



experience,
trust, service

Barricade CO Monitor

Manual #1090005
Revision C, 7/2/03



Before using this equipment, read, understand and follow all instructions in this manual.

Serious injury or death can result if you fail to comply with all instructions in this manual.

If the user or assistants cannot read or understand the warnings and instructions in this manual, the employer of the user and assistants must provide adequate and necessary training to ensure proper operation and compliance with all safety procedures pertaining to this equipment.

NOTA: Si no le es posible leer o comprender el Manual del operador (Operator's Manual), se debe solicitar la ayuda de otra persona que le instruya en los métodos seguros y apropiados de manejo y uso del equipo de limpieza con chorro de arena.

REMARQUE: Si vous ne pouvez pas lire ou si vous ne pouvez pas comprendre le texte du manuel d'utilisation (Operator's Manual), veuillez demander ci une autre personne de vous expliquer les méthodes de manipulation et d'utilisation correctes et sécuritaires du matériel de sablage.

NOTICE TO PURCHASER

Read and understand all instructions in this manual before using this equipment. If the employee or workers do not understand all of this information, the employer is responsible for training all workers operating this equipment in safe operating procedures. Give special attention to the HAZARD ALERT SIGNAL WORDS given on page 2. Not following instructions can result in serious injury or death.

The product described in this manual is only a component in the complete abrasive blasting system. Do not modify or substitute original manufacturer parts with non-approved sub-assemblies. Operating information regarding other products is the responsibility of the manufacturers of those products.



IMMEDIATE REPLACEMENT OF WORN COMPONENTS IS REQUIRED. FAILURE TO REPLACE WORN COMPONENTS COULD RESULT IN EXPOSING THE OPERATOR OR BYSTANDERS TO HIGH SPEED MEDIA AND COMPRESSED AIR WHICH COULD CAUSE DEATH OR SERIOUS INJURY.

FAILURE TO USE ORIGINAL MANUFACTURER REPAIR PARTS WILL VOID WARRANTIES, CAUSE MALFUNCTIONS AND COULD RESULT IN DEATH OR SERIOUS INJURY.

GENERAL INSTRUCTIONS

The very nature of the abrasive blasting operation can create hazards for the user. Read all operating and safety instructions BEFORE using equipment.

Protective equipment for the user and others exposed to the blasting process is the responsibility of the user and/or employer. User must consult with employer regarding potential hazards in the work environment and how to protect against those hazards. Potential hazards include but are not limited to:

- ◆ Dust containing toxic material from abrasive or material being blasted (free-silica sand, asbestos, lead paint, heavy metal paint and other toxins).
- ◆ Harmful dust can remain suspended in the air for long periods of time after blasting has ceased. Anyone in the blast area must use NIOSH-approved supplied-air respirators.
- ◆ Toxic fumes from adjacent coating operations, engine exhaust, chemicals, asbestos and contaminated water.
- ◆ Physical hazards such as poor visibility, excess noise, an uneven work surface and electrical hazards.

All components in a blasting operation must be installed, tested, operated and maintained by trained, qualified users.



BREATHING DUST FROM SILICA SAND MAY CAUSE SILICOSIS, A FATAL LUNG DISEASE. BREATHING DUST DURING BLASTING OPERATIONS MAY ALSO CAUSE ASBESTOSIS AND/OR OTHER SERIOUS OR FATAL DISEASES. A NIOSH-APPROVED, WELL-MAINTAINED AIR-SUPPLIED ABRASIVE BLASTING RESPIRATOR MUST BE USED BY ANYONE BLASTING, ANYONE HANDLING OR USING THE SAND AND ANYONE IN THE AREA OF THE DUST. HARMFUL DUST CAN REMAIN SUSPENDED IN THE AIR FOR LONG PERIODS OF TIME AFTER BLASTING HAS CEASED, CAUSING SERIOUS INJURY OR DEATH. FOLLOW ALL APPLICABLE OSHA STANDARDS, OSHA REGULATION 1910.134 (d).

1044 S. Dittmer Street
Davenport, IA 52802
800.BLAST.IT
www.marcousa.com

Barricade CO Monitor

Manual #1090005
Revision C, 7/2/03

! DANGER

IMPORTANT: KEEP THIS MANUAL IN A CONVENIENT LOCATION FOR FUTURE REFERENCE.

SUPPLIED-AIR RESPIRATOR

BREATHING DUST FROM SILICA SAND MAY CAUSE SILICOSIS, A FATAL LUNG DISEASE. BREATHING DUST DURING BLASTING OPERATIONS MAY ALSO CAUSE ASBESTOSIS AND/OR OTHER SERIOUS OR FATAL DISEASES. A NIOSH-APPROVED, WELL-MAINTAINED AIR-SUPPLIED ABRASIVE BLASTING RESPIRATOR MUST BE USED BY ANYONE BLASTING, ANYONE HANDLING OR USING THE SAND AND ANYONE IN THE AREA OF THE DUST. HARMFUL DUST CAN REMAIN SUSPENDED IN THE AIR FOR LONG PERIODS OF TIME AFTER BLASTING HAS CEASED, CAUSING SERIOUS INJURY OR DEATH.

