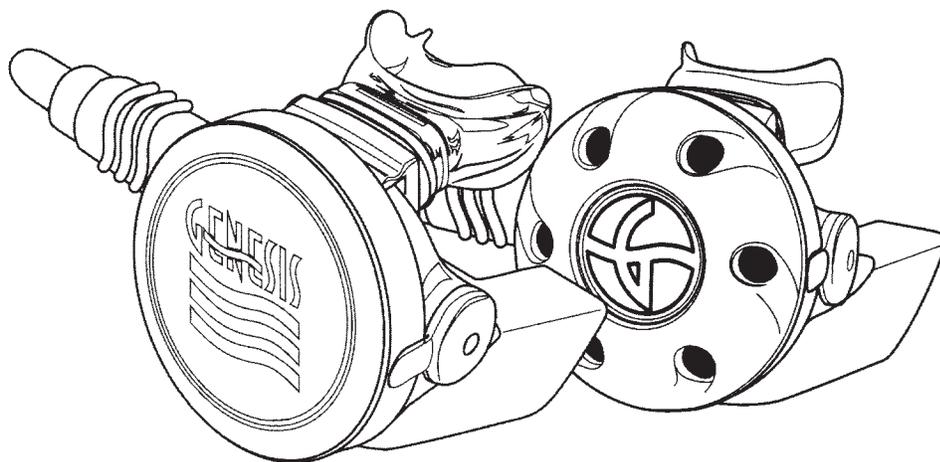


# **GENESIS<sup>®</sup>** **S C U B A**

## **REPAIR & SERVICE MANUAL**



**AXIS GR220**

**ORIGIN GR110**

**ORIGIN OCTOPUS GS010**

**SECOND STAGE REGULATORS**





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Procedural overview and illustrations provided by US Divers Co., Inc.

Technical assistance provided by Robert Ledbetter.

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# I. Introduction

Genesis SCUBA regulator repair manuals are written and provided to Authorized Genesis Dealers for use as a guide to assist in the maintenance, overhaul and trouble-shooting of Genesis SCUBA Regulators. This manual should be used only by personnel that have attended a sanctioned Genesis Regulator Repair Seminar, given by a representative designated by the Liberty Group.

To receive information about repair seminars in your region, contact your Genesis Distributor or sales representative for the date of the next Regulator Repair Seminar in your area. All employees of current Genesis dealers are encouraged to attend.

ANYONE ATTEMPTING TO SERVICE OR REPAIR A GENESIS SCUBA REGULATOR MUST HAVE ATTENDED A SANCTIONED REPAIR CLINIC. THE TECHNICIAN SHOULD HAVE A THOROUGH UNDERSTANDING OF THE PRINCIPLES OF OPERATION OF SCUBA REGULATORS AND VALVES, AS WELL AS THE APPROPRIATE MECHANICAL ABILITY. THE TECHNICIAN MUST ALSO BE FAMILIAR WITH THE SAFE USE OF COMPRESSED AIR AND THE TOOLS AND CLEANING SOLUTIONS INVOLVED IN THE PROCEDURES OUTLINED IN THIS MANUAL. THIS MANUAL IS NOT INTENDED TO BE USED AS A SELF-TEACHING GUIDE.

**N** **NOTE:** Remember that you are working on life support equipment. Good workmanship and cleanliness are extremely important. Do not attempt to substitute parts that look similar from other manufacturers into Genesis regulators. Substitute parts can lead to malfunction or reduced performance.

# II. Safety Precautions

The following symbols are used throughout this manual to bring your attention to situations that require special consideration. Be sure to read and follow all instructions carefully.



A **WARNING** is used before a procedure that will result in serious injury or death if the procedure is not followed carefully.



A **CAUTION** is used before a maintenance technique that will result in damage to parts if that technique is not followed carefully.



A **NOTE** is used to emphasize an important maintenance technique.



### III. General (User) Maintenance

Providing the best possible preventative and routine maintenance before, after and between dives will help to ensure the maximum life of a regulator, and more importantly, proper function between service intervals. To consistently achieve this goal, there are a number of simple, but important, routine maintenance procedures that should be followed by the customer after every use of the equipment. It is therefore important to advise the customer of the following recommended procedures:

**N** **NOTE:** Refer the customer to the MAINTENANCE section of the GENESIS Regulator Owner's Manual.

#### POST-DIVE PROCEDURE

1. After each day of diving, the regulator must be cleaned, inspected and prepared for the next use, or for storage. As soon as the regulator is removed from the SCUBA cylinder, prepare the dust cap to be reinstalled over the regulator inlet port. Because the dust cap is normally attached to the regulator yoke, it has been underwater during the dive, so be sure to blow out all of the water in the dust cap before securing it over the inlet port. Failure to do so may result in water or other contaminants entering the first stage, causing corrosion.

2. There are two methods of routinely cleaning regulators after each dive:

##### The Pressurized method

- a) Remove the dust cap. Attach the regulator to a charged SCUBA cylinder.
- b) Open the cylinder valve slowly to pressurize the regulator.
- c) Thoroughly soak both the first and second stage regulators in warm (not over 120°F) tap water to remove salt and mineral deposits. Direct water into the mainspring cavity of the first stage regulator, the second stage mouthpiece and the holes in the second stage front cover. Depress the purge button several times while the regulator is submerged in water. To remove excess water after soaking is complete, purge the second-stage a few more times.
- d) Close the cylinder valve and purge remaining air from the regulator. Remove the first stage from the cylinder.
- e) Dry the dust cap and place over the first stage inlet. Secure with the yoke screw.
- f) To air dry, lay the regulator on a clean towel, away from direct sunlight.

##### The Non-Pressurized method

The non-pressurized method can be performed if no charged cylinder is available.

- a) With the dust cap in place, thoroughly soak both the first and second stage regulators in warm (not over 120°F) tap water to remove salt and mineral deposits. After soaking, drain or blow all excess water out of the second stage.

**N** **NOTE:** DO NOT DEPRESS THE PURGE BUTTON while soaking the second stage. Doing so may allow water to enter the hose and first stage.

- b) To air dry, lay the regulator on a clean towel, away from direct sunlight.

3. After drying, store the regulator as follows:

- a) Store in a clean equipment box, or as an alternative, seal in a plastic bag
- b) It is good practice to wipe rubber parts with a light application of silicone grease using an impregnated cloth if the regulator is to be stored for a long period of time.



