

MARES SERVICE MANUAL

2009

mares[®]

The Mares logo features the word "mares" in a bold, lowercase, sans-serif font. Below the letter "a" is a red downward-pointing triangle.

RE:
NEW HP POPPET SEAT FOR MR FIRST STAGES (CODE: 46186216)

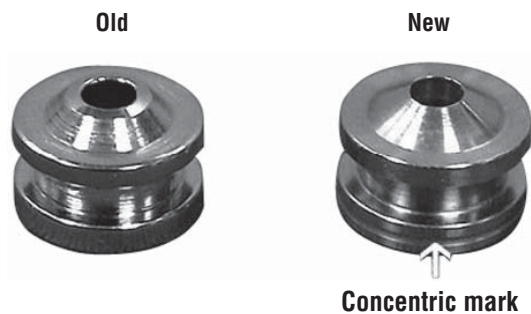
BTM17

THE TECHNICAL ASSISTANCE DEPARTMENT OF MARES S.P.A. ANNOUNCES A MODIFICATION TO THE PROFILE AND MATERIAL OF THE HP POPPET SEAT USED IN ALL OF MARES MR FIRST STAGES.

THE CODE FOR THE NEW HP POPPET SEAT HAS NOT CHANGED AND CAN ONLY BE IDENTIFIED BY THE DESCRIPTION BELOW.

THE NEW HP POPPET SEAT WAS DESIGNED AND TESTED TO GUARANTEE A GREATER RESISTANCE TO WEAR AND TEAR. THE NEW HP POPPET SEAT SHOULD ONLY BE USED WITH THE TRI-MATERIAL POPPET, (CODE: 46200652) THE NEW HP POPPET SEAT CAN BE EASILY IDENTIFIED BY THE RADIAL THROAT DESIGN UNDER THE SEAT OF THE O-RING (AS SHOWN IN PICTURE 1 BELOW).

- NEW HP POPPET SEAT -



⚠ WARNING!

DO NOT ATTEMPT TO USE THE NEW HP POPPET SEAT WITH MARES OLDER STYLE RUBBER POPPET (CODE: 46185002). THE PROFILE OF THE NEW HP POPPET SEAT CAN DAMAGE THE RUBBER POPPET SURFACE CAUSING A FREE-FLOW.

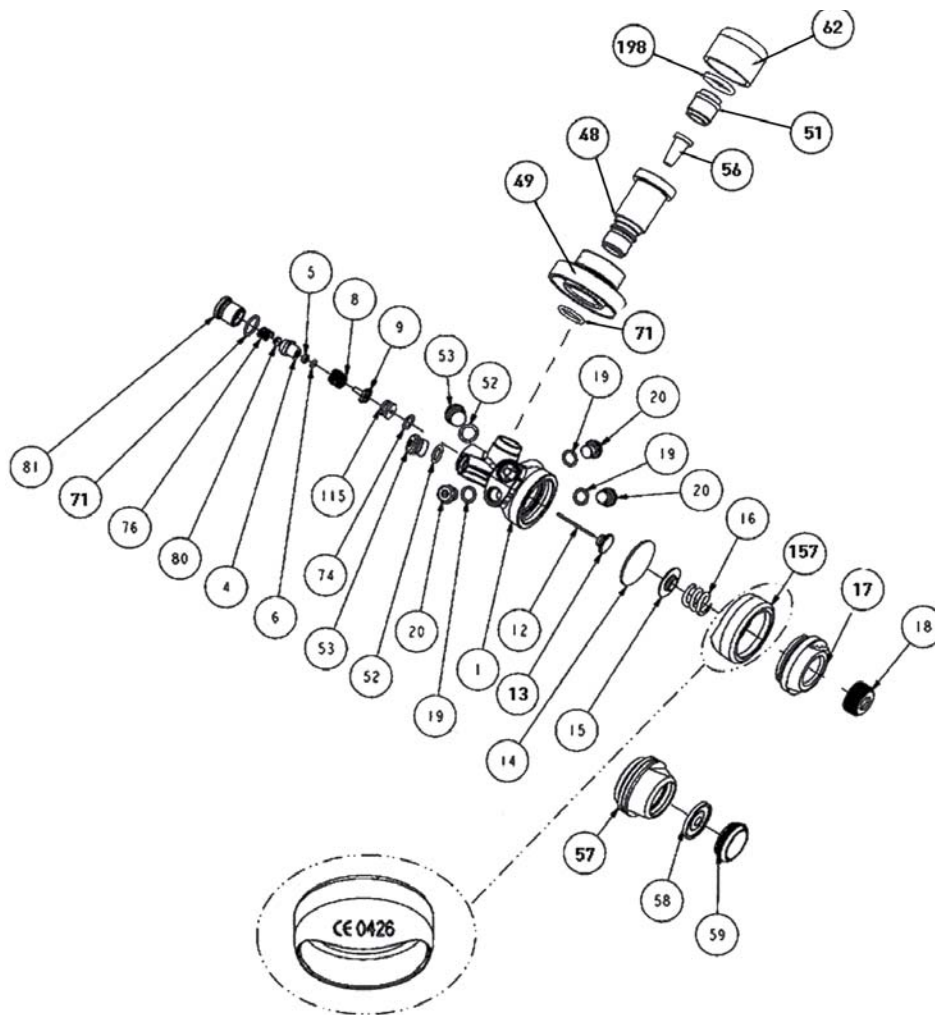
⚠ ATTENTION!

MAINTENANCE AND REPAIR OPERATIONS MUST BE PERFORMED ONLY AND EXCLUSIVELY BY A QUALIFIED AND AUTHORIZED TECHNICIAN AT MARES AUTHORIZED SERVICE CENTERS. ANY PERSON ATTEMPTING TO SERVICE THE EQUIPMENT AUTOMATICALLY TAKES ON FULL RESPONSIBILITY FOR ANY DAMAGES OR HAZARDS WHICH MAY RESULT FROM MAINTENANCE OPERATIONS THAT ARE PERFORMED INCORRECTLY.

FOR DISASSEMBLY AND ASSEMBLY TO INSTALL THE NEW HP POPPET SEAT, CHECK THE PROCEDURES DESCRIBED IN THE MARES MAINTENANCE MANUAL SECTION RELATED TO FIRST STAGE POPPET SEAT REPLACEMENT.

SHOULD THE UPDATED MANUALS CONTAINING THE SECTIONS INDICATED BE LACKING OR IF THE INSTRUCTIONS ARE UNCLEAR OR NOT ENTIRELY UNDERSTABLE, PLEASE CONTACT YOUR LOCAL MARES DISTRIBUTOR BEFORE PERFORMING ANY MAINTENANCE, ADJUSTMENT OR CHECK.

Drawing No.: E39 Table No.: 129	1st STAGE MR22 NITROX 2009	UPDATED: 22/12/2008
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REF	CODE	DESCRIPTION
1	46200959	FIRST STAGE BODY DFC
4	D	HP HOUSING
5	46185038	BACKUP RING 1 st STAGE REGULATOR
6	46110401	OR 2012 Viton 006-9707
8	46185011	SPRING, 1 st STAGE VALVE
9	46200652	POPPET 1° STG TRI-MATERIAL
12	46186214	PIN, 1 st STAGE, 32,5 mm
13	46186213	BUTTON POPPET, 1 st STAGE MR22
14	46185022	DIAPHRAGM, 1 st STAGE REGULATORS
15	46185034	PLATE SPRING BASE, 1 st STAGE REGS
16	46185023	SPRING DIAPHRAGM 1 st STAGE REG.
17	46186219	LOCKING NUT
18	46185028	REGULATING NUT, 1 st STAGE REGS
19	46110402	OR 106 Viton 610-9707
20	46185204	LP PLUG 3/8", 1 st STAGE, REGS.
48	46200594	CONNECTOR BODY NITROX 200 BAR
49	46200592	WHEEL NITROX CONNECTOR 200 BAR
51	46200593	O-RING SEAT
52	46110404	OR 108 Viton 611-9754
53	46185205	HP PLUG 7/16", 1 st STAGE

REF	CODE	DESCRIPTION
56	46200561	FILTER, DIN CONNECTOR,
62	46200658	DUST CAP Nitrox 2K5
71	46110413	OR 2050 Viton 014-9707
74	46110403	OR 2031 Viton 011-9707
76	46186210	SPRING,HP HOUSING, 1 st STAGE MR22
80	46186206	HP HOUSING BUTTON 1 st STAGE MR22
81	46200860	PLUG, 1 st STAGE, MR22
89	46200722	ABYSS T Sticker
115	46186216	POPPET SEAT, 1 st STAGE, MR22
157	46200861	PROTECTION CAP 1 st STAGE
198	46200655	OR 3056
ASSEMBLIES		
D	46186259	HP HOUSING ASSY, 1 st STAGE (4-5-6)VITON
F	46200663	NITROX CONNECTOR 200 BAR (Ref. Tab. 30 Drawing 107)
###	46200692	SERVICE KIT 1 st STG MR22 NX (EN 13949) (5-6-19-52-56-71-74-198)
ACCESSORIES		
98	46186207	LP PLUG 1/2" UNF
97	46110215	OR 2043

Drawing No.: E 108	1st STAGE MR42 T	UPDATED: 20/12/2007
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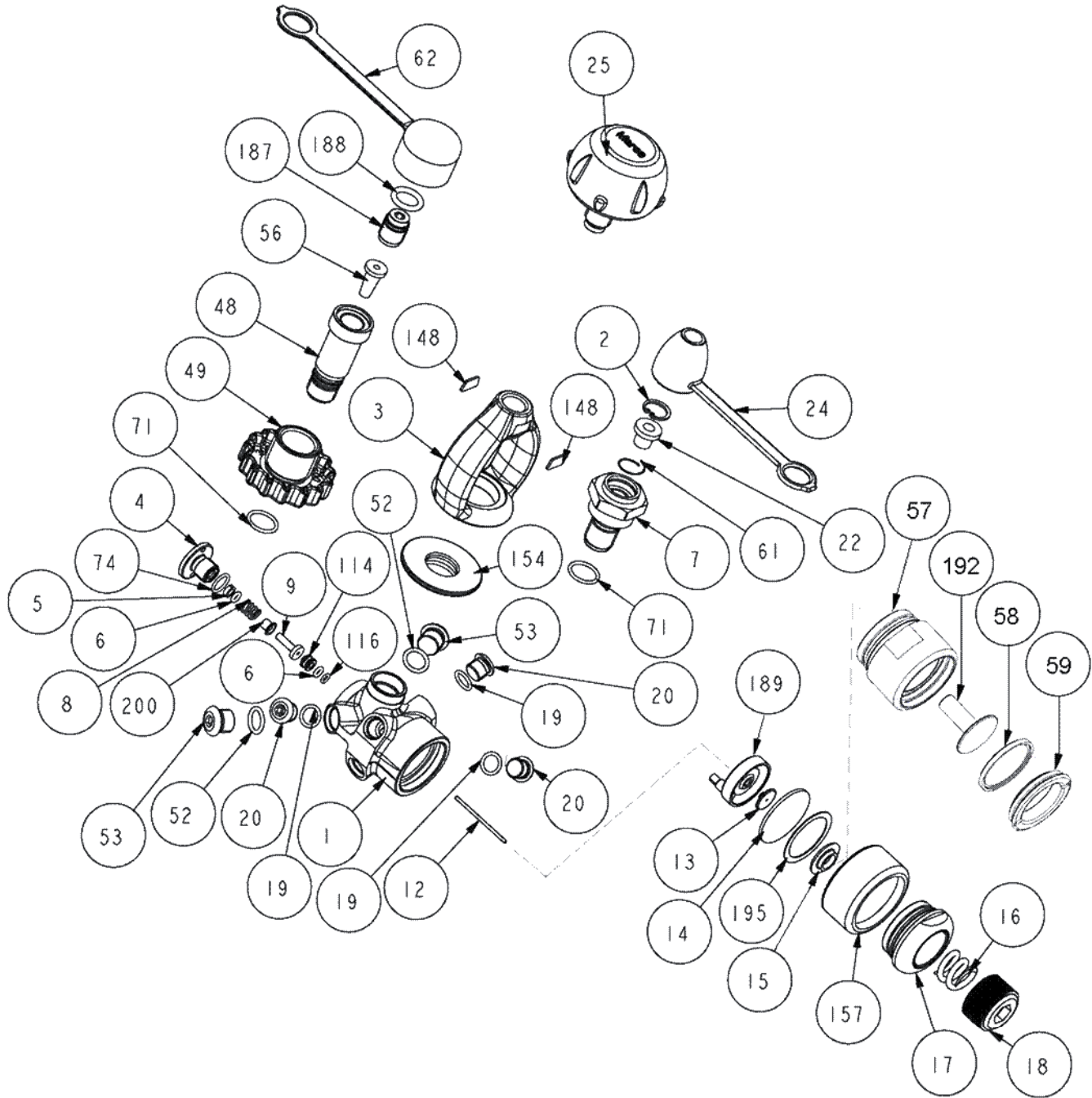


Table: No.: 31	1st STAGE MR42 T	UPDATED: 20/12/2007
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REF	CODE	DESCRIPTION
1	46200676	FIRST STAGE BODY CROMO
1	46200975	FIRST STAGE BODY PVD
2	46185015	RETAINING RING, 1 st STG FILTER
3	46185211	YOKE
3	46200974	YOKE PVD
4	D	HP CHAMBER
5	46185038	BACKUP RING 1 st STAGE
6	46110101	OR 2012
6	46110401	OR 2012 Viton 006-9707
7	46186205	NUT YOKE RETAINER
8	46200765	POPPET SPRING 1° STG
9	46200764	POPPET 1° STG TRI-MATERIAL
12	46200672	PIN POPPET 34,5 mm
13	46200545	BUTTON FIRST STAGE POPPET
14	46200674	DIAPHRAGM
15	46200582	PLATE SPRING BASE
16	46185023	SPRING DIAPHRAGM
17	46200544	RETAINING NUT
17	46200973	RETAINING NUT PVD
18	46185028	REGULATING NUT
18	46200972	REGULATING NUT PVD
19	46110106	OR 106
19	46110402	OR 106 Viton 610-9707
20	46185204	LP PLUG 3/8"
22	46186202	CONICAL FILTER
24	46185010	DUST CAP
25	46184079	YOKE KNOB
48	46200548	BODY, DIN CONNECTOR 300 BAR
49	46200546	THREADED LOCKING RING (300 Bar)
52	46110108	OR 108
52	46110404	OR 108 Viton 611-9754
53	46185205	HP PLUG 7/16"

REF	CODE	DESCRIPTION
56	46200561	CONICAL FILTER DIN CONNECTOR
61	46185013	SPRING, FILTER 1 st STAGE
62	46200562	DUST CAP 300 BAR DIN CONNECTOR
71	46110211	OR 2050
71	46110413	OR 2050 Viton 014-9707
74	46110107	OR 2031
74	46110403	OR 2031 Viton 011-9707
114	46200761	POPPET SEAT (MR)
116	46110405	OR 4 X 1
148	46184315	LABEL YOKE "EN 250"
148	46184316	LABEL YOKE "MARES"
154	46200553	YOKE CONNECTOR 1 st
157	46200829	PROTECTION CAP 1 st STG MR42T
187	46200547	O-RING SEAT DIN
188	46110247	OR 3043
188	46200620	OR 3043 viton
189	46200671	DFC WASHER 42
195	46200581	BACK UP RING 2K4
200	46200763	POPPET BUSHING
ASSEMBLIES		
A	416217	MR42 1° Stage cpl cromo (int-din)
D	46200597	HP HOUSING (4-5-6)
F	416805	DIN CONNECTOR 300 BAR (tab. n. 23 dis E14) (71-48-49-56-187-188)
I	416852	KIT CWD DRY
* * *	46200596	MAINTENANCE KIT 1° STG METAL TECH / V-MR42 INT (2-5-6-19-22-52-61-71-74-116-195)
* * *	46200603	MAINTENANCE KIT 1° STG METAL TECH / V-MR42 DIN (2-5-6-19-52-56-71-74-116-188-195)
°°°	46200751	MAINTENANCE KIT 1° STG MR42 INT (VITON O-RING) (2-5-6-19-22-52-61-71-74-116-195)
°°°	46200752	MAINTENANCE KIT DIN O-Ring Viton. 1° st MR42

**12S "2008" & 12S "2011"
DIN FIRST STAGE**



MAINTENANCE PROCEDURE

WARNING!

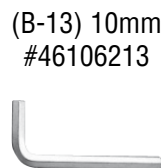
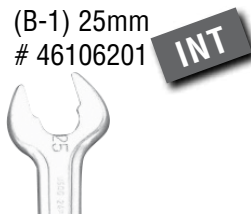
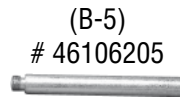
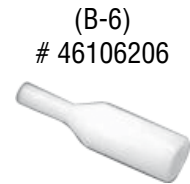
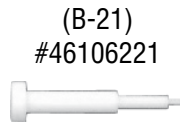
ALL MAINTENANCE AND REPAIR PROCEDURES MUST BE PERFORMED BY A MARES AUTHORIZED SERVICE CENTER AND/OR DISTRIBUTOR. THEREFORE, THE INFORMATION PROVIDED BELOW IS INTENDED STRICTLY FOR TECHNICIANS AT SUCH CENTERS.

NOTE ALL OPERATIONS MUST BE CONDUCTED STRICTLY IN THE ORDER DESCRIBED.

NOTE IN ORDER TO ENSURE ADVANCED PERFORMANCE AND SAFETY DURING USE, AFTER 100 HOURS OF DIVING OR 1 YEAR THE REGULATOR MUST BE CHECKED, AND ITS CRITICAL PARTS MUST BE INSPECTED AND REPLACED IF NECESSARY.

Tools needed

- Flathead screwdriver
- Compressed air supply circuit or tank (180-200 bar)
- nylon brush
- O-Ring removal tool
- Silicone grease (General Electric Versalube G-322 type)
- Compressed air gun (8-10 Bar)
- Descaling solution (Deox Extra type) or ultrasound tank
- Test Bench or LP pressure gauge to calibrate the intermediate pressure
- Thread compound (Loctite 242 INT connection type - Loctite 222 type for DIN connection)
- 12S 1st stage service kit (code 46200963 INT – 46200964 DIN)



DISASSEMBLY**INT**

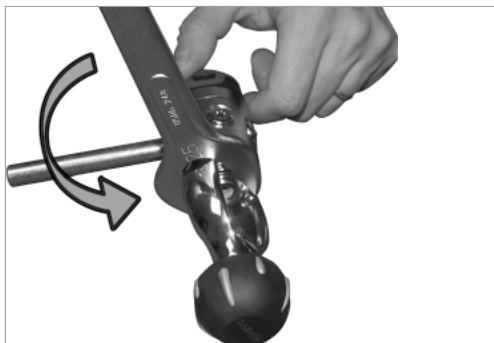
1. Loosen the dust cap (24) from the 1st stage, fully unscrewing the yoke knob (25).
2. Remove the hose protection from the body of the 1st stage.



