



Nemrod - USA

Service and Repair Manual



SNARK III SILVER

2-HOSE REGULATOR



OVERVIEW

The 2-hose regulator represents the earliest designs in pressure reduction and air delivery systems in the evolution of the Self Contained Underwater Breathing Apparatus (SCUBA).

Both first and second stages are set together in a compact housing connected to the tank valve.

The regulator obtains its name from the configuration of its large inhalation and exhaust hoses.

This particular design offers a more diffused exhalation to the rear of the diver, increasing the field of view and reducing noise level created by exhaled bubbles.

The 2-hose regulator has also proven itself as a reliable ice diving regulator due to the warm exhaled air maintaining the working mechanism above the freezing point.

All these features have maintained the popularity of this regulator amongst u/w photographers, commercial and military divers around the world.



Due to its similarity in breathing function with the Re-breather, the old 2-hose is again sought after as an efficient and economical training device.

The Nemrod Snark III is the only 2-hose regulator still in production with full factory support.



FIRST STAGE

DESCRIPTION:

Before the development of the single-hose regulator both, first and second stages were located in the housing.

The first stage offers the same generic function as all un-balanced diaphragm regulators.

The h.p. diaphragm holds the upstream h.p. seat in the open position while at rest.

High pressure air enters the h.p. chamber and flows past the h.p. seat and through the h.p. orifice, (or the volcano, as it's often called) and into the intermediate pressure chamber.

The pressure builds against the upstream low pressure seat until reaching a set pressure of 140 psi where it overrides the main-spring pressure and collapses the diaphragm, causing the h.p. seat to seal against the orifice and stop airflow.

As the diver inhales, the large, low pressure diaphragm collapses on the lever assembly. This pushes the up-stream l.p. seat up and away from the seating surface and allows the air flow to the diver.

As the air pressure in the intermediate chamber drops, the main spring pushes against the h.p. diaphragm which raises the h.p. seat and full air flow is now established.

On any upstream second stage regulator it is imperative to have a pressure release valve. This allows the second stage to remain operational in the event of a catastrophic h.p. seat failure which would have the tendency to press shut the seat with the increasing air pressure.

On the Snark III the over pressure relief valve is found on the back, just above the yoke assembly and is set to free-flow at a pressure of 210 psi.

DISASSEMBLY

HOSE ASSEMBLY REMOVAL:

1. Remove hose assembly by first removing the rubber sleeves (121), Nuts (1016), Band screws (111), and Bands (112).
2. Unscrew Clamp ring (2633), take off box top (2999), and remove Diaphragm (85).

NOTE: The use of plastic wire ties of sufficient size and strength may be substituted for metal bands at regulator connection only (two on each side are recommended).

CAUTION: do not use wire ties at mouthpiece connection.



FIRST STAGE DISASSEMBLY:

1. Inspect Exhaust valve (86) if found in deteriorated condition, remove by pulling. If in good condition, leave in place.
2. Using a 12" adjustable crescent remove Yoke retainer (2287), remove yoke (9201), remove plastic bearing washer (1400).
3. Using circlip tool, remove circlip (29), *caution*: the high pressure assembly is under spring tension, h.p. assembly is now ready to be removed. Filter disc (28), Filter (114), Bushing (24), Spring (25), and high pressure seat (2997).
4. Turn housing over, unscrew Main spring adjustment nut (21), remove Main spring (18), unscrew Main spring housing (20), remove Spring pad (15), remove Plastic trust washer (14), remove Rubber trust washer (13).

CAUTION: do not remove h.p. diaphragm (12) from this side as it will scratch housing.

5. Turn housing over and using (soft) wood, plastic drift, or pencil eraser, push an Pin (2988), using your index finger nail, remove h.p. diaphragm (12), If Pin (2988) has been damaged , or excessive corrosion exists, remove Pin from h.p. end and insert a thin metal drift through h.p. orifice and push out h.p. diaphragm (12). remove Pin pad (150).

CAUTION: use extreme caution to insure orifice (brass volcano) is not damaged, never allow any metal tool to come in contact with the rim of the brass volcano orifice. The use of a pencil eraser is an ideal way to polish and inspect the orifice.

