HOTDIVE

Hotdive S2

First Stage

Service & Repair Manual

for Authorized Service Centers

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INTRODUCTION

This manual is intended only to guide experienced maintenance personnel on the procedures for the proper service and repair of Hotdive regulator products described in this manual. It should not be used as an instruction manual for regulator repair by untrained personnel or consumers. Servicing and repair mainly include cleaning, inspection, adjustment and replacement of worn parts. If you do not fully understand all the procedures listed in this manual, please contact Hotdive to speak directly with the Technical Advisor before proceeding further.

SAFETY PRECAUTIONS

This manual provides step-by-step instructions on the removal, inspection, cleaning, reassembly and testing of the Hotdive S2 primary regulator. It is recommended to perform all steps in the order given. Please read this section in its entirety before starting the work described in this section. This will familiarize the maintenance technician with the important precautions to be taken during each service.

Pay close attention to all WARNINGS, CAUTIONS, and NOTES that are intended to draw your attention to items of importance.

Definition of Warnings, Cautions, and Notes:

⚠ WARNING

Indicates a procedure or situation that may result in serious injury or death for either the technician or

⚠ CAUTION

Indicates any situation or technique that may result in potential damage to the product, or render the

NOTE

Is used to emphasize important points and tips.

GENERAL PROCEDURES

MAINTENANCE SCHEDULES

Regulators are subject to a variety of environmental factors that may affect product performance over time. If the regulator dives less than 50 times per year, it is allowed to be inspected every other year and in "non-" years. Such as:

Year 1: Inspection

Year 2: Overhaul

Year 3: Inspection

Year four: Overhaul, and so on.

Inspections and overhauls need to be documented in the Annual Service and Inspection Record at the end of the Manual to maintain the limited life warranty. If the regulator dives more than 50 times a year, it should be overhauled.

A formal inspections include:

1. Carry out pressure immersion test on the whole unit to check whether there is air leakage.
2. Check stable medium pressure within acceptable range.
3. Check whether the opening force is within the acceptable range.
4. Check that the control knob and venturi switch operate smoothly.
5. Visually inspect filter for debris or discoloration.
6. Visually check the exhaust valve to see whether it is in good condition and whether the surface is clean.
7. Visually inspect the bite for cracks or holes.
8. Open the hose protector and check whether the hose is securely connected.

If a regulator fails after items 1, 2, 3, or 4, the entire regulator should be overhauled. If the regulator fails at 4, 5, 6 or 7, it is at the discretion of the technician whether a complete overhaul is required.

An infrequently used regulator

Do not assume that the regulator is in good condition because it is not used often or because it has been well stored. In this case, deterioration and corrosion of o-rings may still occur.

Work area and tools required

Regulators should be serviced and repaired in a clean, well-lit work area. Since each regulator is disassembled, all parts should be separated from those of the other regulator. Proper disassembly and reassembly require some special tools. For a list of these tools, see Table 2(page 5).

Remove o-ring

When removing the O-ring, care must be taken not to damage the adjustment in contact with the O-ring
On the surface. Tools used to remove o-rings must not have any sharp edges or points that could scratch the metal sealing surface. Hotdive strongly recommends that all O-ring removal tools be made of brass or plastic.

Lubrication

O-rings shall be lubricated with approved compounds. O-rings should be lubricated with very thin grease film only. Do not use spray (aerosol) lubricants under any circumstances. Aerosol propellants can damage the regulator's plastic and rubber components, and the lubricant evaporates quickly with little lasting benefit.

WARNING Hotdive regulator is designed for use in water temperatures above 45° F(7° C). Cooler water may cause the regulator to be more sensitive to free-flow conditions and may result in situations that require an appropriate response to prevent serious injury or death. Users of Hotdive modulators are advised to ensure that they are adequately trained to handle modulators in free flow or hypoxia emergencies before attempting to dive in cold water environments.

CAUTION Note: Before any disassembly, refer to the disassembled parts diagram, which covers all parts that must be replaced. These parts should be replaced with new ones and should not be reused regardless of the age of the regulator or how many times it has been used since the last service.

NOTE When removing o-rings, use only plastic or brass O-ring removal tools to prevent damage to sealing surfaces. Even a small scratch on the surface of the O-ring can cause a leak. Once the o-ring sealing surface is damaged, it must be replaced with new parts. Do not use toothpicks or any other steel tools.

