

PowerCommandTM

Serial Communications Kit Installation Instructions



Onan

Powerful SolutionsTM

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⚠WARNING

INCORRECT SERVICE OR REPLACEMENT OF PARTS CAN RESULT IN DEATH, SEVERE PERSONAL INJURY, AND/OR EQUIPMENT DAMAGE. SERVICE PERSONNEL MUST BE QUALIFIED TO PERFORM ELECTRICAL AND/OR MECHANICAL SERVICE.

Safety Precautions

The PowerCommand™ Serial Communications Interface Board can be used to remotely monitor and operate generator sets. All of the safety precautions for that equipment must be observed. Refer to the Operator's Manual for the equipment that is being remotely monitored and controlled for important safety precautions.

The following symbols, found throughout this manual, alert you to potentially dangerous conditions to the operator, service personnel, or the equipment.

⚠ DANGER *This symbol warns of immediate hazards which will result in severe personal injury or death.*

⚠ WARNING *This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.*

⚠ CAUTION *This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.*

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Keep your hands, clothing, and jewelry away from moving parts.
- Before starting work on the generator set, disconnect battery charger from its AC source, then disconnect starting batteries, negative (-) cable first. This will prevent accidental starting.
- Make sure that fasteners on the generator set are secure. Tighten supports and clamps,

keep guards in position over fans, drive belts, etc.

- Do not wear loose clothing or jewelry in the vicinity of moving parts, or while working on electrical equipment. Loose clothing and jewelry can become caught in moving parts. Jewelry can short out electrical contacts and cause shock or burning.
- If adjustment must be made while the unit is running, use extreme caution around hot manifolds, moving parts, etc.

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Remove electric power before removing protective shields or touching electrical equipment. Use rubber insulative mats placed on dry wood platforms over floors that are metal or concrete when around electrical equipment. Do not wear damp clothing (particularly wet shoes) or allow skin surface to be damp when handling electrical equipment.
- Use extreme caution when working on electrical components. High voltages can cause injury or death. DO NOT tamper with interlocks.
- Follow all applicable state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Tag and lock open switches to avoid accidental closure.
- Jewelry is a good conductor of electricity and should be removed before working on electrical equipment.

MEDIUM VOLTAGE GENERATOR SETS (601V to 15kV)

⚠ DANGER

- Medium voltage acts differently than low voltage. Special equipment and training are required to work on or around medium voltage equipment. Operation and maintenance must be done only by persons trained and qualified to work on such devices. Improper use or procedures will result in severe personal injury or death.
- Do not work on energized equipment. Unauthorized personnel must not be permitted near energized equipment. Due to the nature of medium voltage electrical equipment, induced voltage can remain even after the equipment is disconnected from the power source. Plan the time for maintenance with authorized personnel so that the equipment can be de-energized and safely grounded.

GENERAL SAFETY PRECAUTIONS

- PowerCommand™ Software for Windows® can remotely start and stop a genset. Make certain that all appropriate personnel are notified before remotely operating equipment and make them aware of any equipment that can be energized automatically.
- Do not work on this equipment when mentally or physically fatigued, or after consuming any alcohol or drug that makes the operation of equipment unsafe.

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1. Introduction

ABOUT THIS MANUAL

These instructions cover installation of the components and wiring required for PowerCommand™ Control (PCC) serial communications. The kit includes the PCC Serial Communications Interface Board, the PowerCommand Cable Interface and two cables. The PCC Serial Communications Interface Board provides direct serial communications with the PCC (installation of a control type network is not needed).

⚠ CAUTION *Electrostatic discharge will damage circuit boards and components. Do not remove the circuit board from the antistatic shipping bag until you are grounded to the PCC with a wrist strap.*

The **PCC operating software must be version 2.00 or higher** for the PCC Serial Communications Interface Board to communicate with the PCC. Check the version on the display menu. If the version number is below 2.00, obtain and install an EPROM upgrade kit before proceeding with this installation. Follow the installation instructions provided with the EPROM kit.

The PCC Serial Communications Interface Board allows a host PC with PowerCommand for Windows to communicate, via a serial connection, with the PCC.