BEFORE REMOVING RESPIRATOR, USE AN AIR MONITORING INSTRUMENT TO DETERMINE IF ATMOSPHERE IS SAFE TO BREATHE. CONTACT LOCAL OSHA OR NIOSH OFFICE TO DETERMINE THE PROPER RESPIRATOR FOR YOUR PARTICULAR APPLICATION. WEAR NIOSH APPROVED SUPPLIED-AIR RESPIRATORS ONLY IN ATMOSPHERES NOT IMMEDIATELY DANGEROUS TO LIFE OR HEALTH, WITH AT LEAST 19.5% OXYGEN, FROM WHICH A USER CAN ESCAPE WITHOUT USING THE RESPIRATOR. THE AIR SUPPLIED TO THE RESPIRATOR MUST BE AT LEAST GRADE D QUALITY AS DESCRIBED IN COMPRESSED GAS ASSOCIATION COMMODITY SPECIFICATION G-7.1 AND AS SPECIFIED BY OSHA REGULATION 1910.134 (d).

These requirements are as follows:

Oxygen	19.5-23.5%
Hydrocarbons (condensed)	
in mg/m ³ of gas	5 mg/m ³ max.
Carbon monoxide	10 ppm max.
Carbon dioxide	1,000 ppm max.
Odor	No detectable odor

No toxic contaminants at levels that make air unsafe to breathe. **SUPPLIED-AIR RESPIRATORS DO NOT REMOVE OR PROTECT AGAINST CARBON MONOXIDE (CO) OR ANY OTHER TOXIC GAS.** Use a carbon monoxide removal device and monitoring device with the respirator to ensure Grade D quality air.

! DANGER

ONLY PERSONS HAVING A NATIONAL BOARD "R" STAMP (ISSUED BY THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS) SHOULD BE ALLOWED TO WELD, DRILL, GRIND, OR ALTER THE BLAST MACHINE IN ANY WAY. IF ANYONE WITHOUT A BOARD "R" STAMP WELDS, GRINDS, DRILLS OR ALTERS THE BLAST MACHINE, THE ASME CERTIFICATION CODES AS WELL AS THE MANUFACTURER'S WARRANTY WILL BE VOIDED AND THE VESSEL CAN BE WEAKENED, CAUSING IT TO BURST, RESULTING IN DEATH OR SERIOUS INJURY (ASME PRESSURE VESSEL CODE, 2001, W / 2001 ADDENDUM).

Locate compressors to prevent potentially dangerous air (such as CO from engine exhaust) from entering the air intake. Install an in-line air purifying absorbent bed, filter and CO monitor to assure air quality.

Use only NIOSH approved breathing air hose to connect an appropriate air filter to the respirator. Non-approved hose can release chemical agents harmful to the user.

Ensure air filter and respirator system hoses are NOT connected to non-air, in-plant lines that may contain nitrogen, acetylene or other non-breathable gases. Always test the content of the air line before using. Failure to ensure Grade D quality air is being supplied to the user may result in serious injury or death. The respirator lenses are designed to protect only against rebounding abrasive. They will not protect against flying objects, glare, liquids, radiation, or high speed heavy materials. Using lenses from sources other than the original manufacturer will void NIOSH approval of the respirator.

Wear approved safety glasses or goggles at all times.

! DANGER

OSHA REQUIRES THE USE OF REMOTE CONTROLS ON ALL BLAST MACHINES. OSHA FURTHER REQUIRES THAT THE REMOTE CONTROL HANDLE MUST BE HELD OPEN (IN BLAST POSITION) MANUALLY. DO NOT TIE THE CONTROL HANDLE LEVER DOWN NOR ATTEMPT TO BYPASS ANY PART OF THE REMOTE CONTROL SYSTEM. DOING SO WILL DEFEAT THE PURPOSE OF THE FAIL-TO-SAFE FEATURE OF THE SYSTEM, RESULTING IN UNCONTROLLED BLASTING AND CAUSING DEATH OR SERIOUS INJURY.. 29 CFR 1910.244(B)

! DANGER

NEVER USE A PRESSURIZED OXYGEN CYLINDER TO PROVIDE OXYGEN TO THE AIRLINE RESPIRATOR. FAILURE TO TEST THE AIR LINE MAY RESULT IN THE SUFFOCATION AND DEATH OF THE RESPIRATOR USER, OR SERIOUS INJURY DUE TO THE LACK OF BREATHABLE AIR.

BLAST MACHINES AND REMOTE CONTROLS

Check air control orifice DAILY for cleanliness. Use only twin-line control hose. Do not use welding hose as the internal diameter and rubber composition are NOT SUITABLE for remote control use.

UNLESS OTHERWISE SPECIFIED, the maximum working pressure of blast machines and their related components MUST NOT EXCEED 125 psig (8.5 BAR) as approved by the (ASME) National Board.

! DANGER

ALWAYS USE AT LEAST TWO PEOPLE TO MANUALLY MOVE AN EMPTY BLAST MACHINE. NEVER ATTEMPT TO MANUALLY MOVE A BLAST MACHINE CONTAINING ABRASIVE. ALWAYS USE MECHANICAL LIFTING EQUIPMENT TO TRANSPORT ANY BLAST MACHINE CONTAINING ABRASIVE. FAILURE TO DO SO WILL RESULT IN DEATH OR SERIOUS INJURY.

