

1-1 CHECK OXYGEN MONITOR OPERATION/INSTALLATION DATE

Note

For systems with this equipment, there are two functional check procedures for the oxygen monitor subsystem. The oxygen tank/regulator procedure and the aerosol gas calibration procedure.

Overview

This procedure checks the Oxygen Monitor operation when the oxygen level is a 20.9% (normal air) and when it is reduced to less than 18% (alarm point).

There are two types of Oxygen Monitor Calibration Kits. The part number of the older kit is 46-271523G1 and the newer kit (Aerosol Gas Calibration) is 2173691. The preferred method is to use the newer kit when it is available. When using the older Oxygen Monitor Calibration Kit, the recommended method requires two Field Engineers. Since there are times when a second engineer and/or the Oxygen Monitor Calibration Kits are not available, this procedure covers the use of the newer kit, the older kit with 2 FE's or 1 FE, or no kit at all. If you are using the newer kit, the procedure assumes that a Sensor Retrofit Kit (46-301672P3) has been installed on the Remote Sensor Module.

The New 5-year oxygen sensor (GEMS Part No. 2112207) consists of a sensor cell, a battery, and a PC board (with conversion circuitry contained in an RF-shielded enclosure). The procedures are the same for the older sensors and the new 5-year sensor.

Tools and Instruments Required

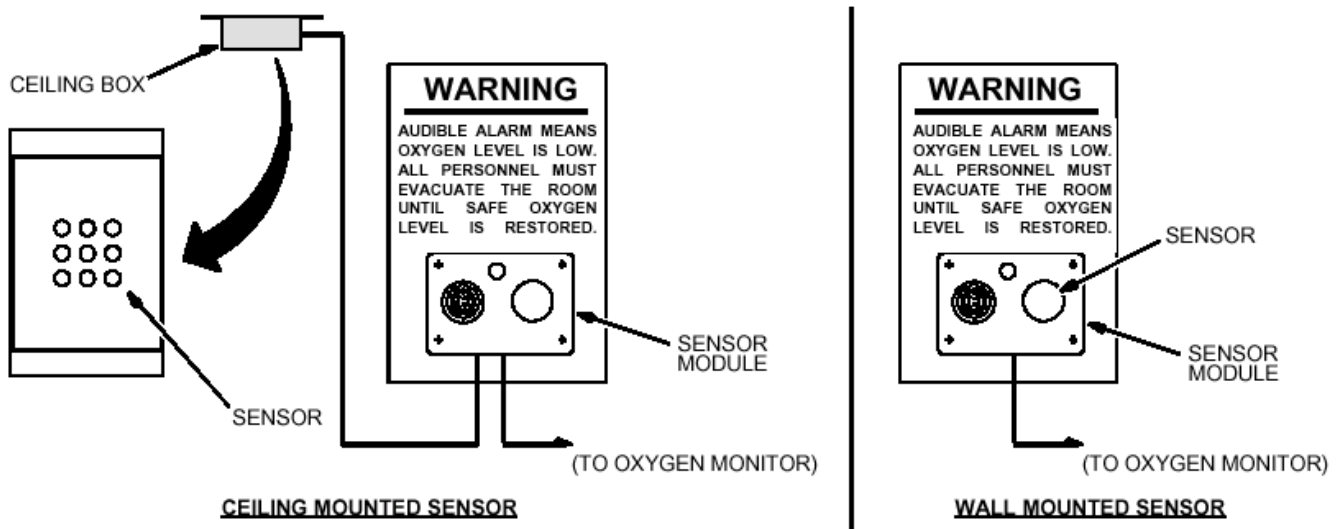
Item	Description	Part Number	Qty.
1.	Original Oxygen Monitor Calibration Kit (300 psi tank)	46-271523G1	1
1.a	Newer Oxygen Monitor Calibration Kit (aerosol can)	2173689	1
	Aerosol Calibration Adaptor	2173691	1

Setup Procedure

1. Locate oxygen monitor sensor. See Illustration 1-1.

- **Fixed sites:** Sensor is located in wall mounted sensor module inside magnet room.
- **Mobiles/Transportables/Relocatables (helium only):** Sensor is located in ceiling mounted box inside magnet room.
- **Transportables/Relocatables (helium and nitrogen):** Two oxygen monitors are used: one for helium and one for nitrogen. The only difference between the two monitors is their sensor location. One sensor is located in a wall mounted sensor module, while the other sensor is located in a ceiling mounted box.

1-1 CHECK OXYGEN MONITOR OPERATION/INSTALLATION DATE (continued)



M3290A

OXYGEN MONITOR SENSOR LOCATIONS
 ILLUSTRATION 1-1

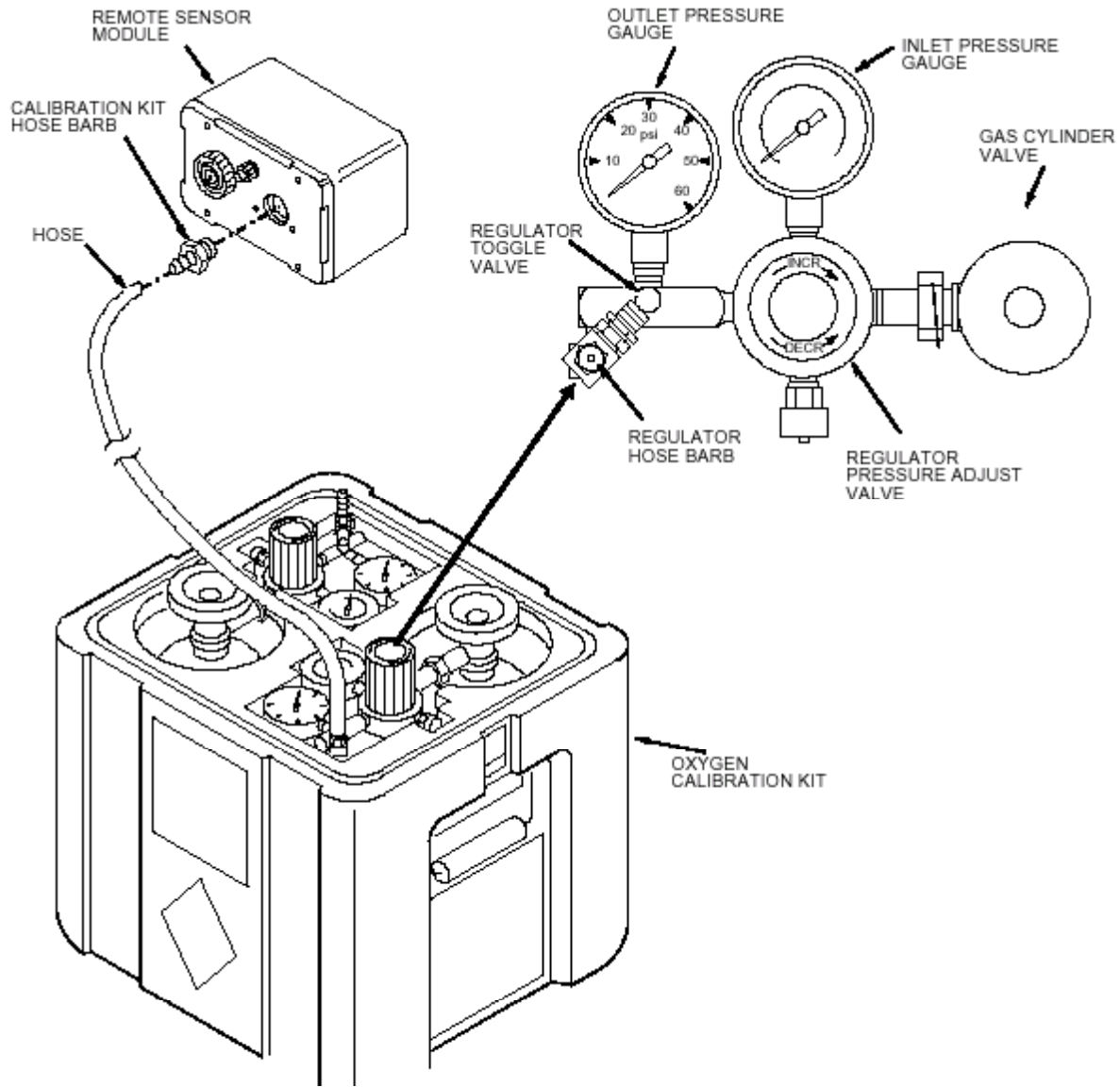
2. Expose sensor to 20.9% oxygen from Oxygen Calibration Kit for one minute. If the kit is not available, open the door/s to exam room and allow fresh air to circulate for at least 15 minutes (if you are using the older kit and there is not a second FE you will have to open the door/s).
 Using the newer Oxygen Monitor Calibration Kit 2173689:
 - a. Screw the hose barb from the calibration kit onto the front cover of the Remote Sensor Module. See Illustration 1-2.
 - b. Connect one end of the hose from the cal kit to the 20.9% regulator hose barb. Leave the other end of the hose unattached at this time., so that the hose can be purged when the gas is turned on.
 - c. With the 20.9% regulator pressure adjust valve closed, open the 20.9% gas cylinder valve. Inlet pressure gauge will show the cylinder pressure.



Adjust the valves slowly and only use low pressure. Adjusting the valves too fast or adjusting to excessive pressures may damage the sensor cell.

- d. Open the 20.9% regulator toggle valve and slowly adjust the regulator pressure adjust valve for an outlet pressure of one or two PSIG as indicated on the outlet pressure gauge.
- e. Connect the other end of the hose to the hose barb on the Remote Sensor Module.

