

CDX5

(BALANCED DIAPHRAGM)

SERVICE PROCEDURE

This Product Service Procedure conveys a list of components and service procedures that reflect the CDX5 as it was configured at the time of this writing (1/28/03).

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CDX5 BALANCED DIAPHRAGM FIRST STAGE

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GENERAL PROCEDURES

REFER TO ..... DOC. 12-2202

SPECIFICATIONS

Torques

P/N 6564	Yoke Retainer	23 to 25 ft-lbs
P/N 4544-200	DIN Filter Retainer*	16 to 18 ft-lbs
P/N 6740	DIN Filter Housing*	16 to 18 ft-lbs
	(*Refer to Supplemental Information on page 14.)	
P/N 3462	HP Port Plug	35 to 40 in-lbs
P/N 3463	LP Port Plug	35 to 40 in-lbs
P/N 6678	Receiver	80 to 100 in-lbs
P/N 6746	End Cap	220 in-lbs
P/N 6745	Environ. End Cap	220 in-lbs
HP Hose into First Stage Body		35 to 40 in-lbs
LP Hose into First Stage Body		35 to 40 in-lbs
Inflator Hose into First Stage Body		35 to 40 in-lbs

Intermediate Pressure

Preferred	138 to 142 psi
Acceptable	137 to 143 psi

TOOLS REQUIRED

Standard Tools

Inch Pounds Torque Wrench
Foot Pounds Torque Wrench
5/32" Hex Key Socket
1/4" Hex Key Socket
1/2" Open End Wrench
9/16" Open End Wrench
5/8" Open End Wrench
13/16" Open End Wrench
1" Open End Wrench
1/4" Hex Key (for DIN model)
5/16" Hex Key
3/8" Drive Socket
Soft Jawed Vise

Specialty Tools

P/N 40.2302 Christo-Lube MCG111 (2 oz)
P/N 40.6536.1 DX Cone Tool
P/N 40.6671.99 End Cap Tool Kit
P/N 40.9311 Filter Circlip Pliers
P/N 40.9315 Intermediate Press. Gauge
P/N 40.9520 O-ring Tool Kit

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TROUBLE SHOOTING

SYMPTOM	POSSIBLE CAUSE	TREATMENT
* **Restricted airflow and inhalation resistance through complete system.**	1. Cylinder valve not completely opened. 2. Cylinder valve requires service. 3. CONE FILTER (4,12) is contaminated.	1. Open valve completely. 2. Connect Regulator to a different Cylinder. 3. Replace with new and perform a complete service.
* **Air leakage detected from beneath the ADJUSTMENT CUP (38), inside the END CAP (35,40).**		
* **Air leakage detected from RECEIVER (22).**		
* **Insufficient intermediate pressure.**		
* **Excessive intermediate pressure/Intermediate pressure creeps.**	1. First Stage improperly adjusted. 2. HP SEAT (26) is damaged or worn. 3. HP SEAT O-RING (25) is damaged or worn. 4. Seating surface of HP SEAT (26), or RECEIVER (22), or HP CONE	

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DISASSEMBLY PROCEDURE

NOTE: Be sure to check and record the intermediate pressure and perform the Leak Detection Test outlined in the Initial Inspection Procedures (Doc. 12-2202) prior to disassembling the Regulator. Review the Troubleshooting Section on page 3 to gain a better idea of which internal parts may be worn, and to better advise your customer of the service that is needed.

1. Before disassembling the First Stage, remove the low pressure Hoses with a 9/16" open end wrench, the high pressure Hose(s) with a 5/8" open end wrench, and the low pressure inflator hose with either a 9/16" or 1/2" open end wrench. Remove all remaining PORT PLUGS (18, 20) with a 5/32" hex key.

2. Remove and inspect the O-RING(S) now visible on all these items for any signs of decay. If found, discard the O-RING(S).

CAUTION: It is important to remove the RECEIVER (22) end components first to avoid damage of the HP Seat Cone located inside the BODY (30).

3. Using 1/4" hex key, turn the RECEIVER (22) in a counter clockwise direction to remove it from the BODY (30). (Fig. 1)

4. Remove the HP SEAT (26) and TRANSFER PIN (27) from the RECEIVER (22). Discard the HP SEAT, regardless of it's condition, and DO NOT attempt to reuse it.

5. Remove the RETAINING SPRING (24). Using a magnifier, closely examine the SPRING for any signs of corrosion, cracks, or other damage. Discard if found.

6. Using care not to scratch or damage the RECEIVER (22), remove the HP SEAT O-RING (25) from inside the RECEIVER (Fig. 2). Discard, regardless of condition, and DO NOT attempt to reuse.

