CHAPTER 2
OPERATION

2.1 INTRODUCTION.

This chapter contains the following information:
• A description and illustrations of the controls, indicators, and mechanisms of the Self-Contained Breathing Apparatus (SCBA).
• Operational use procedures providing visual inspection, donning, go-on air, go-off air, and doffing procedures. Checklists for these procedures are also provided in Appendix A.
• Air replenishment procedures which include quick-charging and cylinder assembly removal and replacement. Appendix A contains a checklist for these procedures.
• Emergency operation procedures. A corresponding checklist is provided in Appendix A.
• Post-operating procedures.
• Proper stowage procedures.

2.2 CONTROLS, INDICATORS, AND MECHANISMS.

The controls and indicators for the SCBA compressor block are described in Table 2-1 and illustrated in Figure 2-1. The following information is provided for each item illustrated:
• Figure Reference Number (Ref. No.) - identifies corresponding callout
• Nomenclature - item name
• Function - provides brief description of function of item
• Normal Operating Condition - position of item during operational use.
### Table 2-1. SCBA Major Component Controls, Indicators, and Mechanisms.

<table>
<thead>
<tr>
<th>Figure 2-1 Ref. No.</th>
<th>Nomenclature</th>
<th>Function Description</th>
<th>Normal Operating Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cylinder Band Clamp</td>
<td>Secures dome end of cylinder assembly to backframe</td>
<td>N/A</td>
</tr>
<tr>
<td>2</td>
<td>Cylinder Adjustment Handwheel</td>
<td>Allows for tightening and loosening of cylinder band to accommodate variations in cylinder size</td>
<td>N/A</td>
</tr>
<tr>
<td>3</td>
<td>Over-Center Latch Mechanism</td>
<td>Secures the cylinder band clamp in a locked position</td>
<td>Locked</td>
</tr>
<tr>
<td>4</td>
<td>Shoulder Strap Spring-Action Buckles</td>
<td>Secures shoulder straps to side straps once tightened to fit</td>
<td>Secured</td>
</tr>
<tr>
<td>5</td>
<td>Quick-Release Buckle</td>
<td>Secures ends of waist adjustment strap together</td>
<td>Locked</td>
</tr>
<tr>
<td>6</td>
<td>Waist Adjustment Straps</td>
<td>Adjusts to allow even distribution of SCBA weight on hips</td>
<td>Tightened</td>
</tr>
<tr>
<td>7</td>
<td>Side Straps</td>
<td>Attaches the waist adjustment straps and shoulder straps together and adjusts length to provide a comfortable fit</td>
<td>Tightened</td>
</tr>
<tr>
<td>8</td>
<td>Waist Strap Spring-Action Buckles</td>
<td>Secures waist adjustment straps once tightened to fit</td>
<td>Secured</td>
</tr>
<tr>
<td>9</td>
<td>Locking Tab</td>
<td>Secures hanger plate of cylinder assembly to backframe</td>
<td>Engaged</td>
</tr>
<tr>
<td>10</td>
<td>Backframe Hook</td>
<td>Engages cylinder assembly hanger plate</td>
<td>N/A</td>
</tr>
<tr>
<td>11</td>
<td>Hanger Plate</td>
<td>Secures the neck of the cylinder assembly to the backframe when engaged with the backframe hook</td>
<td>Engaged</td>
</tr>
<tr>
<td>12</td>
<td>Burst Disc</td>
<td>Relieves cylinder pressure when over 7,200 psig</td>
<td>Not ruptured</td>
</tr>
<tr>
<td>13</td>
<td>Handwheel</td>
<td>Starts and stops cylinder airflow</td>
<td>Open</td>
</tr>
<tr>
<td>14</td>
<td>Dual-Reading Pressure Indicator</td>
<td>Provides a continuous reading of cylinder air pressure whether cylinder valve is opened or closed</td>
<td>Continuous reading</td>
</tr>
<tr>
<td>15</td>
<td>Cylinder Valve</td>
<td>Regulate release of breathable air</td>
<td>N/A</td>
</tr>
<tr>
<td>16</td>
<td>Remote Pressure Indicator</td>
<td>Continuously displays cylinder air pressure when the cylinder valve is open</td>
<td>N/A</td>
</tr>
<tr>
<td>17</td>
<td>Bell Alarm</td>
<td>End-of-service-time indicator that activates to warn of low cylinder pressure</td>
<td>Initialized</td>
</tr>
<tr>
<td>18</td>
<td>Air Saver Switch</td>
<td>Prevents rapid loss of air supply when the cylinder valve is open</td>
<td>Released</td>
</tr>
<tr>
<td>19</td>
<td>Heads-up Display (HUD) (if applicable)</td>
<td>Provides a visual monitor of remaining air supply and HUD battery power</td>
<td>Initialized</td>
</tr>
<tr>
<td>20</td>
<td>Vibralert</td>
<td>End-of-service-time indicator that activates to warn of low air supply</td>
<td>Initialized</td>
</tr>
<tr>
<td>21</td>
<td>Latch Mechanism</td>
<td>Locks the mask-mounted regulator onto facepiece</td>
<td>Engaged</td>
</tr>
</tbody>
</table>
Table 2-1. SCBA Major Component Controls, Indicators, and Mechanisms. - Continued.