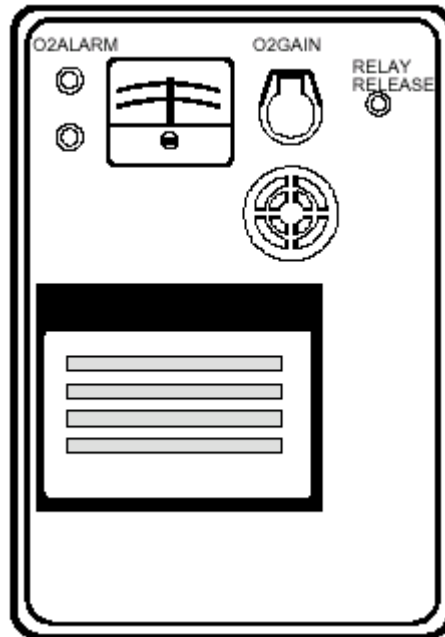
1-1 CHECK OXYGEN MONITOR OPERATION/INSTALLATION DATE (continued)



OXYGEN CALIBRATION KIT
 ILLUSTRATION 1-2

- After sensor has been exposed to 20.9% oxygen for one minute (or fresh air for 15 minutes), check that meter on oxygen monitor (located in operator room) reads 20.9% \pm 0.25% (20.65% - 21.15%). See Illustration 1-3. If meter reading is outside this range, adjust O₂ GAIN pot on front of oxygen monitor until meter reads 20.9% \pm 0.25%. If specified range cannot be obtained, replace oxygen monitor sensor and calibrate oxygen monitor.

1-1 CHECK OXYGEN MONITOR OPERATION/INSTALLATION DATE (continued)



OXYGEN MONITOR
 ILLUSTRATION 1-3

4. Expose sensor to 17% oxygen from the Oxygen Calibration Kit. If the newer kit is not available, you will need a second person. If a second person is not available, go to step 9.

Using the newer Oxygen Monitor Calibration Kit (2173689)

- a. Connect one end of the hose from the calibration kit to the 17% regulator hose barb. Leave the other end of the hose unattached at this time, so that the hose can be purged when the gas is turned on.
- b. With the 17% regulator pressure adjust valve closed (turned completely counterclockwise) and the regulator toggle valve closed, open the 17% gas cylinder valve. Inlet pressure gauge will show the cylinder pressure.



Adjust the valves slowly and only use low pressure. Adjusting the valves too fast or adjusting to excessive pressures may damage the sensor cell.

- c. Open the 17% regulator toggle valve and slowly adjust the regulator pressure adjust valve for an outlet pressure of one or two PSIG as indicated on the outlet pressure gauge.
- d. Connect the other end of the hose to the hose barb on the Remote Sensor Module.

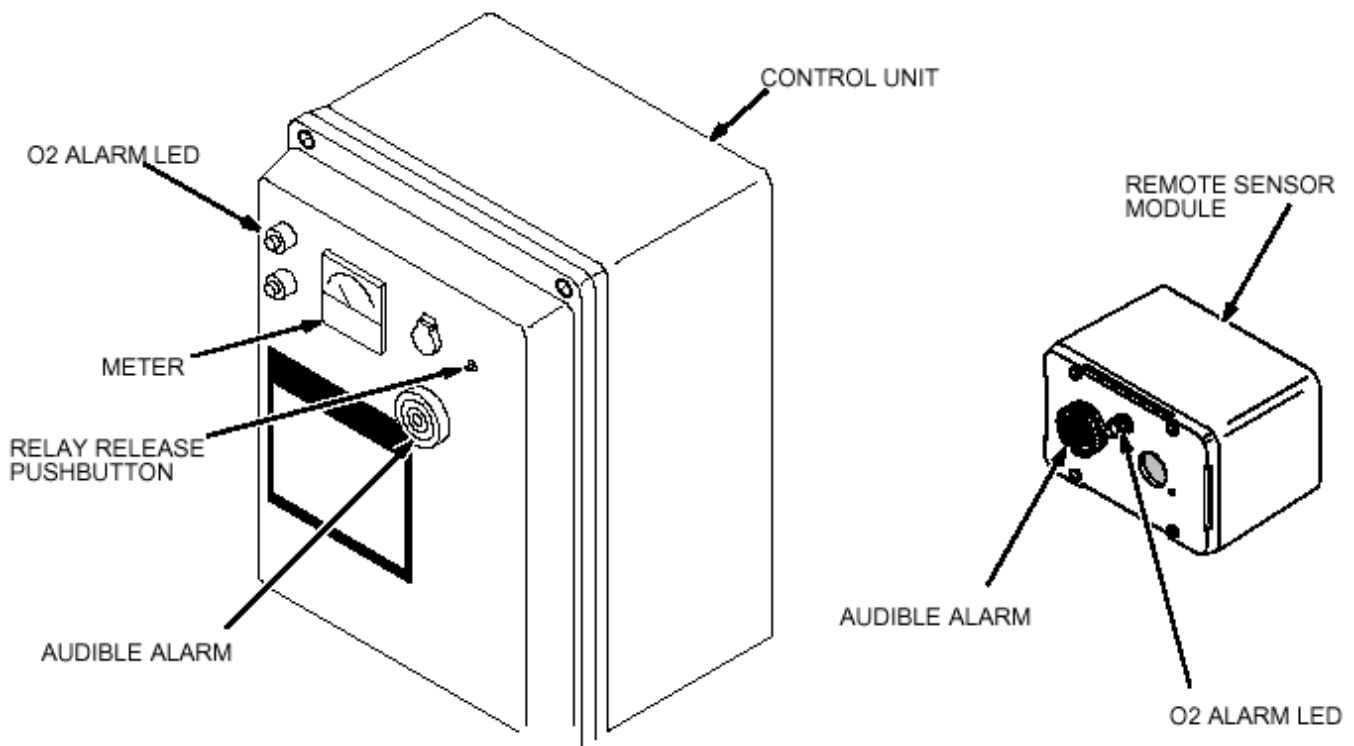
1-1 CHECK OXYGEN MONITOR OPERATION/INSTALLATION DATE (continued)

Using the older Oxygen Monitor Calibration Kit (46-271523G1)

- a. Have a second person expose sensor to 17% oxygen.

If 17% oxygen cylinder is not available, do the following:

- a. Have a second person inhale and hold breath for 10 seconds.
 - b. Exhale on sensor, then cover sensor with hand.
5. Observe the Oxygen Monitor. The following should occur when the alarm point of $18\% \pm 0.25\%$ is reached, see Illustration 1-4.
- The meter reading on the Control Unit should decrease to approximately 17%.
 - The audible alarm should sound on the Control Unit and the Remote Sensor Module.
 - The red alarm LED should blink on the Control Unit and the Remote Sensor Module.



OXYGEN MONITOR SUBSYSTEM ALARMS AND RELAY RELEASE PUSHBUTTON
 ILLUSTRATION 1-4

- 6. If the alarm does not sound when the alarm point ($18\% \pm 0.25\%$) is reached, calibrate Oxygen Monitor as described in Direction 15336, *OXYGEN MONITOR SUBSYSTEM*, revision 3 or higher.
- 7. When Oxygen Monitor alarm point has been successfully checked, expose the sensor to ambient air for one minute.

1-1 CHECK OXYGEN MONITOR OPERATION/INSTALLATION DATE (continued)

8. Press the RELAY RELEASE button on the front cover of the Control Unit. The following should occur:
 - The meter on the Control Unit should read approximately 20.9%.
 - The audible alarms should stop sounding.
 - The red alarm LEDs should stop blinking and stay off.

Then proceed to step 18.

One FE without the newer Oxygen Monitor Calibration Kit

9. Move the sensor to the Control Unit by doing the following:

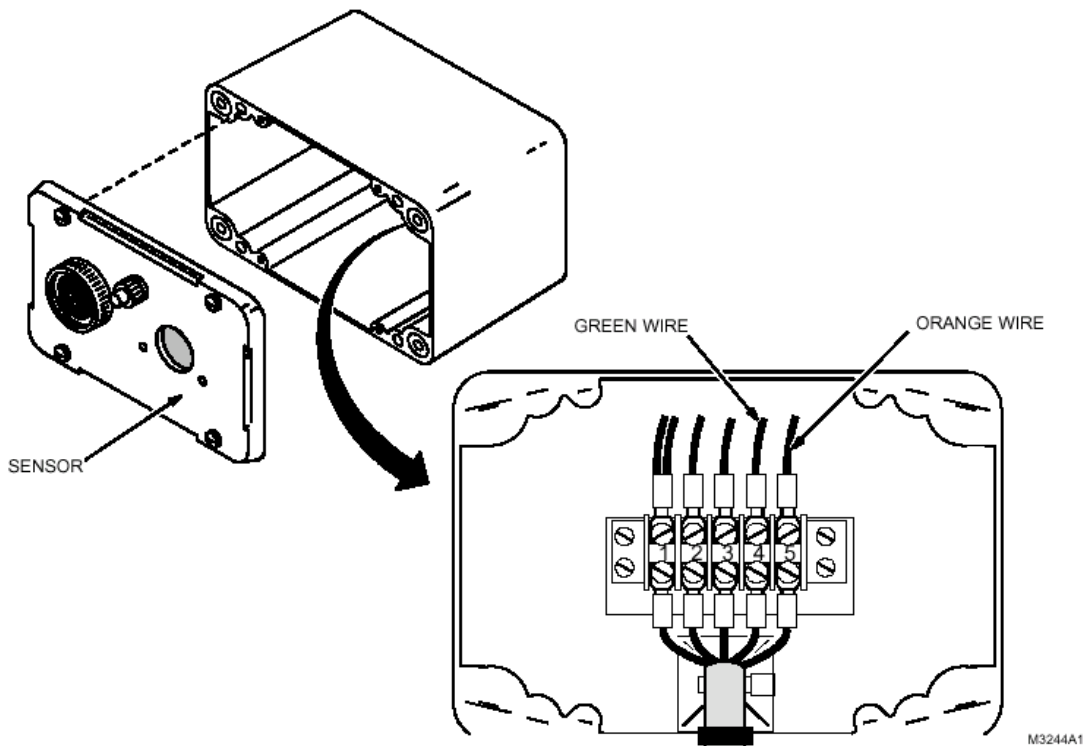
Note

If alarm sounds while removing sensor, press RELAY RELEASE button at oxygen monitor to stop it.