7. Remove and inspect the RECEIVER O-RING (23) for any signs of decay. Discard if found.

8. Carefully insert the longer/tapered end of a DX Cone Tool directly into the HP CONE (29) which is held inside the BODY (30). Pull the HP CONE straight out of the BODY (Fig. 3).

9. Remove and discard the HP CONE O-RING (28), regardless of condition, and DO NOT attempt to reuse it.

NOTE: Perform step 10 if an Environmental Kit has been installed. Perform step 11 only if an Environmental Kit has NOT been installed

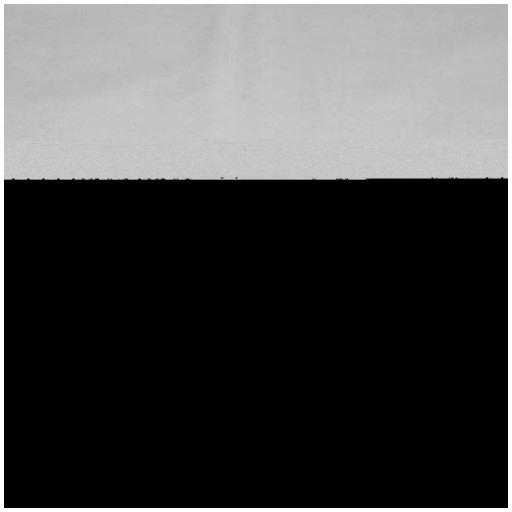


Fig. 1

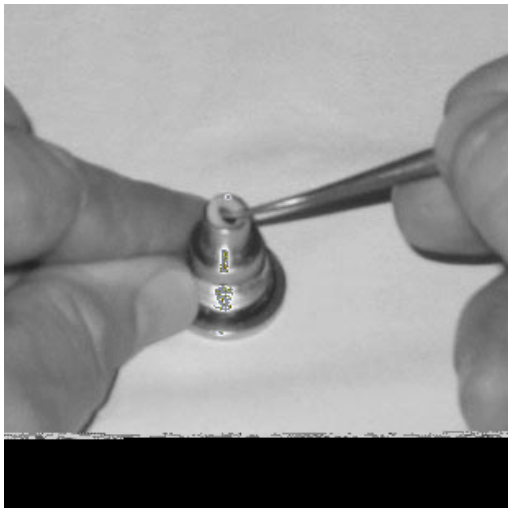


Fig. 2

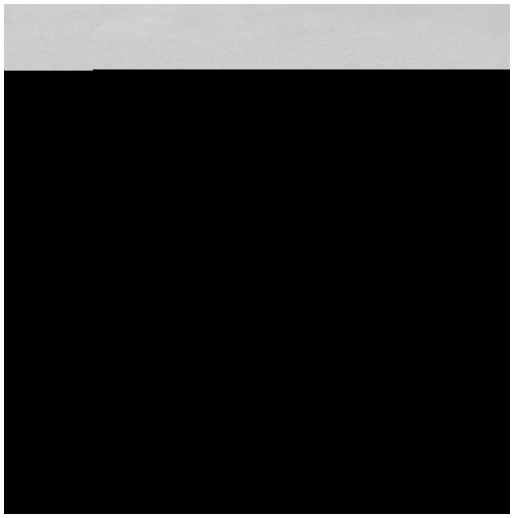


Fig. 3

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10. ENVIRONMENTAL KIT DISASSEMBLY:

    A. Turn the ENVIRONMENTAL CAP (43) counter clockwise by hand to loosen and remove.

    B. Gently peel the Lip of the ENVIRONMENTAL DIAPHRAGM (42) away from the Rim of the ENVIRONMENTAL END CAP (40) and lift it out to remove. Examine the condition of the ENVIRONMENTAL DIAPHRAGM, checking for any signs of wear, distortion, corrosion, or perforation. Discard if found.

    C. Turn the First Stage Diaphragm side down and remove the TRANSFER PISTON (41). Check for any signs of wear, distortion, or corrosion. Discard if found.

11. Lift the END CAP BOOT (39) away from the END CAP (35) using your fingers. DO NOT use tools.

12. Using a 5/16" hex key, turn the ADJUSTMENT CUP (38), counter clockwise to remove it (Fig. 4).

13. Remove the SPRING WASHER (37) and DIAPHRAGM SPRING (36). Inspect the SPRING WASHER for any signs of wear or distortion. Discard if found.

14. Using a magnifier, inspect the DIAPHRAGM SPRING (36) for any signs of corrosion. Discard if found and DO NOT attempt to reuse.

15. Secure the First Stage in a soft-jawed or well padded vise and apply a 3/8" socket wrench with a CDx Hook/Wrench Link (from End Cap Tool) to the END CAP (35,40). Turn the END CAP counter clockwise to remove it from the BODY (30) (Fig. 5). Lift out the DIAPHRAGM WASHER (33) and DIAPHRAGM PLATE (34), and inspect for signs of wear or distortion. Discard if found.

