THE FIRST STAGE WILL CAUSE THE HOSE AND/OR INTERMEDIATE PRESSURE GAUGE TO EXPLODE AND COULD RESULT IN SERIOUS PERSONAL INJURY OR DEATH.**

2. Connect the second stage with the purge cover and diaphragm removed.
3. Attach the first stage to a full tank (2000-3000 psi Fig. 22).



4. Depress the second stage demand lever while slowly opening the tank valve. When air begins to flow from the second stage slowly release the demand lever and fully open the tank valve.
5. Read the intermediate pressure indicated by the gauge. Intermediate pressure specification for the MR 22 Abyss is 142-148 psi.

### **NOTE**

**IF THE REGULATOR IS TO BE USED FOR COLD WATER DIVING (BELOW 47 F) OR IS EQUIPPED WITH A CWD KIT, REFER TO THE COLD WATER DIVING KIT SECTION OF THIS MANUAL FOR INSTALLATION/SERVICING OF THE CWD KIT AND INTERMEDIATE PRESSURE SPECIFICATIONS.**

- a. If the intermediate pressure is greater than necessary, slightly loosen the regulating nut, using tool (B13), until the desired value is obtained.

### **NOTE**

**WHENEVER INTERMEDIATE PRESSURE IS DECREASED, EXCESS AIR MUST BE EXHAUSTED BY DEPRESSING THE SECOND STAGE DEMAND LEVER TO OBTAIN THE CORRECT READING.**

- b. If the intermediate pressure is lower than necessary, slightly tighten the regulating nut until the desired value is obtained.



6. Depress the second stage demand lever a few times to make sure that the intermediate pressure remains constant.
7. After first stage adjustment, depressurize the regulator and remove the intermediate pressure gauge and screw in the appropriate port plug.

### NOTE

**DO NOT SUBMERGE THE INTERMEDIATE PRESSURE GAUGE. SUBMERGING THE INTERMEDIATE PRESSURE GAUGE MAY AFFECT GAUGE ACCURACY AND/OR DAMAGE THE GAUGE.**

