

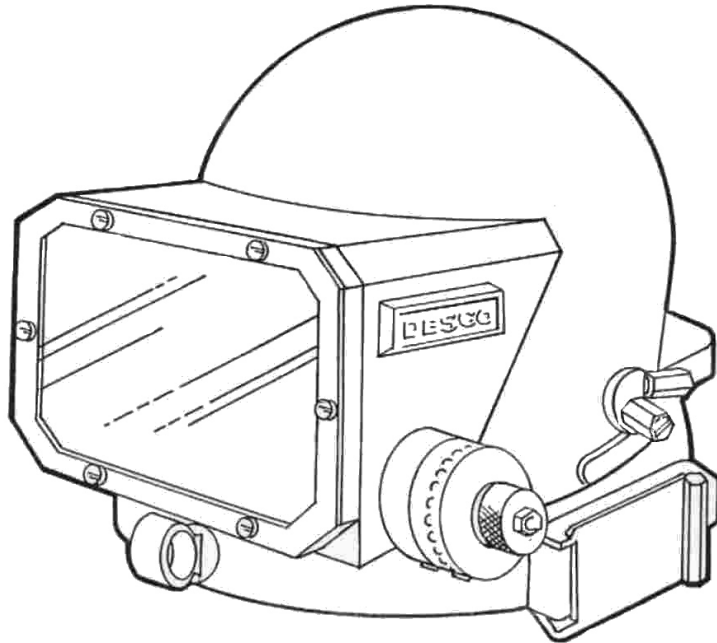


DESCO Air Hat Service Manual

Section

1. DESCO Air Hat Owners Manual
2. Sub-Assemblies, Installation & Servicing
3. Testing

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Air Hat Maintenance

Overview

The Air Hat differs from other low volume helmets on the market in that it does not have a demand system. The free flow design makes field repair and maintenance practical. The helmet can be disassembled with a couple of wrenches and a screwdriver. Hard parts normally will wear slowly and can be repaired and maintained during annual inspections. Soft parts like gaskets and flapper disks should be checked often. These parts are relatively inexpensive and should be replaced as part of routine maintenance. DESCO cannot offer a specific timeline for part replacement as helmets will see a wide range of use and conditions. A regular maintenance program should be instituted based on use and conditions encountered to ensure the Air Hat is always ready for service and will perform satisfactorily.

Maintenance Documentation

The information you need to maintain your Air Hat is available for download on this website. Go to the Downloads page at www.descocorp.com for manuals and guides. Technical specifications are available on the Technical Page.

DESCO in factory Maintenance Services

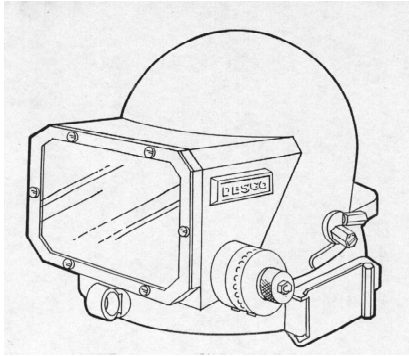
DESCO offers annual inspection and maintenance service for the Air Hat. When an Air Hat is returned to us we evaluate it and provide a report with an estimate for repairs we believe to be necessary or advisable. The customer will be consulted before any repair work is commenced. Some disassembly of the Air Hat will occur during evaluation. Once authorization is obtained the helmet will undergo full disassembly and cleanup. If any additional items of concern are found the work will stop until the customer is consulted. At this time we can also make any upgrades. Air Hats can also be repainted or retinned. A few customers have sent helmets requesting all work necessary be done to bring the Air Hat back up to peak condition. This effectively gives DESCO carte blanche on repairs. We appreciate this trust in us but we will still consult with the customer on any large or expensive repairs before undertaking them. After completion of the work an inspection report is made out. A copy of the report is sent with the helmet for the customer's files. We also retain a copy of the evaluation and inspection reports.



DESCO AIR HAT OWNERS MANUAL

This manual is supplied with all new DESCO Air Hats. General care and maintenance guidelines are found in this manual.

DESCO AIRHAT
CAT. NO. 61000



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Overview

The DESCO Air Hat has been in production over 40 years, and has continually evolved to meet the requirements of the Commercial Diving Industry. The Air Hat complies with all applicable industry and government regulations including ADC, OSHA, U.S. Coast Guard, and EU. The Air Hat has a flow rate capability in excess of that established by the U.S. Navy Divers Manual. Refer to the “Open Circuit System Requirements” in the U.S. Navy Diving Manual for guidance in determining necessary airflow and overpressure requirements for your application. Depth of the dive, hose diameter, air source, number of divers, and other factors will effect the air delivery requirements. Therefore it is the responsibility of the contractor/diver to determine the size of the air delivery system that will deliver a flow rate to adequately ventilate the Air Hat(s).

Policy Statement

When a new DESCO Air Hat leaves the factory it is as simple and safe as we can make it. It is designed to operate safely and efficiently for many years without expensive or time-consuming maintenance. Its simplicity however should not lull a diver into complacency. The Air Hat should receive good care and maintenance on a regular basis to operate at peak efficiency. DESCO believes this design is the best balance of utility, durability, and economy. DESCO Corporation cannot recommend, sanction, nor condone field modification of the Air Hat. Modifying the Air Hat could result in unforeseen serious and life threatening consequences. Under no circumstances should you remove wholly or in part any component, modify components, or drill openings into the Air Hat. Never circumvent the operation of any component of the Air Hat. Older Air Hats can be factory retrofitted to bring them up to current standards. Double exhausts, double air inlet elbow (for bail-out system), mounting blocks (for cameras and lights), or a telephone cup for improved communication and four wire communications capability, can all or individually, be installed by the factory.

If you have special requirements DESCO will attempt to accommodate your needs, provided they do not compromise the safe operation of the Air Hat.

As DESCO strives to make diving equipment better, safer, and more user friendly we welcome comments and suggestions from diving companies, regulatory agencies, **and especially divers**, whose safety is our ultimate goal. Please feel free to contact us.

Instructions for use and maintenance of the DESCOCO Air Hat.

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DESCOCO offers factory annual inspection services for the Air Hat. An evaluation is made and recommendations are made on repairs and servicing necessary to certify the helmet as dive ready. Some DESCOCO dealers are also factory authorized to do annual inspections and repairs. Check with your dealer to see if they are part of this program.

DESCOCO is an importing distributor/dealer for Trelleborg Viking and Hunter Drysuits. We can provide a drysuit with a Viking or Hunter factory installed yoke ready to mate to the Air Hat.

Section 1. Instructions for use of the Air Hat.

Equipment Usable with the Air Hat: When attachment to a dry suit is not desired, the Air Hat can be used with the special DESCO neck dam, which provides a seal at the diver's neck. The Air Hat can also be mated to a conventional commercial collar dress by means of the DESCO Neoprene Breastplate. This attaches to the dress in the same manner as a copper commercial breastplate but incorporates a stretchable cylindrical collar, which is attached to the neck ring insert so as to make a seal with the Air Hat. Similar use can be made of any dry suit, which comes equipped with such a collar.

Adjusting the Headpiece Insert for Head Size: Size adjustments to the headpiece assembly are made with the assembly removed from the Air Hat. Loosen the two brass screws on the upper edge of the back plate at the rear of the assembly. The proper fit is achieved by changing the circumference of the headpiece assembly, by sliding the back band in or out. The headpiece should fit snugly on the diver's head, as the liner will compress somewhat under pressure. When the correct fit is achieved tighten the two screws and reinstall in the Air Hat.

How to Choose the Proper Size of Neck Dam: Neck Dams are available in sizes 12 through 15. The appropriate size is approximately two sizes smaller than the diver's regular collar size. Thus, a diver who wears a size 16 collar should use a size 14 Neck Dam. Custom sized Neck Dams are available upon request.