⚠ **CAUTION: Tighten the vise only as needed to hold the First Stage secure, and DO NOT overtighten. Doing so will result in permanent damage, rendering it inoperable.**

16. Using a 5/32" hex key, install HP PORT PLUGS (18) into the open HP Ports, and LP PORT PLUGS (20) into all but one of the LP Ports. Check to ensure that 1 of the 4 LP Ports is open, and all other Ports are sealed. Tighten the YOKE SCREW (1) to ensure that the PROTECTOR CAP (16) is securely sealed over the YOKE RETAINER (6). For DIN models, place the PROTECTOR CAP securely over the DIN FILTER RETAINER (9) and DIN COUPLER WHEEL (11).

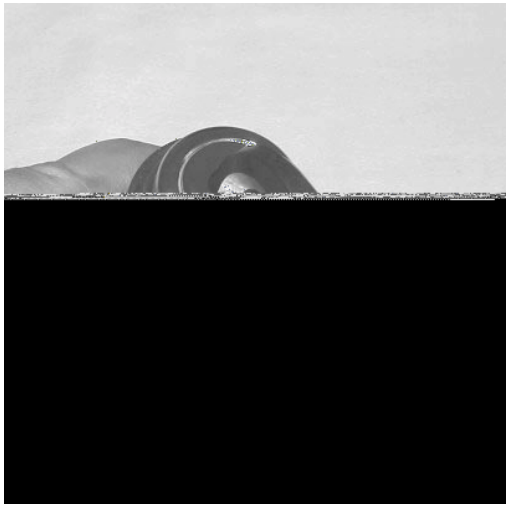


Fig. 4

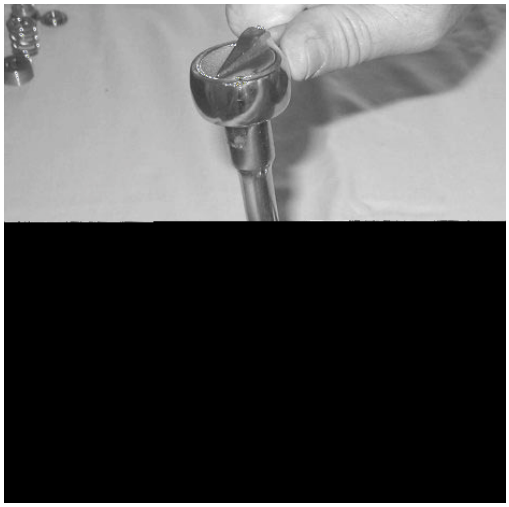


Fig. 5

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17. Remove the DIAPHRAGM (32) from the BODY (30) by covering the Receiver opening in the BODY with the palm of your hand and directing short blasts of low pressure air through the open LP Port (Fig. 6). Lift the DIAPHRAGM out carefully.

⚠ **CAUTION: DO NOT attempt to remove the DIAPHRAGM (32) with the use of a metallic instrument. Doing so will seriously damage the brass Seating Surface of the BODY (30).**

18. Remove the BUTTON (31) and inspect it for any signs of wear or distortion. Discard if found.

19. Discard the DIAPHRAGM (32), regardless of its condition, and DO NOT attempt to reuse it.

20. Remove all PORT PLUGS (18, 20) with a 5/32" hex key. Remove and inspect the PORT PLUG O-RINGS (19, 21) for any signs of decay. Discard if found.

⚠ **NOTE: For units received with Yoke Connectors perform step 21Y, for units received with DIN Connectors perform step 21D.**

21Y. YOKE CONNECTOR DISASSEMBLY:

A. Remove the YOKE SCREW (1) from the YOKE (2)

B. Secure the BODY (30) in a soft jawed or well padded vise and apply a thin wall, or modified, 1" open end wrench to the YOKE RETAINER (6). Using firm steady force, turn the YOKE RETAINER counter clockwise to remove it. DO NOT use impact.

⚠ **CAUTION: It is important that the wrench is properly seated over the entire hex portion of the YOKE RETAINER to prevent any damage to the part (Fig. 7).**

⚠ **CAUTION: Tighten the vise only as needed to hold the First Stage secure, and DO NOT overtighten. Doing so will result in permanent damage, rendering it inoperable.**

C. After removing the YOKE RETAINER (6), remove the YOKE (2), PROTECTOR CAP (8), and SADDLE (17) and set these aside. Remove and discard the YOKE RETAINER O-RING (7), regardless of condition, and DO NOT attempt to reuse.

D. Using Internal Circlip Pliers, remove the RETAINING CLIP (3) that retains the CONE FILTER (4). The CONE FILTER should drop out freely into your hand. Discard, and DO NOT attempt to reuse. Remove and discard the FILTER O-RING (5), regardless of condition and DO NOT attempt to reuse it.