Wall-Mounted Sensor With One FE

- a. Loosen four captive screws and remove cover. See Illustration 1-5.
- b. At terminal board, remove green wire from terminal 4 and orange wire from terminal 5.

Remove two screws attaching sensor cell and circuit board to cover.



WALL MOUNTED SENSOR

ILLUSTRATION 1-5

1-1 CHECK OXYGEN MONITOR OPERATION/INSTALLATION DATE (continued)

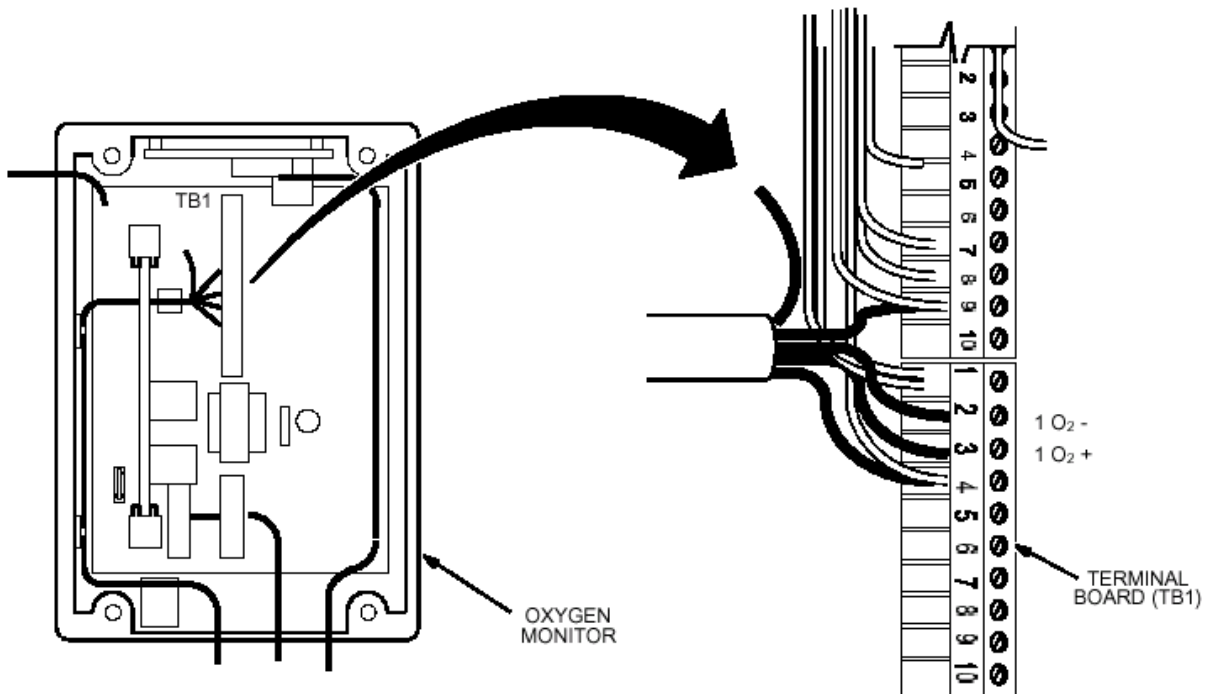
Ceiling mounted sensor with one FE:

- a. Gain access to sensor in ceiling box.
- b. Disconnect and remove green and orange wires from ceiling box terminal board.
- c. Remove two screws attaching sensor cell and circuit board to ceiling box.

Note

If two oxygen monitors are present (Transportables/Relocatables with helium and nitrogen), make sure sensor is connected to correct monitor in the following step.

10. At oxygen monitor, do the following:
 - a. Loosen four captive screws and open hinged cover. See Illustration 1-6.
 - b. At oxygen monitor terminal board (TB1), use jumper wires to connect:
 - Green wire of sensor to terminal marked **1 O₂ -**
 - Orange wire of sensor to terminal marked **1 O₂ +**



TERMINAL BOARD (TB1) LOCATION IN OXYGEN MONITOR
 ILLUSTRATION 1-6

11. Expose sensor to 17% oxygen from the Oxygen Calibration Kit. If 17% oxygen cylinder is not available, do the following:
 - a. Inhale and hold breath for ten seconds.
 - b. Exhale on sensor, then cover sensor with hand.

1-1 CHECK OXYGEN MONITOR OPERATION/INSTALLATION DATE (continued)

12. Observe the Oxygen Monitor. The following should occur when the alarm point of 18% \pm 0.25% is reached, see Illustration 1-3:
 - The meter reading on the Control Unit should decrease to approximately 17%.
 - The audible alarm should sound on the Control Unit and the Remote Sensor Module.
 - The red alarm LED should blink on the Control Unit and the Remote Sensor Module.
13. If alarm does not sound when alarm point (18% \pm 0.25%) is reached, calibrate oxygen monitor as described in Direction 15336, *OXYGEN MONITOR SUBSYSTEM*, revision 3 or higher.
14. When oxygen monitor alarm point has been successfully checked, disconnect sensor from terminal board TB-1 and reinstall it in magnet room.
15. Repeat step 11 to make sure alarm sounds when sensor is installed in magnet room.
16. Expose sensor to ambient air for one minute.
17. Press the Relay Release push button on the front cover of the Control Unit. The following should occur:
 - The meter on the Control Unit should read approximately 20.9%.
 - The audible alarms should stop sounding.
 - The red alarm LED's should stop blinking and stay off.
18. If two oxygen monitors are present (Transportables/Relocatables with helium and nitrogen), repeat Steps 2 through 17 to check operation of second monitor.
19. Record the date of the Oxygen Monitor functional check in the Site Log.

Aerosol Gas Calibration Kit (2173689)

This section contains functional check procedure using the aerosol gas cans.

Note

This section describes the functional check procedure using the newer Aerosol Gas Calibration Kit (2173689). The Remote Sensor Module must contain a Sensor Retrofit Kit (46-320936P1). See Illustration 1-7. If missing, order and install before continuing.

Required Tools

The tools required for performing functional check for the Oxygen Monitor are:

- Aerosol Gas Calibration Kit **GE P/N 2173689 (CAC-2554)**
- Aerosol Calibration Adapter **GE P/N 2173691 (CAC-2500)**
- Small screwdriver.
- Voltmeter (only used for circuit alignment).

The gas cylinder calibration kit 46-328021G1 has been replaced by Aerosol Gas Calibration Kit 2173689. This kit includes two aerosol containers, one filled with 20.9% oxygen, balance nitrogen, and one filled with 17.0% oxygen, balance nitrogen. These aerosol containers are constructed of aluminum and can be safely brought into the MRI room. For the purposes of functional check, the aerosol containers provide approximately 3 individual calibrations. After use, these cans can be discarded.

1-1 CHECK OXYGEN MONITOR OPERATION/INSTALLATION DATE (continued)

Note

Gas flowing time is limited to 30 -45 seconds per can. These aerosol cans can be used for up to three calibrations if they are removed after a 15 second purge attachment. System test should be performed immediately after aerosol removal. It is important to mark the aerosol label where indicated after each test so that filled containers may be distinguished from empty or almost empty containers. For an extended one-time use, the aerosol container may be left in place continuously until all gas has been exhausted. Continuous discharge offers the highest accuracy over the time gas is available in the aerosol container.

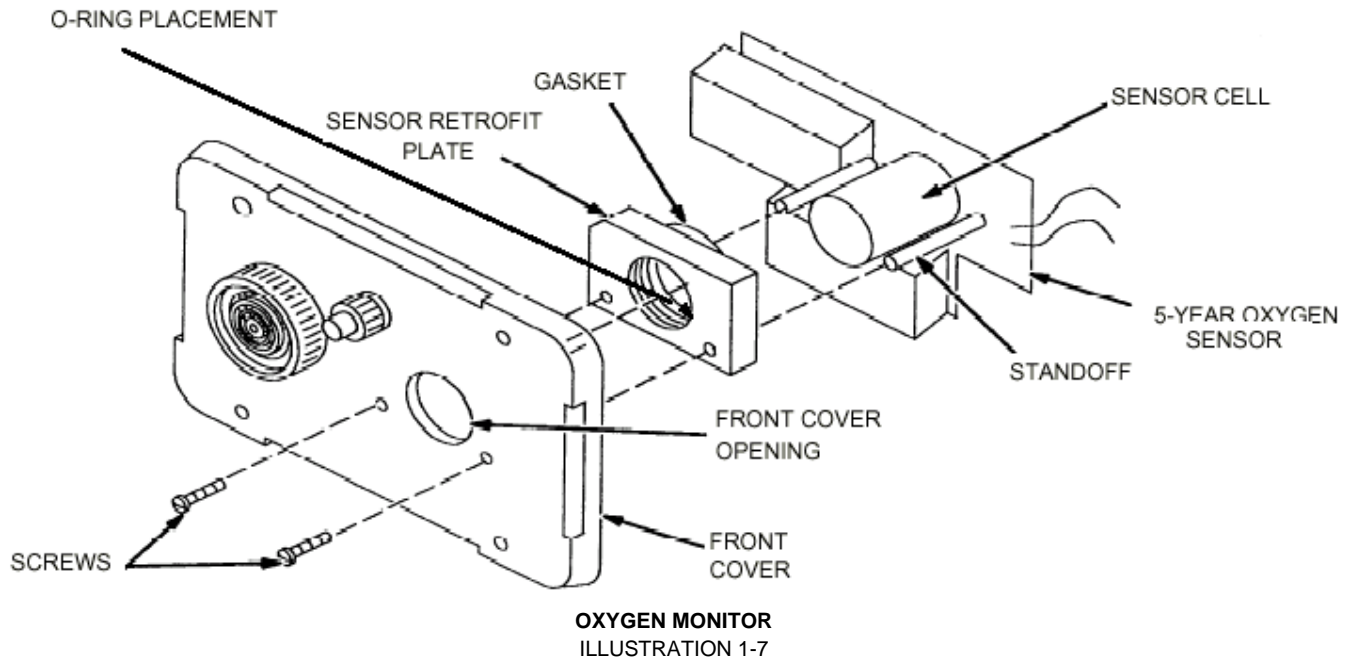
Note

In order to conserve gas, it is necessary to trap a known volume of a gas mixture between the calibration adapter and the oxygen sensor. To properly accomplish this, an O-ring has been included with this kit which must be permanently installed in the oxygen sensor port. The O-ring should be placed by hand or with a needle nose pliers at the bottom of the threaded retrofit block firmly against the foam ring of the oxygen sensor. Refer to Illustration 1-7 for placement details.

