AQUALUNG®

SERVICE MANUAL

MISTRAL
SECOND STAGE

2005

CONTENTS

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INTRODUCTION

This manual gives the instructions and the recommendations for the disassembly, the cleaning, the checking, the reassembly and the adjustment of an Aqualung regulator.
This manual is not an instruction manual for unqualified personnel. The procedures described in this manual are intended only for qualified personnel who have been trained in the servicing of Aqualung equipment during a specialised course.
If you do not understand certain procedures in this manual you should contact an Aqualung service consultant before undertaking any operation.

WARNINGS, ATTENTION, NOTES

Certain icons have been used to facilitate the reading and understanding of this manual. They have the following meanings:

WARNING: Indicates situations that could result in serious or fatal accidents if the advice given is not followed correctly.

.

ATTENTION: Indicates a situation or action that could cause serious damage to the product, making it dangerous if the advice given is not followed correctly.

NOTE: Notes are used to emphasize important points as well as information that needs to be remembered.

MAINTENANCE

Attention: Whatever the number of dives carried out during a year, the regulator should receive a complete service each year. If the regulator is used in a chlorinated or aggressive environment the service period should be reduced to six months.

In order to conform with the Aqualung Regulator Lifetime Guarantee, all servicing (inspection, servicing and repairs) should be recorded in the Service Record incorporated in the regulator User Manual.

GENERAL INSTRUCTIONS

1. In order to carry out the procedures described in this manual correctly it is important that you follow the steps in the exact order indicated. Read the manual through completely so that you become familiar with all the procedures, the special tools and the replacement parts, before starting to disassemble the product. Keep this manual open near to you so that you can refer to it step by step. Do not rely on your memory.

2. All servicing and repair procedures should be carried out in a workshop that is clean, well lit, easy to access and specially fitted for the purpose.

3. The regulator body should never be directly held in the jaws of a vice. To hold the body, screw the tool 116230 into the HP port and then grip the tool with the vice.

4. Once the regulator has been disassembled, the re-usable components should be separated from the components that need to be replaced. Fragile items with seats or crowns with critical sealing surfaces should be separated and protected during servicing in order to prevent any damage.

5. Use only spare parts from Aqualung service kits. Never replace an Aqualung part with one from another manufacturer, even if it appears similar.

6. Never re-use regulator parts which should be replaced on the pretext that the regulator has seen little use since its manufacture or since its last service.

7. When reassembling, check that the torque used conforms with that shown in **Table 4, Torque**. Some parts can be irretrievably damaged if the acceptable torque is exceeded.

CONVENTIONS GENERALES

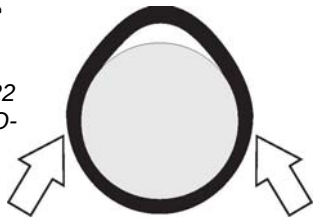
The conventions described below define the actions to be carried out when an instruction is given.

1. **Unscrew**: to unscrew a threaded part, turn it anti-clockwise.

2. **Screw**: to screw a threaded part, turn it clockwise.

3. **Remove the O-ring**: To remove an O-ring follow the method below, using the special tool provided for this purpose. Any tool that could damage the O-ring should be avoided. In every case, replace the O-ring removed with a new one.

   Press simultaneously on the two sides of the O-ring in order to form an 'eye'. . Insert the special tool 944022 into this eye to remove the O-ring.



4. The acronyms used:
   LP: Low Pressure
   MP: Medium Pressure
   HP: High Pressure

5. Numbers in brackets indicate the part number of the component shown on the exploded view attached.

DISASSEMBLY PROCEDURE

***Note**: Before commencing disassembly, consult the exploded view to check the reference numbers of all parts requiring replacement. These parts should all be replaced by new parts and should not be re-used on the pretext that the regulator has seen little use since its manufacture or since its last service.*

***Attention**: Use only the special tool when removing O-rings in order to avoid damaging the seal recess. The slightest scratch on a sealing surface could cause a leak. If a surface should be damaged then this part should be replaced with a new one. Do not use any pointed instrument or metal tool to remove O-rings.*

1. Using a 11/16'' wrench and a 19mm wrench, grip the seat holder (16) and unscrew the screw by turning the hose. Remove the hose nipple O-ring. Take care to avoid damaging the O-ring recess. Remove the O-ring on the hose threads.