3. Unscrew the hose (26) using a 14 mm open end wrench (B18).
4. Screw on the disassembly tool (B5) to make it easier to remove the 1st stage from the 3/8" LP port

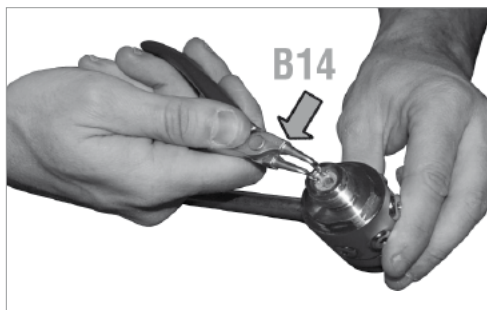


5. Unscrew the yoke retainer nut (7) using the special 25 mm wrench (B1).



NOTE TO MAKE DISASSEMBLY EASIER, WE RECOMMEND THAT YOU PLACE THE FIRST STAGE IN A BENCH VISE.

6. Using the snap ring pliers (B14), pull out the INT HP chamber nut (10), the snap ring (2), the tapered sintered filter, and the filter spring (61).

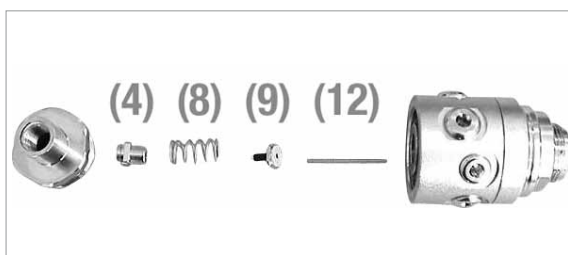
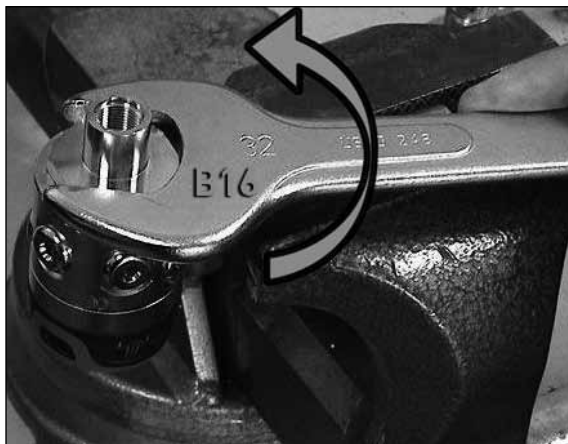


DIN VERSION

- I.** Unscrew the DIN OR seat (187) from the DIN fitting (48) with a 4 mm Allen wrench.
- II.** Remove the O-Ring (188) from the OR seat (187).
- III.** Remove the sintered filter (56) from the DIN connector body (48), turning the first stage over.
- IV.** Insert an 5 mm Allen wrench (B4) inside the DIN fitting (48) and unscrew it completely.
- V.** Remove the DIN fitting (48) and the DIN ring nut (49).
- VI.** Remove the O-Ring (171) from the DIN fitting body (48).



7. Using a 32 mm open end wrench (B16), (46106216), unscrew the INT HP chamber nut (10) then remove the HP chamber assy (4), poppet spring (8), tri-material poppet (9), and the 32 mm poppet pin (12) from the first stage.



8. Extract the O-Ring (6) from the HP housing (4) using a plastic or brass OR removal tool.



WARNING!

REMOVE THE BACKUP RING (5) FROM THE HP CHAMBER ONLY IF IT IS TO BE REPLACED.



NOTE

DO NOT USE BLADES OR POINTED TOOLS MADE OF STEEL OR OTHER MATERIALS, WHICH CAN SCRATCH THE SURFACES.

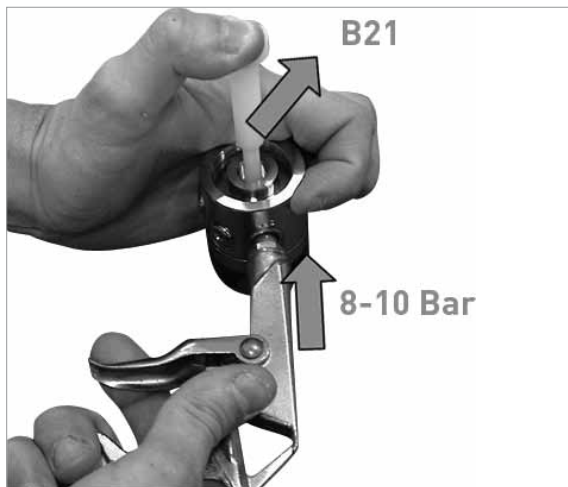


9. Remove the 2068 O-Ring (83) from the HP chamber nut (10).



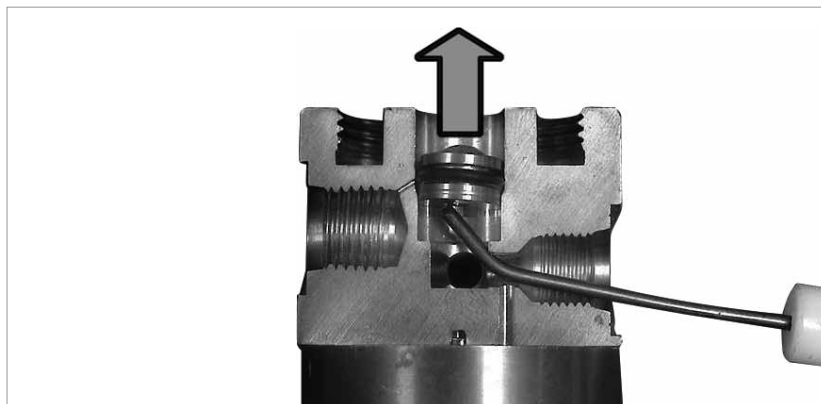
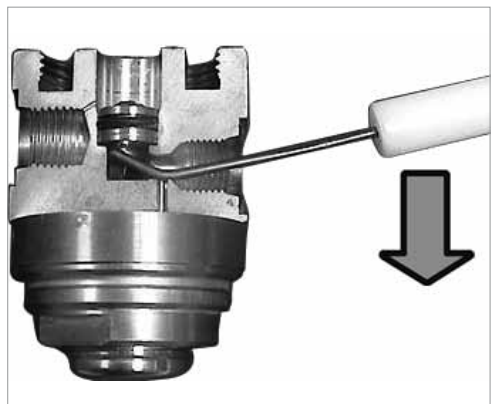
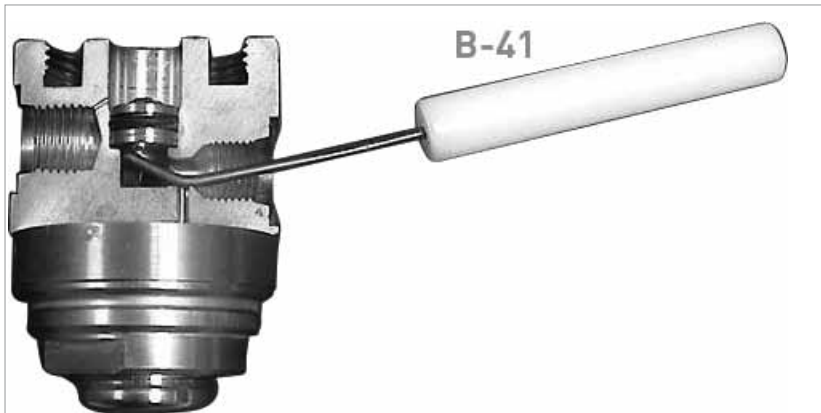
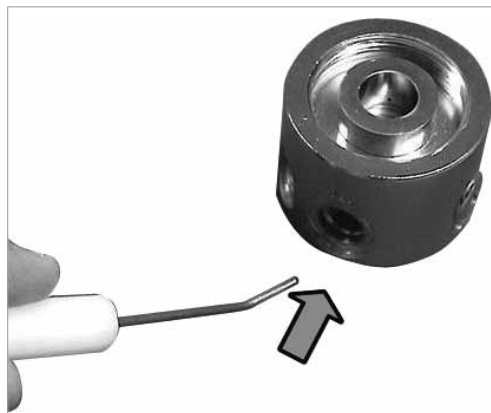
10. Position the special tool (B21) on the 1st stage poppet seat (115) and press lightly; then inject compressed air (8-10 bar) through a 3/8" low pressure port.

NOTE WHEN THE COMPRESSED AIR CAUSES THE POPPET SEAT TO MOVE, REDUCE THE PRESSURE EXERTED ON THE SPECIAL TOOL (B21).



If it is not possible to remove the Poppet Seat (115) in the illustrated way previously it is necessary to use the special utensil special Dismantlement Center 12S (B-41), by inserting it in a hole of low pressure port, and pressing up with it on the Center Valve (115).

46201041 Special 12S Disassembly Tool (B-41) New Tool



11. After removing the seat connector (115) from the 1st stage body (1), remove the O-Ring (74).



12. Rotate the first stage body to remove the cap (157) from it, prying with a flathead screwdriver.



BE CAREFUL TO AVOID DAMAGING THE CHROME PLATING ON THE RETAINING NUT (17).



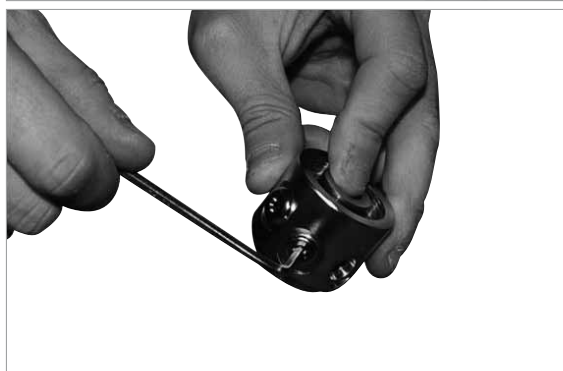
13. Using the Allen wrench (B-13), unscrew the adjusting nut (196) and pull out the spring (16). Unscrew the retaining nut (17) using the 28 mm open end wrench (B2).



14. Use a 4 mm Allen wrench to remove all the low- and high-pressure port caps and then remove their O-Rings.



15. Use a 4 mm Allen wrench to remove all the LP (20) and HP (53) port plugs and then remove their O-Rings (19 LP) (52 HP).



CLEANING AND CHECKS

For routine cleaning of reusable rubber components, wash all parts in a mixture of hot water and mild detergent, scrubbing if necessary with a soft brush. Do not use solvents or acids on rubber components.



ACIDS OR OTHER SOLVENTS MAY DAMAGE PLASTIC AND RUBBER PARTS.
BEFORE CLEANING METAL COMPONENTS, MAKE SURE THAT ALL SEALS AND OTHER PARTS SUBJECT TO DETERIORATION HAVE BEEN REMOVED.

Chrome-plated brass and stainless steel components can be cleaned using a nylon brush to remove any deposits, by immersing them in a fresh water ultrasound bath, or, if suitable equipment is not available, in a gentle acid solution (Deox Extra type) or white vinegar diluted with hot water.

Be sure to rinse all parts in fresh water and dry with a jet of low pressure air at 8-10 bar before proceeding with reassembly.

12S - ROUTINE MAINTENANCE



CERTAIN KEY COMPONENTS OF THE FIRST STAGE SHOULD BE REGULARLY REPLACED AT EACH SCHEDULED OVERHAUL.

LISTED BELOW ARE THE COMPONENTS INCLUDED IN THE 12S 1st STAGE SERVICE KIT (CODE 46200963 INT – 46200964 DIN) :

12S SERVICE KIT (INT: 46200963 – DIN: 46200964)

- SNAP RING (only INT conn.)
- SINTERED FILTER
- BACKUP RING
- O-RINGS
 - 3 106 O-RINGS (LP Cap)
 - 2 108 O-RINGS (HP Cap)
 - 1 2012 O-RING (HP housing)
 - 1 2031 O-RING (HP seat connector)
 - 1 2068 O-RING (HP chamber nut)
 - 1 3043 O-RING (for DIN connection only)
 - 1 2037 O-RING (for DIN connection only)



WARNING!

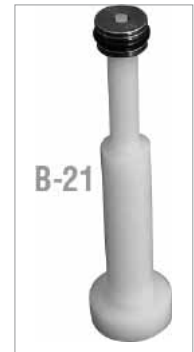
IF THE SECOND STAGE IS USED FOR DIVES WITH OXYGEN-ENRICHED MIXTURES, STRICTLY FOLLOW ALL THE INSTRUCTIONS PROVIDED IN THIS MAINTENANCE MANUAL IN THE NITROX CHAPTER (EN 13949) BEFORE BEGINNING REASSEMBLY!



BEFORE REASSEMBLING, LIGHTLY LUBRICATE ALL THE O-RINGS WITH SILICONE GREASE (TYPE GENERAL ELECTRIC VERSALUBE G-322). LUBRICATION REDUCES THE LIKELIHOOD OF DAMAGE DURING REASSEMBLY

REASSEMBLY

- 16.** Place the O-Ring (74) in the MR poppet seat (115) and then correctly position the poppet seat on the special tool (B21).



- 17.** Pressing gently, push the poppet seat (115) into position in the first stage body (1).



WARNING!

TAKE SPECIAL CARE WHEN INSERTING THE POPPET SEAT. MAKE SURE THAT IT IS POSITIONED CORRECTLY ONCE IT IS INSERTED INTO THE HIGH-PRESSURE CHAMBER, WITH THE CONICAL SECTION FACING UPWARD.



- 18.** Insert the O-Ring (83) into the HP chamber nut (10 INT - 192 DIN)



WE RECOMMEND THAT YOU PLACE THE O-RING (83) IN ITS SEAT USING A PLASTIC ROD. CHECK THAT IT SITS PROPERLY IN PLACE.



19. Insert the backup ring (5) and the O-Ring (6) into the HP housing (4).



20. Place the complete HP housing (4) inside the HP Chamber Nut (10 INT - 192 DIN). Then position the MR spring (8) and the trimaterial valve (9) over the HP housing.



21. Turn the first stage (1) over and screw the HP chamber nut into it.



22. Use a 32 mm wrench (B16) to fully tighten the HP nut (10 INT - 192 DIN).



NOTE IF USING A TORQUE WRENCH, USE TIGHTENING TORQUE OF APPROXIMATELY 35 N/m.



23. Rotate the 1st stage body and insert the 32.5 mm steel pin (12) into the center hole in the 1st stage body (1).



24. Position the poppet button (13) on the pin (12), and press on it to feel the "response" of the poppet spring.



NOTE FOR THE CWD DRY PROCEDURE, SEE PAGE 16

25. Place the diaphragm (14) in the retaining nut seat (17), making it adhere perfectly to the edges.



NOTE REINSTALL THE DIAPHRAGM (14) IN THE SAME POSITION FROM WHICH IT WAS REMOVED. NOTE THE IMPRESSION OF THE POPPET BUTTON (13) ON IT.

26. Tighten the retaining nut (17) including the diaphragm (14) to the 1st stage body (1).



27. Use a 28 mm wrench (B2) to fully tighten the retaining nut to the 1st stage body.

NOTE USING A TORQUE WRENCH, USE TIGHTENING TORQUE OF APPROXIMATELY 32-35 N/m.



28. Place the spring base plate (15) in the middle of the diaphragm (14).



29. Position the spring (16) over the spring base plate (15).



30. Screw the adjusting nut (196) 3 – 4 turns on the retaining nut (17) using a 10 mm Allen wrench (B13).

! WARNING!

DO NOT OVER-TIGHTEN THE ADJUSTING NUT; THIS WILL CAUSE AN INCREASE IN INTERMEDIATE PRESSURE, INTERFERING WITH SUBSEQUENT ADJUSTMENTS.



31. Place the cap (157) on the first stage.



32. Rotate the 1st stage body and insert the yoke spacer (154).



33. Assemble the filter spring (61) and the sintered filter (22) in the yoke retainer nut body.



34. Using the snap ring pliers (B14), fit the snap ring (2) in its position above the sintered filter (22).

NOTE ROTATE THE SNAP RING TO CHECK ITS CORRECT POSITIONING.



NOTE TO PREVENT THE YOKE RETAINER NUT FROM WORKING LOOSE ACCIDENTALLY, POUR ONE OR TWO DROPS OF THREAD COMPOUND (LOCTITE 242 TYPE) ONTO ITS THREADING.



35. Position the yoke (3) with the knob (25) on the first stage body.



36. Using the wrench (B1), fully tighten the complete yoke retainer nut (7).

NOTE IF USING A TORQUE WRENCH, USE TIGHTENING TORQUE OF APPROXIMATELY 18-20 N/m.



DIN VERSION

37. Install the O-Ring (171) on the DIN coupling (48).

NOTE TO PREVENT THE NUT YOKE RETAINER FROM WORKING LOOSE ACCIDENTALLY, PUT ONE OR TWO DROPS OF THREAD COMPOUND (LOCTITE 222 TYPE) AT THE BEGINNING THREADS.



38. Place the DIN ring nut (49) on the DIN chamber nut (192) and then fully tighten the coupling (48).

NOTE IF USING A TORQUE WRENCH, USE TIGHTENING TORQUE OF APPROXIMATELY 18-20 N/m



- 39.** Insert the tapered filter (56) into the DIN connector.
40. Position the O-Ring (188) on the OR seat (187).



- 41.** Screw the O-Ring housing (187) to the DIN fitting (48) with a 4 mm Allen wrench and unscrew the disassembly tool (B5) from the first stage body.

NOTE IF USING A TORQUE WRENCH, USE TIGHTENING TORQUE OF APPROXIMATELY 1.5-2 N/m.

NOTE CONNECT THE FIRST STAGE TO A FULL TANK (AT LEAST 180 BAR) OR TEST BENCH, AND OPEN THE AIR VALVE SLOWLY TO EXPEL ANY FOREIGN MATTER FROM THE FIRST STAGE.



- 42.** Position the O-Rings (19 - 52) on the caps (20 - 53).



- 43.** Tighten the caps (20 - 53) to the first stage body (1) using a 4 mm Allen wrench and the flexible hoses in the corresponding ports on the first stage.

NOTE FOR CHECKS AND ADJUSTMENTS ON THE FIRST STAGE, CONSULT THE CORRESPONDING SECTION OF THE MAINTENANCE MANUAL : F 7-1 (2008)



CWD DRY

- a. Place the diaphragm (14) in the CWD Dry body (57), making it adhere perfectly to the edges.