The Air Control Valve: DESCO uses a commercial Hoke Stainless Steel Valve rated for 6000 psi. This valve has been used in all DESCO Air Hats. They have proven to be very durable and reliable. The only issues with the valve are occasionally the stem will become bent, and the Teflon® packing washers will wear and compress over time. DESCO stocks genuine Hoke replacement parts for these valves. The packing should be kept taught to prevent unintended adjustments to airflow by bumping or the hose rubbing against the valve handle.

The Air Distributor/Muffler: The Polyethylene air distributor directs air across the inside surface of the window and helps to prevent fogging. As delivered from the factory, the interior of this air distributor is packed with Lambs wool, which greatly reduces air intake noise. Lambswool is a natural, coarse fiber that does not compress to the point where it would choke airflow. It can be compacted if it becomes loaded with oil or other contaminants. Cotton and other similar materials will compress to a point where it can impede airflow. Never substitute another material in the air distributor. Lambswool is available in drug stores, and the health products aisle in most department and grocery stores.

The Lambswool will also act as a filter in the incoming air. Particulate matter coming down the air system can accumulate in the Lambs wool gradually reducing the airflow capability. Periodically inspect the Lambs wool and replace if it is dirty, shows signs of compacting, or is contaminated with oil. If the air distributor shows signs of a color change this may indicate oil contamination and it should be checked. **THERE IS NO SUBSTITUTE FOR LAMBSWOOL IN THE AIR DISTRIBUTOR**

Airflow rate: Each new and rebuilt Air hat is tested at the factory to a minimum flow rate of 12cfm at 100psi. All Air Hats have been able to deliver between 15 & 20 cfm in testing. Variance is due to the packing of the air distributor, which is not exacting. Factors such hose diameter, delivery pressure, and condition of the Lambswool will effect flow rate in the field. The Hoke Valve is capable of delivering in excess of 50 SCFM at 100 PSI. It will reach approximately 75% of its maximum flow at one turn of the valve handle. DESCO recommends a minimum of 6CFM at 100 PSI to properly ventilate the Air Hat. This figure is based on U.S. Navy Diving Manual recommendations for open circuit diving, and DESCO testing of the Air Hat.

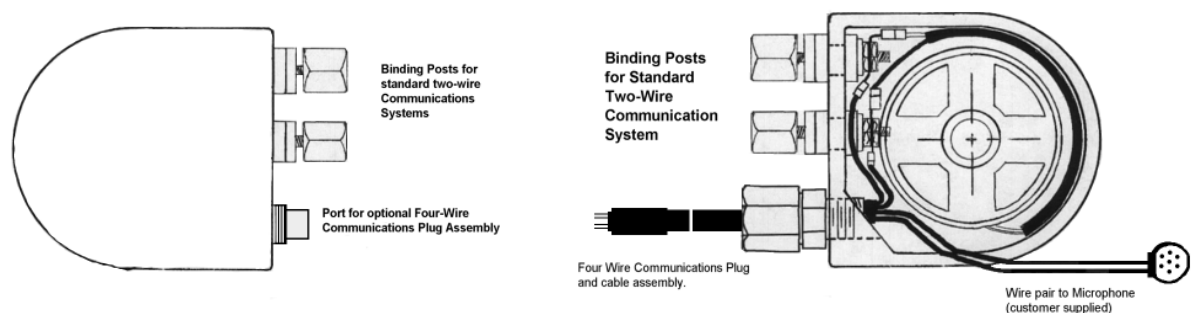
How to Minimize Air Intake Noise: Setting the Air Control Valve to provide sufficient airflow for the workload will reduce airflow noise. At ¾ turn the Air Hat will deliver approximately 10cfm. In dry bench testing by DESCO the sound level at full flow averaged 100db. Reducing the flow rate will cut down the sound level. Testing showed that db will drop to about 94db at 10cfm. At 6.1cfm the sound level measured 88db. OSHA permissible continuous exposure to 90db is 8 hours; at 100db is 2 hours [1910.95(b) (2)].

Non-Return and Bail-out Non-Return Valves: The Non-Return valve on the Air Hat is standard 9/16"- 18 Oxygen thread. The Bail-out Non-Return (marked with a letter "B") is drilled to accept a SCUBA whip from a Bail-out Bottle. A dust cap is provided on the Bail-out Non-Return to protect the threads when not in use. The dust cap will provide some sealing but a complete airtight seal is not guaranteed. The integrity of the Non-returns can be tested by applying air pressure to the Air Hat with the control valve fully closed, then removing the air supply hose, and applying a solution of dishwashing detergent and water to the inlets. No air should leak back through the Non-Returns. If a leak is found the Non-Return disk may require replacement. This test method can be used on all connections in the air supply train.

IMPORTANT SAFETY NOTE: Never add additional plumbing to either Non-return Valve or the air inlet elbow. The additional length increases the forces exerted on these components. Failure of the Non-return Valve or the elbow is possible. There is also an increased snag hazard and the possibility of the helmet being dislodged from the diver's head.

DESCO does not offer a suit inflator whip connection on the Air Hat. DESCO discourages using the breathing gas supply for anything other than life support. Suit inflation should be accomplished by other means when using the Air Hat

Communications: This new DESCO Air Hat comes equipped with a new speaker cup which incorporates the binding posts for standard two-wire communications, and a port for the installation of a Marsh marine style plug assembly. This port comes plugged from the factory unless the Air Hat is ordered with the two or four wire communications plug option. The customer can install the plug assembly at a later time with parts DESCO can provide



Instructions for connection of a four-wire communications equipped Air Hat to customer's umbilical.

If your new Air Hat was ordered with the Four Wire Communications Plug assembly, the helmet is shipped without any wiring connections made to the speaker. This allows the customer to match the connections in the Air Hat to the umbilical communications line. The customer should check which wires are paired to the microphone and to the speaker on the umbilical communications line. The wire pair going to the speaker should be shortened so they can reach the binding post ends without any strain on them. The microphone wires can be cut to length according to the placement of the microphone, which is determined according to the customer's location preference.

Instructions for installing the four-wire communications assembly as a retrofit.

Remove the port plug and clean and inspect the threads. Mix a small amount of fast set two-part epoxy, apply it to the threads on the fitting, and insert into the port. Tighten the fitting to approximately 3/4 of the length of the threads. Allow the epoxy to set per the manufacturers recommendations. Slip the compression nut and ferrules provided onto the plug pigtail. The nut and ferrules should be placed so as to leave enough of the plug out to connect to the umbilical without straining. Approximate the final location of the plug in relation to the bulkhead fitting and strip off the excess cable sheathing, leaving enough to pass through the bulkhead fitting into the helmet. Insert the cable through the bulkhead fitting. If the cable resists passing through apply soapy water or silicone spray to the cable. Also, the sheathing of the cable can be worked towards the bare wire ends of the cable to reduce the diameter to aid in installation. Tighten the compression nut. Follow the connection instructions above to complete the installation. Bench test the installation before placing the Air Hat "in service".

