#### STATEMENTS OF FACT BENCH BIOPAK 240-R CONTEST

- 1. Use only exact replacement parts in the configuration as specified by the manufacturer.
- 2. The battery is to be changed in fresh air only.
- 3. MSHA approved for use with one of the following 9-Volt batteries only:

Eveready Panasonic Rayovac Duracell

- 4. Never substitute, modify, add or omit parts.
- 5. Prior to using the BioPak 240 Revolution it must be determined that the user is medically fit.
- 6. Always handle oxygen cylinders with care to prevent damage.
- 7. Do not open the cylinder valve in the presence of open flame, sparks or high radiant heat.
- 8. Oxygen will enhance the combustion of other materials so that materials that normally will not burn in air may burn in oxygen-rich atmospheres; and, materials that do burn in air will burn more vigorously and at a higher temperature in oxygen-rich atmospheres.
- 9. Oxygen will not cause materials to ignite without the presence of an ignition source.
- 10. The use of an SCBA will add to the workload and stress of the user.
- 11. The BioPak 240 Revolution is suitable for respiratory protection during entry into and escape from oxygen deficient atmospheres with a temperature range of 5 degree F (-15C) to 110 degree F (43C).
- 12. The BioPak 240 Revolution is approved when the oxygen cylinder is fully charged with compressed medical or aviation grade oxygen at 3000 psi.

- 13. Allow the oxygen cylinder to cool after filling to determine the correct pressure.
- 14. A foreign gas may cause cylinder corrosion.
- 15. Always check for a current hydrostatic test date.
- 16. DOT requires carbon fiber wrapped aluminum cylinders be tested by an approved facility on a 5-year cycle from the date of manufacture.
- 17. An unapproved facepiece will compromise the protection provided to the user by the SCBA.
- 18. A good facepiece seal is important to achieving full protection and proper SCBA duration.
- 19. Users should never wear the BioPak if they have any facial hair.-
- 20. Replace the battery when the low battery alarm has activated, after 200 hours of use or every 6 months whichever comes first.
- 21. The connectors of the monitoring device may only be connected to a Biomarine BioPak 240R breathing Apparatus oxygen regulator, manifold block and breathing chamber.
- 22. The fiber optic cable may only be connected to the BioPak 240R remote gauge assembly.
- 23. Turn-Around maintenance procedures should be performed as soon as possible after each use of the SCBA.
- 24. If the lower housing is being washed, always leave the cylinder securely attached to the regulator so that the area remains clean, dry and free of contamination.
- 25. The usual scrubber consists of limestone and a plastic core. Do not reuse previously used CO<sub>2</sub> absorbent cartridges or the rubber gaskets.
- 26. DO NOT submerge the Alarm Module during turn-around maintenance.
- 27. The RMS Module IS NOT watertight with the TRIM light pipe connector or the battery door removed.

- 28. The lower housing should be cleaned with the cylinder securely attached to the regulator.
- 29. If the cylinder is removed for washing you Must Attach the Regulator Wash Cover provided in the test kit to seal off the regulator from contamination while washing the lower housing.
- 30. The facepiece should be sprayed with Multi-Wash "Disinfectant and rinsed with clean water.
- 31. Allow all components to remain wetted by the cleaning solution a minimum of 10 minutes.
- 32. Thoroughly rinse all components several times with clean water to remove cleaning solution residue.
- 33. C.O.P.D. could limit or prevent the use of the BioPak 240 Revolution.
- 34. Freeze the ice canisters for a minimum of 8 hours before use at a maximum temperature of 10 degrees F (-12 C).
- 35. Apply anti-fog solution or water to both halves of the chamois before every use to ensure mask lens do not scratch.
- 36. Failure to install the Phase Change Material Canister into the center section prior to use will result in increased breathing gas temperature.
- 37. Installing wet sponges and closing up the SCBA may lead to mold growth during extended storage periods.
- 38. To prevent mold growth, install the sponges in a totally dry state and moisten sponges just prior to SCBA use.
- 39. Do not expose opened CO<sub>2</sub> scrubber cartridges to ambient air for more than 20 minutes.
- 40. Excess exposure of ambient air with the CO<sub>2</sub> scrubber cartridges can adversely affect the optimal absorption process and increase the potential for CO<sub>2</sub> entering the breathing loop.

