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**SERVICE MANUAL
TWIN MODEL RP050BMSTO2-S2
RESPIRATORY PROTECTOR®
(CO/O2 MONITOR VERSION MANUAL)**

WARNING: Do not attempt to operate this equipment without first reading and understanding these operating instructions. Suitability for use of this device lies solely with user.

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**SPECIFICATIONS
RESPIRATORY PROTECTOR
RP050BMSTO2-S2**

INLET PRESSURE (Max.)	150 PSIG STATIC (10.4 bar)
RATED AIR FLOW (Max.)	100 SCFM (47.2 L/s)
OPERATING PRESSURE	100 PSIG DYNAMIC (6.9 bar)
OUTLET PRESSURE RANGE	0-125 PSIG (0-8.6 bar)
OPERATING TEMP. RANGE	68 -150 F (20-65 C) COMPRESSED AIR TEMP 0 - 105 F (-17 TO 40 C) AMBIENT AIR TEMP
OPERATING RELATIVE HUMIDITY (INLET AIR)	30-100% RH
OUTSIDE DIMENSIONS	48"L x 24"W x 5.75"D (1219mm x 610mm x 146mm)
WEIGHT (INCLUDING MONITOR)	53 LBS (24.1 kg.)
REPLACEMENT FILTER SET	FX050/2

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 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) OXYGEN MONITOR MODULE will alarm if oxygne level falls to 19.5% or less. If alarm should sound, remove respirator or activate SCBA and immediately move to a safe breathing atmosphere. Have the proper qualified personnel examine the equipment and make the appropriate corrections before using again.
- 5) SHOULD NOT have air inlet pressure greater than 150 PSIG static (10.4 bar). Personal injury could result.
- 6) PURIFIED AIR provided at the point - of - attachment for the Manufactures’ Respirator/Hose should be regulated and not exceeding the Manufacturers’ Respirator/Hose Assembly pressure requirements.

GENERAL PURIFICATION SYSTEM DESCRIPTION

The MST Respiratory Protector, a compressed breathing air purifier, is a system designed to remove or reduce selected contaminants, including Carbon Monoxide that is found in standard compressed air lines. The Respiratory Protector gives you the advantage of connecting 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 devices. This eliminates the necessity of providing a separate breathing air compressor or air supply to your workers.

The Respiratory Protector has a four stage filtration system and a Carbon Monoxide/Oxygen Monitor that is mounted on a convenient mounting board that allows the unit to be mounted on any available surface.

SYSTEM DESCRIPTION

(Refer to Figure No. 1 & 2)

Air entering the Respiratory Protector Filtration System at the inlet (A) is usually contaminated with oil, water, dirt, rust, scale and often deadly Carbon Monoxide gas. As the air passes through the First Stage (B) of the MST Prefilter, particulate matter is trapped and retained. The air then enters the Second Stage (C) of the Prefilter which coalesces liquid contaminants down to seventy-five hundredths (0.75) of a micron in size (0.3 micron for particulate matter) 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 of the unit by the Auto Drain. The air entering the Air Scrubber Inlets is 99.97% free of liquid water and contaminants (down to 0.3 micron in size). The Third Stage (D) of the Air Scrubber contains an odor absorbing activated charcoal which also collects various gaseous Hydrocarbons (such as oil fumes, benzene, etc). The Fourth Stage (E) of the Air Scrubber 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. Finally, the air passes through a one (1) micron Filtration Disk at (F). A sample of the filtered air is taken at (G) and passed through the Carbon Monoxide/Oxygen Monitor. The Carbon Monoxide/Oxygen Monitor continuously checks the air quality, per OSHA/CSA requirements for Carbon Monoxide and Oxygen and digitally displays the amount present. An audible and visual alarm will alert operators if any dangerous levels of Carbon Monoxide or Oxygen deficiency exist.