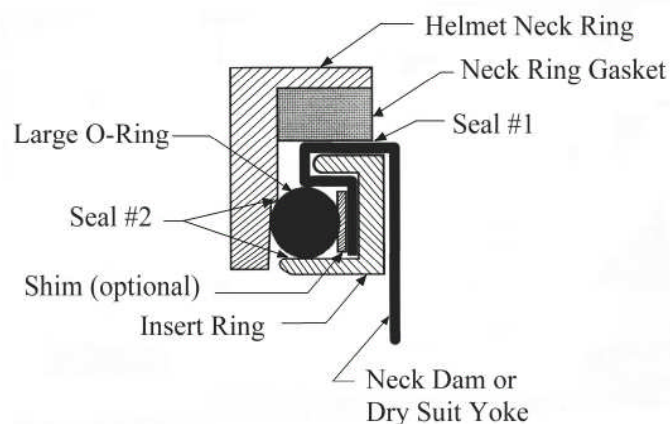
Light/Video Mounting Blocks: Two mounting blocks have been added to the snout of the Air Hat. They are supplied with a 3/8"-16 x 1/2" Brass hex bolt and a rubber washer. Mounting ancillary items on the Air Hat will change the natural balance of the helmet and should be taken into account. The blocks are soft soldered to the helmet in recesses machined into the snout. This allows the block to break away if sufficient force from being hit or hung up is applied. This feature offers some protection to the diver's head and neck in a mishap involving the mounts.

Welding Shield: A Welding Shield accessory is available for the Air Hat from DESCO (Cat. No.61001W/S). It features a standard 4 1/2"x 5 1/4" square lens, and the frame covers the entire faceplate. It comes with 2 stainless steel screws, which should be used in lieu of the brass window screws.

Neck Ring Insert Assembly: To achieve a watertight seal at the neck, the Air Hat makes use of a brass neck ring insert, a large O-ring, rubber shims (if necessary), and either a neoprene neck dam, or the neck yoke of a dry suit. When these components are properly assembled and the insert is pressed and locked into the neck ring of the Air Hat, two separate sealing points are provided against entry of water. The seals are interdependent and both must be properly installed to provide maximum watertight integrity.

Seal No. 1 is provided by the neck dam (or dry suit yoke) pressed between the neck ring insert and the flat neck ring gasket. The neck ring gasket is attached to the helmet neck ring with adhesive.

Seal No. 2 is provided by the large O-ring, which is pressed at its top against the shoulder of the neck ring, and at its bottom against the lower surface of the channel in the brass neck ring insert. As the neck dam or dry suit yoke age the material may compress necessitating the use of a shim to take up the additional space.



These two seals are different both in operation and effect. The flat neck ring gasket used in Seal No.1 is an open-cell or sponge like material, which resists, but will not wholly prevent the passage of water. An open cell material is used since it maintains its shape under pressure at depth. So long as a positive air pressure is maintained in the Air Hat no water will enter. Should the pressure in the Air Hat become negative, as when the air is turned off and the diver inhales, a little water may enter. This can, however, readily be blown out through the neck dam simply by closing the exhaust valve so that air is forced out through the neck dam. Seal No.2, when installed properly provides a completely watertight seal. The shim (optional) is provided to take up any space caused by the neck dam or yoke material compressing under long term use.

Assembly of Neck Dam or Dry Suit Collar to Air Hat: To attach the DESCO neck dam to the Air Hat hold the brass neck ring insert with its smaller diameter up. Bring the neck dam up through the ring wide end first. Fold the top edge of the neck dam out over the top of the insert ring so that the taped edge fits into the channel. Holding this point fold the rest of the top edge of the neck dam outward and over the channel. The large O-ring is then placed in the insert ring channel on top of the neck dam material. If because of wear or compacting of this material the O-ring fits too loosely one or more rubber shims can be placed in the channel on top or below the neck dam material, beneath the O-ring. When properly fitted the O-ring should rest firmly against the neck dam material.

The collar of the Neoprene Breastplate or dry suit can be assembled to the neck ring insert in the same manner except that with the thinner collar material it will nearly always be necessary to use one or more rubber shims in order to properly fit the O-ring. To insure a completely watertight seal care must be taken to see that the large O-ring is correctly fitted so its outer circumference contacts completely around the inside surface of the Air Hat neck ring when it is clamped in place.

Due to variances in materials and processes by suit manufacturers the fit of the drysuit yoke may require the use of shims.

The large O-ring in the Air Hat has been given a light coat of Silicone lubricant at the factory. It will be found that keeping the insert parts clean and lubricated will ease installing the neck ring insert assembly into the Air Hat, and will prolong the life of the O-ring. Use a lubricant suitable for rubber O-rings (petroleum free).

Section 2. Maintenance of the DESCO Air Hat

The DESCO Air Hat is simple to maintain and will provide reliable service with normal care and maintenance. The following schedule will keep your DESCO Air Hat in top working order.

General Maintenance: The basic materials and construction of the DESCO Air Hat shell are the same as those used in conventional diving gear like the U.S. Navy Mark V helmet, and it should generally be cared for in the same manner. If used in salt water it should be washed off with fresh water after use, and dried with a clean cloth.

The Air Hat shell has a standard coating of tin-plating, or it can be painted as an option. If the finish becomes badly worn the Air Hat can be disassembled and the shell can be retinned or repainted.

Painted Air Hats are coated with DuPont Imron Polyurethane Enamel Paint. This is a high durability Automotive and Boat coating. This finish should be treated in the same manner as a cars finish.

The window is Acrylic and care should be taken to prevent scratching the surface. Clean the window with standard glass cleaner and a soft clean cloth. To remove very fine scratches and some stains use a specially formulated plastic cleaner like Novus Plastic Polish No.2. This polish will also work on fine abrasions in the paint on the shell.

IMPORTANT MAINTENANCE NOTE: The flat neck ring gasket can be permanently compressed, which will reduce its effectiveness as a seal, if the neck ring insert assembly is left clamped in the Air Hat while it is not in use. When the Air Hat is not going to be used for some time the neck ring insert assembly should be separated from the Air Hat.

Before each dive:

1. Inspect all seals for nicks and tears. Replace as necessary.
2. Inspect the window for nicks, cracks, and deep scratches, which may weaken it. Pay special attention to the screw holes.
3. Check the window screws for damage and tightness.
4. Check the air control valve for smooth operation. There should be some resistance to opening and closing of the valve to prevent accidental readjustment during the dive.
5. Inspect the clamp and lock mechanism for damage and adjustment. . There should be some resistance to opening and closing of the clamps and locks to prevent accidental opening during the dive.
6. Inspect the shell of the helmet for damage. Pay special attention to fittings and joints
7. Inspect the insert ring for damage. Also inspect the O-Ring, shim (if installed), and neck dam (if installed).
8. Test the air train. With air connected check the operation of the non-return valves and air train. Close the air control valve to pressurize the air train. Turn off the compressed air supply to the helmet. After one minute open the air control valve. Air should be heard escaping from the air distributor. If no air is heard check all fittings for leakage, repair and retest.

Periodic Maintenance:

Due to the varying conditions that DESCO Air Hats will encounter it is not possible to suggest a fixed interval for periodic maintenance. The compressor, umbilical, environment, and usage will all effect how often the Air Hat will need comprehensive maintenance. Particular attention should be paid to these items when doing periodic maintenance. DESCO recommends that the periodic maintenance be done fairly often. It is not possible to over maintain a DESCO Air Hat.

1. Check Lambswool in the Air Diffuser for discoloration and/or particulate matter. Replace if any contamination is observed. **ONLY USE Lambswool in the Air Diffuser.** Use of any other material in the Air Diffuser is not recommended.
2. Check the threading on the non-return valves for wear, dirt, or damage. **Never use Teflon Tape in any part of the air train. Loose pieces of tape can clog the Lambswool or air control valve and result in loss of airflow.**
3. Check all items, which are not easily accessible during the pre dive inspections.

To Replace the Flat Neck Ring Gasket: This gasket, as supplied with the Air Hat, is attached to the neck ring using Feathering Disc adhesive (used for attaching sanding disk paper sanders). This adhesive allows for easier changing of the neck ring gasket. The gasket can be removed by peeling it gently off the neck ring surface. A new gasket is installed using the same type of adhesive. Care should be taken to see that the gasket's outer edge is in contact with and adhered to the wall of the neck ring at all points, otherwise the gaskets effectiveness as a seal is reduced. Lacquer Thinner can be used on the tinned Air Hats to remove adhesive residue when changing the neck ring gasket. Lacquer Thinner should not be used on painted helmets. Instead a cleaner like Goo Gone can be used as it will not damage the paint.

