RESPIRATORY AIR LINE MONITOR
ABL-4021
O.M. 21457

DISTRIBUTED FOR

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MANUFACTURER
WARRANTY
SUPERSEDES ALL
OTHER WARRANTIES

⚠ WARNING

Do not proceed with these instructions until you have READ the orange cover of this MANUAL and YOU UNDERSTAND its content.* These WARNINGS are included for the health and safety of the operator and those in the immediate vicinity.

*If you are using a Clemco Distributor Parts and Maintenance Guide refer to the orange warnings insert preceding the Index before continuing with the following instructions.

This gas detection instrument is to be operated as a life saving device. Such a unit requires proper care, testing, calibration, and maintenance. Please read this manual prior to operating and respect an instrument that can save your life.

1.0 DESCRIPTION

1.1 GENERAL
The instrument's electronics are enclosed in a NEMA-4A polycarbonate case. The case is corrosion resistant, positively pressurized by the compressor supply line, and sealed except for a bleed hole to exhaust the compressor's air. The unit standardly operates on 110 VAC power and has an access port to connect auxiliary remote alarms to the relay contacts. It comes equipped with a case mounted horn which may be disconnected if not required.

1.2 Adjustment controls are not necessary since they are automatically performed by the microprocessor. The unit has two internal push buttons to set alarm levels and other set-up functions.

1.3 The instrument uses the latest state-of-the-art electrochemical cell for detecting carbon monoxide. The sensor has a life expectancy of approximately two years and has a one year warranty. It is easily replaced and should be periodically calibrated as its output diminishes during its life - especially during the final months.

READOUT

2.1 The readout is a one line eight character back-lighted LCD display located on the front panel. The display shows the level of gas in PPM (parts per million) and flashes when in red alarm. It also displays prompt messages during calibration or warnings such as low flow.

3.0 ANNUNCIATOR LIGHT/ALARMS

3.1 **Red Alarm** - Indicates a level of gas above the red alarm point.

Yellow Caution - one of the following conditions:

3.2.1 Indicates a gas reading above the caution alarm point.

Indicates a low flow.

3.2.3 Indicates that the instrument is in the calibration mode or not calibrated and requires attention.

3.3 **Green** - Safe operational condition.

3.4 **Relay/Alarms**

3.4.1 **Red Relay** - If switched on, Red Relay activates when Red Alarm light is illuminated - Gas level above Red Alarm Point.

3.4.2 **Yellow Relay** - If switched on, Yellow Relay activates:

3.4.2.1 Gas level above Yellow Alarm Point.

3.4.2.2 In low flow after a two minute delay (delay required during calibration to avoid activating Yellow Relay).

3.5 During calibration the alarm relays are deactivated to eliminate any external alarms and remain shut off for one minute after calibration to clear test gas from the sensor. The alarm circuits are reactivated when the yellow light is off and the green light appears or after two minutes in low flow.

4.0 MOUNTING

4.1 Screw the regulator to the brass bulkhead port on the right side of the unit prior to mounting the case. Secure the black mounting feet (located on the four corners of the instrument to a surface using 1/4" bolts or screws.

4.2 An optional mounting method is to remove the feet and fasten the unit through the four corner holes as now described.

CAUTION

TOUCHING THE CIRCUIT BOARDS CAN PLACE A STATIC CHARGE TO THE MICROCOMPUTER CHIP CAUSING FUTURE ERRATIC OPERATION. PLEASE HANDLE ELECTRONICS WITH CARE.

4.3 To mount the unit without feet, first remove the corner cover screws. Note that all the electronics are mounted to the front cover except the transformer, alarm, and air hose line. All these have disconnects and the wiring for the transformer, is shown on Diagram 1. After unscrewing the front cover and disconnecting the lines, set

it on a static free table. (In the event your unit needs factory service, you can send the front cover with the electronics to the factory eliminating the need to unbolt the case and disconnect the auxiliary equipment.) The front cover screw holes have a shaft which continues to the bottom of the case. Secure the case to a surface using No. 8 screws or bolts.