Barricade CO Monitor

Manual #1090005
Revision C, 7/2/03



BREATHING DUST FROM SILICA SAND MAY CAUSE SILICOSIS, A FATAL LUNG DISEASE. BREATHING DUST DURING BLASTING OPERATIONS MAY ALSO CAUSE ASBESTOSIS AND/OR OTHER SERIOUS OR FATAL DISEASES.

A NIOSH-APPROVED, WELL-MAINTAINED AIR-SUPPLIED ABRASIVE BLASTING RESPIRATOR MUST BE USED BY ANYONE BLASTING, ANYONE HANDLING OR USING THE ABRASIVE AND ANYONE IN THE AREA OF THE DUST. HARMFUL DUST CAN REMAIN SUSPENDED IN THE AIR FOR LONG PERIODS OF TIME AFTER BLASTING HAS CEASED, CAUSING SERIOUS INJURY OR DEATH.

**FOLLOW ALL APPLICABLE OSHA STANDARDS,
OSHA REGULATION 1910.134 (d).**

PAY SPECIAL ATTENTION TO INDICATIONS OF DANGER, WARNINGS, CAUTIONS AND NOTICES!

THIS DOCUMENT CONTAINS SAFETY INDICATORS FOR YOUR SAFETY AND THE SAFETY OF PEOPLE AND PROPERTY AROUND THIS PRODUCT. DO NOT OPERATE OR SERVICE THIS EQUIPMENT UNTIL YOU HAVE THOROUGHLY READ AND UNDERSTAND THIS DOCUMENT.



THIS IS AN EXAMPLE OF DANGER. THIS INDICATES AN IMMINENTLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.



THIS IS AN EXAMPLE OF A CAUTION. THIS INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, MAY RESULT IN MINOR OR MODERATE INJURY. IT CAN ALSO BE USED TO ALERT AGAINST UNSAFE PRACTICES.



THIS IS AN EXAMPLE OF A WARNING. THIS INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.



THIS IS AN EXAMPLE OF A NOTICE. THIS INDICATES POLICY OR PRACTICE DIRECTLY RELATED TO SAFETY OF PERSONNEL OR PROTECTION OF PROPERTY.

THIS DOCUMENT CONTAINS INSTRUCTIONS AND WARNINGS FOR THE USE AND MAINTENANCE OF THE BARRICADE CO MONITOR ONLY. IT DOES NOT ADDRESS HAZARDS ASSOCIATED WITH MEDIA BLASTING OR OTHER MEDIA BLASTING EQUIPMENT.

FOR INFORMATION ON USE, OPERATION AND SAFETY OF OTHER BLASTING EQUIPMENT, SEE APPROPRIATE EQUIPMENT MANUALS.



WHEN THE BARRICADE CO MONITOR IS CORRECTLY INSTALLED AND MAINTAINED, IT MONITORS THE LEVEL OF CARBON MONOXIDE IN THE RESPIRATORY AIR LINE. THE MONITOR DOES NOT REMOVE CARBON MONOXIDE FROM THE AIR.



HARMFUL DUST CAN REMAIN SUSPENDED IN THE AIR FOR LONG PERIODS OF TIME AFTER BLASTING HAS CEASED. ANYONE IN THE BLAST AREA MUST USE A NIOSH-APPROVED, AIR-SUPPLIED RESPIRATOR. FAILURE TO USE A NIOSH-APPROVED, AIR SUPPLIED RESPIRATOR IN THE WORK AREA MAY CAUSE SERIOUS INJURY OR DEATH.

I. INTRODUCTION

The Barricade Carbon Monoxide (CO) Monitor and Alarm is a weather-resistant instrument that can be placed or hung at a convenient point on the job site and connected to AC or DC power, dependent upon the type of power cord provided.

The Barricade CO Monitor continuously monitors a compressed air sample connected to its sample inlet and it gives an alarm when:

- a) the CO in the sample exceeds a preset level (adjustable). Unit is initially set at 10 PPM (parts per million)
- b) there is a discontinuity in the detector circuit

The monitor indicates CO concentration on a digital display, and has a pilot light to verify that the instrument is on and operating properly.

The instrument is assembled into a black ABS-plastic waterproof housing 10" w X 8"h X 4" overall. A hose fitting for introducing the sample gas extends from the right hand side. Visible through the window in the front face are the display (LCD), sample-flow meter, the pilot and alarm lights. The left side contains the alarm buzzer and the power supply socket; on the right side are the sample inlet fitting and an alarm silence switch. A fold-down handle at the top serves as a carrying handle or a means of hanging the instrument. The front door is hinged at the bottom and is secured by two thumb latches at top. A gasket seal makes the instrument water and dust-resistant.

II. DETAILED DESCRIPTION

When the hinged and gasketed front door is opened after releasing the two latches, the interior is visible and accessible. Each major component is described in this section.