**MODEL RP050BMSTO2-S2
OPERATIONAL DIAGRAM**

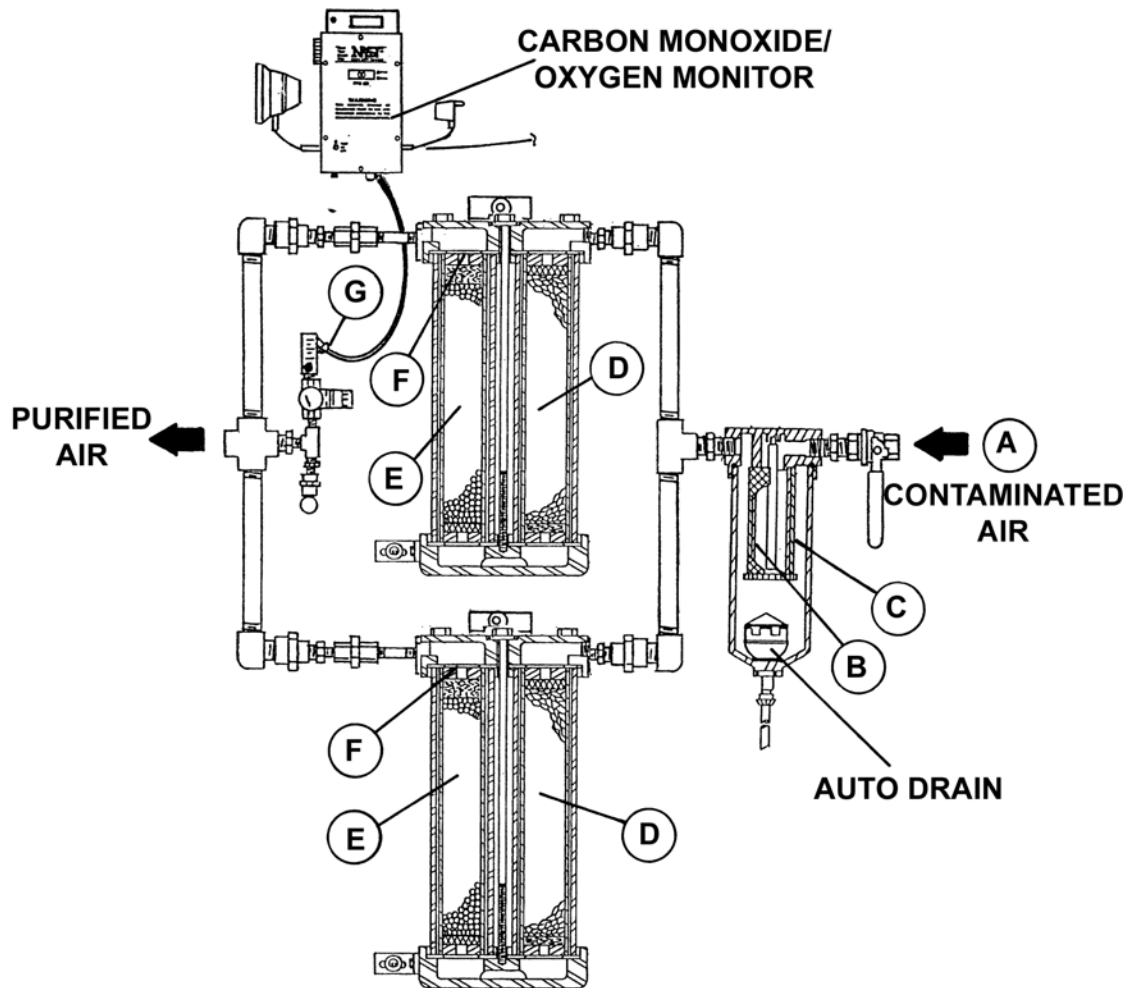


FIGURE NO. 1

MODEL RP050BMSTO2-S2 RESPIRATORY PROTECTOR

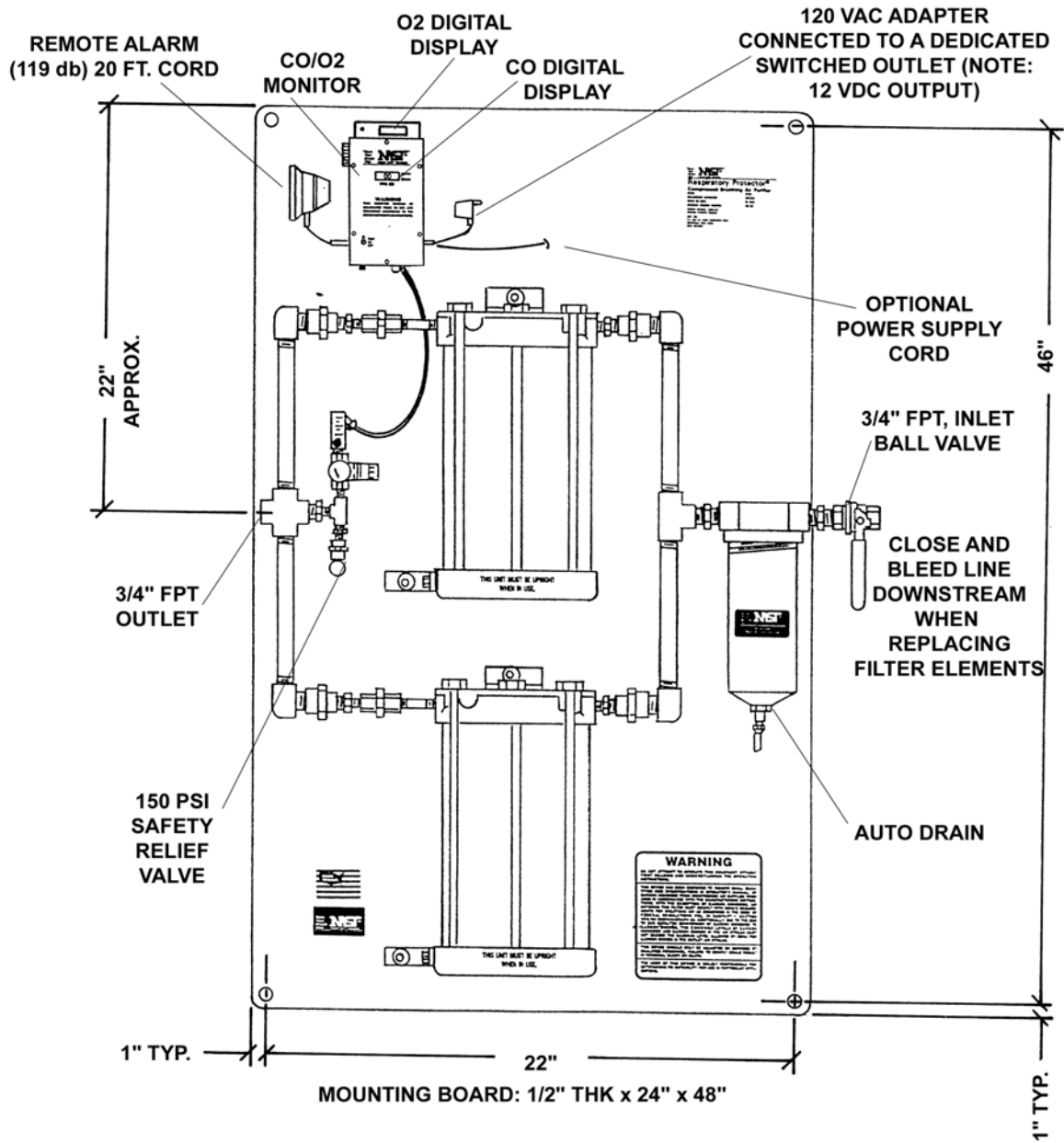


FIGURE NO. 2

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 3/4" I.D. hose or 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, all MST Units incorporate 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 30-100% 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) CONNECT CUSTOMER'S PIPE/HOSE TO MST UNIT - Be sure a minimum 3/4" I.D. pipe or hose is used. Purge new air line prior to connecting to MST Unit.
- 2) NEW FILTER SYSTEM CONDITIONING - Flow supplied air through new filter sets for several minutes to condition.
- 3) POWER MONITOR/CALIBRATE - Plug the 120 VAC Adapter into right side of monitor and into switched 110 VAC outlet power source (Installing the two 9 VDC batteries in monitor is optional). Switch monitor's toggle switch into the "ON" position and leave monitor warm-up for (5) minutes. Initially the monitor's green LED will blink and then come on full bright. The RED Alarm Led will flicker faintly (approx. every 0.7 seconds). Plug in the Remote Alarm (supplied with 20 ft. cord) into the "REM ALARM" jack located on the left side of monitor. After the warm-up period, check monitor's circuits/audible-visual alarm system by pushing the toggle switch up into the "TEST" position and hold. If the monitor is functioning properly, the following will occur:
 - A) Red/Amber LED - will come on steady
 - B) Green LED - will blink briefly, then come on steady
 - C) Audible alarm will sound and the remote alarm jack ("REM ALARM") will be energized.

Monitor's calibration should be checked now. Refer to MST Monitor Manual

- 4) CALIBRATION GAS REQUIREMENTS - Zero Gas: free of 'CO'. Span Gas: 50 to 150 ppm of 'CO' concentration in air. Calibration gas flow to monitor should be 0.5 to 1.5 SCFH (approx. 472 cc/min).
- 5) REGULATOR/SAMPLE AIR FLOW METER - Needs to be set so proper air sample flow will be metered to the monitor. The regulator needs to be adjusted up to a maximum 100 PSIG and the air flow meter ball set between 0.5 - 1.5 SCFH or in the green boxed area, (depending on style of scale meter has).
- 6) EXTREME TEMPERATURE CHANGES - Avoid; MST's monitor best performs at a temperature range of 0 - 105⁰F (-17 to 40⁰C). Always calibrate monitor after it has stabilized in the surrounding air temperature where system is to be used.
- 7) RESPIRATOR/HOOD/HOSE ASSEMBLY HOOK-UP - Consult Manufacturer's respirator manual for the proper air pressure requirements and set regulator(s) at point of attachment (MST Unit outlet or remote regulated drops). The air should be dynamically flowing through respirator/hose assemblies when the air pressure is set. **DO NOT EXCEED RESPIRATOR/HOSE ASSEMBLY MANUFACTURER'S PRESSURE REQUIREMENTS OR PERSONAL INJURY COULD RESULT.**