2. Pull back the hose protectors and check that there is no damage to the hose or the metal sleeve. The hose should not move in the sleeve. If this is the case, it should be replaced.

3. Cut the two tightening collars and remove the corrugated hoses from the casing.

4. Remove the 4 screws (6) and recover the 4 Nylstop locknuts (5) at the back of the casing (1)

5.Remove the exhalation casing (2).

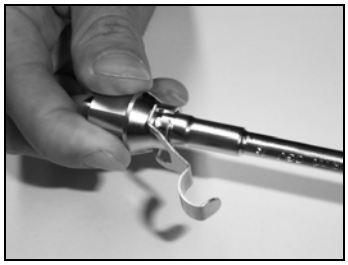
6. Lift up the exhaust valve (19) and check that the surface is clean and unscratched. It should be flexible and have a clean edge.
If it is in good condition it is not necessary to replace it and it can be reused. If there are any signs of deterioration it

should be replaced.


7. Remove the diaphragm (3) and its washer (4).


8. Remove the washer (4) from the diaphragm (3).


9. Using a 19 mm wrench, unscrew the crown holder (16), then extract the lever support assembly (7).

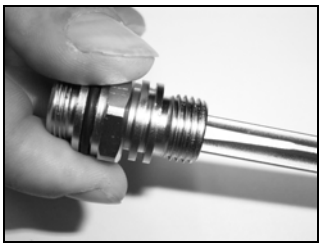
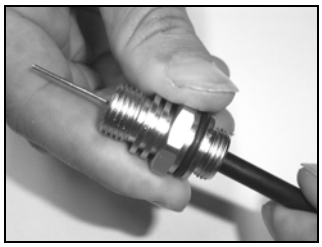



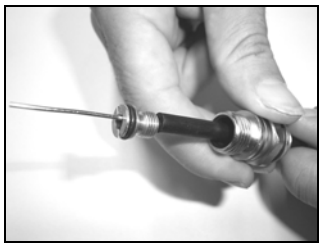
10. Unscrew the Nylstop locknut (11).
To remove the seat holder, spring, washer and lever. .

11. Extract the square poppet bearing (8) pushing on the seat holder if necessary.

12. Remove the silicone seat from the seat holder.

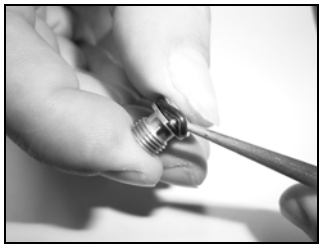
Keep the used seat: it will be of use during reassembly.



13. Unscrew the seat, then using tool ref: 116236, extract the seat from the seat holder.

14. Remove the two O-rings from the seat and the seat holder.



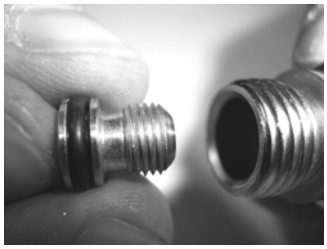

END OF DISASSEMBLY

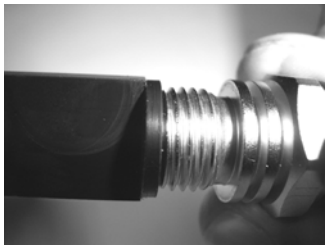
Before starting to re-assemble the regulator, make sure that all replacement parts have been cleaned and lubricated in accordance with *Procedure A: Cleaning and Lubricating* on page 13.

RE-ASSEMBLY PROCEDURE

1. If the exhaust valve has been removed, thread the tail through the hole in the casing (from the outside) and pull gently on the tail using pliers until the shoulder passes through to the inside of the casing.


