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CARBON MONOXIDE DETECTOR MODEL 452 INSTALLATION AND OPERATIONAL MANUAL

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LOG OF REVISIONS

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FORWARD

This document provides information intended for use by persons who, pursuant to current regulatory requirements, are qualified to install this equipment. Because equipment and system installations vary depending on a particular aircraft, this document is intended only as a guideline. If further information is required, contact:

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DESCRIPTION

1.0 GENERAL

This section gives a physical and functional description of the CO Guardian CO Detector indicator as installed in Cessna 172 aircraft.

2.0 PHYSICAL DESCRIPTION

CO Detector indicator flange type front panel unit part numbers are listed in Table 1.

PART NUMBER	MOUNT	POWER	DATA BUSS
452-101-001	Panel	14 VDC	RS-232 Data Buss
452-101-002	Panel	28 VDC	RS-232 Data Buss
452-101-003	Panel	14 VDC	None
452-101-004	Panel	28 VDC	None

TABLE 1 - Part Numbers

3.0 LEADING PARTICULARS

Table 2 gives the CO Detector leading particulars.

LEADING PARTICULARS

PARAMETER	SPECIFICATION
PHYSICAL	
Dimensions (approximate)	3.35 in. X 2.25 in. X 1.50 in.
Weight (actual)	3.5 oz.
ENVIRONMENTAL	
Cooling	Passive
Temperature and Altitude	DO-160D, Category B1
Temperature	(DO-160D Category B1)
Non-operating high temperature	+85 °C
Non-operating low temperature	-55 °C
Operating high temperature	+55 °C
Operating low temperature	-20 °C
Temperature Variation	DO-160D, Category B
Altitude	(DO-160D, Category B1) 25,000 feet
Decompression	DO-160D, Category B1
Overpressure	DO-160D, Category B1
Humidity	(DO-160D Category A) 95percent
Operational Shock and Crash safety	DO-160D Category B
Vibration	DO-160D: Category S, Curve M
Magnetic Effect	DO-160D, Category Z
Power Input	DO-160D, Category B
Voltage Spike	DO-160D, Category B
Radio Frequency Emission	DO-160D, Category B
Electrostatic Discharge	DO-160D, Category A
POWER REQUIREMENTS	
Power - 14 VDC Models	+14 VDC (Nominal 9.0 vdc to 15.1 vdc)
Power - 28 VDC models	+ 28 VDC (nominal 18.0 vdc to 30.3 vdc)
Dissipation (nominal)	
14 and 28 vdc models	<1 watt
Dissipation (maximum)	
14 vdc models (heater ON)	9 watts
28 vdc models (heater ON)	10 watts

TABLE 2 - Leading Particulars

4.0 SCOPE

The Model 452 Carbon Monoxide Detector is designed to detect, measure, and provide both a visual and aural alert to the crew of piston engine type aircraft before the level of carbon monoxide (CO) reaches a critical level.

The installation consists of a single carbon monoxide detector indicator operating on aircraft DC power. The aircraft supplied power and aircraft wiring is protected by a 2 ampere, resetable, trip free, type circuit breaker. The Carbon Monoxide Detector is installed in the existing aircraft instrument panel within view and reach of the pilot.

The CO Detector contains a Test/Reset button, an aural alarm buzzer, an Amber LED ALERT annunciator, and a green LED STATUS annunciator.

The carbon monoxide alarm level is calibrated to provide both an aural and visual alert within 5 minutes or less whenever the carbon monoxide level reaches 50 parts per million (PPM) by volume or above per TSO C48A. The warning time is shortened at higher levels of CO concentrations and becomes approximately instant should the carbon monoxide level reach 400 parts per million by volume (PPM) or above.

In case of a carbon monoxide alert, the pilot can acknowledge the alert and silence the aural warning while keeping the visual alert until the carbon monoxide level is again reduced below the alert level. The indicator is automatically reset when the CO level drops below 50 PPM. There is a three-minute delay at startup for sensor to stabilize before the unit will sense CO.

5.0 SERVICE FACILITIES

The operator can service all components other than the model 452 units itself at an FAA certified Repair Station.