The PowerCommand Cable Interface provides a junction box between the twisted pair from TB1 and the serial cable from the host PC or modem.

The null modem cable is used to connect directly to a host PC, and the Modem cable is used to connect to a modem.

This manual is intended for service personnel with a basic understanding of serial communications who are also qualified to perform service on generator sets. Review the entire manual before starting the installation.

Section 2 provides an overview of PCC serial communications. Section 3 describes the hardware installation. Section 4 covers the alarm setup.

Abbreviations

ACK	Acknowledgement
NAK	Negative Acknowledgement
PC	Personal Computer
PCC	PowerCommand™ Control
PCW	PowerCommand™ for Windows
SCT	Serial Configuration Tool

SPECIAL TOOLS REQUIRED

- Grounding wrist strap with grounding clip
- Serial Communication Configuration Tool Software
- PowerCommand™ for Windows (minimum version 1.1) Only required if an installation checkout will be preformed

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2. PCC Serial Communications

SERIAL COMMUNICATIONS

The PCC serial protocol provides simple commands for reading bytes from—and writing bytes to—the PCC. In the single set software, a protocol command is provided for alarm reporting in direct or remote connections. The serial communications interface does not support the Emergency stop feature in PCW.

The PCC has the means of reporting alarm events as they transpire. When enabled, it is an event-driven real-time alarm reporting protocol. This means anytime the PCC senses a warning or fault, it has the ability to initiate communications to report the event to the host. This is accomplished either through remote connections via a modem or a direct serial link. Refer to Figures 2-1 and 2-2.

The PCC has three lines for communications that are available at the Customer Interface Terminal Block:

- NET_DATA 2 (TB1-15 [TX]) – Transmit
- NET_DATA 1 (TB1-14[RX]) – Receive
- NET_POWER (TB1-13[GND]) – Ground

There are no handshaking or control lines available.

The PCC’s serial communication is interrupt-driven. Any time data is received at the PCC, an interrupt is generated for the microprocessor to handle the data. Once all the data is received, it is checked for validity and errors. If the command was valid and the data was without error, the command is executed and the proper data is returned. If the communication was unsuccessful, a NAK (negative acknowledgment) or no data will be returned. The host must then re-transmit the command.

The PCC does incorporate a simple form of error checking. The PCC uses a longitudinal redundancy check (LRC), which is the exclusive-OR (XOR) of all the bytes in the packet to be sent. This byte is attached to the end of the packet.

PCC Serial Interface

The PCC Serial Communication Protocol is designed for two conditions of connection:

1. The PCC is directly connected through a PC serial port (direct serial connection). Figure 2-1.
2. The PCC is remotely connected via modems and the telephone line to the host PC (remotely connected). Figure 2-2.

