DIVE GEAR EXPRESS

DGX Gears BCI Backup Regulator Service Manual

Revision 2 Published 01/01/2023

Revision	Date	Changes
1	10/28/2022	Initial publication
2	01/01/2023	Added Adapter service

1. Overview

(1) The availability of subassemblies and components, repair parts, specialized tools, and maintenance manuals does not imply qualification to assemble and/or service scuba equipment. Improper service of dive equipment can lead to severe injury or death. Dive Gear Express recommends that non-qualified individuals seek professional training/mentoring before attempting repairs or servicing on any diving equipment.

Failure to follow the procedures outlined herein may result in injury or death!

(2) In the following pages will be found the disassembly, assembly, tuning and troubleshooting steps for these components. Photos are used throughout to illustrate the procedures.

Please pay special attention to all Caution Notes!

(3) Whenever an item of extra importance needs to be observed, a “Caution Note:” will appear, followed by the required information. See below.

Caution Note: This must be read and followed!

(4) Included in this manual is a list of recommended/required tools for each disassembly, assembly, and testing section. They are identified in each section where they are used.

(5) A schematic diagram is located at the rear of this manual. The diagram contains the detailed parts lists. The diagram also includes the torque specifications for parts where required.

(6) A general troubleshooting guide with space for notes is also included for those using a printed version. Those who prefer an electronic version should keep detailed notes in an accessible location for their own observations and service tips, as well as a record of service.

(7) Throughout the text, parts are referenced using the item number on the schematic to facilitate locating each individual component.

(8) Parts should not be taken out of their packaging until the actual assembly stage is reached, and the user is ready to lubricate, where necessary, and install them.

(9) Ensure the service area is free of any environmental factors that may cause problems during the service of your regulators. The area must be clean and organized. The use of nitrile gloves is highly recommended for final rinsing and assembly. This will minimize the risk of skin oils contaminating the internal components of the regulator.

(10) Ensure that all required servicing/testing air supplies are available and at the proper test pressures if not using a regulated supply from a single source. “**Modified Grade E” air as typically delivered at a dive shop fill station is preferred.**

Caution Note: Only use air from a breathing air source! Do not use a hardware store shop compressor.

Cleaning and Rinsing - General Considerations

(11) Cleaning and rinsing of components should be done using clean, fresh water.

(12) Only use degreasers that leave no organic residue (e.g., Extreme Simple Green , Blue Gold Cleaner, or any clear liquid dish soap that does not contain scents or dyes).

(13) To remove corrosion, use a 50/50 vinegar/water solution and nylon brushes. Areas of heavy corrosion not removed with vinegar can be addressed with mild phosphoric acid solutions available from scuba supply houses.

(14) Allow parts to air dry without the use of loop-weave cloths that may leave fibers.

(15) Once all service procedures have been completed and bench testing done, in-water testing in a confined environment such as a swimming pool is recommended to confirm proper function before taking the regulator on an actual dive.

Cleaning of Regulator Parts

(16) Cleaning of parts that are going to be reused is one of the most critical steps in servicing the regulator. As was stated earlier, use the proper solutions for the job at hand. Removal of hydrocarbons and debris should be accomplished before attempting removal of corrosion. Areas of corrosion are often also coated with old lubricant or oily contaminants. Before attempting to remove corrosion, use warm detergent and a soft brush to remove oils and debris. Then use an acidic solution to remove corrosion. Once corrosion has been removed, inspect parts and repeat detergent washing as needed. Wearing nitrile gloves throughout the process reduces the risk of contaminating the parts with skin oils.

(17) First, prepare a warm solution of detergent from the list above. Immerse both plastic and metal parts and agitate thoroughly. Protect critical delicate parts (such as the Crown Orifice) by washing them separately or isolating them in a small plastic container with holes. Wash the diaphragm separately, using your fingertips to remove debris. Use a soft nylon brush and/or soft rags soaked in detergent to scrub away visible debris and contaminants. Corrosion will likely not be removed during this step. Rinse repeatedly in clean water.

(18) Now address visible corrosion by submerging **metal parts only** in a 1:1 dilution of white vinegar and hot water. Do not immerse plastic parts in an acid bath - it will degrade the plastic and make it more susceptible to cracking. Agitate the parts occasionally and allow parts to stand in the acidic solution for ten minutes. Wearing gloves, remove and inspect parts, and reimmerse them for an additional ten minutes if visible corrosion is still noted. Removal of corrosion will leave bare brass behind, which will not affect regulator function, but will necessitate more frequent future inspection and service. After the acid bath, rinse all metal parts thoroughly.

(19) Best practice is to neutralize any possible residual acid remaining in crevices and threads, by immersing all acid-treated parts in a neutralizing solution of warm water and sodium bicarbonate (baking soda) in a ratio of 1 tablespoon per gallon of water. After a brief neutralizing soak, again rinse all parts thoroughly. In areas with high mineral content in the water, a final rinse with distilled water should be considered. A plastic colander is excellent for drainage after rinsing. For very small parts, a mesh strainer for sink drains works well. Often sold as a set, they are inexpensive and can be used for many types of regulator components. Again, protect delicate parts from contact with hard metal surfaces. Retained final rinse water should be allowed to stand and examined for a surface sheen indicative of residual hydrocarbon residue. If noted, return to step (17) above.

(20) After washing and rinsing the regulator parts, allow them to air dry. Using a drying rack will facilitate this. Do not lay the parts on a paper towel or loop-weave cloth towel. Doing so runs the risk of having fibers stick to them that will cause issues with sealing. If a cloth is used as an aid to drying, make sure to use a tight, flat weave lint-free cloth that has previously been well washed to remove fabric sizing.

Inspection After Cleaning

(21) Before assembling the regulator, it is necessary to inspect all the cleaned components. Using a magnifying glass or inexpensive USB microscope, ensure all parts are clean and contaminant-free, and check the components for damage that may have been hidden by corrosion or lubricant. Look for scratches that may affect the sealing surfaces of the regulator.

(22) Lay all parts out on a padded work surface following the schematic. A rubber or silicone mat of suitable size that is clean and free of contaminants works well for this.

(23) Now that all parts have been cleaned and checked, the assembly can begin. Remove the new parts from the service kit bag and lay them out following the schematic, matching them to the old parts for size. Then make sure all old parts that are to be replaced have been discarded or segregated.

> **Caution Note: Removing parts from their packaging, before they are to be used, runs the risk of mixing them up. Some O-rings are very close in size but are not interchangeable! Keep the parts in their packaging until you are ready to exchange them for their used equivalent.**

(24) As with the parts that have been cleaned, it is a good idea to inspect the new parts as well. Inspect the LP Seat to ensure it is free of any defects. Check all the O-rings and inspect them as you use them for nicks or imperfections. Inspect the washers to ensure they are free of burrs or other defects that could affect their function. It is critical to use the parts list on the schematic to ensure that all new parts are present and accounted for in their required quantities.

(25) **Lubrication can be overdone**. Doing so runs the risk of trapping excess dirt or debris on the parts. One way of reducing the risk of overdoing it is to use the lube-in-a-bag method - Fig. 1

Fig. 1

This involves using a small clean plastic bag containing a small amount of lubricant. The O-ring is inserted into the bag, worked around to evenly coat with lube while squeezing off excess, then taken out of the bag and used in its location - Fig. 2.

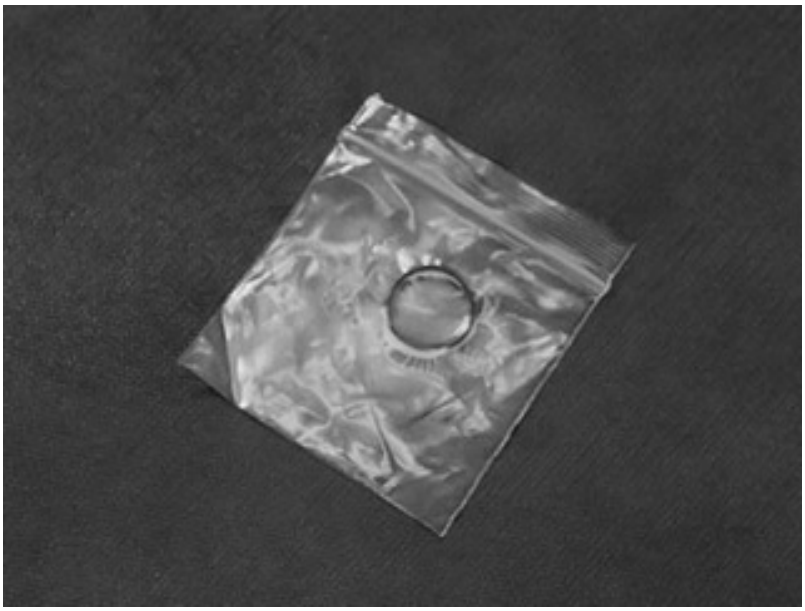


Fig. 2

(26) Another way is to apply a small amount of lubricant to the gloved index finger and massage the O-ring between the thumb and index finger.

(27) **Under most circumstances, a lubricant should be used very sparingly or not at all.** In nearly all scuba applications, if you can see the lubricant, too much has been applied. Before using any lubricant, any existing lubrication should be removed before new is applied. In dynamic applications, it is used to reduce excessive wear. Static O-rings do not generally require the use of lubricant.

(28) Do not unnecessarily lubricate parts. Certain parts are specifically noted to be installed without lubrication. It also helps to keep those parts clean and free of debris that will cling to the lubricant. Not lubricating unnecessarily helps to keep those parts clean and free of debris that might otherwise cling to the lubricant.