A. Front Panel

When the door is open, the following components are visible:

1. Display (a liquid crystal digital type, shows ppm concentration of CO from 0 to 199).
2. Flowmeter (shows rate of sample flow, from 0 to 2 scfh). The normal operating band, from 0.7 to 1.3, is marked on the panel.
3. Flow Adjust knob adjusts a pressure regulator which in turn gives the desired flowmeter reading. As with all pressure regulators, clockwise rotation increases pressure, hence increases flow.
4. ALARM light, red, comes on when instrument is in the alarm condition, generally due to a reading greater than 10 ppm.
5. NORMAL light, green, indicates that instrument is on and operating normally.

NOTE: There is no on-off switch; the instrument is active whenever the power cord is connected.

II. DETAILED DESCRIPTION (FRONT PANEL) CONTINUED:

6. SPAN adjustment is a small potentiometer which can be adjusted using a small screwdriver to give the correct sensitivity while testing a known CO sample.
7. ZERO adjustment is a similar small potentiometer that is used to set the reading to 00 on a known CO-free test sample.
8. ALARM adjustment is a small potentiometer which is adjustable through a hole in the right-hand lip of the panel. It sets the CO level at which the alarm is activated.

NOTE: The panel is pivoted at each lower corner, and can be swung down when the latch screw at the top center is released.

B. Case Interior

When the panel is unlatched and swung down the remaining components are visible and accessible.

1. Main Circuit board is mounted to standoffs on the back of panel. All active components are on the opposite side, but the exposed side includes four separate plug connectors leading to the various electrical components to be mentioned below.
2. Flowmeter circuit board supports the flowmeter and the two LED-type lamps (red and green). It also includes three plug connectors.
3. Regulator, which extends from rear of panel, reduces incoming air supply pressure to a constant low level of approximately 5 psig. It is adjustable from the front of panel as noted.
4. Flow block, a rectangular plastic block with a cavity to receive the CO sensor, has inlet and outlet fittings at the bottom. An O-ring seal within the cavity prevents leakage around the body of the CO sensor.
5. CO sensor, a three-electrode electrochemical device in a cylindrical plastic housing, responds to any CO that is present in the atmosphere passing over the lower face. CO diffuses through a permeable membrane and enters into an electrochemical reaction, producing a current directly and linearly proportional to CO content.

Note: An electrical contact board with red, black and blue wires mates with the pins of the sensor and connects them to the main circuit board. It also holds the sensor in place against the O-ring seal in the flow block.
6. Buzzer, a solid-state sounding device in the upper left side of case, gives an alarm sound whenever the instrument is in an alarm condition. It connects to one of the plug connectors on the rear of flowmeter board.
7. Power Supply, an encapsulated AC to DC electronic regulator, provides 12 volts DC for operation of the instrument, whenever the AC power cord is plugged in. It is secured through standoffs to the rear of the case.
8. Power Socket, a 4-pin connector on the left-hand side of case, accepts either an AC or a DC power cord, and connects either power source to the appropriate part of the circuit.
9. Silence Switch, a push-button switch that can be used to silence the alarm buzzer for a 4-minute period. This is useful particularly during calibration.
10. Flow restrictor, a threaded-body orifice screwed into the outlet of the pressure regulator. It is used to provide a fixed flow resistance for the pressure regulator to work against. It is combined with a sintered-metal filter to prevent dust from collecting on the orifice.

C. External Components

1. Alarm Silence switch, a push-button on the right hand side, when pressed activates a time delay circuit that holds the buzzer silent for 4 minutes, then re-energizes it if the reading remains above the alarm level.

NOTE: The silence circuit returns to normal whenever the instrument goes out of alarm condition

2. Buzzer, a solid-state sounding device on the left side of the case.
3. Handle, which folds down at the top of the case, is provided as a carrying means and also as a way of hanging the instrument in an location outside of the work area in order to reduce the possibility of damage.
4. Inlet fitting is installed in the right-hand side of case. It is a heavy-duty threaded brass fitting with 1/8" plastic tube connection. The outside is fitted initially with a 3/8" flare fitting, which can be easily exchanged for any other type of fitting with 1/8" male threads.
5. Outlet fitting is a small hose barb at the top of the case interior. it extends to an opening in the top face, which is concealed under the hinge. All of the analyzed air escapes at this point.
6. Power cord connects to the power socket. Two types are available:
 - a) AC type plugs into a standard 115 AC outlet.
 - b) DC type has clips for connection to a 12V battery.

III. OPERATION

A. Placing in Operation

1. Place or hang the instrument in the desired location, close to the air supply and to a source of power, and where it will be reasonably protected but readily seen.
2. Provide an air hose supply line, as short as possible, to connect to sample inlet.
3. Connect power cable, either AC or DC, to the appropriate power source.
4. When connected, the green light should come on and the red light and buzzer may also come on momentarily. Display should show a reading of 00 or close to it.
5. Open door of case and turn ZERO potentiometer clockwise to bring display to the desired alarm setting, for example 10 ppm. If the alarm does not come on, or comes on too soon, adjust it using the ALARM ADJ potentiometer. Clockwise rotation increases the alarm level. Then set reading back to 00.
6. Connect a source of nitrogen or CO-free air to sample inlet, and set flow to 1.0 by turning Flow Adjust control. Turn clockwise to increase flow.
7. If reading is other than 00, turn the ZERO potentiometer to obtain a zero reading; clockwise rotation increases reading.
8. Disconnect the air sample and connect a known sample of 50 to 150 PPM of CO in air or nitrogen, and again set the flow to 1.0.
9. Verify that the display reading increases and the alarm light and buzzer operate.
10. If reading does not reach the desired level corresponding to the known gas concentration, adjust it using the SPAN potentiometer. Clockwise rotation will increase reading.
11. Remove the CO sample, connect the air line sample to the sample inlet and adjust flow to 1.0.
12. Instrument is now in operation, and will actuate an alarm if CO concentration rises above the preset alarm level.