#### • Cold water diving kit (CWD)

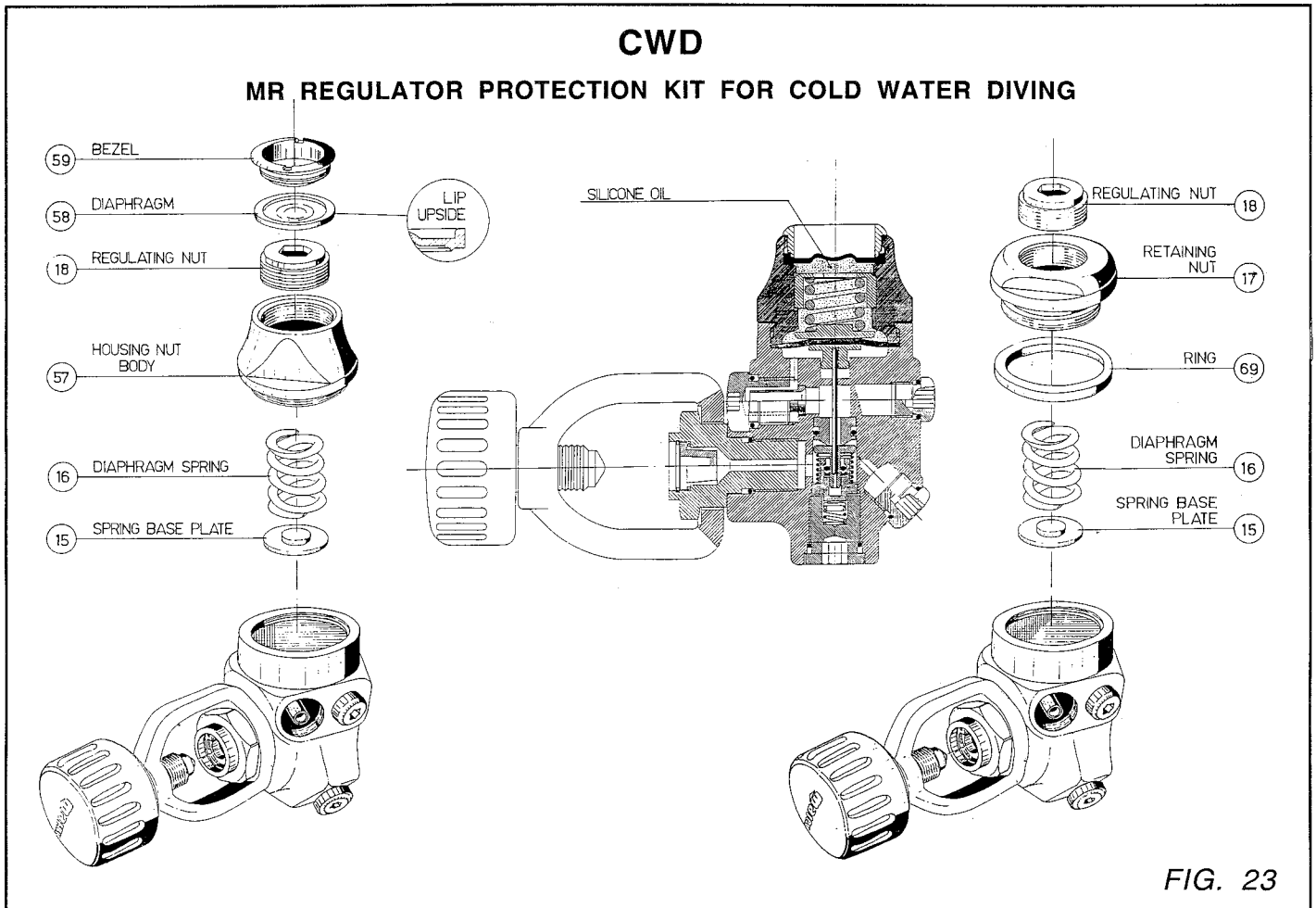
For use in cold water diving (below 47 F) we recommend that a Cold Water Diving Kit (CWD) be installed. The assembly of this kit must be preformed by a Mares authorized service center.



### WARNING

**DIVING IN COLD WATER (BELOW 47 F) WITHOUT PROPER TRAINING CAN CAUSE SERIOUS INJURY. BEFORE DIVING IN COLD WATER SPECIAL TRAINING FROM A CERTIFIED INSTRUCTOR SHOULD BE OBTAINED.**

**ANY SCUBA DIVING REGULATOR, EVEN THOSE EQUIPPED WITH A CWD KIT CAN UNDERGO "FREEZE-UP" PHENOMENA. "FREEZE-UP" OF A REGULATOR IS DETRIMENTAL TO THE EFFICIENCY OF A REGULATOR AND CAN CAUSE THEM TO FAIL, THUS INTERRUPTING AIR DELIVERY TO THE DIVER. THIS MAY CAUSE SERIOUS INJURY OR DEATH. TO MINIMIZE SUCH RISKS, DIVERS SHOULD BE PROPERLY TRAINED TO PREVENT OR BE ABLE TO COPE WITH A REGULATOR AFFECTED BY "FREEZE-UP" PHENOMENA.**