2. Tool List - Fig. 3

1. Magnehelic or Other Cracking Effort Gauge
2. Thin Wooden Dowels
3. Thin Brass and Heavy Nylon Picks
4. Scuba Tools Double Hook O-Ring Pick
5. Blunt Brass Pick and Blunt Brass Spade
6. Heavy 90° Circlip Pliers
7. Coin - (US Nickel is best diameter/thickness)
8. Stubby Slotted Screwdriver
9. 5/32” Slotted Screwdriver
10. 5.5 mm Nut Driver
11. 13mm Open End and Adjustable Wrench
12. Side-Cutting Snips
13. Scuba Tools Spider 2 Tool
14. 3/16” and 1/16” Hex Keys
15. Tribolube 71

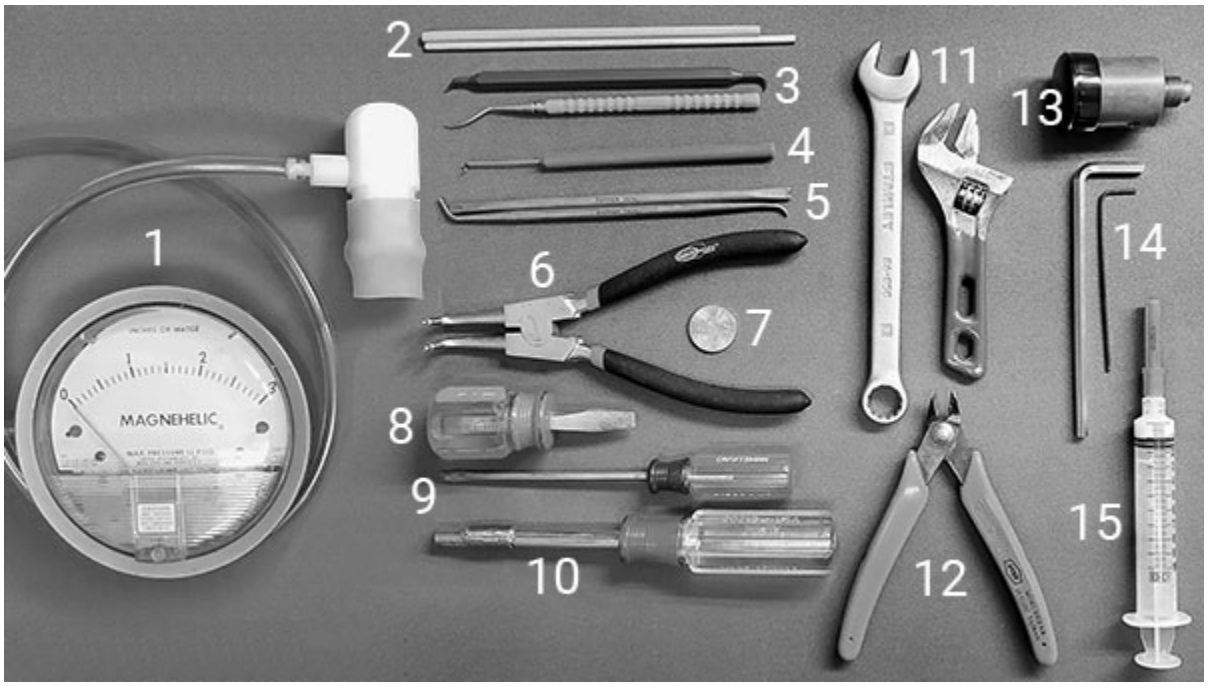


Fig. 3

(1) A Brass O-Ring Pick Set can be found at Dive Gear Express using the link below.

https://www.divegearexpress.com/tools/scuba-tools

(2) Tools may also be purchased from Scuba Tools at the link below.

www.scubatools.com

(3) Additional useful items are a magnifying glass or inexpensive USB microscope, nitrile gloves and, to aid in rinsing, a plastic colander and small mesh strainers for smaller parts.

3. Preliminary Testing

(1) Preliminary testing of the regulator is necessary to identify any problems and verify the overall regulator and BCD valve function. This testing will include:

1. Visual inspection of the regulator
2. Inspection of the hoses
3. Cracking effort and negative pressure test
4. Inflation and exhaust valve tests

Visual inspection is done to identify issues that could affect servicing and to ensure that pressurizing the system will not compromise the safety of the service technician.

Check all connections to make sure they are secure.

Check that on the first stage, there are no extruded O-rings, and hoses are tight.

Detailed inspection of hoses is done to ensure it is safe to pressurize the regulator set. Look for evidence that might lead to hose failure. Check all hose connection crimps. Defects must be taken care of before pressurizing the system! Replacement of any suspect hoses is recommended.

> **Caution Note: Defects in hoses require replacement before pressurizing the regulator! Failure to do so may result in serious injury!**

(2) The Intermediate Pressure (IP) of the first stage should be confirmed before testing the backup regulator.

(3) The standard operating range for the system is with an IP of 135 psi.

4. Regulator Evaluation

(1) The negative pressure test verifies the seals of the Diaphragm and Exhaust Valve, confirms proper O-ring seal and verifies housing integrity. With the supply pressure off, and attached to a first stage on a cylinder, attempt a normal breath from the backup regulator. You should be unable to draw any air. If flow is obtained, remove the regulator from the hose and try to draw air while sealing the hose inlet with your finger. If a flow is still present, the Diaphragm and Exhaust Valve need to be checked for damage. Salt accumulation, sand, and defects in the housing or O-rings may also allow airflow when the air inlet is covered. Carefully check all of these.

(2) Cracking effort testing is most accurately done with the use of a magnehelic gauge. A container of water can be used by measuring the depth to which a stage can be submerged face-down parallel to the water. This gives an indication at which level of effort the second stage will open. The normal range for the BCI Backup Regulator is 1.4 to 1.9 inches of water. Less pressure may be desired by the diver, but the minimum initial factory setting of at least 1.4 should be used. This permits a break-in period for the LP seat. It is normal to see this initial setting drop as the LP seat takes a set.

(3) The housing should be inspected for signs of damage. Scratches, gouges, missing parts, a damaged exhaust port or a loose Retainer Ring may be indications of a damaged housing.

(4) After the negative pressure test, test the purge button, and confirm brisk airflow. Check Inflation Button and Oral Button movement. Do they move freely and with no indication of stiffness? Do they feel like there is sand or grit in them? With the regulator attached to a BCD, confirm that the Inflation Button quickly inflates the BCD, and that the exhaust valve stays closed until the Oral Button is depressed.

(5) A problem with housing integrity should be dealt with before starting the rebuild. A defective housing will compromise final testing and pose a safety hazard to the user.

> **Caution Note: A damaged Main Body, Purge Cover, or Diaphragm cannot be repaired. They must be replaced.**

(6) Having completed the initial evaluation and determined that service is necessary, the rebuild of the regulator can take place.

5. Regulator Disassembly

(1) Ensure the system is depressurized. The use of small, clean containers to hold parts is recommended.

(2) In the following steps, the part numbers from the schematic will be used with their description. The numbers on the photos also correspond with the parts list on the schematic. Items in the service kit are identified in the same way. Have the schematic in front of you while following the instructions. Be sure to keep all old parts organized and separate from new ones in the service kit. The old washers and O-rings marked with an asterisk (*) will be replaced with new ones from the service kit and the remaining parts will be cleaned and reused.

1. Unscrew the threaded collar of the Hose Connector Assembly (01) from the Main Body (08), using an adjustable wrench to loosen if necessary. Remove O-ring (04*) using a heavy nylon pick - Fig. 4.

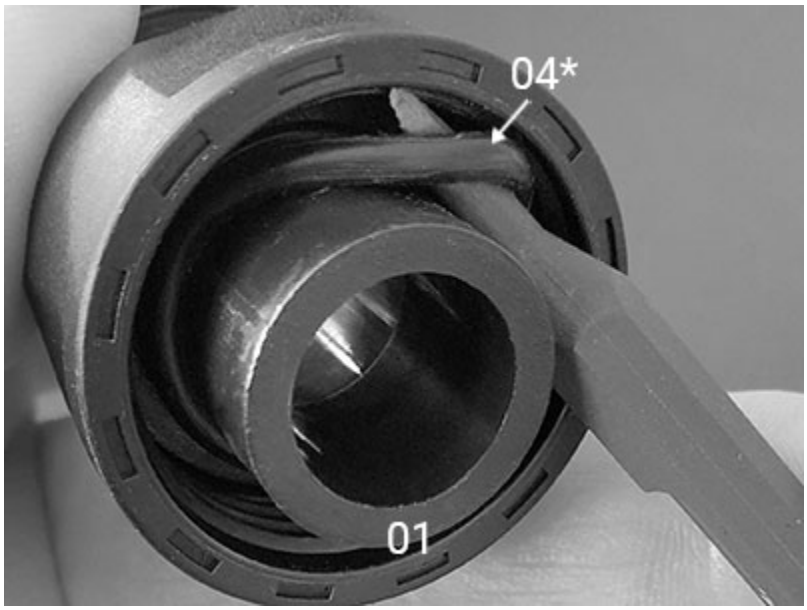


Fig. 4

2. Using side-cutting snips, remove the tie wrap(s) securing the corrugated hose to the Hose Connector Assembly. Using a brass spade, loosen the seal of the hose and work it off. If a pull dump cable is used, use a 1/16” hex key to push out the Retainer Pin (05).

3. Using side-cutting snips, cut the Tie Wrap (44) holding the Mouthpiece (25). Peel off the mouthpiece, inspecting it for cuts or tears.

4. Unlock the Retainer Ring (42) by depressing all four tabs in the slots in the Main Body with a stubby slotted screwdriver - Fig. 5. Remove the purge cover assembly consisting of the Retaining Ring (42), the Purge Cover (41) and the Diaphragm Washer (40). Run a blunt brass spade around the rim to break any seal between the Diaphragm (39) and the Main Body. Remove the Diaphragm.

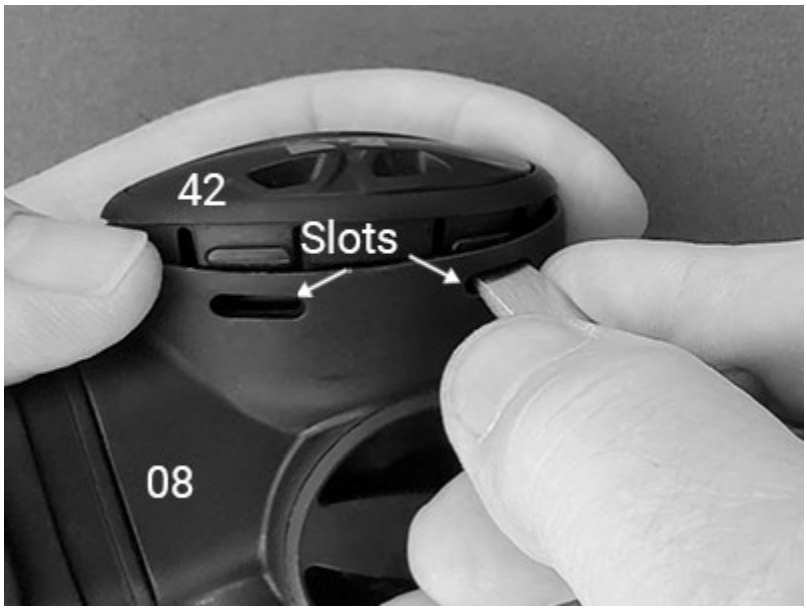


Fig. 5

5. Insert a U.S. nickel or other suitable coin in the slot in the Threaded Cap (09) and unscrew it completely - Fig. 6. Use a thin brass pick to remove its O-ring (10*) - Fig. 7.