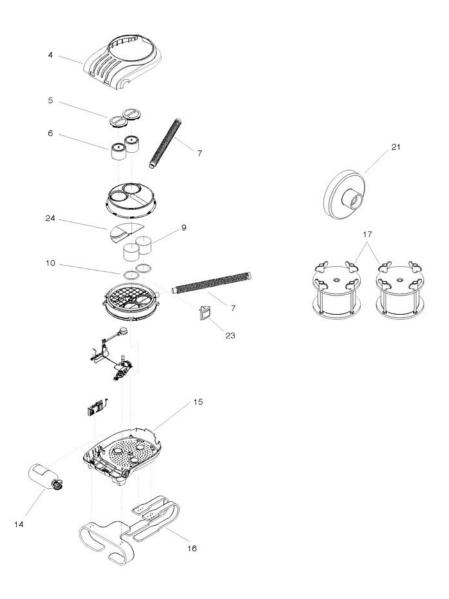
- 41. Install each CO<sub>2</sub> canister into the SCBA so that the red end cap is visible on the top side of the canister.
- 42. The hoses and facepiece adapter MUST be installed with the breathing gas directional arrows facing UP.
- 43. To get the most accurate flow meter reading you must have a minimum of 1500 psi (104 bar) in the cylinder.
- 44. The use of non-approved flow meters will result in inaccurate flow readings.
- 45. Over pressurization of the SCBA with the test keys installed beyond 8" of water column could damage the vent valve and diaphragm.
- 46. The battery has completed its battery check and has battery life for a full 4 hour mission if you receive a green flashing light.
- 47. A low battery alarm is indicated by a Red, Green, Blue light sequence followed by a short alarm chirp any time the battery will not complete a four-hour mission.
- 48. The oxygen cylinder pressure gauge and the RMS gauge pressure readings shall match within +/-10%.
- 49. A properly stored SCBA will be one that has been thoroughly cleaned, dried, tested and all items on the Turn-Around Maintenance Tag properly documented.
- 50. Any SCBA that fails testing must be clearly identified or "Tagged-Out" of service.
- 51. If a quick Turn-Around Maintenance has been performed, the SCBA will function and is designed to work wet.
- 52. In addition to normal Turn-Around Maintenance, the SCBA shall be visually inspected and high-pressure tested on a monthly basis if the SCBA is in constant use once a month or placed into long-term storage.
- 53. Constant use is defined as being in use at least once a month
- 54. The RMS will automatically power down once the system pressure has dropped below 25 psig.

- 55. NEVER Pry an o-ring from its seat with a screwdriver. Carefully remove the oring by hand or with the pick tool provided in the tool kit.
- 56. Cristo-Lube and Dow-111 are the only o-ring lubricants that shall be utilized on the SCBA components.
- 57. NEVER Use Dow 111 on any o-ring seal that comes in contact with high-pressure oxygen.
- 58. There are no user serviceable components on the oxygen cylinder assembly.
- 59. Other than replacement of the battery, there are no user serviceable components in the RMS gauge, alarm module or TRIM.
- 60. The RMS alarm module is sealed to prevent entry of moisture and to provide immunity against RFI/EMF interference.
- 61. In the event the SCBA fails flow testing during Turn-Around or Long-term Maintenance the flow restrictor is most likely clogged and will require replacement.
- 62. Not achieving full 4-hour duration of BioPak during use could be caused by poor or leaking facepiece seal.
- 63. Not achieving full 4-hour duration of BioPak during use could be caused by the oxygen cylinder being opened prior to donning facepiece.
- 64. Not achieving full 4-hour duration of BioPak during use could be caused by the bypass valve over used or utilized to attempt to clear facepiece lens.
- 65. Not achieving full 4-hour duration of BioPak during use could be caused by the user being under heavy workloads or extreme ambient conditions.
- 66. Not achieving full 4-hour duration of BioPak during use could be caused by a leak in the BioPak.
- 67. Not achieving full 4-hour duration of BioPak during use could be caused by a pressure Regulator Failure.
- 68. High breathing resistance during exhalation could be caused by the facepiece exhalation valve sticking closed.