## □ MR 22 CWD INSTALLATION

1. Insert the disassembling tool for the first stage (B5) into a LP port.
2. Remove regulating nut (18) with hex wrench (B13) and remove diaphragm spring (16) (Fig. 15).
3. Remove retaining nut (17) and shock ring (69) with wrench (B16) then remove spring base plate (15) (Fig. 16).
4. If the CWD kit is not being installed on a newly serviced first stage. Clean the first stage diaphragm with a damp cloth and wipe dry. Clean the diaphragm spring and spring base plate as described in the cleaning section of this manual.
5. Lubricate both sides of the spring base plate with the silicone oil provided in the CWD kit then place spring base plate (15) on diaphragm.
6. Lightly lubricate the sealing edge of retaining nut (17) with the silicone oil provided in the CWD kit and tighten into the first stage body until snug (Approx. 25 Ft/lb. 34 N/m.).
7. Lubricate the diaphragm spring (16) with the silicone oil provided in the CWD kit then place it on the base plate.
8. Place the regulating nut (18) over the diaphragm spring. Using tool (B13) tighten regulating nut until it is just below the inside shoulder of the retaining nut.
9. Remove the disassembling tool for the first stage (B5) from the LP port and install port plug.
10. Remove the second stage purge cover.
  - a. Slide the second stage hose protector towards the hose until the clamp ring screw is exposed.
  - b. Remove clamp ring screw.
  - c. Expand the clamp ring until it will slide over the flange of the second stage body.
  - d. Remove the second stage purge cover, diaphragm and clamp ring.
11. Connect an intermediate pressure gauge to a LP port on the first stage.



**DANGER**

### **EXPLOSION HAZARD**

**DO NOT CONNECT THE INTERMEDIATE PRESSURE GAUGE TO THE HIGH PRESSURE PORT OF THE FIRST STAGE. CONNECTING THE INTERMEDIATE PRESSURE GAUGE TO THE HIGH PRESSURE PORT OF THE FIRST STAGE WILL CAUSE THE HOSE AND/OR INTERMEDIATE PRESSURE GAUGE TO EXPLODE AND COULD RESULT IN SERIOUS PERSONAL INJURY OR DEATH.**

12. Attach the first stage to a full tank (2600-3000 psi Fig 22).
13. Depress the second stage demand lever while slowly opening the tank valve. When air begins to flow from the second stage slowly release the demand lever and fully open the tank valve.
14. Read the intermediate pressure indicated by the gauge. Intermediate pressure for the MR 22 Abyss is 128-132 psi.
  - a. If the intermediate pressure is greater than specified, slightly loosen the regulating nut, using tool (B13), until the desired value is obtained.

### **NOTE**

**WHENEVER INTERMEDIATE PRESSURE IS DECREASED, EXCESS AIR MUST BE EXHAUSTED BY DEPRESSING THE SECOND STAGE DEMAND LEVER TO OBTAIN THE CORRECT READING.**

- b. If the intermediate pressure is lower than specified, slightly tighten the regulating nut until the desired value is obtained.
15. Depress the second stage demand lever a few times to make sure that the intermediate pressure remains constant.
16. Adjust demand lever height using the demand lever height gauge. The demand lever height gauge sides are marked with the second stage model. Place the side of the demand lever height gauge marked with the corresponding model across the second stage case (Fig 24).

- a. If the demand lever height is too low, tighten the demand lever lock nut until the demand lever contacts the lower edge of the gauge.
- b. If the demand lever height is too high, loosen the demand lever lock nut until the demand lever contacts the lower edge of the gauge.

**C-SHAPED GAUGE FOR DEMAND  
LEVER HEIGHT INSPECTION**

For the correct adjustment stand the gauge on the Second Stage case and adjust lever height until it makes contact with the gauge.

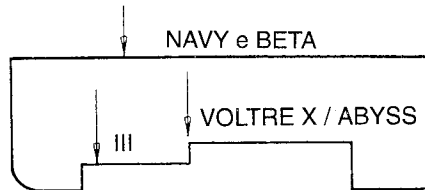


FIG. 24

17. Install the second stage purge cover.
  - a. Expand the clamp ring until it will slide over the flange of the second stage body.
  - b. Place the second stage diaphragm on to the second stage body making sure the metal disk is against the demand lever.
  - c. Place the purge cover on the diaphragm.
  - d. Position the clamp ring over the flange of the second stage and the flange of the purge cover. Rotate the clamp ring so the split end is facing the second stage hose.
  - e. Install clamp ring screw and tighten.
  - f. Slide the second stage hose protector into position over the clamp ring.
18. After second stage adjustment, depressurize the regulator and remove the intermediate pressure gauge.

