

*"Save  
Your  
Breath  
With*



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**MODEL RP100BA-S1  
RESPIRATORY PROTECTOR®  
MANUAL**

\*\*\*\*\*  
**WARNING:** Do not attempt to operate this equipment without first reading and  
understanding the manual enclosed with this device. Suitability for use of this device lies solely  
with user.  
\*\*\*\*\*

2/13/03

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**SPECIFICATIONS**  
**RESPIRATORY PROTECTOR®**  
**MODEL RP100BA-S1**

<b>INLET PRESSURE (MAX.)</b>	<b>150 PSIG STATIC (10.4bar)</b>
<b>RATED AIR FLOW (MAX.)</b>	<b>100 SCFM (47.2 L/s)</b>
<b>OPERATING PRESSURE</b>	<b>100 PSIG DYNAMIC (6.9bar)</b>
<b>OUTLET PRESSURE RANGE</b>	<b>0-125 PSIG (0-8.6 bar)</b>
<b>OPERATING RELATIVE HUMIDITY (INLET AIR)</b>	<b>30-100% RH</b>
<b>OPERATING TEMPERATURE RANGE (INLET AIR)</b>	<b>68-150°F (20-65°C)</b>
<b>OUTSIDE DIMENSIONS</b>	<b>36"L x 24"W x 7.75" D (915mm x 610mm x 197mm)</b>
<b>WEIGHT (INCLUDING MONITOR)</b>	<b>80 LBS. (36.3 kg.)</b>
<b>REPLACEMENT FILTER SET (INCLUDES ALL ELEMENTS)</b>	<b>FX100</b>
<b>REPLACEMENT PREFILTER ELEMENT ONLY</b>	<b>80192</b>

## **GENERAL SAFETY WARNINGS**

### **WARNING: The MST RESPIRATORY PROTECTOR MODELS:**

- 1) SHOULD NOT be used when the air entering the filtering system is oxygen deficient. The MST Respiratory Protector® will not increase the oxygen content of the air.
- 2) SHOULD NOT be used in an Immediately Dangerous to Life and Health Atmosphere (IDLH) unless it is used in conjunction with a Back-Up Escape system or a supplied air Self-Contained Breathing Apparatus (SCBA), where applicable.
- 3) CARBON MONOXIDE MONITOR will alarm if Carbon Monoxide levels exceed requirements for Grade "D" Breathing Air set fourth by OSHA/CSA. If alarm should sound, remove respirator or activate SCBA and immediately move to safe breathable atmosphere. Have the proper qualified personnel examine the equipment and make the appropriate corrections before using again.
- 4) SHOULD NOT have air inlet pressure greater than 150 PSIG static (10.4bar). Personal injury could result.

The MST Respiratory Protector® is a Four Stage Purification System designed to remove or reduce select contaminants including Carbon Monoxide that is found in compressed air lines while monitoring for carbon monoxide through the MST 2002 Monitor. The Respiratory Protector can be connected directly to shop air from a standard compressed air source to help provide breathing quality air to face masks, helmets, hoods and other supplied air breathing apparatus.

## GENERAL FILTER SYSTEM DESCRIPTION

(Refer to Figure No.1 & 2)

Air entering the MST Respiratory Protector® at the inlet (A) is usually contaminated with oil, water, dirt, rust, scale, gaseous Hydrocarbons and often deadly Carbon Monoxide. As the air passes through the First Stage (B) of the MST Prefilter, particulate matter is trapped and retained down to 0.3 microns. The air then enters the Second Stage (C) of the Prefilter which coalesces liquid contaminants down to 0.75 microns with an efficiency rating of 99.97% (meets Underwriters Laboratories Specification UL 586 for High Efficiency, Particulate, Air Filter Units). The liquid contaminants are trapped in the lower chamber of the prefilter and expelled out through the Automatic Float Drain (D). The Third Stage (F) contains a deep bed of odor absorbing activated charcoal which collects various gaseous Hydrocarbons (such as oil vapors, benzene, etc.). The Fourth Stage (G) contains a low temperature catalyst which converts Carbon Monoxide gas into Carbon Dioxide. The unique catalyst also converts or absorbs ozone, Nitric Oxide, Sulfur Dioxide, Nitrogen Dioxide, Hydrogen Sulfide, Ammonia, Acetaldehyde, Methyl Chloride, Methyl Ethyl Ketone, Acetone and Methyl Alcohol. The air then passes through a final particulate filter disc (H) before entering the Regulator (I), which may be used to adjust the air pressure going to the respirator(s). A sample of the filtered air is taken at (J) and passed through the Carbon Monoxide Monitor (K). The Carbon Monoxide Monitor continuously checks the carbon monoxide levels per OSHA/CSA requirements and digitally displays the amount present in PPM, (parts per million). An audio alarm will alert operators if levels of carbon monoxide exceed OSHA/CSA requirements.