Oxygen Monitor Functional Check

1. Turn on the power to the Control Unit. The green power LED should light.
2. Screw the Aerosol Gas Calibration Adapter 2173691 into the gas sensing port (which contains the retrofit block) located on the front cover of the Remote Sensor Module. See Illustration 1-7.
3. Using the aerosol can marked 20.9% Oxygen found in the Oxygen Calibration Kit, remove the cap and insert the top of the can with the nozzle inserted into the Aerosol Calibration Adapter. It will be necessary to snap the can onto the plastic fingers of the adapter by first attaching the can at an angle. Apply moderate force until the aerosol can snaps into place. When properly attached, you will be able to hear the gas automatically discharging. See Illustrations 1-8 through 1-10.

1-1 CHECK OXYGEN MONITOR OPERATION/INSTALLATION DATE (continued)

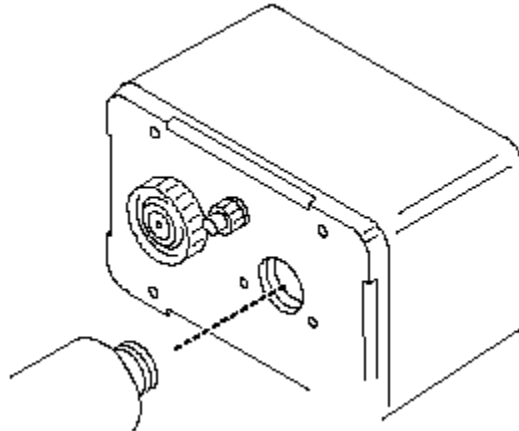


CAUTION

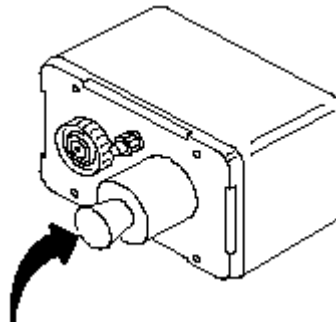
Because of the annoying and possibly alarming sound made by the Sonalert, it may be disabled during testing by disconnecting it's red wire. Be sure to reconnect the wire after testing! Attaching a 10K resistor in series with the Sonalert permits audible alarm operation at a reduced volume.

4. Wait approximately 15 seconds. (After 15 seconds, aerosol container may be removed for repeated tests or left in place for continuous gas discharge.) Verify the meter reads 20.9% oxygen (Illustration 1-11). Immediately remove the aerosol can by tilting the can at an angle until the container snaps free from the calibration adapter. Retain for possible repeated tests.
5. Using the aerosol can marked 17.0% Oxygen found in the Oxygen Calibration Kit, remove the cap and insert the top of the can with the nozzle directed into the Aerosol Calibration Adapter. It may be necessary to snap the can onto the plastic fingers of the adapter by first attaching the can at an angle. Apply moderate force until the aerosol can snaps into place. When properly attached, you will be able to hear the gas automatically discharging. See Illustration 1-8 through 1-10.

1-1 CHECK OXYGEN MONITOR OPERATION/INSTALLATION DATE (continued)

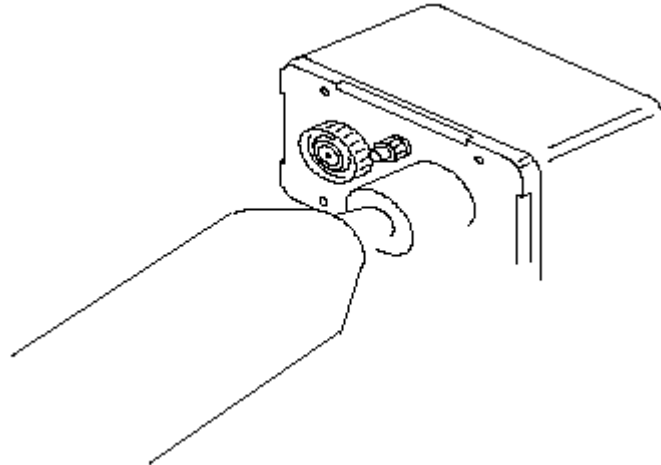


ATTACHING CALIBRATION TOOL TO THE OXYGEN SENSOR PORT
ILLUSTRATION 1-8



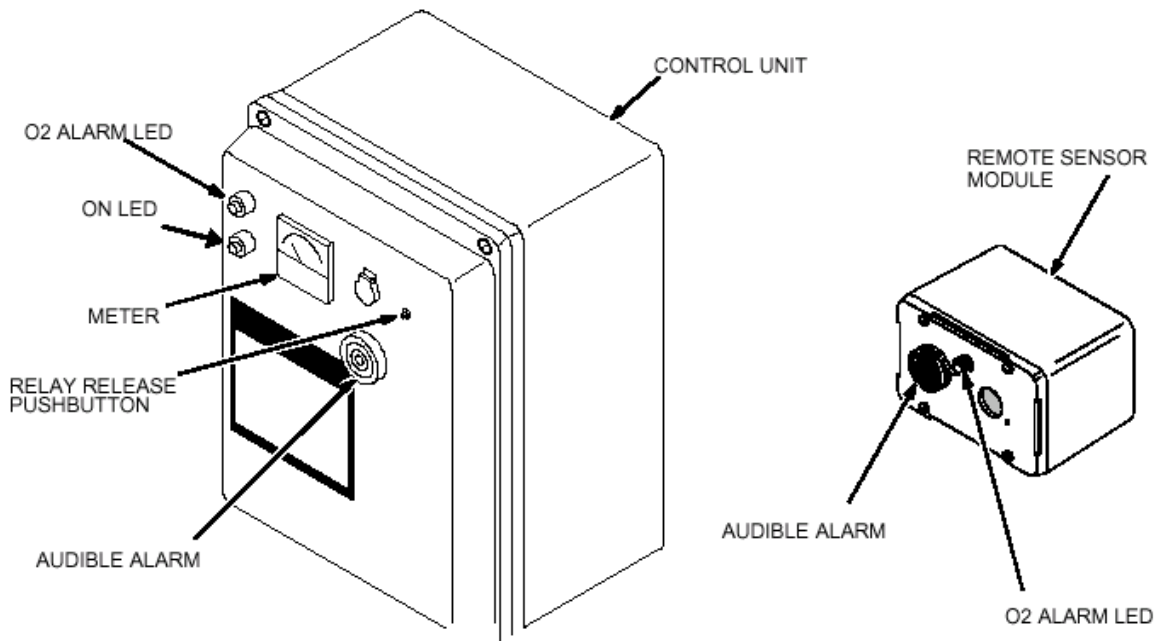
INSERT OXYGEN CAN INTO THE CALIBRATION TOOL
ILLUSTRATION 1-9

1-1 CHECK OXYGEN MONITOR OPERATION/INSTALLATION DATE (continued)



APPLY MODERATE FORCE UNTIL CAN SNAPS INTO PLACE
ILLUSTRATION 1-10

6. With the 17% oxygen aerosol attached to the Remote Sensor Module the following should occur after approximately 15 seconds. (See Illustration 1-11):
- The meter reading on the Control Unit should decrease to less than 18%.
 - The audible alarm should sound on the Control Unit and Remote Sensor Module.
 - The red alarm LED should blink on the Control Unit and Remote Sensor Module.