**NOTE**

**DO NOT SUBMERGE THE INTERMEDIATE PRESSURE GAUGE. SUBMERGING THE INTERMEDIATE PRESSURE GAUGE MAY AFFECT GAUGE ACCURACY AND/OR DAMAGE THE GAUGE.**

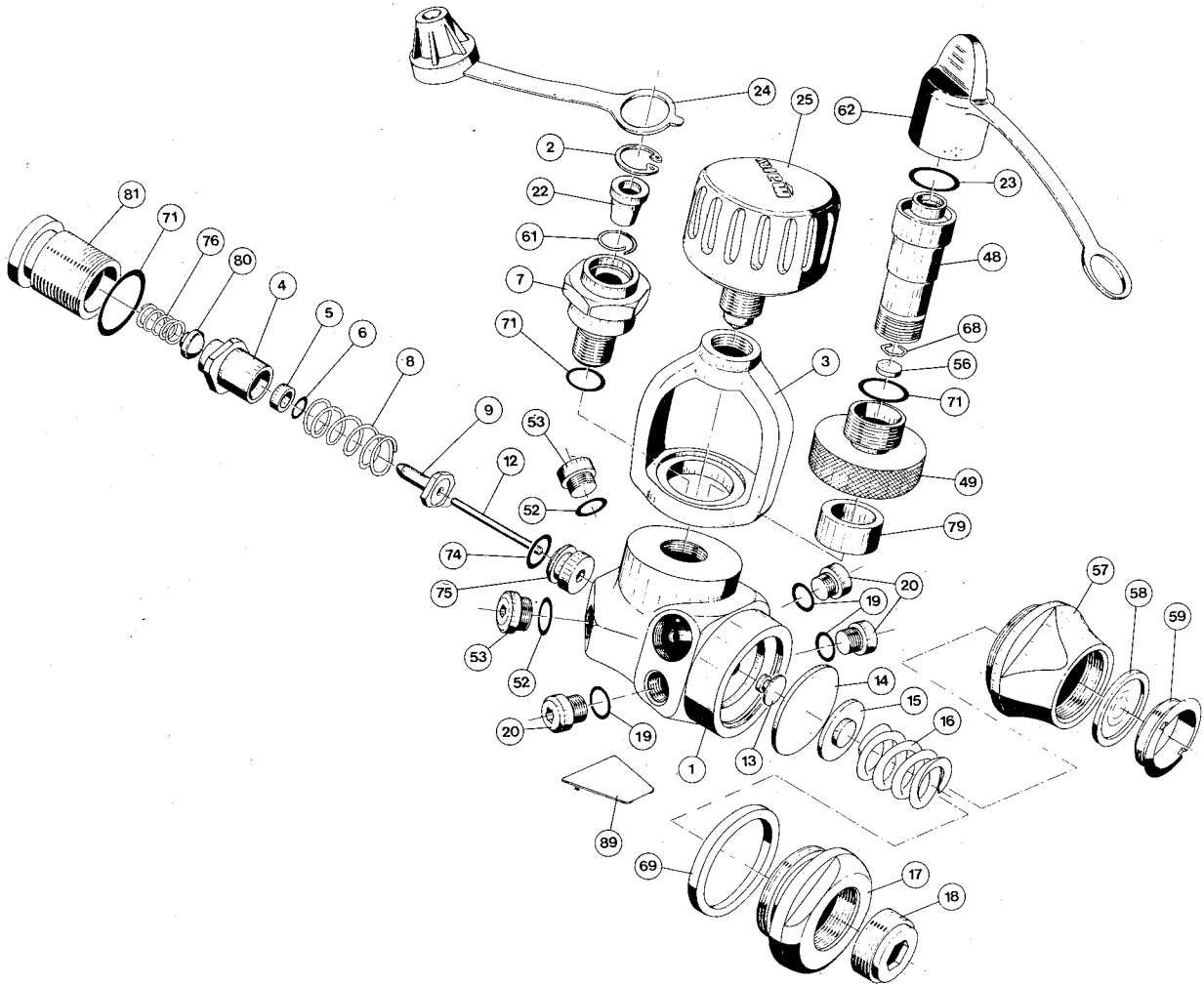
19. Position the first stage five to ten degrees from vertical with the open end of the retaining nut facing up.
20. Fill the regulating nut with the silicone oil provided in the CWD kit until it is full.
21. Gently tap the sides of the regulating nut with a soft object such as a wood or plastic screwdriver handle to eliminate bubbles from the silicone oil.
22. Install diaphragm (58) with the lip facing up (See inset Fig 23).
  - a. Keep the first stage positioned five to ten degrees from vertical.
  - b. With a thin tipped tool lift the higher edge of the diaphragm while gently depressing the center of the diaphragm with a blunt tool allowing air to escape. When all the air has been removed from under the diaphragm remove the thin tipped tool.
  - c. The diaphragm should be completely submerged in the oil and seated against the shoulder of the retaining nut.
  - d. With a thin tipped tool gently lift the edge of the diaphragm to release the vacuum which may exist under the diaphragm. Take care not to allow any air under the diaphragm. If air is allowed under the diaphragm repeat steps a. thru d.
23. Install CWD bezel (59) and tighten with tool provided in CWD kit. The bottom edge of the bezel should contact the retaining nut.
24. Pour excess oil into a suitable container. Rinse residual oil off first stage with fresh water. Make sure the first stage dust cap is tightened in place before rinsing.