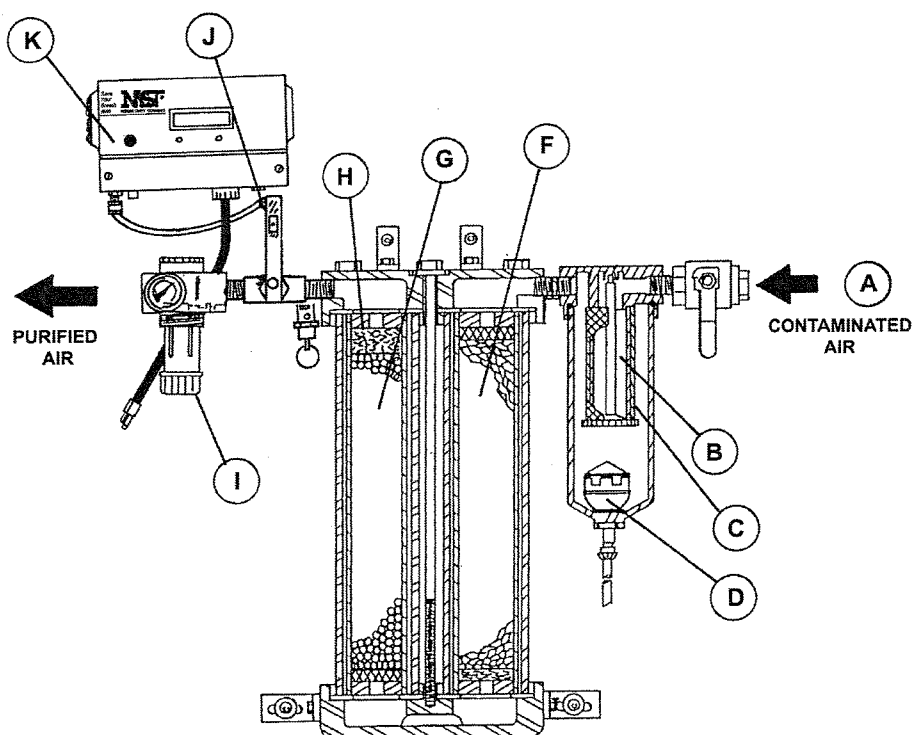
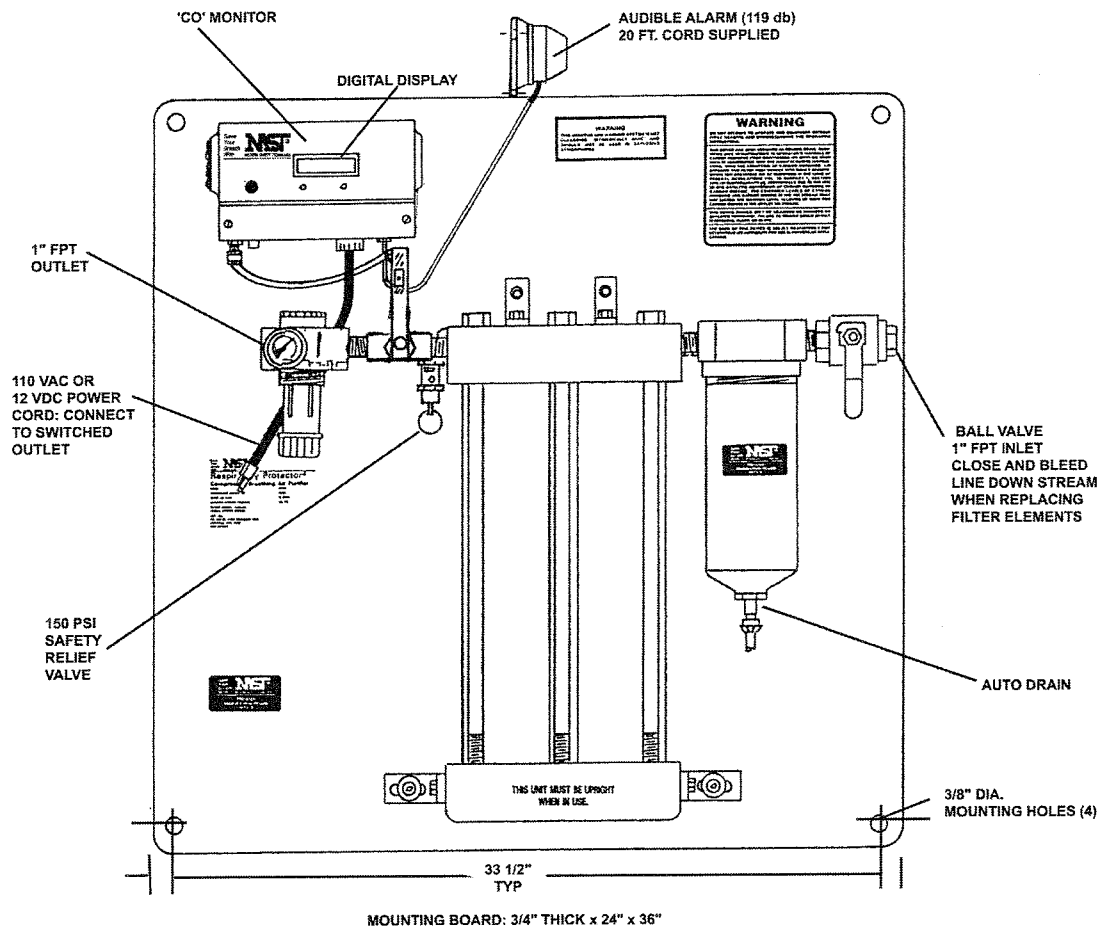