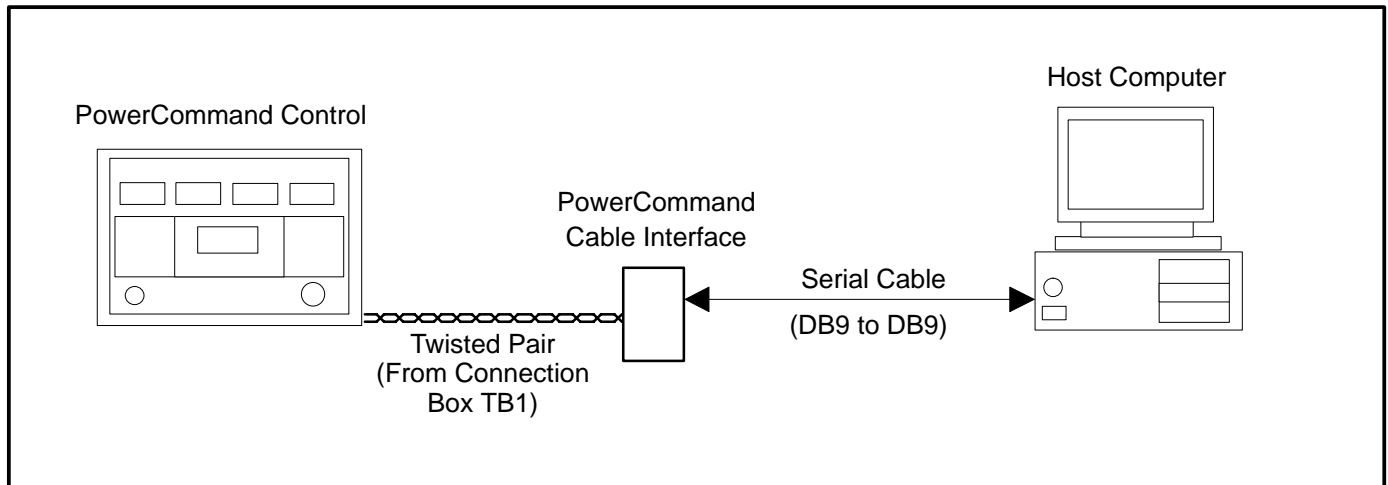


FIGURE 2-1. DIRECT SERIAL COMMUNICATION

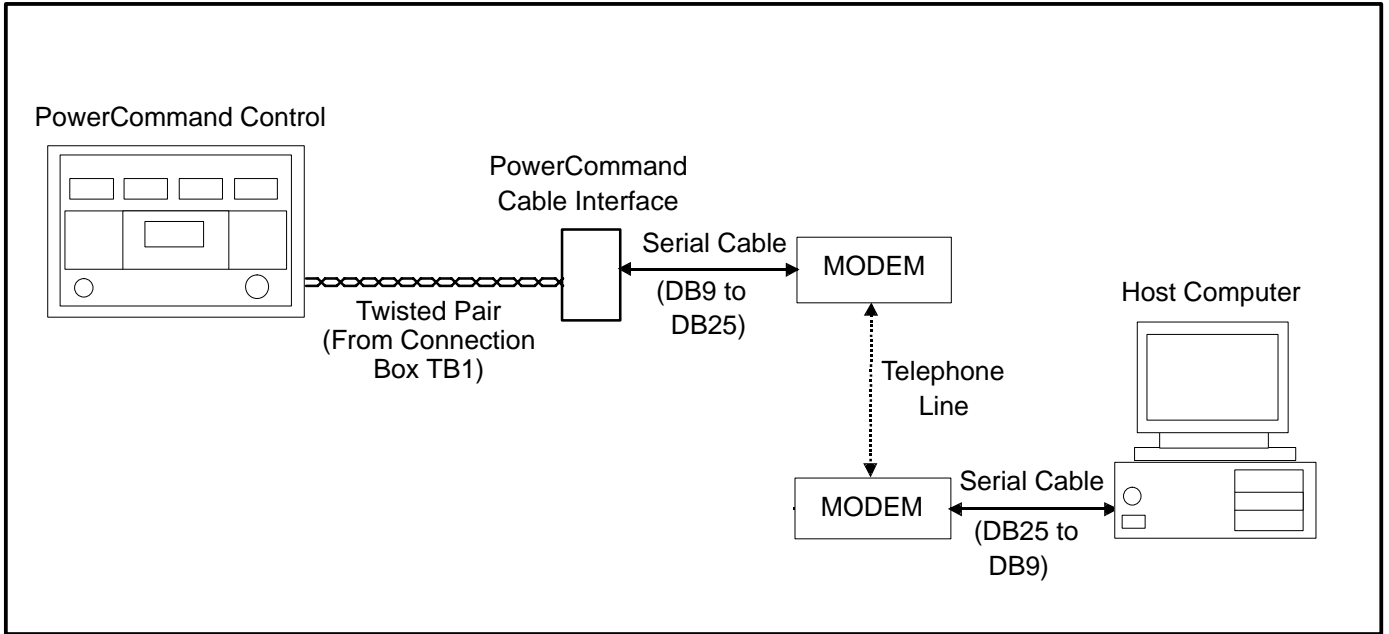


FIGURE 2-2. REMOTE SERIAL COMMUNICATION VIA MODEMS

3. Hardware Installation

OVERVIEW

This section describes installation of the PowerCommand Serial Communications Interface Board and the Serial Cable Interface Board.