**CAUTION**

**DO NOT PROD CWD KIT DIAPHRAGM WITH TOOLS, FINGERS OR DIRECT A VIOLENT STREAM OF WATER (E.G. FROM A HOSE) AGAINST IT. PERFORATION OR DISPLACEMENT OF THE DIAPHRAGM COULD RESULT, CAUSING OIL LEAKAGE OR WATER SEEPAGE.**

# FIRST STAGE MR 22 - DFC Dynamic Flow Control



Ref.	Part.	Description
1	186203	Body
2	185015	Retaining ring Ø 13
3	185208	Yoke
4	185209	Poppet retainer
5	185038	Back up ring
6	110101	O-Ring 2012
7	186205	Yoke nut
8	185011	Spring, poppet
9	185002	Poppet
12	186214	Pin, poppet
13	186213	Button poppet
14	185022	Diaphragm
15	185034	Plate, spring base
16	185023	Spring, diaphragm
17	186219	Retaining nut
18	185028	Regulating nut
19	110106	O-Ring 106
20	185204	Plug LP 3/8"
22	185014	Filter
23	110117	O-ring 115
24	185009	Dust cup
25	184076	Knob
48	183050	DIN connector - 200 BAR
48	183049	DIN connector - 300 BAR
49	183006	DIN connector wheel - 200 BAR
49	183001	DIN connector wheel - 300 BAR
52	110108	O-ring 108
53	185205	Plug HP 7/16"
56	183053	Filter for DIN connector 0 9
57	185300	Body (CWD)
58	185301	Diaphragm (CWD)
59	185302	Bezel (CWD)
61	185013	Spring, filter

Ref	Part	Description
62	183015	Cap, DIN connector
68	183052	Spring, DIN connector Ø 12
69	186218	Ring
71	110211	O-Ring 2050
74	110107	O-Ring 2031
75	186216	Poppet seat
76	186210	Spring, first stage cover
79	183051	Spacer ring, DIN connector
80	186206	HP housing button
81	186208	First stage cover
89	184311	Label
<b>ASSEMBLIES</b>		
A	185983	First stage MR 22 assy
A	185984	First stage MR 22 assy
A	185988	First stage MR 22 DIN assy
A	185993	First stage MR 22 CWD assy
A	185998	First stage MR 22 DIN/CWD assy
D	185210	Poppet retainer, complete (4-5-69)
F	183025	DIN connector 200 BAR assy (23-48-49-56-62-68-71-79)
F	183030	DIN connector 300 BAR assy (23-48-49-56-62-68-71-79)
I	185332	CWD Kit MR 22
-	185322	Maintenance Kit (2-5-6-19-22-52-71-74)
<b>ACCESSORIES</b>		
	186207	Plug 1/2 UNF
	110215	O-Ring 2043