Fig. 6

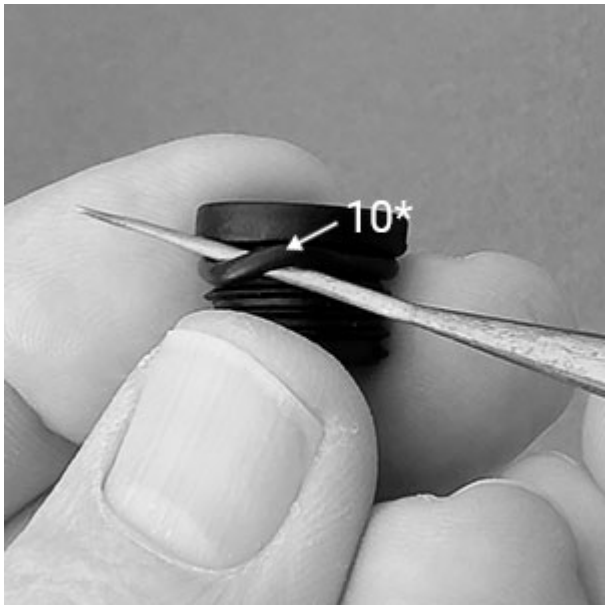


Fig. 7

6. Maintaining pressure on the Inflation Button (14), use a flat-bladed screwdriver in the slot in the Cone Seat (11) to unscrew it completely - Fig. 8. Releasing pressure on the Inflation Button, remove the Inflation Button assembly from the Main Body. Remove the Spring (13).

Fig. 8

7. Using a thin brass pick, remove O-ring (12*) from the shaft of the Inflation Button - Fig. 9. The metal shaft of the Inflation button is permanently bonded to the plastic top - do not try to separate. Use a thin brass pick to pry out the sealing O-ring (12*) from the Cone Seat - Fig. 10.

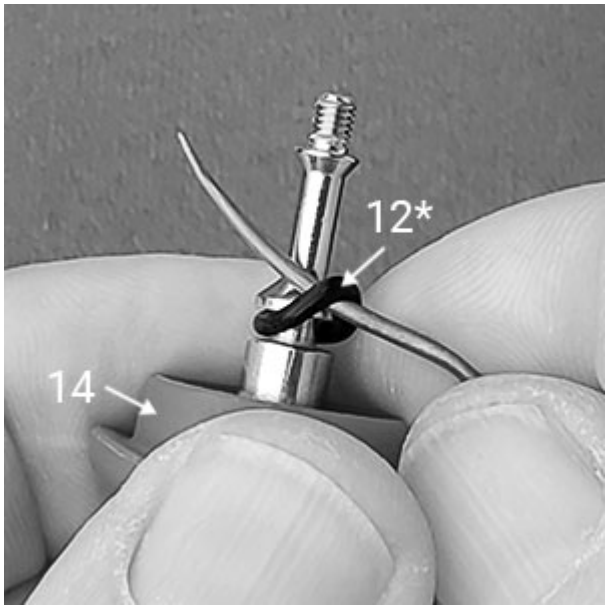


Fig. 9

Fig. 10

8. Using the tips of heavy 90° circlip pliers set on either side of the center bar in the Exhaust Cover (15), loosen the cover, then unscrew and remove it by hand - Fig. 11.

Fig. 11

9. Carefully lift the edges of the Exhaust Valve and insert the circlip pliers on opposite sides of the two spokes in the Exhaust Retainer (17) - Fig. 12. After loosening the Exhaust Retainer, remove it completely with your fingertips. Inspect the Exhaust Valve (16) for damage. It is not necessary to remove the Exhaust Valve from the Retainer during routine service if it is undamaged and the edge seals against the rim.

Fig. 12

10. Use a thin brass pick to remove the Exhaust Retainer O-ring (18*) - Fig. 13.

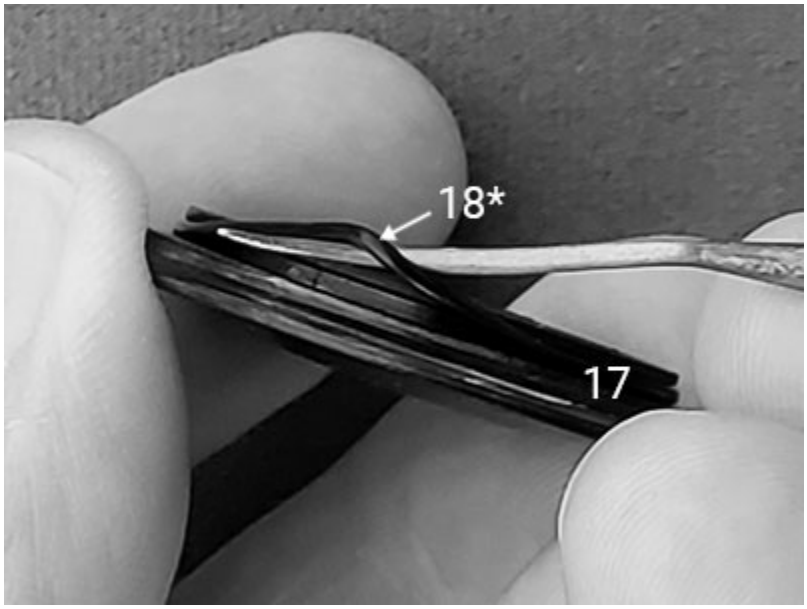


Fig. 13

11. While maintaining pressure on the Oral Button (24), and using a 5.5 mm nut driver, unscrew and remove the Nut (19*) from the center of the Exhaust Seal (20) - Fig. 14.

Fig. 14

12. Release pressure on the Oral Button and remove the Exhaust Seal - Fig. 15. Inspect its edges for cracking or damage.

Fig. 15

13. Remove the Oral Button assembly from the Main Body and separate its four parts: Oral Button (24), Spring (23), Washer (22) and O-ring (21*) - Fig. 16. The O-ring may be retained in the Main Body. If so, extract it with a plastic pick.

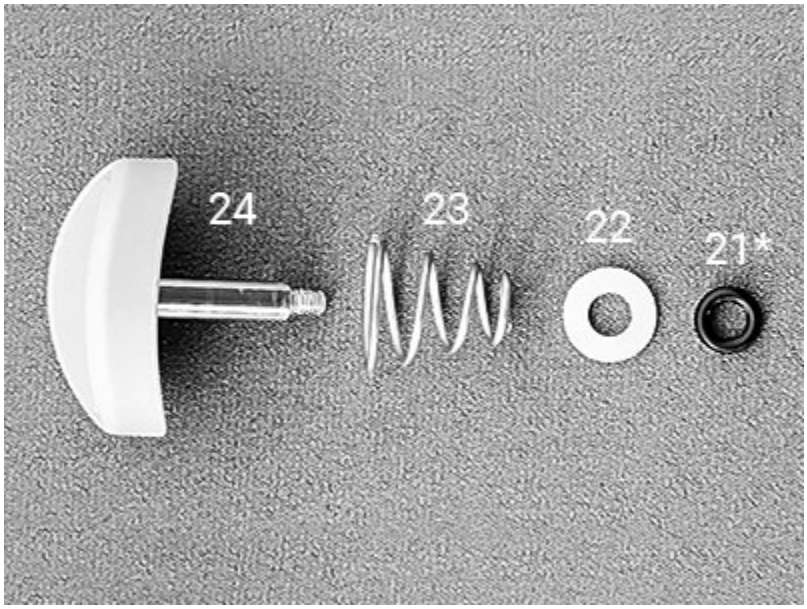


Fig. 16

14. Stretch the Dust Cap (06) away from the Inlet Stem (28) until it is free of its groove and slide it off - Fig 17. Insert a 5/32” flat-bladed screwdriver in the slot in the C-Clip (07) between it and the Inlet Stem (28) and twist the screwdriver so that the clip is forced out - Fig 18.

Fig. 17

Fig. 18

15. Grasping the valve assembly by the Lever (37), and pressing on the Inlet Stem (28), pull the valve assembly out of the Main Body from the Lever end - Fig. 19.

Fig. 19

16. Using a 13mm open-end wrench set against the thin flats of the Inlet Stem (28), and an adjustable wrench attached to the flats on the Valve Housing (35), loosen and unscrew the two parts - Fig. 20.

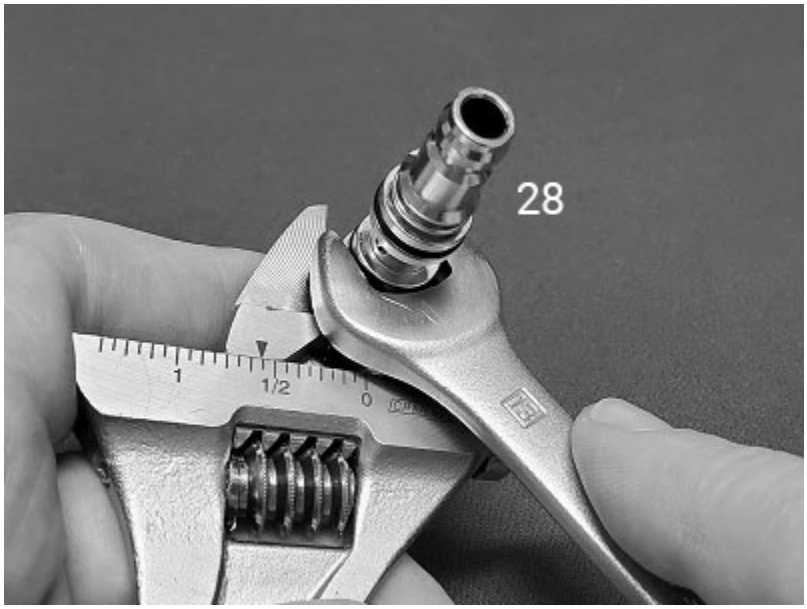


Fig. 20

17. Pull the Crown Orifice (30) straight out of the Inlet Stem – Fig 21. If it remained behind inside the Valve Housing, apply pressure to the Lever and unscrew it completely with a 3/16” hex key – Fig. 22.

Fig. 21

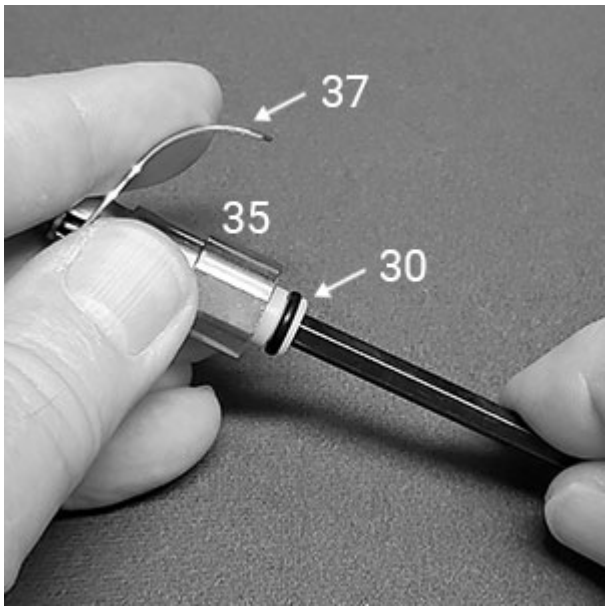


Fig. 22

18. Using a thin brass pick, remove the O-ring (29*) from the Crown Orifice, **protecting the knife edge from contact with metal parts,** and remove both O-rings (27*) from the Inlet Stem.