CONTROL UNIT METER
ILLUSTRATION 1-11

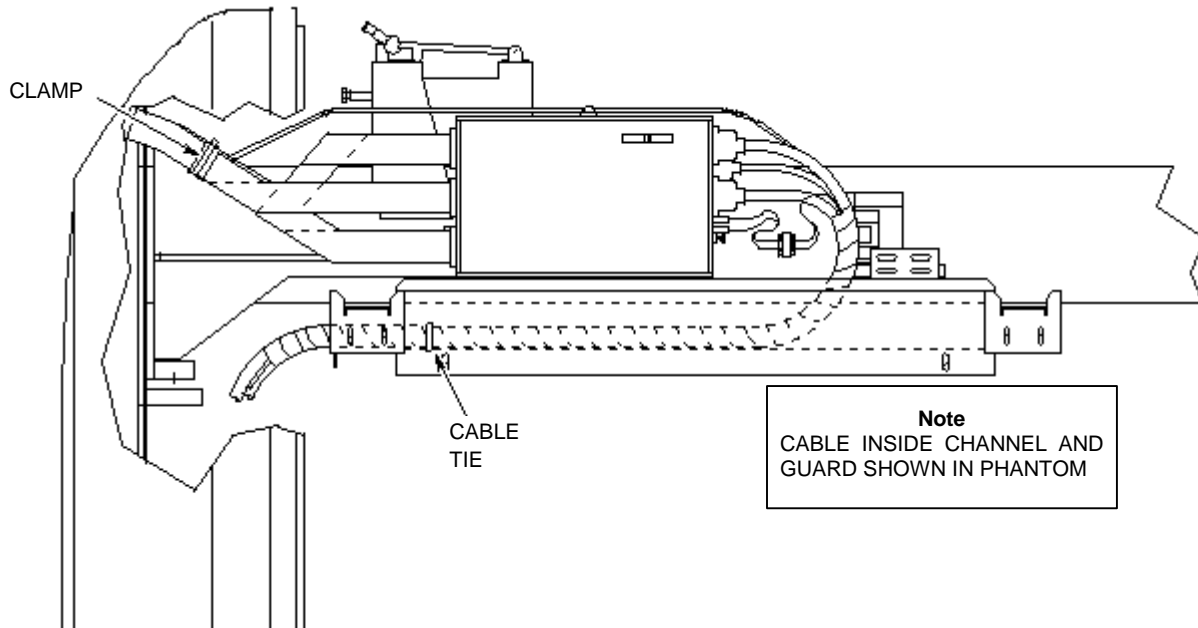
1-1 CHECK OXYGEN MONITOR OPERATION/INSTALLATION DATE (continued)

7. Immediately disconnect the 17.0% aerosol container from the Remote Sensor Module (after approximately 15 seconds). Disconnect the Aerosol Calibration Adapter to allow the ambient air with normal oxygen content to contact the sensor. Retain the 17% aerosol container for possible repeated tests. **Note: Unscrewing the Aerosol Calibration Adapter from the Remote Sensor Module allows rapid diffusion of ambient oxygen to reach the sensor cell. Unscrew adaptor only if aerosol container is removed to prevent unnecessary gas waste.**
8. Press the Relay Release push-button on the front cover of the Control Unit. The following should occur:
 - The meter on the Control Unit should read approximately 20.9%.
 - The audible alarms should stop sounding.
 - The red alarm LEDs should stop blinking and stay off.
9. If the system responds correctly as per steps 1 through 8, your calibration is complete. Otherwise, refer to Direction 15336, *OXYGEN MONITOR SUBSYSTEM* for calibration procedure.
10. Record the date of the Oxygen Monitor functional check in the Site Log.

1-2 INSPECT FRONT COVER CABLE TAKE-UP

Oxford And "S"-Series Magnets

1. Open or remove right front side cover of magnet enclosure.
2. Inspect cable ties (46-208758P5) and replace if broken. See Illustration 1-8.



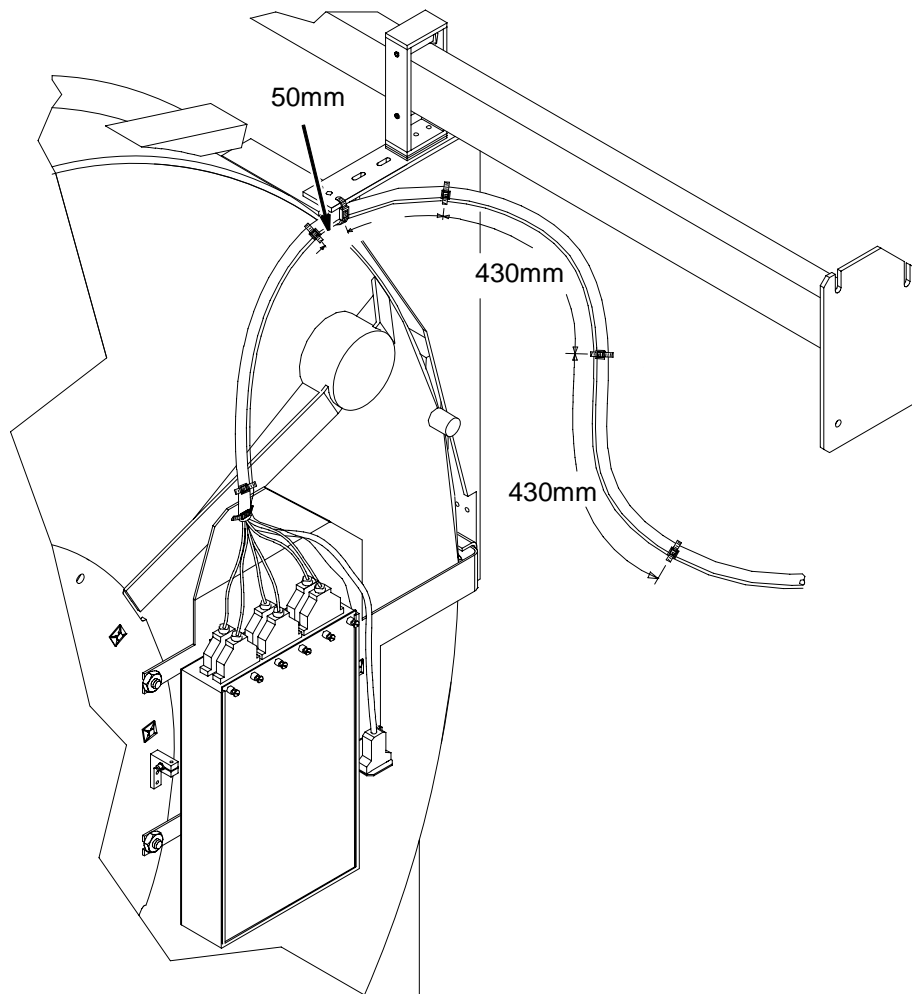
FRONT COVER CABLE ROUTING FOR OXFORD AND "S" SERIES MAGNETS
ILLUSTRATION 1-8

3. Inspect cables for wear or strain. Adjust or re-position cables in channel and/or guard, if necessary.

1-2 INSPECT FRONT COVER CABLE TAKE-UP (continued)

Cx and LCC Magnets

1. Open Front Cover of enclosure to check the secured spiral wrapped cable bundle, pneumatic tube, and fiber optic cable attached to bracket. See Illustration 1-13.
2. Check remaining length of secured spiral wrapped cable bundle for Ty-wraps at indicated distances and cable wear or strain. Inspect Ty-wraps (46-208758P5) and replace if broken. See Illustration 1-13.
3. Open, close, and again open the Front Cover to check cable movement. Adjust or re-position cables if needed.



FRONT COVER CABLE ROUTING FOR CX AND LCC MAGNETS
ILLUSTRATION 1-13

1-3 PERFORM PHYSICAL ACQUISITION CONTROLLER (PAC-II) LEAKAGE CURRENT TEST

Initial Conditions

- System in Standby or Idle Operating Condition

Equipment required

- Dale 600 (120VAC) (46-328406G1) or Dale 600E (220VAC) (46-328406G2) Safety Analyzer
- OR
- Dale 601 (120VAC) (46-328406G1) or Dale 601E (220VAC) (46-328406G2) Safety Analyzer

The Safety Analyzer Kits are slowly being upgraded with the Dale 601/601E Safety Analyzer as the units are sent in for calibration. This procedure is now divided into two sections one for the old model, Dale 600/600E and the second for the new model Dale 601/601E.

1-3-1 PAC-II Leakage Current Test Using The OLD Dale 600/600E Safety Analyzer



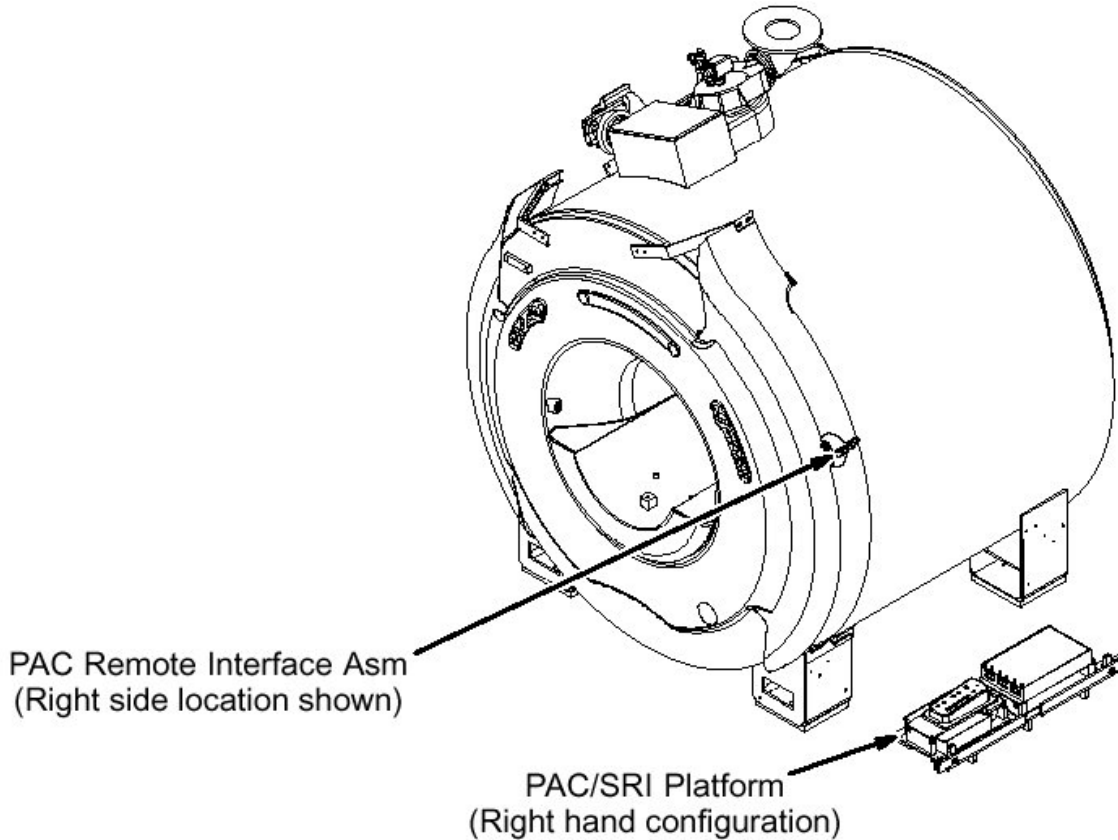
STRONG MAGNETIC FIELD! FERROUS MATERIALS CAN BECOME DANGEROUS PROJECTILES IN THE PRESENCE OF THE MAGNETIC FIELD PRODUCED BY THE SIGNA MAGNET. DO NOT BRING ANY FERROMAGNETIC TOOLS OR EQUIPMENT INTO THE MAGNET ROOM.