- 69. High breathing resistance during exhalation could be caused by diaphragm springs in breathing chamber not properly seated or damaged.
- 70. High breathing resistance during exhalation could be caused by vent valve in breathing chamber not opening properly.
- 71. High breathing resistance during inhalation could be caused by the facepiece inhalation check valve sticking closed.
- 72. High breathing resistance during inhalation could be caused by the diaphragm springs in breathing chamber are missing or damaged.
- 73. High breathing resistance during inhalation could be caused by the demand valve in breathing chamber has failed.
- 74. Alarm indications of remaining service time not functioning correctly could be caused by the monitoring system battery has expired.
- 75. Breathing gas uncomfortably warm during use could be caused by the frozen ice canisters have not been installed into the coolant shells.
- 76. BioPak weight, ready to use is 34 pounds.
- 77. BioPak tidal volume is over 6 liters.
- 78. BioPak Carbon Dioxide Scrubber is Dual, single use Calcium Hydroxide cartridges, non-dusting, non-channeling, non-hazardous.
- 79. Use only exact replacement parts in the configuration as specified by Biomarine.
- 80. Do not allow oil, grease or other foreign materials to come in contact with cylinder, cylinder valve or cylinder pressure regulator to prevent possible ignition.
- 81. A clean-shaven user will significantly increase his chances of achieving a good facepiece seal.
- 82. Do not change battery in hazardous area.
- 83. The low oxygen alarm must activate between 650-750 psig and is indicated by a flashing red light and audible alarm.
- 84. The CO<sub>2</sub> Scrubber Gasket should be replaced after 1 use.

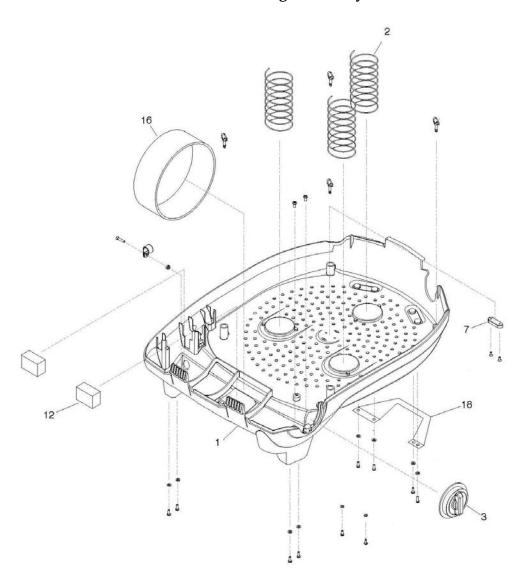
- 85. The CO<sub>2</sub> Scrubber should be replaced after 1 use.
- 86. The facepiece Anti-Fog Lens should be replaced after approximately 20 uses.
- 87. The Oxygen Seal Washer should be replaced as needed.
- 88. The Center Section Lid O-Ring should be replaced as needed.
- 89. The BioPak 240 Revolution has certification approvals for a Hydration System Kit and a Facepiece Magnetic Wiper.
- 90. Mask fogging during use could be caused by the Anti-fog lens insert missing or damaged.
- 91. Mask fogging during use could be caused by Anti-fog agent not applied or applied incorrectly.
- 92. Breathing gas uncomfortably warm during use could be caused by the PCM canister.
- 93. Facepiece failing positive and/or negative testing during user donning could be caused by the inhalation and/or exhalation check valves <u>missing</u> in the facepiece.
- 94. Facepiece failing positive and/or negative testing during user donning could be caused by the inhalation and/or exhalation check valves <u>damaged</u> in the facepiece.
- 95. Facepiece failing positive and/or negative testing during user donning could be caused by poor facepiece fit.
- 96. A Pacemaker or other Cardiac Condition could limit or prevent the use of the BioPak 240 Revolution.
- 97. Breathing difficulties could limit or prevent the use of the BioPak 240 Revolution.
- 98. Claustrophobia or anxiety when wearing a SCBA could limit or prevent the use of the BioPak 240 Revolution.
- 99. X-Ray evidence of Pneumonia could limit or prevent the use of the BioPak 240 Revolution.
- 100. Epilepsy-Grand Mal or Petit Mal could limit or prevent the use of the BioPak 240 Revolution.