FIGURE NO.1

# **MODEL RP100BA-S1 RESPIRATORY PROTECTOR®**



**FIGURE NO. 2**

## GENERAL OPERATIONS

\*\*\*\*\*

**WARNING: The MST Respiratory Protector should not:**

- 1) be used when the air entering MST's Unit is oxygen deficient. MST's Unit will not increase the oxygen content of the oxygen deficient air.
- 2) be used in an "Immediately Dangerous to Life and Health" atmosphere, (IDLH), unless it is used in conjunction with a back-up escape system or a supplied air self-contained breathing apparatus, (SCBA), where applicable.

\*\*\*\*\*

MST, Inc. strongly recommends that a complete safety program be instated to ensure that the respiratory air is in compliance with all OSHA/CSA standards and other applicable laws regulating the use of supplied air respiratory systems. MST, Inc. recommends that the air quality be tested upon installation and periodically re-tested to ensure that the minimum requirements for breathing air are maintained.

MST, Inc. will not assume any liability for accidents or personal injury resulting from the improper use of this equipment. Service on this equipment should only be performed by qualified personnel. This system is to be used only by trained qualified personnel in accordance with a respiratory program as outlined in OSHA Regulation 29 CFR 1910.134(b).

### **CUSTOMER AIR SUPPLY** (Refer To Figure No. 3)

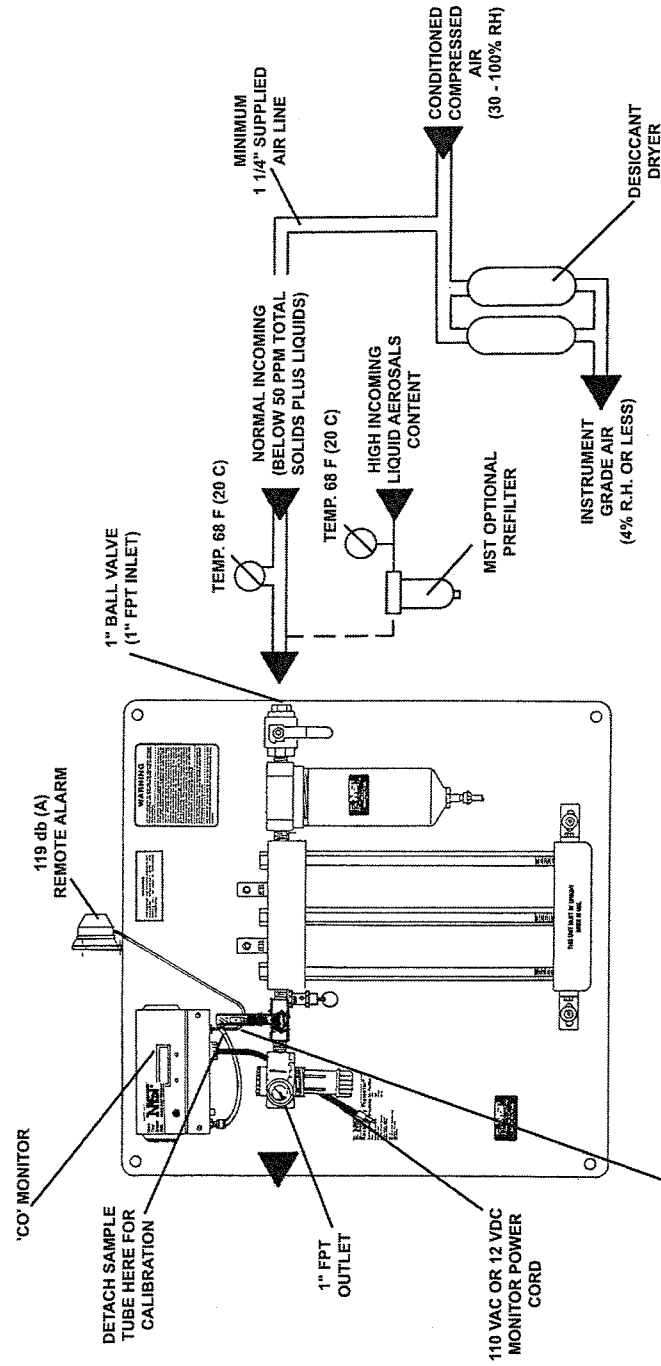
- 1) SUPPLIED AIR LINE - Use minimum 1" I.D. pipe to MST Unit.
- 2) SUPPLIED AIR LINE PRESSURE - Maximum air pressure at MST Unit's inlet should not exceed 150 PSIG. As a Safety Back-Up, MST Units incorporates a pressure relief valve rated at 150 PSIG.
- 3) SUPPLIED INLET AIR TEMPERATURE RANGE - 68 to 150°F (20-65°C).
- 4) SUPPLIED AIR CONDITIONING - May be required ahead of MST's Unit to control:
  - a) Inlet air temperature.
  - b) Large Volumes of oil/water from entering MST Unit. A coarse oil/water extractor, (rated at 2-microns abs.), may be required if excessive oil/water conditions are present. Installation of the extractor should be located as close to MST Unit's inlet hook-up as possible. MST, Inc. has coarse oil/water extractors available as an option.
- 5) AVOID INSTALLING MST UNIT AFTER DESICCANT DRYER - The Desiccant Dryer will produce extremely dry air, (4% R.H. or less), and MST's fourth stage catalyst requires 30-90% R.H. in the supplied air for the catalyst to work and remove Carbon Monoxide efficiently. The extremely dry air produced by a Desiccant Dryer will also cause worker discomfort, i.e. dry throat, etc.