Note

The Dale 600/600E Safety Analyzer may only be taken 51 cm or 20 inches from the PAC Remote Interface Assembly. The gauss field closer will affect the Dale Safety Analyzer, thereby altering the tool's ability to take an accurate measurement.

1-3-1 PAC-II Leakage Current Test Using The OLD Dale 600/600E Safety Analyzer (continued)

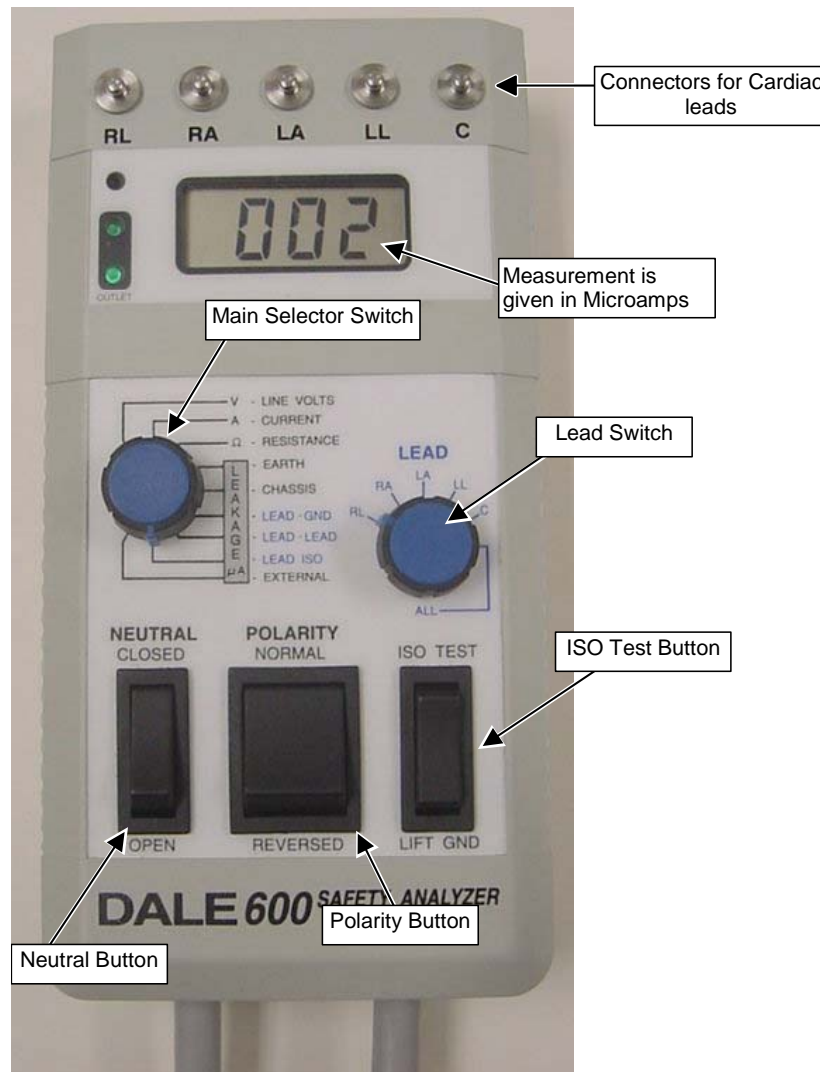
1. Plug the Analyzer into a power source in the magnet room, which allows access to the PACII Remote Interface Assembly while maintaining distance (see Note above) from the magnet.
2. At Physiological Acquisition Controller (PAC-II) Remote Interface Assembly, connect the Patient Lead cable and the Cardiac Lead Set at the ECG connector. See Illustration 1-14.



LOCATION OF THE PAC REMOTE INTERFACE ASM FOR LCC/CX/K4 MAGNET
ILLUSTRATION 1-14

1-3-1 PAC-II Leakage Current Test Using The OLD Dale 600/600E Safety Analyzer (continued)

3. Connect cardiac leads to Dale 600/600E (46-328406G1). See Illustration 1-15. Not all systems will have a Cardiac (C) lead.



DALE 600 ANALYZER
 ILLUSTRATION 1-15

4. Place the Neutral Button in the CLOSED position.

1-3-1 PAC-II Leakage Current Test Using The OLD Dale 600/600E Safety Analyzer (continued)

5. Place the POLARITY switch in the NORMAL position.
6. On the Dale 600/600E set the main selector switch to LEAKAGE - LEAD-GND.

7. Move LEAD switch through the positions shown in Table 1-1. Verify leakage current displayed on meter is less than 50 micro amps and record the values in the Data Sheet.

Note

Typically the Lead to Ground and Lead-to-Lead readings are close to zero and less than 50 microamps. Measurements exceeding the 50 micro amps indicate an issue in the corresponding lead.

TABLE 1-1
LEAKAGE CURRENT MEASUREMENTS

LEAD SELECT POSITION
RL
RA
LA
LL

8. On the Dale 600/600E set the main selector switch to LEAKAGE - LEAD-LEAD.
9. Move LEAD switch through the positions shown in Table 1-1. Verify leakage current displayed on meter is less than 50 micro amps and record the values in the Data Sheet.
10. On the Dale 600/600E set the main selector switch to LEAKAGE - LEAD-ISO.
11. Make sure that the leads are not touching the floor.
12. Move the LEAD switch to ALL LEADS.
13. Press button ISO TEST and record the meter reading in Data Sheet. This reading must be less than 50 micro amps.
14. Repeat Steps 5 - 13 with the POLARITY switch in the REVERSED position.

Restoration

1. Disconnect the Cardiac Lead Set from Dale Safety Analyzer.
2. Remove the Patient Lead cable from the ECG Connector.
3. Unplug the Dale Safety Analyzer.

1-3-2 PAC-II Leakage Current Test Using The NEW Dale 601/601E Safety Analyzer

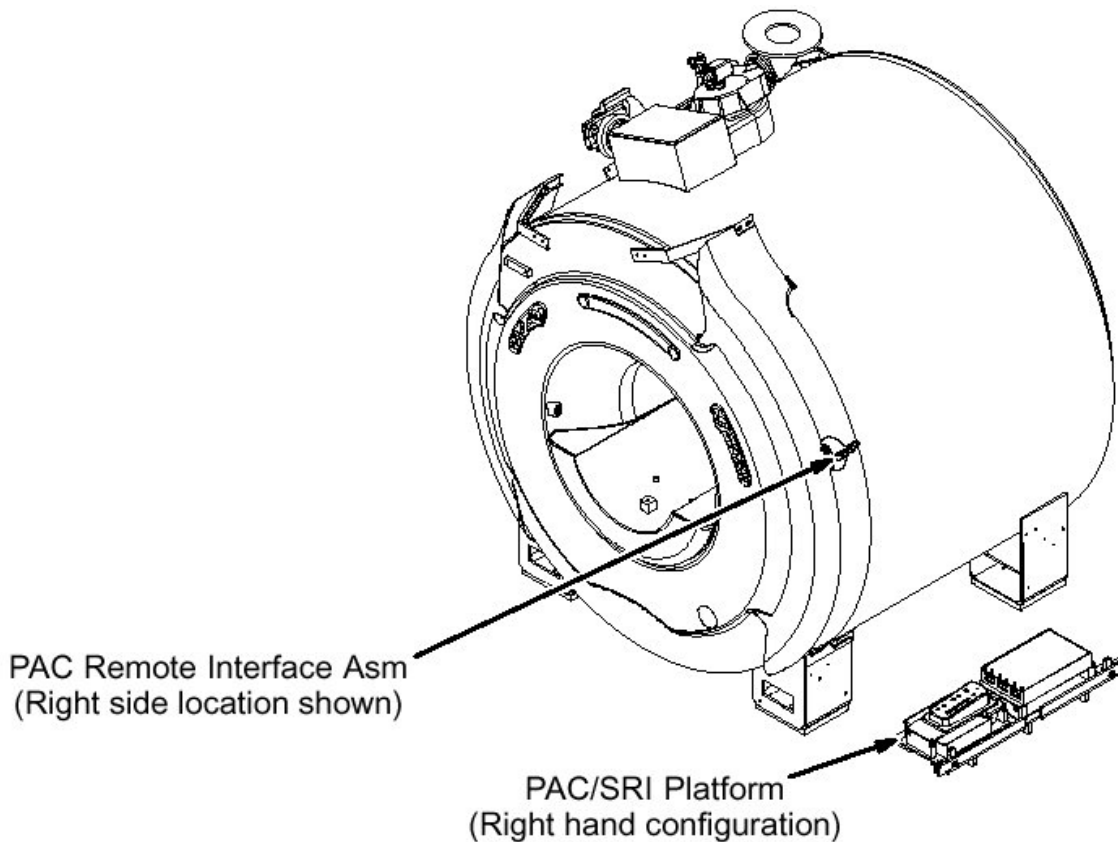


STRONG MAGNETIC FIELD! FERROUS MATERIALS CAN BECOME DANGEROUS PROJECTILES IN THE PRESENCE OF THE MAGNETIC FIELD PRODUCED BY THE SIGNA MAGNET. DO NOT BRING ANY FERROMAGNETIC TOOLS OR EQUIPMENT INTO THE MAGNET ROOM.