**BioPak 240 Revolution Complete** 



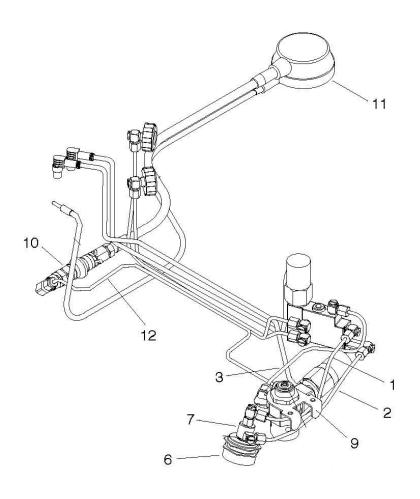
| 1 2 Cons. No. Designation   | 1 2<br>Cons. No. Designation  |
|---|---|
| 4 Upper Housing Assembly 5 Coolant Lid 6 Ice Canister 7 Breathing Hose 14 O <sub>2</sub> Cylinder 15 Lower Housing Assembly | <ul> <li>16 Harness Assembly</li> <li>17 Ice Canister Freeze Form</li> <li>21 Facepiece Storage Plug</li> <li>23 (PCM) Heat Exchanger</li> <li>24 Moisture Absorbent Pad Set</li> </ul> |

## Lower Housing Assembly



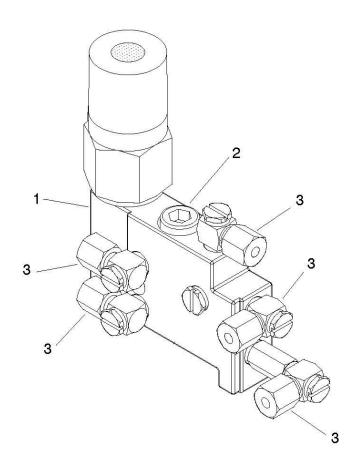
| 1 2   | 1 2   |
|---|---|
| Cons. No. Designation   | Cons. No. Designation   |
| <ol> <li>Lower Housing Shell</li> <li>Diaphragm Springs</li> <li>External Oxygen Knob</li> <li>Vent Spacer</li> </ol> | <ul><li>12 Latch Foam Pad</li><li>16 Oxygen Cylinder Hold-Down Strap</li><li>18 Carrying Handle</li></ul> |

#### Pneumatic Assembly



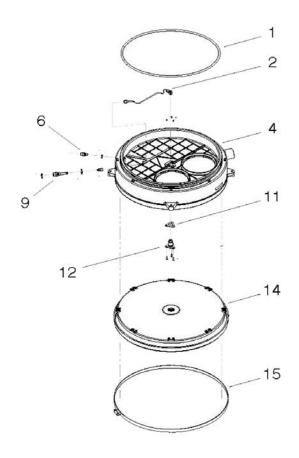
| 1 2 Cons. No. Designation  | 1 2<br>Cons. No. Designation   |
|--|--|
| <ol> <li>Bypass Feed Tube</li> <li>Bypass Return Tube</li> <li>Oxygen Feed Tube</li> <li>Bypass Valve Push Button</li> <li>Bypass Valve</li> </ol> | <ul> <li>9 Oxygen Regulator Assembly</li> <li>10 Remote Gauge Shut Off Assembly</li> <li>11 Remote Gauge Assembly</li> <li>12 Remote Gauge Feed Tube Assembly</li> </ul> |

#### Manifold Assembly



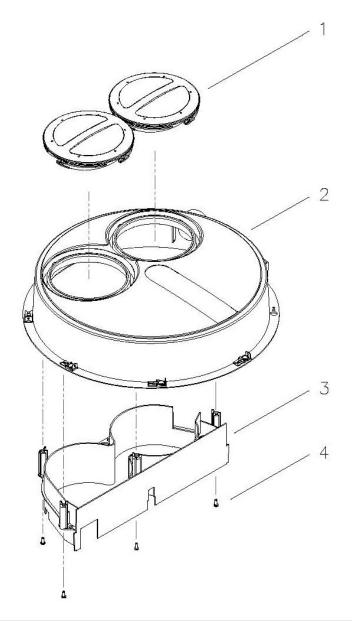
| 1         | 2   | 1  | 2                    |
|-----------|---|----|----------------------|
| Cons. No. | Designation   | Co | ns. No. Designation  |
|           | d Block w/ Pressure Switch<br>nt Add Flow Restrictor Assembly | 3  | Swivel Elbow Fitting |