## **MST RESPIRATORY PROTECTOR INITIAL INSTALLATION AND START-UP** (Refer To Figure No. 3)

- 1) **INLET SUPPLIED AIR HOOK-UP** - Prior to installing to MST's Unit be sure all solvent fumes and gross particulates (that could build up when initially assembling inlet piping) are purged out of line(s). This will prevent premature overloading of MST Unit's filter elements.
- 2) **NEW FILTER SYSTEM CONDITIONING** - Flow supplied air through new filter sets for several minutes to condition.
- 3) **POWER MONITOR/CALIBRATE** - Connect the 110 VAC/12VDC to the correct switched outlet power source. Be sure the monitor's "Red Power On Light" is on, and after a (5) minute warm-up, calibrate monitor. Refer to MST 2002 Monitor Manual.
- 4) **CHECK AUDIBLE ALARM** - Rotate "zero potentiometer" (CW) until display reading is equal to alarm level setting (US=10 ppm, CAN=5 ppm). The audible alarm should be energized. The "zero potentiometer" will have to be reset to '00' using "zero air" calibration gas, (refer to Monitor Manual).
- 5) **CALIBRATION GAS REQUIREMENTS** - Zero Gas: Nitrogen, free of "CO". Span Gas: 50 to 100 PPM of "CO" concentration in air. Calibration gas flow to monitor should be 1.0 SCFH (472 cc/minute).
- 6) **RESPIRATOR/HOOD/HOSE ASSEMBLY HOOK-UP** - If an outlet piping network system is used after MST's Unit, a regulator at each drop will be needed so the proper air pressure requirements per the Manufacturer's respirator manual are met. The air should be dynamically flowing through respirator/hose assemblies when the air pressure is set. **DO NOT EXCEED RESPIRATOR/HOSE ASSEMBLY MANUFACTURER'S REQUIREMENTS FOR OUTLET PRESSURE. PERSONAL INJURY COULD RESULT.**
- 7) After pressurizing system and respirators air flow set, adjust the air sample metering's adjustment knob so the black floating ball is within the GREEN BOXED area etched on valve body.
- 8) **EXTREME TEMPERATURE CHANGES** - Avoid; Monitor best performs at a temperature range of 32-104°F (0-40°C). Always calibrate monitor after it has stabilized in the surrounding temperature where system is to be used.



INITIAL START-UP AND INSTALLATION  
MODEL RP100BA-S1 RESPIRATORY PROTECTOR



AFTER PRESSURIZING SYSTEM AND RESPIRATOR AIR FLOW SET,  
ADJUST THE SAMPLE AIR FLOWMETER VALVE SO BLACK FLOATING  
BALL IS WITHIN GREEN BOXED AREA.

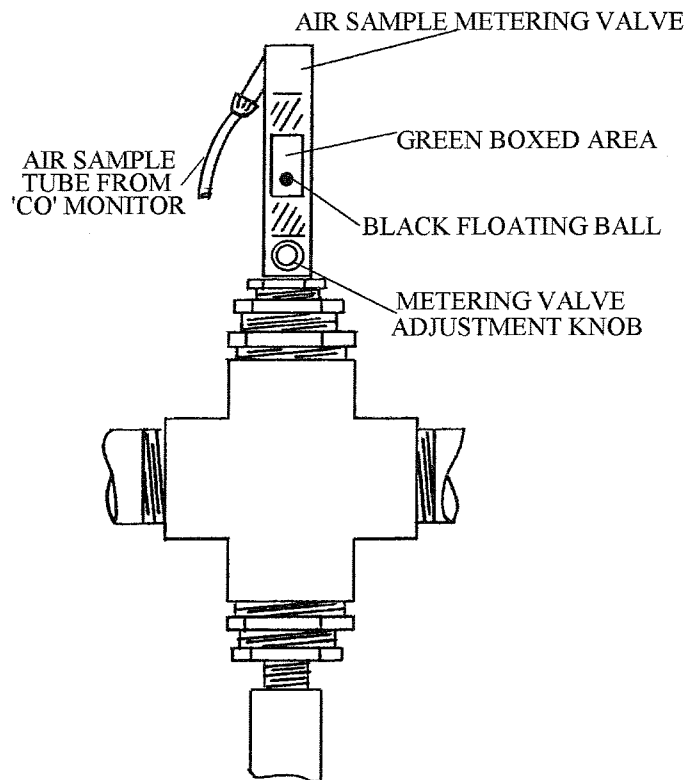
FIGURE NO. 3

## AIR SAMPLE TO MONITOR ADJUSTMENT

\*\*\*\*\*  
**WARNING : SERIOUS INJURY** could result if the **AIR SAMPLE METERING VALVE** is not properly adjusted. Proper sample air flow to 'CO' monitor is required for monitor to give correct 'CO' level readout.  
\*\*\*\*\*

### AIR SAMPLE METERING VALVE ADJUSTMENT

- A) Pressurize system and set pressure for proper air flow to respirator(s).
- B) Adjust Air Sample Metering Valve's adjustment knob so the black floating ball is within the GREEN BOXED area etched on valve body. Proper air sample is now being metered to the 'CO' Monitor. Periodically check to be sure ball is floating in this area.