Note

The Dale 600/600E Safety Analyzer may only be taken 51 cm or 20 inches from the PAC Remote Interface Assembly. The gauss field closer will affect the Dale Safety Analyzer, thereby altering the tool's ability to take an accurate measurement.

1. Plug the Analyzer into a power source in the magnet room, which allows access to the PACII Remote Interface Assembly while maintaining distance (see Note above) from the magnet.
2. At Physiological Acquisition Controller (PAC-II) Remote Interface Assembly, connect the Patient Lead cable and the Cardiac Lead Set at the ECG connector. See Illustration 1-16.



LOCATION OF THE PAC REMOTE INTERFACE ASM FOR LCC/CX/K4 MAGNET
ILLUSTRATION 1-16

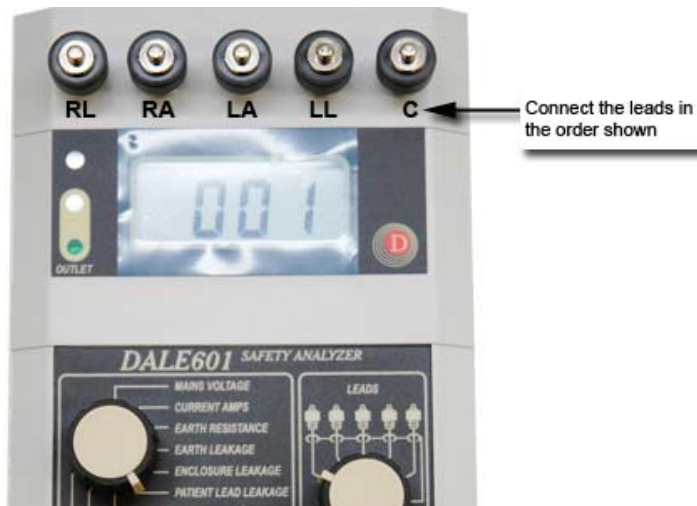
1-3-2 PAC-II Leakage Current Test Using The NEW Dale 601/601E Safety Analyzer (continued)

- 3. Verify that the Test Load selector switch is set at 601 for IEC601.1. See Illustration 1-17.



TEST LOAD SELECTOR SWITCH SETTING
ILLUSTRATION 1-17

- 4. Connect cardiac leads to Dale 601/601E. See Illustration 1-18. Not all systems will have a Cardiac (C) lead.



DALE 601/601E ANALYZER: CONNECTING LEADS
ILLUSTRATION 1-18

1-3-2 PAC-II Leakage Current Test Using The NEW Dale 601/601E Safety Analyzer (continued)

5. Place the [L2] (Neutral) Switch in the **CLOSED** position. See Illustration 1-19.



DALE 601/601E SAFETY ANALYZER
 ILLUSTRATION 1-19

Note:

Be sure to pause in the OFF (Middle) position when switching polarity from normal to reverse.

6. Place the **Outlet** (Polarity) switch in the **NORMAL** position.
7. On the Dale 601/601E set the Function Switch to **PATIENT LEAD LEAKAGE**.

1-3-2 PAC-II Leakage Current Test Using The NEW Dale 601/601E Safety Analyzer (continued)

8. Move Lead switch through the lead positions shown in Table 1-2. Verify leakage current displayed on meter is less than 50 micro amps and record the values in the Data Sheet.

Note:

Typically the Patient Lead Leakage (Lead to Ground) and the Patient Aux Current (Lead-to-Lead) readings are close to zero and less than 50 microamps. Measurements exceeding the 50 micro amps indicate an issue in the corresponding lead.

Table 1-2
LEAKAGE CURRENT MEASUREMENTS

LEAD SELECT POSITION
RL
RA
LA
LL

9. On the Dale 601/601E set the main selector switch to **PATIENT AUX CURRENT**.
10. Move Lead switch through the lead positions shown in Table 1-2. Verify that the current displayed on meter is less than 50 micro amps and record the values in the Data Sheet.
11. On the Dale 601/601E set the main selector switch to **M.A.P.** (Mains on Applied Parts sink current).
12. Make sure that the leads are not touching the floor.
13. Move the Lead switch to measure All Leads, which is the 6th position all the way to right on the switch.
14. On the **LIFT/Ground/MAP** Switch, press and hold **M.A.P.** Verify that the current displayed on meter is less than 50 micro amps and record the values in the Data Sheet.

Note:

Be sure to pause in the OFF (Middle) position when switching polarity from normal to reverse.

15. Repeat Steps 7 - 14 with the **POLARITY** switch in the **REVERSED** position.

Restoration

1. Disconnect the Cardiac Lead Set from Dale Safety Analyzer.
2. Remove the Patient Lead cable from the ECG Connector.
3. Unplug the Dale Safety Analyzer.

DATA SHEET 1-1
 PAC-II LEAKAGE CURRENT MEASUREMENTS

LEAD SELECT POSITION	METER READING NORMAL POSITION (microamps)	METER READING REVERSE POSITION (microamps)
Patient Leakage Current (Lead to Ground)		
Right Leg (RL)		
Right Arm (RA)		
Left Arm (LA)		
Left Leg (LL)		
Patient Auxillary Current (Lead to Lead)		
RL		
RA		
LA		
LL		
M.A.P. (ISOLATION Tests)		
ALL LEADS M.A.P. (ISO) Test		

1-4 CHECK MAGNET ROOM RF INTEGRITY WITH CORRELATED NOISE TEST

Correlated Noise is checked using data from SPT. (Refer to Appendix E, Section E-1-2, Viewing Results and Calibration File.)

1. Verify there is a SPT file that was run within the last month. If not, run a SPT now. (Refer to APPENDIX E, SYSTEM PERFORMANCE TEST.)
2. Verify that SPT Coherent Noise Test is within specification.
3. If Coherent Noise Test is within specification, the Correlated Noise is OK. If it is out of specification, contact the OnLine Center or your local support engineer. This specification is very tight and may fail on systems that do not have a significant problem.

1-5 CHECK CARDIAC GATING CABLE

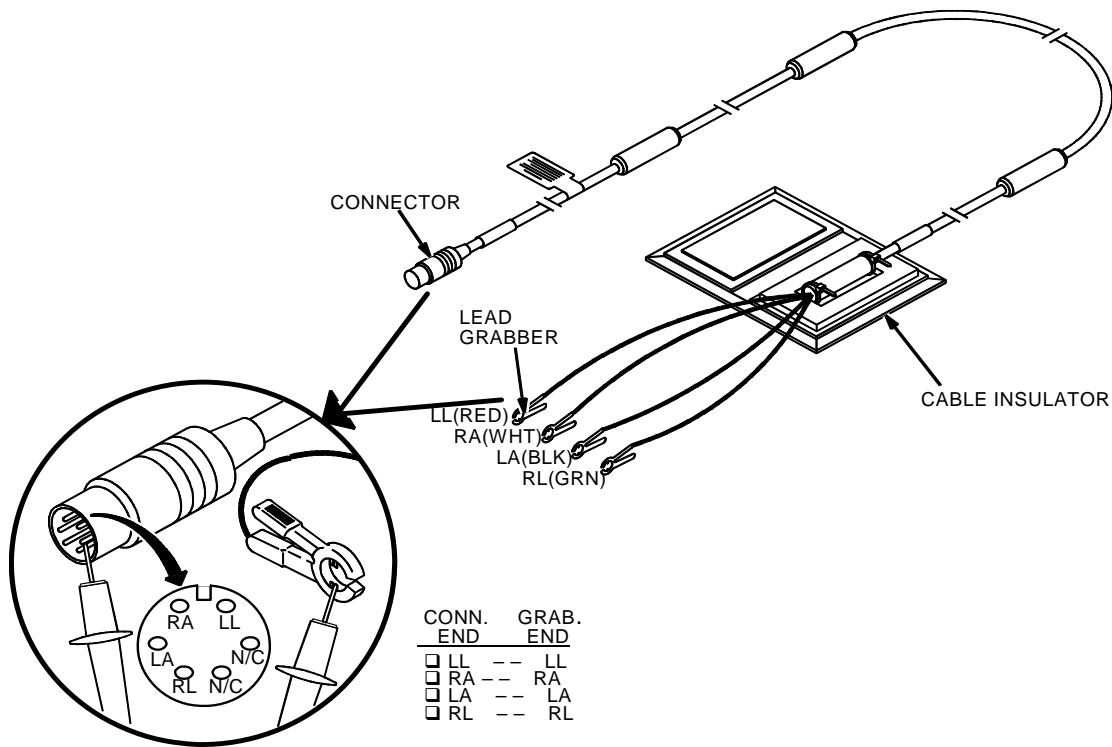
Under certain conditions, the resistor pod closest to the patient leads on the Cardiac Gating Cable may become warm, or burn the patient. This section describes a safety check for the cable to protect the patient. This check has two parts; a visual inspection, and an electrical test. The electrical test checks the functionality of all the ECG leads. All the clip leads are connected together. The right leg (RL) lead supplies a +2.5V DC drive signal to the right arm (RA), left arm (LA), and left leg (LL) leads. The signal from each of these leads will be read in turn and checked that their respective inputs to the ECG A/D converter are in range $+2.5V \pm 200mv$. If any of these leads are not in this range, an error message will be entered into the Message Log. If the signals from the RA, LA, and LL leads are all out of range, it is assumed that RL lead has failed.

1-5 CHECK CARDIAC GATING CABLE (continued)

Note

If the customer cable fails any of the safety checks below, the cable should be disposed of immediately per step 11.