<table>
<thead>
<tr>
<th>Figure 2-1 Ref. No.</th>
<th>Nomenclature</th>
<th>Function</th>
<th>Normal Operating Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Purge Valve</td>
<td>Bleeds residual air from the SCBA after cylinder valve is closed</td>
<td>Closed</td>
</tr>
<tr>
<td>23</td>
<td>Hand Coupling</td>
<td>Rotates to allow removal of the high-pressure hose assembly or RIC UAC assembly from the cylinder valve</td>
<td>Tightened</td>
</tr>
</tbody>
</table>
Figure 2-1. SCBA Major Component Controls, Indicators, and Mechanisms. (Sheet 1)
Figure 2-1. SCBA Major Component Controls, Indicators, and Mechanisms. (Sheet 2)
2.3 OPERATING PROCEDURES.

Paragraphs 2.3.1 through 2.3.2 address operational use, air replenishment, and emergency operation. Appendix A contains corresponding checklists to be copied and used as needed to ensure procedures are correctly performed. Post-operation and stowage procedures are addressed in paragraph 2.3.3.

2.3.1 Operational Use.

2.3.1.1 Visual Inspection. Regular visual inspection is necessary prior to operation. Prior to each use, a visual inspection must be conducted and the Visual Inspection Checklist (Table A-1) should be completed.

**WARNING**

Damaged cylinder assemblies may suddenly leak or rupture if left charged with compressed air. Failure to inspect for damage and to depressurize damaged cylinder assemblies may result in serious personal injury or death.

If any worn, broken, frayed, or damaged components are found, remove SCBA from service and tag for repair. Failure to identify and remove defective SCBA from service may result in serious personal injury or death.

a. Inspect backframe and harness assembly and facepiece for obvious damage.
b. Visually inspect cylinder assembly for physical damage such as dents, gouges, abrasions, cuts, loose fibers, etc. in accordance with (IAW) inspection procedures in Appendix C.
c. If damage is found, remove component from service and tag for repair. If applicable, depressurize IAW paragraph 1.9.1.
d. Ensure minimum 4,000 psig reading on dual-reading pressure indicator (2, Figure 2-2). If below 4,000 psig, replenish air IAW paragraph 2.3.2.
e. Ensure hanger plate (1, Figure 2-2) is firmly secured by locking tab (2, Figure 2-3) and cylinder band clamp (1) is tightened to properly secure installed cylinder assembly.
2.3.1.2 Donning.  The Donning checklist (Table A-2) should be completed each time the following procedures are performed.

**WARNING**

Ensure immediate location provides adequate space to safely don SCBA without causing equipment damage or serious personal injury.

**NOTE**

Do not attach anything to the shoulder strap spring-action buckles. Side straps could loosen during use of the SCBA.

a.  There are two methods to don SCBA: coat-style method or the over-the-head method.

1.  **To don SCBA using coat-style method:**

   a)  Position backframe and harness assembly with cylinder valve on deck, cylinder assembly facing user, and fully extended side straps facing away as shown in Figure 2-4.
Figure 2-4. Position Backframe and Harness Assembly for Coat-Style Method.