4.4 Place a T-fitting pipe in the supply line between the compressor and respirator user and feed a 1/8" line to the regulator. It is an excellent idea to place a drop pipe (trap) below the regulator with a manual drain to periodically remove water and scale. Run any auxiliary alarm wires to the case at this time through the one inch plug hole using a C type electrical fitting. Finish the auxiliary wires with red colored spade lugs for easy servicing and connect to either the NO, NC, or C marked terminals. See Diagram 1 for appropriate terminal selection and wiring.

4.5 Reconnect the air and electrical lines and then replace front cover.

5.0   SET-UP PROCEDURE

5.1 There are push buttons inside the unit to change parameters such as alarm level, cal gas concentrations, etc. These can be accessed by removing the two left screws and loosening the right ones allowing the left side of the front cover and electronics to be forward of the box enclosure. The two buttons are located on the left edge of the top circuit board. Pushing the top button places the unit in the following set up modes: CO Alarm Point Red, CO Alarm Point Yellow, CO Cal Gas 5 to 100, Relay Red On or Off, Relay Yellow On or Off, and Test Alarms. The set-up values can be changed or alarms tested by pressing the bottom button. The Red alarm Point is factory set at 10 PPM which is the government's standard for respiratory air grades D and E. The Yellow Alarm Point is factory set at 5 PPM as a caution condition. The test gas concentration may be set from 5 to 100 PPM and is factory set at 20 PPM. It is important to use the same test gas as the set concentration, otherwise the calibration will fail because of the error protection feature. Changing the test gas concentration to another value without calibrating will fault (FLT) the unit's reading. The FLT message may be removed by returning to the calibration value prior to the change.

5.2 Settings the relays ON or OFF permits any auxiliary device connected to them to be shut off if not needed. During calibration they will be automatically shut off.

5.3 The alarm horn and lights may be tested by pressing and holding the bottom button while in alarm test set-up mode. When testing an auxiliary horn, be sure the relay is turned on.

6.0   OPERATION

6.1 Plug the unit into 110 VAC and the display will show introductory messages and a warm-up countdown. If the unit does not power up, check the electrical connections and try replugging in the unit. If the start up does not occur, call the factory.

6.2 After the warm-up countdown, the instrument will display the gas level. The air regulator may be adjusted at any time to set the flow level from 0.5 to 0.9. If the low flow indication shows on the display, increase the flow; and then drop the flow to operational range to activate the low flow switch.

CAUTION

If the unit is reading a gas level, do not make any adjustments for a few hours until the unit has settled in. If calibration is attempted within the first fifteen minutes a Too Soon message will occur on the display.

6.3 If gas readings remain high or below zero (-0), recalibration may be needed. We also recommend checking the compressor's air, this may be the cause for high readings since inside air normally contains a few parts of carbon monoxide.

7.0   CALIBRATION

7.1 Although the unit was calibrated at the factory, it may require recalibration due to handling. The only way to assure a gas sensor is properly operating is to place gas on it.

7.2 To calibrate the unit with gas, shut-off the air from the compressor supply line with the regulator and a low flow message will appear with the supply line shut off. Connect the tank of test gas to the cal port connector on the instrument. Open the gas valve until the meter displays "CAL GAS" and a 60 second count down begins. Set the flow in the operating range of 0.5 to 0.9 CFH. If the compressor air supply line was not shut off, a message will appear SUPPLY OFF. If such a message occurs, shut off the supply air; and then reinitiate the cal process to activate the cal port switch.

7.3 After 60 seconds a gas reading will appear along with a COUNT NUMBER. With 20 PPM test gas applied the gas reading should be 20 and the count 70. At 70 counts with 20 PPM CO the unit will automatically set. The count number is used for trouble shooting (see trouble shooting section). After the unit autocalibrates, a message will appear CO G SET indicating that the CO gain adjustment has been set for 20 PPM. Next an informational message on the automatic control pot valve is displayed which also can be used for trouble shooting after the G (gain) SET message.