The PCC Serial Communications Interface Board **must be used with PCC operating software version 2.00 or higher** for all models. Check the version on the display menu. If the version number is below 2.00, obtain and install an EPROM upgrade kit before proceeding with this installation. Follow the installation instructions provided with the EPROM kit.

DESCRIPTION

The Serial Communications Interface Board provides customers with an electrically isolated (EIA-232) RS232 serial communications interface to the PCC.

When the PowerCommand Serial Communications Interface Board is installed, the PCC control will no longer enter the sleep mode.

The Serial Cable Interface Board is used to provide a DB9 cable connection. This connection can be used for either direct serial communication with a host computer or for remote serial communication via a modem (Figures 2-1 and 2-2).

LOCATION

The PowerCommand Serial Communications Interface Board is mounted inside the PCC cabinet on top of the analog board (Figure 3-1). The Serial Cable Interface Board is located outside the generator set connection box. Refer to the installation instruction section.

CAUTION *Electrostatic discharge will damage circuit boards. Do not remove the circuit board from the antistatic shipping bag until you are grounded to the PCC with a wrist strap.*

Circuit Board Handling Precautions

To help prevent circuit board damage due to electrostatic discharge (ESD), a grounding wrist strap must be worn when handling the circuit board. (The wrist strap does not provide a direct short to ground, it is typically rated at approximately 1 megohm to ground.)

Attach the wrist strap clip to a clean unpainted surface of the control box (see Figure 3-1) and place the strap around your wrist before handling a circuit board.

PCC SERIAL COMMUNICATIONS INTERFACE BOARD INSTALLATION

1. Place the genset Run/Off/Auto switch, on the control panel, in the Off position.
2. Disconnect the battery charger (if applicable). Remove all electrical supply sources.

CAUTION Always disconnect a battery charger from its AC source before disconnecting the battery cables. Otherwise, disconnecting the cables can result in voltage spikes high enough to damage the DC control circuits of the system.

3. Disconnect the genset starting battery cable(s). Disconnect the negative (-) cable(s) first to reduce the risk of arcing.

WARNING Accidental starting of the genset while working on it can cause severe personal injury or death. Prevent accidental starting by disconnecting the starting battery cables. To reduce the risk of arcing, disconnect the negative (-) cable first. When reconnecting, connect the negative (-) cable last.

Make certain battery area has been well-ventilated before servicing battery. Arcing can ignite explosive hydrogen gas given off by batteries, causing severe personal injury. Make certain hydrogen gas, engine fuel, and other explosive fumes are fully dissipated. This is especially important if battery has been connected to a battery charger.

4. Open the control box door. Connect the wrist strap ground clip as shown in Figure 3-1.
5. Use a Phillips screwdriver to remove the four leftmost analog board mounting screws shown in Figure 3-1.
6. Install four new standoffs in place of the analog board mounting screws removed in step 5 (Figure 3-2). Tighten the standoffs securely.