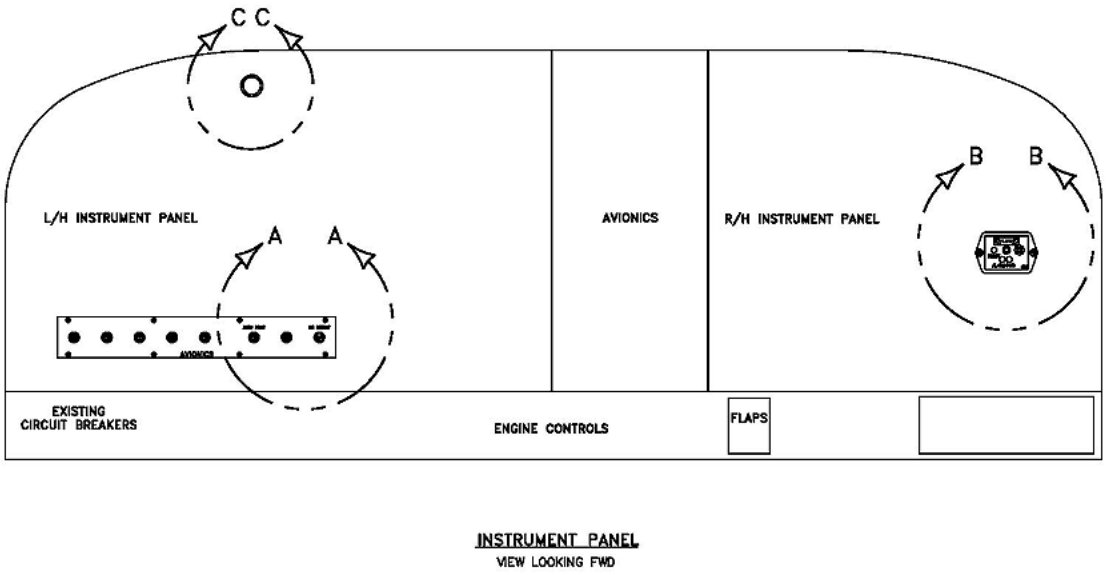
NOTE: The sensor requires special gases for testing and calibration. If any discrepancies are found with the unit during installation or during the seven-year operational service life, the unit must be returned to CO Guardian for repair or replacement. After seven (7) years, the unit must be returned to the manufacturer for CO sensor replacement and re-calibration.

6.0 INSTALLATION PROCEDURE

The following documents the installation criteria of the Carbon Monoxide Detector

Installation:

- Install the CO Detector on the instrument panel in view and within reach of the pilot.
- Insure that the air intake on the front of the CO Detector is not obstructed.
- Install the CO Detector in a location on the instrument panel without high or disturbed airflow movement. The CO Detector will detect the presence of CO more effectively if the unit does not have air blowing over it.
- Insure that the CO Detector installation area meets the temperature and humidity ranges listed in the List of Particulars specifications. Temperature and humidity conditions outside the specification may affect the sensitivity of the alarm.



View A-A Circuit Breaker View B-B CO Detector View C-C Remote Caution Light

FIGURE 1 - Recommended Installation Locations

a. Gain access to the area, front and back, where the CO Detector is to be installed. Verify that the unit will not interfere with any other instruments.

b. Cut to the dimensions shown in Figure 2.