## **MST RESPIRATORY PROTECTOR**

### **GENERAL OPERATION AND MAINTENANCE**

- 1) MST 2002 MONITOR - Utilizes an electrochemical sensor to measure the carbon monoxide content of the respirable air. If a problem has developed in the system, the monitor will alarm due to one or more of the following conditions:
  - a) Monitor is out of calibration. The monitor should be calibrated monthly if used continuously and prior to use if used on a non-continuous basis. Calibrate monitor as outlined in the MST 2002 MONITOR MANUAL.
  - b) If the monitor can be and is calibrated, but the alarm still sounds, the filter cartridge life is exhausted. Replace all three (3) filter cartridges as outlined in the FILTER REPLACEMENT INSTRUCTIONS, page 12.
  - c) If the monitor can not be calibrated, the carbon monoxide sensor may require replacement. See MST 2002 MONITOR MANUAL for replacement instructions and other troubleshooting information. The MST 2002 MONITOR has a two (2) year warranty. All warranty work must be performed at factory.
  - d) If the monitor was calibrated in a surrounding temperature other than where the system was being used and the temperature difference was 36°F (20°C) or greater, the monitor may give a false alarm due to its characteristics. Always calibrate the monitor in the temperature conditions where the monitor is to be used in. Monitor best performs at temperature range of 32 to 104°F (0 to 40°C).
- 2) MST 2002 MONITOR - Alarm should be checked prior to use. See "Initial Installation and start-up", page 8.
- 3) MST 2002 MONITOR - POWER MONITOR/CALIBRATE - Connect the 110VAC/12VDC to the correct switched outlet power source. Be sure the monitor's "Red Power On Light" is on, and after a (5) minute warm-up, calibrate monitor. Refer to MST 2002 Monitor Manual.
- 4) MST 2002 MONITOR - Flow of the air sample to monitor should be checked periodically to ensure sample valve is not clogged. This situation normally occurs when customers' supplied air has excessive liquids in it and the filters in the MST unit are not routinely changed. Periodically check that the black floating ball is within the GREEN BOXED area etched on the valve body when air is flowing to respirators.
- 5) MST RESPIRATORY PROTECTOR® SYSTEM - Filters should be replaced every (6) months unless the air quality conditions warrant more or less frequent replacement. Replace all (3) filter cartridges if:
  - a) The "CO" monitor alarms (fourth stage catalyst is used up).
  - b) The operator detects a petroleum smell and or taste in his purified air (third stage charcoal is used up).

**NOTE:** If the supplied air entering MST's unit has high volumes of liquids in it, the filter set life may be greatly reduced. If this happens, the Prefilter Dual Stage Element should be changed. See FILTER SET INSTRUCTIONS, page 12, Item 1 and also CUSTOMER AIR SUPPLY, page 7, for corrective measures to take.

- 6) MST RESPIRATORY PROTECTOR® SYSTEM - New filter set:
- Has an indefinite shelf life, but should be stored in a cool/dry storage area.
  - When first installed in MST's unit the filters should be conditioned by flowing the customer's supplied air through system for several minutes.

**NOTE:** If MST's unit is not to be used for an extended period of time, before storing, check 3rd and 4th stage filters for presence of liquid/moisture. If moisture present, dry system and replace all filters. Also, if moisture present, consider changing filter set more frequent and or installing MST's OPTIONAL PREFILTER prior to MST's system hook-up.

## **FILTER SET** **SERVICE INSTRUCTIONS**

(Refer To Figure No. 4)

\*\*\*\*\*  
**WARNING:** Always turn off air supply and bleed air pressure before disassembling unit or **SERIOUS INJURY COULD RESULT.**  
 \*\*\*\*\*

MST, Inc. recommends replacing all three (3) filter cartridges after (6) months of use unless conditions warrant more or less frequent replacement. The Prefilter Dual Stage Element may require changing more frequent if excess particulates and/or oil is present in supplied air line. (See Item 1) below for explanation. To replace the filter cartridges in the RESPIRATORY PROTECTOR<sup>R</sup> follow these steps:

### 1) PREFILTER FIRST/SECOND DUAL STAGE ELEMENT REPLACEMENT

Element change may be required prior to replacing all three elements if air source has high volumes of liquids in it.

