

MODEL 5800A

**CARBON MONOXIDE (CO)
MONITOR AND ALARM
SAMPLE-DRAWING TYPE**

*“Save
Your
Breath
With*

NST®

MODERN SAFETY TECHNIQUES

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INSTRUCTION MANUAL - MODEL 5800A CO ALARM

I. INTRODUCTION

This MST Model 5800A Carbon Monoxide (CO) Alarm is a surface-mounted, DC-powered unit which continuously monitors a compressed air sample introduced to its detector at an approximate flow rate between 0.5 SCFH and 1.50 SCFH and gives an alarm when:

- . the CO in the sample exceeds a preset level (adjustable; initially set at 10 PPM).
- . the battery voltage has diminished to a preset level (non-adjustable, visual only).
- . there is a discontinuity in the detector circuit.

There is also an indicator to verify that the instrument is on and operating properly (Continual flashing on and off of the green NORMAL light plus flickering of the red ALARM light).

The components are assembled into a black powder-coated aluminum housing 5½"H x 4"W x 3"D overall. A hose barb for introducing the sample gas extends from the bottom. Visible on the front face are the indicating lights (NORMAL, ALARM, and LOW BATTERY) and an access hole for calibration adjustment.

The left side contains the alarm buzzer. Accessible on the right side is the battery drawer, the auxiliary power jack, and an opening for connecting an external alarm circuit if desired.

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II. DETAILED DESCRIPTION

General descriptions of each of the items mentioned in the previous section are provided below. Their functions are indicated in Section IV. OPERATION.

A. Front Panel**1. ADJ Adjustment**

A miniature multiturn slotted-shaft potentiometer is accessible through a hole in the panel, adjustable with a small screwdriver.

The next three items are colored LED indicating lights that come on when various conditions, described later, are present.

2. ALARM Light

Red ALARM light blinks faintly during normal operation and is on steadily during the high CO alarm condition (above 10 ppm CO).

3. NORMAL Light

The green NORMAL light acts as a pilot light and flashes when the instrument is turned on and is not detecting carbon monoxide.

4. LOW BATT Light

A yellow light comes on when the battery voltage drops to a level too low for reliable operation.

B. Left Side

A buzzer is mounted on the side panel. It provides a continuous tone during alarm.

C. Bottom

A rectangular opening in the bottom allows clearance for the detector which is mounted to the upper face of the bottom plate. The bottom plate is held in place by two knurled thumbscrews. The sample inlet fitting extends from the outer face of the bottom plate.

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D. Right Side

These items are located toward the upper rear of the right side panel.

1. Battery Compartment

A battery compartment drawer contains the 9V "transistor" type alkaline battery that will power the instrument whenever the external power source is disconnected.

2. Auxiliary Power Jack

A 2.5mm pin jack is located below the battery drawer for operating the instrument from a Continuous Operation Adapter (COA). The COA will power the instrument as long as power is supplied to it, and when unplugged the battery will continue to carry the load for about 4 hours.

3. Alarm opening

A 3/8" hole just forward of the power jack is provided to admit an auxiliary alarm circuit when needed. It is filled by a solid grommet in which the center is thinned so it can be punched through if needed, to clear an alarm cable.

E. Circuit Board

The circuit board is accessible when the four corner screws are removed from the front panel and the panel is pulled off. There are no normal operating adjustments on the circuit board other than those that are reached through holes in the front panel. However, the following components should be noted:

1. Test jacks, red and black, near top of board, are used in making initial adjustments, or after sensor replacement. A normal digital multimeter can be plugged in at these jacks.
2. ALARM potentiometer, the right hand of the group of three potentiometers, is used to set the alarm level to any desired point.
3. ZERO potentiometer is used in initial setup of the instrument.
4. SPAN potentiometer is the ADJ control that extends through the panel and is used to set the point at which the alarm sounds, on a known 10 ppm CO sample.
5. Terminal block, at lower left corner, is used to connect an auxiliary external alarm device.

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III. INSTALLATION**A. Housing**

Install the instrument case to a vertical surface where it can easily be seen. Use #8 screws through the mounting flanges top and bottom.