2. Fit the O-ring (18) onto the seat (15)



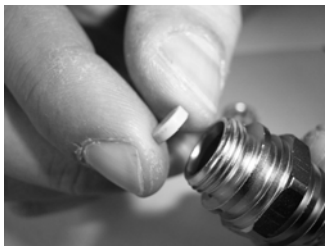



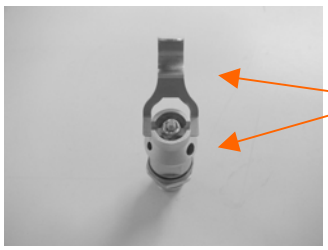
3. Fit the seat (15) into the crown holder (16). Using tool 125727 screw the seat in until it is fully home against the seat holder and no longer moves the seat.

4. Fit a new seat into the seat holder.


5. Fit a new square poppet bearing (8) using the seat holder (13); then place the spring (12) into the insert (7), then the poppet (13).

6. Put the used seat into the seat holder. This is to avoid marking the new seat. Screw the seat holder assembly into the insert (7) fitted with the poppet.

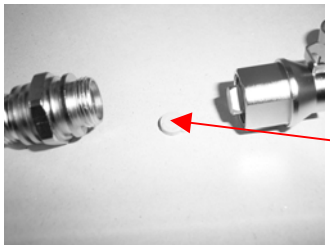


7.Fit the lever (9).

The lever should be opposite the injection holes.

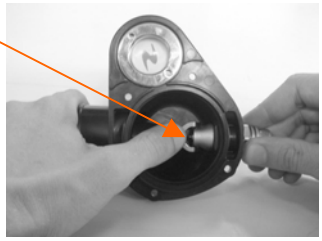

8. Fit the washer (10), then the Nylstop locknut (11). Screw it in until 1 or 2 threads are visible.



9. Unscrew the crown holder (16) from the insert.

Remove the used seat and discard it.

10. Fit the lever/insert assembly into the casing (1). Screw in the crown holder (16) until it is fully home, while pressing the lever down (9).



11. Using a 19mm torque wrench, tighten the crown holder at 1 m.kg

12. Fit new lubricated O-rings to the nipple and the threaded side of the hose.

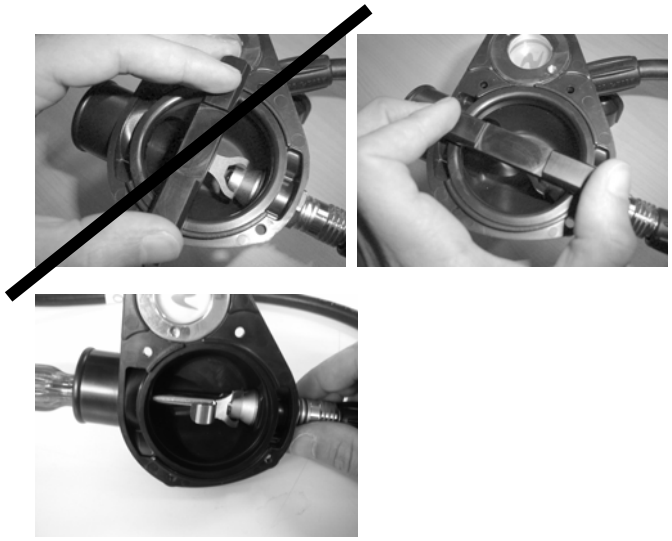
13. Adjusting the lever height:

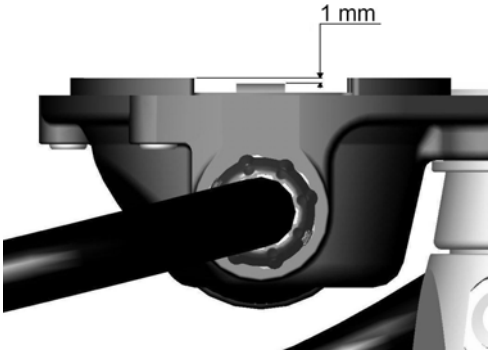
Connect the hose to the second stage. Connect the assembly to its first stage giving an MP=9.5 ±0.5 bar. Place the regulator under pressure.

Fit the washer (4) in the casing.

Place the face of the adjusting tool ref: 125727 on the top of the casing in contact with the washer (4). The lever should not touch the tool edge if the LP is not leaking.