- First unlock tube locking collar and then pull Drain Tube (1) down. Then unscrew Prefilter Bowl Assembly (2), clean in mild soap and water and blow dry with low pressure air.
- Remove Dual Stage Element (3) by unscrewing End Cap Retaining Nut (4) .
- Inspect the Prefilter Manifold (5) for dirt/contaminates and clean as required. Inspect O-Ring (6) for cuts, etc. and replace if required.
- Install new Dual Stage Element and Tighten End Cap Retaining Nut. Be sure Element is seated squarely on Manifold boss and End Cap.
- Apply light film of petroleum jelly on Bowl's beveled edge to provide good seal between Bowl and O-Ring. HAND TIGHTEN ONLY.
- Lock Drain Tube into tube locking collar.
- Dispose of used Dual Stage Element according to local, state and federal regulations.

## 2) THIRD/FOURTH STAGE CARTRIDGE REPLACEMENT

- a) Loosen Bracket Bolts (7) from Brackets (8), (do not remove), on both sides of Base (9).
- b) Loosen the five Manifold Bolts (10) and remove the front two Bolts. Now slide out the Third (11) and Fourth (12) Stage Aluminum Tube Assemblies.
- c) Remove the four old Gaskets (13) from the recessed areas in Base (9) and Manifold (14); cleaning sealing surfaces from any gasket material debris.
- d) Slide old Third Stage Filter Cartridge (15) out of aluminum tube. Clean aluminum tube in mild soap and water, dry and install new Third Stage Filter Cartridge. Be sure the Flow Direction Arrow on Third Stage Filter Cartridge is pointing down. Remove End Sealing Labels (16) from both ends of cartridge completely.
- e) Follow same procedure for the Fourth Stage Filter Cartridge (17) replacement as in step (d). Be sure the Flow Direction Arrow on Fourth Stage Filter Cartridge is pointing up. Also remove End Sealing Labels (16) from both ends of cartridge.
- f) Before sliding the Third and Fourth Stage Aluminum Tube Assemblies back in place, install Gaskets (13). Coat both sides of each gasket with petroleum jelly and install in recessed areas in Base (9) and Manifold (14). After Aluminum Tube Assembly are installed, check to make sure the Gaskets (13) are positioned properly top and bottom - both assemblies.
- g) Replace the front two Manifold Bolts (10) and tighten all bolts in sequence from center outward to 25 foot-pounds. Repeat sequence and torque bolts to 30 foot-pounds. Recheck for proper torque limit.
- h) Tighten Bracket Bolts (7) against Brackets (8), on both sides.
- i) Dispose of used cartridges according to local, state and federal regulations.

## 3) FINAL CHECK AND CALIBRATION

- a) Pressurize system and check for leaks.
- b) Flush system with compressed air for several minutes.
- c) Calibrate Carbon Monoxide Monitor as outlined in MST 2002 MONITOR MANUAL.