B. Power

Provide a source of 12 V DC power, generally a vehicle battery or a 12 volt AC to DC adapter, with a 2.5 mm recess plug (center contact, positive). Arrange power source to plug into socket on right hand side.

C. External Alarm

An optional external alarm circuit can be brought in through the grommet hole on the right hand side.

1. Remove instrument cover by taking out the screws at each corner, then lifting cover off.
2. Punch out the center of the grommet to allow a suitable 2 wire cable to enter.
3. Connect external alarm to terminals at lower left of circuit board. Two types of connection are available:
 - a) To use the instrument to turn on an external circuit of any voltage up to 115AC at 2 amps, connect to terminals 3 and 4 of the alarm terminal block. These two terminals will be connected in case of alarm.
 - b) To activate an external 12 volt device, connect a jumper between terminals 1 and 3, then connect the external load to 4 (+) and 2 (-).

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IV. OPERATION

A. Preliminary

1. Connect power to instrument and allow about 2 minutes to stabilize. To connect, install a 9 V. battery and/or plug in a 12 V. continuous operation adapter.
2. Verify that the green NORMAL light is flashing about once a second.
3. Introduce a known sample of 10 PPM CO "SPAN GAS" to the sample inlet at 0.5-1.5 SCFH.
4. Turn ADJ (SPAN) potentiometer up (Clockwise) until ALARM light comes on, then back down (counterclockwise) until it just goes off. Then turn it **slowly** clockwise until it comes on, and leave at this setting. (Alarm light and buzzer will be on during this test).
5. Remove the CO sample.
6. Introduce the air line sample to the inlet at 0.5-1.5 SCFH. ALARM light will turn off and buzzer will stop.
7. Instrument is now ready for normal use. Disconnect power when not in use.

NOTE:

If instrument is to be used frequently or continuously, steps 3 through 5 only need to be repeated occasionally. See page 7 for Calibration Frequency.

B. Normal Operation

1. Instrument will analyze the sample, the green NORMAL light will flash every second and the red ALARM light will flicker about every second.
2. When CO exceeds the alarm point (initially set at 10 PPM) the red ALARM light will come on steady, and the buzzer will sound a steady tone.
3. When the CO concentration drops below the alarm setting, the alarm and light automatically return to normal as in paragraph 1. above.

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C. Abnormal Indications**1. Low battery**

If the power supply is disconnected and battery voltage drops below a preset value (about 6.5V), the amber LOW BATT light will come on steady, indicating a low battery alarm condition. At this time the battery should be changed (see Section VI, MAINTENANCE) or auxiliary power should be restored. Attempts to operate the instrument further will result in degraded performance.

2. Detector open circuit

If there is a discontinuity in one of the detector leads, the indicator lights will show as follows:

- a) Working Electrode (SENSING) line (red wire) -- red lamp will blink slowly, green continue to blink normally.
- b) Counter Electrode (CNTR) line (black wire) -- red lamp will blink slowly, green continue to blink normally.
- c) Reference Electrode (REF) line (blue wire) -- red light comes on, audible alarm on, green lamp continues to blink normally. (Recovery from this condition takes several minutes)

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V. CALIBRATION AND ADJUSTMENT

For normal routine operation, the preceding steps (IV.A) are sufficient. However, internal adjustments are available for use when needed.

A. Zero Adjustment

When a sensor is replaced, or when it seems that the alarm activation is too sensitive, or not sensitive enough, it is desirable to check the zero setting. To adjust:

1. Remove front cover by taking out the screws in each corner.
2. Note location of ZERO potentiometer.
3. Plug a voltmeter, range 0-200 mV, into test jacks on circuit board. Upper (red) jack is (+). Output here corresponds approximately to 0.5 millivolt per ppm.
4. Using a cylinder of CO-free gas, either air or nitrogen, admit a flow stream between 0.5 & 1.5 SCFH.
5. Adjust ZERO potentiometer to bring voltage to exactly 00.

B. Calibration

Final calibration should always be made at 10 ppm as described in IV. A. However for preliminary adjustment using the voltmeter as in V.A.3, admit a known mixture such as 100 ppm and set SPAN potentiometer to produce a reading of one-half the ppm value. For example, 50 mV for 100 ppm CO, or 35 for 70 ppm.