- b. Tighten the retaining nut (57) including the diaphragm (14) to the 1st stage body (1). Use a 30 mm wrench (B40) to fully tighten the CWD body (57) to the 1st stage body.



NOTE IF USING A TORQUE WRENCH, USE TIGHTENING TORQUE OF APPROXIMATELY 32-35 N/m.

- c. Place the metal spring base plate (194) in the middle of the diaphragm (14).
d. Position the spring (16) over the metal spring base plate (194).



- e. Screw the adjusting nut (18) 3 – 4 turns on the retaining nut (57) using a 10 mm Allen wrench (B13).



⚠ WARNING!

DO NOT OVER-TIGHTEN THE ADJUSTING NUT; THIS WILL CAUSE AN INCREASE IN INTERMEDIATE PRESSURE, INTERFERING WITH SUBSEQUENT ADJUSTMENTS

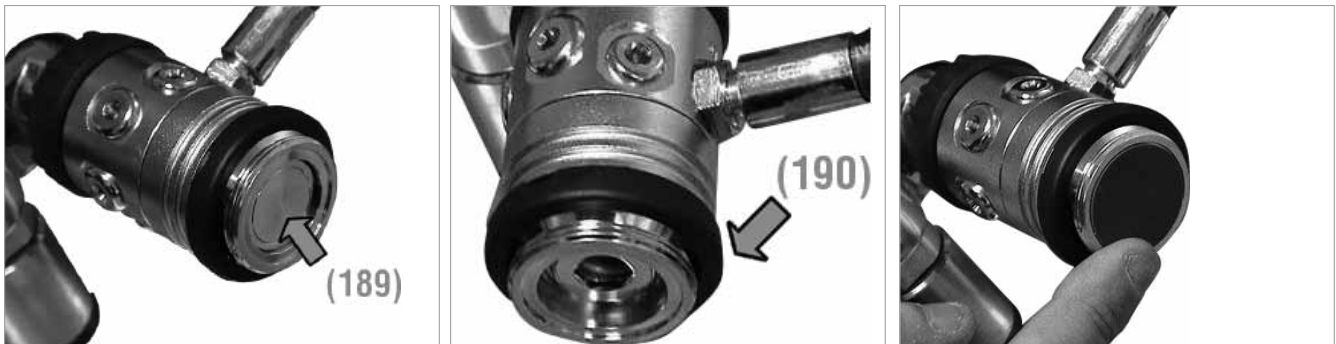
- f. After calibrating the intermediate pressure on the first stage (9.0-9.4 bar), place the shock ring (190) on the CWD body (57).

⚠ WARNING!

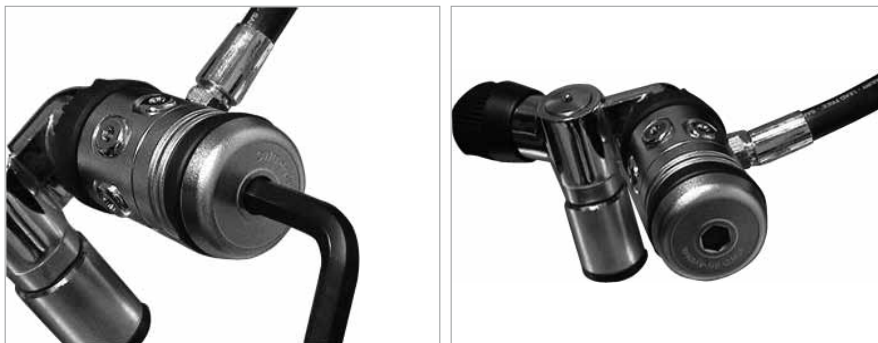
ALL THE OPERATIONS DESCRIBED BELOW MUST BE PERFORMED WITH THE REGULATOR PRESSURIZED!



- g.** Position the CWD Dry piston inside the CWD Dry body (57).



- h.** Arrange the CWD Dry diaphragm (193) over the piston (189) and hold it in place with your finger.
- i.** Tighten the cap (191) to the CWD Dry body (57) and tighten the 10 mm Allen wrench (B13), making sure that the diaphragm (193) has stayed in place.



NOTE IF USING A TORQUE WRENCH, USE TIGHTENING TORQUE OF APPROXIMATELY 32-35 N/m.

NOTE RUN SOME SUPPLY CYCLES FOR A FEW MINUTES. CHECK THE INTERMEDIATE PRESSURE. IT MUST BE BETWEEN 9.2 AND 9.6 BAR. ADJUST AGAIN IF NECESSARY.

Drawing # E112	FIRST STAGE MR12S	UPDATED: 22/12/2008
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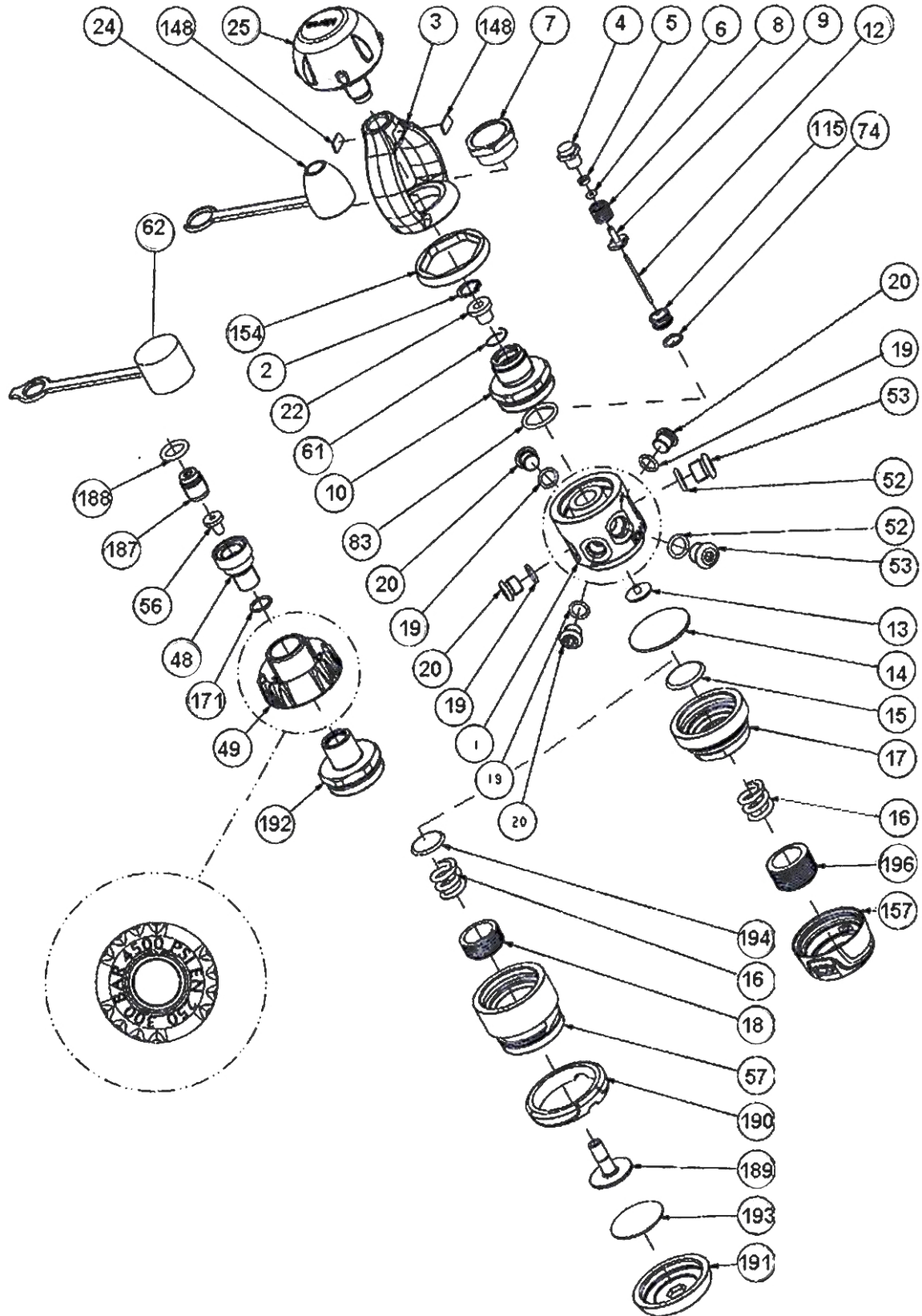


Table # 35	FIRST STAGE MR12S	UPDATED : 22/12/2008
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REF	CODE	DESCRIPTION
1	46200944	First stage body 12S
2	46185015	Seeger d. Int. 13
3	46185211	Yoke 2000
4	D	Hp chamber
5	46185038	Backup ring 1 st stg regulator
6	46110101	OR 2012
6	46110401	OR 2012 viton 006-9707
7	46185212	Nut yoke retainer 1 st stage mr12
8	46185011	Spring, 1 st stage valve, mr12
9	46200652	Poppet 1° stg tri-material
10	46200940	Connector body int
12	46186214	Pin poppet MR12 32,5 mm
13	46185032	Button, 1 st st. Poppet
14	46185022	Diaphragm, 1 st stage regulators
15	46185034	Plate spring base
16	46185023	Spring diaphragm 1 st stage reg.
17	46200938	Retaining nut 12S
18	46185028	Regulating nut, cwd
19	46110106	OR 106
19	46110402	OR 106 viton 610-9707
20	46185204	Lp plug 3/8", 1 st stage, regs.
22	46186202	1 st stage filter, regulators
24	46185010	Dust cap
25	46184079	Yoke knob
48	46200934	Connecting plug, din 300 bar 12S
49	46200932	Din 300 bar threaded locking ring
52	46110108	OR 108
52	46110404	OR 108 viton 611-9707
53	46185205	Hp plug 7/16", 1st stage
56	46200948	Filter, din connector, 12S
57	I	Cwd dry 12S body
61	46185013	Spring, filter 1 st . Stage
62	46200562	Dust cap 300 bar din connector

REF	CODE	DESCRIPTION
74	46110107	OR 2031
74	46110403	OR 2031 viton 011-9707
83	46110225	OR 2068
83	46110420	OR 2068 viton
115	46186216	Poppet seat mr
148	46184315	Label yoke "en 250"
149	46184316	Oval label
154	46200930	Plastic ring int 12s
157	46200929	Hock cap, 1 st stage 12S
171	46110110	OR 2037
171	46200298	OR 2037 viton
187	46200946	O-Ring seat din 12S
188	46110247	OR 3043
188	46200620	OR 3043 viton
189	46200925	Cwd dry 12S piston
190	46200923	Plastic ring cwd dry 12S
191	46200922	Hock cup cwd dry 12S
192	46200942	Conn. Body hp din 12S
193	46200926	Diaphragm, cwd dry 12S
194	46200950	Plate spring base cwd dry
196	46184511	Regulating nut, 1 st stage
ASSEMBLIES		
A	416209	1 st stage assembly 12S (int-din)
D	46185210	Hp housing assy, 1 st stage (4-5-6)
D	46186259	Hp housing assy, 1 st std (viton o-rings)
F	416807	Din connector 300 12S (48-49-56-62-171-187-188-192)
I	416856	Kit cwd dry 12S
###	46200963	Service kit 1st stg 12S int
###	46200965	Service kit 1 st stg 12S int (viton o-rings) (2-5-6-19-22-52-74-83)
ooo	46200964	Service kit 1 st stg 12S din
ooo	46200966	Service kit 1 st stg 12S din (viton o-rings) (5-6-19-52-56-74-83-171-188)

**CARBON
SECOND STAGE**



MAINTENANCE PROCEDURES

▶ TOOLS NEEDED



WARNING!

ALL MAINTENANCE AND REPAIR PROCEDURES MUST BE PERFORMED BY A AUTHORIZED MARES LAB SERVICE CENTER, DISTRIBUTOR, OR A AUTHORIZED MARES DEALER. THEREFORE, THE INFORMATION PROVIDED BELOW IS INTENDED STRICTLY FOR TECHNICIANS AT SUCH CENTERS.



ALL OPERATIONS MUST BE CONDUCTED STRICTLY IN THE ORDER DESCRIBED.

IN ORDER TO ENSURE ADVANCED PERFORMANCE AND SAFETY DURING USE, AFTER 100 HOURS OF DIVING OR 1 YEAR THE REGULATOR MUST BE CHECKED, AND ITS CRITICAL PARTS MUST BE INSPECTED AND REPLACED IF NECESSARY.

- Phillips head screwdriver
- Compressed air supply circuit or tank (180-200 bar/ 2,646 - 2,940 psi)
- Cutting nippers
- O-Ring removal tool
- Silicone grease (General Electric or Novagard Versilube G-322L type or equivalent / Nitrox - Christo – Lube MCG111)
- Compressed air gun (8 -10 Bar/118 -147 psi)
- Descaling solution (Deox Extra type or equivalent) and or an ultrasonic tank
- Test Bench
- Carbon/Prestige/Rebel 2nd stage maintenance kit (code 46200296 - 46200297 VITON O-RING)



(B-6)
46106206



(B-17) 17mm (2)
46106217



(B-18) 14mm
#46106218



(B-12) 5.5mm
#46106212



(B-4) 5mm
#46106204



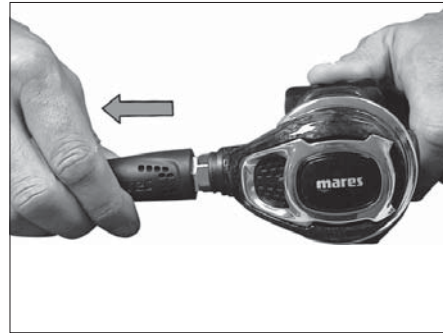
B-8) 6mm
46106208



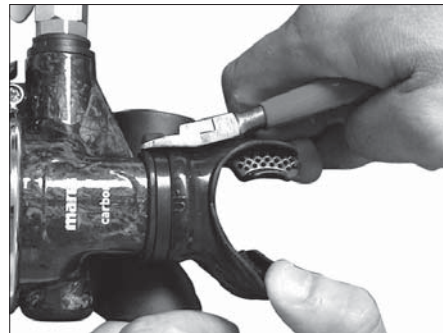
Hex wrench 4mm

DISASSEMBLY

1. Slide hose protector from body of the 1st stage
2. Unscrew the hose (26) using a 14 mm open end wrench (B18 - 46106218).
3. Slide the 2nd stage side hose cover away from 2nd stage body.



4. Using the two 17 mm open end wrenches (B17 - 46106217), unscrew the hose from the 2nd stage connector. (need picture)
5. Remove the clamp (43) from the mouthpiece using a cutting nippers or a similar tool.



6. Unscrew the clamp screw (38) with a Phillips head screwdriver and then remove it from the ring clamp (37).
7. Open the ring clamp (37) and pull it off of the second stage case (32).



WARNING!

GENTLY SPREAD OPEN THE RING CLAMP TO A

VOID BENDING IT , WHICH WILL COMPROMISE SUBSEQUENT

REASSEMBLY.

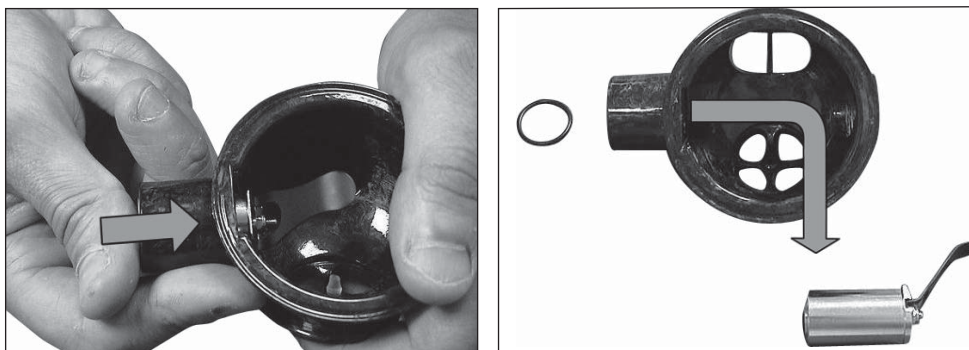
8. Remove the cover (39) and the diaphragm (36) from the 2nd stage body.



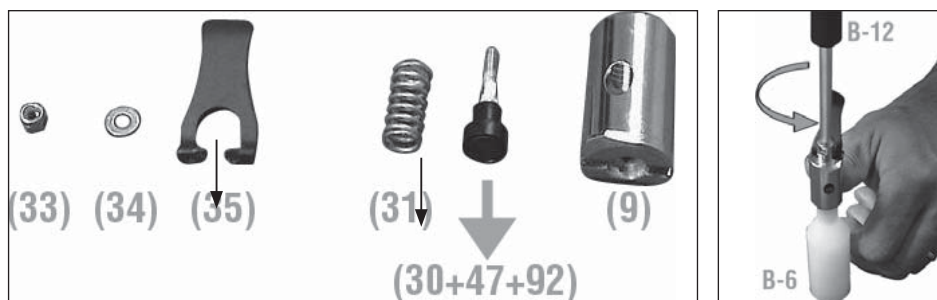
9. Remove the exhaust tee (41) from the second stage case (32) by pinching together and pulling off.
10. Gently pull the exhaust valve out of the bottom of 2nd stage case (40).
11. Unscrew the hose connector (28) using a 17 mm open end wrench (B17 - 46106217), and then remove the spacer ring by – pass BK (96).



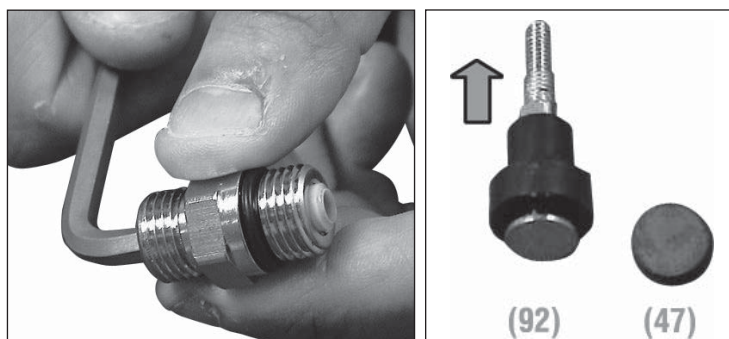
12. Gently press the demand lever insert assembly into the 2nd stage case, then remove the O-Ring 2068 (83) from its seat in the 2nd stage case (32).