Note: The steps on the previous page are needed only for the first operation and periodically during the life of the instrument. For normal use, steps 5-11 can be omitted.

B. Normal Operation

1. Instrument will analyze the sample and show CO content on the display, in parts per million (PPM). The green NORMAL light will glow continuously and the red ALARM light will flicker approximately one time per second.
2. When the CO concentration exceeds the alarm point (initially set at 10 PPM) the red ALARM light will come on steady, the green NORMAL light will go off and the buzzer will sound a steady tone.
3. When the CO concentration drops below the alarm setting, the indicators will automatically return to normal.
4. While instrument is in alarm condition, pressing ALARM SILENCE button will stop the audible alarm from sounding, but leave the red light on. The silence condition will continue for up to 4 minutes, and then if the alarm condition persists the buzzer will resume sounding. If the reading drops below the alarm level at any time during the delay period, the circuit is reset and ready to alarm at the next alarm condition.

C. Abnormal Indications

1. Detector Open Circuit
 - a. Working Electrode (SENSING) wire (red) -- red and green lights will flash on and off, buzzer will sound and display will read "SC".
 - b. Counter Electrode (CNTR) wire (black) -- same action as "a" above.
 - c. Reference Electrode (REF) wire (blue) -- ready light will come on steady, buzzer will sound and display will read "1".
 - d. Entire detector disconnected, -- same as a. or b. above.
2. Flow cannot be set as high as 1.0 with clockwise rotation of Flow ADJUST knob.
 - a. Verify that air pressure is available at inlet.
 - b. Verify that sensor is seated in its cavity.
 - c. Verify that ball float is free in its tapered tube (Turn instrument upside down.)
 - d. Loosen retainer screw and tilt panel forward. Remove plastic tube from inlet of flow block, and determine whether air is coming from regulator. If it is not, and the problem cannot be otherwise solved, send instrument to the distributor where unit was originally purchased, for correction.

IV. MAINTENANCE

A. Routine Maintenance

1. Each day or period of operation, verify flow between 0.5 and 1.5, also reading close to 00. Adjust if needed.
2. Every 3 months, check calibration.
3. Replace sensor whenever reading cannot be set high enough, during calibration.

B. Sensor Replacement

1. Unplug or disconnect power cable.
2. Open instrument door.
3. Loosen retaining screw at top of panel, and swing panel forward and downward.
4. Locate sensor flow block at left rear of panel.
5. Remove two 8-32 x 3/4" Philips-head screws holding the green contact board to the block. Pull contact board and sensor from the block.
6. Unplug sensor from contact board and replace it with a new sensor (First remove and discard the jumper spring found between the center and left contact pins; it is provided to keep the cell fresh and ready to use while in storage.)
7. Verify that the o-ring is in place in the bottom of the cavity in the block.
8. Install the sensor and contact board in the block; only tighten the screws enough to cause mild flexing of the contact board.
9. Discard old detector cell, keeping in mind that it contains a small amount of sulfuric acid.
10. Reconnect power.
11. Allow approximately one half hour for stabilization, then calibrate as in Section III.A.

C. Main Circuit Board

The principal electronic components are all installed on the main printed circuit board which is secured to standoffs by three screws. The board can be removed by taking out the three screws and lifting the board off of the panel. Then the wires can be unplugged from their sockets along the edge of the board. The board can then be sent to the factory for repair or exchange.

D. Flowmeter

The flowmeter can be removed by first taking out the two screws that hold the board to standoffs. Work the flexible tube connection from the end of each flowmeter nipple, then push the spring retainer sleeves off, which will release the flowmeter.

E. Repair

For repair of other components, it is recommended that you call the distributor from whom the unit was purchased.

V. CALIBRATION KIT

A field calibration kit is offered for use in accurate adjustment of the instrument. It consists of one compressed gas cylinder containing 100 ppm CO in nitrogen, a gas dispensing valve, a length of plastic tubing and a 3/8" flare fitting to connect to instrument inlet.

A. Calibrating the monitor

1. Turn off air pressure and disconnect air line at instrument inlet, while instrument is still in operation. Install calibration fitting onto the flare fitting at instrument inlet.
2. Watch display, and after reading stabilizes set to 00 using ZERO potentiometer.
3. Install dispensing valve on cylinder and connect tubing to the valve outlet and to the calibration fitting on air inlet.
4. Open dispensing valve enough to produce a flow of 1.0 on flowmeter. Turn instrument FLOW ADJUST knob if necessary to produce sufficient flow.
5. Watch display as reading rises when CO mixture reaches sensor.
6. Adjust SPAN to give reading corresponding to the value marked on the cylinder, about 100 ppm.
7. Restore all connections to original state.