Attention : 1. *The adjusting tool must be used in the right direction, with the hollowed face uppermost.*
2. *The tool should be correctly aligned with the casing (see photos).*





If there is an LP leak under the tool: unscrew the Nylstop locknut,
If the lever does not touch the tool: screw in the Nylstop locknut, until the lever height is correctly adjusted.

Once the adjustment is completed, turn off the air supply and purge the regulator

14. Fit the washer (4) onto the diaphragm (3) and fit the assembly to the casing.

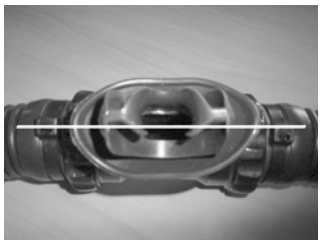
15. Fit the exhalation casing (2) onto the inhalation casing (1), then fit the 4 screws (6).


16. Fit 4 new Nylstop locknuts (5) into the inhalation housing, then screw in the screws (6) using a 3 mm allen key but without excessive force.


17. Tighten the MP hose using a 11/16 wrench.

18. Fit the corrugated hoses to the inhalation and exhalation sides of the casing, proceeding as follows:

a. Align the tightening screw lugs with the mouthpiece orifice.



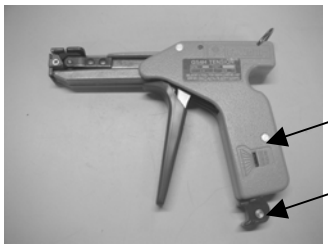
b. Connect the corrugated hoses to the casings

***Attention**: The corrugated hoses should be fitted to the connectors so that the gas can circulate in the direction indicated by the arrows engraved on the mouthpiece body.*

***Attention**: The mould lines on the corrugated hoses should fit over those on the inhalation and exhalation casings.*

c. Check that the corrugated hose mould line is identical with that shown below when the regulator is laid flat with the mouthpiece pointing upwards.


19. Fit the tightening collars and tighten them with PANDUIT GS4H pliers following the adjustment information supplied:

PANDUIT GS4H :

- Tension = 8
- Locker = HVY

WARNING: Only pliers and tightening collars following the references given by Aqualung should be used.

CONTROLE FINAL

1. Connect the regulator to a supply pressure of 200 bar (±10 bar)

***Note** : Tests 2,3 and 4 require the use of a regulator test bench.*

2. Opening effort test. Gradually increase the inhalation flow. When the MP begins to fall record the pressure and compare it with the limits on ***Table 5. Checking specifications***.

2.1 If the opening effort is too low, disassemble the second stage to give access to the lever: disassembly steps 3 and

Screw in the adjustable seat (15) 1/2 a turn using a screwdriver.
Readjust the lever height, see step 13 then reassemble the second stage step to the end.

2.2 If the opening effort is too high, disassemble the second stage to give access to the lever: disassembly steps 3 and 4.
Unscrew the adjustable seat (15) 1/2 a turn using a screwdriver.

Do not unscrew the adjustable seat more than a ½ turn, relative to the adjustment obtained using tool 125727 in step 3.

Readjust the lever height, see step 13 then reassemble the second stage step to the end.

3. ***Flow/depression test***. Adjust the inhalation flow to 400 l/min check that the depression does not exceed 15 mbar. If the depression is higher than this check ***Table 1. Troubleshooting Guide***.

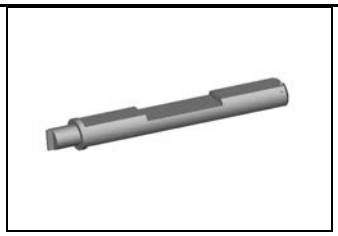
4. ***Leak test***. Connect the first stage to a cylinder charged to 200 bar, open the valve and immerse the complete set into a bath of water for 1 minute. Check that there are no leaks. If there are still leaks, completely disassemble the second stage and inspect all sealing surfaces and the correct fitting of all parts.