**GENERAL CAUTIONS AND WARNINGS - Whenever possible, be sure to advise your customers to take the following precautions while using or caring for their equipment.**

**CAUTION: First-stage regulators equipped with a DIN adapter must be cleaned with the pressurized method only, unless the inlet is covered with a threaded, o-ring sealed protective cap. Failure to adequately cover the DIN inlet may allow water to enter the first-stage, causing corrosion.**

**CAUTION: Do not expose any part of the regulator to silicone spray since some aerosol propellants attack, or degrade, rubber and plastic materials.**

**CAUTION: DO NOT use any type of solvent to clean any part of the regulator.**

**CAUTION: Never store the regulator while still connected to a SCUBA cylinder.**

**CAUTION: DO NOT carry the SCUBA cylinder by the regulator or hoses. Such abuse will eventually damage the regulator or the cylinder valve.**

## IV. Scheduled Dealer Service

1. Do not assume that a regulator is in good working condition because of storage or infrequent use. Remember that even prolonged or improper storage can result in internal corrosion and/or deterioration of o-ring seals and rubber components.
2. A regulator should be cleaned and adjusted frequently at a competent service facility (by a trained GENESIS repair technician). As an authorized GENESIS Scuba repair technician, it is your responsibility to inform your staff and customers that regulators require a complete servicing with scheduled parts replacement **at least** once a year in order to comply with the Limited Lifetime Warranty and 2 Year Parts Program for the regulator. **Failure to obtain service annually will void the warranty and parts program for the regulator.** The frequency of service should be appropriate for the frequency of use and the conditions under which the regulator is used. Use as rental or commercial equipment and/or use in salt, chlorinated (swimming pool) or polluted water might require cleaning and overhaul of the regulator more frequently. Chlorinated water is an especially bad environment for regulators since chlorine chemically deteriorates the neoprene rubber components.
3. Advise your customers to regularly inspect the filter in the inlet port of the first stage. If it is discolored or corroded, replacement by trained personnel is required. Also, the entire regulator may need a general overhaul with replacement of all soft seals and non-reusable components. Rust (red powder) or aluminum oxide (white/gray powder) deposits on the filter are usually an indication that water has entered the SCUBA cylinder and caused internal corrosion. The customer must be notified that their SCUBA cylinder(s) should be internally inspected and cleaned or hydrostatically tested as required.
4. When counseling your customers on preventative maintenance, inform them that no other adjustment or maintenance of their regulator is recommended by GENESIS Scuba. For adjustments such as intermediate pressure setting or proper lubrication, the regulator must be taken to an Authorized GENESIS Scuba Dealer.

## V. Disassembly

### GENERAL CONSIDERATIONS:

This section of the manual presents step-by-step disassembly procedures for the Origin and Axis second stage regulators. It is important that the sequence be followed exactly in the order given. Read over the entire manual prior to overhaul to become familiar with maintenance procedures. Take special note of all reference tables following these procedures.

Servicing of the second stage regulator should be carried out in a work area specifically set up and equipped for the task. Adequate lighting, cleanliness and easy access to all required tools are essential for an efficient repair facility. Special tools (see Table 6, page 14) are required for disassembly and subsequent assembly.

Before disassembling the second stage regulator, perform a pretest. By following the tests described on page 11 and making reference to the Troubleshooting Guide (see Table 1, page 12), you will be able to better determine the need for parts replacement.



**NOTE:** Fold out the exploded view of the Origin/Axis 2<sup>nd</sup> Stage from the back cover of this manual for easy reference during the service procedure.

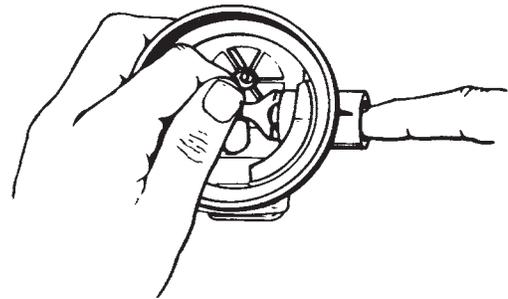


1. Slide back the hose protectors. While holding the inlet fitting (item 27) with a  $\frac{3}{4}$ " wrench, use a  $\frac{11}{16}$ " wrench to unscrew the swivel end of the hose. Use a  $\frac{9}{16}$ " wrench to unscrew the hose from the 1<sup>st</sup> stage body. Remove and discard the o-rings (items 27 and 29) on both ends of the hose.
2. Use a  $\frac{5}{16}$ " or 8mm Allen wrench and remove the access plug (item 19) from the 2nd Stage body.
  - a) Remove and discard the o-ring (item 20)
  - b) Remove the alignment key (item 21) from the case (item 24).
3. Remove the front cover.
  - a) AXIS: Turn the cover retaining ring (item 3A) counterclockwise using tool G1004-89.
  - b) ORIGIN: Turn the cover (item 5B) counterclockwise using tool G1019-40.
4. AXIS: Remove the support cone (item 6A) and the diaphragm (item 7).  
ORIGIN: Remove the plastic thrust washer (item 6B) and then the diaphragm (item 7).



**CAUTION:** On step 5, keep the demand lever (item 15) depressed while removing the inlet fitting (item 27). Failure to keep the lever depressed may cause damage to the inlet fitting sealing surface.

5. Depress the lever and, using a  $\frac{3}{4}$ " wrench, remove the inlet fitting (item 27). Remove and discard the o-ring (item 26).
6. Grasp the lever (item 15) and, with your other hand, push the insert (item 13) into the case with your finger tip.  
*Figure 1.*



**Figure 1**



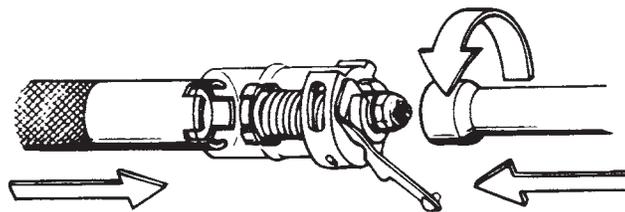
**NOTE:** The venturi baffle (item 11) is not normally removed during servicing. Remove only if damaged and in need of replacement.

7. If required, disassemble the lever support as follows:



**NOTE:** The assembly is spring loaded; maintain tension as you proceed.

- a) Place the poppet wrench (G1100-05) over the sealing end of the poppet (item 9).
- b) Use the  $\frac{1}{4}$ " nut driver portion of Lever Height Adjustment Tool (G1016-84) to turn the locknut (item 17) counter clockwise to remove. *Figure 2.*



**Figure 2**

- c) Discard the used locknut and remove the spacer (item 16), lever (item 15) and washer (item 14) from the insert (item 13).
  - d) Remove the poppet (item 9) and spring (item 10).
8. Remove the low pressure seat (item 8) from the end of the poppet (item 9) and discard.
  9. Remove the o-ring (item 12) from the outside of the insert (item 13) and discard.
  10. Remove the mouthpiece tie (item 23) with a pair of pliers or sidecutters and discard.
  11. Remove the mouthpiece (item 25).
  12. Pull the exhaust tee (item 18) off of the back half of the case.
  13. Pull the exhaust valve (item 22) out of the case and discard.



14. If removal of the Origin purge button (item 1B) is required:
  - a) Squeeze the four arms of the button towards the center.
  - b) Push inward and remove the button (item 1B) and spring (item 4B).

## VI. Parts Cleaning



**CAUTION:** NEVER expose plastic or rubber parts to solvents, acidic, or caustic cleaning agents of any type. Never use aerosol silicone sprays to lubricate or clean plastic or rubber parts. The propellant or solvents may attack or weaken the plastic material.