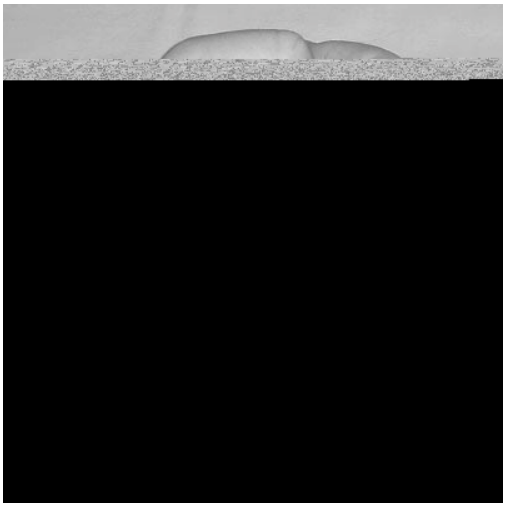


Fig. 6



Fig. 7

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21D. DIN CONNECTOR DISASSEMBLY:

A. Secure the First Stage in a soft-jawed or well padded vise, with the DIN Connector facing up. Apply a 1/4" hex key to the FILTER RETAINER (9) and loosen* in a counter clockwise direction to remove (Fig. 8).

*See Supplemental Information on page 14.



Fig. 8

⚠ **CAUTION: Tighten the vise only as needed to hold the First Stage secure, and DO NOT overtighten. Doing so will result in permanent damage, rendering it inoperable.**

B. Remove the DIN FACE O-RING (8) and RETAINER O-RING (10). Discard and DO NOT attempt to reuse them.

C. Lift the COUPLER WHEEL (11) straight off the DIN FILTER HOUSING (14) and set aside. Remove the PROTECTOR CAP (16) and set aside.

D. Apply a 13/16" open end wrench to the flange at the Base of the DIN FILTER HOUSING (Fig. 9). Using firm, steady force, loosen in a counter clockwise direction to remove. DO NOT use impact to loosen.

*Refer to Supplemental Information on page 14.

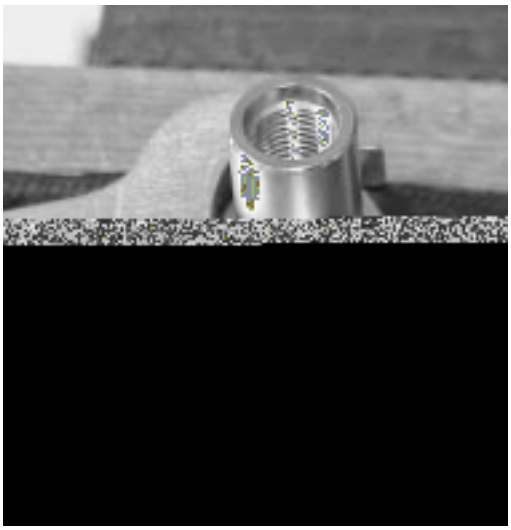


Fig. 9

⚠ **CAUTION: It is important that the wrench is deep enough to seat entirely over the Flange to avoid any damage to the Seating Surface.**

E. After removing the DIN FILTER HOUSING (14) from the BODY (30) and removing the SADDLE (17), turn the BODY over and tap it lightly to drop out the DIN CONE FILTER (12). Discard the FILTER and DO NOT attempt to reuse it.

F. Remove and inspect the FILTER O-RING (13) for any signs of decay. Discard if found. Remove the FILTER HOUSING O-RING (15). Discard and DO NOT attempt to reuse it.

G. Inspect the SADDLE (17), checking for any signs of damage or distortion. Discard if found.

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REASSEMBLY PROCEDURE

NOTE: Prior to Reassembly, it is necessary to inspect all parts, both new and those that are being reused. Check to ensure that O-rings are clean and supple, and that every part and component has been thoroughly cleaned.

WARNING: Use only genuine Oceanic parts, subassemblies, and components whenever assembling Oceanic products. DO NOT attempt to substitute an Oceanic part with another manufacturer's, regardless of any similarity in shape, size, or appearance. Doing so may render the product unsafe, and could result in serious injury or death of the user.

NOTE: For units received with Yoke Connectors perform step 1Y, for units received with DIN Connectors perform step 1D.