DISASSEMBLY PROCEDURES

1. Before disassembling the first stage, remove all hoses using an appropriate wrench.
2. **Yoke disassembly**: Unscrew the Yoke screws(37) by hand , loosen the dust cap (30), remove the Circlip(28) using the circlip pliers, and flip the regulator to let the filter (27) fall into your hand. Use a 6mm hex wrench to remove the inlet fitting (26) and remove the O-ring (25) and yoke(29) from the fitting.

3. **DIN disassembly**: remove the dust cap (36), use a 6mm hex wrench to drive into the inlet fitting (34), remove the o-ring (35,31) from the fitting, take out the filter (32), remove DIN hand roulette (33)

CAUTION Note: It is important that the wrench be placed securely at the inner hexagon of the inlet fitting to prevent any damage to the part. Do not use force release.

4. Using a 4mm hex wrench, unscrew the HP(19) and LP(1,5,6) port plug. Remove o-ring (2,4,7,20) from port plug.



5. Using a 6mm hex wrench, loosen the retaining cap (24) and remove the high pressure seat (23) and o-ring (22). Separate regulator body (18) and bonnet retaining cap (24).



6. Carefully remove the piston assembly (14) and spring (16), remove the o-rings at both ends of the piston (13,15),



7. Unscrew the fixing screw (12) with a 6mm hex wrench, take out the O-ring (10) and gasket (11), separate the Swivel turret(3) from the main body (9), and take out the main o-ring (8).

The disassembly process is now complete.

Clean and lubricate the parts before starting reassembly

CLEANING & INSPECTION

1. All components should be washed first in warm (not over 120° F/50° C) mild soap and water solution. Use a soft nylon brush to help remove any excess or separated areas. After initial washing with warm water and soap, all components should be thoroughly rinsed in clean fresh water and dried with filtered low pressure (30 psi) air. After initial cleaning in warm soap and aqueous solution, metal parts should be cleaned in ultrasonic cleaners using appropriate ultrasonic cleaners.

NOTE Make sure all O-rings and other rubber or plastic parts are removed before cleaning with an ultrasonic cleaner or chemical bath.

2. If you don't have an ultrasonic cleaner, soak the metal parts in Chromesafe's chemical bath solution, stirring gently for 3-4 minutes. Metal parts can also be cleaned by soaking in a mild acetic acid solution (distilled household white vinegar) for 10-15 minutes.

NOTE Exceeding the recommended cleaning time may damage plated parts. Do not clean parts longer than the time specified by the manufacturer of the solution used. After finishing cleaning in any solution, rinse the parts thoroughly with clean water and blow dry with low pressure (30 psig) air. Only brass, brass plated and stainless steel parts should be immersed in a chemical cleaning solution.

WARNING Protect hands and eyes when handling chemical cleaning solutions

3. After cleaning, all parts should be thoroughly rinsed

in fresh water and dried with filtered low pressure (30 psig) air.

NOTE Before any reassembly, it is important to check all parts (both new and reused) to ensure that each part is clean and free of any contamination, corrosion or defects.

4. All O-rings should be replaced at every service. New O-rings should be checked for contamination and/or defects and coated with a thin coat of approved lubricant prior to installation.

CAUTION Do not use any petroleum based lubricants or products, or any aerosol silicone sprays on any part of Hotdive regulators. The petroleum base or propellant gas may attack or weaken plastic or rubber parts.

5. In addition to the O-ring, the following parts should be replaced regularly during maintenance:

Low HP seat (23)

● Filter-Yoke connector (27)

● Filter - DIN connector (32)

All o-rings and the daily replacement parts mentioned above are included in the overhaul service package. (2.4.7.8.10.13.15.20.22.23.25.31.35.)

6. The following parts should be carefully checked for the following damage. Strong magnification is best under bright lights.

● Check all cavities for any nicks, scratches and pitting. Pay special attention to the seal edge of the valve cone and the diaphragm seat shoulder.

● Spring (16) Check for signs of permanent corrosion, including pitting or cracks in the metal surface.

● Fixed cap (24) and body (18) check the inner cavity for scratches, scratches, pitting or any defects.

●DIN or Yoke fittings(34 or 26) Check the condition of base threads and O-ring seal slots for signs of damage.