19. Thread the Spider 2 tool into the Valve Housing and screw it in until the lever just begins to drop - Fig. 23. Using a 5.5 mm nut driver, unscrew the Nut (19*), then remove the Washer (38) and Lever (37) - Fig. 24.

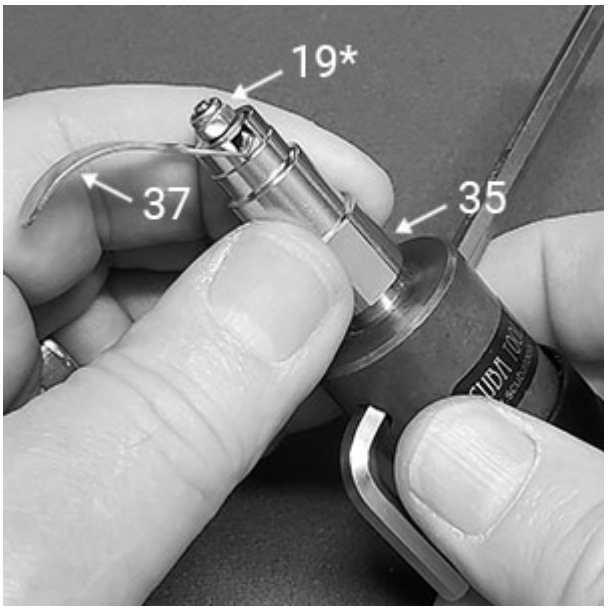


Fig. 23

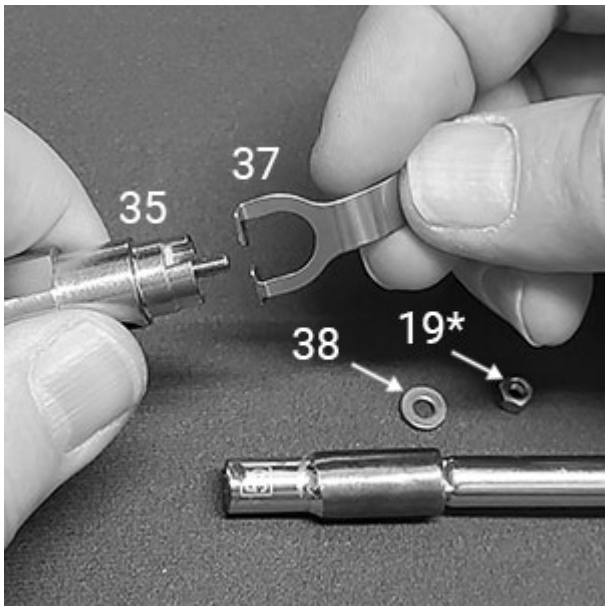


Fig. 24

20. Unscrew the Spider 2 tool. Noting that the Seat assembly is under tension from the Spring (34), remove the Seat assembly and Spring. Slide back the Seat Retainer (33) and remove the Seat (31*) and Stem (32) - Fig. 25. Using a fingernail, remove the Housing Insert (36) from the Valve Housing - Fig. 26.

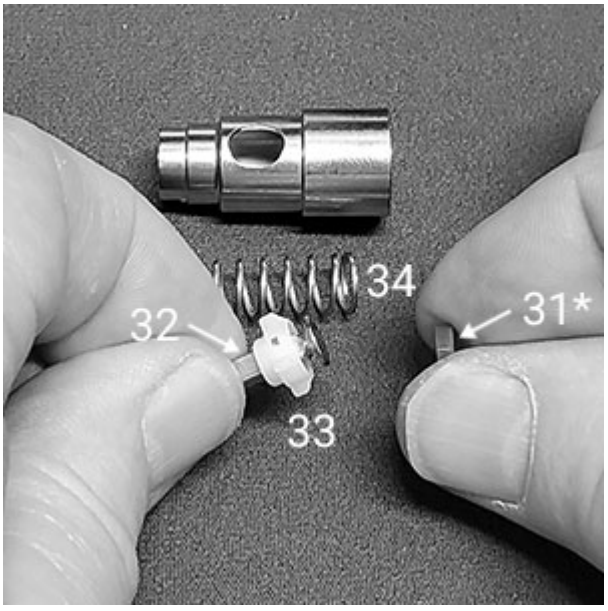


Fig. 25

Fig. 26

This completes disassembly of the BCI Backup Regulator.

(3) The photographs below show the disassembled regulator - Fig. 27 - and Service Parts Kit - Fig. 28. All the parts not in the service kit need to be washed, rinsed and dried, as discussed previously. O-rings and washers that will be replaced with new from the service kit should be discarded.

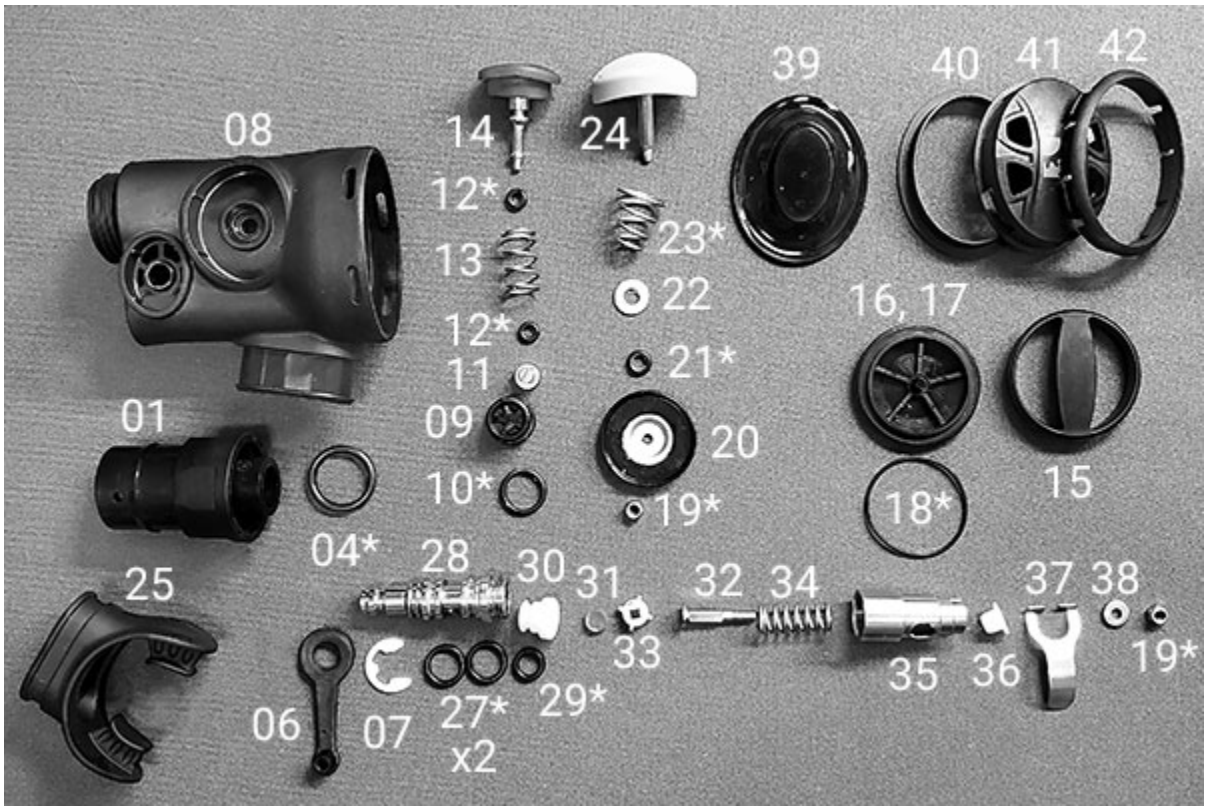


Fig. 27

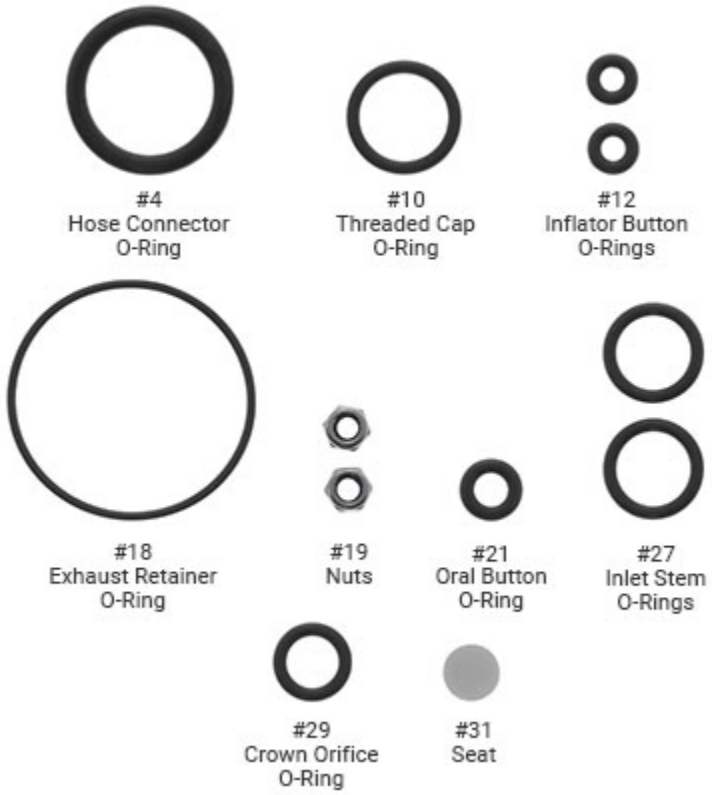


Fig. 28

6. Regulator Assembly

(1) Before starting the assembly of the second stage, complete a thorough inspection of all parts to be reused. Refer to the Overview Inspection section above for details. At this time, open the service kit and lay out the parts. Use the schematic to identify each part.

Caution Note: Only use enough lubricant to lightly coat the O-rings and ensure no debris is trapped on them.

1. Install a lightly lubricated O-ring (12*) on the shaft of the Inflation Button (14) - Fig 29. Add the Inflation Button Spring (13) to the shaft of the Inflation Button. Press a lightly lubricated O-ring (12*) into the land in the Cone Seat (11), taking care not to damage - Fig. 30.