1Y. YOKE CONNECTOR REASSEMBLY:

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1D. DIN Connector Reassembly:

A. Lubricate and install the DIN FILTER HOUSING O-RING (15) into the Groove on the End of the DIN FILTER HOUSING (14).

B. Insert the threaded End of the DIN FILTER HOUSING (14) through the flat Side of the SADDLE (17).

C. Secure the BODY (30) in a soft jawed or well padded vise, with the threaded HP Inlet Bore facing straight up.

⚠ **CAUTION: Tighten the vise only as needed to hold the First Stage secure, and DO NOT overtighten. Doing so will result in permanent damage, rendering it inoperable.**

D. Install the DIN FILTER HOUSING (14) into the BODY (30) so that the Threads seat properly, and hand tighten in a clockwise direction until secure. Using a thin-wall, or modified, 13/16" open end wrench that is properly seated over the entire Seating Surface of the Filter Housing Flange, tighten **to a torque of 16 to 18 ft-lbs**.

E. Lubricate and install the FILTER O-RING (13) into the DIN FILTER HOUSING (14), at the Base of the Filter Cavity. Install the DIN CONE FILTER (12) into the FILTER HOUSING.

F. Install the PROTECTOR CAP (16) and the DIN COUPLER WHEEL (11) down over the Stem of the DIN FILTER HOUSING (14), with the Threaded End facing up.

G. Lubricate and install the DIN FACE O-RING (8) and RETAINER O-RING (10) onto the DIN FILTER RETAINER (9).

H. Insert the Threaded End of the DIN FILTER RETAINER (9) through the DIN COUPLER WHEEL (11) into the DIN FILTER HOUSING (14), and tighten until secure. Apply a 1/4" hex socket and tighten **to a torque* of 16 to 18 ft-lbs.**

*Refer to Supplemental Information on page 14.

2. Using the Button Alignment Tool*, affix the BUTTON (31) directly onto the Center of the DIAPHRAGM (32) (Fig. 14). Ensure that it adheres properly and remove the Tool.

*Refer to Supplemental Information on page 14.

3. Position the DIAPHRAGM (32) with BUTTON (31), directly over the opening of the BODY (30) (Fig. 15). Gently push the Edges of the DIAPHRAGM down inside the Internal Threads of the BODY, one Thread at a time (Fig. 16). Rotate the BODY while doing this, to facilitate an even seating of the DIAPHRAGM. Inspect to ensure it is well seated at the Base of the Threads.

⚠ **CAUTION: DO NOT force the DIAPHRAGM into the BODY in a manner that will damage either the Lip or Surface of the DIAPHRAGM, or the Threads of the BODY. The use of a sharp instrument, such as a screwdriver, is to be strictly avoided.**

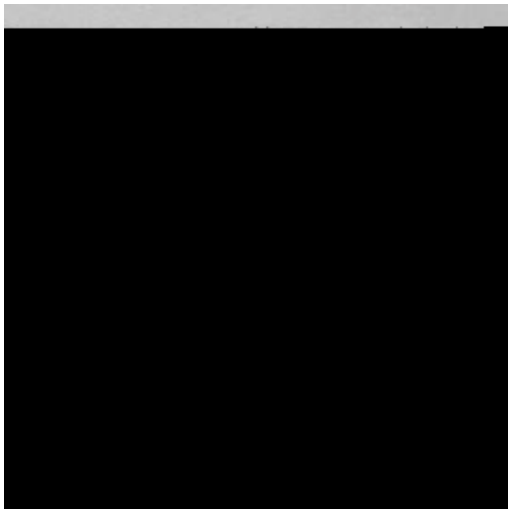


Fig. 14

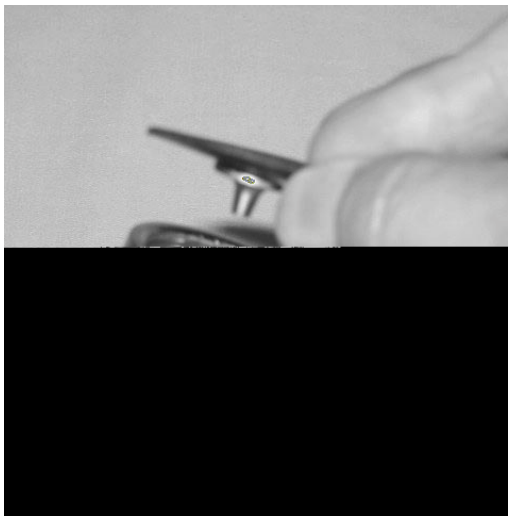


Fig. 15

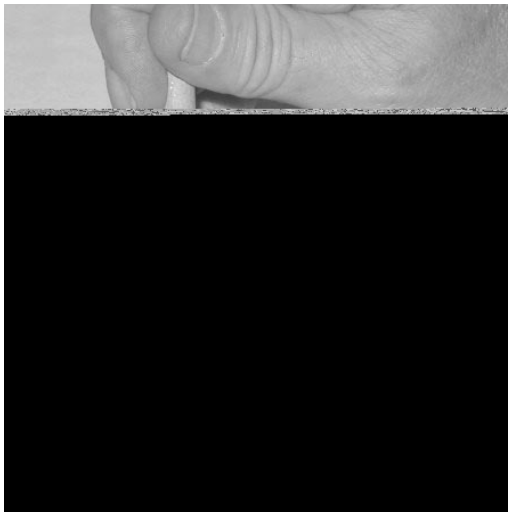


Fig. 16

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4. Place the DIAPHRAGM WASHER (33) into the BODY (30) on top of the DIAPHRAGM (32) with the Collar facing up.