●DIN handwheel (33) check thread for signs of damage.

7. If any of the listed parts are damaged, they must be replaced with new ones.

8. Check all metal parts for excessive wear or corrosion. Inspect all metal sealing surfaces in contact with the O-ring for signs of contamination and/or defects that may cause leakage. Check all product surfaces for signs of peeling or flaking. Inspect all threads for wear, cross threads or damage. If any part shows damage or excessive wear, it must be replaced.

REASSEMBLY PROCEDURES

NOTE Before any reassembly, it is important to check all parts (both new and reused) to ensure that every part and component is very clean and free of any dust, corrosion or defects. Before applying silicone oil to each O-ring, check to make sure it is clean, soft, and free of imperfections.

WARNING Only real Hotdive parts, components, and components are used when assembling any Hotdive product. Don't try to replace one. Hotdive is separate from other manufacturers' products, regardless of any similarity in shape, size or appearance. Doing so may make the product unsafe and may result in serious injury or death.

1. Take a new O-ring (22) and place it inside the valve body (18) with appliance assistance.

2. Install a new, lubricated o-ring (15,13) on the piston (14) shaft and in the groove on the head.

3. Carefully combine the spring (16) and piston (14) and insert them into the valve body (18) with the aid of a tool, then place the Spacer ring (17).

4. Install a new, lubricated O-ring (8) on the main body

(9) and another O-ring (10) on the inside.

5. Place the main body (9) and Swivel Turret(3), insert the Washer(11) into the main body, and tighten the Retaining Screw(12) with a 6mm hex wrench.

6. Connect the assembled turret(3) and valve body (18) and tighten it by hand, then Insert the pin of the wrench tool into the hole in the body (9). While holding the wrench tool safely to prevent sliding, tighten the diaphragm cap clockwise until it is fully aligned with the body (18) (metal to metal).

9. Install the new high pressure seat (23), press to the inside of the fixing cap by hand, replace with a new, lubricated O-ring (22), install the Spacer ring (21), and tighten the fixing cap (24) with a 6mm hex wrench.

10. Yoke Installation: Install new, lubricated O-rings (25) to the Yoke Inlet Fittin(26), mount the Yoke and secure it to the body (18) with a 6mm hex wrench, applying 18 ft/lb / 24.5nm of torque to the Inlet Fitting.

11. Install filters (27) and Circlip(28), dust caps (30) and Yoke screws (37).

12. DIN Installation: Install new, lubricated O-rings (31) and strainers (32) on DIN Inlet Fitting(34). Set DIN handwheel and secure to body (18) with 6 mm hex wrench, apply 18 ft/lb / 24.5nm torque to intake joint. Install new, lubricated O-rings on intake connections. Screw on the dust cap (36).

13. Install new, lubricated o-rings (9,20) on each port plug (10,19). Using a 4mm hex wrench, install each port hole plug into its respective port before installing the hose.

This Concludes Reassembly

FINAL TESTING

CHECKING THE MEDIUM PRESSURE

1. Connect the intermediate pressure test gauge (0-400 psig or 0-27 bar). If your test gauge does not have a over-pressure relief valve, you must also attach a properly adjusted second stage to the first stage to act as the relief valve in case of a HP leak.
2. Attach the first stage to a cylinder charged to 3000 psi (206 bar). Slowly open the cylinder valve to pressurize the regulator.

WARNING Warning: if the gauge rapidly exceeds 160psi (11bar), there is a high pressure leak. Close the cylinder valve quickly and clean the regulator. Failure to do so may result in LP hose and/or LP pressure gauge rupture, which could result in personal injury. Refer to Table 1 Troubleshooting Guide to find the cause of HP leakage.

3. With the regulator under pressure, cycle the over-pres sure relief valve or the second stage purge button to produce an airflow.
4. Check the MP reading, which should be between 130 and 145 psi (9-10 bar).

IMMERSION TEST

With the port plugs and at least one properly adjusted second stage installed, slowly open the cylinder valve and pressurize the first stage. Completely submerge the first stage in fresh water and check for leaks.

NOTE NOTE: Do not confuse bubbles from trapped air with a true leak. If there is an air leak, bubbles will come out in a constant stream.