1. All o-rings, the seat and exhaust valve are routinely replaced during a general overhaul.
  - a) All of the parts in the repair kit should be installed in the Axis or Origin, and the used parts discarded.
  - b) A list of the parts to be replaced during routine maintenance is on page 7 of this manual.
2. All of the plastic and rubber parts (case, front cover, retaining ring, color ring, diaphragm, mouthpiece, exhaust tee, and access port cap) should be cleaned in fresh, warm (not over 120°F) water with a mild detergent. Use a soft nylon brush, if necessary, taking care not to scratch or abrade the rubber or plastic parts.
  - a) Rinse in clean, fresh water.
  - b) Blow dry with low pressure air (less than 30 psi.)
  - c) Inspect the parts for cracks, burrs, distortion and solvent attack.
  - d) Hold the diaphragm up to the light and gently stretch it, looking for holes and tears and proper placement of the nylon plate.
  - e) Inspect the poppet for wear, and ensure that the relief hole is free of blockage.
3. Use a soft nylon brush to loosen and remove any loose or flaking material from all metal parts.



**NOTE:** The inlet fitting (item 27) should be cleaned and rinsed separately to prevent any damage to the sealing surface that could be caused by contact with the other parts.

4. Place the metal parts in suitable cleaning solution (see list on page 13).
  - a) Genesis recommends the use of an ultrasonic cleaner, and mixing cleaning materials to manufacturer's specifications.
  - b) If a 50% vinegar/50% water solution is used, check parts frequently to avoid deterioration of the finish.
  - c) Always follow manufacturer's recommendations for dilution and soak times. The plating on interior bore surfaces is very thin and can easily be damaged. Subsequent corrosion of unprotected brass can lead to early performance deterioration.



**CAUTION:** Do not over use acid solutions, damage to plated surfaces may result. NEVER use a wire brush to remove mineral encrustation or corrosion. Damage to plated surfaces or orifice sealing surfaces may result.

- d) If no ultrasonic cleaning tank is available, use the cleaning solution mixed to manufacturer's specifications, or 50% water/50% white vinegar solution. Immerse metal parts and gently agitate for three to four minutes. Check frequently.
5. Thoroughly rinse the clean parts in fresh water, and blow dry with low pressure air (30 psi or less).



## VII. Parts Inspection

1. All of the parts in the kit should be inspected before use. Look for contaminants and molding flaws before installation.
2. All reusable metal components must be inspected for burrs, scoring and corrosion. Genesis strongly recommends the use of a strong light and magnifying lens to aid inspection.
3. Replace components if you find:
  - a) blistered, peeling or cracked chrome;
  - b) damaged threads, cross-threaded or stripped threads;
  - c) scratches or damage to o-ring sealing surfaces;
  - d) nicks, burrs, scoring or scratches that could effect sliding or rotating parts;
  - e) solvent attack, deformation, cracking or distortion of plastic parts;
  - f) holes, tears or dislodged plate on the diaphragm.
4. Pay specific attention to the following parts and replace if necessary.
  - a) Inspect the poppet (item 9) for nicks, galling or wear. The hole under the seat must be clear of obstruction. Replace if necessary.
  - b) Examine the sealing surface of the inlet fitting (item 27) for scratches, nicks, excessive wear or damage to the plating. Inspect the o-ring seating surface and threads. Replace if necessary.
  - c) Examine the insert (item 13) for internal scratches or corrosion damage and inspect the threads and o-ring sealing surface. Replace if necessary.
  - d) Check the demand lever (item 15) for bending, distortion or excessive wear. Replace if necessary.
  - e) Examine the back half of the case (item 24) for cracks, or damaged threads. Replace if necessary.
  - f) Inspect the diaphragm for cuts, pinholes, or any other damage by gently stretching it while holding it to a light. The pressure plate in the center of the diaphragm is held in place by tension. Ensure the pressure plate is properly seated. Replace if necessary.
  - g) Inspect the hose for cuts, nicks, cracking, or hardening. Pay particular attention to the outer jacket at the hose ends. Look for damage around the crimped portion of the hose fittings. If the braided reinforcement is showing or there is evidence that the hose is pulling out of the fittings, replace the hose. Inspect the threads on the hose fittings and the o-ring seating surfaces. Replace if necessary.

**Refer to Table 1 Troubleshooting Guide for additional problem areas.**



## VIII. Routine Replacement Parts

These parts are included in Genesis Axis / Origin Parts Kit, PK010, and should be replaced during all routine maintenance

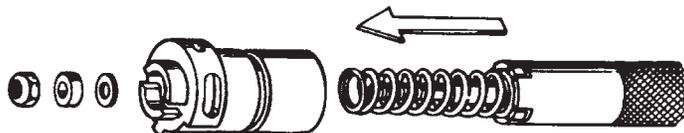
Item Number	Part number	Description	Qty Needed
8	G1085-10	l.p. seat	1
12	R015B	o-ring	1
17	G1025-10	locknut	1
20	R905B	o-ring	1
22	G1005-22	exhaust valve	1
23	G1049-13	clamp	1
26	R014B	o-ring	1
28	R010B	o-ring	1
30	R011B	o-ring	1



**NOTE:** Genesis recommends that all of the parts in the Routine Replacement Parts list be replaced every year for regulators used by recreational divers. Heavily used rental regulators and commercially used units should be serviced on more frequent intervals, based on their level of use and abuse. The second stage diaphragm need only be replaced if it shows signs of damage from age, deterioration or chemical attack.

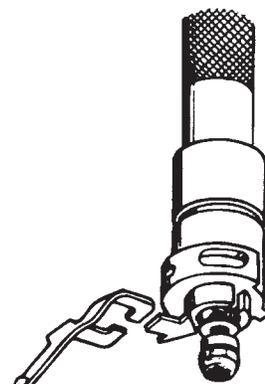
## IX. Reassembly Procedure

1. Assemble the lever support subassembly
  - a) Insert a new low pressure seat (item 8) into the poppet (item 9)
  - b) Place the spring (item 10) onto the poppet and holding it with the poppet wrench, G1100-05, insert it into the insert (item 13).
  - c) Push in on the wrench to expose the threads of the poppet through the other end of the insert.
  - d) Place the washer (item 14), radiused side out, then the spacer (item 16), and a new locknut (item 17) onto the poppet stem. *Figure 3*. Tighten the locknut only until the first threads are engaged.



*Figure 3*

- e) Push inward on the poppet wrench and insert the lever (item 15) between the spacer and washer such that it is pointing away from the alignment tab on the bottom of the insert. *Figure 4*.
  - f) Remove the wrench. Depress the lever and release it. If the lever is aligned correctly in its groove the lever will spring back freely when released.
2. Re-install the wrench onto the poppet. Use the 1/4" nutdriver portion of the lever height adjusting tool, G1016-84, to turn the locknut clockwise until about 3 threads of the poppet are visible beyond the nut.
  3. Lightly lubricate the o-ring (item 26) and place it on the inlet fitting (item 27).
  4. Lightly lubricate the o-ring (item 12) and place it in the groove on the insert (item 13).
  5. If the baffle (item 11) was removed, replace it at this time.