B. External Alarm Repeater

The No. 50110 External alarm and Strobe is an auxiliary alarm device that can repeat the alarm action at a remote point, accompanied by a flashing strobe light. This alarm can be silenced at the same time as the internal buzzer, by pressing the Alarm Silence button.

External alarm plugs into the socket on the right-hand end of the instrument, and can be placed or mounted at any convenient location within the 20' length of the cable. The alarm housing has a magnetic face for a convenient mounting against any steel structure. A 50' extender cable is available if needed to reach a more remote point. See parts list.

The buzzer operates directly from the internal alarm circuit.

VI. PARTS LIST

The following is a list of the instrument, parts and accessories that can be ordered from your distributor.

PART NO.	DESCRIPTION
1050001	Barricade Monitor, complete
1050102	12V DC Cord - 110"
1050103	115V AC Cord - 94"
1050104	Calibration Kit
1050105	Calibration Gas - 95PPM
1050106	Calibration Gas - Zero
1050107	Barricade Calibration Dispensing Valve
1050108	Sensor for Barricade
1050110	External Strobe and Buzzer-Barricade-20ft
1050111	50'Extender Cord-Barricade Strobe and Buzzer
1050112	Flow Block-Barricade
1050113	Flow Meter-Barricade
1050114	Calibration Adapter Fitting-3/8" Flare
1050115	Pressure Regulator-Barricade
1050116	Flow Resistor-.010"-Barricade
1050117	Flow Screen-Barricade
1050109	Barricade CO Monitor"Tune Up" *Installation of new CO sensor cell *Calibration of Unit *Cleaning inside and outside of unit *Replace necessary wires and tubes *Replace voltage regulator if necessary *Unit is returned to customer within approximately one month
1090005	Barricade CO Monitor Operator's Manual

CALIBRATION RECORD

Calibration Date:

Initials of individual performing calibration:

NOTES

NOTES



DO NOT EXCEED MAXIMUM WORKING PRESSURE OF 125 PSI. FAILURE TO KEEP MAXIMUM WORKING PRESSURE BELOW 125 PSI CAN CAUSE THE BLAST MACHINE TO BURST, CAUSING DEATH OR SERIOUS INJURY.



POINT THE NOZZLE ONLY AT THE OBJECT BEING BLASTED. NEVER POINT THE ABRASIVE BLAST STREAM AT YOURSELF OR OTHERS. THE HIGH VELOCITY ABRASIVE PARTICLES MAY INFLICT SERIOUS INJURY OR DEATH. KEEP UNPROTECTED WORKERS OUT OF THE BLASTING AREA. ALWAYS BE CERTAIN TO HAVE SECURE FOOTING WHEN BLASTING. THERE IS A RECOIL HAZARD WHEN BLASTING STARTS THAT MAY CAUSE USER TO FALL AND MISDIRECT THE ABRASIVE STREAM AT OPERATOR OR BYSTANDER.

AIR HOSE, BLAST HOSE, COUPLINGS, AND NOZZLE HOLDERS

Keep air hose length as short as possible and in a straight line. Inspect daily and immediately repair leakage. It is recommended the blast hose have an inside diameter 3 to 4 times the size of nozzle orifice diameter. Keep hose lengths as short as possible to reduce pressure loss. Inspect blast hose daily for soft spots and repair or replace immediately. Cut loose hose ends square when installing hose couplings and nozzle holders to provide uniform fit of hose to coupling shoulder. Only install couplings or nozzle holders that provide a tight fit on hose. Use only manufacturer's recommended coupling screws. Check all gaskets several times during a working day for wear, distortion and softness. Replace coupling gaskets FREQUENTLY to prevent leakage. Abrasive leakage can result in coupling failure. Install safety pins at all coupling connections to reduce risk of accidental disengagement during hose movement. Always attach safety cables at ALL air hose AND blast hose coupling connections. Cables relieve tension on hose and also control whipping action in the event of a coupling failure.

ADDITIONAL TECHNICAL DATA

The associations listed below offer information, materials and videos pertaining to abrasive blasting and safe operating practices.

American Society for Testing and Materials (ASTM)

100 Barr Harbor Drive, W. Conshohocken, PA 19428
Phone: (610) 832-9500
FAX: (610) 832-9555

National Association of Corrosion Engineers (NACE)

1440 South Creek Drive, Houston TX 77084
Phone: (713) 492-0535
FAX: (713) 492-8254

Office of General Industry Compliance Assistance (OSHA)

Room N - 3107 United States Department of Labor
200 Constitution Avenue NW, Washington, DC 20210
Phone: (202) 219-8041

Steel Structures Painting Council (SSPC)

40-24th Street 6th Floor, Pittsburgh PA 15222
Phone: (412) 281-2331
FAX: (412) 281-9993

MAINTENANCE



ALWAYS DEPRESSURIZE AND LOCKOUT THE BLAST SYSTEM BEFORE ANY MAINTENANCE OR TROUBLESHOOTING IS ATTEMPTED. FAILURE TO DEPRESSURIZE WILL RESULT IN RELEASE OF HIGH SPEED MEDIA AND COMPRESSED AIR CAUSING DEATH OR SERIOUS INJURY.