**MODEL RP050BMSTO2-S2
RESPIRATORY PROTECTOR®**

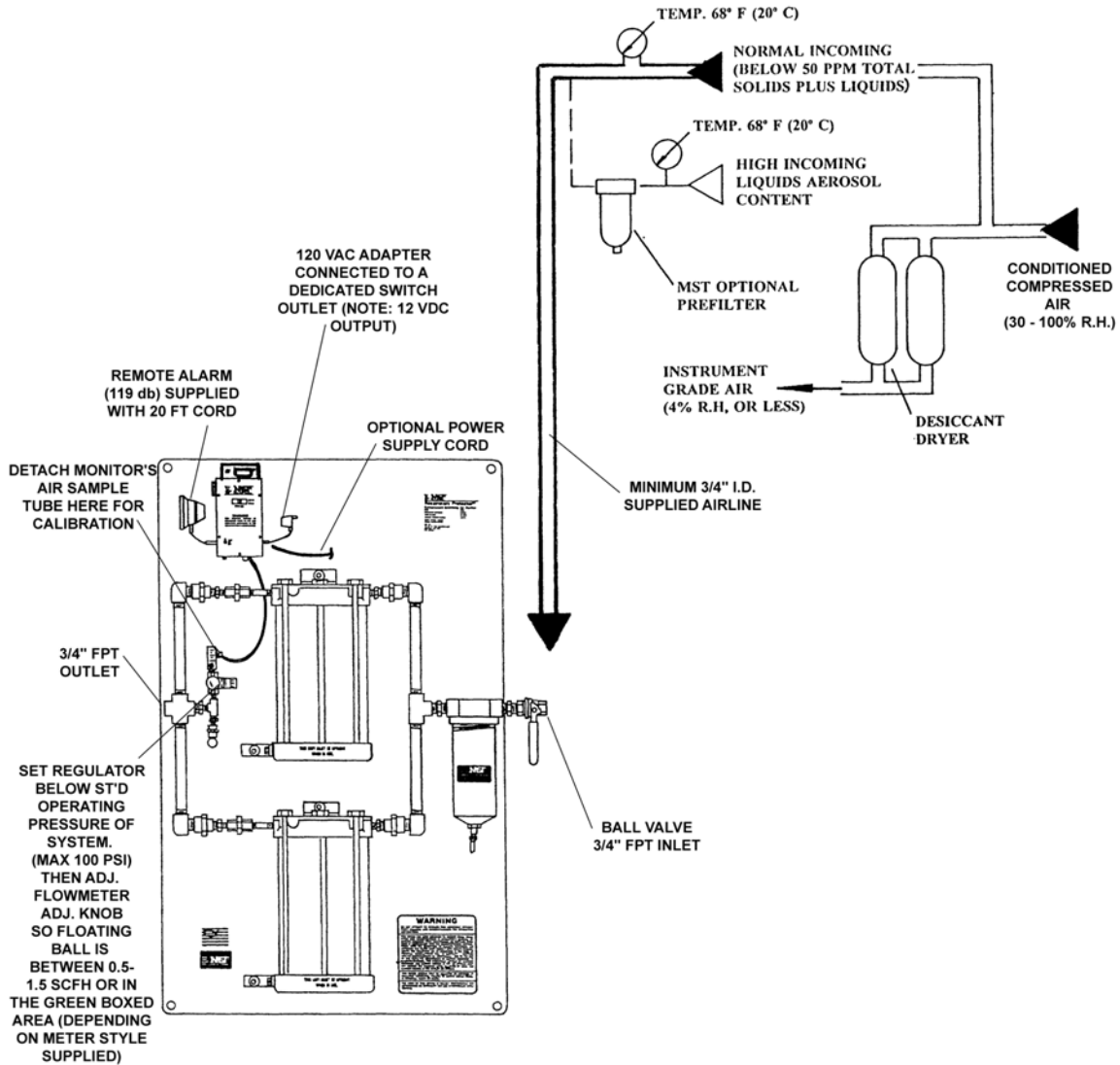


FIGURE NO. 3

MST RESPIRATORY PROTECTOR®
GENERAL OPERATION AND MAINTENANCE

- 1) MST MONITOR - Utilizes electrochemical sensors to measure the carbon monoxide and oxygen 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 MONITOR MANUAL.
 - b) If the monitor can be and is calibrated, but the alarm still sound, one or both conditions could exist:
 - 1) The filter cartridge life is exhausted; the 'CO' digital is at or greater than alarm level setting per OSHA/CSA requirements. Replace filter cartridges.
 - 2) Oxygen deficient air source exists; the 'O2' digital display reads 19.5% or less. Relocate air compressor intake to area not oxygen deficient.
 - c) If the monitor can not be calibrated, the carbon monoxide sensor may require replacement. See MST MONITOR MANUAL for replacement instructions and other troubleshooting information. The MST 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 MONITOR - Alarms should be checked prior to use.
- 3) MST MONITOR - Power supply is (2) 9-volt transistor - type batteries, (unless optional power supply used). The batteries will power the monitor continuously for approximately (30-35) hours. When the batteries output fall below (7.3) volts, the Amber LED "Low Battery" light will come on, indicating the batteries require replacement. When installing the new batteries into the battery holders, review polarity position marked inside holders and install batteries accordingly.
- 4) MST MONITOR - Flow of the air sample to monitor should be checked periodically to ensure sample air flow meter 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 the regulator/air flow meter for proper setting/location of air flow meter floating ball and general appearance (presence of excessive oil, water).
- 5) MST RESPIRATORY PROTECTOR® SYSTEM - Filters should be replaced monthly unless the air quality conditions warrant more or less frequent replacement. Replace all (5) 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. See CUSTOMER AIR SUPPLY, page 8, for corrective measures to take.

- 6) MST RESPIRATORY PROTECTOR® SYSTEM - New filter set:
- Has no 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 five (5) filter cartridges after one month's use, unless conditions warrant more or less frequent replacement. Conditioning equipment prior to the filtration system will increase the required service intervals when only low levels (below 25 ppm CO) of carbon monoxide are present.

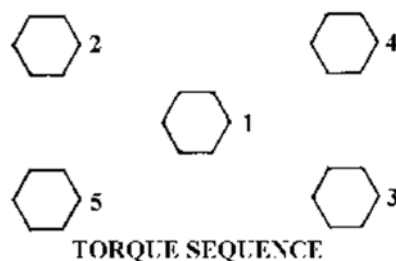
To refill or replace the filter cartridges in the Respiratory Protector Model RP050BMSTO2-S2, follow these steps (refer to Figure No. 4):