(b) Grasp shoulder straps as shown in Figure 2-4.
(c) Swing backframe and harness assembly over and onto back, sliding shoulder strap over arm as shown in Figure 2-5. Extend both arms through shoulder straps.

Figure 2-5. Position Backframe and Harness Assembly onto Back for Coat-Style Method.

(d) Lean forward and pull down on both side straps to tighten as shown in Figure 2-6.
Figure 2-6. Tighten Side Straps for Coat-Style Method.

NOTE

Ensure low-pressure hose is not behind waist adjustment strap.

(e) Secure quick-release buckle as shown in Figure 2-7.

Figure 2-7. Secure Quick-Release Buckle for Coat-Style Method.

(f) Simultaneously pull waist adjustment straps forward and outward to tighten as shown in Figure 2-8.
Figure 2-8. Tighten Waist Adjustment Straps for Coat-Style Method.

(g) Readjust side straps to ensure most of SCBA weight is on hips.
(h) Lift hands straight up to ensure comfortable fit and proper adjustment.

(2) **To don SCBA using over-the-head method:**
   
   (a) Position backframe and harness assembly with cylinder valve facing up, cylinder assembly away from user, and fully extended side straps facing away as shown in Figure 2-9.

Figure 2-9. Position Backframe and Harness Assembly Over-the-Head Method.

(b) While on one knee, grasp sides of backframe as shown in Figure 2-10.
(c) Lift backframe and harness assembly up and over head, making sure elbows extend through loop formed by shoulder straps as shown in Figure 2-11.

(d) Pull down on side straps to tighten as shown in Figure 2-12. Stand up.
Figure 2-12. Tighten Side Straps for Over-the-Head Method.

NOTE

Ensure low-pressure hose is not behind waist adjustment strap.

(e) Secure quick-release buckle as shown in Figure 2-13.

Figure 2-13. Secure Quick-Release Buckle for Over-the-Head Method.
(f) Simultaneously pull waist adjustment straps forward and outward to tighten as shown in Figure 2-14.

![Figure 2-14. Tighten Waist Adjustment Straps for Over-the-Head Method.](image)

(g) Readjust side straps to ensure most of SCBA weight is on hips.

(h) Lift hands straight up to ensure comfortable fit and proper adjustment.

b. Ensure air saver switch (3, Figure 2-15) on mask-mounted regulator is fully depressed and purge valve (1) is rotated fully clockwise (CW) until closed.

![Figure 2-15. Depress Air Saver Switch.](image)
WARNING

Using an SCBA with cylinder valve partially opened may cause a reduction or sudden complete loss of air supply, resulting in serious personal injury or death.

c. Fully open cylinder valve (1, Figure 2-16) by slowly turning handwheel (2) away from user as many turns as possible, then back off 1/4 turn.

Figure 2-16. Open Cylinder Valve.

WARNING

If Vibralert® does not actuate or HUD (if attached) does not initialize as described, remove SCBA from service and tag for repair to prevent serious personal injury or death from using defective SCBA.

d. The Vibralert® (4, Figure 2-15) shall actuate then stop. The HUD (2, Figure 2-15), if attached, shall initialize with all four LEDs illuminated for approximately 20 seconds then display cylinder air pressure as percentage of air remaining.

e. Ensure remote pressure indicator (Figure 2-17) reading is greater than 0 psig. If 0 psig, replace cylinder assembly IAW paragraph 2.3.2.2.
f. Extend head harness straps as shown in Figure 2-18. Ensure head harness straps are not twisted and will lay flat against head.

**NOTE**

Before donning facepiece, ensure voice amplifier is attached to facepiece. SCBA facepiece without voice amplifier attached shall be considered to be in a degraded condition.

g. To don facepiece, place chin in chin pocket and pull head harness straps over head as shown in Figure 2-19.
Figure 2-19. Don Facepiece.

NOTE

When tightening facepiece straps, start with neck straps first and always pull both neck and temple straps straight back.

h. Simultaneously tighten the neck straps by pulling the two lower strap ends straight back towards the rear of the head.

i. Stroke the head harness down the back of the head using one or both hands as shown in Figure 2-20. Retighten neck straps.
Figure 2-20. Positioning Head Harness.