THIS EQUIPMENT IS NOT INTENDED FOR USE IN ANY AREA THAT MIGHT BE CONSIDERED A HAZARDOUS LOCATION AS DESCRIBED IN THE NATIONAL ELECTRIC CODE NFPA 70 1996, ARTICLE 500. USE OF THIS EQUIPMENT IN A HAZARDOUS LOCATION MAY CAUSE AN EXPLOSION OR ELECTROCUTION RESULTING IN SERIOUS INJURY OR DEATH.

WARRANTY

Seller warrants to the original purchaser that the Product covered by this Warranty will remain free from defects in workmanship or material under normal commercial use and service for a period of one year from the date of shipment to the original Purchaser. This Warranty shall not apply to defects arising, in whole or in part, from any accident, negligence, alteration, misuse or abuse of the Product, operation not in accordance with applicable instructions or manuals or under conditions more severe than, or otherwise exceeding, those set forth in the written specifications for the Product, nor shall this Warranty extend to repairs or alterations of the Product by persons other than Seller or Seller's authorized representatives, or to maintenance parts.

DISCLAIMER OF WARRANTIES

THE FOREGOING WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHER WARRANTIES OF QUALITY, WHETHER ORAL OR WRITTEN AND WHETHER EXPRESS OR IMPLIED. ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY EXCLUDED AND ARE INAPPLICABLE TO THE PRODUCT.

EXCLUSIVE REMEDY FOR WARRANTY CLAIMS

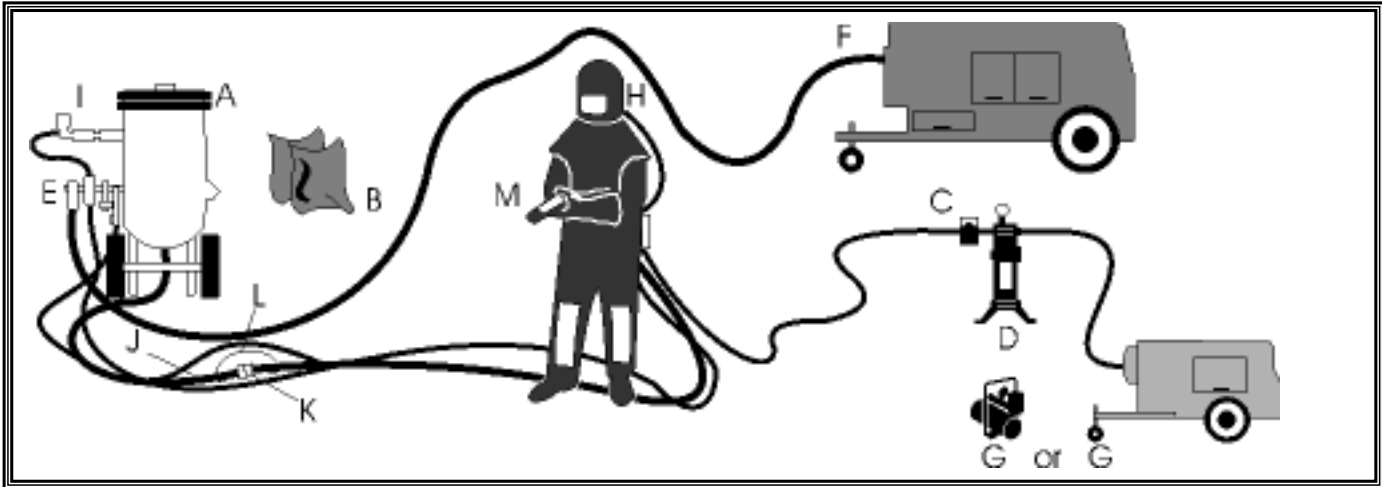
The sole and exclusive remedy of Purchaser for under the foregoing Warranty covering this Product shall be repair or replacement, free of charge, F.O.B. point of manufacture, of any defective part or parts of the Product that were manufactured by Seller, and which are returned to Seller at Seller's principal place of business, postage prepaid. This sole and exclusive remedy is conditioned upon Purchaser's prompt written notice to Seller at Seller's place of business that a defect has been discovered, together with a reasonably detailed description of the defect in the Product, within thirty (30) days after discovery of the defect, otherwise such claims shall be deemed waived. No allowance will be granted for any repairs or alterations made by Purchaser or others without Seller's prior written consent. If such notice is timely given, Seller will have the option to either modify the Product or component part thereof to correct the defect, replace the Product or part with complying Products or parts, or refund the amount paid for the defective Product, any one of which will constitute the sole liability of Seller and full settlement of all claims. Purchaser shall afford Seller prompt and reasonable opportunity to inspect the Product for which claim is made. The sole purpose of the foregoing stipulated exclusive remedy shall be to repair or replace defective Products or components thereof, or to refund Purchaser the purchase price thereof. This stipulated exclusive remedy shall not be deemed to have failed of its essential purpose so long as Seller is willing and able to repair or replace the defective parts or refund the purchase price in accordance with the terms hereof.