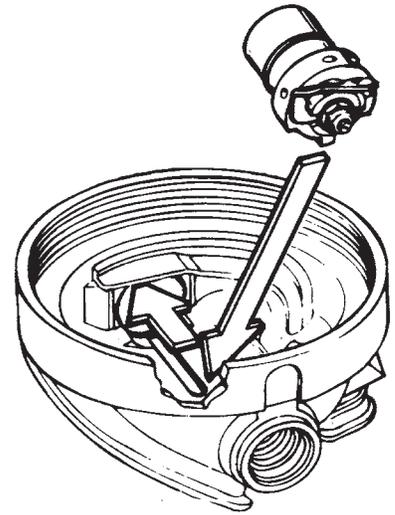
*Figure 4*



6. Align the tab on the insert with the channel just above the exhaust port in the case (item 24) and slide it into the case until the female threaded end is flush with the boss on the case. *Figure 5.*
7. Lightly lubricate the first two threads of the inlet fitting (item 27). While depressing the lever (item 15), thread the inlet fitting into the insert assembly you installed in the case. Tighten the inlet fitting to 50 inch-pounds. Release the lever.

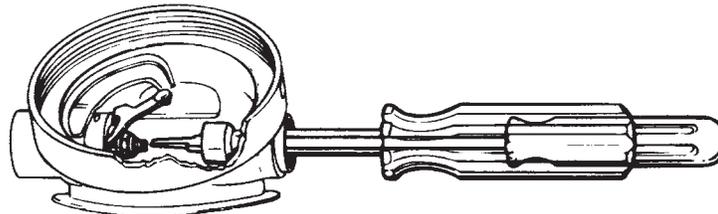


**CAUTION:** WHEN USING THE LEVER HEIGHT ADJUSTMENT TOOL (G1016-84), ALWAYS HOLD THE SCREWDRIVER PORTION STATIONARY WHILE TURNING THE NUTDRIVER PORTION. FAILURE TO PREVENT TURNING OF THE POPPET WHILE ADJUSTING THE LOCKNUT WILL CAUSE DAMAGE TO THE LOW PRESSURE SEAT (ITEM 8), REQUIRING ITS REPLACEMENT.



**Figure 5**

8. An easy pre-adjustment of the poppet and inlet orifice will make the final adjustment easier. There should be just enough spring force to seal against air flow at normal operating pressures.
  - a) Blow into the hose fitting. You should be able to just barely blow through the fitting.
  - b) If necessary, use the lever height adjustment tool (G1016-84) to make an adjustment.
    - i) Mate the screwdriver into the nutdriver.
    - ii) Place the screwdriver into the slot in the end of the poppet (item 9).
    - iii) Slip the nutdriver onto the locknut (item 17).
    - iv) **DO NOT TURN THE SCREWDRIVER.** While holding the poppet stationary with the screwdriver, turn the locknut clockwise until you can just blow through the inlet fitting.
  - c) While holding the screwdriver stationary. Turn the nutdriver in small increments counterclockwise until you can no longer blow past the poppet. *Figure 6.*



**Figure 6**

9. Insert the exhaust valve (item 22) into the case from the outside. Pull on the stem until the barb passes through the hole in the spider in the exhaust port. Use side cutters to trim the stem of the exhaust valve  $\frac{1}{4}$ " above the barb. Ensure that the exhaust valve is properly seated.



## X. Authorized Adjustment and Testing



**NOTE:** Before adjusting and testing the Axis or Origin 2<sup>nd</sup> stage, you should first complete the adjusting and testing of the 1<sup>st</sup> stage regulator with which it will be used. Refer to the appropriate 1<sup>st</sup> stage manual, and complete all recommended tests before proceeding with this manual.

1. Attachment of the 1st stage to the 2nd stage.
  - a) Lightly lubricate and install the two o-rings (item 28 and item 30) on to the intermediate pressure hose (item 29).
  - b) Attach the hose to the primary low pressure port on the 1st stage body using a 9/16" wrench. Install to 40 inch pounds torque. The primary port is identified by a ( +\* ) stamp.
  - c) Connect the 1st stage to a source of low pressure (500 psig) breathing air. While firmly holding the free end of the 2nd stage hose, carefully open the valve and flush out any dirt or debris with a small quantity of air flow.
  - d) Attach the second stage to the free end of the hose. While holding the inlet fitting with a 3/4" wrench, use an 11/16" wrench to tighten the swivel nut to 40 inch-pounds.



**CAUTION:** WHEN USING THE LEVER HEIGHT ADJUSTMENT TOOL (G1016-84), ALWAYS HOLD THE SCREWDRIVER STATIONARY WHILE TURNING THE NUTDRIVER. ALLOWING THE POPPET TO TURN WHILE ADJUSTING THE LOCKNUT MAY CAUSE DAMAGE TO THE LOW PRESSURE SEAT (ITEM 8), REQUIRING ITS REPLACEMENT.

2. Axis and Origin adjusting and testing
  - a) Install the 1st stage on an air source with 3000 to 3500 psi minimum.
  - b) SLOWLY turn the air on. The 2nd Stage should be leaking slightly.

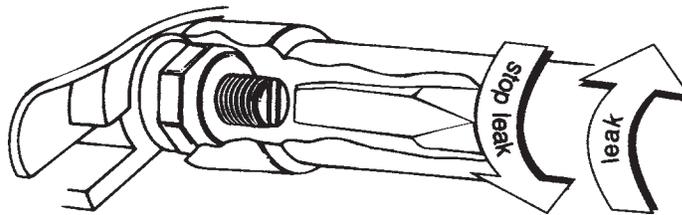


Figure 7

- c) Insert the nutdriver portion of the lever height adjustment tool through the access port and engage the locknut. Insert the screwdriver portion of the tool through the center of nutdriver and engage the slotted end of the poppet. **While holding the poppet (screwdriver) stationary, turn the nut counterclockwise until the airflow just stops.** Figure 7. Remove the adjustment tool.



**NOTE:** If excessive adjustment is required or the regulator continues to leak:

- Check to ensure that hose pressure is not creeping above 150 psig.
- Check the condition of the L.P. seat and orifice.

Refer to Troubleshooting, Table 1.

- d) Position the diaphragm (item 7) over the lever (item 15) with the plastic plate facing the lever.
      - e) With your finger tap gently on the diaphragm, there should be minimal play between the diaphragm and lever.
3. If the 2nd Stage is a Origin then:
  - a) Hold the face plate (item 5B) with the alignment key hole in the threads pointing to the right.
  - b) Install the spring (item 4B) into the center recess of the face plate - large end toward the face plate, small end facing up.
  - c) Insert the purge button (item 1B) into the spring with the G symbol horizontal. The "wave" stripe should point toward the alignment hole in the threads. Push the purge button into the face plate until it snaps into place.
  - d) Install the plastic thrust washer (item 6B) over the diaphragm.



e) Screw the front cover onto the case snugly until the locking holes in the case threads and the cover are in alignment.

4. If the 2nd Stage is an Axis then:

a) Install the support cone (item 6A) and purge cover (item 5A) over the diaphragm.

**NOTE:** Lubricating the back edge of the retaining ring with a small amount of DOW-111 will minimize the friction on the purge cover during assembly. Use the face removal tool (G1004-89) to get the ring snug and alignment proper.

b) Screw the retaining ring (item 3A) into the case snugly while holding the purge cover horizontal until the locking holes in the case and retaining ring are in alignment.