5. Lay the DIAPHRAGM PLATE (34) into the Center of the DIAPHRAGM WASHER (33), with its flat surface against the DIAPHRAGM (32).

6. Thread the END CAP (35,40) into the BODY (30), turning clockwise by hand until secure.

7. Secure the BODY (30) in a soft jawed or well padded vise, and using a 3/8" socket wrench with a CDx Hook/Wrench Link (from End Cap Tool) and a foot-pounds torque wrench, tighten the END CAP (35,40) into the BODY **to a torque of 220 in-lbs** (Fig. 17).

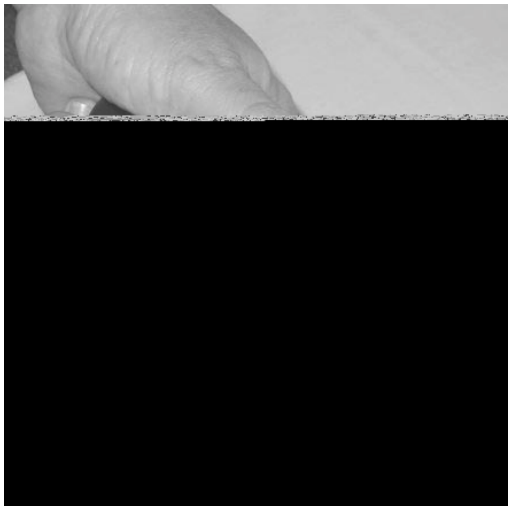


Fig. 17

⚠ **CAUTION: Tighten the vise only as needed to hold the First Stage secure, and DO NOT overtighten. Doing so will result in permanent damage, rendering it inoperable.**

8. Apply a very light film of lubricant (Christo Lube MCG #111) to both Ends of the DIAPHRAGM SPRING (36), and place it on the DIAPHRAGM PLATE (34).

9. Place the SPRING WASHER (37) directly onto the Upper End of the DIAPHRAGM SPRING (36) and install the ADJUSTMENT CUP (38) into the END CAP (35,40). Using a 5/16" hex key, turn the ADJUSTMENT CUP clockwise until only 2 Threads show.

10. Lubricate and install the HP CONE O-RING (28) onto the HP CONE (29), and place the Sealing Edge of the HP CONE down onto the smaller end of a clean DX Cone Tool. Use care not to damage the seating surface of the HP CONE as this is done. Lower the large opening of the Tool sleeve over the HP CONE until the Edge of the Narrow Opening is even with the Base of the HP CONE.

11. Guide the HP CONE/Tool Assembly into the High Pressure Chamber of the BODY (30), taking care to align the HP CONE (29) with the Recess in the High Pressure Chamber properly (Fig. 18). Carefully press the HP CONE completely into place and withdraw the Tool, pulling it straight out.

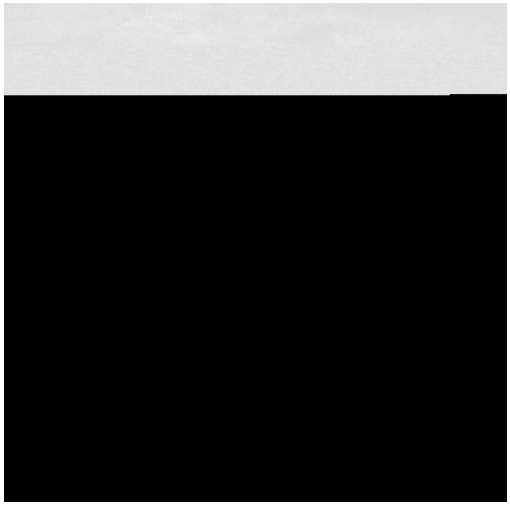


Fig. 18

12. Lightly lubricate and install the RECEIVER O-RING (23) onto the RECEIVER (22) and the HP SEAT O-RING (25) into the Inner Bore of the RECEIVER. Lightly lubricate the threads of the RECEIVER.

13. Apply a very light film of lubricant to both ends of the RETAINING SPRING (24) and the lower 1/4" of the HP SEAT (26) Shaft. Install the RETAINING SPRING onto the end of the RECEIVER (22).