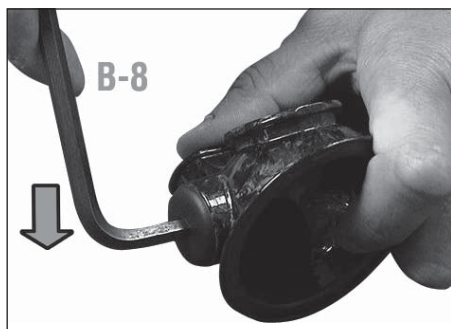
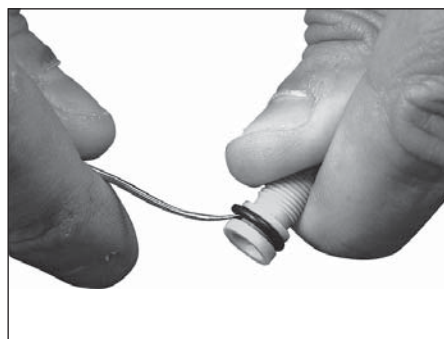
- 13.** Position the demand lever connector assembly on the Demand lever assembling tool (B6 - 46106206), and use the Demand lever adjusting tool (B12 - 46106212) to unscrew the demand lever locknut (33) from the demand lever (35). Then remove the washer (34), the poppet assembly pieces (30 + 47 + 92), and the spring (31).



- 14.** Remove the poppet seat (47), pushing slightly on the poppet seat holder (92) in the direction of the threaded stem. Remove the poppet seat holder (92) from the stem of the 2nd stage valve shaft (30).
- 15.** Unscrew the seat connector (21) from the hose connector assembly (28) using a 5 mm hex wrench (B4 - 46106204).



- 16.** Remove the O-Ring 2050 (71) from the hose connector (28), and the O-Ring 2025 (27) from the adjustable poppet seat 2nd stage - (21).
- 17.** Remove the 2nd stage adjustment plug (64) using a 6 mm hex wrench (B8 - 46106208), and remove the O-Ring 2068 (83) from the case plug.



CLEANING AND CHECKS

For routine cleaning of reusable rubber, plastic and Carbon components, wash all parts in a mixture of hot water and mild detergent, scrubbing if necessary with a soft brush..



WARNING!

ACIDS OR OTHER SOLVENTS MAY DAMAGE PLASTIC, CARBON AND RUBBER PARTS.

BEFORE CLEANING MET AL COMPONENTS, MAKE SURE THA T ALL SEALS AND OTHER P ARTS SUBJECT TO DETERIORA TION HAVE BEEN REMOVED.

Chrome-plated brass and stainless steel components can be cleaned using a nylon brush to remove any deposits, by immersing them in a fresh water ultrasound bath, or, if suitable equipment is not available, in a gentle acid solution (Deox Extra type) or white vinegar diluted with hot water. Be sure to thoroughly rinse all parts in fresh water and dry with a jet of low pressure air at 8 – 10 bar / 117 – 148 psi before proceeding with reassembly.

CARBON - ROUTINE MAINTENANCE



WARNING!

CERTAIN KEY COMPONENTS OF THE 2ND STAGE SHOULD BE REGULARLY REPLACED AT EACH SCHEDULED OVERHAUL. BELOW ARE LISTED THE COMPONENTS INCLUDED IN THE ABYSS / CARBON 2ND ST AGE SERVICE KIT (#46200296 - #46200297 VITON O-RINGS):

► **CARBON/CARBON OCTOPUS 2ND STAGE SERVICE KIT**

- DEMAND LEVER LOCK NUT (ref. 33)
- 2nd STAGE, RUBBER SEAT (ref. 47)
- EXHAUST VALVE 8 (ref. 40)
- MOUTHPIECE CLAMP (ref. 43)
- O-RINGS :

I. O-RING 106 (ref. 19)

II. O-RINGS 2025 (ref. 27)

III. O-RINGS 2068 (ref. 83)

IV. O-RING 2050 (ref. 51)

REASSEMBLY

⚠ WARNING!

IF THE FIRST STAGE IS USED FOR DIVES WITH OXYGEN-ENRICHED MIXTURES, FOLLOW ALL THE INSTRUCTIONS PROVIDED IN MARES SERVICE MAINTENANCE MANUAL IN THE NITROX CHAPTER BEFORE BEGINNING REASSEMBLY!

SPECIAL NOTE:

2ND STAGE REGULATORS USED IN EUROPE MUST BE CLEANED AND REASSEMBLED IAW EN13949 STANDARDS!!

NOTE

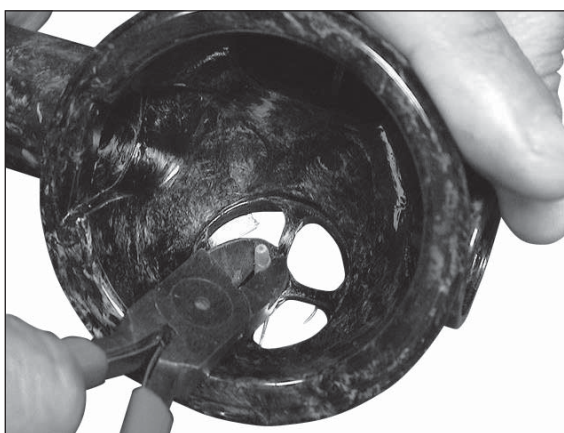
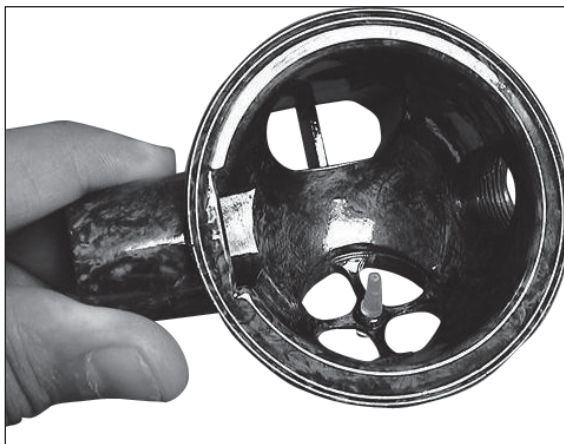
BEFORE REASSEMBLING, LIGHTLY LUBRICATE ALL THE O-RINGS WITH SILICONE GREASE (TYPE GENERAL ELECTRIC OR NOVAGARD VERSILUBE G-322L). FOR NITROX REASSEMBLY USE CHRISTO – LUBE MCG111. LUBRICATION REDUCES THE LIKELIHOOD OF DAMAGE DURING REASSEMBLY.

- 18.** Install a new exhaust valve (40), carefully pulling its silicone stem through the center hole of the second stage exhaust valve support.

⚠ WARNING!

DO NOT PULL TOO HARD ON SILICONE STEM AS THIS MAY DAMAGE THE EXHAUST VALVE.

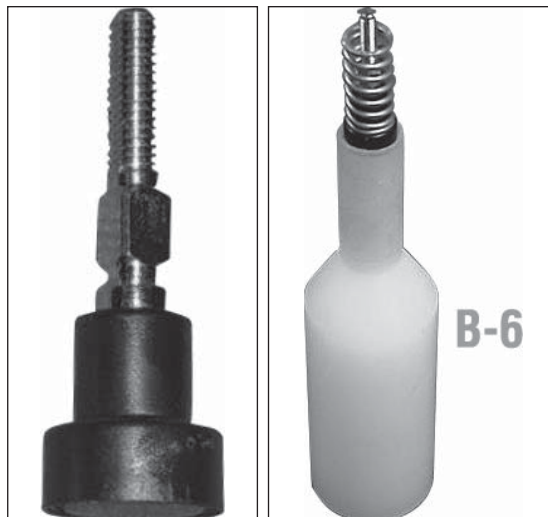
- 19.** Use cutting nippers to cut the silicone stem at approximately half its length.
- 20.** Fit the O-Ring (71) in the seat of the hose connector (28) and fit the O-ring (27) in its place on the 2nd stage adjustable poppet seat (21).



- 21.** Insert and screw the seat connector (21) into the hose connector (28) using the 5 mm hex wrench (B4 - 46106204) until it protrudes about 2.2-2.5 mm).



- 22.** Reassemble the poppet seat holder (92) on the 2nd stage poppet stem (30). Reassemble the rubber poppet seat (47) in the poppet seat holder (92).
- 23.** Place the 2nd stage poppet assembly (30-47-92) together with its spring (31) on the Demand lever assembling tool (B6 - 46106206).



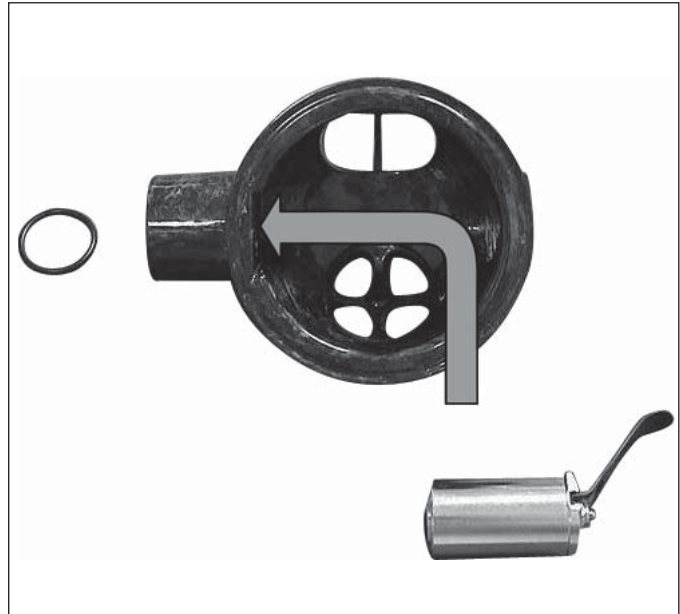
24. Pressing gently, correctly position the 2nd stage valve and its spring into the demand lever connector (91) and hold it in place.

NOTE TO ENSURE THAT THE 2ND STAGE POPPET STEM IS POSITIONED CORRECTLY IN THE DEMAND LEVER CONNECTOR HOLE, GENTLY ROTATE THE CONNECTOR LEFT AND RIGHT ON THE B-6 TOOL.

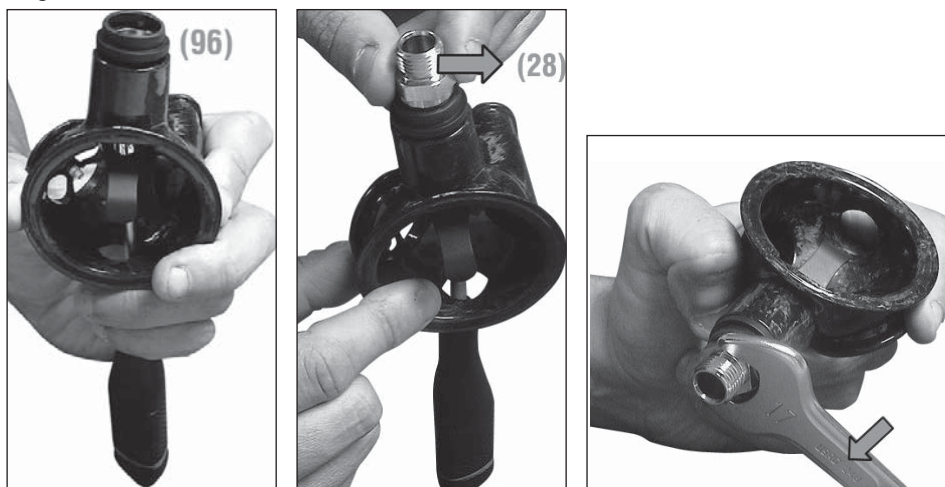
25. Properly position the demand lever (35) with respect to the by-pass hole (VAD) in the metal insert (91) channel.
26. Fit the washer (34) on the poppet stem and tighten the demand lever adjusting nut (33) 7 or 8 full turns using the Demand lever adjusting tool (B12 - 46106212).

NOTE PRESS THE DEMAND LEVER A FEW TIMES TO BE SURE IT MOVES FREELY IN HOUSING.

27. Correctly position the demand lever connector assembly (91) in the 2nd stage case (32). Ensure VAD holes are lined up in case.
28. Hold the demand lever connector in place in the second stage case with the B12 - 46106212 Demand lever adjusting tool, insert the O-Ring (83) into the seat between the 2nd stage case and the demand lever connector using the Demand lever assembling tool (B6 - 46106206).



29. Put the spacer ring (96) in place, and then use the 17 mm open-end wrench (B17 - 46106217) to fully lock down the case assembly connector (28) in the 2nd stage case. Press the demand lever a few times to ensure it still moves freely in housing.



NOTE IF USING A TORQUE WRENCH, USE TIGHTENING TORQUE OF 8 - 8.5 N/m

30. Fit the O-ring (27) in the seat on the swivel coupling of the hose (26). Screw the hose (26) into the case assembly connector (28) using the wrench (B-17).



NOTE IF USING A TORQUE WRENCH, USE TIGHTENING TORQUE OF 3 - 3.5 N/m

31. Place the O-Ring 106 (19) in the Hose (26) and assemble the hose with the partially finished 2nd stage on the D.F.C. port on the first stage, locking it down with the 14 mm wrench (B-18).



NOTE IF USING A TORQUE WRENCH, USE TIGHTENING TORQUE OF 4 - 4.5 N/m

FINAL ADJUSTMENTS

To correctly adjust the regulator:

- a. The repair shop should be equipped with a high- and low-pressure compressed air supply.
- b. A pressure gauge is required for checking the intermediate pressure (the pressure gauge should have a full scale value of MAX 25 BAR / 350 psi, for greater adjustment accuracy).
- c. Screw the intermediate pressure measuring gauge into one of the 3/8" low-pressure ports on the 1st stage, using the wrench (B18 - 46106218).
- d. Mount the regulator group on the control valve (of the tank or test bench).
- e. Holding down the second stage demand lever, slowly open the tank valve and, slowly release the demand lever.
- f. Read the intermediate pressure gauge to check whether the 1st stage pressure is correct. 9.8 - 10.2 bar / 142 – 148 psi
cold water kit installed: 9.2 – 9.6 bar / 133 – 139 psi



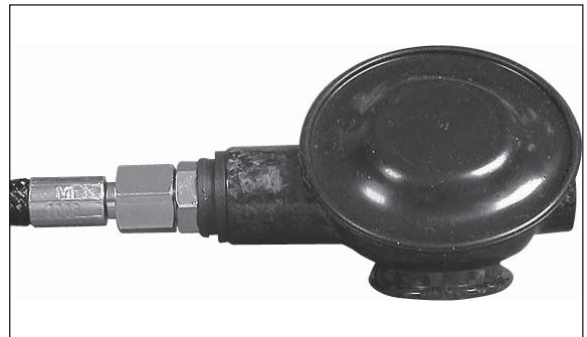
WARNING!

THE FIRST STAGE INTERMEDIATE PRESSURE MUST BE MEASURED WHEN THERE IS NO AIR COMING OUT OF THE 2ND STAGE. FOR THE NECESSARY 1ST STAGE ADJUSTMENTS, REFER TO THE CORRESPONDING MARES SERVICE MANUAL.

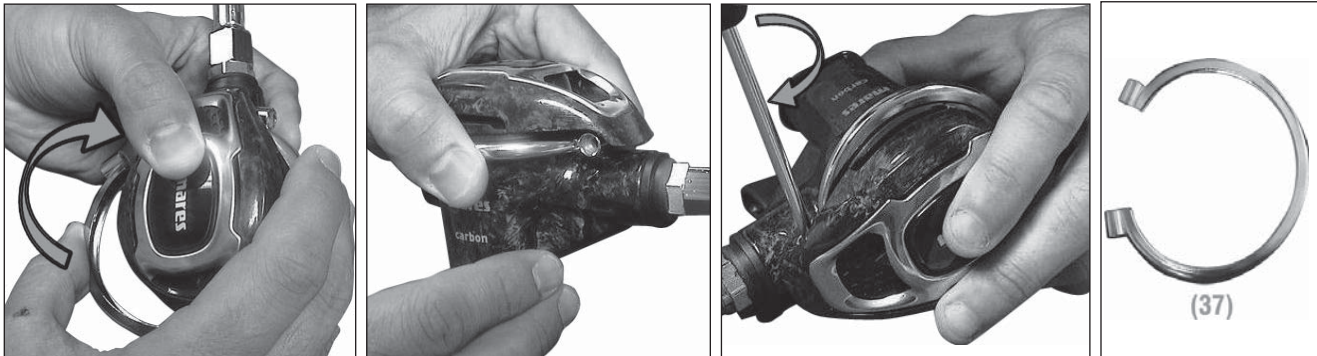
IMPORTANT!

ALL THE ADJUSTMENTS BELOW MUST BE MADE WITH THE SECOND STAGE CONSISTENTLY SUPPLIED WITH THE CORRECT INTERMEDIATE PRESSURE.

32. Place the 2nd stage diaphragm (36) in the 2nd stage case.
33. Fit the cover (39) on the diaphragm, orienting it the right way round.



34. Holding the cover in the correct position, insert the ring clamp (37) with the screw eyelets over the second stage case assembly connector.



35. Lock down the clamp screw (38).

⚠ WARNING!

BEFORE TIGHTENING THE LOCK SCREW (38), ENSURE THAT THE COMPONENTS (39) AND (37) ARE ORIENTED CORRECTLY ON THE 2ND STAGE CASE (32) IN ORDER TO PREVENT MOVING THE INHALATION DIAPHRAGM (36) INTO THE WRONG POSITION.

36. Working through the hole in the second stage case, use the wrench (B-12 - 46106212) to lock down or back off the demand lever lock nut (32) in order to make final adjustments to the demand lever (35).



⚠ WARNING!

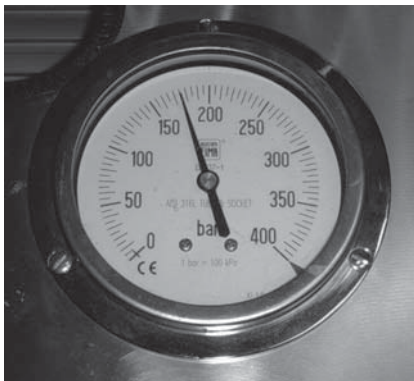
THE DEMAND LEVER IS ADJUSTED CORRECTLY WHEN YOU CAN PRESS THE PURGE BUTTON ON THE COVER DOWN ABOUT 2 mm BEFORE AIR BEGINS TO RELEASE. IN ADDITION, THE SOUND OF THE DEMAND LEVER TOUCHING THE METAL DISK OF THE SECOND ST AGE DIAPHRAGM AS IT MOVES ("TAPPING") SHOULD BE AUDIBLE WHEN THE PRESSURIZED SECOND STAGE IS SHAKEN VIGOROUSLY UP AND DOWN.