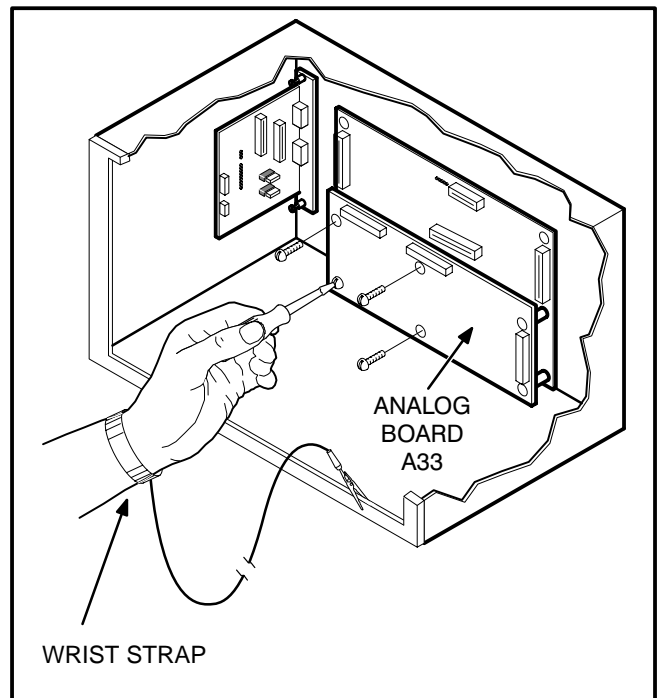


FIGURE 3-1. PREPARING FOR INSTALLATION

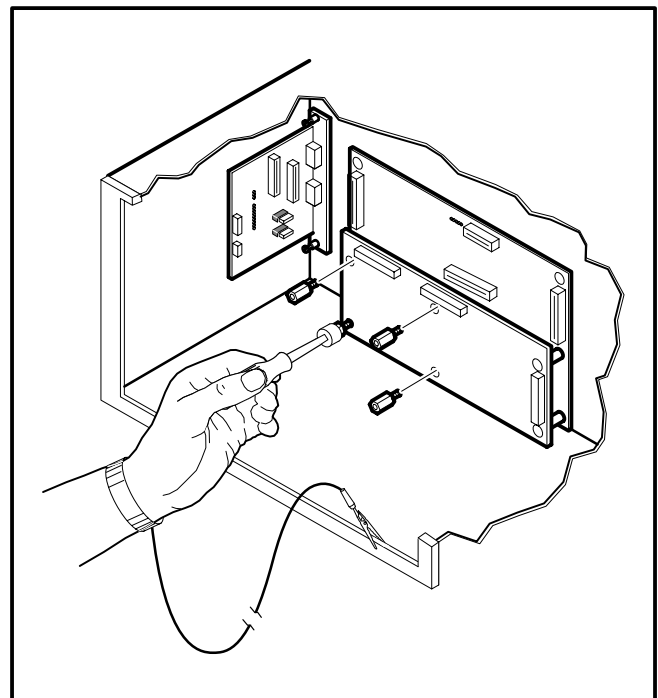


FIGURE 3-2. INSTALLING STANDOFFS

7. Mount the board as shown in Figure 3-3, using the screws removed from the analog board. Tighten the mounting screws securely.
8. Orient the J6 harness connector as shown in Figure 3-4. Push the J6 plug securely into the connector on the engine interface board.
9. Spread locking tabs apart on the J7 connector. Fold the ribbon cable, as shown in Figure 3-4, align key on plug with socket cutout. Insert the J7 harness plug into the J7 connector on the engine interface board. Press in on the harness connector, at the location indicated by the arrow, until the locking tabs lock into place.
10. Proceed to PowerCommand Cable Interface Installation.