7.4 If an incorrect gas concentration is used or the sensor and instrument is not properly functioning, a message will appear CO G FAILED, PREV CAL, END CAL. This affords improper calibration protection and an effort should be made to understand why it did not calibrate (See trouble shooting section for assistance).

7.5 After proper calibration the next messages will be REMOVE CAL GAS, END CAL, SUPPLY ON. This prompts the calibrator to remove test gas and turn the supply on at the regulator.

7.6 In cases where zero gas calibration is needed, the unit can be automatically zeroed by inserting a small diameter wire in the zero cal opening near the cal port and pushing on a button switch. The hole is made inconveniently small so that an unbent paper clip may activate the switch but larger wire or devices will not. It also doubles as the compressor's supply line outlet. There are two conditions where pushing the zero button will activate zeroing:

7.6.1 Holding the button for three seconds while air is coming from the supply line. In this case the zero button needs to be depressed until the zeroing message stops flashing and a solid zeroing message appears. The autozero process will begin without a countdown as it is assumed that air has been flowing from the supply line for more than a few minutes. If the supply line has more than one or two PPM of carbon monoxide, messages will appear BAD 0 AIR, PREV CAL, END CAL. The instrument is informing the user that it will not calibrate because of bad zero air; and it will use its previously zeroed cal setting. If the supply air is about 0 PPM concentration, the messages displayed will be CO 0 SET, END CAL, which indicates that a new zero setting has been accepted and is now in use.

7.6.2 A second method for zeroing is to place zero test gas in the cal port similarly as described above with calibration gas, and the unit will initiate its calibration gas routine. However, the unit expects that 20 PPM CO or another cal gas concentration that was inserted in the setup mode is being applied in the cal port unless the zero button is pushed. Check to see that the message now says zero gas instead of cal gas as the 60 second countdown proceeds. Any time during the countdown the zero may be pushed to have the unit know that zero gas is being applied. If the button is not pushed, a bad air message will appear resulting in returning to the previous calibration. This is the error protection.

7.7 After the zero button is depressed, a ZEROING message appears and then RELEASE UNLESS ZERO INT message. Holding the zero button for 15 seconds will reinitialize a unit, which is used when replacing a sensor or as discussed in the trouble shooting section.

8.0 MAINTENANCE

8.1 Sensor Checkout and Changing

8.1.1 To check a sensor's response, test gas has to be placed on the sensor. When it fails to show a gas response during calibration, a new sensor is required. Most sensors will last from one and one-half years to two and one-half years.

8.1.2 To replace the sensor, disconnect the power to the unit and remove the four corner screws and the electronics front cover as described in the mounting section. Next remove the three screws which hold the sensor block and unplug the sensor from its socket. Replace with a new sensor after being sure that the shorting wire is removed from the new sensor. Re-assemble the unit and reconnect to power. Let the new sensor settle in for an hour prior to calibrating.

8.1.3 When calibrating with a new sensor, an initializing step is added to the calibration procedure which eliminates the error protection that is afforded after a sensor has once been calibrated. In effect this permits the sensor to be zeroed on any background air and caution needs to be taken that the air is free of carbon monoxide. If the supply line is not CO free, then obtain a tank of impurity free air test gas from Dynamation (Stock No. 7800-006). To initialize the unit hold the zero button depressed for 15 seconds without the supply line air on or with impurity free air on the cal port. During the fifteen seconds the messages will read: ZERO CAL, RELEASE UNLESS ZERO INT, INTIT-ING. Release the zero button when INIT-ING appears and the display will read: ZERO GAS REQUIRED. Flow zero gas from either the supply line or cal port and the unit will set its zero after 60 seconds. The instrument message will then read CAL GAS REQUIRED. When placing 20 PPM cal gas or another value selected in the set-up mode on the unit, it will calibrate after a minute and the next message will read END CAL, REMOVE GAS, SUPPLY ON. After turning the supply gas on, the unit will have the error protection and will be reading the carbon monoxide level of the compressor supply line.