Assuming there are no leaks, close the cylinder valve and depressurize the regulator. Remove the first stage from the valve and secure the dust cap in place with the yoke screw. If a leak is detected, note the source of the leak and refer to Table 1, Troubleshooting Guide for possible causes and corrective actions.

Table1-Troubleshooting Guide

SYMPTOM	POSSIBLE CAUSE	TREATMENT
Restricted airflow/high inhalation resistance through entire system	1. Cylinder valve not completely opened.	1. Open valve. Check fill pressure
	2. Cylinder valve requires service	2. Connect to a different cylinder
	3. Conical filter (27,32) contaminated	3. Replace filter with new
	4. Insufficient medium pressure	4. See below
Insufficient medium pressure	1. Low inlet pressure	1. Refill test cylinder
	2. Main spring (16) weakened	2. Replace main spring
High intermediate pressure (leakage or freeflow through second stage)	1. HP seat (23) damaged or worn	1. Replace HP seat
	2. Piston o-rings (13,15) damaged and worn	2. Replace o-rings
	3. Damaged piston (14)	3. Replace piston
Leakage of air from ambient ports of piston cap	1. Piston shaft o-ring (15) damaged or worn	1. Replace o-ring
	2. Piston head o-ring (13) damaged or worn	2. Replace o-ring
Leakage of air from inlet fitting	1. Inlet fitting o-ring (25) damaged	1. Replace o-ring
Leakage of air from the Fixed Cap	1. Valve seat sealing ring (22) is damaged or worn	1. Replace o-ring

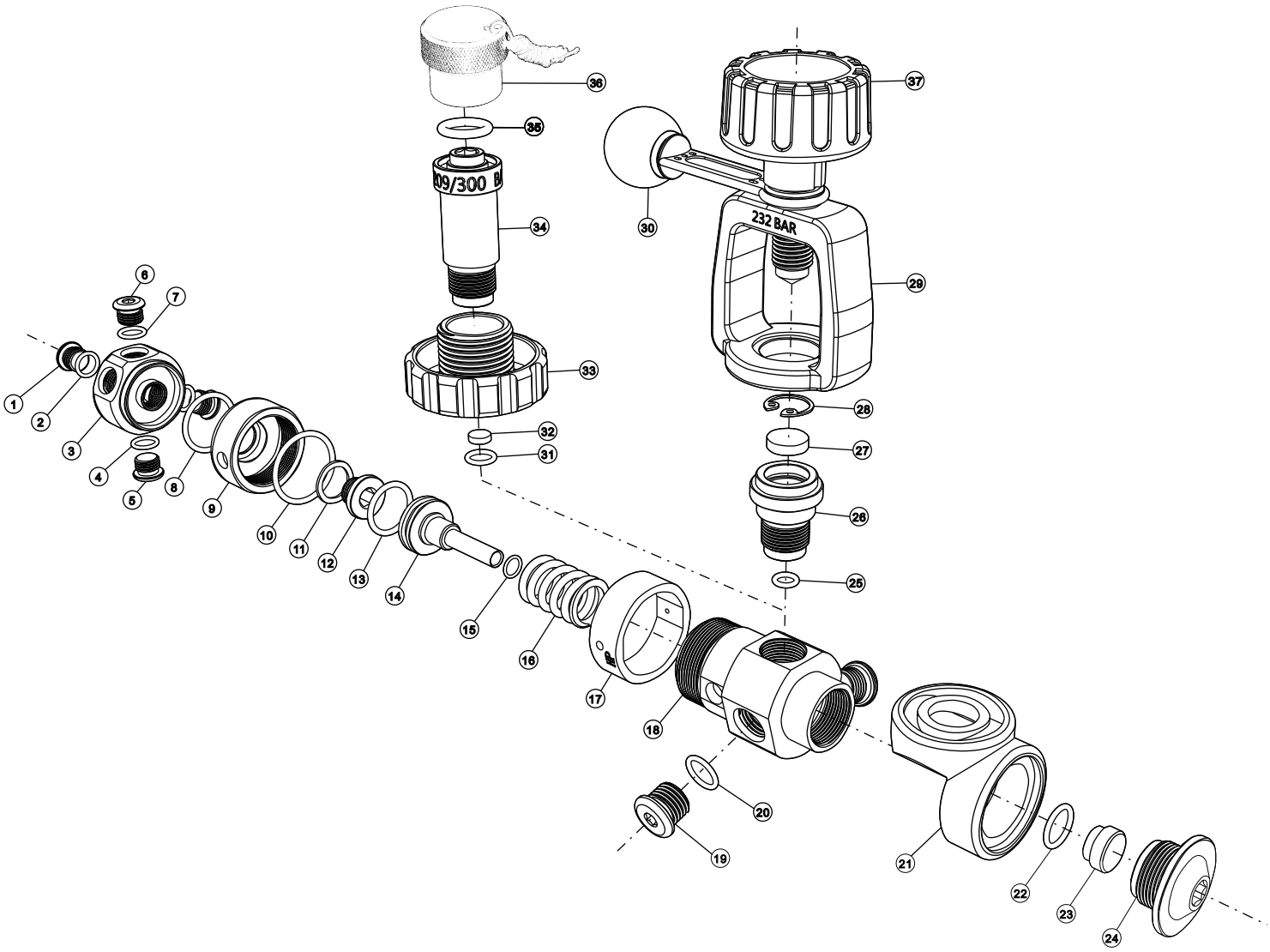
CAUTION Note: This table only lists some possible problems and recommended treatments. For more information, please contact Hotdive's Technical Services for assistance with issues not mentioned here.