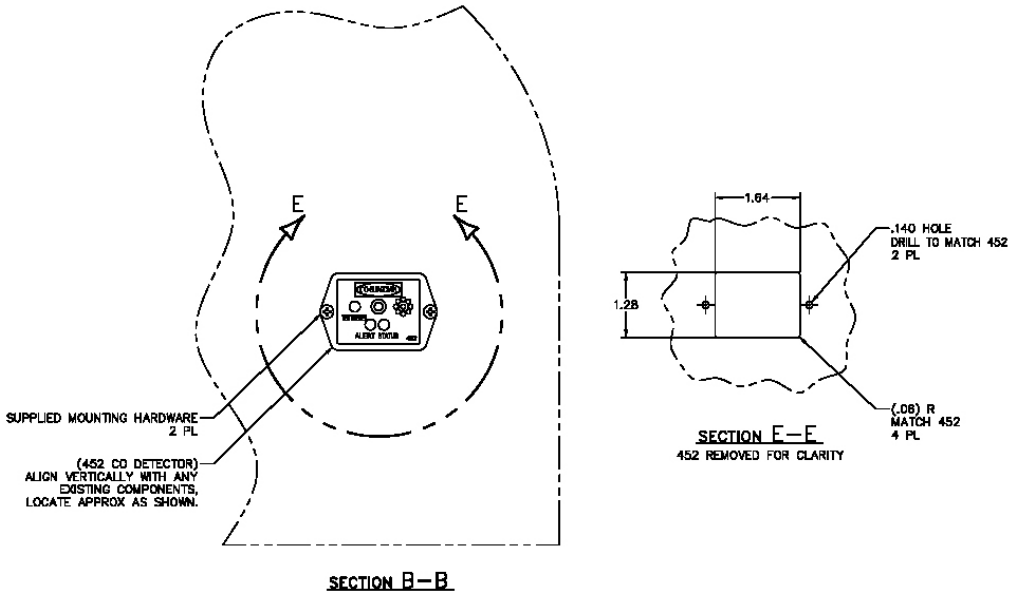


FIGURE 2 - Indicator Cutout

c. Install circuit breaker per Figure 3 and wiring per Figure 4. It is recommended that the circuit breaker be installed on the Avionics Master switch buss. See Figure 3.

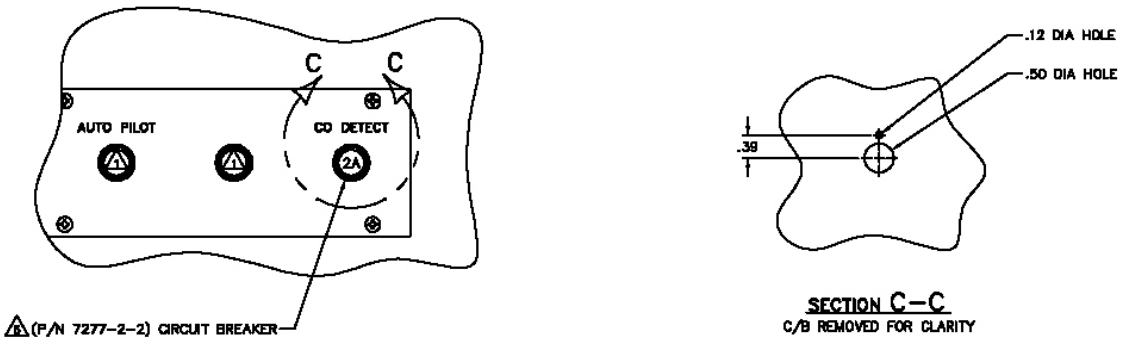
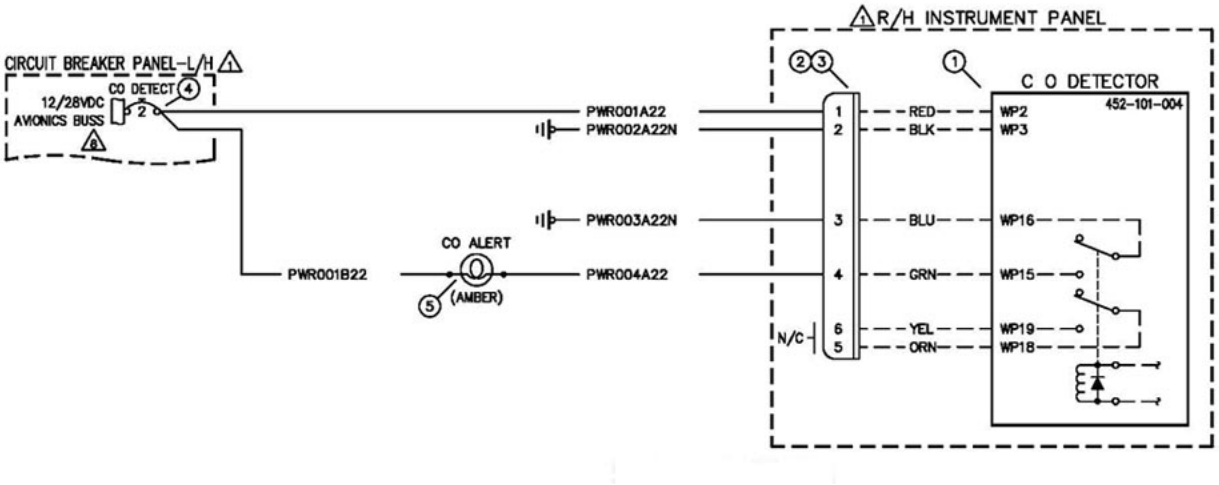


FIGURE 3 - Circuit Breaker Cutout



Notes

1. Connect to +14 VDC or to +28 VDC power as applicable to aircraft and CO Detector rating.
2. Twist the power and ground return wires together approximately 6 turns per foot.
3. Ground power return wires to aircraft structure near circuit breaker panel.
4. All wire to be MIL-W-22759/16 or equivalent.