OBJECT:
Regulator Test Bench**IMPORTANT INFORMATIONS**

TO CHECK THE HIGH PRESSURE (2) MARES RECOMMENDS HP AIR BETWEEN 150 - 200 BAR / 2,175 – 2,900 PSI

TO CHECK THE INTERMEDIATE PRESSURE (IP), ON THE LP GAUGE AND ADJUST IT IF NECESSARY. TO DOWNLOAD THE AIR FROM REGULATOR YOU CAN USE THE “DISCHARGE LEVER”

TANK PRESSURE



IP PRESSURE



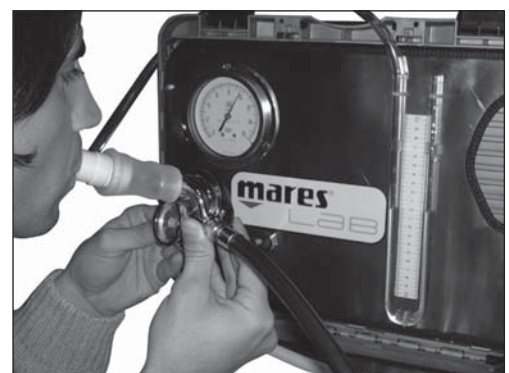
DISCHARGE LEVER



- INSTALL THE INHALING MOUTHPIECE (8) ON THE SECOND STAGE MOUTHPIECE TUBE.

- TO CHECK THE CRACKING EFFORT USING COLUMN WATER (SEE INFO TABLE)

NOTE ...THE CRACKING EFFORT IT MUST BE READ THE SAME MOMENT THAT THE VALUE OF INTERMEDIATE PRESSURE STARTS TO DECREASE...



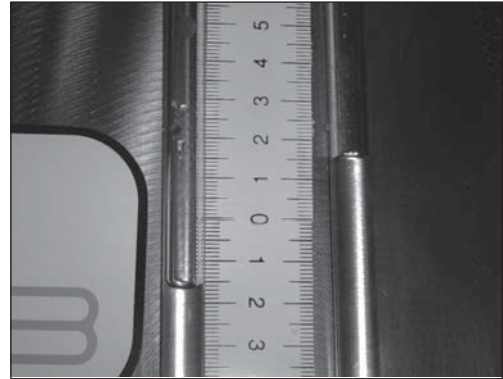
2ND STAGE CRACKING EFFORT

2° STAGE	cm of H ₂ O	inch of H ₂ O
PRIMARY	2,8-3,3	1,1-1,3
OCTOPUS	3.0-3.5	1,2-1,4

NOTE TO OBTAIN THE CRACKING EFFORT IS NECESSARY TO ADD THE VALUE OF COLUMN WATER THAT GOES UP WITH THE VALUE OF COLUMN WATER THAT GOES DOWN (OR REDOUBLE ONE OF THEM).

NOTE SOMETIMES THE GRADUATION OF COLUMN WATER IS ALREADY REDOUBLED (1 REAL cm = 2 ON GRADUATION OF COLUMN WATER)

- CLOSE THE TANK VALVE, AND DISCHARGE THE RESIDUAL AIR, BY PUSHING ON THE SECOND STAGE BUTTON COVER OR THE DISCHARGE LEVER (5)
- CLOSE THE TEST BENCH VALVE, AND TRY TO INHALE DIRECTLY FROM THE SECOND STAGE (W/O THE INHALING MOUTHPIECE (8)), IN ORDER TO DETECT LEAKAGE INSIDE OF THE CASE.



FINAL ASSEMBLY

- 37.** Press the purge button a few times, and then reassemble the O-Ring (83) on the case plug (64).
- 38.** Use the hex wrench (B8 - 46106208) to fully tighten the case plug assembly (83+64) in the 2nd stage case (32).



WARNING!

FOR CHECKS AND ADJUSTMENTS ON THE SECOND STAGE, CONSULT THE CORRESPONDING SECTION OF THE MARES SERVICE MAINTENANCE MANUAL (S 9-1).

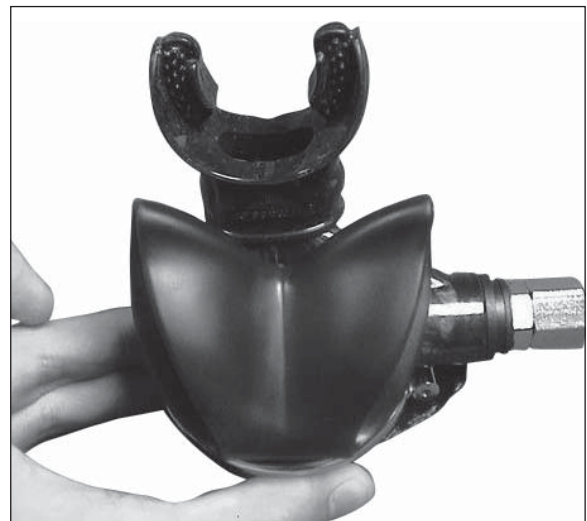
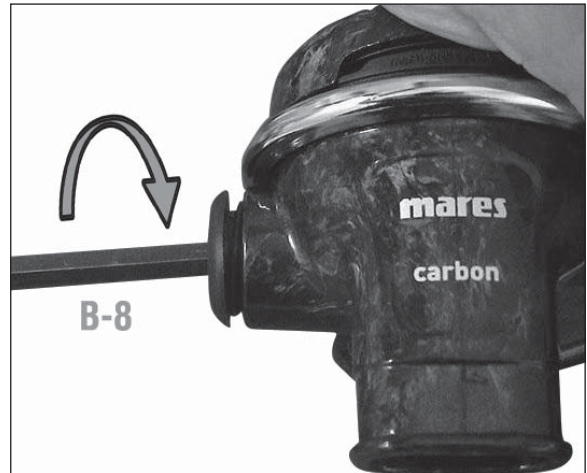
- 39.** Assemble the exhaust tee (41) on the support flange on the second stage.



WARNING!

MAKE SURE THAT THE EDGE OF THE EXHAUST TEE IS CORRECTLY FITTED ON THE FLANGE. LIGHT LUBRICATION WITH LIQUID SOAP OR DETERGENT FACILITATES INSTALLATION. (S 9-1).

- 40.** Carefully assemble the mouthpiece (44), securing it with a new mouthpiece clamp (43).



**AIR CONTROL
OCTOPUS**

mares®

MAINTENANCE PROCEDURES

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- Small flathead screwdriver
- Compressed air supply circuit or tank (180-200 bar/2,646 - 2,940 psi)
- Cutting nippers
- Plastic or Brass O-Ring removal tool (Pin)
- Silicone grease (General Electric Versalube G-322 type/ Christo Lube 111)
- Compressed air gun (8-10 Bar / 116 - 145 psi)
- Descaling solution (Deox Extra type) or ultrasound tank
- Test Bench (code 416920 or code 416922)
- Octopus Service kit (code 46201064)



(B-6)
46106206



A-3 13 mm
46201071



B-18 14 mm
#46106248



(B-12) 5.5 mm
#46106212



(B-4) 5 mm
#46106204



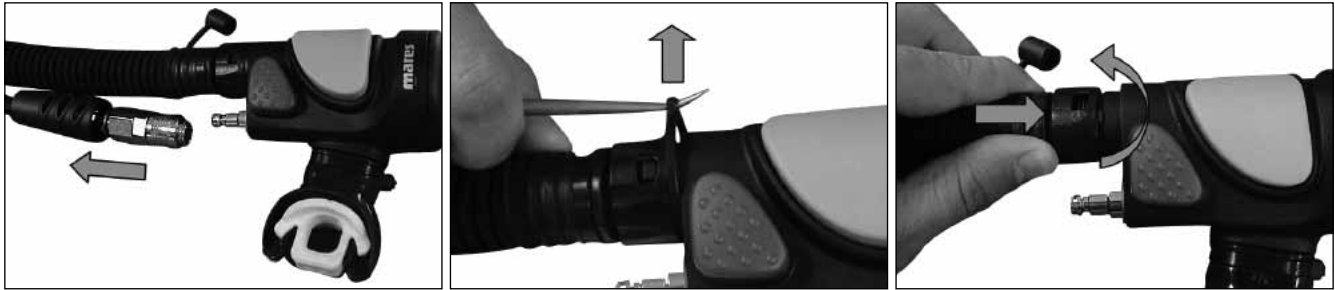
(A-1)
46201039



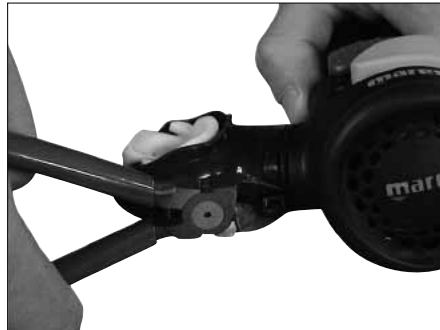
(A-4) #46201073

DISASSEMBLY

1. Disconnect the LP hose Quick Coupler (55) from the air control body (218), then remove the Plastic Seeger (208), along with the Inflator Adaptor (189) from the Air Control unit.



2. Remove the clamp (43) from the mouthpiece (44) using cutting nippers or a similar tool.



3. Using a flathead screwdriver, remove the pin-cover (63). Unscrew the cover (204). Remove the diaphragm plastic ring (78) and the diaphragm (36) from the Air Control Body (218).



4. Remove the Retaining Ring (198) from the Male Connector (210) using a screwdriver.
5. Carefully press the Male Connector (210) out of the Main Air Control Body (218).



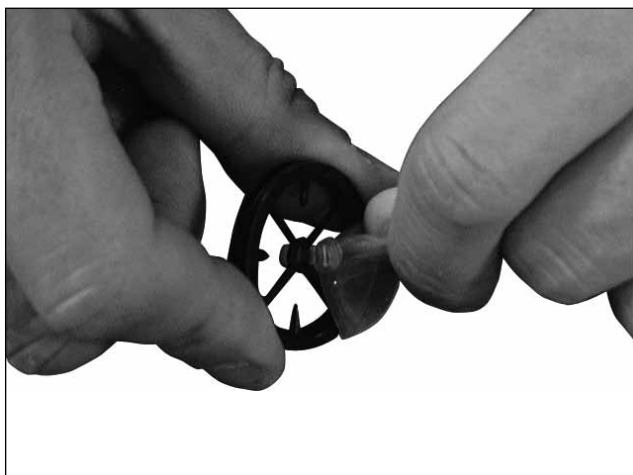
- Using the special A-1 wrench, unscrew the Exhaust Valve Cap (211).



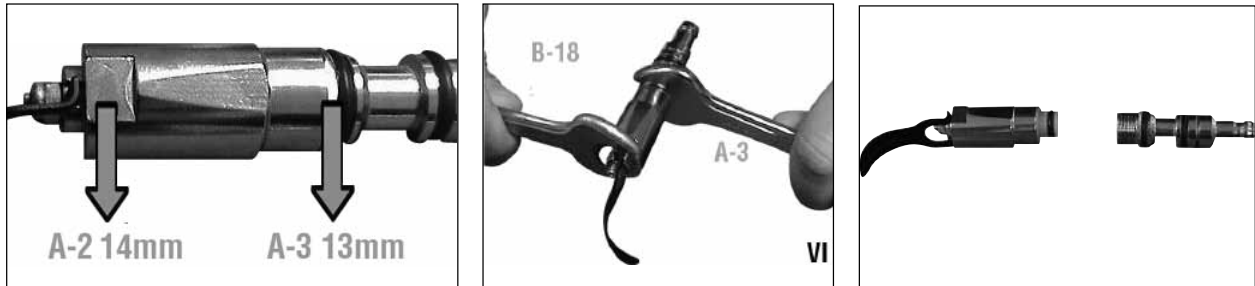
- Remove the Exhaust Valve Seat (220) from the outside by pressing gently on it and then remove the Spacer Ring (222).



- Remove the exhaust valve (221) and the O-ring (193) from the exhaust valve seat (220).



9. Using the B-18 (14mm) and A-3 (13mm) open end wrenches, carefully unscrew the Male Connector (210) from the Poppet Housing (205).



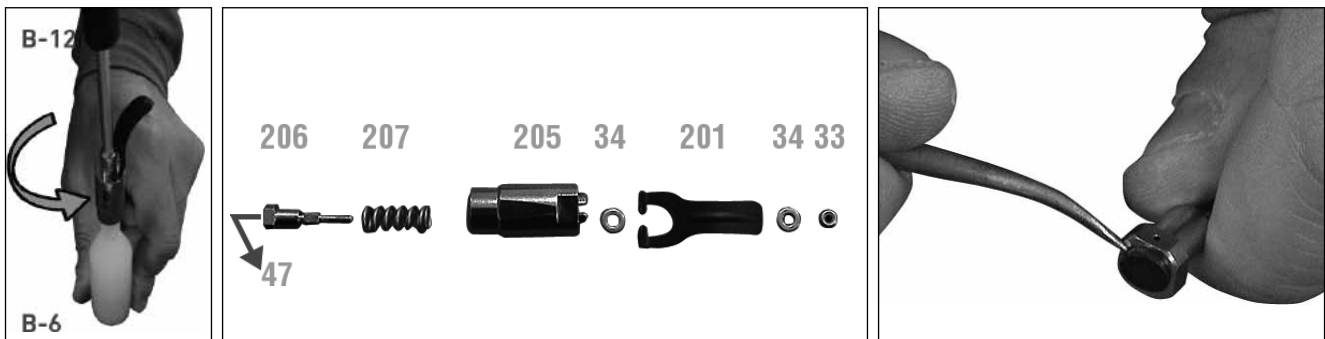
IMPORTANT INFORMATION!

THROUGH SERIAL NUMBER EC10473, MARES ASSEMBLED A POPPET HOUSING (205) THAT REQUIRED A 15 mm WRENCH INSTEAD OF A 14 mm WRENCH AS DESCRIBED IN STEP 9 IN ORDER TO BE REMOVED/REASSEMBLED.

10. Remove the O-Rings (171) from the Male Connector (210).
 11. Use the hex wrench (B-4) to fully unscrew the poppet seat (209) from the Poppet Housing (205), then remove the O-Ring (19).



12. Position the Poppet Housing (205) on the Special Tool (B-6). Using the wrench (B-12), unscrew the demand lever locknut (33), pulling out the demand lever (201) located between the 2 Washers (34), the poppet metal body regs (206), and the spring (207).
 13. Remove the rubber seat III (47-46185060) from the 2nd stage poppet.



CLEANING AND CHECKS

For routine cleaning of reusable rubber and plastic components, wash all parts in a mixture of hot water and mild detergent, scrubbing if necessary with a soft brush.



WARNING!

ACIDS OR OTHER SOLVENTS MAY DAMAGE PLASTIC AND RUBBER PARTS.

BEFORE CLEANING METAL COMPONENTS, MAKE SURE THAT ALL SEALS AND OTHER PARTS SUBJECT TO DETERIORATION HAVE BEEN REMOVED.

Chrome-plated brass and stainless steel components can be cleaned using a nylon brush to remove any deposits, by immersing them in a fresh water ultrasound bath, or, if suitable equipment is not available, in a gentle acid solution (Deox Extra type) or white vinegar diluted with hot water (10-20%).

Be sure to thoroughly rinse all parts in fresh water and dry with a jet of low pressure air at 8 - 10 bar / 116 - 145 PSI before proceeding with reassembly.



WARNING!

CERTAIN KEY COMPONENTS OF THE AIR CONTROL SHOULD BE REGULARLY REPLACED AT EACH SCHEDULED OVERHAUL. BELOW ARE LISTED THE COMPONENTS INCLUDED IN THE SERVICE KIT FOR THE AIR CONTROL OCTOPUS (CODE 46201065):

N.	Code	Description
33	46185051	Demand Lever Locknut
19	46110106	OR 106
43	47157984	Mouthpiece clamp
47	46185060	Rubber Seat III
63	46184289	Pin Cover
171	46110110	OR 2037 (2)
193	46110175	OR 2125
198	46201007	Retaining Ring
221	46184006	Exhaust valve

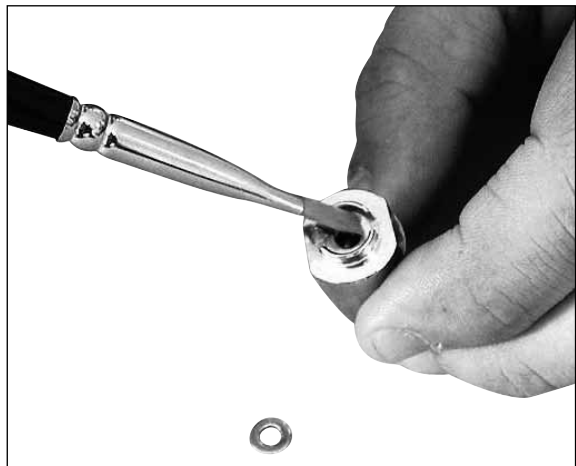
REASSEMBLY

NOTE BEFORE REASSEMBLING, LIGHTLY LUBRICATE ALL THE O-RINGS WITH SILICONE GREASE (TYPE GENERAL ELECTRIC VERSALUBE G-322 / CHRISTO LUBE 111). LUBRICATION REDUCES THE LIKELIHOOD OF DAMAGE DURING REASSEMBLY.

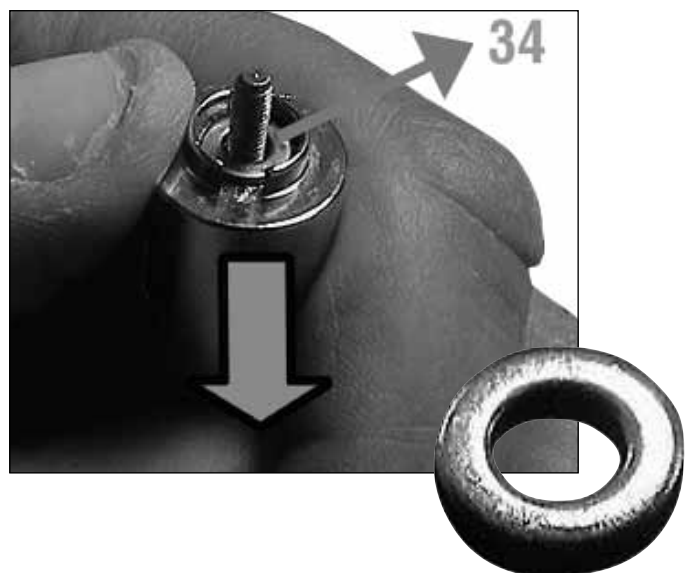
14. Reassemble the poppet seat (47) in the poppet seat holder (206)
15. Arrange the poppet metal body (206) with the corresponding spring (207) on the special tool (B-6).
16. Pressing gently, correctly position the poppet metal body (206) in the demand lever air control (201).



WARNING!
TO ENSURE THAT THE 2nd STAGE POPPET STEM IS POSITIONED CORRECTLY IN THE DEMAND LEVER CONNECTOR HOLE, GENTLY ROTATE THE CONNECTOR LEFT AND RIGHT ON THE B-6 TOOL.