**NOTE**

Use caution when pulling temple straps as overtightening may cause discomfort.

j. Simultaneously adjust the temple straps by pulling the two upper strap ends straight back towards the rear of the head as shown in Figure 2-21.

Figure 2-21. Tighten Temple Straps.

k. Feel crown of head with one hand to ensure proper head harness strap placement (Figure 2-22). Readjust temple and neck straps as necessary until comfortable fit and proper placement is achieved. SCBA is now in place and facepiece donned without mask-mounted regulator installed.
NOTE

Applying excessive pressure with hand may cause false seal.

1. Perform a seal check by placing palm of hand over adapter port on facepiece as shown in Figure 2-23.
NOTE

Ensure correct size of facepiece is being used before repeating procedures if facepiece does not seal properly.

m. Inhale and hold breath for a second so facepiece can seal to face. If facepiece does not seal to face, repeat steps f through l.

n. Turn on voice amplifier and check for operation.

o. Don flash hood, positioning it fully around the facepiece as shown in Figure 2-24.

p. Don protective head gear and properly position and close any required protective clothing such as turn-out gear. The SCBA is now in standby condition (as shown in Figure 2-25) but not in operational use.
2.3.1.3 Go-On-Air. The following procedures mount the mask-mounted regulator to the facepiece and provide procedures for the subsequent use in an operational environment. The Go-On-Air Checklist (Table A-3) should be completed each time the following procedures are performed.

a. Remove mask-mounted regulator from regulator holder.

b. From user’s perspective, orient purge valve (1, Figure 2-26) at a 12 o’clock position and air saver switch (2) at 3 o’clock position, insert mask-mounted regulator into adapter port and rotate counterclockwise (CCW) 1/4 turn until latch mechanism (3) engages.
Figure 2-26. Mask-Mounted Regulator Mechanisms.

c. Attempt to rotate mask-mounted regulator to ensure latch mechanism is engaged.

NOTE
If air is not supplied on first inhalation, ensure cylinder valve is fully open and remote pressure indicator indicates air pressure in cylinder.

d. Inhale sharply to release air saver switch and start airflow.

NOTE
If free flow of air is experienced, readjust temple and neck straps of head harness.

e. Breathe normally.

WARNING
Should the bell alarm, Vibralert®, or HUD activate during operational use, immediately leave area requiring use of SCBA protection to prevent serious personal injury or death from loss of oxygen.

f. Proceed with use of SCBA.

2.3.1.4 Go-Off-Air. The Doffing Checklist (Table A-4) should be completed each time the following procedures are performed.

a. Depress air saver switch (2, Figure 2-26) until click is heard, then release.

b. Pull out on latch mechanism (3) and rotate mask-mounted regulator 1/4 turn CW and remove from adapter port.

c. Stow mask-mounted regulator in regulator holder to return to standby condition.

2.3.1.5 Doffing. The Doffing Checklist (Table A-4) should be completed each time the following procedures are performed.
**WARNING**

Doffing the SCBA must be performed only when the user is in a safe environment that does not require SCBA protection. Failure to comply may result in serious injury or death from inhaling toxic substances.

a. Perform Go-Off-Air procedures IAW paragraph 2.3.1.4.
b. Fully close cylinder valve by rotating handwheel toward user.
c. Fully open purge valve by rotating CCW to bleed residual air from SCBA.
d. When airflow stops, close purge valve by rotating CW.

**NOTE**

When removing facepiece, the user may find it more comfortable to first relieve tension on the temple straps by loosening buckles.

e. Lift each buckle on temple and neck straps and remove facepiece from head.
f. Depress waist strap spring-action buckles and fully extend waist adjustment straps.
g. Unbuckle quick-release buckle.
h. Depress shoulder strap spring-action buckle and fully extend side straps.

**CAUTION**

Ensure positive control is maintained during removal of the backframe and harness assembly to prevent equipment damage.

i. Maintain firm grip on shoulder straps while removing SCBA.