LIMITATION OF REMEDY

THE FOREGOING STIPULATED EXCLUSIVE REMEDY IS IN LIEU OF ALL OTHER REMEDIES FOR BREACH OF CONTRACT OR WARRANTY SELLER SHALL NOT BE LIABLE FOR ANY LOSS OR DAMAGE RESULTING, DIRECTLY OR INDIRECTLY, FROM THE USE OF LOSS OF USE OF THE PRODUCT WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, THIS EXCLUSION EMBRACES THE PURCHASER'S EXPENSES FOR DOWNTIME OR FOR MAKING UP DOWNTIME, DAMAGES FOR WHICH THE PURCHASER MAY BE LIABLE TO OTHER PERSONS, DAMAGES TO PROPERTY, AND INJURY TO OR DEATH OF ANY PERSONS, AND IS ALSO EXCLUSIVE OF ANY CLAIMS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF PROFITS, REGARDLESS OF WHETHER SELLER HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. SELLER NEITHER ASSUMES NOR AUTHORIZES ANY PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OR USE OF ANY PRODUCTS COVERED BY THE FOREGOING WARRANTY AND DISCLAIMERS, AND THERE ARE NO ORAL AGREEMENTS RELATING TO REMEDIES WHICH ARE COLLATERAL TO OR WHICH AFFECT THIS LIMITATION.

OPERATOR: Conduct the following maintenance procedures on a daily basis. Check all piping, fittings and hoses for tightness and leakage. Replace worn or damaged parts immediately.

PERSONNEL: Blast operators must receive thorough training on the use of abrasive resistant attire which includes: supplied air respirator, safety shoes, leather gloves, ear protection and eye protection. PROTECT both the operator and bystanders by complying with NIOSH and OSHA safety standards.



DAILY PRE-OPERATION CHECKLIST

- ⇒ GROUND Blast Machine (A) to help reduce static electricity hazard. Fit Blast Machine with a screen and cover to prevent foreign matter and moisture from entering.
- ⇒ CHECK Abrasive (B) material safety data sheet (MSDS) for presence of toxic or harmful substances. USE only properly sized abrasives which are free of harmful substances such as lead, silica, cyanide, or arsenic. Test surface to be blasted for toxic substances.
- ⇒ USE a CO Monitor Alarm (C) at all times. The OSHA required breathing Air Filter (D) removes moisture and particulate matter. It does NOT detect or remove Carbon Monoxide.
- ⇒ INSTALL Air Line Moisture Separator (E) as close to blast machine inlet as possible. The separator must fit either the inlet piping or air supply line. CLEAN filter if necessary and DRAIN moisture.
- ⇒ READ and follow air compressor (F) manufacturer's instructions for maintenance. Use correct size compressor to provide adequate volume (cfm) for nozzle and other tools, with an additional 50% to allow for nozzle wear. Select a compressor outlet and air hose four times the size of the nozzle orifice.
- ⇒ SELECT an oil-free Breathing Air Compressor (air pump) (G), which is capable of providing Grade D quality air in an atmosphere free of contaminants. Pump must be located in an area suitable to transfer Grade D quality air. Oil-lubricated air compressors should only be used in conjunction with a CO (Carbon Monoxide) monitor (C).
- ⇒ CLEAN and carefully MAINTAIN NIOSH approved Supplied Air Respirator (H). OPERATE only with all components, outer lens and inner lens in place. INSPECT all components for dirt, wear or damage. Do NOT substitute any respirator parts with non-approved sub-assemblies, as doing so will void NIOSH approval.
- ⇒ CHECK Remote Controls carefully to keep them in operating condition. USE only approved spare parts. Including twin line hose. Do NOT use welding hose. TEST system operation before system pressurization.
- ⇒ CHECK Blast Line Hoses (J) for external and internal wear, soft spots and damage. KEEP hoses free of kinks and bends and as straight as possible. It is recommended the blast hose have an ID three to four times the size of the nozzle orifice.
- ⇒ CHECK Hose Coupling (K) and Nozzle Holders to ensure a snug fit and they are secured with correct coupling screws. Check gaskets and replace if worn, soft or distorted. PLACE coupling lugs in LOCKED position. Gasket must provide positive seal with safety pins inserted through pin holes. INSTALL safety cables (L) at every connection to prevent disengagement. Do NOT mix different brands of components. CHECK nozzle holder for worn threads.
- ⇒ INSPECT Nozzle (M) and Gasket for wear. Replace nozzle when liner is cracked, damaged or when 1/16" larger than original size.



EVERYONE IN THE BLAST AREA SHOULD CORRECTLY USE AND MAINTAIN A NIOSH-APPROVED AIR-SUPPLIED RESPIRATOR AS REQUIRED BY OSHA, EVEN AFTER BLASTING HAS CEASED. HARMFUL DUST CAN REMAIN SUSPENDED IN THE AIR FOR LONG PERIODS OF TIME AFTER BLASTING HAS CEASED, CAUSING SERIOUS INJURY OR DEATH.