#### **Center Section Assembly**



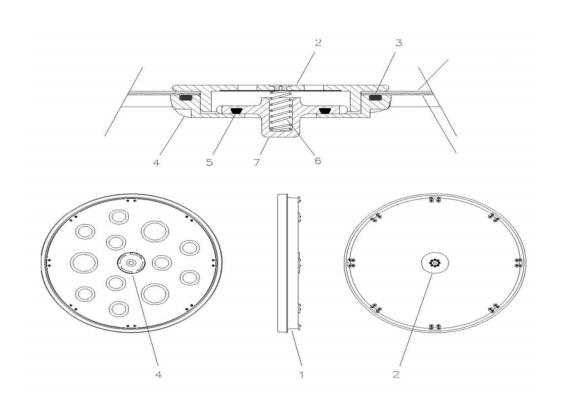
| 1                         | 2   | 1                    | s. No.            | 2  |
|---------------------------|---|----------------------|-------------------|--|
| Cons. No.                 | Designation   | Cons                 |                   | Designation  |
| 4 Center Se<br>6 Constant | ng<br>Feed Tube<br>oction Body Assembly<br>Add Fitting<br>Add Fitting | 11<br>12<br>14<br>15 | Deman<br>Flexible | d Valve Gasket<br>d Valve Assembly<br>e Diaphragm<br>agm Clamp |

# Center Section Lid Assembly



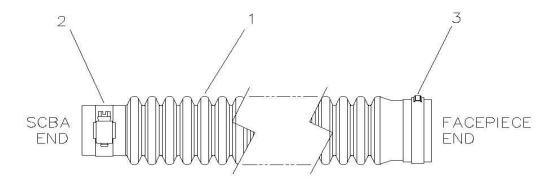
| 1 2                                   | 1 2   |
|---------------------------------------|---|
| Cons. No. Designation                 | Cons. No. Designation   |
| 1 Coolant Lid<br>2 Center Section Lid | <ul><li>3 Flow Baffle</li><li>4 Self-Tapping Screws</li></ul> |

## Diaphragm Assembly



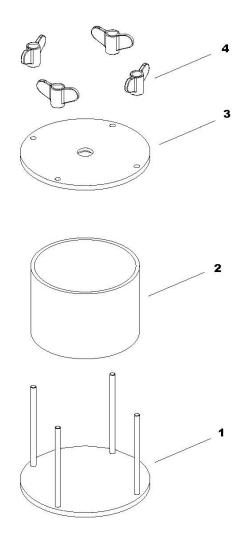
| 1                | 2   | 1           | 2  |
|------------------|---|-------------|--|
| Cons. No.        | Designation   | Cons. No    | o. Designation   |
| 1<br>2<br>3<br>4 | Flexible Diaphragm<br>Vent Cap<br>Vent Body O-Ring<br>Vent Body | 5<br>6<br>7 | Vent Seat O-Ring<br>Vent Valve Spring<br>Vent Valve Seat |

#### **Breathing Hose**



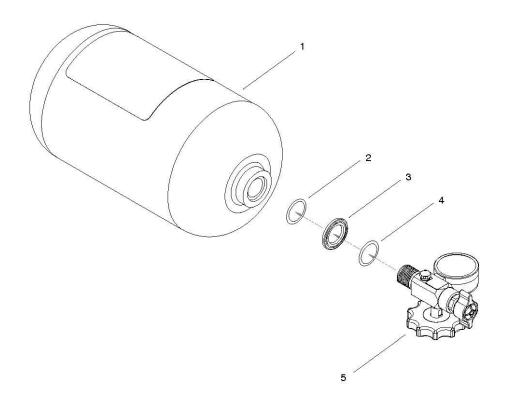
| 1 2  | 1 2                   |
|--|-----------------------|
| Cons. No. Designation  | Cons. No. Designation |
| <ol> <li>Breathing Hose</li> <li>Worm Gear Hose Clamp</li> </ol> | 3 Stepless Ear Clamp  |