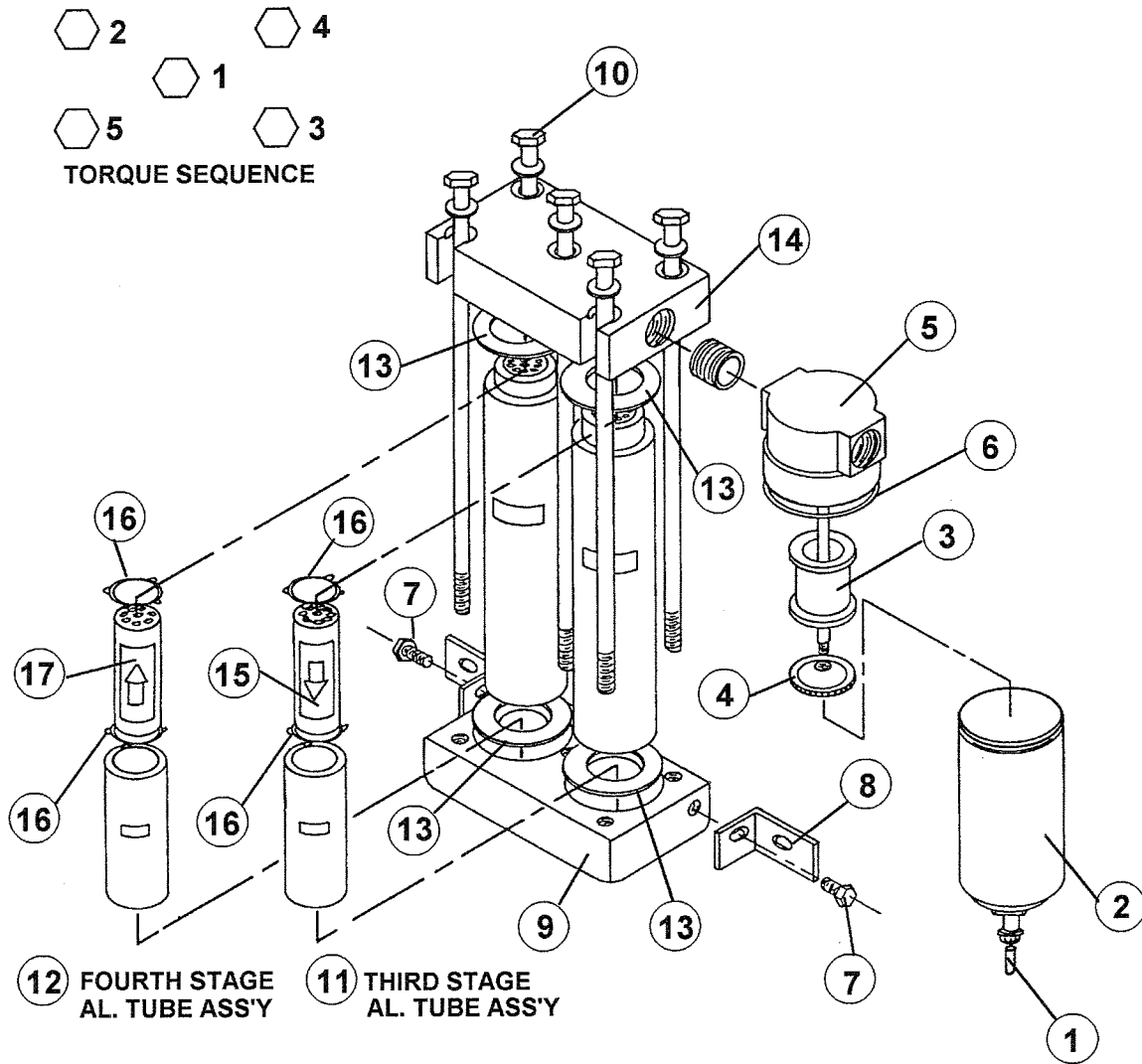


FIGURE NO. 4

## **RECORD KEEPING**

Record all periodical air quality checks, monitor calibration date, filter cartridge change intervals and any other service performed on the MST RESPIRATORY PROTECTOR®

**MST INC. SHALL NOT BE LIABLE FOR ANY INJURY, LOSS OR DAMAGE, (DIRECT OR CONSEQUENTIAL), ARISING OUT OF THE USE OF OR THE INABILITY TO USE THIS PRODUCT, BEYOND THE REPLACEMENT OF DEFECTIVE MATERIALS OR WORKMANSHIP. USER OF SUPPLIED AIR RESPIRATORS SHOULD EVALUATE THEIR OWN PARTICULAR APPLICATION AND PERFORM THEIR OWN TESTS FOR AIR QUALITY TO DETERMINE THE SUITABILITY FOR USE OF THIS PRODUCT.**

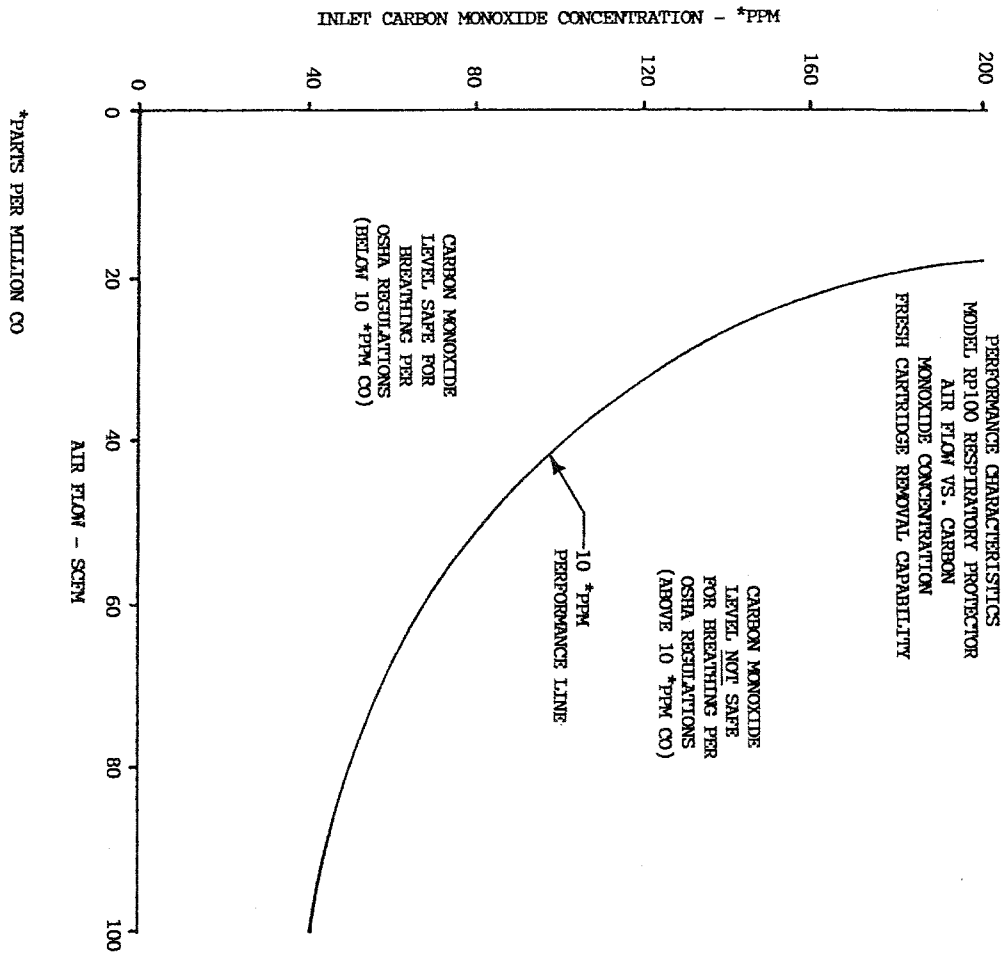
For further information, or questions about service or maintenance care of this unit, contact your local distributor or MST, Inc. at (800) 542-6646.