Fig. 29

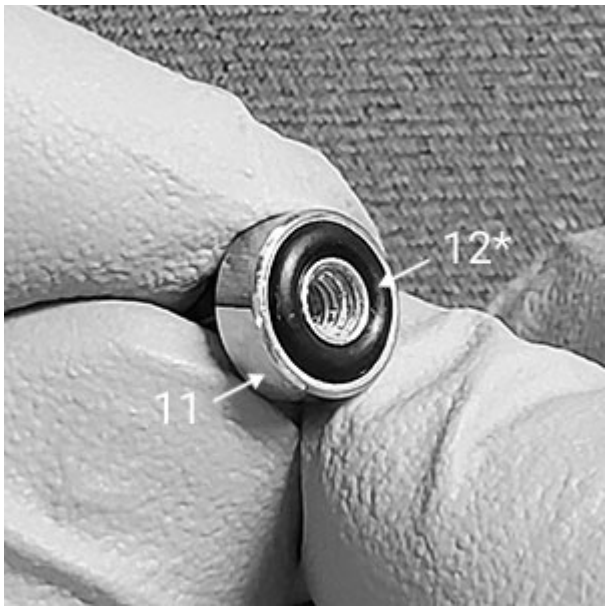


Fig. 30

2. Insert the shaft of the Inflation Button into the hole in the Main Body (08) and slightly compress the spring until the threaded end just appears on the other side - Fig 31. Drop the Cone Seat into the recess, O-ring down, and use a screwdriver to tighten the Cone Seat - Fig. 32. **Do not over-torque.**

Fig. 31

Fig. 32

3. Add a lightly lubricated O-ring (10*) to the Threaded Cap (09). Screw the cap into place using a U.S. nickel or other coin in the cap slot.

4. Place the conical Spring (23) on the Oral Button (24) with the broad end against the button. Place a generous bead of Tribolube 71 in the land in the Main Body for the Oral Button O-ring. Place a generously lubricated O-ring (21*) in the land and add a bead of lubricant on top of the O-ring. Place the Washer (22) in the recess above the O-ring - Fig. 33.

Fig. 33

5. Inverting the Oral Button assembly, carefully align the shaft and insert it in the bore in the Main Body.

6. Pressing the Oral Button so that the shaft is just protruding, place the Exhaust Seal (20), metal center up, onto the shaft end - Fig 34.

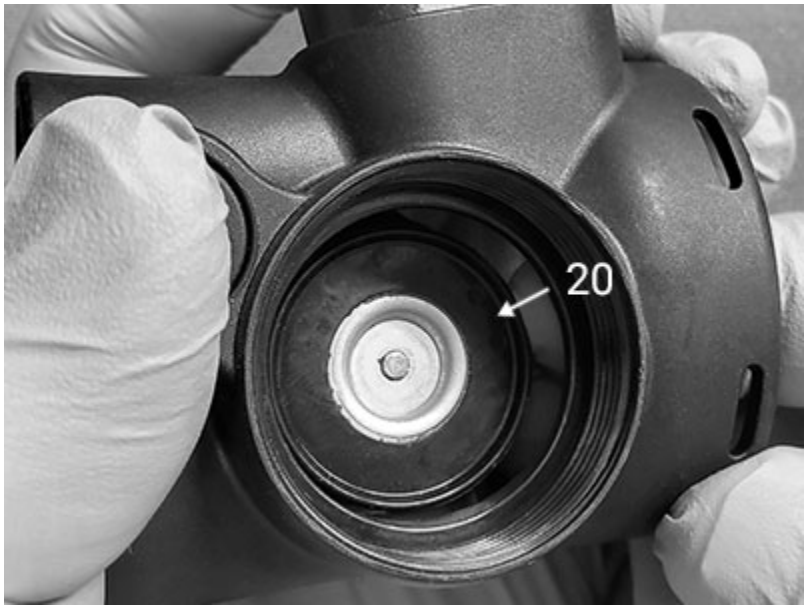


Fig. 34

7. Using a 5.5 mm nut driver, tighten a Nut (19*) until the Exhaust Seal is firmly attached to the shaft without wiggle or play - Fig. 35. Confirm that you cannot rotate the Exhaust Seal on the shaft after tightening the nut - Fig. 36.

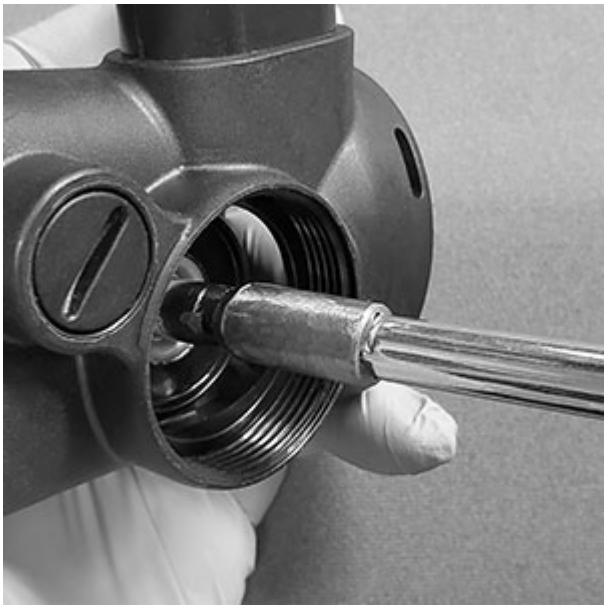


Fig. 35

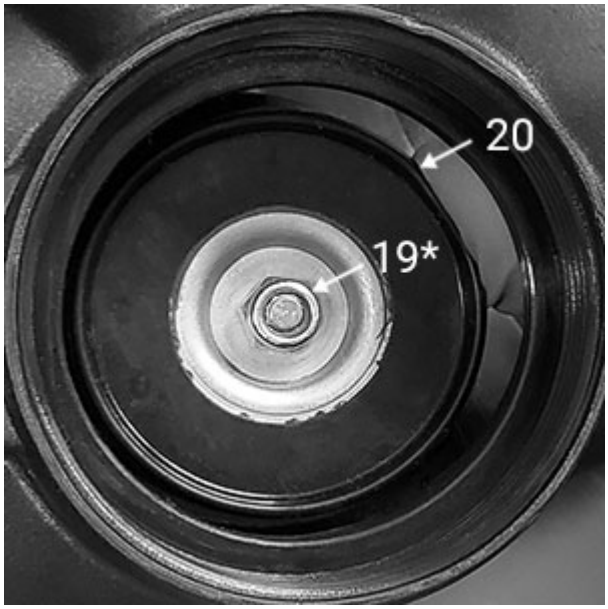


Fig. 36

8. Add a lightly lubricated O-ring (18*) to the land on the back of the Exhaust Retainer (17). Generously lubricate the lower threads in the Main Body for the Exhaust Retainer and add a thin line of lubricant to the thread on the Exhaust Retainer - Fig, 37. Pinching the Exhaust Valve leaflet so the spokes of the Retainer are visible, use your fingertips to engage the thread in the Main Body. Thread the retainer in as far as possible by hand, then use circlip pliers to screw in the retainer until it comes to a stop - Fig. 38. **Do not over-torque.**

Fig. 37

Fig. 38

9. Screw the Exhaust Cover (15) into the same Main Body threads used for the Exhaust Retainer. Tighten by hand until snug.

10. Sliding the Seat Retainer (33) up the Stem (32) until it meets the flat top - Fig. 39. Press a new Seat (31*) into the recess formed by the Seat Retainer and the plate of the Stem. Confirm that the Seat is flat and there are no surface imperfections - Fig. 40. Now invert the seat assembly and add the Spring (34).

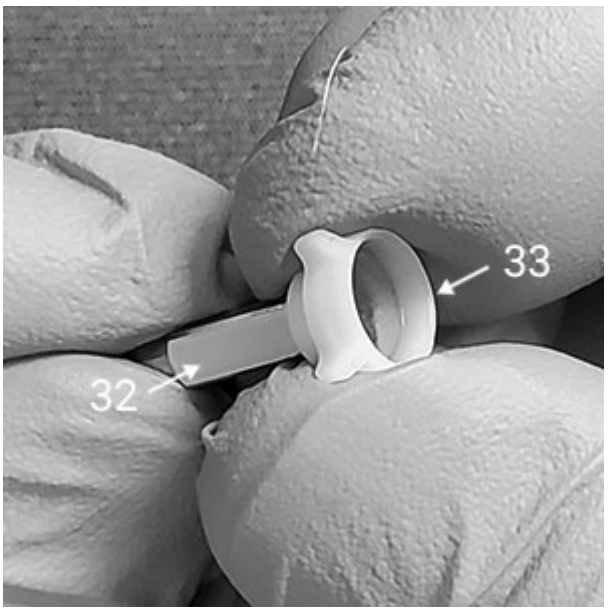


Fig. 39

Fig. 40

11. Drop the seat assembly and spring into the Valve Housing (35), threaded end down. Thread the Spider 2 tool into the Valve Housing and screw it in until the square portion of the Stem protrudes from the top of the Valve Housing.

12. Drop the Housing Insert (36) onto the protruding stem threads, round end down. Rotate the Housing Insert until its square broach engages the Stem. Rotate both the Housing Insert and Stem until the tabs of the are aligned - Fig. 41. Push the Insert fully into the Housing - Fig. 42.

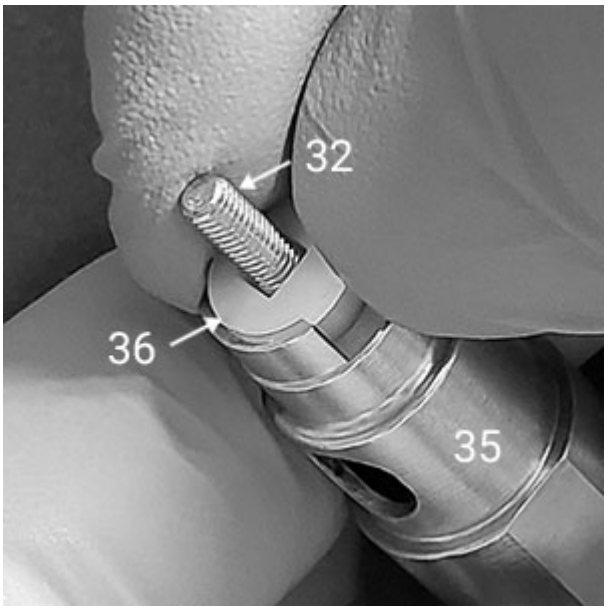


Fig. 41

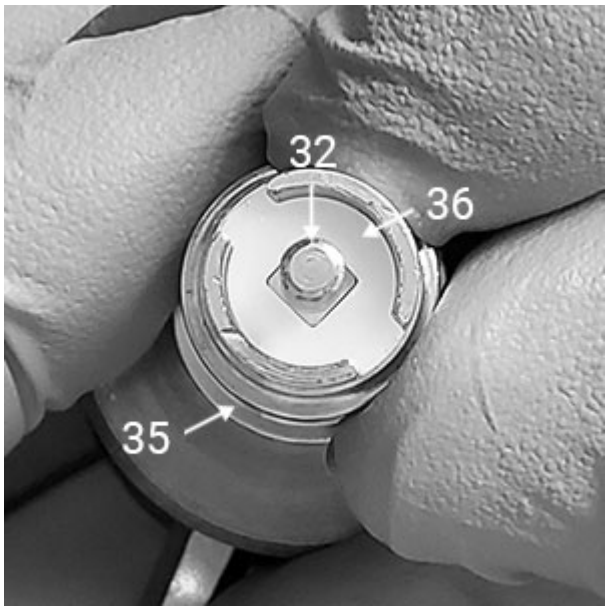


Fig. 42

13. Add the Washer (38) to the Stem, followed by the Nut (19*). Using a 5.5 mm nut driver, tighten the Nut until one thread is showing. Tip the assembly so that the washer sits against the Nut and slide the feet of the Lever (37) into the housing slots. The curved lever should **face away from** the oval hole in the Valve Housing and the feet of the lever should be between the Housing Insert and the Washer - Fig. 43. While holding the lever feet in position, completely unscrew the Spider 2 tool - Fig. 44.