- 80104 Prefilter-Combined First and Second Stages
 - Remove plastic Drain Tube (1) by pulling down on the Retaining Collar of Fitting (2) to release Drain Tube.
 - Unscrew Prefilter Bowl Assembly (3) from Manifold (5) and clean Bowl Assembly in mild soap and water, blowing dry with low pressure compressed air.
 - Remove Two-Stage Prefilter Element (6) by unscrewing End Cap Retaining Nut (4) and pulling Prefilter Element down over center rod of Manifold.
 - Discard clogged Prefilter Element.
 - Inspect Manifold (5) for dirt and contaminates, clean as required, and inspect O-Ring (7) located inside Manifold for any cuts or cracks. Replace O-Ring, if required, to prevent air leakage.
 - Install new Two-Stage Prefilter Element (6) by sliding new Element over center on Manifold so that rod protrudes from end of Element and Element is squarely seated against Manifold with rod centered in Element.
 - Screw End Cap Retaining Nut (4) onto threaded portion of rod until End Cap Retaining Nut is seated properly against end of Prefilter Element and Element has come solidly against shoulder in Manifold.
 - Apply a light film of petroleum jelly on beveled edge of Prefilter Bowl Assembly (3) and screw bowl Assembly into Manifold (5) until tight (NOTE: Be sure O-Ring is properly seated in Manifold to prevent cutting O-Ring).

HAND TIGHTEN ONLY!

- i. Re-attach Drain Tube (1) by sliding Drain Tube into end of Fitting (2) and pushing Retaining collar up to lock Drain Tube in place. Be sure to slide outside diameter of Drain Tube completely into inside diameter of Fitting or Retaining collar will not lock Drain Tube into place properly.
2. 8007803 Air Scrubber-Third and Fourth Stages
 - a. Loosen (8) Screw from (9) Bracket.
 - b. Loosen five Manifold Bolts(10) enough to allow the Third and Fourth Stage Filter Tube Assemblies to move freely.
 - c. Remove the two front Bolts (10) with Washers (11).
 - d. Slide out old Third And Fourth Stage Filter Tube Assemblies.
 - e. Remove old Third Stage Filter Cartridge (13) and Cap Gasket (12) from the Third Stage Aluminum Tube (16) .
 - f. Clean the Aluminum Tube in mild soap and water and wipe dry.
 - g. Refill the Third Stage Aluminum Tube (16) by sliding the new Third Stage Filter Cartridge (13) into the Aluminum Tube from the bottom.. Make sure that the flow direction arrow on the new Third Stage Filter Cartridge is pointing down for proper operation.
 - h. Remove (14) Sealing Label and install new (12) Cap Gasket on the top of the Third Stage Aluminum Filter Tube Assembly.
 - i. Slide the new Third Stage Aluminum Filter Tube Assembly in the Air Scrubber on the inlet side.
 - j. Remove old Fourth Stage Filter Cartridge (15) and Cap Gasket (12) from the Fourth Stage Aluminum Tube (17).
 - k. Clean the Aluminum Tube in mild soap and water and wipe dry.
 - l. Refill the Fourth Stage Aluminum Tube (17) by sliding the Fourth Stage Filter Cartridge (15) into the Aluminum Tube from the top. Make sure that the flow direction arrow on the new Fourth Stage Filter Cartridge is pointing up for proper operation.
 - m. Remove (14) Sealing Label and install new (12) Cap Gasket on the bottom of the Fourth Stage Aluminum filter tube Assembly.
 - n. Slide the new Fourth Stage Aluminum filter tube Assembly in the Air Scrubber on the outlet side.
 - o. Tighten Manifold Bolts (10) in sequence from center outward to 100 inch-pounds. Repeat Sequence and torque bolts to 250 inch-pounds. Recheck for proper torque limit.
 - p. Tighten Screw (8) on Bracket (9) to prevent any damage from occurring when transporting the Respiratory Protector.

NOTE: Dispose of used filter cartridges in landfill according to local, state and federal regulations.