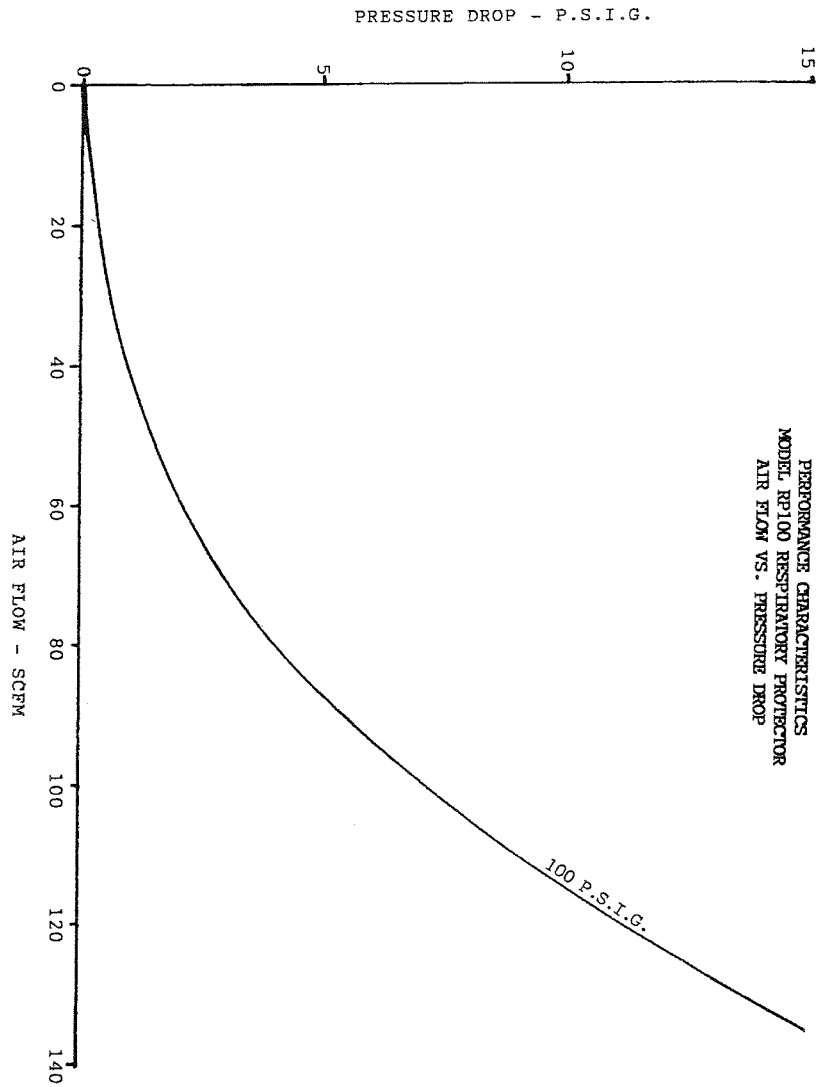
**MST, INC.**  
**SERVICE RECORD**  
**RESPIRATORY PROTECTOR®**  
**MODEL RP100BA-S1**

DATE OF SERVICE	SERVICE PERFORMED









## RESPIRATORY PROTECTOR® MODEL RP100BA-S1 PARTS

1	80184, (1), 1" Ball Valve	17	80178, (5), Manifold Bolts
2	S608-011, (4), Hex Nipple-1"	18	80197, (5), Manifold Washers
3	80186, (1), Prefilter-100 SCFM	19	80185, (1), 1" Tee
4	S638-014, (2), 1 1/4" x 1" Red. Bushing	20	80014, (1), 1/4" PVR 150 PSI
5	80051, (1), Tube Locking Collar	21	S638-013, (1), 1" x 1/2" Red. Bushing
6	S710-005, (1), Drain Tube		
7	80172, (1), Blue Base	23	S623-002, (1) 1/4" X 90° St. Elbow
8	80176-1, (1), Al Tube-3rd Stage	24	S638-008, (1), 1/2" X 1/4" Red. Bushing
9	80176-1, (1), Al Tube-4th Stage	25	S608-002, (1), 1/4" X 1/8" Hex Nipple
10	80114, (2), Base Bracket	26	80213, (1), Air Sample Metering Valve
11	S037-056, (2), Base Brkt Bolts	27	80261, (1), 90° Tube Lock Collar
12	S412-009, (2), Internal Lockwasher	28	80183, (1), Regulator
13	80115, (2), Fender Washer	29	80076, (1), 0-160 PSI Gauge
14	80173, (1), Blue Manifold	30	80077, (1), MST 2002 "CO" Monitor
15	80196, (2), Manifold Bracket	31	8008403, (1), Audible Alarm
16	S006-148, (4) Manifold/Base Brkt Bolts	32	80188, (1), 3/4" x 24" x 36" Board

**(SEE FOLLOWING PAGE FOR PARTS DRAWING).**