Fig. 43

Fig. 44

14. Add two O-rings (27*) to the lands in the Inlet Stem (28). Add a lightly lubricated O-ring (29*) to the Crown Orifice (30), **protecting the knife edge**.

15. Press the Crown Orifice into the smooth recess in the Inlet Stem until it is fully seated - Fig. 45. While depressing the lever to retract the Seat, thread the Inlet Stem assembly into the Valve Housing - Fig. 46.

Fig. 45

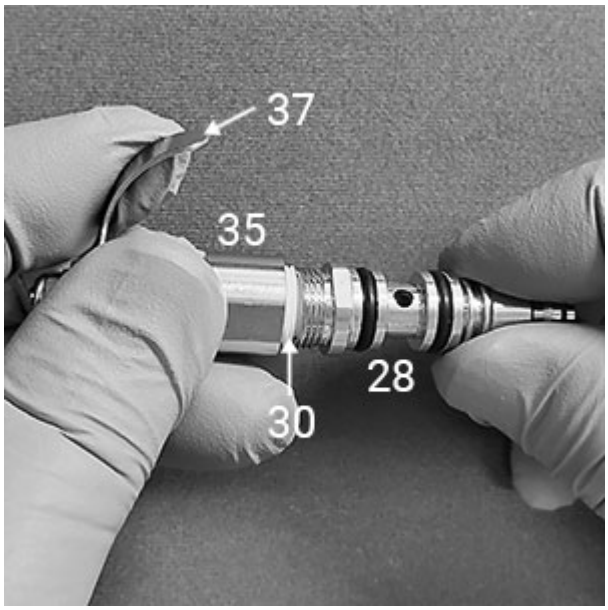


Fig. 46

16. Using a 13 mm open-end wrench on the Inlet Stem and an adjustable wrench on the Valve Housing, tighten the two until snug - Fig. 47.

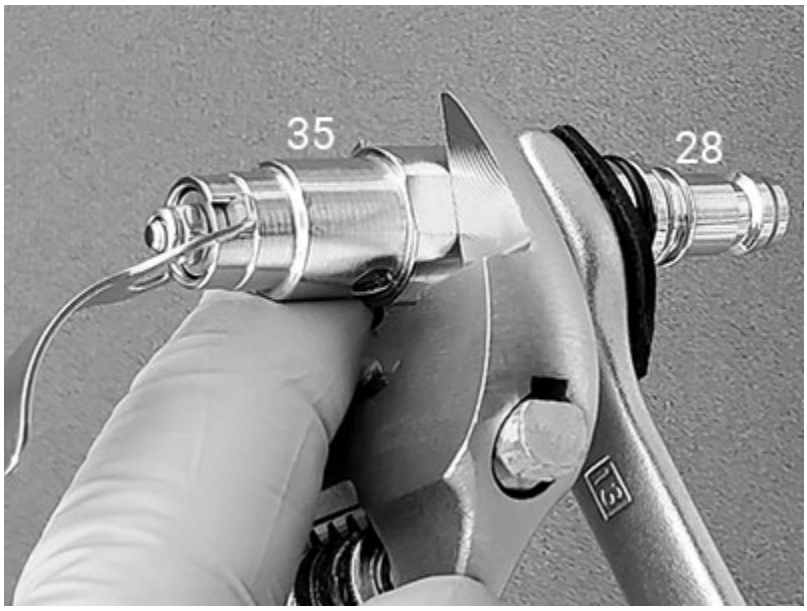


Fig. 47

17. Insert a 3/16” hex key into the Inlet Stem (28), and while depressing the lever, fully unscrew the Crown Orifice until it stops.

18. Locate the molded flats inside the Main Body (08) along the bore for the Valve Housing/Inlet Stem assembly, and then find the corresponding flats on the assembly. With the Lever facing away from the mouthpiece opening, push the assembly into the bore by aligning the two sets of flats - Fig. 48.

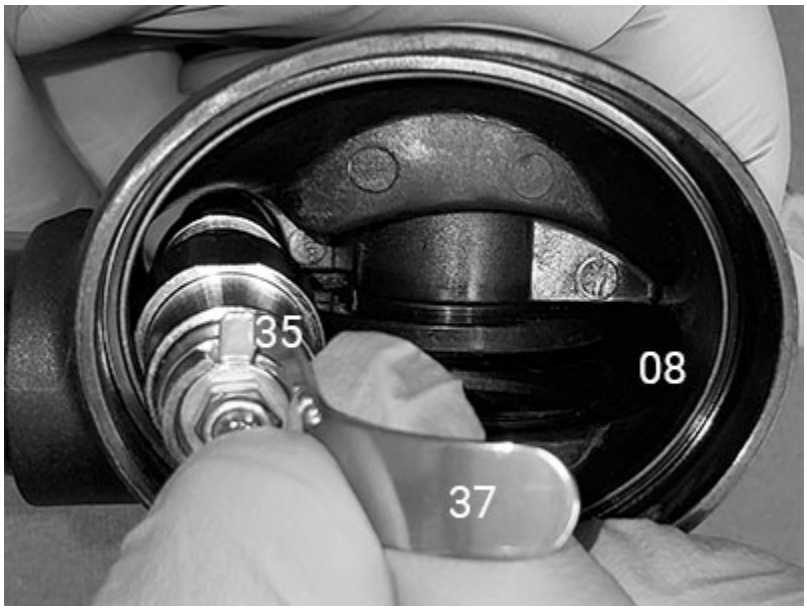


Fig. 48

19. Push the assembly into the bore until the groove in the Inlet Stem for the C-Clip (07) is visible - Fig. 49. Add the C-Clip and push against its edge with a screwdriver until it clicks into place - Fig. 50. Add the Dust Cap (06) to the groove above the C-Clip, with the sealing nipple facing up.

Fig. 49

Fig. 50

This completes initial assembly. Final assembly will be completed during tuning below.

7. Regulator Tuning and Final Assembly

(1) Second stage testing and adjustment can be accomplished by using a regulated supply or any cylinder of air. There is no required tank pressure as the second stage is supplied by a first stage delivering air at Intermediate Pressure (IP). Tune the BCI Backup Regulator against the highest IP of the intended first stage. If the first stage IP is unknown, tune the regulator at a bench intermediate pressure of 140 psi.

1. To adjust the Crown Orifice (30), attach the BCI Backup Regulator to a first stage via a low pressure hose and the BCI Adapter. Slowly turn on the air. There should be an audible leak. Disconnect the regulator.

2. Screw the Crown Orifice clockwise 1/4 turn using a 3/16” hex key inserted into the Inlet Stem - Fig. 51. Reconnect the regulator and check for a leak again. If a leak is still present, repeat 1/4 turns (or less) and retests as needed until the valve **just seals** to intermediate pressure.

Note: If the regulator **did not leak**, tighten the Nut clockwise until an audible leak is heard, then turn counterclockwise until the leak stops.

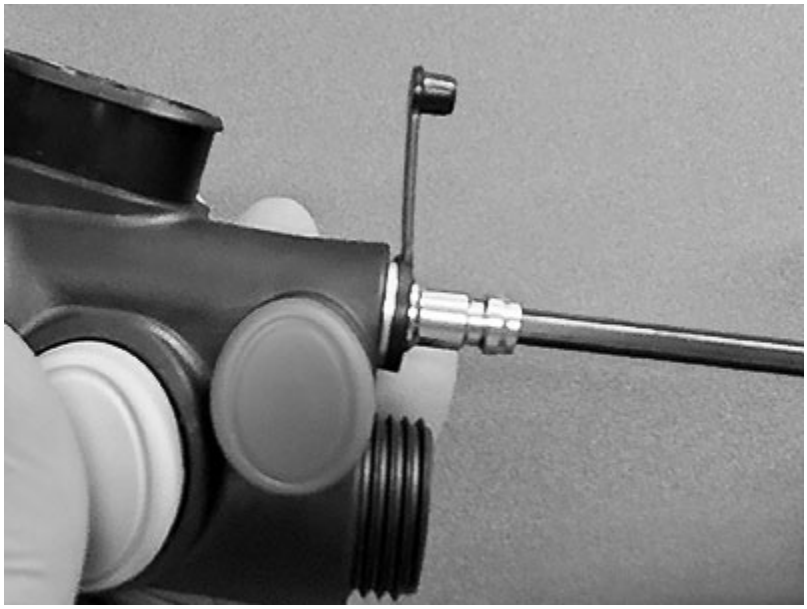


Fig. 51

Caution Note: To avoid excessive wear or cutting of the low pressure seat when making adjustments, only turn the Orifice with the lever depressed.

3. Now add one more 1/4 clockwise turn to the Crown Orifice with a 3/16” hex key, to place initial cracking effort in a predictable range.

4. The Lever tip should be 1 - 2 mm below the oval case rim - Fig. 52. If the lever is higher than this, unscrew the nut with a 5.5 mm nut driver until the lever drops to 1 mm below the rim. If the lever is lower than 2 mm below the rim, after confirming that there is some slack in the lever, tighten the nut until it is 1 - 2 mm below the case rim.

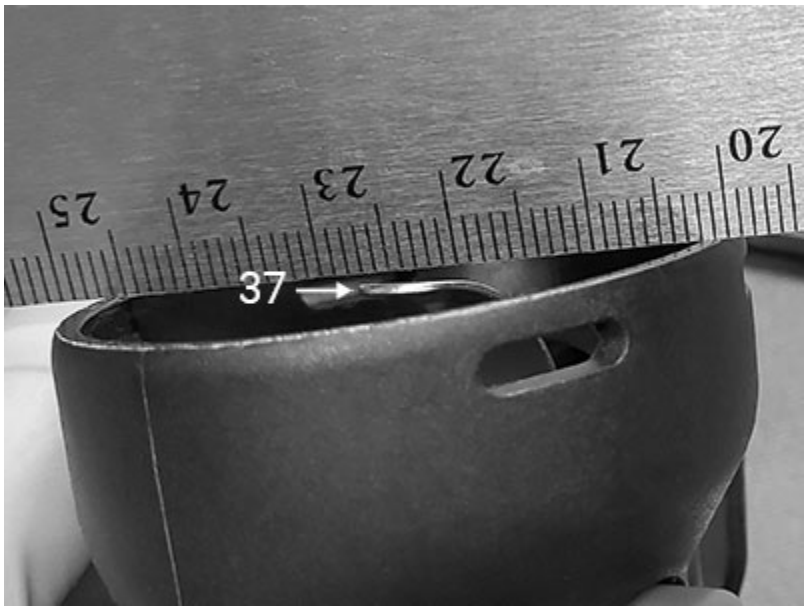


Fig. 52

6. **With the regulator pressurized**, install the Diaphragm (39) and Diaphragm Washer (40), wide flange down. If the valve leaks, readjust lever height.