FIGURE 4 - Installation Schematic

d. Mount CO Detector per Figure 2.

e. With the CO Detector disconnected from the aircraft harness, conduct a continuity check of the added aircraft wiring.

f. Close the CO DETECT circuit breaker and measure aircraft voltage between pins 1 and 2 of the CO Detector connector. Pull the CO DETECT circuit breaker and connect the CO Detector connector to the aircraft harness. Close CO DETECT circuit breaker.

g. Operational check the unit by verifying the unit comes on with steady green status LED and with an audible beep from the buzzer. Verify remote alert light operation.

h. Reset the unit on the panel and verify the CO Detector comes on with steady green and with an audible beep from the buzzer.

i. Verify the unit can be shut off with the circuit breaker.

j. Unit weights 3.5 oz. Record in Aircraft weight and balance manual.

7.0 MAINTENANCE INSTRUCTIONS

The carbon monoxide detector and associated equipment consist of certain parts, which do not require periodic scheduled servicing or periodic scheduled preventive maintenance. At every power up the system will go through a self-diagnostic check and will show a green light within 10 seconds if the unit is working properly.

WARNING: If the model 452 unit shows a blinking Amber light approximately each second and a flashing Amber external remote light every 4 seconds, return the unit to CO Guardian for repair or replacement. No Field repair or service is allowable other than to the aircraft wiring harness and circuit breaker.

The aircraft wiring harness and circuit breaker shall be included in general visual inspections for system integrity, security, corrosion and chaffing.

8.0 CARBON MONOXIDE DETECTOR SCHEDULED MAINTENANCE

Scheduled Maintenance Program tasks to be added to the aircraft operator's appropriate airplane maintenance program are as follows:

a.	Recommended Periodic Scheduled Servicing Tasks:	None Required.
b.	Recommended Periodic Scheduled Preventative Maintenance test/checks to determine system condition and/or latent failures: **Note:** Be sure vents on the faceplate are free of obstructions. Any failures of the system are evident to the pilot through a blinking Amber light approximately very 1 second and a flashing Amber external light (if connected) approximately every 4 seconds.	AT EVERY TIME THE UNIT IS TURNED ON.
c.	Recommended Periodic Inspections:	None Required.
d.	Recommended Periodic Structural Inspections	None Required.
e.	Required CO Sensor replacement and calibration.	Every SEVEN (7) YEAR interval.

NOTE

The unit must be returned to the manufacturer for sensor replacement and recalibration every seven calendar years.

NO FIELD SERVICE OR OVEHAUL of Model 452 IS ALLOWED.

9.0 SELF TEST SEQUENCE

When power is applied to the Model 452 CO Detector, a self-test routine begins. The test checks for functionality of the critical components such as the CO sensor, temperature sensor, and the integrity of the total CO Detector system.

The test sequence is as follows:

- Alert buzzer beeps twice.
- Green light flashes twice.
- Remote Amber Alert light flashes once.
- Amber Alert light flashes twice.
- Alert buzzer beeps once.
- Green light ON steady.
- Remote Amber Alert light flashes once.

The remote alert light will flash once before the detector mounted Amber alert light flashes and once after the steady green light in the above sequence. Then the external Amber light will remain OFF until there is another CO alert or until a failure of the unit occurs.

10.0 PILOT RESPONSE TO IN-FLIGHT CO ALARM

If the CO Detector aural and visual alarms go off in flight, press the TEST/RESET button.

If the alarm continues to operate by showing a blinking Amber light on the CO Detector and the remote Amber light stays on:

- Shut off the heater, air conditioning or any other opening to the engine compartment.
- Open a fresh air source immediately.
- Don't smoke.
- Use 100% oxygen, if possible.
- Land as soon as conditions permit.
- Be sure the source of the contamination is corrected before further flight

NOTE: Blinking Amber light on the unit itself and the remote Amber light will stay on until the CO level goes below 50 PPM.