SECOND STAGE DISASSEMBLY:

1. Remove l.p. plug (14095), remove bushing (10769), remove Spring (2987), remove l.p. seat (2985).
2. Reverse housing position and remove pin lever (88) by removing cotter pin (75), slide out Pin (71), remove lever, remove set screw (73) and retaining locknut (74) from lever.
3. Remove Diaphragm lever (2993) in same fashion, remove Cotter pin (75), slide out lever pin (184), remove lever.
4. Remove l.p. guide bushing (2986) from regulator body (3879).
5. Disassembly of regulator housing (2668) from regulator body (3879) is not necessary unless excessive corrosion or deteriorated conditions exist. This is accomplished by unscrewing bolts (83) and replacing O-ring (81).



SAFETY VALVE REMOVAL:

Because the Snark III is of upstream second stage design it is imperative that the safety valve be in proper operation and bleed setting , this prevents regulator lock-up in case of a h.p. seat failure.

1. Unscrew safety valve plug (2598).
2. Unscrew and remove pressure release adjustment screw (100).
3. Remove spring (99), and safety valve plunger (98).
4. Unscrew safety valve body (2597), remove from regulator body (3879) washer (94), O-ring (95), and washer (96).

CLEANING:

The regulator is now ready for cleaning. The use of an ultrasonic cleaner and weak acid solution is recommended. In the event that cleaning solutions are not available, the universal cleaning agent is 50% white vinegar and water, followed by thorough fresh water rinse.

LUBRICATION:

The use of silicone based lubricants is acceptable and compatible with this regulator.

NOTE: Please be aware that the O-rings are metric and buna. They are not interchangeable with US standard.

ASSEMBLY:

1. If complete disassembly was made, align main body (3879) with regulator housing (2668), careful not to pinch O-ring (81). Tighten by using bolts (83).

FIRST STAGE ASSEMBLY:

1. Place regulator body (3879) flat on bench with hp orifice facing up, drop in new hp seat (2997), followed by spring (25), support crown (24), filter (114), perforated disc (28), and held in place by circlip (29).
2. Flip assembly and insert push pin (2988), and place pin pad (150) over the pin head. At this point push in pin pad with fingers to insure proper travel and spring pressure.
3. Place hp diaphragm (12) into place over pin pad (150). Make sure diaphragm reaches the bottom all the way around.



4. Place rubber gasket (13) over hp diaphragm (12), place plastic washer (14), followed by the main spring pad (15) and held in place by screwing main spring housing (20) tightly into place.
5. Place mainspring (18) so it engages main spring pad (15) and screw adjustment cap (21) tightly over main spring (18). Do not over tighten at this time. End of adjustment cap (21) should not screw below level of main spring housing (20). Adjustments will be made later.
6. Reverse position again and install bearing washer (1400) over hp housing, place yoke (9201) into position and secure by tightening yoke retainer (2287), screw yoke screw (9019) in place.

HOSE & MOUTHPIECE ASSEMBLY:

NOTE. This procedure is not necessary for yearly maintenance, check one way operation and smooth flow of valves, wash in warm soapy water, and reassemble to regulator. If valves found to be "sticky" or defective, remove and replace using the following guidelines.

WARNING: Because of the likelihood of bacterial build-up within the hose/mouthpiece assembly, it is required to frequently disinfect by removing hose/mouthpiece assembly from regulator and submerging hose/mouthpiece assembly in weak bleach and water solution, follow with thorough fresh water rinse. Complete disassembly is not required for disinfecting procedure.

MOUTHPIECE DI'SASSEMBLY:

1. Slide back rubber sleeves (120) exposing retainer bands (118), unscrew bolts (111) from retaining cylindrical nut (1016), remove bands.
2. Remove hoses (200).
3. Remove mouthpiece valve support (122) from inside mouthpiece.
4. Remove valve assembly (123), check and replace (if necessary) check valves (106).

REPLACEMENT PARTS:

The following components are required to be replaced yearly:

1. High pressure diaphragm (12)
2. High pressure seat (2997)
3. low pressure seat (2985)
4. filter (114)
5. safety valve o-ring (95)
6. Cotter pins (75)
7. Rubber gasket (13)
8. Low pressure seat bushing o-ring (8443)
9. Main body o-ring (81) If housing removed.



Components to be inspected and replaced if found defective:

1. Main diaphragm (85)
2. Exhaust valve (86)
3. Mouthpiece valves (106)
4. Hoses (200)
5. Any screw showing extensive wear or damage to treads.
6. Any O-ring showing excessive wear or deformity.