Repacking the Air Distributor with Lambswool: To pack the Air distributor with Lambswool take a quantity almost as large as a golf ball. Shred the Lambswool to loosen and fluff the fibers. Roll the fluffed Lambswool in your hands but do not compress it. The quantity you want will remain close to the size of a golf ball. Use a flat screwdriver to tuck the ball of Lambswool into the Air Distributor. The Lambswool will be lightly packed once in place. Over packing the Air Distributor will reduce the air flow.

To Replace Pads on the Headband Assembly: The headpiece assembly is held in the Air Hat by a single #10-32 hex nut in the center of the top band. To remove the headpiece assembly unscrew the hex nut as pull the headpiece assembly out by the side opposite the air control valve. On older helmets with the diagonal binding post block backing out or removing the communications binding posts will ease removal. The pads are attached with pressure sensitive tape making replacement simpler. The top pad is held in place by a thin top pad above the band and a thick pad below the band. To change the pads remove the liner from the Air Hat. Peel off the old side pad and discard. Remove the old top pad by cutting it away. Clean any oil, grease, dirt, or old adhesive from the area where the new side pads will go with Denatured Alcohol or Lacquer Thinner. Line up the new upper top pad with the mounting hole then align the lower top pad with the upper and press them together so the self adhesive tape forms a full bond. Peel the paper backing from the new side pad and press firmly into place. Slide the headpiece assembly back into place. Watch the side pads as you install the liner so they do not roll as you press the liner into place. Check the liner to make sure it is centered in the Air Hat and replace and tighten the hex nut. Make sure all the solvents are completely gone before using the Air Hat again.

Section 3. Helmet Disassembly

1. Before doing any disassembly inspect the general condition of the helmet. Look for signs of wear, corrosion and/or damage.

- a. Dents, deep scratches, or gouges in the helmet shell
- b. Scratches, chips, or hazing in the Acrylic window.
- c. Mechanical operation of the air control valve, exhaust valve, clamps and locks.
- d. Dents, nicks, or gouges in the insert ring.
- e. Holes in the neck dam (if installed).
- f. Cuts or gouges in the insert ring O-ring.
- g. Corrosion on any exposed solder joints.
- h. Corrosion to nuts, bolts, and screws.

2. Disassemble the helmet keeping the parts grouped together as they are removed. During the detailed inspection having the related parts together will aid in diagnosing problems. Some parts are best examined as they are removed from the helmet. Sub assemblies will be individually examined after the helmet is disassembled. The disassembly sequence is as follows:

Insert Ring Assembly (with Neckdam installed):

- a. Remove the assembly from the helmet.
- b. Remove the O-ring from the insert ring.
- c. Remove the Neckdam from the insert ring.
- d. If the insert ring is fitted with a shim, remove it. On helmets where the shim has been in use for a long time it may have adhered to the insert ring. It will be necessary to destroy the shim to remove it. Carefully scrape the shim off of the insert ring. The insert ring can be cleaned with Lacquer thinner and very fine steel wool to remove the residual shim material.

Window Assembly

- a. Remove the six window screws from the front window. Take note of the force required to remove them. The need for excessive force may indicate a damaged screw or significant corrosion in the threads. Corrosion will be visually obvious on the screw threads. Check for any bent screws.
- b. Remove the window and gasket from the helmet. The gasket may stick to the helmet frame, or the window, or both. If necessary you may use a thin blade screwdriver or putty knife to release the gasket being careful not to damage any of the parts.

Exhaust Valve Assembly (Double Exhaust):

- a. Remove the two 6-32 screws closest to the helmet and pull the exhaust valve off of the base.
- b. Remove the O-ring and flapper valve.
- c. Remove the flapper screw and nut.

Exhaust Valve Assembly (Single Exhaust):

- a. Remove the four 6-32 screws in the cover assembly.
- b. Remove the flapper valve.
- c. Remove the flapper screw and nut.

Clamp and Lock Assemblies:

- a. Unbolt each clamp and lock assembly keeping the related parts together.

Binding Posts and Communications:

Old Style Installation:

- a. Remove the speaker by first unscrewing the lock screw from the speaker ring. Pull the speaker and cup from the ring. Detach the wires from the binding posts. Remove the post retaining nuts and unscrew the binding posts. Remove the bushings from the block.

New Style Installation:

- a. Remove the speaker from the side cup. It is held in place with two sided foam tape. Using a flat screwdriver gently pry up on the speaker, alternating sides until the tape releases. Detach the wires from the binding posts. Remove the post retaining nuts and pull out the binding posts. Remove the bushings from the cup.

Headpiece Assembly:

- a. Remove retaining nut in the center top of the helmet.
- b. On older helmets the side and top pads may be adhered to the shell. Slide a screwdriver or putty knife along the shell and gently pry the pads loose. You may have to pry in several locations to keep from tearing the pads.
- c. On older helmets with the diagonal binding post block the liner is easiest to remove by pulling the side by the binding post block in and up to clear the block then hooking the assembly around from under the air train assembly.
- d. To replace the headpiece assembly insert the side at the air control valve first making sure it is clear of the copper tube. Rock the assembly in till the top band is over the retaining stud, then check the assembly is aligned left and right by gauging the distance between the snout/shell seam and the front end of the side pads. Replace and tighten the hex nut.

Air Train Assembly:

- a. Remove the Non-Return Valve/s from the helmet.
- b. Remove the Air Control Valve Handle.
- c. Loosen the valve-retaining nut.
- d. Loosen the compression nuts on the copper tube and remove the tube.
- e. Remove the valve-retaining stem adapter, valve retaining nut, brass and lead washers, and then the valve. Use caution when removing the valve so as not to lose the compression ring off of the valve stem. A piece of tape on the valve stem before the valve is removed will prevent loss.
- f. Unscrew the Air Diffuser from the valve body.
- g. The inside elbow can be removed if needed. It is secured using 10-minute two-part epoxy. Use two adjustable wrenches, one on the flats of the elbow and one to turn the first wrench. Use extreme caution to avoid damaging the threads or bending the elbow.

To remove the copper air distribution tube, first loosen the air control valve-retaining nut so that the valve will rotate freely. Secondly, completely unscrew the compression nuts at both ends of the copper tube and rotate the valve body counter clockwise until the tube drops free. If the tube is undamaged it can be reused. If replacement is necessary the compression ferrules will also have to be replaced. A set of stainless steel ferrules are used on the valve end, and a set of brass ferrules on the elbow end. The small ferrule goes on first, then the larger one with the tapers on both pointing towards the end of the tube

Light/Video Block Assembly:

- a. Unscrew the two 3/8" bolts and Rubber washers from their blocks.

Section 4. Inspection of Air Hat Parts

Insert Ring O-ring: Wash the O-ring in soap and warm water to remove all dirt and contaminants. Do a careful inspection for cuts, nicks, or gouges. Look closely at the glue seam for any evidence of potential failure.

Neckdam: When examining for holes pay particular attention to the area where the Neckdam wraps back around to pass under the O-ring. Slightly stretching the material aids in locating holes. Check for wear and stretching at the lower end of the Neckdam where it contacts with the diver's neck.

Shim: Where the shim has been removed intact from the insert ring check for deterioration of the shim material.

Insert Ring: Carefully inspect the insert ring for dents and nicks. Remove any burrs with very fine sandpaper. Check the ring for evidence of damage, which may have put it out of round.

Window: Check the window carefully for cracks, scratches, or chips along the edges. Inspect the window's gasket-sealing surface for dirt or gasket material adhering to it.