7. Insert the Purge Cover (42) into the Retaining Ring (41). After checking the orientation of the DGX logo (small gear toward the buttons), press the Purge Cover assembly into the oval opening in the Main Body - Fig. 53, and carefully engage all four locking tabs.

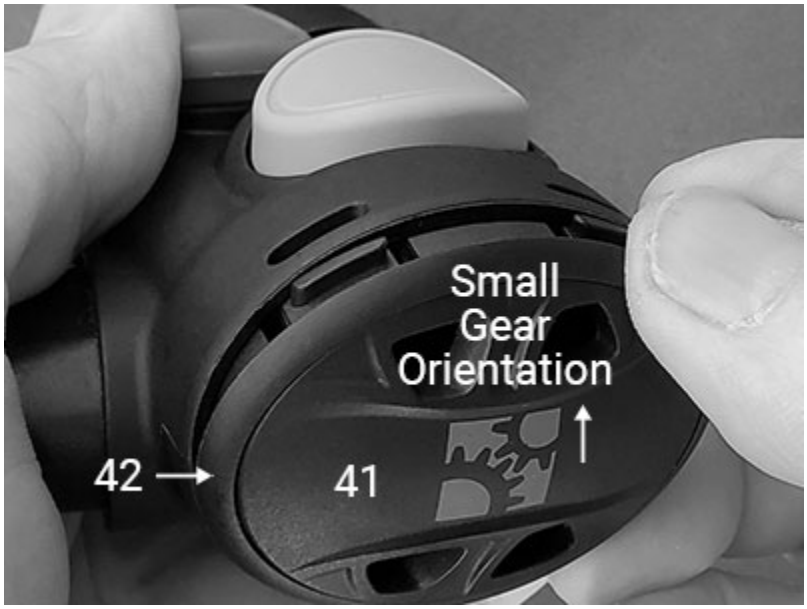


Fig. 53

8. Attach the mouthpiece (25) and secure with a Tie Wrap (44). Trim the end of the Tie Wrap.

9. Add a lightly lubricated O-ring (04*) to the regulator end (non-barbed end) of the Hose Connector Assembly (01). Push the Hose Connector Assembly into the Main Body and tighten the threaded collar finger tight.

This completes reassembly and tuning of the BCI Backup Regulator.

8. Testing for Cracking Effort

(1) Cracking effort is the suction required to depress the lever and allow air to flow through the second stage. It is measured in inches of water. A magnehelic gauge is one method of measuring this pressure. The gauge is attached to the second stage, and a normal breath is taken. The gauge measures the cracking pressure.

(2) Another method is to carefully submerge the second stage into a container of water and note where the air begins to flow using a ruler attached or held to the stage. This method is not always as accurate as using a magnehelic, but still yields acceptable results.

(3) Cracking effort should initially be set at 1.4 to 1.7 inches of water. This will account for the decrease that will occur as the regulator is used. As the Seat begins to form the groove between it and the Crown Orifice knife edge, cracking effort will decrease. Raise cracking effort by turning the Crown Orifice clockwise, which lowers the Lever. Reduce cracking effort by turning the Crown Orifice counterclockwise, which raises the Lever. After Crown Orifice adjustment, remove the Purge Cover assembly and return lever height to 1mm below the case rim as in step 7. (1) 4. above.

9. DGX BCI Adapter Service

(1) In the following steps, the part numbers from the schematic will be used with their description. The numbers on the photos also correspond with the parts list on the schematic. Have the schematic in front of you while following the instructions. Be sure to keep all old parts organized and separate from new ones in the service kit. The parts marked with an asterisk (*) will be replaced with new ones from the service kit and the remaining parts will be cleaned and reused.

Caution Note: Only use enough lubricant to lightly coat the O-rings and ensure no debris is trapped on them.

1. With the Collar (46-6) locked back, use a fingernail or sharp tool to catch the end of the C-Clip (47-3*) and lift it out of its groove in the Body (46-3) - Fig. 54.

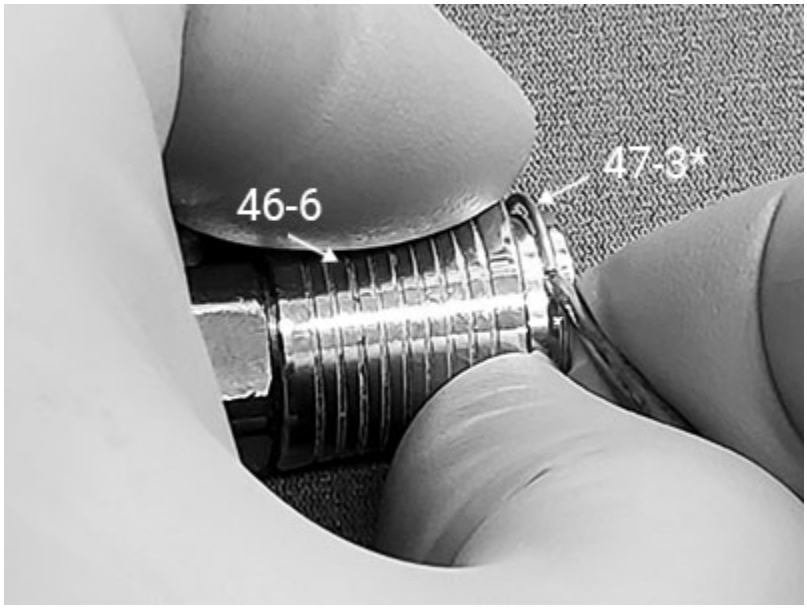


Fig. 54

2. Insert a wooden dowel or blunt brass spade into the BCI Regulator end of the Adapter and push out the Receiver Spring (46-1) and the Receiver (46-2) with its sealing O-ring (47-1*) - Fig. 55. This will release the Collar.

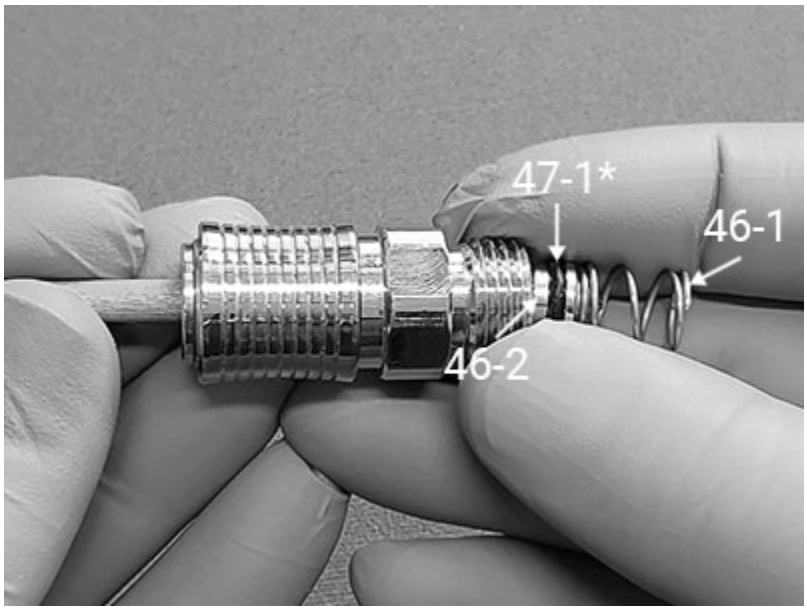


Fig. 55

3. Positioning the Adapter over a shallow container, carefully slide the Collar off the Body and remove the Collar Spring (46-5) - Fig. 56. The four Ball Bearings (46-4) will now likely fall out. If any are retained, push them out from the inside with a nylon pick.

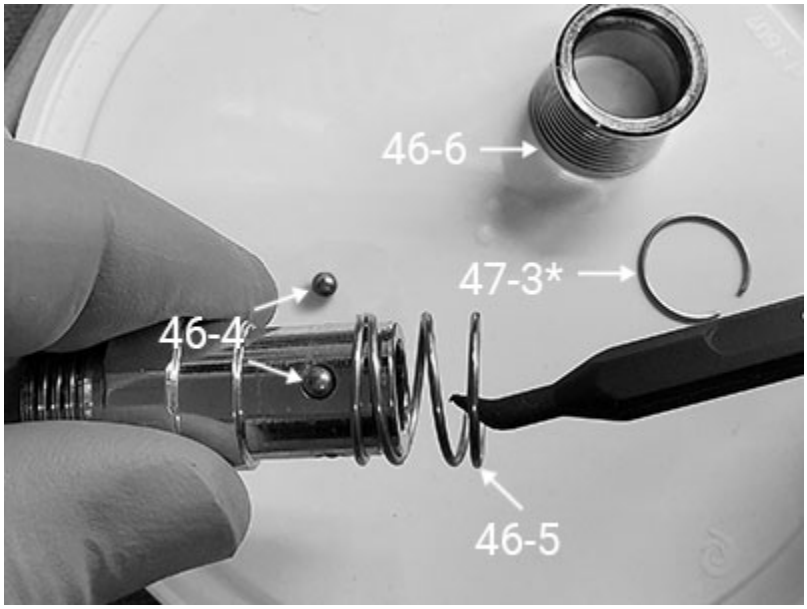


Fig. 56

4. Using a double hook pick, retrieve the O-ring (47-2*) from the bore of the Body - Fig. 57. Using a thin pick, remove the Receiver O-ring.

Fig. 57

(2) The photographs below show the disassembled regulator - Fig. 58, and Service Parts Kit - Fig. 59. All the parts not in the service kit need to be washed, rinsed and dried, as discussed previously. The O-rings and C-Clip that will be replaced with new from the service kit should be discarded.