17. Position the one washer (34) only after lightly coating the seat of the Poppet Housing (205) with silicone grease or christo lube 111.



18. Position the second Washer (34) on the stem of the Poppet Metal Body (206) and tighten the Demand Lever Locknut (33) at least one or two full turns on the Poppet Stem (206).

NOTE MARES RECOMMENDS THAT YOU PLACE THE TWO WASHERS (34) AS SHOWN IN IMAGE A.

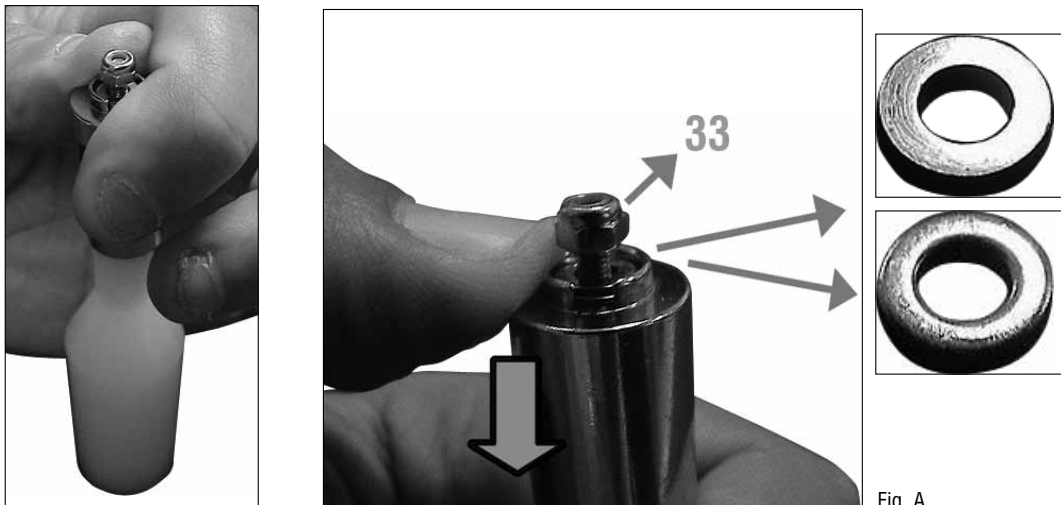


Fig. A

19. Lift the special tool (B-6) from the workbench, maintaining pressure on the Poppet Housing (205) in order to make the valve stem (206) stick out as far as possible. Insert the Air Control Demand Lever (201) between the (2) two washers (34).

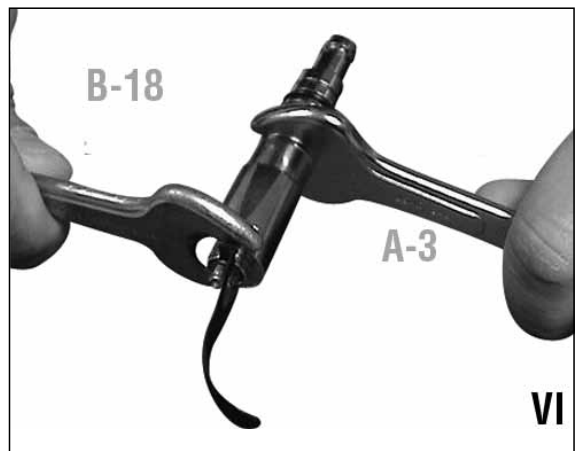


20. Screw the demand lever locknut (33) approximately 5 full turns using the special wrench (B-12).



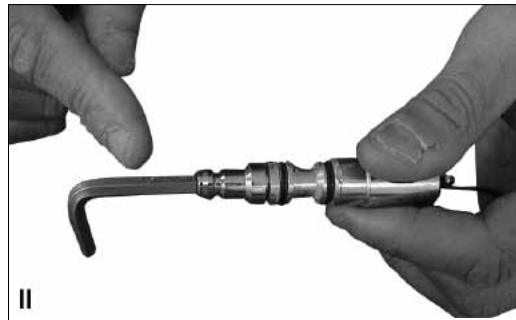
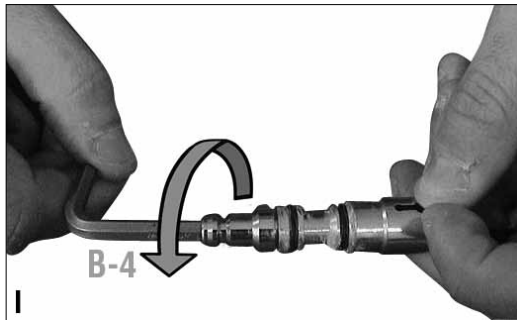
- 21.** Install the O-Ring (19) in the Poppet Seat (209) and the two O-Rings (171) in the Male Connector (210) - I
- 22.** Place the Poppet Seat (209) on the Male Connector (210) as shown and fully screw them down on the Poppet Housing (205). Then tighten gently using the open end wrenches B-18 and A-3. II-III-IV-V-VI

NOTE IF USING A TORQUE WRENCH, USE TIGHTENING TORQUE OF 6 N/m



NOTE BEFORE MAKING ANY ADJUSTMENTS, WE RECOMMEND THAT YOU FULLY UNSCREW THE ADJUSTABLE POPPET SEAT (209) INTO THE POPPET HOUSING (205) USING A B-4 HEX WRENCH (I).

23. Turn about $\frac{3}{4}$ turn on adjustable poppet seat with the B-4 wrench. (II)



24. Insert the full Demand Lever connector inside the Air Control Body (218).

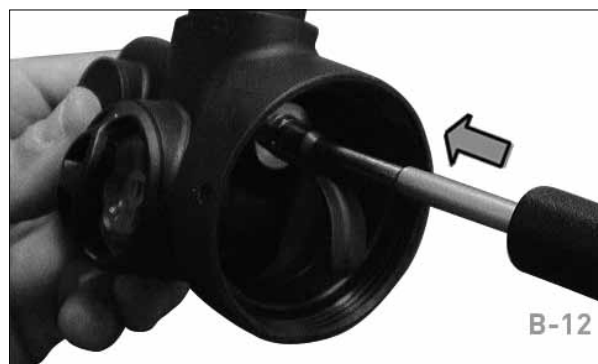
NOTE NOTE THAT THE FLAT SURFACE OF THE POPPET HOUSING (205) MUST BE INSERTED AGAINST THE FLAT SURFACE INSIDE THE AIR CONTROL BODY (218).



25. Carefully put the assembled connector in place using the special B-12 tool and push it into the body.

NOTE BE ESPECIALLY CAREFUL DURING INSERTION TO AVOID DAMAGING THE O-RINGS (171).

NOTE DO NOT FORCE THE DEMAND LEVER, WHICH COULD BEND.



26. Use the New Retaining Ring (198) to fasten the connector body to the Air Control Body (218).

27. Place the O-Ring (193) in the seat of the exhaust valve seat (220).

⚠ WARNING!

MAKE SURE THAT THE EXHAUST VALVE (221) IS INSERTED FROM THE CORRECT SIDE INTO ITS SEAT (220).

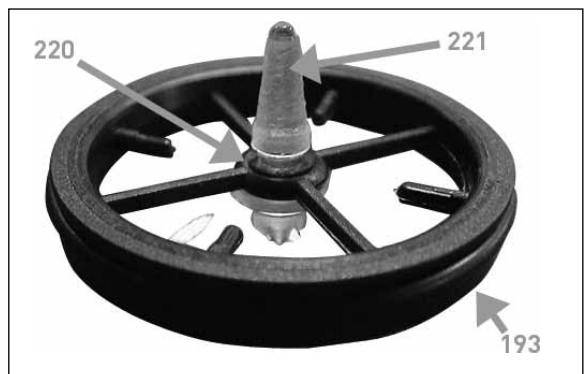
28. Carefully install a new Exhaust Valve (221), pulling the silicone stem through the central hole in the Exhaust Valve Seat (220).

⚠ WARNING!

IN ORDER TO AVOID DAMAGING THE EXHAUST VALVE, DO NOT PULL TOO HARD ON THE STEM.

⚠ WARNING!

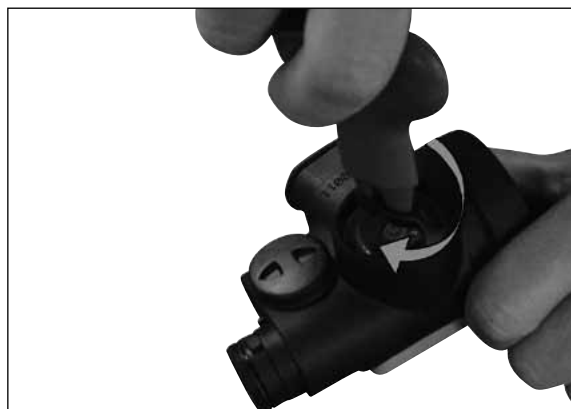
USE CUTTING NIPPERS TO TRIM THE EXHAUST VALVE TO APPROXIMATELY 3 mm.



29. Position the Spacer Ring (222) with the flat part facing up.
30. Set the Exhaust Valve Seat (220) in the Air Control Body (218) with the exhaust valve side facing outward and bring it into position, touching the edges of the Valve Seat (220).
31. Screw the Exhaust Valve Cap (211) on to the Air Control Body (218), tightening gently with the A-1 tool.
32. Attach the Hose (55), complete with the Quick Coupler, to the Air Control unit.
33. Screw the hose (55) to an LP port on the 1st Stage Body using a 14 mm open end wrench (B-18).



IF USING A TORQUE WRENCH, SET A TIGHTENING TORQUE OF 4 - 4.5 N/m



FINAL ADJUSTMENTS

TO CORRECTLY ADJUST THE REGULATOR:

- A.** The repair shop should be equipped with a high-and low-pressure compressed air supply.
- B.** A pressure gauge is required for checking the intermediate pressure (the pressure gauge should have a full scale value MAX 30-40 BAR / 440 - 590 psi, for greater adjustment accuracy).
- I.** Screw the intermediate pressure measuring gauge into one of the 3/8" low-pressure ports on the 1st stage, using the wrench (B-18).
- II.** Mount the regulator group on the control valve (of the tank or test bench).
- III.** Holding down the second stage demand lever, slowly open the tank valve and, almost simultaneously, release the demand lever.
- IV.** Read the pressure gauge to check whether the 1st stage pressure is correct (9,8 - 10,2 bar / 142 - 148 psi).

⚠ WARNING!

THE FIRST STAGE INTERMEDIATE PRESSURE MUST BE MEASURED WHEN THERE IS NO AIR COMING OUT OF THE 2nd STAGE. FOR ANY NECESSARY 1st STAGE ADJUSTMENTS, REFER TO THE CORRESPONDING MARES TECHNICAL SERVICE MANUAL.

IMPORTANT INFORMATION!

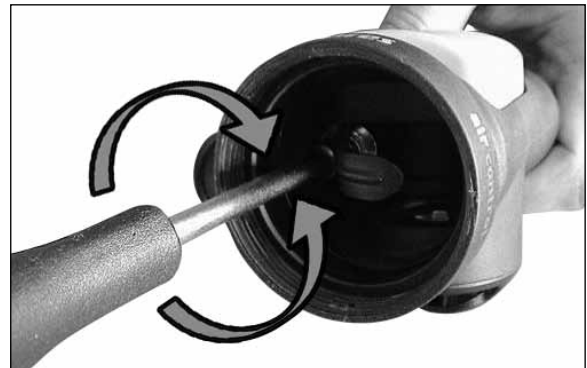
ALL OF THE ADJUSTMENTS DESCRIBED BELOW MUST BE PERFORMED WITH THE AIR CONTROL SUPPLIED WITH THE APPROPRIATE INTERMEDIATE PRESSURE (I.P.).

- 34.** Place the Gauge (A-4) perpendicular to the edge of the second stage case.
- 35.** Tighten or loosen the demand lever locknut (33), using the special wrench (B-12) to correctly adjust the height of the demand lever (201).

⚠ WARNING!

THE DEMAND LEVER IS CORRECTLY ADJUSTED WHEN IT JUST TOUCHES THE GAUGE (A-4) BUT THERE IS NO AIR COMING OUT.

- 36.** Depress and trigger the demand lever a few times.
- 37.** Insert the plastic ring (78) on the diaphragm (36) and place them inside the Air Control Body (218).
- 38.** Twist the cover (204) until both seats line up (case and cover) to allow insertion of the Pin Cover (63).



OBJECT:
Regulator Test Bench - Final adjustment

Install the Inhaling Mouthpiece (8) on the second stage mouthpiece tube.



To check the Cracking Effort using Column Water (see info table)



...THE CRACKING EFFORT MUST BE READ THE SAME MOMENT THAT THE VALUE OF INTERMEDIATE PRESSURE STARTS TO DECREASE...



AIR CONTROL CRACKING EFFORT

cm of H ₂ O	inch of H ₂ O
3.5-4	1,4-1,6



TO OBTAIN THE CRACKING EFFORT IS NECESSARY TO ADD THE VALUE OF COLUMN WATER THAT GOES UP WITH THE VALUE OF COLUMN WATER THAT GOES DOWN (OR REDOUBLE ONE OF THEM).

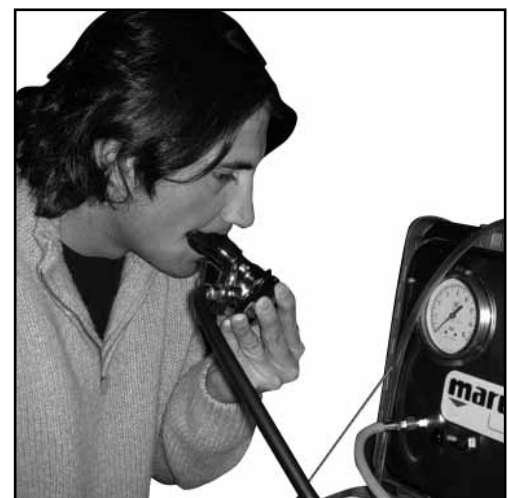


SOMETIMES THE GRADUATION OF COLUMN WATER IS ALREADY REDOUBLED (1 REAL cm = 2 ON GRADUATION OF COLUMN WATER)



Close the Tank Valve, and discharge the residual air, by pushing on the second stage button cover or the Discharge Lever (5)

Close the Test Bench Valve, and try to inhale directly from the second stage (w/o the Inhaling Mouthpiece (8)), in order to detect leakage inside of the case.



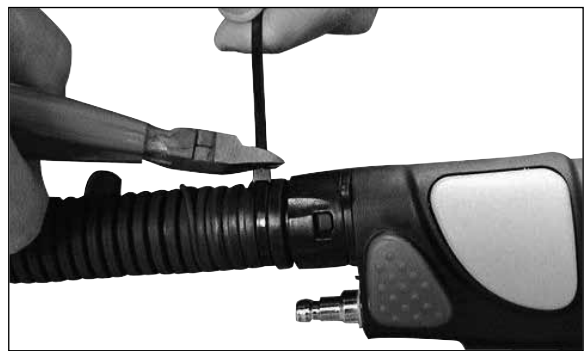
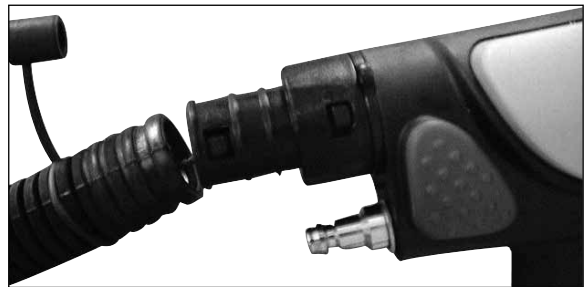
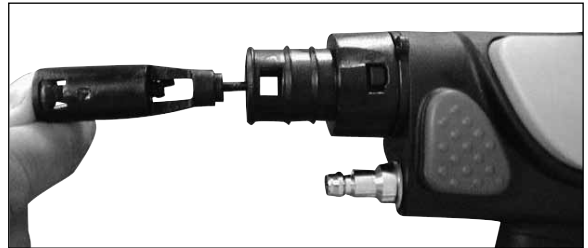
OPERATION CONCLUDED

Install the Proper Inflator Adaptor (189) on the Air Control Body (218).

Fasten the Plastic Seeger (208) in place, and then attach the Fastening Sleeve (without spring) on the Air Control Body.

Insert the hose into its Adaptor and apply the Ring clamp / wire tie (42), trimming away the excess.

Connect the Quick Hose Coupler to the Air Control and bring the Hose cover into position. Carefully assemble the mouthpiece (44), securing it with a new mouthpiece clamp (43).



**AIR CONTROL
INFLATOR**

mares®

MAINTENANCE PROCEDURES

WARNING!

ALL MAINTENANCE AND REPAIR PROCEDURES MUST BE PERFORMED BY A MARES LAB AUTHORIZED SERVICE CENTER AND/OR DISTRIBUTOR. THEREFORE, THE INFORMATION PROVIDED BELOW IS INTENDED STRICTLY FOR TECHNICIANS AT SUCH CENTERS.

NOTE ALL OPERATIONS MUST BE CONDUCTED STRICTLY IN THE ORDER DESCRIBED.

IN ORDER TO ENSURE ADVANCED PERFORMANCE AND SAFETY DURING USE, AFTER 100 HOURS OF DIVING OR 1 YEAR THE REGULATOR MUST BE CHECKED, AND ITS CRITICAL PARTS MUST BE INSPECTED AND REPLACED IF NECESSARY.

- Small flathead screwdriver (Usage Type 322-0.4x2.5)
- Pliers (Usage Type 133)
- Compressed air supply circuit or tank (180-200 bar)
- Cutting nippers
- Plastic or Brass O-Ring removal tool (Pin)
- Silicone grease (General Electric Versalube G-322 type or Christo lube 111 (Nitrox))
- Compressed air gun (8-10 Bar)
- Descaling solution (Deox Extra type) or ultrasound tank
- Test Bench (code 416920 or code 416922)
- Inflator Service kit (code 46201064)



(B-12) 5.5mm
#46106212



(B-17) 17mm (2)
46106217



(B-18) 14mm
#46106218



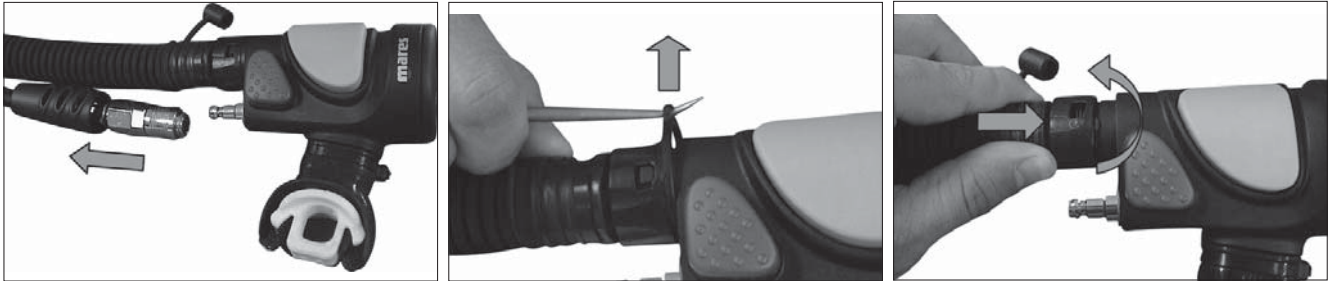
4mm



(A-1)
46201039

DISASSEMBLY

1. Disconnect the Quick Coupler from the Hose (55), and, after removing the Plastic Seeger / locking clip (208), the Inflator Adaptor (189) from the Air Control unit.