**N** c) Insert the color ring (item 2A).

5. Place the 1st stage regulator on an air source with 3000 - 3500 psi minimum. SLOWLY turn on the air supply.

a) Check the 1st stage hose pressure. Lockup pressure should be 135-150 psig.

**N** **NOTE:** If the 2nd stage leaks when the regulator is pressurized, do not continue with the testing procedures until the leak is stopped.

b) If a minor leak is occurring, insert the nutdriver portion of the lever height adjustment tool in the access port and engage the locknut. Insert the screwdriver portion through the center of the nutdriver, and engage into the slot on the end of the poppet. While holding the poppet stationary with the screwdriver, adjust the locknut counterclockwise in small steps until the leak stops. Remove both portions of the tool.

c) If there is a major leak or excessive adjustment is required, open the front cover and inspect the lever for damage or distortion. Replace if necessary and repeat adjustments.

6. Lightly lubricate the o-ring (item 20) and place it on the access plug (item 19). Insert the alignment key (item 21) into the hole just above the adjustment hole in the case. Thread the access plug (item 19) into the adjustment hole and tighten it to 5 to 8 inch pounds with a 5/16" or 8mm Allen wrench.

7. Install the mouthpiece on the case (bridge up if using the stock mouthpiece). Fasten the mouthpiece in place with a new mouthpiece clamp. Use a knife to cut the clamp smoothly at the tab, so there are no sharp edges.

8. With the air turned off and the system purged, but with the regulator still mounted on the valve or with the dust cap securely installed, inhale strongly on the second stage. No air should be available. If any leaks occur:

a) Inspect the mouthpiece for deterioration or holes.

b) Check the exhaust valve and its seating surface for cracks, tears or molding flaws.

c) Remove the front cover and check the diaphragm and its mounting surface for sand or contaminants that might affect the seal. Re-inspect the diaphragm for holes, tears, or defects.

d) Check the case for cracks or defects.

e) Remove the access plug and check the o-ring and its sealing surface for contaminants or defects.

f) Correct the problem, re-assemble and retest.

9. Install the exhaust tee (item 18) by stretching it over the flange on the case.

**N** **NOTE:** Before placing the regulator back in service, the following sequence of tests are necessary. A flow bench is the preferred device to ensure the quality of your adjustments. This will enable the service technician to check critical performance requirements of the regulator more precisely. If a flow bench is not available, testing with the use of a SCUBA cylinder (the less preferred testing procedure) will follow this section.

### Second Stage Air Flow Test with Flow Bench

1. With the regulator attached to the flow test bench, repressurize the regulator to 3500 to 3000 psig. Place the 2<sup>nd</sup> stage mouthpiece over the flow stand mouthpiece adapter. Slowly turn the flow meter control knob until flow reaches a minimum of 15 scfm (425 lpm). The reading on the Magnahelic



gauge should indicate no more than 6.0" water column. If the reading is over 6.0 w.c., refer to Table 1 Troubleshooting Guide, for corrective procedures.

2. *Second Stage Opening Effort Test.* With the flow control knob turned off, gently inhale on the regulator. When the air starts to flow, the Magnahelic gauge should indicate an opening effort of 0.6" w.c., up to 1.5" w.c. for an octopus. If the opening effort is not within this range, refer to Table 1 Troubleshooting Guide, for corrective procedures.
3. *Second Stage Purge Flow Test.* With the flow control knob turned off, and the mouthpiece mounted on the adapter, fully depress the purge cover and watch the flow meter gauge. The flow meter must indicate a minimum of 5.0 scfm (142 lpm.) If the purge flow is not correct, refer to Table 1 Troubleshooting Guide, for corrective procedures.

### **Second Stage Air Flow Test with a SCUBA Cylinder**

1. Attach Hose Pressure Test Gauge (G1116-10) to the regulator 1<sup>st</sup> Stage.
2. With the regulator attached to a full SCUBA cylinder, repressurize the regulator to 3000 to 3500 psig. Hose pressure should be 135-150 psig.
3. *Second Stage Purge Flow Test.* Fully depress the purge cover. There should be a moderate flow of air from the mouthpiece. If the purge flow is not correct, refer to Table 1 Troubleshooting Guide, for corrective guidelines and specific procedures.
4. *Second Stage Opening Effort Test.*
  - a) Hold the second stage by the mouthpiece so that the diaphragm is horizontal.
  - b) Slowly lower the regulator into a pan of clean water. The regulator should start to free flow at about one inch of water depth on the diaphragm, indicating an approximate opening effort of one inch of water column.
  - c) If the opening effort is not correct, refer to Table 1 Troubleshooting Guide, for corrective procedures.

### **Final Tests to be performed on all regulators**

1. *Second Stage Leak Test.* After final reassembly and adjustment of the 2<sup>nd</sup> stage regulator, the following simple tests for external leaks is recommended.
  - a) With the air turned OFF, and the regulator still connected to the air source, inhale hard on the 2<sup>nd</sup> stage. If any air leaks into the regulator, inspect it for leaks. The seal of the diaphragm to the case, the exhaust valves and the condition of the mouthpiece should be suspect.
  - b) With the regulator connected to an air source, (a small pony bottle is ideal), submerge the entire system. Turn on the air supply. Observe the regulator 1<sup>st</sup> and 2<sup>nd</sup> stages for one minute. The one minute period will allow small leaks, if present, to form observable bubbles. Bubbles indicate a leak that might worsen, which means the regulator must be disassembled to check sealing surfaces.
  - c) Correct any problems and reassemble and readjust as required, following the procedures in this manual.
2. *Subjective Breathing Test.* Breathe on the regulator slowly and deeply 4 or 5 times. It should deliver air without excessive effort, free flow or fluttering of the diaphragm. When exhaling there should be no fluttering or sticking of the exhalation valve. If you suspect problems, refer to Table 1 Troubleshooting Guide, for corrective procedures.