END OF REASSEMBLY

Table 1. Troubleshooting Guide

SYMPTOME	POSSIBLE CAUSE	TREATMENT
Leak or free flow in second stage	1. MP is too high	1. Refer to First Stage Troubleshooting Guide
	2. LP seat (14) is worn or damaged	2. Replace the seat
	3. The crown (15) is not correctly adjusted	3. Readjust the crown
	4. The lever (9) is bent	4. Replace the lever
	5. The seat surface (15) is damaged	5. Replace the seat
	6. The lever (9) is adjusted too high	6. Unscrew the Nylstop locknut (11)
	7. The spring (12) is damaged	7. Replace the spring
Breathing effort is too high	1. MP is too low	1. Readjust the lever and the crown
	2. The lever (9) is adjusted too low	2. Readjust the lever and crown
	3. The MP hose is blocked	3. Clean or replace the hose
	4. The lever (9) is bent	4. Replace the lever
Water enters second stage during inhalation	1. Diaphragm (3) damaged	1. Replace the diaphragm
	2. The diaphragm (3) is not correctly positioned between the casing (1) and the washer (4)	2. Disassemble the casing and refit the assembly.
	3. The inhalation casing (1) is damaged	3. Replace the inhalation casing
	4. The O-ring (17is damaged	4. Replace the O-ring
	5. Mouthpiece is holed	5. Refer to Mouthpiece Troubleshooting Guide

Table 2. List of tools and service kits

REF	DESCRIPTION	APPLICATION	US PART NO.
116222	MP pressure gauge complete 0/16B	Checking medium pressure	111610
125727	 Seat and lever adjusting tool	Adjust crown (15) and lever (9)	125727
116236		Seat assembly/disassembly	109436
116239		For Nylstop locknut (11)	N/a
N/C	Torque wrench 1 m.kg	Crown holder (16)	N/a
N/C	Medium flat screwdriver	Seat removal (15)	N/a
N/C	O-ring tool	Fit and remove O-rings	944022
N/C	3mm allen key	Assemble/disassemble casing	N/a
N/C	Tightening collar tool PANDUIT GS4H 	Tightening collars PLT4H	N/a
N/C	Collar cutting pincers	Removing collars	N/a

125905	**Service Kit MISTRAL**	**All versions except Nitrox**	**N/a**
125936	**Service Kit MISTRAL Nitrox/O2**	**Nitrox Version**	**N/a**

Table 3. Recommended cleaners and lubricants

LUBRICANT / CLEANER	APPLICATION	SOURCE
Cristo-Lube MCG 111	All O-rings	Aqualung, ref. 480025
	***Attention**: Silicone parts do not require lubrication. Do not grease them. Greasing silicone parts can change their molecular construction and cause premature degradation of the material.*	
Oakite #31	Acid bath for cleaning brass and stainless steel parts.	Oakite Products, Inc.
NETALU	Acid bath for cleaning brass and stainless steel parts.	Aqualung, ref. 455001
Diluted white vinegar	Acid bath for cleaning brass and stainless steel parts.	Household stores
	***Attention**: Do not use hydrochloric acid for cleaning parts. Hydrochloric acid, even when well diluted, attacks the coating of metal parts and leaves a corrosive deposit that damages plastic parts and O-rings.*	
Washing-up liquid (diluted with hot water)	Degreases brass and stainless steel parts; general cleaning of plastic and rubber parts.	Household stores

Procedure A
Cleaning and Lubricating
(All Aqualung Regulators)

Cleaning brass and stainless steel parts.

1. Pre-clean by soaking in NETALU diluted to 25%.
2. Cleaning in an ultra-sonic bath filled with a mixture of washing-up liquid + hot water. If some resistant deposits remain then fill the ultrasonic bath with white vinegar and repeat. DO NOT put plastic, rubber, silicone or anodised aluminium parts in contact with vinegar.
3. Rinse in demineralised or fresh water to avoid calcium deposits. Soak for 10 minutes. Dry with filtered low pressure air and then check that their condition is now suitable for re-use.

Cleaning plastic, rubber and anodised aluminium parts.

For anodised aluminium parts: soak in a « NETALU diluted to 25% ». Rinse in fresh water and dry with low-pressure filtered air.
For plastic parts. (casings, plugs.): clean in an ultrasonic bath containing a mixture of washing-up liquid and hot water. Use only a toothbrush with nylon bristles to remove any deposits. Rinse in fresh water and dry with low-pressure filtered air

***Attention**: Do not place plastic and rubber parts in contact with acid solutions. This could alter their physical properties and cause degradation and premature breakdown.*

Cleaning parts for Nitrox/O2 use.