SECOND STAGE ASSEMBLY:

1. Drop Ip seat (2985) (note that this is an upstream poppet) with stem down into place in Ip housing, next, place spring (2987) into place, replace o-ring (8443) and cap with Ip bushing (10769), leave port plug off as this will be used to connect Ip hose for Intermediate Pressure gauge connection.
2. Flip regulator and screw into place the Ip seat guide bushing (2986), careful not to bend seat stem.
3. On poppet lever (88) screw set screw (73) and set retaining lock nut (74) on top of lever.

NOTE: U channel of poppet lever (88) faces towards regulator body.

4. Place poppet lever (88) on central guide hinge on regulator body (3879) and slide into place hinge pin (71) securing it with cotter pin (75) remember to spread ends.
5. Place diaphragm lever (2993), channel away from regulator body, into regulator housing hinge on (2668), slide hinge pin (184) and secure with cotter pin (75), spread ends to secure.

SAFETY VALVE ASSEMBLY:

WARNING: The threaded opening for the safety valve is not compatible with US Ip hoses. Do not use this orifice as a Ip port.

SAFETY VALVE ASSEMBLY MUST BE IN PLACE AND IN PROPER WORKING ORDER WITH A MAXIMUM BLEED OFF PRESSURE OF 210 PSI.

1. Place small washer (94) into safety valve orifice on main body (3879) above Ip housing.
2. Place o-ring (95) on top of washer (94).
3. Place large washer (96) on top of o-ring (95).
4. Screw valve body (2597) tightly into place.
5. Insert into valve body (2597) safety valve plug (98), then spring (99).
6. Screw into place adjustment screw (100) but do not tighten at this time.



SETTING PROPER PRESSURE LEVELS:

It is important to understand that in the case of unbalanced upstream diaphragm regulator - as the tank pressure drops, the intermediate pressure will increase. Therefore the regulator will undergo various Intermediate Pressure levels during use.

The use of conventional downstream regulators as octopus may free flow at lower tank pressures.

The Snark III, 2 - hose regulator is designed to function with an intermediate pressure of 130 psi at 2,500 psi of tank pressure. *(Note the chart on the last page)*

1. Set regulator on test bench or pressurised scuba tank to 2,500 psi.
2. Connect low pressure hose from port behind Ip seat to Intermediate Pressure Gauge. If not using a test bench connect the submersible pressure gauge to the regulator at the H.P. port.
3. Open valve slowly, tighten (clockwise) main spring adjustment cap (21) until Intermediate pressure reaches 210 psi (purge often to set proper pressure).

NOTE: If safety bleed valve starts free flowing (below 210 psi of IP), tighten down adjustment screw (100) to prevent free flow.

4. Adjust safety valve to begin to free flow at a pressure of 210 psi of intermediate pressure.
5. Reduce intermediate pressure by backing off (counter clockwise) the main spring adjustment cap (21). and set I.P. to 130 psi.
6. Reduce the tank pressure and watch for Intermediate Pressure increase as pressure drops. This may be accomplished by adjusting inlet pressures on a test bench or turning off tank valve and taking little breaths from the regulator, keep an eye on the H.P. gauge to indicate tank pressure.

Setting exact pressures is very difficult in an unbalanced regulator with a small main spring so a +/- of 10 psi (.68 bar) after the regulator is assembled will be acceptable.

Because the Snark III is an unbalanced upstream diaphragm regulator the Intermediate Pressure (IP) will increase as supply pressure decreases. Curiously, the IP increased at a constant rate of 1/-50, 1 psi increase for every 50 psi drop of tank pressure.



Safety valve release pressure to be set at 210 psi. (14.38 bar)

* Set Intermediate Pressure with tank pressure at 2,500 psi (171.23 bar).

<i>Tank Pressure</i>	<i>Intermediate Pressure</i>
3,000 psi	120 psi
205.5 bar	8.2 bar
<u>2,500 psi *</u>	<u>130 psi</u>
<u>171.23 bar</u>	<u>8.9 bar</u>
2,000 psi	140 psi
137 bar	9.58 bar
1,500 psi	150 psi
102.73 bar	10.27 bar
1,000 psi	160 psi
68.5 bar	10.95 bar
500 psi	170 psi
34.24 bar	11.64 bar
300 psi	175 psi
20.54 bar	12 bar

Connect hose assembly. Test for proper breathing.

Turn off air and depressurise.

Place dust cap in place.

Inhale an mouthpiece, no air should be drawn, this tests for possible air leaks an hose assembly, check valves and regulator body.

Service is now complete.