## TABLE 1 Troubleshooting Guide Axis and Origin 2<sup>nd</sup> Stage Regulators

PROBLEM	PROBABLE CAUSE	RECOMMENDATION	
<b>Leaking or hissing sound from second-stage</b>	High intermediate-pressure	Set intermediate pressure to 135-150 psig. See Genesis 1 <sup>st</sup> Stage Manual Troubleshooting Guide.	
	Lever (item 15) set too high	Turn locknut (item 17) counterclockwise to adjust lever down (for more detailed adjustment (see Adjustment and Testing Section X)	
	Purge button (item 1B) jammed down	Clean out the purge button area	
	Lever (item 15) bent	Replace lever (item 15)	
	Orifice (item 27) seating surface damaged or worn	Clean and inspect orifice (item 27). Replace if damaged.	
	Seat (item 8) dirty, damaged or worn	Replace Seat (item 8)	
	Poppet (item 9) dirty, damaged or worn	Clean or replace poppet (item 9)	
	Spring (item 10) worn or weak	Replace spring (item 10)	
<b>Hard to breathe</b>	Intermediate pressure set too low	Set intermediate pressure to 135-150 psig. See Genesis 1st Stage Manual Troubleshooting Guide.	
	Lever (item 15) set too low	Turn locknut (item 17) clockwise to adjust lever upward toward diaphragm	
	Lever (item 15) bent	Replace lever (item 15)	
	Sintered inlet filter clogged in 1st stage	Inspect filter and replace if necessary	
	Intermediate-pressure hose (item 29) clogged	Clean or replace hose (Item 29)	
<b>Low purge flow</b>	Lever (item 15) set too low	Turn locknut (item 17) clockwise to adjust lever up toward diaphragm	
	Lever is bent (item 15)	Replace lever	
<b>Water entering second-stage</b>	Hole in mouthpiece (item 25)	Examine and/or replace mouthpiece	
	Hole in diaphragm (item 7)	Examine and/or replace diaphragm	
	Diaphragm (item 7) improperly seated in case (Item 24)	Disassemble and properly reassemble	
	Exhaust valve seating surface on case (item 24) dirty, damaged or worn	Clean and/or replace case (item 24)	
	Dirty, damaged or worn exhaust valve (item 22)	Replace exhalation valve (item 22)	
	O-rings (items 26, 20 or 12) dirty damaged or worn	Examine and/or replace o-rings	
	Cracked or damaged case (item 24)	Examine and/or replace case (item 24)	
<b>External air leaks</b> (See note, Table 3)	Intermediate-pressure hose (item 29) loose	Tighten intermediate pressure hose	
	<b>NOTE:</b> Immerse pressurized regulator in water to locate source of leak. Always depressurize system prior to tightening loose fittings, plugs or hoses.	O-rings (items 12, 20, 26 and/or 28) dirty, damaged or worn	Examine and/or replace o-rings.
	Orifice / hose fitting is loose (item 27)	Tighten Orifice / hose fitting	



## TABLE 2 Test Bench Specifications

Test	Condition	Acceptable Range
Leak Test	inlet pressure: 3000 - 3500 psi	no leaks allowed
Intermediate pressure	inlet pressure: 3000 - 3500 psi	hose pressure 135-150 psig
Intermediate pressure creep	inlet pressure: 3000 - 3500 psi	hose pressure should not change more than 5 psig within 15 seconds after purging regulator.
Opening effort	hose pressure: 135-150 psig	.6 - 1.5 inches water column
Flow effort	hose pressure: 135-150 psig flow rate: 15 SCFM	6 inches water column or less
Purge flow	hose pressure: 135-150 psig	5.0 SCFM flow rate minimum

## TABLE 3 Torque Specifications

Part Number	Description / Item Number	Torque
G1004-44	Inlet fitting (item 27)	50 inch pounds
G1003-24	Access Plug (item 19)	5 to 8 inch pounds
LPH-31	Hose Assembly (item 29)	40 inch pounds



**NOTE:** All hoses attached to the regulator, including gauge and BC inflator hoses, should be installed to 40 inch pounds of torque before any leak tests are performed.

## TABLE 4 Recommended Lubricants and Cleaners

Item	Application	Source(s)
Dow Corning DOW-111	For regulators in service with air only (21% oxygen max.). All o-rings and threaded metal parts.	Genesis distributor
Christo Lube 111	For regulators in service with air or enriched air mixtures. <i>See Note below.</i> All o-rings and threaded metal parts.	Genesis distributor, Lubrication Technology, Inc. 310 Morton Street Jackson, Ohio 45640
<b>NOTE:</b> Use only a light film of lubricant. Do not use silicone spray. Sprays leave very little lubricant after the propellant evaporates and the propellant in many sprays attacks plastic and rubber parts. <b>NOTE:</b> Use of regulators with enriched air mixtures (over 21% oxygen) requires special cleaning, handling, and maintenance techniques. The standard models of Origin and Axis regulators are not intended for use with enriched air mixtures.		
Ultrasonic cleaner with ultrasonic detergent	Mixed according to manufacturer specifications. All metal regulator parts	Dental supply houses Ultrasonic manufacturers
Oakite #31	All metal regulator parts	Oakite Products, Inc 50 Valley Rd. Berkeley Heights, NJ 07922
Lawrence Factor LWF	All metal regulator parts	Lawrence Factor (305) 430-0550
White Distilled Vinegar	50/50 solution with fresh water. All metal regulator parts	Grocery Stores
Liquid dishwashing detergent	All reusable rubber/plastic parts	Grocery Stores



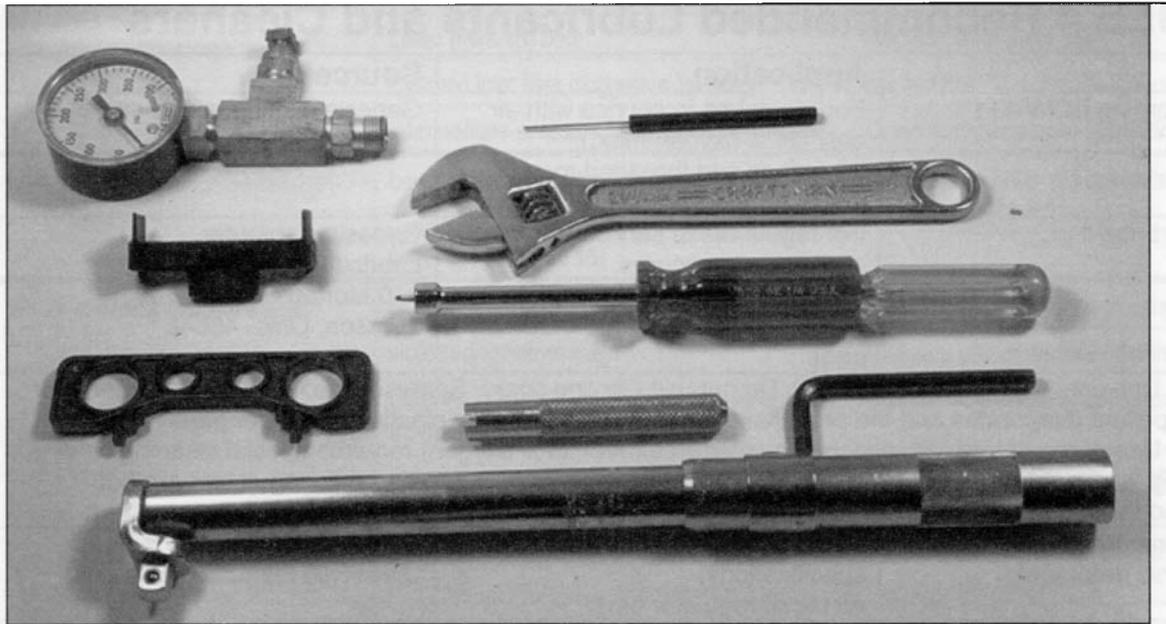
## TABLE 5 O-Ring Reference Chart

This chart is provided to help you identify the o-rings included in the parts kit. All sizes are approximate. DO NOT use this chart as a guide for selecting substitute o-rings.

	R015B	Insert
	R905B	Access plug
	R014B	Inlet Fitting
	R010B	Hose end, swivel
	R011B	Hose end, male thread

## TABLE 6 Special Tools

Required for proper maintenance of the Axis & Origin 2<sup>nd</sup> stages.