1. Metal parts: Pre-clean by soaking in NETALU diluted to 25%.
2. Ultrasonic cleaning in Promoclean TP108 diluted at 5%.
3. Rinse in demineralised water. Soak for 10 min.
4. Dry in the open air in a clean and dust-free atmosphere. Place the parts on a white cloth, allow to dry and check after drying that the cloth shows no grease deposits and that the condition of the parts is appropriate for re-use with Nitrox/O2.

Cleaning hoses.

If there is significant corrosion then it is permissible to soak only the ends in an ultrasonic bath, avoiding any possibility of the solution entering the hose. Rinse in fresh water and allow to dry with the connections hanging down. Dry the inside with filtered compressed air before reconnecting the hose to the regulator.

Wiping.

To wipe parts, use a white filter paper, a pure cotton cloth or any other material that **does not produce fluff.**

Inspection.

Visually check under a white light (day light or artificial light).
The parts are completely free of any traces of:

1. organic materials (oil, grease, paint, rust…)
2. cleaning agents
3. dust
4. humidity

Lubrication.

When handling O-rings wear unpowdered latex gloves. It is important not to allow contact between the internal components and the skin or any other source of contamination when the regulator is being prepared for Nitrox use. All seals should be lubricated with Cristolube MCG111. Cover the seals with a light film of grease and remove any excess by rolling the seal between finger and thumb. Do not use an excess of grease; this can have the effect of accumulating particles that could damage the O-rings.

Table 4. Torque values

N° REFERENCE	DESCRIPTION	COUPLE
124506	Crown holder (16)	1 m.kg.

Table 5. Checking specifications

TEST	CONSIGNES	SPECIFICATIONS
Leak test	MP = 9.5 ±0.5 bar	No leak
Opening effort	MP = 9.5 ±0.5 bar	Between 2.5 **mbar** and 4.3 **mbar**
Depression / Flow	**MP at 9.5 bar ± 0.5**	15 mbar maxi at 400 L/min

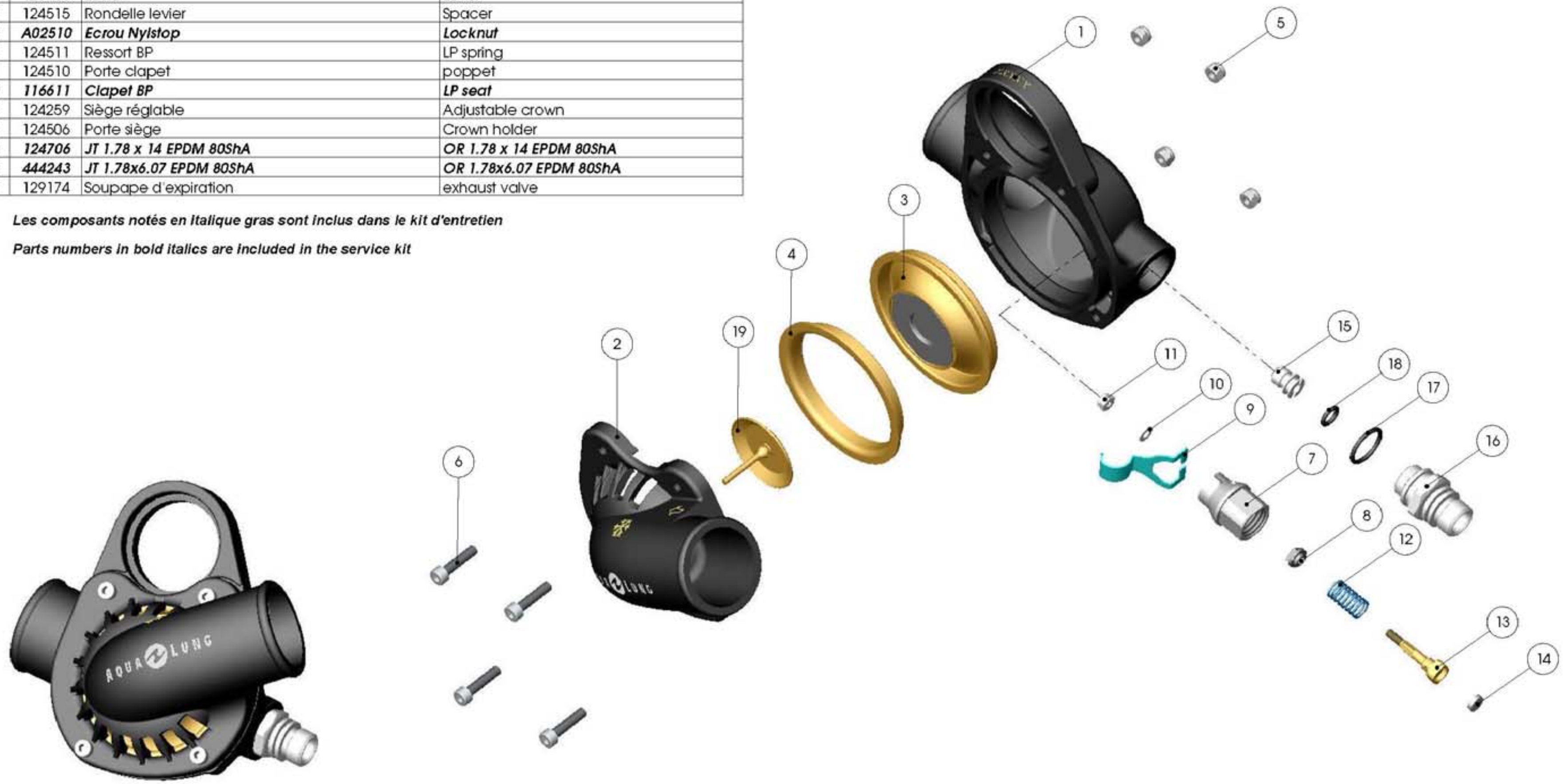
Maintenance Notes.