Window Gasket: Wash the gasket and window with soap and warm water. Carefully inspect the gasket for cuts, cracking, or nicks, and check that the gasket is not gotten hard or soft.

Window Screws: Check for excessive corrosion or if the screw is bent. Look for cracking where the threads meet the head.

Double Exhaust Valve: Generally look over the unit for contamination or damage. Inspect the solder joint where the adjuster cap meets the top section. Look for corrosion or cracking. Check the movement of the plunger in the top section assembly and the action of the spring. Inspect the threads on the top section adjuster assembly. Work the adjuster cap as a check for the condition of the cap threads. Excessive play in the operation of the adjuster would warrant further disassembly down to the component parts. Check the condition of the plunger in the top section and the flapper guard in the mid section. Look for signs that the flapper valve(s) may be sticking to them.

Exhaust Valve O-ring: Wash the O-ring on soap and warm water. Carefully inspect for cuts and nicks.

Exhaust Valve Flapper Disk(s): Check for wear and cracking in the material. Look for signs of physical deterioration of the material such as hardening or softening. Look for signs that the flapper valve may be sticking to the plunger or flapper guard.

Exhaust Valve Body Sections: Look for signs of damage or corrosion. Look for plating flaking or cracking. Check the flapper valve sealing surface on the mid body for wear or damage. Check the threads in the mid body for dirt or corrosion.

Single Exhaust Valve: Generally look over the unit for contamination, corrosion, cracking, or damage. Inspect the solder joint where the adjuster cap meets the cover. Check the movement of the plunger in the cover assembly and the action of the spring. Work the adjuster cap as a check for the condition of the cap threads. Excessive play in the operation of the adjuster would warrant further disassembly down to the component parts. Check the condition of the four cover retaining screws.

Clamps: Inspect the clamps for corrosion, bends and cracks. Inspect the clamp holes for cracks and wear.

Locks: Inspect the locks for cracks at the solder joint. Look for bending or twisting in the tab. Check the hole for cracking or wear.

Bolts & Nuts: Inspect the bolts for corrosion, wear, and bending. Look at the nuts for rounding off and thread corrosion or wear. Try threading the nuts and bolts together to test the threads and the nylon locks on the nuts. If the nuts will not self-lock they should be replaced. If the nylon washers appear to be flattened out replace them.

Binding Posts: Check the solder joint for cracking. Test the clamp nut for operation. Check for bending. Older binding posts were drilled for inserting the communications wire. If the binding post has this hole look for cracking of the post next to the hole. Check the bushing for cracks of excessive compression. Check for rounding off and the general condition of the threads.

Speaker: Check the speaker for operation using a sound source. Inspect the speaker, wire and terminals for wear, corrosion, or damage.

Speaker Cup: Check for wear and damage.

Headpiece Band Assembly: Inspect for corrosion, missing parts, or loose hardware. Check for wear and cracking.

Insert: Check for wear and excessive hardening of the pads. Check the screw fasteners to make sure they are still firmly attached to the pad.

Top & Side Pads: Inspect for wear, compression, or damage. Check that they are still firmly attached to the band.

Non-Return Valve(s): Inspect the body parts for corrosion, wear, or damage. Check the threads for condition. Check for damage to the valve seat. Look for loose plating or corrosion. Check the spring for loss of strength or corrosion.

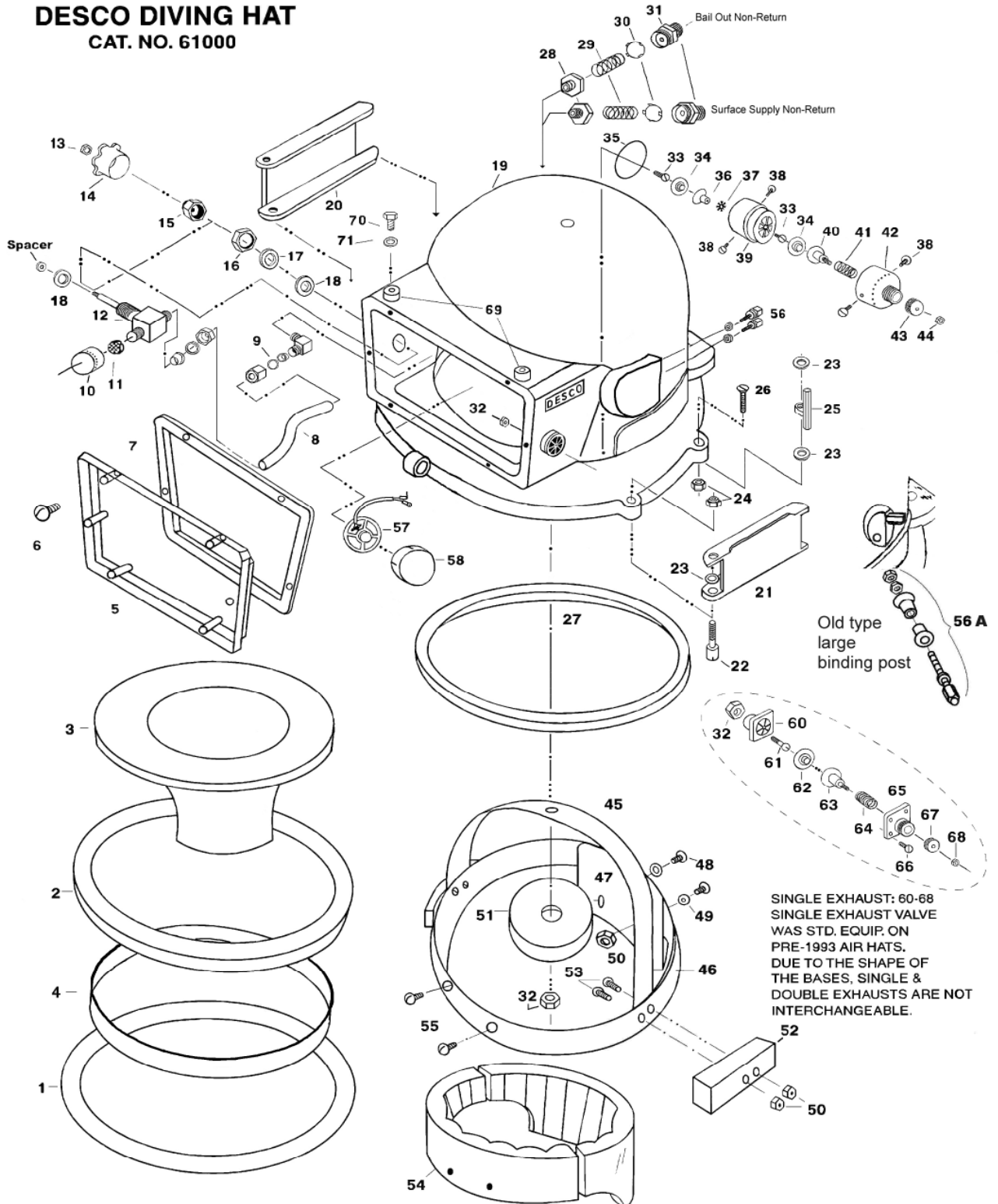
Inside Elbow: Inspect the elbow for corrosion, wear, or damage.

Tube Inspect for corrosion, wear, or damage. Look for corrosion at the tube ends and on the ferrules where it can interfere with the seals.

Air Control Valve Inspect for corrosion, wear, or damage. Look inside the valve openings for signs of foreign material or contaminants. If the valve operation seemed loose before disassembly check the valve packing. Check the valve stem for bending.

Air Distributor Inspect for contamination or damage. Carefully remove and place the Lambswool into a plastic bag. Inspect the Lambswool for contaminants and foreign material. Check the opening in the body for excessive wear. Look at the body for oil or contaminate saturation.