C. Calibration Frequency:

1. MONTHLY CALIBRATION *: If monitor is used on a continuous basis, (daily or weekly use).
2. PRIOR TO USE CALIBRATION *: If monitor is used on a non-continuous basis.
* If monitor's alarm is energized, always check calibration to be sure monitor is not malfunctioning and/or out of calibration producing a false alarm.

D. Alarm Adjustment

The alarm was initially set at 10 ppm, but can be reset to any level by this procedure:

1. With cover removed and voltmeter plugged into test jacks as above, turn ZERO to bring voltage to the desired level. For example, turn ZERO clockwise to bring voltage to 10 mV corresponding to 20 ppm.
(Alarm will come on).

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2. Turn ALARM potentiometer counterclockwise until alarm stops, then turn clockwise carefully until alarm just comes on.
3. Turn ZERO counterclockwise to bring voltage below alarm point, with alarm off, then turn clockwise slowly to confirm alarm setting.
4. Bring voltage back to 00 with ZERO potentiometer.

VI. MAINTENANCE**A. BATTERY**

Check battery each time the monitor is turned on. The red ALARM light will flicker about every second and green NORMAL light will come in the flashing mode. Amber light will be off, unless battery is too low for normal operation.

Battery is contained in the drawer on the right-hand side. To replace the battery:

1. Pull the small slot in the drawer face toward the front of the instrument to unlatch the drawer and pull the drawer out of the housing.
2. Pry battery out of drawer with fingers and replace with a fresh 9V alkaline transistor type battery, providing for proper polarity by placing minus (-) terminal uppermost in holder. Place bottom of fresh battery against spring and press into place.

CAUTION: OBSERVE PROPER POLARITY WHEN INSERTING BATTERY. POLARITY IS MARKED ON THE INSIDE OF THE DRAWER. FAILURE TO OBSERVE THIS CAUTION CAN RESULT IN FAILURE TO OPERATE.

3. Push drawer back into housing until it latches in place. The drawer if inserted incorrectly will not latch.

NOTE:

The instrument is normally operated directly from an AC to DC Continuous Operation Adapter plugged into socket below battery drawer. Generally the battery is only used to insure continuous operation.

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B. Detector

If the alarm adjustment cannot be made within the range of the potentiometer the detector needs to be replaced. To replace detector:

1. Remove the two knurled thumb screws at bottom.
2. Pull the bottom plate off the housing as far as the wiring will allow.
3. Unplug the circular connector from the four pins of the sensor.
4. Pull detector cell from its cavity in the flow block on top of bottom plate. (Rock it back and forth to loosen it first).
5. Discard old detector cell, keeping in mind that it contains a small amount of sulfuric acid.

Plug the 4-pin circular connector into the new detector. If the new detector was received with a shorting wire or spring between the sensing and reference terminals, remove and discard the wire.

6. Put a small amount of vaseline or similar lubricant on the O-ring seal within the block. Then push the cell into the block until it seats on the ledge half way down.
7. Replace bottom plate and secure it with thumb screws.
8. Allow at least one hour for stabilization, then calibrate as in CALIBRATION AND ADJUSTMENT, V.A and B.

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C. Main Circuit Board

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

D. Other Components

The other electrical components, including buzzer, battery holder and power jack, can readily be replaced if necessary, but replacement involves soldering. Alternatively, the entire instrument may be returned to MST for repair.

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VII. PARTS LIST

The following is a list of items that would most likely need replacement during the life of the instrument.

<u>Identifier</u>	<u>Description</u>
80052	NORMAL light, green, 12V
80053	ALARM light, red, 5V
80081	LOW BATT light, amber, 5V
80082	Buzzer
80132	Battery, alkaline, 9V transistor type
80133	Cell, CO detector
80135	Continuous Operation Adapter, 115 AC
80061	Flow Block
80062	Thumb screw, 10-32
80399	Battery holder
80064	Power jack
80500	Sensor cable with 4-pin connector
8003103	Calibration kit for 5800A instrument
8003001	Regulator assembly for calibration kit
80071	Span gas replacement cylinder for calibration, 10 ppm CO
80023	Zero air cylinder for sensor replacement (See p. 7), not included in calibration kit
80044	Calibration adjustment tool