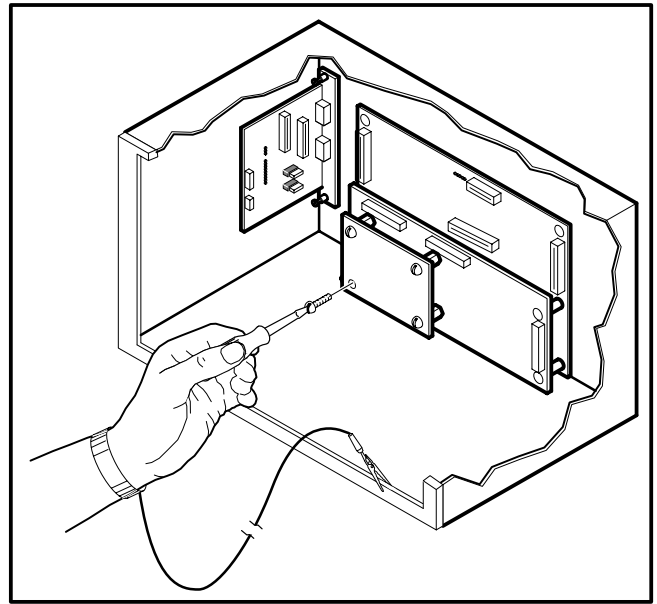


FIGURE 3-3. BOARD MOUNTING

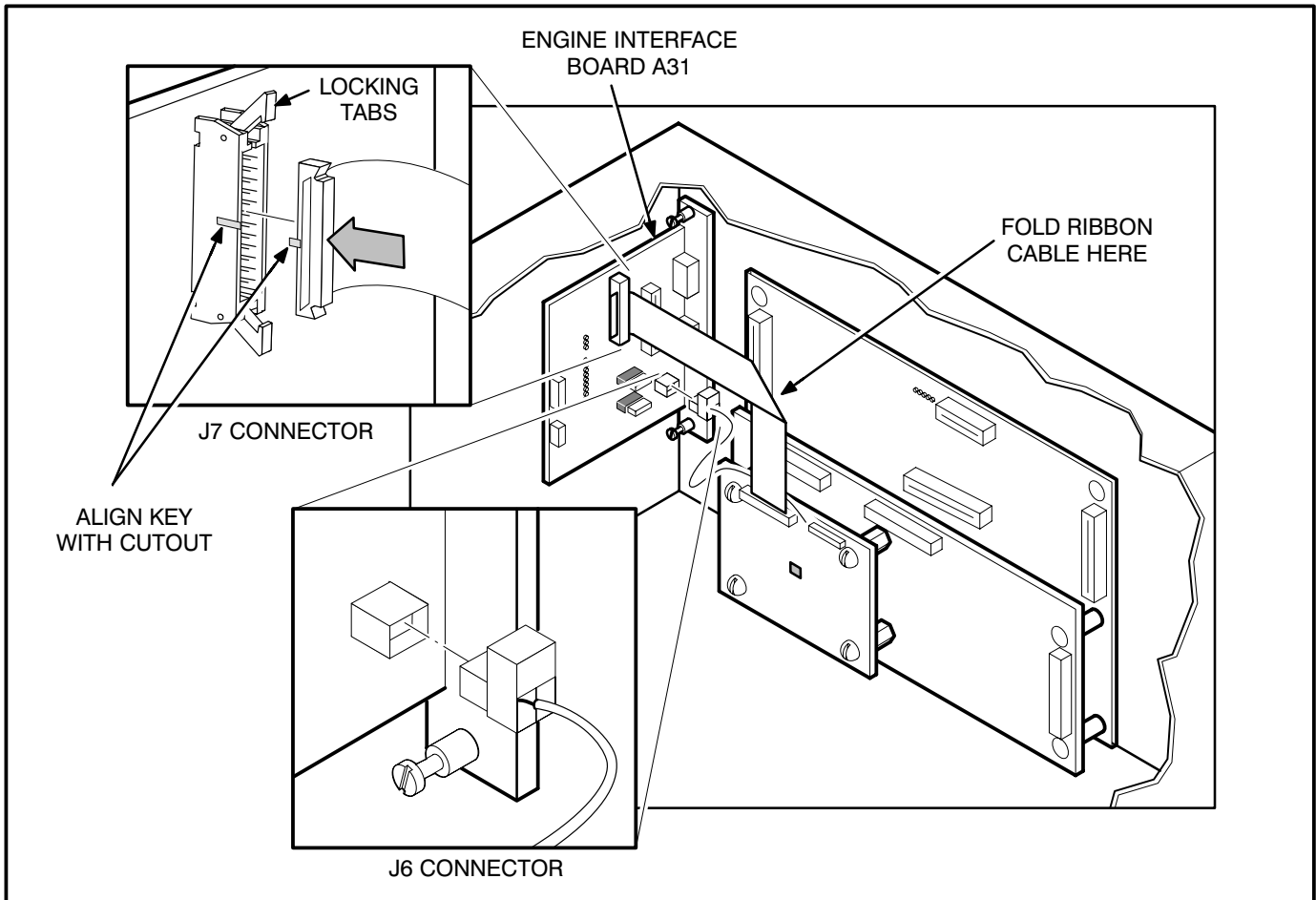


FIGURE 3-4. INSTALLING J6 AND J7 CONNECTORS

POWERCOMMAND CABLE INTERFACE INSTALLATION

Location

Choose a clean, vibration-free mounting surface within 100 ft. (30.5 M) of the generator set. Avoid locations that are hot, damp or dusty. The temperature range must not exceed -40°F (-40°C) to 158°F (70°C).

The board is designed for panel mounting within other equipment enclosures. The board is potted in a molded shell.

Mounting

Figure 3-5 shows the outline dimensions. The outside dimensions do not include clearance for wire connections.