G1116-10	Hose Pressure Test Gauge, 0-400 psig	G1094-36	Seat Extractor
G1004-89	Face removal tool - Axis		Adjustable Wrench
G1019-40	Face removal tool - Origin	G1016-84	Lever height adjustment tool
	Torque Wrench, 0-50 inch pounds	G1100-05	Poppet wrench
			8 mm Allen wrench

Additionally, the technician will need a complete set of wrenches, an o-ring tool/pick set, and common tools, a source for high pressure and low pressure breathing air, a clean well lighted work area. A professional flow bench is highly recommended for making accurate adjustments.



## Limited Lifetime Warranty (as printed in the Genesis regulator Owner's Manual)

*GENESIS regulators are warranted to be free of defects in materials and workmanship for as long as you own the regulator.* This warranty originates at the date of consumer purchase from an authorized GENESIS retailer. The warranty is limited and subject to the restrictions listed below.

### **What is covered**

All parts of your Genesis regulator are covered under this warranty. Should any part of your Genesis regulator be found *defective*, Genesis Scuba, at its discretion, will repair or replace the component at no charge to you.

### **What is not covered**

Inspection, service, and/or labor charges will be paid by the regulator owner.

Some regulator parts are subject to wear even under normal or minimal use. O-rings, high pressure seats, low pressure seats, filters, star washers, diaphragms, exhaust valves, tie wraps, mouthpieces, and hoses should be inspected for excessive wear on a regular basis. Replacement of worn items constitutes normal maintenance, and is the responsibility of the owner. *See the GENESIS 2 Year Parts Program below.*

This warranty does not cover damage to the product resulting from the introduction of rust or other contaminants from the air supply, normal wear, improper usage, improper maintenance, neglect of care, alteration, or unauthorized repair. This warranty will automatically become void if proper preventative maintenance procedure have not been followed as outlined in this manual.

All repairs made, not covered under the terms of this warranty, will be made at the owner's expense.

### **What you need to do**

Keep a copy of the original purchase receipt and subsequent inspections with this manual.

Your GENESIS regulator must be inspected and serviced by a qualified GENESIS repair facility within 6 weeks before or after the one year anniversary date of your purchase or last servicing. Service must take place at least annually, or more frequently with heavy use. See your authorized GENESIS retailer if you have questions regarding the recommended frequency of service. Failure to have your regulator inspected/serviced within the specified time will void the warranty.

The repair facility must sign your service registration log at each annual inspection. Failure to do so will void the warranty.

Put this manual, your original purchase receipt, and subsequent inspection receipts in a safe place for future reference.

This warranty is nontransferable from the original owner. No salesperson, dealer, or representative is authorized to make any modification to this warranty.

ALL IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED TO THE DURATION OF THIS WRITTEN WARRANTY. Some states do not allow limitations on the duration of implied warranties so this may not apply to you.

GENESIS SCUBA SHALL NOT BE LIABLE OR RESPONSIBLE IN ANY MANNER FOR LOSS OF USE OF THE PRODUCT OR ANY INCIDENTAL, CONSEQUENTIAL, OR INDIRECT COSTS, EXPENSES OR DAMAGES INCURRED WITH THE USE OF THE GENESIS REGULATOR. Some states do not allow this exclusion so this limitation may not apply to you.

This warranty gives you specific legal rights. You may have rights which will vary from state to state.

### **GENESIS 2 Year Parts Program**

Genesis Scuba will provide the annual service kits for your Genesis regulator for your first two annual service/inspections. The service kits contain all the standard overhaul parts that Genesis recommends be replaced at least on an annual basis.

The GENESIS 2 Year Parts Program is automatic but you must adhere to the stipulations of the Limited Lifetime Warranty to keep it in effect.

- Your regulator must be inspected/serviced only by an qualified GENESIS repair facility.
- Your regulator must be inspected/serviced within 6 weeks before or after the one year anniversary date of your purchase or last servicing.
- Keep a copy of the original purchase receipt and subsequent inspections with this manual.
- Inspection, service, and/or labor charges will be paid by the regulator owner.

This program is nontransferable from the original owner.



# Genesis Regulator Warranty - Dealer Procedure

## At the time of sale:

1. Complete the Inspection Record on page 15 of the Regulator Owner's Manual. The purchase date, model of regulator, service technician's name and serial numbers of both first and second stages must be recorded on this page. The customer needs to keep this information and the transaction receipt as a record of the original purchase.
2. You also need to let your customer know that this record (the Regulator Owner's Manual and receipt) is important and must be presented to the service facility to take advantage of the 2 Year Parts Program and Limited Lifetime Warranty. Recommend the customer keep these items in a safe, accessible place - with his/her logbook for instance.

## When it's time for service:

In order to keep the Limited Lifetime Warranty and 2 Year Parts Program in effect, the customer must provide: the regulator, the owner's manual, the original sales receipt, and receipts or records of any subsequent service.

## You need to:

1. Verify ownership of the regulator. The warranty and parts program are only eligible to the original retail purchaser.
2. Verify warranty is in effect. Service must take place within one year of the original purchase date,  $\pm 6$  weeks; or within one year of the last service procedure,  $\pm 6$  weeks. Additional service procedures will not affect the warranty, however, exclusion of an annual service procedure within the specified time frame will void the warranty and parts program.
3. Determine if 2 Year Parts Program is in effect. The 2 Year Parts Program provides a free parts kit for each of the first two annual service procedures as long as the customer has kept the warranty in effect.
  - 2 Year Parts Program in effect.** Cut out the applicable coupon from the inside back cover of the Owner's Manual. Completely fill out all information on the coupon. ALL information must be provided to obtain parts kit replacement.
  - 2 Year Parts Program expired or void.** Notify the consumer of the warranty status of this regulator and estimate his/her parts costs before beginning the service procedure.
4. Service the regulator with appropriate parts kit. Each kit contains all the standard overhaul parts that Genesis recommends be replaced at least on an annual basis.
5. Record the service on page 15 of the regulator owner's manual. The repair facility must sign the Inspection Record at each annual service. Failure to do so will void the warranty.
6. Return the regulator and the owner's manual with all dated receipts and records to the customer. Again, stress to the owner the importance of keeping all receipts for verification of warranty status in the future. It is a good idea to staple the receipts inside the back cover of the regulator Owner's Manual.
7. Send the completed coupon to your Genesis Scuba distributor. Your distributor will replace the coupon with a new kit of the same parts.