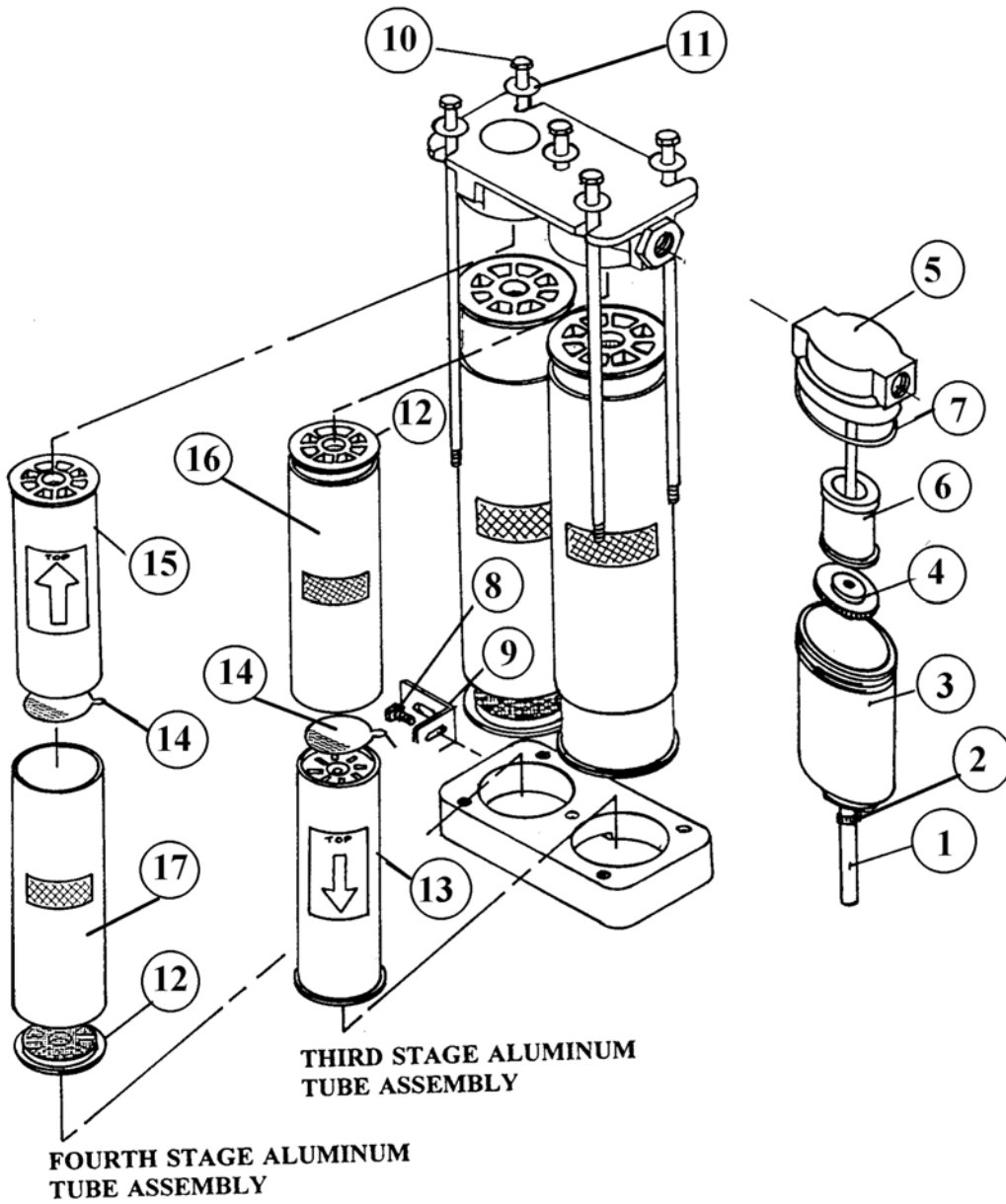


FIGURE NO. 4

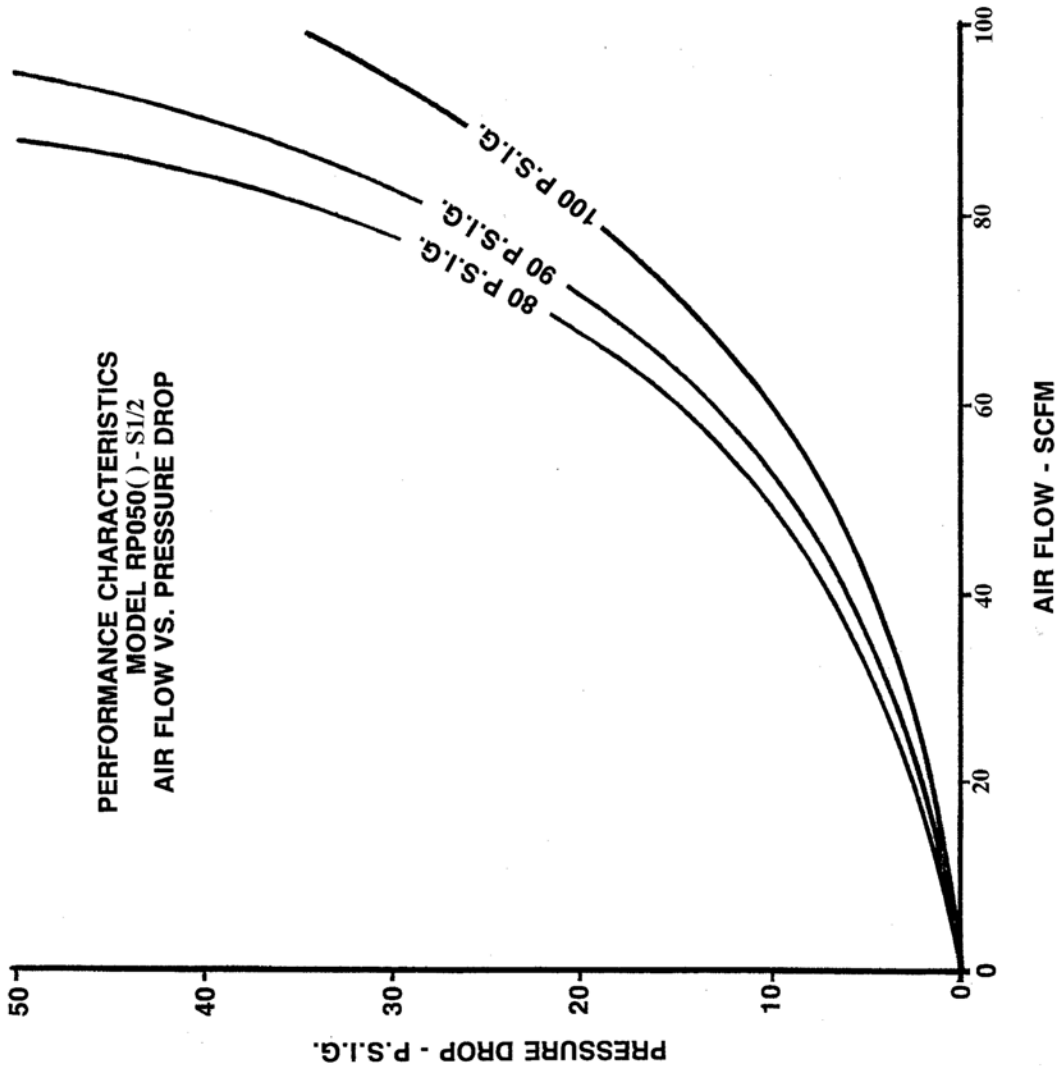
3. Final Check and Calibration:
 - a. Pressurize system and check for leaks. Re-tighten necessary parts to stop any leakage.
 - b. Flush system with compressed air for five (5) minutes.
 - c. Calibrate the Carbon Monoxide Monitor as outlined in the Monitor's instruction manual.