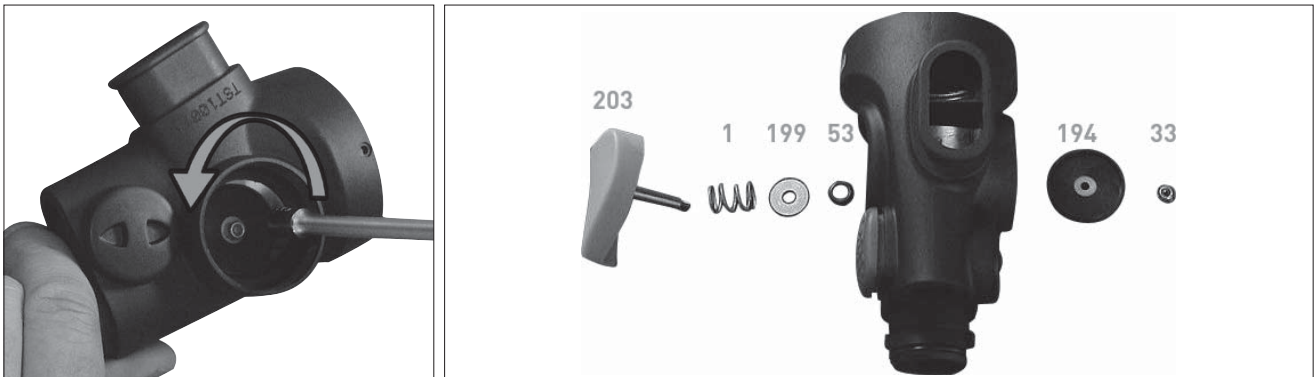
! WARNING!

TO MAKE THESE OPERATIONS EASIER, YOU CAN REMOVE THE MOUTHPIECE (44) AND THE CLAMP (43) FROM THE AIR CONTROL UNIT. ONLY REMOVE THE CLAMP FROM THE MOUTHPIECE IF A REPLACEMENT PART IS AVAILABLE.

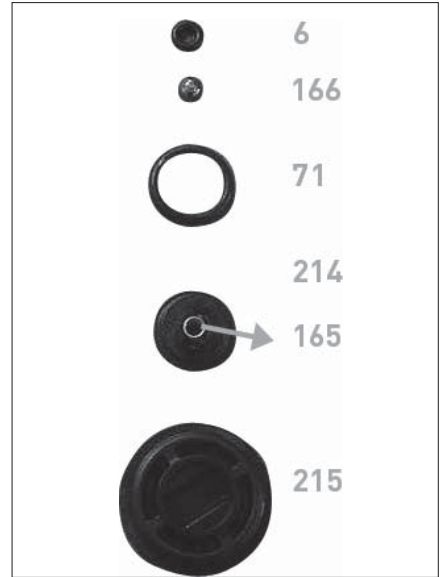
2. Remove the exhaust valve cap w/tool (46201039) (New tool)



3. Carefully remove the Exhaust Valve Seat (220) from the outside by gently pulling up on it, and then remove the Spacer Ring (222). Remove the Demand Lever Locknut (33) using the B-12 (5 mm nut driver -46106212) , and remove all the Purge Button components from the Air Control body.



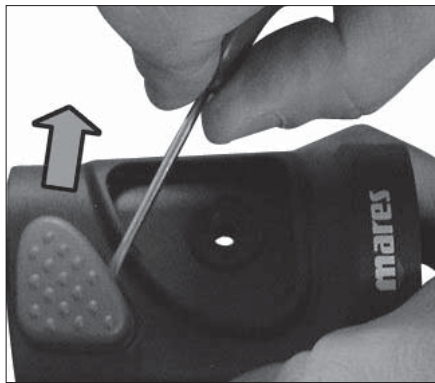
- Using the special A-1 tool (46201039), unscrew the Inflating Plug (215).
- Using Pliers, remove the O-Ring Seat (214) from the Air Control Body (218), and then remove the other components (6, 71, 165, 166).



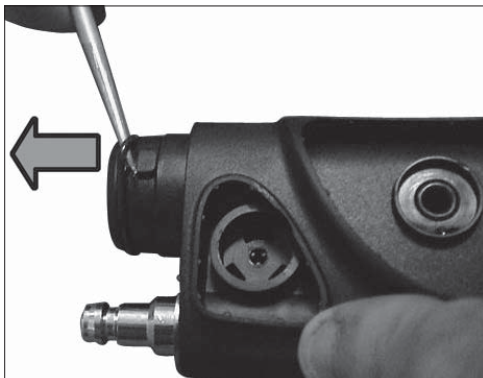
- Rotate the Air Control Body and remove the Red Inflating Button (216), gently prying with a flathead screwdriver through the side (Use type 322 - 0.4 x 2.5).

⚠ WARNING!

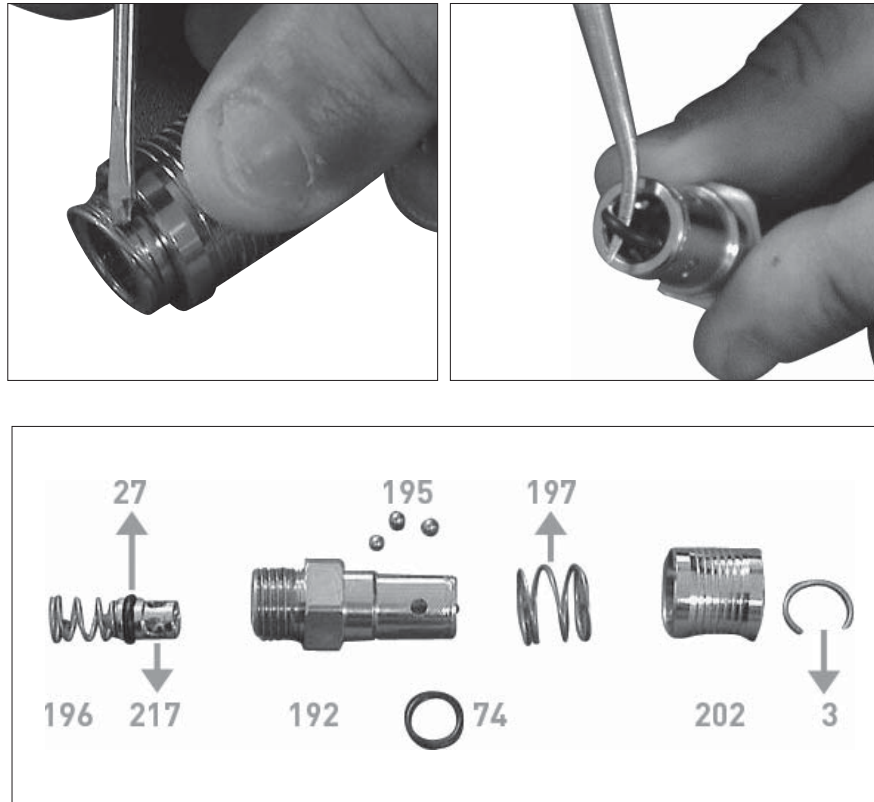
ONCE THE INFLATION BUTTON ASSEMBLY HAS BEEN REMOVED (REF . 72-168-216) CODE 46201067, IT CANNOT BE REUSED WHEN THE UNIT IS REASSEMBLED (FIG. 1). YOU WILL FIND THE REPLACEMENT P ART (46201067), IN THE MAINTENANCE KIT 46201065 (FIG. 2).



- Lift the O-Ring (54) from Air Control Body (218).
- Using 2 open-end wrenches (B-17), unscrew the Assembled Quick Connector, female (46201066) from the Hose (55).



- 9.** Using a flathead screwdriver, remove the Snap Ring (3) from its seat. Then remove all remaining components from it.
- 10.** Remove the O-Ring (74) from the Quick Connector Body (192).



- 11.** Remove the first stage connection side (19) and second stage swiveling connector (27) O-Rings from the Hose (55).

CLEANING AND CHECKS

For routine cleaning of reusable rubber and plastic components wash all parts in a mixture of hot water and mild detergent, scrubbing if necessary with a soft brush.



WARNING!

ACIDS OR OTHER SOLVENTS MAY DAMAGE PLASTIC AND RUBBER PARTS. BEFORE CLEANING METAL COMPONENTS, MAKE SURE THAT ALL SEALS AND OTHER PARTS SUBJECT TO DETERIORATION HAVE BEEN REMOVED

Chrome-plated brass and stainless steel components can be cleaned using a nylon brush to remove any deposits, by immersing them in a fresh water ultrasound bath, or, if suitable equipment is not available, in a gentle acid solution (Deox Extra type) or white vinegar diluted with hot water (10-20%).

Be sure to thoroughly rinse all parts in fresh water and dry with a jet of low pressure air at 8-10 bar / 116 – 145 psi before proceeding with reassembly.



WARNING!

CERTAIN KEY COMPONENTS OF THE AIR CONTROL SHOULD BE REGULARLY REPLACED AT EACH SCHEDULED OVERHAUL. BELOW ARE LISTED THE COMPONENTS INCLUDED IN THE SERVICE KIT FOR THE AIR CONTROL INFLATOR (CODE. 46201064) :

Air Control Exploded Diagram

N.	Code	Description
6	46110101	O-Ring 2012
19	46110106	O-Ring 106
27	46110205	O-Ring 2025 (N°2)
33	46185051	Demand Lever Locknut
42	45179863	Clamp 3.6x200
53	46110204	O-Ring 2021
54	46200999	O-Ring 2081
71	46110211	O-Ring 2050
74	46110107	O-Ring 2031
C	46201067	Inflating Button Red assembled

REASSEMBLY

WARNING!

IF THE FIRST STAGE IS USED FOR DIVES WITH OXYGEN-ENRICHED MIXTURES, STRICTLY FOLLOW ALL THE INSTRUCTIONS PROVIDED IN THIS MAINTENANCE MANUAL IN THE NITROX CHAPTER (EN 13949) BEFORE BEGINNING REASSEMBLY!

NOTE

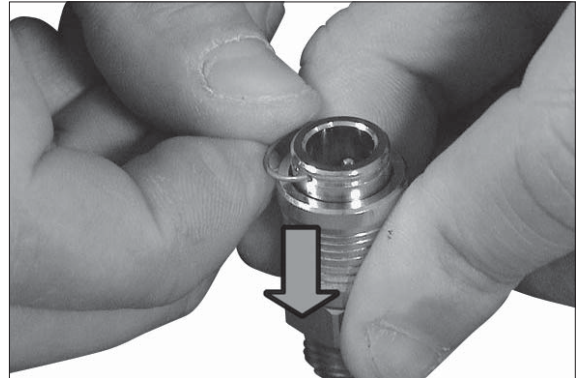
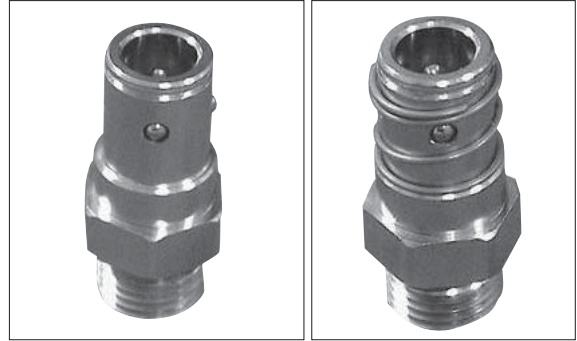
BEFORE REASSEMBLING, LIGHTLY LUBRICATE ALL THE O-RINGS WITH SILICONE GREASE (TYPE GENERAL ELECTRIC VERSALUBE G-322 OR CHRISTO LUBE 111). LUBRICATION REDUCES THE LIKELIHOOD OF DAMAGE DURING REASSEMBLY.

12. Insert the 4 Steel Balls (195) into the Quick Connector Body (192) and then insert the Spring (197), holding the components vertically to keep them inside.
13. Insert the Quick Connector Slider (202) in the correct position over the Spring (197).
14. Fasten the Quick Connector with the Snap Ring (3), holding down the Quick Connector Slider (202).
15. Insert the Quick Connector Shutter (217), including the O-Ring (27) and Conical Spring (196), in the Quick Connector Body (192).
16. Install the O-Rings on the first stage connection side (19) and the second stage swiveling connector (27) on the Hose (55).

NOTE

IF USING A TORQUE WRENCH, SET A TIGHTENING TORQUE OF APPROXIMATELY 3 N/m.

17. Using 2 17-mm wrenches (B-17), tighten the Assembled Quick Connector to the Hose (55).
18. Insert the O-Ring 2031 (74) in its seat inside the Quick Connector Body (192), bringing it into place using a pointed plastic or brass tool.



19. Lubricate and insert the O-Ring (54) in the seat of the Air Control Body (218).



20. Position the O-Ring (53) in the Purge Button seat, and then place the Metal Washer (199) and the Spring (1) on top of it. Insert the Purge Button (203).



21. Rotate the Air Control Body, holding down the Purge Button (203) and insert the LP Inflator Exhaust Diaphragm (194) on the threaded stem of the Purge button.

! WARNING!

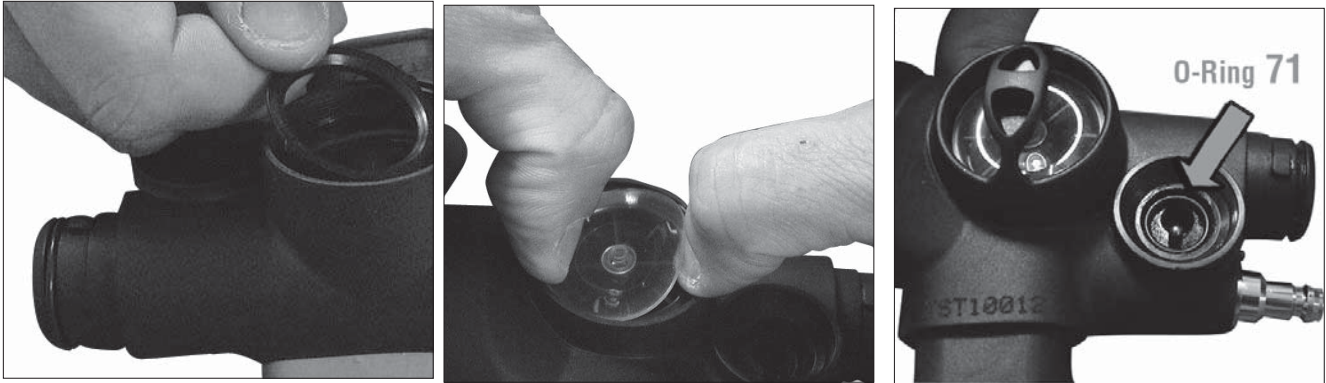
MAKE SURE THAT THE LP INFLATOR EXHAUST DIAPHRAGM IS FACING THE RIGHT WAY UP.

22. Screw the Demand Lever Locknut (33) onto the LP Inflator Exhaust Diaphragm (194) using the B-12 tool.

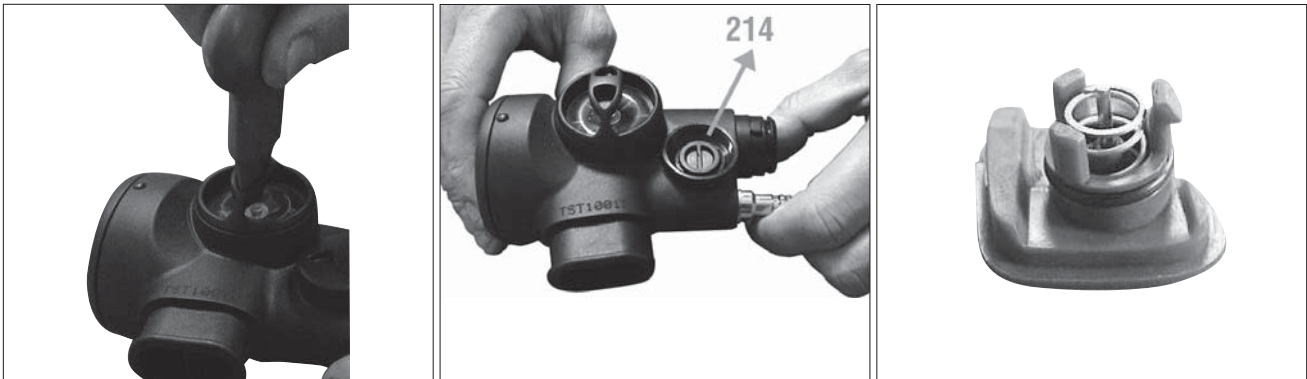
NOTE IF USING A TORQUE WRENCH, SET A TIGHTENING TORQUE OF 80 N/cm.



- 23.** Place the Spacer Ring (222) with the flat part facing up.
- 24.** Set the Exhaust Valve Seat (220) in the Air Control Body (218) with the exhaust valve side facing outward and bring it into position, touching the edges of the Valve Seat (220).
- 25.** Screw the Exhaust Valve Cap (211) onto the Air Control Body (218), tightening gently with the A-1 tool
- 26.** Insert the O-Ring (6) in its seat, and then the Steel Ball (166). Position the O-Ring (71) as shown.



- 27.** Place the O-Ring seat (214) in the correct position.
- 28.** Screw the Inflating Plug (215) snug using the special A-1 tool.
- 29.** Rotate the Air Control Body. Place the Spring (2) inside the Inflation Button assembly (C).



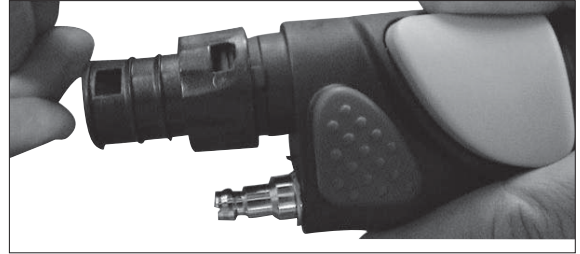
- 30.** Insert the Inflation Button (C), pressing it all the way down until it fastens to the Air Control Body.