DESCO DIVING HAT
CAT. NO. 61000



SINGLE EXHAUST: 60-68
 SINGLE EXHAUST VALVE
 WAS STD. EQUIP. ON
 PRE-1993 AIR HATS.
 DUE TO THE SHAPE OF
 THE BASES, SINGLE &
 DOUBLE EXHAUSTS ARE NOT
 INTERCHANGEABLE.

DESCO Air Hat Cat. No. 61000
Exploded View & Parts List

1-3	NECK RING INSERT ASSEMBLY	61050	45-55	HEAD PIECE ASSEMBLY	61100
1.	NECK SEAL O-RING	61054	45.	TOP BAND	61103
2.	NECK RING INSERT	61051	46.	HEAD BAND	61101
3.	NECK DAM	61052	47.	BACK PLATE	61104
4.	SHIM	61053	48.	3/8" BRASS SCREW	61108
5-7	WINDOW ASSEMBLY	61075	49.	BRASS FLAT WASHER	61109
5.	WINDOW	61076	50.	BRASS NUT	61110
6.	WINDOW RETAINING SCREWS	61078	51.	TOP PAD	61113
7.	WINDOW GASKET	61077	52.	SIDE PAD	61112
8-18	AIR INTAKE ASSEMBLY	61125	53.	7/16" BRASS SCREW	61114
8.	COPPER TUBE	61127	54.	INSERT	61106
9.	INSIDE ELBOW	61126	55.	SCREW	61107
10.	AIR DISTRIBUTOR	61135	56-59	COMMUNICATIONS	61200
11.	LAMBSWOOL		56.	BINDING POST ASS'Y (SMALL)	61224
12.	CONTROL VALVE	61128	56A.	BINDING POST ASS'Y (LARGE)	61203
13.	VALVE HANDLE NUT	61134	57.	SPEAKER WITH CLIPS	61205
14.	VALVE HANDLE (SMALL)	61133S	58.	FOAM SPEAKER COVER	61226
15.	VALVE STEM ADAPTER	61132	59.	1/4" NPT PIPE PLUG	61227
16.	VALVE RETAINING NUT	61131	60-68	SINGLE EXHAUST ASSEMBLY	59112T
17.	BRASS WASHER	61130	60.	EXHAUST BASE	51025
18.	LEAD WASHER	61129	61.	SCREW	53037
19-27	POT & NECK RING ASSEMBLY	61025	62.	FLAPPER	53026
19.	POT & NECKRING	61026	63.	PLUNGER	53024
20.	NECK RING CLAMP (RIGHT)	61034	64.	SPRING	27009
21.	NECK RING CLAMP (LEFT)	61035	65.	COVER	52090
22.	CLAMP SCREW	61030	66.	SCREW	54025
23.	CLAMP & LOCK WASHER	61031	67.	CAP	53028
24.	CLAMP & LOCK NUT	61032	68.	NUT	54058
25.	LOCK	61038	69-71	VIDEO/LIGHT MOUNTS	61115
26.	LOCK RETAINING SCREW	61037	69.	VIDEO/LIGHT BLOCK	61115
27.	NECK RING GASKET	61036	70.	VIDEO/LIGHT BLOCK BOLT	61116
28-31	NON-RETURN VALVE ASS'Y	59091	71.	VIDEO/LIGHT BLOCK WASHER	61117
28.	BODY	53079			
29.	SPRING	57029			
30.	PLATE	52030			
31.	ADAPTER	53029			
31.	ADAPTER (BAILOUT)	53029B			
32-44	DOUBLE EXHAUST ASSEMBLY	60231			
32.	LOCKNUT	53025			
33.	SCREW	53037			
34.	FLAPPER	56026			
35.	O-RING	60234			
36.	FLAPPER GUARD	60238			
37.	STAR WASHER	60237			
38.	SET SCREW 6-32	60235			
39.	CENTER SECTION	60233			
40.	PLUNGER	53024			
41.	SPRING	57029			
42.	TOP SECTION	60236			
43.	KNURLED CAP	53028			
44.	NUT	54016			

NOT SHOWN ON EXPLODED VIEW

These parts are for older DESCO Air Hats. The transceiver was mounted above the exhaust port in a plastic cup held by a brass ring. Two sizes of speaker were offered but the larger may not fit on very old Air Hats due to the speaker ring location. Parts with * indicate parts for the four wire retrofit offered for older Air Hats.

COMMUNICATIONS

	RETAINING SCREW	54009
57X	SPEAKER WITH CLIPS	61204
	TELEPHONE CUP	61209
	*4 WIRE COMM ELBOW	61214
	*BULKHEAD FITTING	61215
	*4 WIRE PIGTAIL	61216

MISCELLANEOUS

14X	VALVE HANDLE (CAST)	61133
14X	VALVE HANDLE (LARGE)	61133N



SUB-ASSEMBLIES

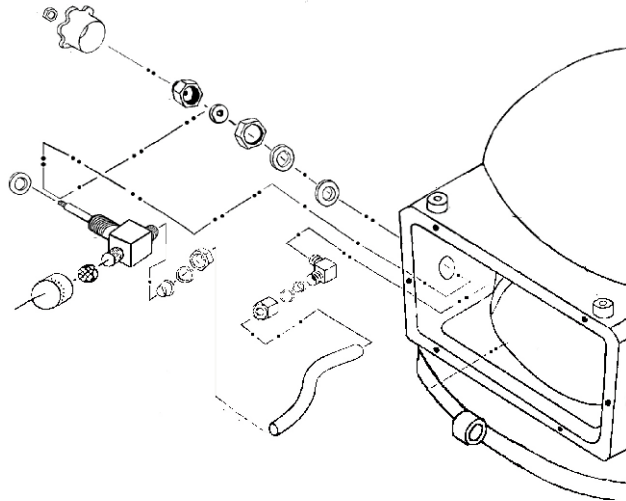
Installations & Servicing

Section

1. Installing the Air Train
2. Assembling the Non-Return Valve
3. Assembling the Double Exhaust Valve
4. Servicing the Air Control Valve

DESCO Air Hat Air Train Installation Instructions

The DESCO Air Hat Air Train consists of the inside air elbow, copper tube, air control valve, and air diffuser/muffler.



Installation:

Air Diffuser/muffler;

The Air Diffuser/muffler is loosely packed with Lambswool. It is pressed (using arbor press) or screwed onto the outlet of the Air Control Valve with the holes faced 180 degrees away from the valve stem.

Inside elbow;

Thread the inside elbow into the outside elbow 3-4 turns. It should screw in with little resistance. Remove the inlet compression nut and ferrules in preparation for installing the copper tube.

Air Control Valve;

The cap, spacer, retaining nut, Brass washer, and two Lead washers are removed from the valve. Place some tape on the valve stem to prevent the packing rings from falling off the stem.

Place one lead washer on the valve body and insert into the helmet snout. Place the second Lead washer, Brass washer, and retaining nut on the valve. Leave the assembly loose for the next assembly step.

Copper Tube;

To install the copper tube place the end with the longer straight length into the elbow, then line the other end up with but outside of the valve inlet. Check the tube length. If it is too long remove equal amounts from each end, and when the tube is the correct length deburr both ends.

The tube should have a small amount of end play when installed in the assembly before all is secured.

Install the nuts, thin ferrules, then thick ferrules with the Stainless Steel ones to the valve, and the brass ones to the elbow. The tapers on the ferrules should point to the tube ends.

DESCO Air Hat Air Train Installation Instructions continued.