Exploded view of Mistral Second Stage - 125920.

N°	Qté	N° Pièce	Désignation	Description
1	1	125937	Boîtier Inspiration marqué	Inhalation Box w/ laser markings
2	1	125935	Boîtier Expiration marqué AQL + marquage laser	Exhalation Box w/ AQL and laser marking
3	1	125705	Membrane complete	complete diaphragm
4	1	124509	Rondelle membrane	Diaphragm washer
5	***4***	***125928***	***Ecrou nylstop***	***Locknut***
6	4	125929	Vis CHC	CHC Screw
7	1	125931	Insert	Insert
8	***1***	***124551***	***Palier carré***	***square poppet bearing***
9	1	125708	Levier	Lever
10	1	124515	Rondelle levier	Spacer
11	***1***	***A02510***	***Ecrou Nylstop***	***Locknut***
12	1	124511	Ressort BP	LP spring
13	1	124510	Porte clapet	poppet
14	***1***	***116611***	***Clapet BP***	***LP seat***
15	1	124259	Siège réglable	Adjustable crown
16	1	124506	Porte siège	Crown holder
17	***1***	***124706***	***JT 1.78 x 14 EPDM 80ShA***	***OR 1.78 x 14 EPDM 80ShA***
18	***1***	***444243***	***JT 1.78x6.07 EPDM 80ShA***	***OR 1.78x6.07 EPDM 80ShA***
19	1	129174	Soupape d'expiration	exhaust valve

Les composants notés en italique gras sont inclus dans le kit d'entretien

Parts numbers in bold italics are included in the service kit



			Désignation	2nd étage MISTRAL
			Description	MISTRAL 2nd stage
			Notice	------
			Date	01 / 02 / 05
N°	Date Modif	Ind		

Visa: TM Vérif:
1ère Avenue, 14ème rue - BP 148
06513 CARROS CEDEX FRANCE
Tel (33) 04 92 08 28 88
Fax (33) 04 92 08 28 99
AQUA LUNG
125920

1ere Avenue – 14e rue – BP 148
06513 CARROS cedex – France
☎ 00.33.(0)4.92.08.28.88
FAX 00.33.(0)4.92.08.28.99