⚠ WARNING!

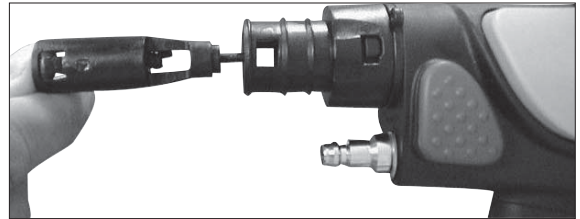
MAKE SURE THAT THE INFLATION BUTTON WAS INSERTED CORRECTLY AND CHECK THAT IT IS FASTENED. PRESS THE INFLATION BUTTON (C) A FEW TIMES TO CHECK THAT THE SPRING (2) HAS THE CORRECT "RETURN" MOTION.



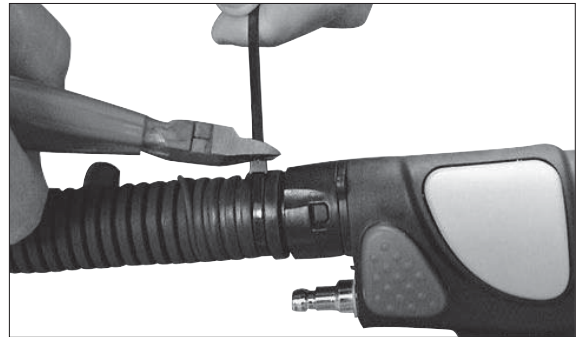
31. Install the 21-mm Inflator Adaptor (189) on the Air Control Body.



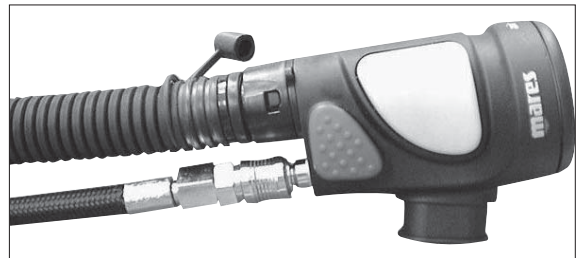
32. Fasten the Plastic Seeger (208) in place, and then attach the Fastening Sleeve on the Air Control Body.



33. Insert the hose inside the 21-mm Adaptor (189) apply the Ring clamp 3.6x200 (42), trimming away the excess.



34. Connect the Quick Hose Coupler to the Air Control and bring the Hose cover into position.



35. Screw the Hose (55) to a Low-pressure (LP) port on the 1st stage using a 14-mm open end wrench (B-18). If you removed it previously, install the Mouthpiece (44) with a new Clamp (43).

NOTE IF USING A TORQUE WRENCH, USE TIGHTENING TORQUE OF 4 - 4.5 N/m.

Slowly open the tank valve, checking for any air leaks. Press the Inflation Button (216) until the BC fully inflates and the over-expansion relief valve opens.

Deflate the BC using the R.E. valve and the Purge Button (203). Repeat this operation a few times to make sure that the Air Control Unit functions properly.

DRAWING NO. E42	AIR-CONTROL	UPDATED: 02/02/2010
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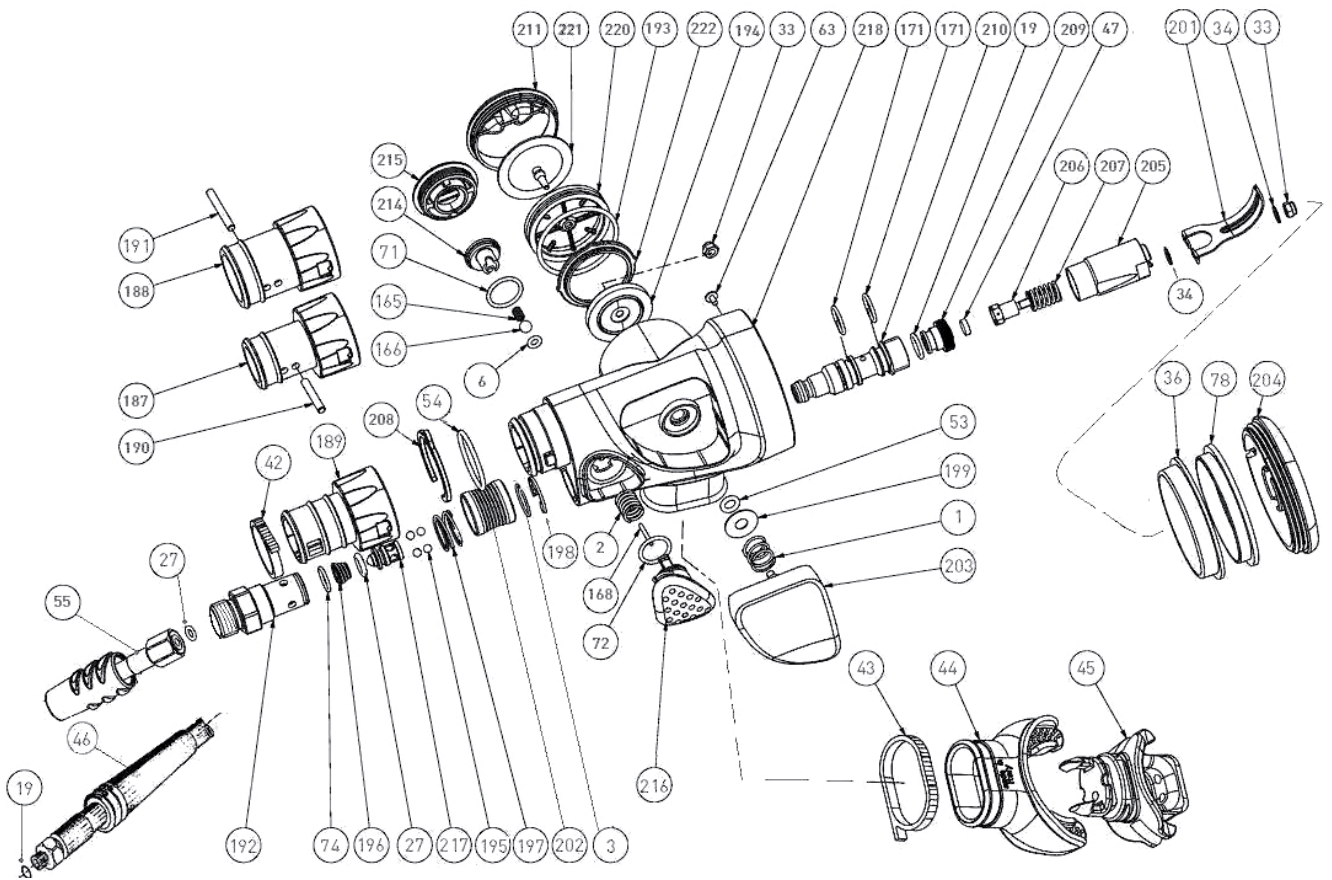


Table No 132	AIR-CONTROL	UPDATED: 14/12/2009
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N. NO.	CODE	DESCRIPTION	N. NO.	CODE	DESCRIPTION
1	46185011	Spring Deflate ButtonAIR 2k9	194	46201033	Exhaust Diaphragm LP Inflator
2	47200744	Spring Inflate ButtonAIR 2k9	195	###	Steel Ball d3,2
3	46201040	Snap Ring	196	46201009	Conical Spring
6	46110101	OR 2012	197	46201008	Quick Connector Spring
19	46110106	OR 106	198	46201007	Retaining Ring
27	46110205	OR 2025	199	46201031	Metal Washer
33	46185051	Locknut, Demand Lever	201	46201044	Demand Lever AirControl
34	46185049	Washer	202	###	Quick Connector Slider
36	46200311	DIAPHRAGM, 2 ND STAGE REG.	203	46201019	Purge Button Silver
42	45179863	Clamp 3,6x200	204	46201029	Cover Air Control
43	47157984	Mouthpiece Clamp	205	46201028	Poppet Housing
44	46200855	Mouthpiece BK (10 pics)	206	46201027	Poppet metal body regs
45	46186090	Octopus Plug	207	46185059	Spring Regulator
46	46179902	Hose Protector	208	46201026	Plastic Segeer
47	46185060	Rubber Seat III	209	46201012	Poppet Seat
53	46110204	OR 2021	210	46201015	Male Connector
54	46110221	OR 2081	211	46201025	Exhaust Valve Cap
55	46200998	Hose SFX 3/8"	214	46201024	O-Ring seat
63	46184289	Pin-Cover	215	46201023	Inflating Plug
71	46110211	OR 2050	216	---	Inflating Button Red
72	46110215	OR 2043	217	46201016	Quick Connector Shutter
74	46110107	OR 2031	218	46201021	Corpo AirControl
78	46200321	DIAPHRAGM Plastic RING	220	46187025	Exhaust Valve Seat
165	43163807	Spring Inflating Valve	221	46184006	Exhaust Valve
166	47200807	Steel Ball 3/16"	222	46201020	Spacer Ring
168	---	Pin Ergo 2K5	ASSEMBLIES		
171	46110110	OR 2037	***	46201065	Service Kit Octopus (19-33-43-47-63-171-193-198-221)
187	A1	Inflator Adaptor 20 mm	ooo	46201064	Service Kit Inflator (3-6-19-27-33-42-53-54-71-72-74-216)
188	A2	Inflator Adaptor 25 mm	###	46201066	Quick Connector Assembled Female (3-27-74-192-195-196-197-202-217)
189	46201036	Inflator Adaptor 21 mm	---	46201067	Inflating Button Red assembled (72-168-216)
190	A1	Metal Pin 3x20	A1	46201068	Adaptor d20 Air Control (42-54-187-190-208)
191	A2	Metal Pin 3x25	A2	46201069	Adaptor d25 Air Control (42-54-188-191-208)
192	###	Quick Connector Body			
193	46110175	OR 2125			

RE:
SPECIAL TOOLS (# 46201041 - # 46201042)

ITM19

IMPORTANT INFORMATION

MARES TECHNICAL SUPPORT ANNOUNCES THE INTRODUCTION OF TWO NEW SPECIAL WRENCHES: 12S 1ST STAGE HP VALVE DISASSEMBLY TOOL (B-41) CODE 46201041, AND 1ST STAGE HP SEAT CONNECTOR DISASSEMBLY TOOL (B-42) CODE 46201042 . THEIR PURPOSE IS TO HELP REMOVE THE SEACONNECTOR FROM ALL MARES DIAPHRAGM FIRST STAGES, WITHOUT COMPROMISING THEIR FUNCTION, ESPECIALLY WHEN THERE ARE SIGNIFICANT TRACES OF SEDIMENTATION, OXIDE, AND/OR DEPOSITS OF RUST INSIDE THE HIGH PRESSURE CHAMBER.

12S HP SEAT CONNECTOR DISASSEMBLY TOOL (B-41)



INSERT THE TOOL (B-41) IN A LOW PRESSURE PORT T AND USE IT TO PRY OUT THE HP SEAT CONNECTOR.

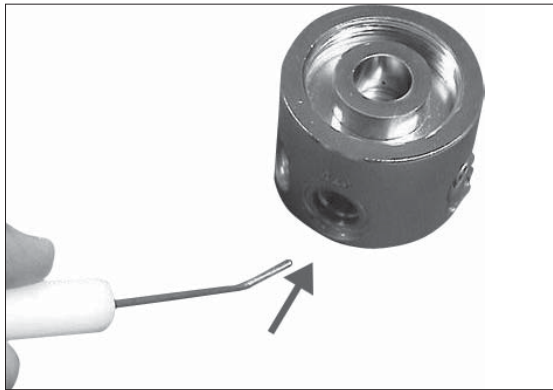


FIG. 2

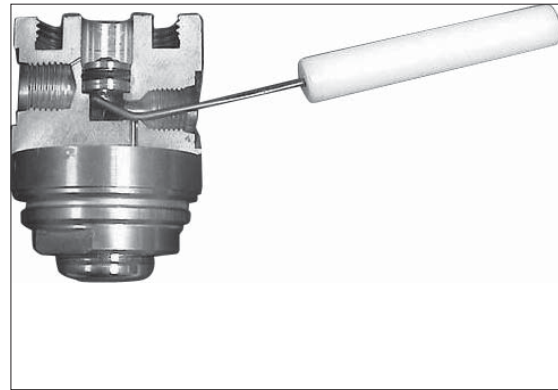


FIG. 3

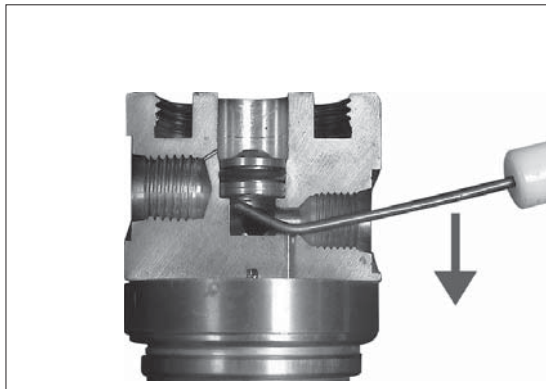


FIG. 4

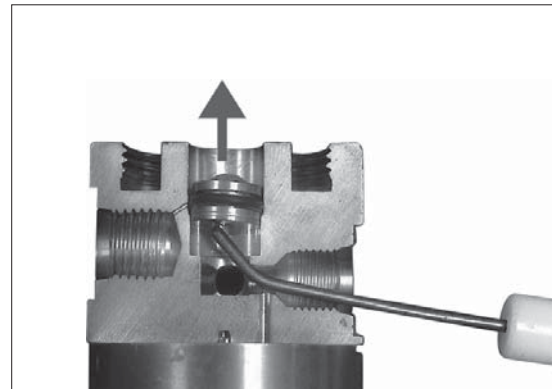


FIG. 5

**RE:
SPECIAL TOOLS (# 46201041 -#46201042)****HP SEAT CONNECTOR DISASSEMBLY TOOL (B-42)**

INSERT THE TOOL (B-42) IN THE CENTRAL PORT ON THE DIAPHRAGM SIDE UNTIL YOU FEEL IT TOUCH THE SEAT CONNECTOR (FIG. 3). THEN PRESS (FIG. 3) ON THE SEAT CONNECTOR UNTIL IT COMES OUT COMPLETELY (FIG. 4). VALVE PROCEDURE FOR THE MR-V 12/16/22/32/HUB SERIES.



FIG. 2

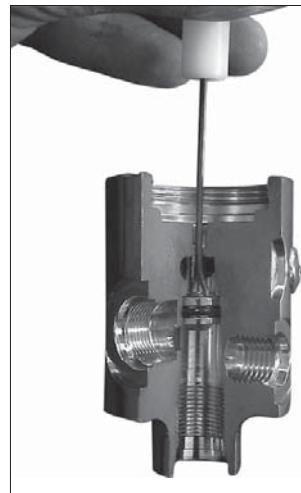


FIG. 3

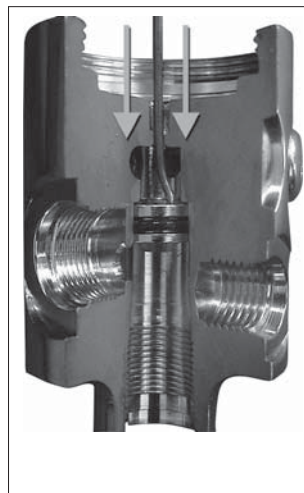


FIG. 4

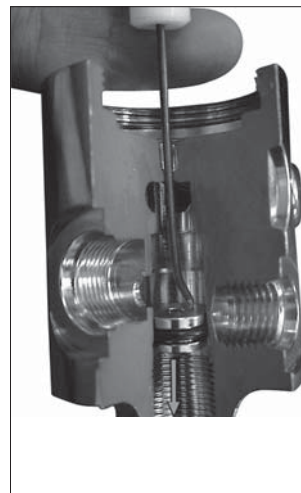


FIG. 5

RE:
SPECIAL TOOLS (# 46201041 -#46201042)

BELOW IS THE VALVE SEQUENCE FOR MR42

INSERT THE TOOL (B-42) IN THE CENTRAL PORT ON THE DIAPHRAGM SIDE UNTIL YOU FEEL IT TOUCH THE SEAT CONNECTOR (FIG. 3). THEN PRESS ON IT (FIG. 4) UNTIL YOU COMPLETELY REMOVE THE SEAT CONNECTOR.



FIG. 1

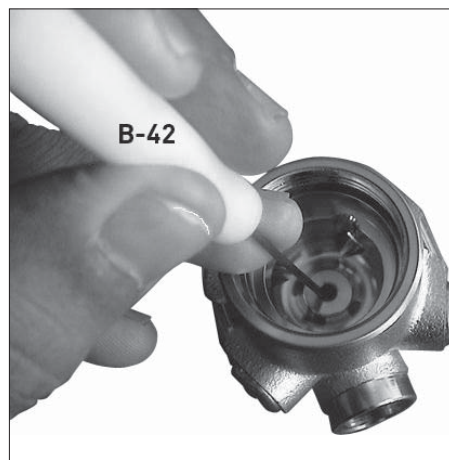


FIG. 2

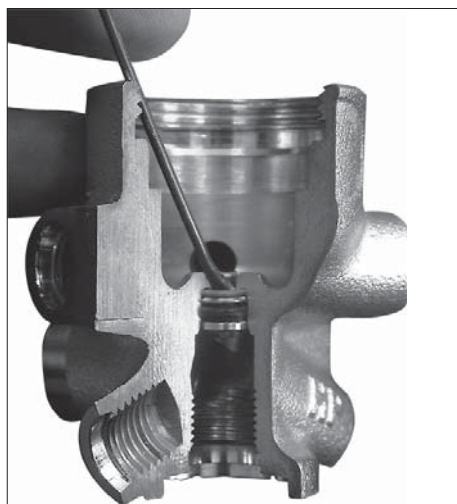


FIG. 3

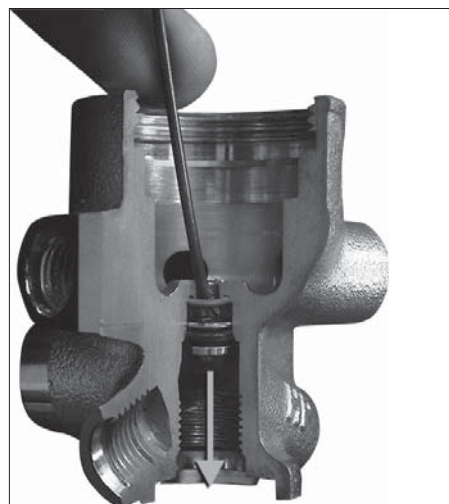


FIG. 4