9.0   TROUBLE SHOOTING SECTION

9.1   Count Numbers

9.1.1   Another set of numbers are displayed during calibration other than the gas concentration. These numbers are there to assist in trouble shooting in case zero or cal fails or other malfunctions occur. These other numbers are called counts.

9.1.2   The zero cal will not set if the counts are less than 46 or greater than 53 and when the unit sets at zero the number will read 50±1 count. With 20 PPM cal gas the count number will be 70±1 to set. If the computer cannot auto-adjust the readout to these values of 50 and 70, the zero or calibration will fail.

9.2   Zero Fail During Calibration

9.2.1   If a failure occurs during zero cal, it means the counts are not between 46 and 53. If the counts are above 53, a BAD AIR message occurs and the zero air should be questioned for CO content. When the count level is below 46, it may be a malfunctioning unit or during initial zero calibration (without the error protection) it was zeroed with a concentration of gas on it.

9.2.2   Another initialization will remove the 46 or 53 count restraint, and with known zero air the unit may be rezeroed. If the counts never reach 50 , the unit is malfunctioning, call the factory for further instructions.

9.3   Calibration Gas Fail During Calibration

9.3.1   With 20 PPM gas on the unit the gas reading should reach 20 PPM and 70 counts. If the reading does not reach 70 counts, use the appropriate following procedure:

9.3.2   If the counts or gas reading do not show any increase when the gas is applied, probably the sensor is expired or the test gas is zero concentration. Check hose connections to assure gas is flowing into sensor chamber.

9.3.3   If the counts are close to 70, a zero reinitializing with known zero gas will probably correct the problem. If the unit was initialized with more than couple PPM of CO, the cal will fail when 20 PPM test gas is applied.

CAUTION

Be sure that the air is zero CO concentration when zero initializing.

10.0   REPLACEMENT PARTS

Item	Description	Stock No.
	ABL 4021 CO Monitor, complete Includes: alarm w/horn, calibration connector, calibration gas (20 PPM)	21373
	ABL 4021 Alarm w/horn	21381
	Transformer	21374
	Horn 12 VDC	21375
	Flowmeter	21376
	Sensor	21377
	Regulator/filter assembly	21382
	Element, filter	21383

10.1   Accessories

Calibration kit, Includes: calibration, connector, calibration gas (20 PPM)		21380
Carrying case		21379
Calibration connector		21378

10.2   Test Gas

Calibration gas (20 PPM)		03598
Calibration gas, (Impurity free air)		11132

WARRANTY

DYNAMATION, INC., warrants each new electrical product manufactured by it to be free from defective material and workmanship as to its merchantability and fitness for the purpose intended, for a period of one (1) year from the date of sale to the original purchaser, and agrees to remedy any such defect or to furnish a new part (at the company's option) in exchange for any part of any product of its manufacture which under normal use, and service disclosed such defect; provided the product is delivered by the purchaser to DYNAMATION'S factory, intact, for our examination, with all transportation prepaid to our factory, provided that such examination discloses, in our judgement, that it is thus defective.