NOTE Any of the above recommended treatments requiring the removal of a regulator must be carried out during a complete overhaul in accordance with the prescribed procedures for scheduled annual service. Do not attempt partial service.

Table 2-Recommended Tool List

Picture	DESCRIPTION	APPLICATION
	I.P. test gauge	Checking medium pressure
	O-ring Tool	Removing and installation of o-rings
	Hex Key	Loosen/tighten/adjust parts
	Ultrasonic Cleaner	Brass & stainless steel parts cleaning
	Piston assembly tool	Piston assembly
	Valve body (18) O-ring installation tool	Install the Valve body (18) O-ring

Schematic Drawing&Repair and Replacement Parts



Ref # PN	Qty	Description
1/5/6.....S2-01	5	**Port Plug, Low Pressure**
2/4/7.....S2-02	**5**	**O-ring**
3.....S2-03	1	Swivel Turret
8.....S2-08	**1**	**O-ring**
9.....S2-09	1	Body
10.....S2-10	**1**	**O-ring**
11.....S2-11	1	Washer
12.....S2-12	1	Retaining Screw
13.....S2-13	**1**	**O-ring**
14.....S2-14	1	Piston
15.....S2-15	**1**	**O-ring**
16.....S2-16	1	Main Spring
17.....S2-17	1	Spacer ring
18.....S2-18	1	Main Body
19.....S2-19	2	Port Plug, High Pressure
20.....S2-20	**2**	**O-ring**
21.....S2-21	1	Spacer ring

Ref # PN	Qty	Description
22.....S2-22	**1**	**O-ring**
23.....S2-23	**1**	**HP Seat**
24.....S2-24	1	Fixed Cap
25.....S2-25	**1**	**O-ring**
26.....S2-26	1	Inlet Fitting
27.....S2-27	**1**	**Filter**
28.....S2-28	**1**	**Circlip**
29.....S2-29	1	Yoke
30.....S2-30	1	Dust Cap
31.....S2-31	**1**	**O-ring**
32.....S2-32	**1**	**Filter**
33.....S2-33	1	DIN Handwheel
34.....S2-34	1	DIN Inlet Fitting
35.....S2-35	**1**	**O-ring**
36.....S2-36	1	DIN Cap
37.....S2-37	1	Yoke Screw

*Part numbers in **BOLD** indicate standard overhaul replacement part.

Find the size of the O-rings!

Print this page at 100%. Do not scale to fit. (To make sure you printed at 100%, place the largest O-ring at the bottom. If it's an exact fit, you're good to go.)

x 1 #25

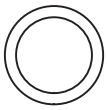
x 1 #15

x 1 #31

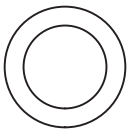
x 5 #2/4/7

x 2 #20

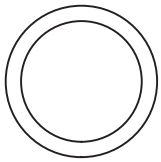
x 1 #22



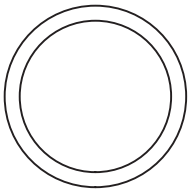
x 1 #35



x 1 #13



x 1 #8



x 1 #10