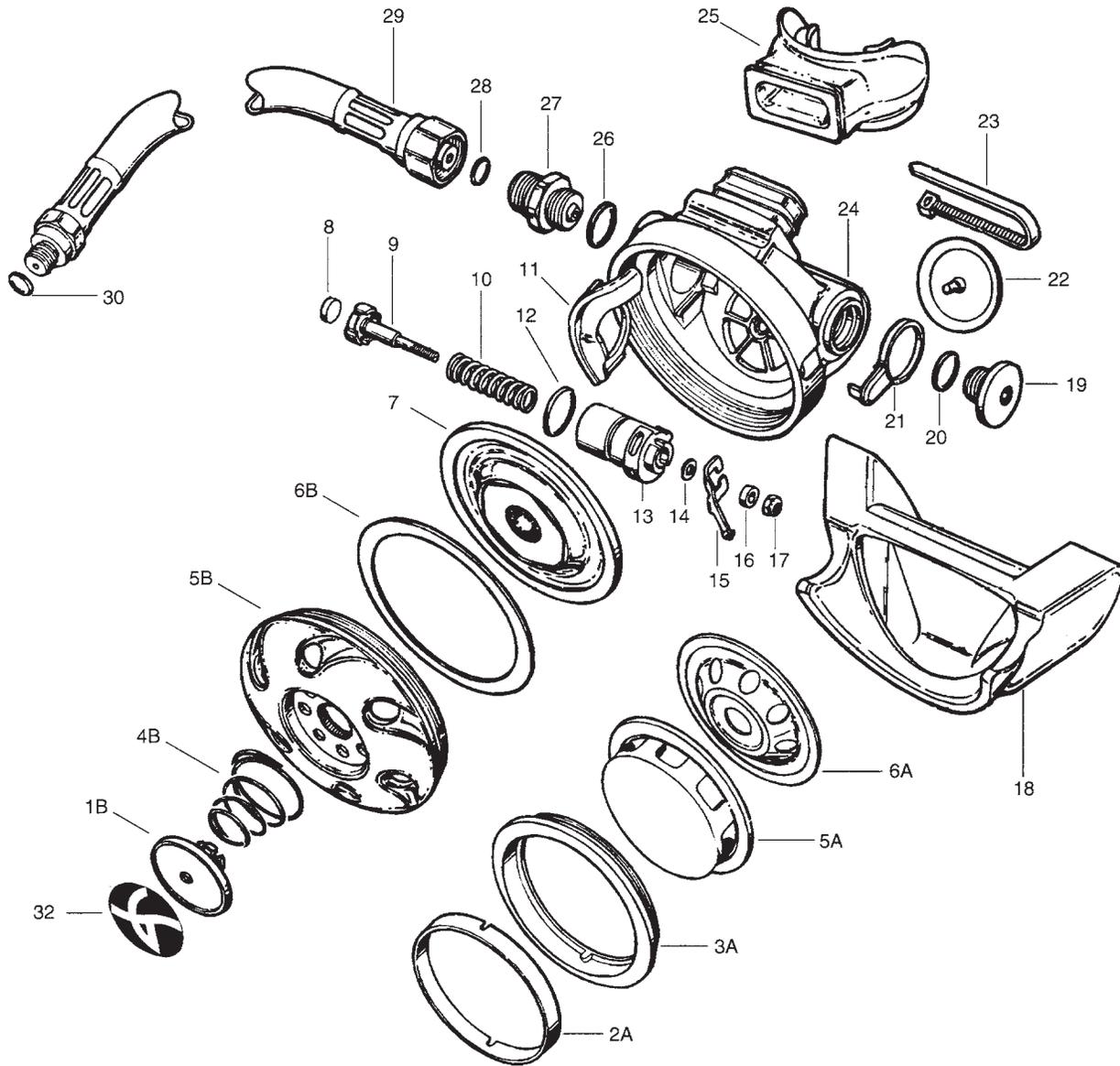
## Defective Parts

Should any part of a Genesis regulator be found defective in materials or workmanship, Genesis Scuba, at its discretion, will repair or replace the component at no charge to the dealer. Please refer to the warranty statement on the previous page for explanations and examples of items that are, and are not, covered by this warranty. Defective parts should be sent to your Genesis distributor along with a completed Defective Parts Claim Form. (Forms are available from your Genesis distributor, or you may photocopy the form on the next page.) ALL information must be provided for the claim to be processed. Contact your Genesis distributor to obtain a Returned Goods Authorization number and other shipping instructions. Shipments without an RGA number visible will be refused and returned to sender.

This form is *not* to be used for normal, regular maintenance items, seats, o-rings, etc.

## Rental

All regulators used in rental service have a Limited Lifetime Warranty to be free of defects in materials and workmanship as long as the dealer owns the regulator. The warranty is not transferable. All repairs on these regulators are to be maintained by the dealer. All defective parts will be evaluated by Genesis Scuba, and at their discretion, will repair or replace the component to the dealer. Defective parts need to be returned with a RGA number and a Limited Lifetime Warranty Defective Parts Claim Form. The form is not used for items replaced for annual maintenance.



Item	Part #	Description
1B	G1003-45	Origin purge Button
4B	G1014-36	Origin, spring
5B	G1077-05	Origin faceplate, black
	G1077-14	Origin faceplate, yellow
6B	G8210-32	Origin, thrust washer
2A	G1079-27	Axis color ring
3A	G1079-22	Axis retaining ring
5A	G1079-23	Axis purge cover
6A	G1079-24	Axis support cone
7	G1005-71	Diaphragm
8	G1085-10	LP seat
9	G1049-03	Poppet
10	G1085-15	Spring (red)
	G1085-14	Spring, octopus
11	G1005-23	Baffle
12	R015B	O-ring
13	G1005-14	Insert
14	G8450-22	Washer
15	G1085-13	Lever
16	F1025-17	Spacer
17	G1025-10	Locknut

Item	Part #	Description
18	G1079-14	Exhaust Tee
19	G1003-24	Plug
20	R905B	O-ring
21	G1003-89	Alignment key
22	G1005-12	Exhaust valve
23	G1049-13	Tie wrap
24	G1005-03	Case
25	G1058-31	Mouthpiece, Origin
	G1058-41	Mouthpiece, Axis
26	R014B	O-ring
27	G1004-44	Inlet fitting
28	R010B	O-ring
29	LPH-31	hose, 31"
	LPH-36	hose, 36"
	LPH-39	hose, 39"
	LPH-48	hose, 48"
	LPH-60	hose, 60"
30	R011B	O-ring
31	G1079-17	Hose protector
32		Decal, Origin



## Limited Lifetime Warranty - Regulators Defective Parts Claim Form

Use this form to submit parts that are defective in materials or workmanship to your Genesis distributor. Should any part of a Genesis regulator be found defective, Genesis Scuba will, at its discretion, repair or replace the component at no charge to the dealer. Contact your Genesis distributor to obtain a Returned Goods Authorization number and other shipping instructions. Shipments without an RGA number visible will be refused and returned to sender. ALL information must be provided and legible on this form for the claim to be processed.

This form is *not* to be used for normal, regular maintenance items, seats, o-rings, etc. Refer to the Genesis Limited Lifetime Warranty for further explanation of parts that are, and are not, covered under this warranty.

**Warranty Verification** (must meet both of the following)

- Original Owner verified by original bill of sale
- Annual service verified by receipt(s) for previous annual service(s)

Owner Information
Name
Regulator model
1 <sup>st</sup> Stage Serial number
2 <sup>nd</sup> Stage Serial Number
Original date of purchase
Date of this service

Dealer Information
Store name
Address
Phone
Technician name
Signature

Defective Part(s)		
Part number	Description	Nature of defect