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14. Carefully guide the shaft of the HP SEAT (26) so that it passes through the RETAINING SPRING (24) and into the HP SEAT O-RING (25) in the Inner Bore of the RECEIVER (22). (Fig. 19)

15. Carefully insert the TRANSFER PIN (27) into the Opening of the HP SEAT (26).

16. While looking into the BODY (30) so that you can see the HP CONE (29), insert the HP SEAT/RECEIVER Assembly directly into the Center of the Receiver Opening in the BODY and carefully guide the TRANSFER PIN (27) through the Center of the HP CONE and into the BUTTON (31) (Fig. 20). Use caution to avoid touching the HP CONE as the TRANSFER PIN passes through the Center of it.

17. While holding the BODY (30) secure, turn the RECEIVER (22) clockwise to engage the Threads and using a 1/4" hex key, tighten the RECEIVER into the BODY **to a torque of 80 to 100 in-lbs**.

18. Lubricate and install PORT PLUG O-RINGS (19, 21) onto the PORT PLUGS (18, 20). While holding the BODY (30) secure, install the PORT PLUGS into the BODY, tightening clockwise with a 5/32" hex key **to a torque of 35 to 40 in-lbs**.

19. Lubricate and install all Hose O-rings onto Hoses and install the Hoses into the BODY (30). While holding the BODY secure, tighten the LP Second Stage Hose(s) clockwise with a 9/16" open end wrench, the HP Hose(s) with a 5/8" open end wrench, and the LP Inflator Hose(s) with either a 9/16" or 1/2" open end wrench, **to a torque of 35 to 40 in-lbs**.

△ **NOTE: For optimum performance, it is important to connect the Primary Second Stage to the LP Port identified by the letter R molded onto the BODY (30).**

⚠ **CAUTION: Be certain NOT to install any Low Pressure Hose into a High Pressure Port using an adaptor.**

△ **NOTE: Perform step 20 only if an Environmental Kit has NOT been installed.**

20. Ensuring proper alignment and secure placement, install the END CAP BOOT (39) onto the END CAP (35).

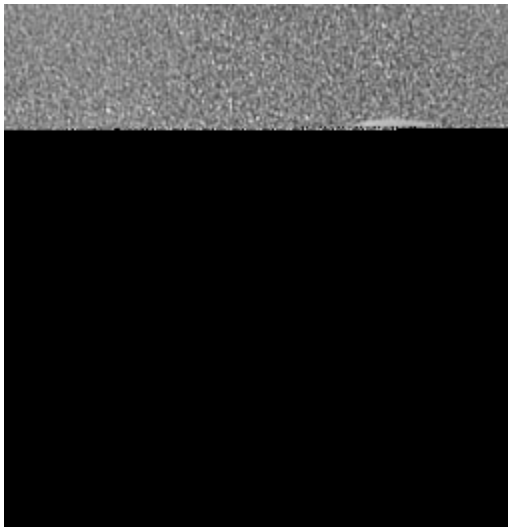


Fig. 19



Fig. 20

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FINAL ADJUSTMENT

1. Connect a recently calibrated Intermediate Pressure Test Gauge to a Low Pressure Hose, and connect the First Stage with Second Stage and Low Pressure Test Gauge to a pure breathing gas source of 3000 PSI (206 BAR). Slowly open the supply valve to pressurize the Regulator, and purge the Second Stage several times.

2. Adjust the intermediate pressure, if necessary, to read 138 to 142 PSI by turning the ADJUSTMENT CUP (38) clockwise to increase the pressure or counter clockwise to decrease it (Fig. 21).

△ **NOTE: Turn the ADJUSTMENT CUP no more than 1/8 of a turn at a time, pausing to purge the Second Stage several times to gain an accurate reading of the intermediate pressure before adjusting further.**

△ **NOTE: Ensure that the intermediate pressure holds stable at 138 to 142 PSI, and does not creep or fluctuate after the Second Stage has been purged several times. If creeping is detected, refer to the Troubleshooting Section on page 3 to determine possible cause and treatment.**

△ **NOTE: Perform the following steps only if an Environmental Kit is being installed.**

ENVIRONMENTAL KIT REASSEMBLY

1. Insert the TRANSFER PISTON (41) into the ENVIRONMENTAL END CAP (40) (Fig. 22).

2. Turn the air supply off and bleed off intermediate pressure. Insert the ENVIRONMENTAL DIAPHRAGM (42) over the Top of the ENVIRONMENTAL END CAP (40) with the thin Perimeter Seal facing down. Ensure that the Perimeter Seal is seated completely into the circular Groove in the ENVIRONMENTAL END CAP (Fig. 23).

3. Thread the ENVIRONMENTAL CAP (43) onto the ENVIRONMENTAL END CAP (40), being very careful to avoid cross threading, and tighten clockwise by hand until secure. DO NOT use tools to tighten.