**2.3.2 Air Replenishment.** The SCBA may be recharged with 4,500 psig Grade D air by two methods: quick-charge and cylinder assembly removal and replacement.

**2.3.2.1 Quick-Charge.** Quick-charge of the cylinder assembly may be accomplished while wearing or using the SCBA.

   a. Go to approved charging station.

**WARNING**

User shall ensure charging station operator inspects the SCBA prior to charging. Failure to do so can cause equipment damage/failure, resulting in serious personal injury or death.

**NOTE**

Cylinder pressure will decrease after charging due to cooling effects. Any cylinder with a starting pressure of less than 3,000 psig prior to charging will require another charging evolution at least 3 minutes after initial recharge. This process will help ensure cylinder pressure will remain above 4,000 psig upon cooling assuming cylinders are charged to end pressure of 4,500 ± 50 psig.

b. Monitor remote pressure indicator for indication of pressure increase during quick-charge of cylinder assembly.
c. After quick-charge has been completed, ensure the following have been performed;
   (1) Dust cap is reattached to RIC UAC fitting (Configurations 4 and 5)
   (2) Ensure quick-charge coupling is secured to waist adjustment strap (Configurations 1-3).
2.3.2.2 **Cylinder Assembly Removal and Replacement.** Cylinder assembly removal and replacement procedure can be performed with assistance while the SCBA is being worn, or alone with the SCBA removed from wearer’s back. The Cylinder Assembly Removal and Replacement Checklist (Table A-5) should be completed whenever the following procedures are performed.

a. **Removal.**

**WARNING**

To prevent serious personal injury or death, cylinder assembly is to be removed only when the user is in a safe environment that does not require SCBA protection.

1. Fully close cylinder valve (15, Figure 2-27) by rotating handwheel (13) toward user if SCBA is donned, or CW if SCBA has been doffed.
Figure 2-27. SCBA Backframe, Harness, and Cylinder.

(2) Fully open purge valve (22, Figure 2-28) on mask-mounted regulator by rotating CCW to bleed residual air from SCBA.
(3) When airflow stops, close purge valve (22, Figure 2-28) by rotating CW.
(4) Check remote pressure indicator (16) for indication of no air pressure.

Figure 2-28. Remote Pressure Indicator, Bell Alarm, and Mask Mounted Regulator.
WARNING

Leakage of high-pressure air could cause equipment damage and serious personal injury or death.

(5) Rotate hand-coupling (23, Figure 2-29) CCW to remove high-pressure hose assembly or RIC UAC assembly from cylinder valve (15, Figure 2-27).

Figure 2-29. Hand Coupling on High Pressure Hose Assembly and RIC UAC.

(6) Unsnap and pull up on over-center latch mechanism (3, Figure 2-27) to release cylinder band clamp (1).

WARNING

To prevent serious personal injury or death, do not grab handwheel instead of cylinder valve to remove from backframe and harness assembly.

(7) With one hand, grab cylinder valve (15, Figure 2-27) and press on locking tab (9) with the other hand.

(8) Push up on cylinder assembly approximately 1 inch until hanger plate (11) disengages from backframe hook (10) and then pull cylinder assembly down and out of backframe and harness assembly.

b. Replacement.

WARNING

Never use a cylinder assembly having a damaged cylinder valve or a cylinder valve with damaged threads. Leakage may occur, which could cause loss of breathing air or sudden release of high-pressure air, resulting in serious personal injury or death.

(1) Conduct visual inspection of cylinder assembly IAW Appendix C.
(2) Ensure dual-reading pressure indicator (14, Figure 2-27) indicates a minimum of 4,000 psig.

(3) Position cylinder band clamp (1) on bail for different-sized cylinders as follows:
   (a) Top position for 45-minute fiberglass cylinder.
   (b) Middle position for 45-minute carbon-fiber cylinder. If middle position is not present, proceed to Appendix E for instructions on upgrading bail.
   (c) Inner position for either type 30-minute cylinder. See Figure 2-30.

![Figure 2-30. Cylinder Band Clamp Bail Positions.](image)

(4) Guide dome end of cylinder assembly upward through cylinder band clamp (1, Figure 2-27).