1. Open the Cable Insulator (46-306867G1) attached to the end resistor pod. See Illustration 1-20. Check for any smell or visual evidence of warming (i.e., brownish discoloring of the insulation material). Check for any cracking in the pod insulation. If there is evidence of damage, proceed to step 11, otherwise close and seal the cable insulator.
2. Check to see that all lead grabbers are secured to the cable.

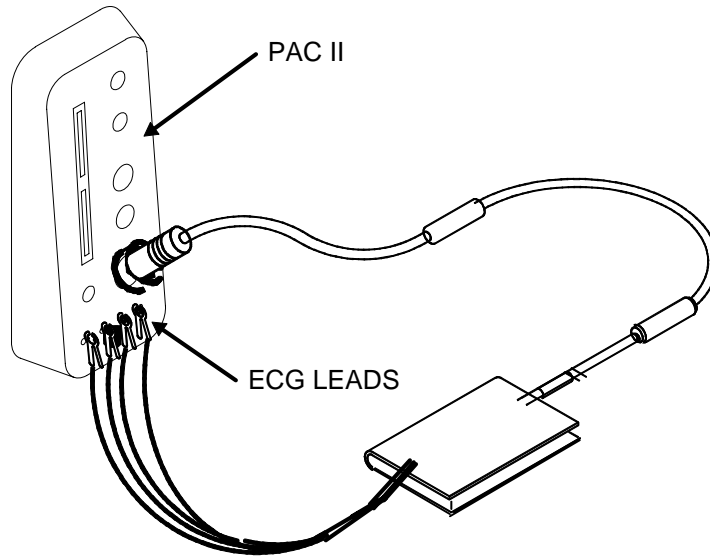


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CARDIAC GATING CABLE SAFETY CHECK (CONTINUITY)
 ILLUSTRATION 1-20

1-5 CHECK CARDIAC GATING CABLE (continued)

3. Connect cardiac gating lead to the Physical Acquisition Controller (PAC-II) Assembly (MG2 A11) as shown in Illustration 1-21. Connect clip leads to test points on PAC-II (test points are shorted together). Clips leads are color-coded: red is LL, white is RA, black is LA, and green is RL.



PAC II ASSEMBLY
 ILLUSTRATION 1-21

Release 5.X:

4. Touch **[UTILITIES]** and then **[Diags]**. Deselect all diagnostics on Test Selection screen by touching **[Toggle On/Off]**. On the "Submenu Selection" screen touch **[TPS Manual]** and then **[ECG Leads]**.

Release 8.X:

- 4A. Access to the diagnostics is via the **[Tools Icon]** on the Service Desktop. After the **[Tools Icon]** has been selected click on the **[Diags]** icon and then select the main diagnostic menu. Click on **[IPG]** icon, **[Manual...]**, and then click on the box next to "PAC ECG Leads." Click on **[Close]**, then **[Close]** again, then **[Run Diags]** in the Diagnostics window. When finished, click on **[Stop Diags]** and **[Close]**, then **[Quit]** in the Diagnostics window.
5. The system resets the TPS/IPG. The following message will be displayed at the bottom of the screen while the test is running:

The PAC Lead Test is running. Check that the PAC ECG leads are connected together. Please use the tool provided.

6. After test completes in about 90 seconds, open the Message Log by touching **[MESSAGES]**, then **[View Log Left]**.

1-5 CHECK CARDIAC GATING CABLE (continued)

7. Find TPS Diagnostics start message similar to this example:

DIAGS STATUS MESSAGE
 TPS Manual Diags have been selected and are starting execution.

8. Find TPS Diagnostics finished message similar to this example:

DIAGS STATUS MESSAGE
 TPS Manual diags have finished execution.

Note

If the leads are good, no message will be logged.

9. If any of the leads failed there will be an error message between these two diagnostics messages indicating which lead failed. An example is shown below:

The left arm ECG lead is failing or has failed. Check this lead and replace if necessary.

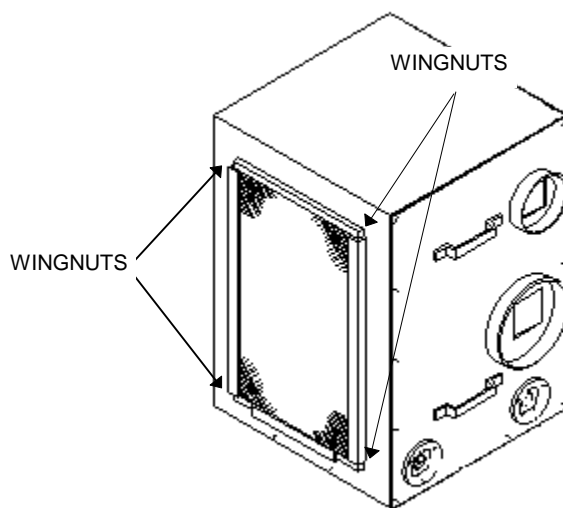
10. If any of the lead grabbers have been removed or are loose from the cable, or if the leads failed the diagnostic test, notify the customer that the cable is damaged and can be replaced by calling DIA, 1-800-433-5366 and ordering E8811EC. GE will only replace, without charge, cables with defective resistor pods.
11. If you have a new cable, replace the defective cable. If you do not have a new cable, order a new Cardiac Gating Cable (46-306867G1) from GPO as a priority 1. Charge it off on a code 99 dispatch using charge code #120-930-299. Notify the customer that the cable is damaged and could be a potential safety hazard. It will be replaced free of charge. When the new cable is received, replace it immediately. Insure that the old cable is made unusable, perhaps by cutting it in half, so that someone doesn't pick it up and inadvertently use it somewhere else.

1-6 CHECK PATIENT BLOWER FANS AND FILTERS

1. Remove Filter grill from Patient Blower by turning four wing nuts ¼ turn counter-clockwise See Illustration
 1-22. Listen for operation of fans. Replace as necessary with P/N 2121199-2 (Comfort Module Fan) or P/N 2121199-3 (Body Coil Fan).
2. Remove and replace filter (P/N 2121199-5) as necessary.

CAUTION

Do not use a screwdriver or other solid object to probe fans or damage to fan blades may occur.



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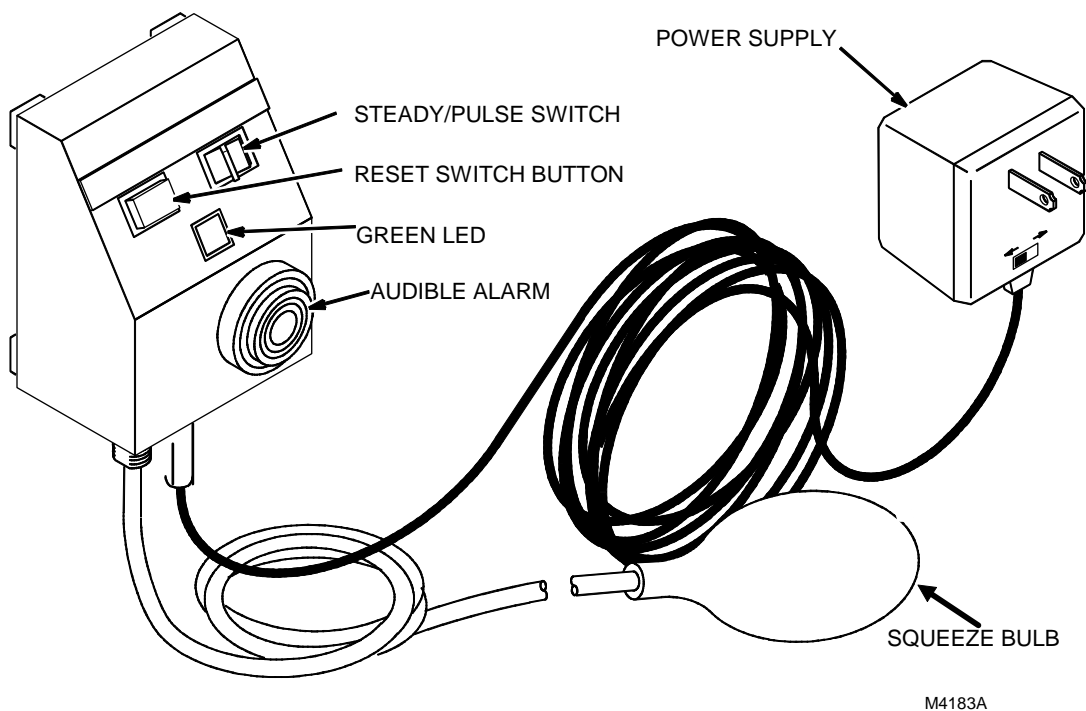
LOCATION OF PATIENT BLOWER AND FILTER
ILLUSTRATION 1-22

1-7 CHECK PNEUMATIC PATIENT ALERT SYSTEM

The Pneumatic Patient Alert System is a stand alone system that allows the Patient to contact the Operator even when the Console volume is turned down. Patient to Operator contact is accomplished by means of the Patient depressing a hand-held squeeze bulb that activates an audible and visual alarm near the Operator. The Operator must reset the Control Box in order to stop the alarms. Either a PULSE or STEADY audible tone can be selected at the Control Box.

Use the following procedure to verify proper functioning of the Pneumatic Patient Alert System:

1. Check that green LED is lit. See Illustration 1-23.
2. Set the Control Box STEADY/PULSE Switch to PULSE.
3. Depress the Squeeze Bulb slowly until fully collapsed.
4. Check that Control Box red LED is lit and the audible alarm is emitting a pulsating tone.
5. Set the Control Box STEADY/PULSE Switch to STEADY.
6. Check that Control Box red LED remains lit and audible alarm is emitting a steady tone.
7. Depress the Control Box RESET Button.
8. Check that Control Box red LED and audible alarm have turned off, but green LED remains lit.



CONTROL AND INDICATOR LOCATIONS
 ILLUSTRATION 1-23