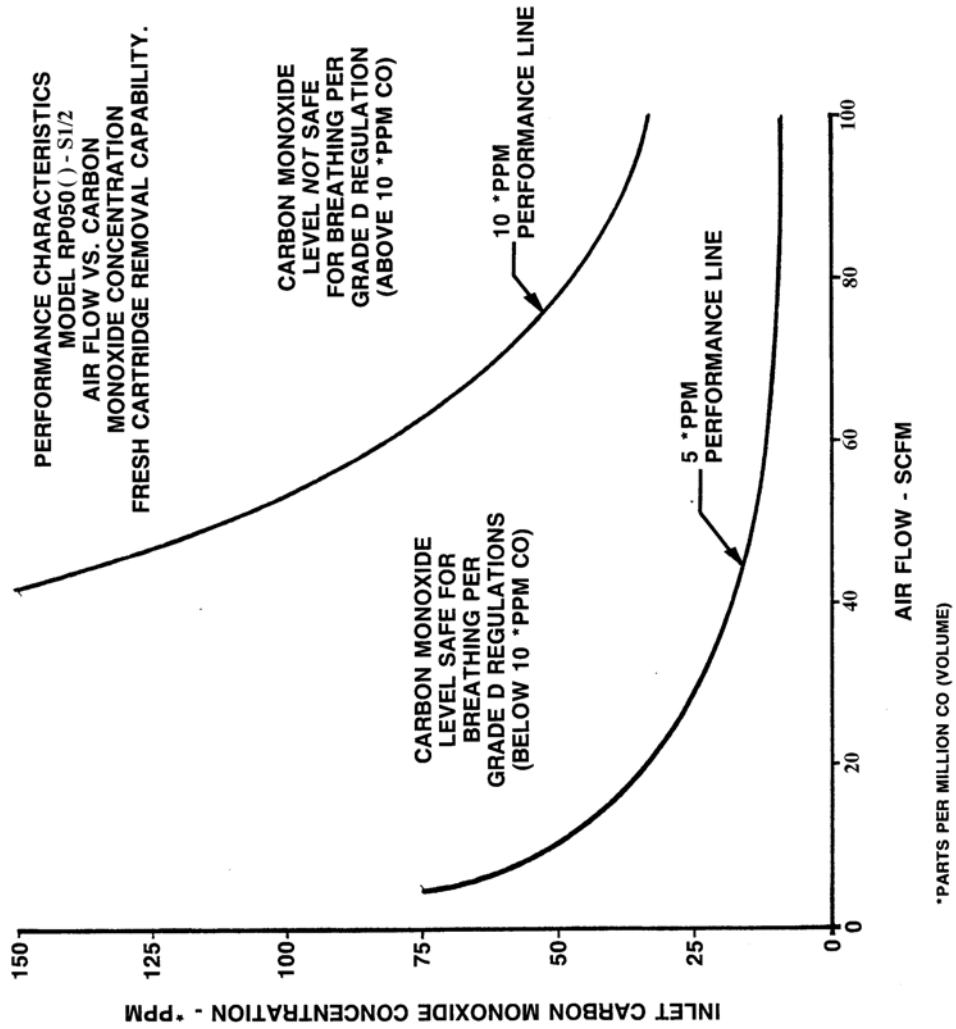
RECORD KEEPING:

Record all periodical air quality checks, monitor calibration dates, filter cartridge change intervals and any other service performed on the Model RP050BMSTO2-S2 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. Users 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.