#### **Ice Canister Freeze Form**



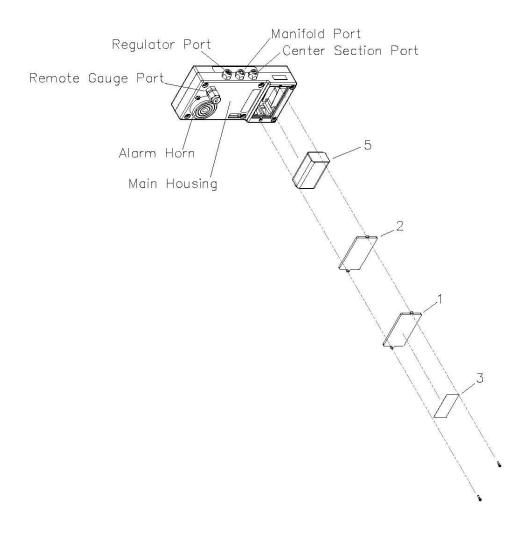
| 1         | 2                            | 1         | 2                                |
|-----------|------------------------------|-----------|----------------------------------|
| Cons. No. | Designation                  | Cons. No. | Designation                      |
| 1 2       | Base Assembly<br>Freeze Tube |           | op Plate<br><sup>7</sup> ing Nut |

## Oxygen Cylinder Assembly



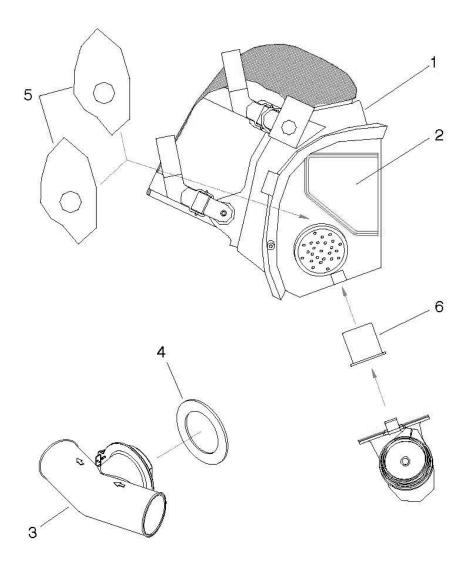
| 1 2   | 1 2                                   |
|---|---------------------------------------|
| Cons. No. Designation                                   | Cons. No. Designation                 |
| 1 Green Cylinder<br>2 Exterior O-Ring<br>3 Valve Collar | 4 Interior O-Ring<br>5 Valve Assembly |

#### RMS Monitoring System



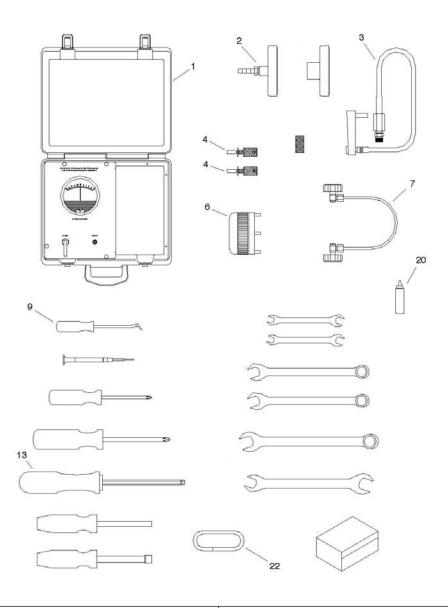
| 1         | 2                                   | 1         | 2                                     |
|-----------|-------------------------------------|-----------|---------------------------------------|
| Cons. No. | Designation                         | Cons. No. | Designation                           |
| 1 2       | Battery Door<br>Battery Door Gasket |           | tery Door Warning Label<br>dc Battery |

#### **Facepiece Assembly**



| 1 2  | 1 2   |
|--|---|
| Cons. No. Designation  | Cons. No. Designation   |
| <ul> <li>Facepiece Complete</li> <li>Anti-Fog Lens Insert</li> <li>Facepiece Adapter Assembly</li> </ul> | <ul> <li>Facepiece Adapter Gasket</li> <li>Nose Cup Insert</li> <li>Interface Tube</li> </ul> |

#### **Tool Kit**



| 1 2   | 1 2   |
|---|---|
| Cons. No. Designation   | Cons. No. Designation   |
| <ul> <li>Case Assembly</li> <li>Leak Check Adapter Fitting</li> <li>Flow Test Fixture</li> <li>Test Key</li> <li>Vent Valve Wrench</li> </ul> | <ul> <li>7 Center Section Pneumatic Plug</li> <li>9 Combination Pick Tool</li> <li>13 1/4 - Inch Hex Driver</li> <li>20 Leak Detection Fluid</li> <li>22 3/8 - Inch OD Rubber Tubing</li> </ul> |