(5) Turn cylinder assembly so hanger plate (11) points toward backframe and aligns with center of backframe hook (10) in bottom of backframe.

(6) Push cylinder assembly down until backframe hook (10) engages with hanger plate (11).

   **NOTE**

Do not force over-center latch mechanism. Adjust cylinder band clamp for a snug fit by turning cylinder adjustment handwheel.

(7) If necessary, cylinder band clamp (1) may be adjusted to compensate for small variations in cylinder size by rotating cylinder adjustment handwheel (2) CW to compensate for smaller cylinders and CCW for larger cylinders after cylinder band clamp is unsnapped and over-center latch mechanism (3) is disengaged.

(8) Push down on over-center latch mechanism (3) until locked firmly in place and snap.

   **NOTE**

Slide pressure reducer within mounting plate to assist in aligning the hand coupling to the cylinder valve.

(9) Connect, but do not tighten, hand coupling (23, Figure 2-29) to cylinder valve (15, Figure 2-27).
CAUTION

Do not use a wrench to tighten hand coupling to cylinder valve. Overtightening may damage hand coupling and cylinder valve.

(10) Hand-tighten coupling (23) by turning CW until seated.

2.3.3 Emergency Operation. Emergency operation procedures shall be followed immediately should the SCBA not operate normally. Table A-6 contains the emergency operations procedures checklist that should be completed each time emergency operations are necessary.

WARNING

If any situation listed in steps a through d below occur, leave hazardous area at once to avoid inhaling toxic substances which may lead to serious personal injury or death.

a. Should the Vibralert®, bell alarm, or HUD activate during use, even if air supply has not been depleted to approximately 1,125 psig (25% of full capacity), leave hazardous area at once.

b. Should air supply be partially cut off during use, fully open purge valve by rotating CCW (pointer on knob downward), ensure cylinder valve is fully opened (turned fully CCW) and leave hazardous area at once.

c. Should air supply begin to flow freely into facepiece during use, leave hazardous area at once.

d. Should a total and irreversible loss of SCBA protection or an airflow blockage occur, leave hazardous area at once.

e. Once in a safe environment not requiring SCBA protection, bleed system, doff SCBA IAW paragraph 2.3.1.5, and tag for repair.

2.4 POST-OPERATING PROCEDURES.

a. Clean SCBA IAW appropriate MRC.

b. Inspect SCBA IAW appropriate MRC.

2.5 SCBA STOWAGE INSTRUCTIONS.

a. Insert SCBA into walkaway bracket clips, ensuring the stowage strap is not trapped within the bracket clips or by the SCBA cylinder. SCBA cylinder valve should rest of hanger plate of stowage bracket.

b. Extend both side straps to fully extended positions as shown in Figure 2-31 and ensure mask-mounted regulator has been stowed in its holder on waist strap.
Figure 2-31. Extending Side Strap.

c. Buckle waist belt and take up all slack by tightening adjustments on both sides of waist belt, as shown in Figure 2-33.
NOTE

SCBA stowed without voice amplifier attached to the facepiece assembly shall be considered to be in a degraded condition.

d. Place facepiece assembly under right side-strap as shown in Figure 2-33. The facepiece assembly shall be placed below the backplate with the rubber gasket against the wire frame (lens facing out). Tighten side-strap adjustment strap to hold facepiece assembly in place.
e. Take waist belt with mask-mounted regulator in its holder and raise waist straps and pads up under left side-strap next to facepiece as shown in Figure 2-34. Tighten left shoulder strap to hold regulator in place.

f. Making sure shoulder straps stay secure over the facepiece and mask-mounted regulator, fold any loose straps up into the center of the apparatus. While keeping one hand (or forearm) in place to hold this, reach behind SCBA and grab the stowage strap from both sides. Connect stowage strap around SCBA and tighten. The stowage strap should be positioned below pressure reducer as shown in Figure 2-36 and tighten.
g. Ensure facepiece and mask-mounted regulator are secured behind the side straps of the backpack. Place the extended portions of the side and waist straps that may be hanging below the SCBA under the stowage strap.

h. The SCBA is now properly and securely stowed with the mask-mounted regulator. See Figure 2-36.