**RESPIRATORY PROTECTOR
MODEL RP050BMSTO2-S2 PARTS**

- | | |
|---|--|
| 1) 80347, (1), 3/4" BALL VALVE | 21) 80484, (2), 3/8" BR. UNION |
| 2) S608-009, (2), 3/4" HEX NIPPLE | 22) 80483, (1), 3/4" BR. CROSS |
| 3) 80104, (1), PREFILTER - 100 SCFM | 23) S638-016, (1), 3/4" x 1/4" RED BUSHING |
| 4) 80051, (5), TUBE LOCKING COLLAR | 24) S608-003, (1), 1/4" HEX NIPPLE |
| 5) S710-005, (1), DRAIN TUBE | 25) 80014, (1), 150 PSI PR. VALVE |
| 6) 80067, (1), 3/4" BR. TEE | 26) |
| 7) S603-038, (4), 3/4" x 8" BR. NIPPLE | 27) 80235, (1), 1/4" BRASS TEE |
| 8) S623-005, (4), 3/4" x 90 ST. ELBOW | 28) 80533, (1), REGULATOR |
| 9) 80068, (4), 3/4" x 1/2" BELL RED. | 29) 80091, (1), PRESSURE GAUGE, 0 - 160 |
| 10) S608-006, (4), 3/8" x 1/2" HEX NIPPLE | 30) |
| 11) 80078, (2), BLUE MANIFOLD | 31) S608-003, (1) 1/4" HEX NIPPLE |
| 12) 80009, (2), MANIFOLD BRACKET | 32) S608-002, (1), 1/4" x 1/8" HEX NIPPLE |
| 13) S006-148, (6), BRACKET BOLTS | 33) S623-001, (1), 1/8" 90° ST. ELBOW |
| 14) S011-040, (10), MANIFOLD BOLTS | 34) 80213, (1), SAMPLE AIR FLOW METER |
| 15) 12021, (10), MANIFOLD WASHERS | 35) 80261, (1), TUBE LOCK COLLAR x 90° |
| 16) 80001, (2), BLUE BASE | 36) 80208-B, (1), MONITOR SAMPLE TUBE |
| 17) 80005, (2), AL. TUBE, 3 RD STAGE | 37) 80313, (1), MST 'CO/O2' MONITOR |
| 18) 80005, (2), AL. TUBE, 4 TH STAGE | 38) 80247, (1), 120 VAC ADAPTER |
| 19) 80114, (2), BASE BRACKET | 39) 8008403, (1), REMOTE ALARM |
| 20) S603-025, (2), 3/8" x 2" BR. NIPPLE | 40) 80257, (1), 1/2' THK x 24" x 48" MNTING. BD. |

See following page, Figure No.5, for detailed drawing.

**MODEL RP050BMSTO2-S2
RESPIRATORY PROTECTOR®**

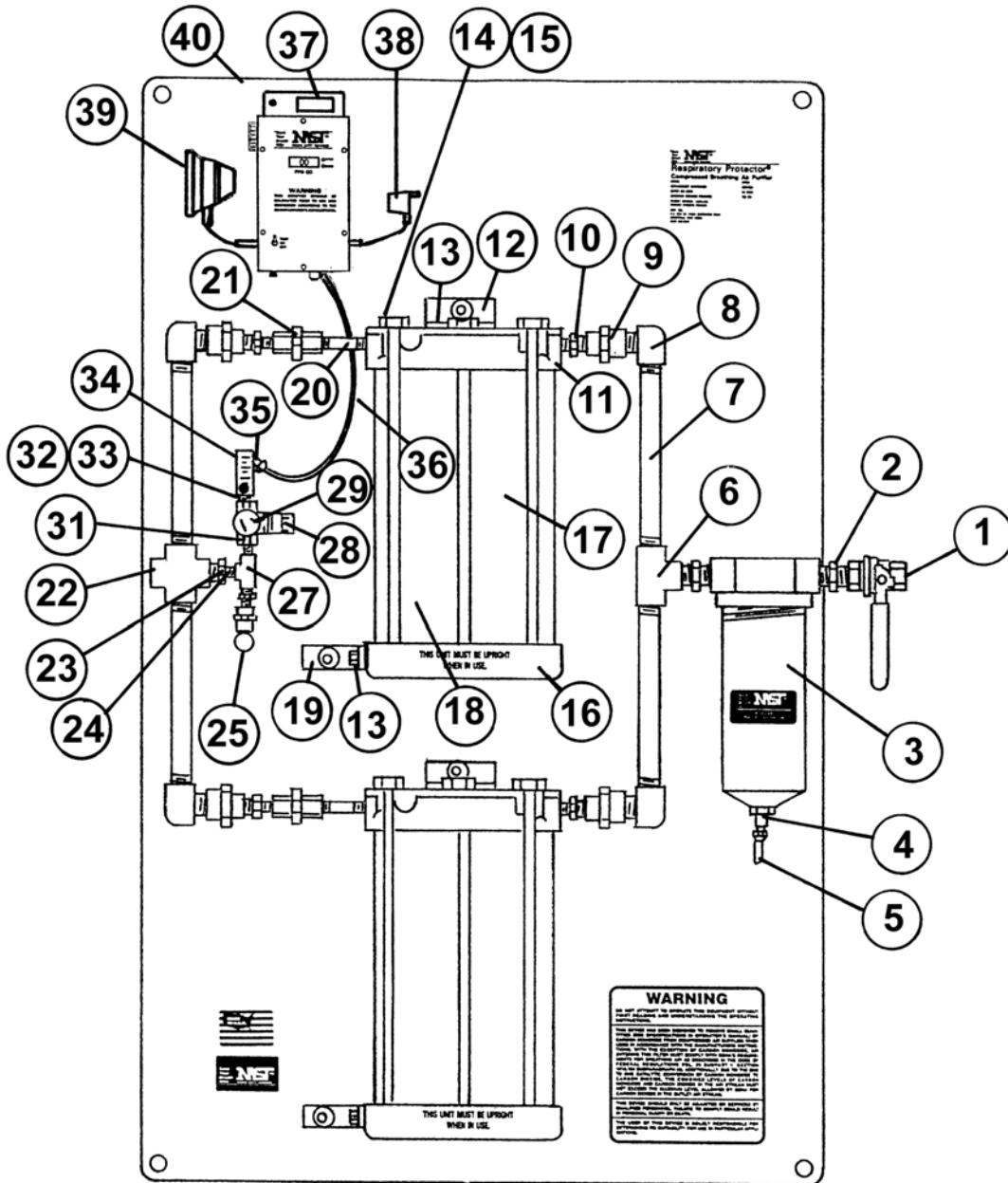


FIGURE NO. 5