DO not recycle the unit through the circuit breaker, as there is a three-minute delay for the CO sensor to stabilize at each startup.

11.0 ALERT CYCLE

When the unit detects CO, the following alert cycle is activated:

a. The Amber alert light will flash 4 times; each flash is accompanied by a short audible beep.

b. There will be a gap of 4 seconds with no light or beep.

c. Again, the Amber alert light will flash 4 times; each flash is accompanied by a short audible beep.

d. The Amber light flash and audible beep sequence will again be followed by a gap of 4 seconds with no light or beep.

NOTE
This cycle will continue until the CO level decreases below acceptable levels.

12.0 UNIT FAILURE INDICATION:

A failure of the CO Sensor, Temperature Sensor, or the Micro-controller will result in the following failure indications:

- The Amber LED will continue to flash at an approximately rate of 1 second on and one second off until the failure is cleared or power is removed from the unit.

- The remote Amber light will flash at an approximate rate of one flash each four (4) seconds until the failure is cleared or power is removed from the unit.

In case of a failure indication, attempt to clear the failure condition by resetting the CO Detector. Should the failure condition continue, remove the CO Detector power by pulling the CO Detector circuit breaker.

13.0 RS-232 DATA BUSS OPTION

The RS-232 Data Buss option is not currently available. When available, the RS-232 data buss output will couple CO Detector status information to electronic display systems with RS-232 input capability.

14.0 Warranty

WARRANTY COVERAGE: CO GUARDIAN LLC. WARRANTS TO THE ORIGINAL CONSUMER PURCHASER, THAT THIS DETECTOR WILL BE FREE OF DEFECTS IN MATERIAL AND WORKMANSHIP FOR A PERIOD OF THREE (3) YEARS FROM DATE OF PURCHASE. THE MANUFACTURER'S LIABILITY HEREUNDER IS LIMITED TO REPLACEMENT OF THE PRODUCT, REPAIR OF THE PRODUCT OR REPLACEMENT OF THE PRODUCT WITH A REPAIRED PRODUCT AT THE DISCRETION OF THE MANUFACTURER. THIS WARRANTY IS VOID IF THE PRODUCT HAS BEEN DAMAGED BY ACCIDENT, UNREASONABLE USE, NEGLECT, TAMPERING OR OTHER CAUSES NOT ARISING FROM DEFECTS IN MATERIAL OR WORKMANSHIP. THIS WARRANTY EXTENDS TO THE ORIGINAL CONSUMER PURCHASER OF THE PRODUCT ONLY.

Warranty Disclaimers: Any implied warranties arising out of this sale, including but not limited to the implied warranties of description, merchantability and fitness for a particular purpose, are limited in duration to the above warranty period. In no event shall the Manufacturer be liable for loss of use of this product or for any indirect, special, incidental or consequential damages, or costs, or expenses incurred by the consumer or any other user of this product, whether due to a breach of contract, negligence, strict liability in tort or otherwise. The manufacturer shall have no liability for any personal injury, property damage or any special, incidental, contingent or consequential damage of any kind resulting from gas leakage, fire or explosion.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Some states do not allow the exclusion or limitation of consequential or incidental damages, so the above limitations or exclusions may not apply to you.

Legal Remedies: This warranty gives you specific legal rights and you may also have other rights that vary from state to state.

Warranty Performance: During the above warranty period, your product will be replaced with a comparable product if the defective product is returned, postage prepaid, to CO Guardian, Customer Service Department, 1951 East Airport Drive, Tucson, AZ 85706, together with proof of purchase date. Please include a note describing the problem when you return the unit. The replacement product will be in warranty for the remainder of the original warranty period or for six months, whichever is longer. Other than the cost of postage, no charge will be made for replacement of the defective product.

Important: Do not attempt to open unit. If unit is opened, warranty will be void.

Your Carbon Monoxide Alarm is not a substitute for property, disability, life or other insurance of any kind. Appropriate insurance coverage is your responsibility. Consult your insurance agent.

NOTE

The warranty will be void if the unit is opened or tampered with.