4. Turn on the air supply and purge the Second Stage several times, and check once more to ensure proper intermediate pressure of 138 to 142 psi.

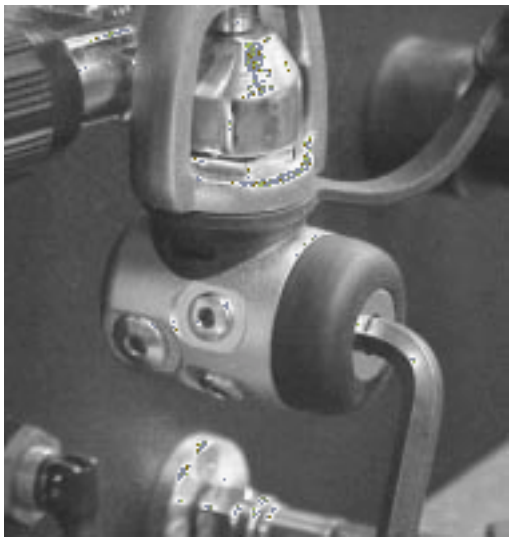


Fig. 21

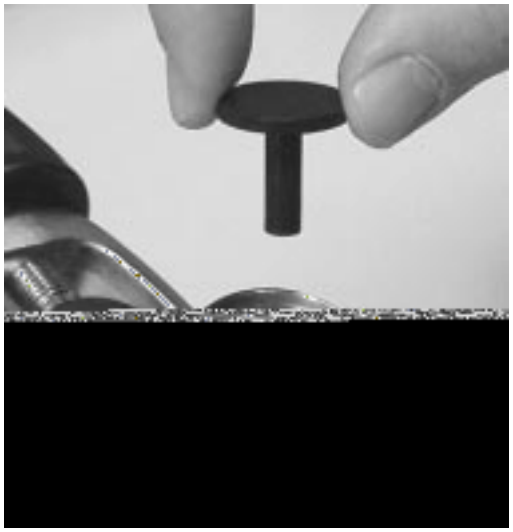


Fig. 22

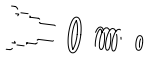


Fig. 23

Doc. 12-2209-r02 (1/28/03)

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CDX5 BALANCED DIAPHRAGM FIRST STAGE



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SUPPLEMENTAL INFORMATION

DIN FITTING

In the event that the complete DIN Fitting comes off the First Stage when the DIN FILTER RETAINER is being removed during Disassembly (step 21D, page 7), it will be necessary to disassemble the Fitting to replace the FILTER (12).

If the DIN FILTER HOUSING (14) has a hex machined into the end opening of the Inner Barrel, hold the HOUSING with a 7/32" hex key and remove the DIN FILTER RETAINER (9) using a 1/4" hex key.

If the DIN FILTER HOUSING (14) does not have a hex machined into the end opening of the Inner Barrel, insert a flat blade screwdriver into the opening to hold the HOUSING and remove the DIN FILTER RETAINER (9) using a 1/4" hex key. If the HOUSING becomes damaged, it must be replaced.

Dia. Part No. 9 - DIN FILTER RETAINER

current p/n 4544.200 (schedule c)
- Must be used with DIN FILTER HOUSING p/n 6740
- Compatible with other old and new parts.
- Tighten to a torque of 16 to 18 ft-lbs.

older p/n 4544.300 (schedule c)
- Must be used with DIN FILTER HOUSING p/n 6565
- Replacement with the new part is not required unless the DIN FILTER HOUSING is replaced with the new part.
- If the DIN FILTER HOUSING has a hex machined into the Inner Barrel, tighten to a torque of 16 to 18 ft-lbs.
- If the DIN FILTER HOUSING does not have a hex machined into the Inner Barrel, tighten to a torque of 120 to 140 in-lbs.

Dia. Part No. 14 - DIN FILTER HOUSING

current p/n 6740 (schedule c)
- Has a hex machined into the end opening of its Inner Barrel.
- Must be used with DIN FILTER RETAINER p/n 4544.200
- Compatible with other old and new parts.

older p/n 6565 (schedule c)
- A mix of configurations exists, some have a hex machined into the end opening of the Inner Barrel and some do not.
- Must be used with DIN FILTER RETAINER p/n 4544.300
- Replacement with the new part is not required unless the DIN FILTER RETAINER is replaced with the new part.

Dia. Part No. 31 (BUTTON) and 32 (DIAPHRAGM)

As described in Reassembly Procedure, step 2 on page 9, the Button Alignment Tool is to be used to affix the BUTTON to the DIAPHRAGM prior to installing them in the Regulator BODY. Refer to the Instructions, Doc. No. 12-2376, provided with the Button Alignment Tool that is enclosed in the Service Parts Kit.

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