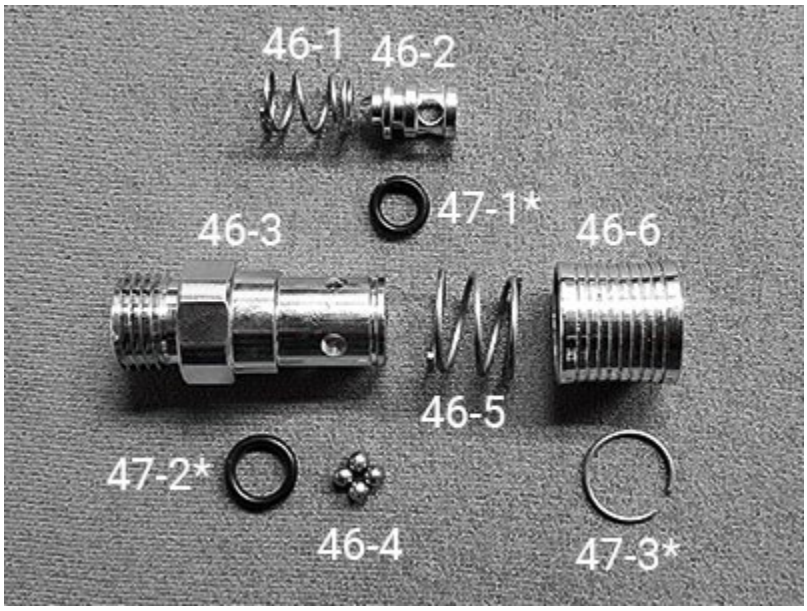


Fig. 58

Fig. 59

(3) At this time, open the service kit and lay out the parts. Use the schematic to identify each part.

1. To begin reassembly, insert a 3/8” dowel in the hose end of the Adapter as far as it will go. This will serve as a floor while you insert a new lubricated O-ring (47-2*) into the bore of the Body (46-3). Manipulate the O-ring with a thin dowel until it is seated - Fig. 60.

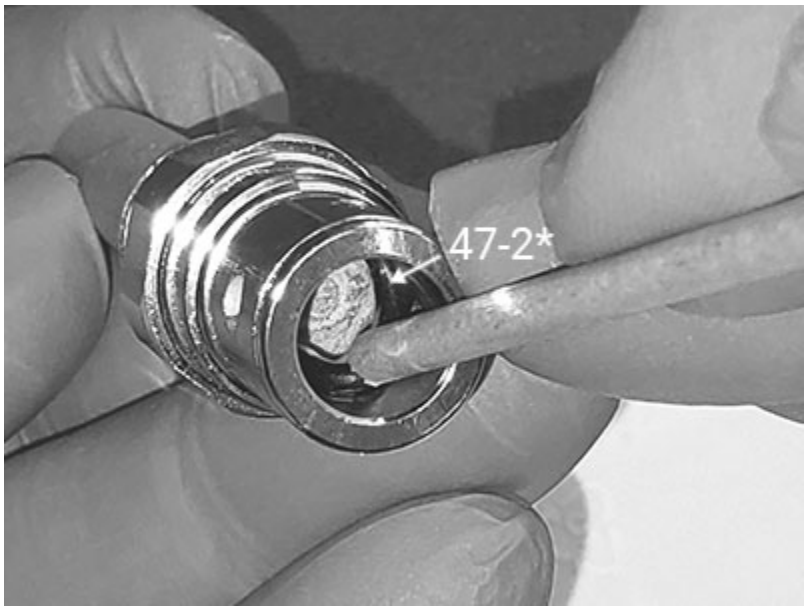


Fig. 60

2. Return the Ball Bearings (46-4) to the Body by first adding a small dot of Tribolube 71 to each hole as a temporary adhesive, and then inserting each Ball Bearing. Add the Collar Spring (46-5). Place the Collar (46-6) with the thin smooth bore first - Fig. 61. Place a new C-Clip (47-3*) in its groove.

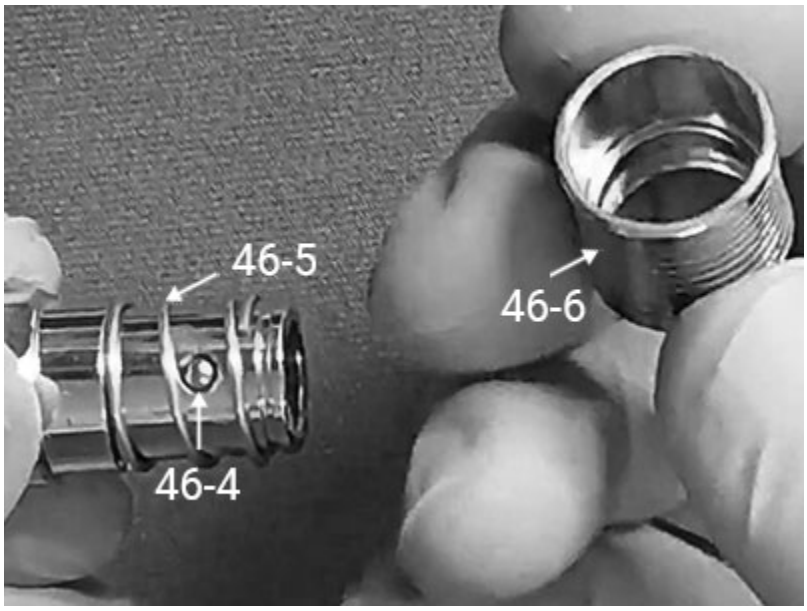


Fig. 61

3. Add a new lubricated O-ring (47-1*) to the Receiver (46-2). Reattach the Spring (46-1) to the Receiver. Using a thin dowel, and pushing from the spring end, slide the Receiver assembly inside the Body at the threaded hose end - Fig. 62.

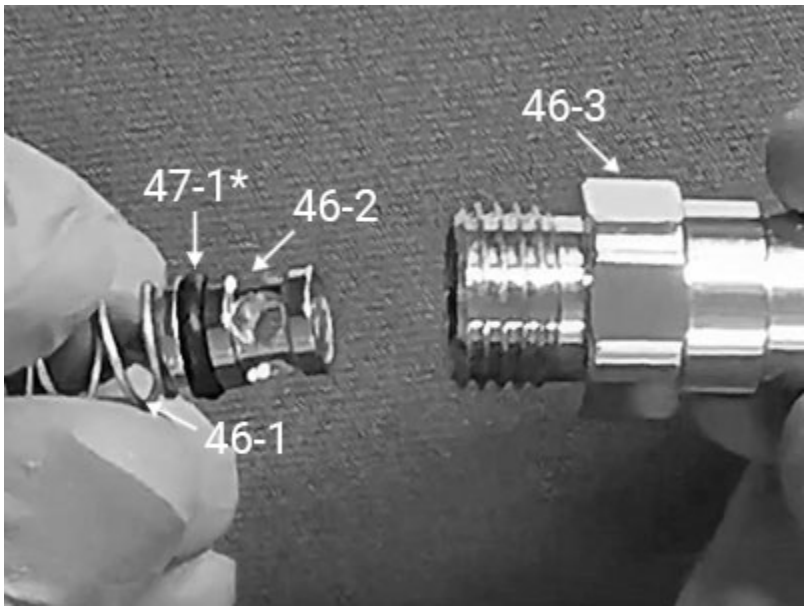


Fig. 62

4. Pushing firmly with the dowel on the pointed end of the Receiver, confirm that the Collar locks back. Blow into the threaded end of the Adapter and confirm that the quick disconnect valve is sealed.

5. Connect the Adapter to an LP hose which is attached to a breathing gas source. Before pressurizing, connect the BCI Backup Regulator to the Adapter and confirm that the Collar springs forward toward the regulator, and that the regulator is now locked to the Adapter.

6. Pressurize the regulator set and confirm air flow by pressing on the BCI Inflation Button, or by breathing from the regulator.

7. Disconnect the BCI Backup Regulator from the Adapter while pressurized and confirm that the Adapter seals with the Collar locked back. Confirm the ability to reconnect the BCI Backup Regulator while pressurized. If the Adapter fails the function check it must be replaced.

This completes service of the DGX BCI Adapter.

(4) BCI General Troubleshooting – Not all possibilities may be noted.

Failed negative pressure check	Diaphragm damaged; cracked Main Body; damaged O-rings; bad Exhaust Seal or Valve
Free flowing	Orifice misadjusted; excessive IP; damaged LP Seat, Crown Orifice or orifice O-ring
No airflow	IP extremely low; first stage metal filter clogged; Lever rattles
Wet breathing	Cracked Main Body; bad Exhaust Valve; bad Diaphragm
Unable to inflate BCD	BCD dump valve malfunction; failed Exhaust Seal; broken Spring

DIVE GEAR EXPRESS

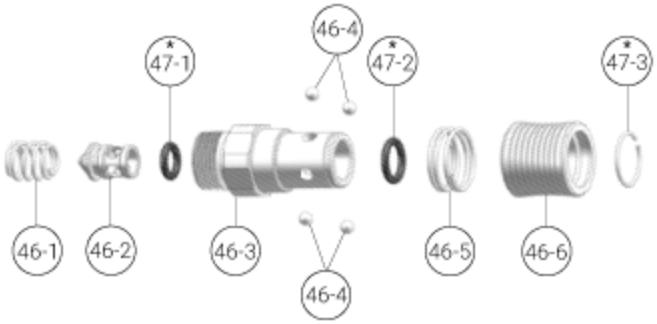
Item	Description	Qty	Item	Description	Qty	Item	Description	Qty
01	Hose Conn Assy	1	17	Exhaust Retainer	1	32	Stem	1
04*	Hose Conn O-Ring	1	18*	Exh Ret O-Ring	1	33	Seat Retainer	1
05	Retainer Pin	1	19*	Nut	2	34	Spring	1
06	Dust Cap	1	20	Exhaust Seal	1	35	Valve Housing	1
07	C-Clip	1	21*	Oral Button O-Ring	1	36	Housing Insert	1
08	Main Body	1	22	Washer	1	37	Lever	1
09	Threaded Cap	1	23	Spring	1	38	Washer	1
10*	Thread Cap O-Ring	1	24	Oral Button	1	39	Diaphragm	1
11	Cone Seat	1	25	Mouthpiece	1	40	Diaph Washer	1
12*	Infl Button O-Ring	2	27*	Inlet Stem O-Ring	2	41	Purge Cover	1
13	Spring	1	28	Inlet Stem	1	42	Retainer Ring	1
14	Inflation Button	1	29*	Crown Orif O-Ring	1	44	Tie Wrap	1
15	Exhaust Cover	1	30	Crown Orifice	1			
16	Exhaust Valve	1	31*	Seat	1			

Note: Items marked with * are included in service parts kit to be replaced at time of service.

DGX GEARS BCI BACKUP REGULATOR

DX-700000

DIVE GEAR EXPRESS



Item	Description	Qty	Item	Description	Qty	Item	Description	Qty
46-1	Receiver Spring	1	46-3	Body	1	46-5	Collar Spring	1
46-2	Receiver	1	46-4	Ball Bearings	4	46-6	Collar	1
47-1*	Receiver O-Ring	1	47-2*	Body O-Ring	1	47-3*	Circlip	1

Note: Items marked with * are included in service parts kit to be replaced at time of service.

DGX ADAPTER: LP REG HOSE = BCI 2ND STAGE

DX-700100