Final Assembly;

Remove the copper tube and inside elbow. Using two part epoxy cement the inside elbow into the helmet. The epoxy should be the 10 – 15 minute type to allow time for reassembly. Make sure no epoxy covers the end of the valve or the opening in the helmet. A method of assuring there is no epoxy blocking the opening is to blow compressed air into the double elbow from the outside before the copper tube is reinstalled. Reinstall the copper tube and hand tighten all joints. If the copper tube is in contact with the helmet shell place a piece of cardboard box under the tube as a spacer. Allow the epoxy to completely set.

Remove the cardboard spacer from under the copper tube (if used).

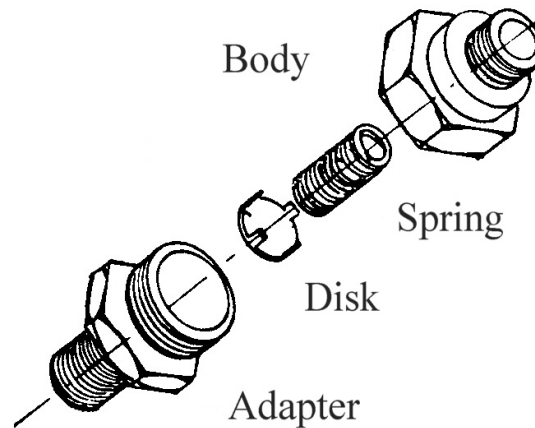
Tighten all connections starting with the air control valve retaining nut. The copper tube and inside elbow can force the air control valve to cock if tightened first. It is important to align the air control valve with the snout to insure the valve handle will not hit the snout.

Install the spacer and cap on the Air Control Valve stem.

After the Non-Return Valves are installed on the outside elbow the assembly can be pressure tested by attaching a 100psi air source to the helmet. With the ACV closed use dish soap and water solution to check each joint for leakage.

ASSEMBLY of the DESCO Non-Return Valve

The Non-Return Valve on the DESCO Air Hat is the same part as is used on the DESCO Jack Browne Mask. This unit has been in use in excess of 50 years and has proven to be reliable.



Assembly of the Non-Return Valve is straight forward. It consists of four parts, the body, disk, spring, and adapter. There are two versions of the adapter. The supply Non-Return Valve has an adapter which will accept a 9/16-18 Oxygen fitting for the supply umbilical hose. A second adapter for a Bailout whip has its inlet drilled to accept a SCUBA whip. It is stamped with a "B".

All parts should be clean and free of defects.

To install the Non-Return Disk bend one tab out slightly to allow the spring to seat against the bottom of the disk. Bend the tab back to its original position.

Insert the disk and spring into the body.

Apply pipe thread compound to the threads on the body and assemble the parts.

Test the Non-Return Valve for leaks.

DESCO Air Hat Double Exhaust Assembly Instructions

The DESCO Air Hat Double Exhaust Valve consists of two flapper chambers. The upper flapper resistance is adjustable, while the lower flapper resistance is fixed. Tension on the upper flapper is controlled by a knurled cap on the top of the exhaust valve which alters spring tension on the plunger.

Assembly:

Top section;

Screw the cap onto the exhaust cover completely. Check for roughness or catching in the threads when screwing the cap on. Unscrew the cap from the top section and clean the threads of any plating which may have flaked off.

Thread the cap onto the top section $\frac{1}{4}$ turn. Place the spring over the plunger and insert the plunger into the top section and cap assembly so the threaded stud protrudes from the cap. Install the hex nut on the threaded stud to hand tight. Back the cap slightly to wedge the nut in position.

Remove the excess threaded stud above the hex nut. Using a center punch put three dimples in the end of the stud to prevent the hex nut from coming off. Make sure the relief hole in the center of the stud is open. The relief hole prevents a vacuum from forming between the flapper and plunger.

Screw the cap down fully to make sure the spring will not catch between the top section and the cap. If the cap does not screw down fully the spring is shifted to one side and is pinching between the cap and top section. Run the cap up and lightly tap the side of the top section on a table or bench top to reposition the spring.

Center Section;

Screw the 10-32 Pan Head screw into the center section about $\frac{1}{3}$ of the way in.

Place the flapper disk onto the screw head. Turn the flapper disk down until it sits evenly on the center section. Turn it flapper disk in an additional $\frac{1}{8}$ turn to put tension on it.

Turn the assembly over and install the star lock washer and flapper guard. Tighten the flapper guard using needle nose pliers in the relief holes.

The top and center sections can now be assembled using two 6-32 Stainless Steel Pan Head screws.

DESCO Air Hat Double Exhaust Assembly Instructions continued.

Base Section;

Screw the 10-32 Pan Head screw into the center section about 1/3 of the way in. If you hold the locking nut on the underside of the base and feed the screw into it as you install it the assembly is easier.

Turn the flapper disk down until it sits evenly on the center section. Turn it flapper disk in an additional 1/8 turn to put tension on it. Tighten the lock nut using a nut driver being careful not to over tighten and damage the exhaust spider.

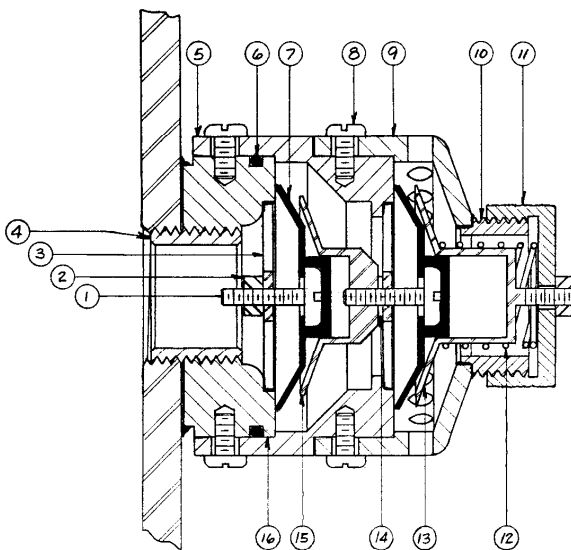
Install the o-ring in the groove after checking the o-ring and the groove for dirt or damage.

The double exhaust assembly can now be installed. Silicone spray on the o-ring and interior surface of the double exhaust will aid in installation.

Before proceeding check the exhaust center section screw holes for burrs which might cut or nick the o-ring. Make sure the o-ring groove in the base is clean and undamaged.

Set the double exhaust assembly on the base squarely. Apply even down pressure to slip it over the o-ring. Slightly rocking the exhaust assembly will help in installing it. Never twist the exhaust assembly as this will damage the o-ring. Watch the screw holes for the o-ring bulging into them. If you force the exhaust assembly down with the o-ring protruding into the screw hole you will nick or cut the o-ring. The end of a drill bit or other item with a similar diameter to the screw hole and flat face can be used to press the o-ring into the groove allowing the exhaust valve to pass.

Install the two 6-32 Stainless Steel Pan Head retaining screws to complete the assembly.