This warranty does not extend to any products, which have been subjected to misuse, neglect, accident, unauthorized modifications, or to use in violation of instructions furnished by us, nor does it extend to products which have been repaired or altered outside of our factory. THIS WARRANTY IS IN LIEU OF ALL WARRANTIES EXPRESS OR IMPLIED AND NO REPRESENTATIVE OR PERSON IS AUTHORIZED TO ASSUME FOR US ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF OUR PRODUCTS. ALL IMPLIED WARRANTIES ARE LIMITED TO THE DURATION OF THIS WRITTEN WARRANTY. IN NO EVENT IS DYNAMATION, INC., LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING FROM ANY BREACH OF WARRANTY OF PRODUCT
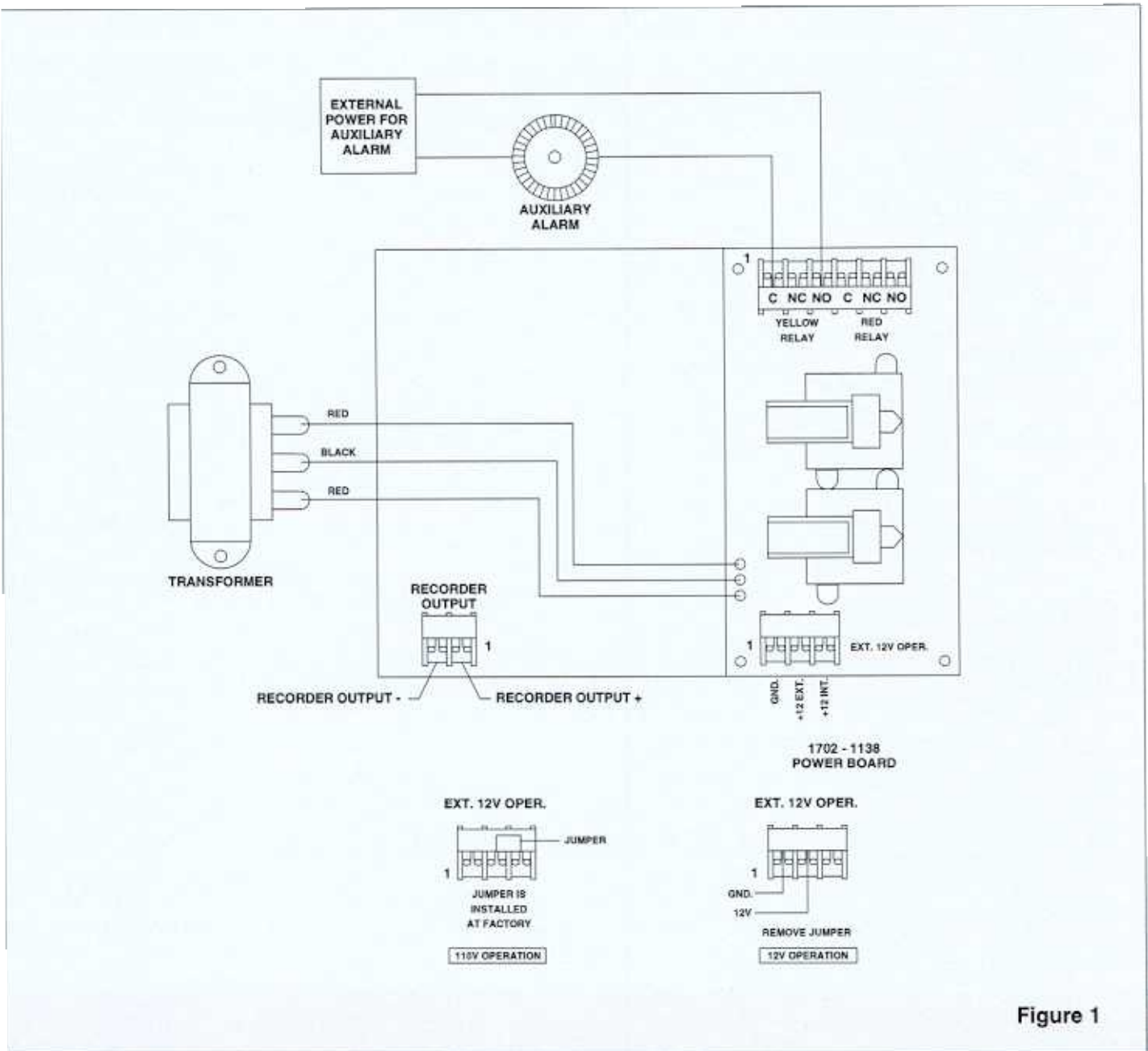

Figure 1