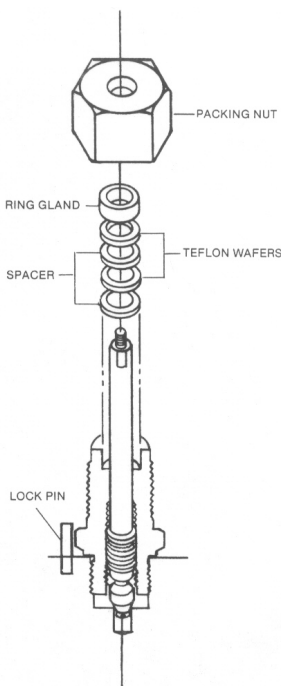


ITEM	QTY.	NAME	MAT.	PART NO.	REMARKS
1	2	SET SCREW		53037	
2	2	NUT 10-32		54016	
3	2	SPIDER		52022	SOLDER TO 5116
4	1	BASE STUD		60232A	
5	1	CENTER SECTION		60233	
6	1	O-RING	NEO.	60234	
7	2	FLAPPER DISC	NEO.	56026	
8	4	SET SCREW 6-32	*7/16"	60235	1/4" LONG
9	1	TOP SECTION		60236	
10	1	EXTENSION		53143	SOLDER TO 9
11	1	KNURLED CAP		53028	
12	1	SPRING		57029	
13	1	PLUNGER		5302A	
14	1	STAR WASHER		60237	
15	1	FLAPPER GUARD		60238B	
16	1	BASE		60239	

Servicing the Air Control Valve

The DESCO Air Hat uses a Hoke Incorporated 2100 Series Needle Valve. This valve is rated to a maximum 6000 psi. The stem is sealed with a stack of alternating Teflon® wafers and Stainless Steel spacers. Replacement of the packing is simple and can be done in the field. All parts should be inspected for wear and damage. The packing can be compressed over time and it may show between the ring gland and stem and/or bonnet wall. Packing in this condition should be replaced. The other valve part that needs frequent attention is the valve stem. The valve handle and stem are vulnerable to being damaged due to the exposed position of the handle. If the valve stem is bent the handle will have a noticeable wobble. A bent valve stem should be replaced immediately.

To Replace Packing



DISASSEMBLY

1. Unscrew hex nut from stem and remove handle.
2. Unscrew packing nut from housing and extract ring gland and packing (wafers & spacers).

Note:

It may be necessary to carefully pry parts loose from housing.

3. Thoroughly clean packing sealing surfaces (stem and housing) with acetone.

REASSEMBLY

1. Replace packing as illustrated in reverse order of disassembly. Note that the ring is the thicker washer and is assembled last.
2. With packing fully inserted in housing, replace packing nut and handle.
8. With valve in open position, secure handle with self locking hex nut.
9. With valve in closed position, tighten packing nut until snug.

Valve Stem Replacement

1. Remove the air control valve from the helmet.
2. Follow the disassembly instructions for the packing above.
3. Remove the locking roll pin from the body.
4. Unscrew the bonnet from the body.
5. Inspect the body and seat for damage and clean parts.
6. Remove the old stem from the bonnet and inspect and clean the bonnet.
7. Install the new stem in the bonnet running it in completely. Pay attention to the “feel” of the thread as you turn the stem in. If there is any roughness or stoppage locate and correct the problem before you continue assembly.
8. Thread the bonnet into the body and tighten down (55-65 ft. lbs.)
9. Replace the locking roll pin in the body.

The air control valve is held in the helmet by a panel nut. This nut is Nickel coated Brass. The threads can be damaged by over tightening.



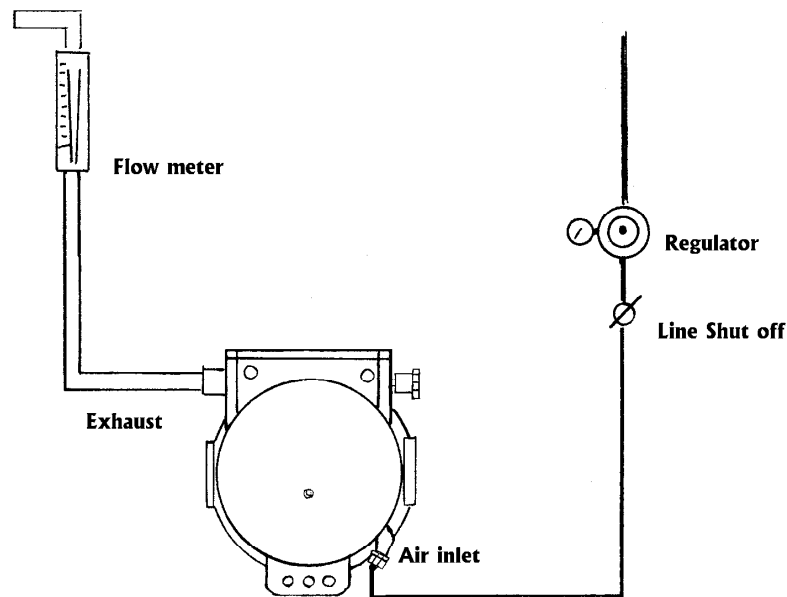
TESTING

Flow testing the Air Hat
Leak testing the Non-Return Valve

Flow testing the DESCO Air Hat

The DESCO Air Hat should be ventilated with a minimum of 6 cfm @ 100 psi over bottom pressure. DESCO tests each new Air Hat for flow through the delivery air train, excluding the exhaust valve. This insures proper flow through the Non-Return valve, air elbow, copper tube, air control valve, and air diffuser.

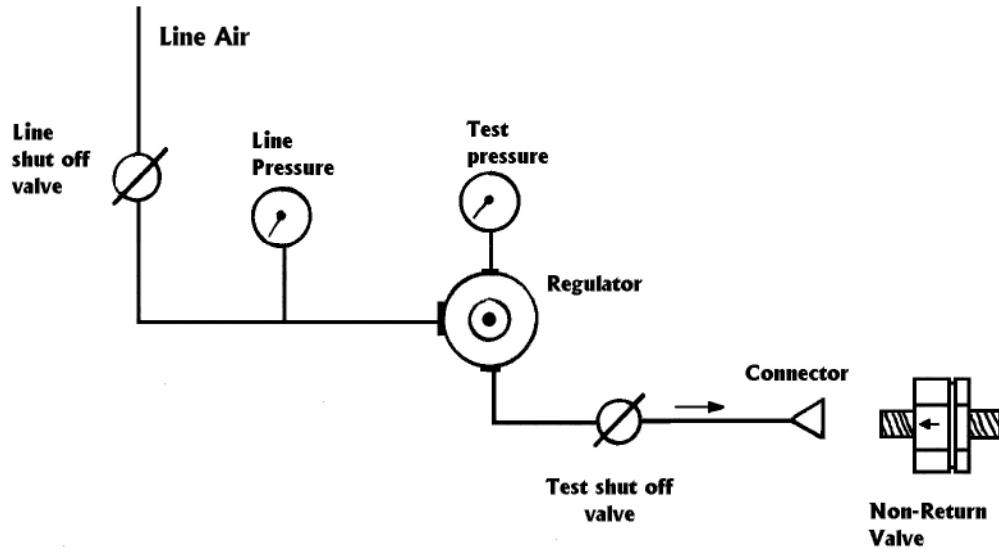
The Air Hat is connected to the test station with a supply delivery set at 100 psi during free flow. The neck ring is sealed with a special modified insert ring. The outlet is connected with a special adapter to the exhaust valve base. No parts are installed on the exhaust base other than the O-ring. The outlet feeds via 1" I.D. smooth wall hose to a flow meter.



The minimum acceptable flow rate for a new Air Hat is 12 cfm. The average cfm reading for new Air Hats has fallen between 15– 18 cfm. The most common fault for not reaching 12 cfm is over packing the air diffuser with Lambswool. Any failure to reach 12 cfm should be investigated.

Leak testing of DESCO Non-Return Valve

The Non-Return Valve on the DESCO Air Hat is the same part as is used on the DESCO Jack Browne Mask. This unit has been in use in excess of 50 years and has proven to be reliable. New Non-Return Valves are tested in the factory for leak back. The diagram below illustrates the test station and the procedure.



The connector is $\frac{1}{4}$ " NPT. The outlet side of the Non-Return Valve is screwed into the connector. Air pressure (15psi) is applied to the Non-Return Valve and it is submerged in water. Leak back will appear as bubbles coming out of the inlet. If leakage is detected the Non-Return Valve must be disassembled and the seat, disk, and spring checked. The joint where the two Non-Return Valve halves meet should also be checked during testing. The Non-Return Valve should only be reassembled and installed using pipe thread compound. Teflon® tape should never be used in the air supply train.