If mounting the module to a wall, make sure that no wires, plumbing, gas or exhaust lines run behind the wall before drilling the mounting holes.

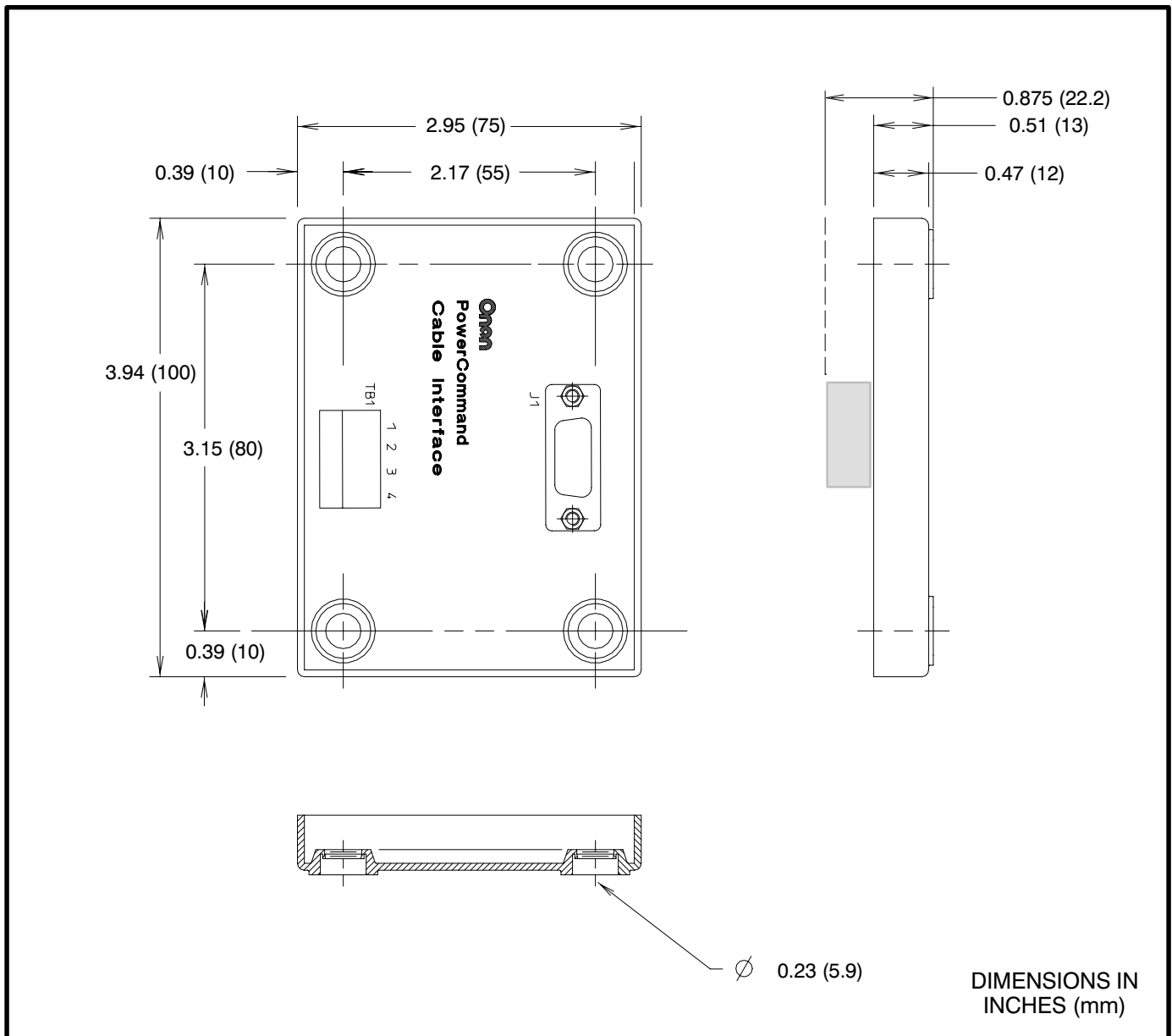


FIGURE 3-5. POWERCOMMAND CABLE INTERFACE OUTLINE DRAWING

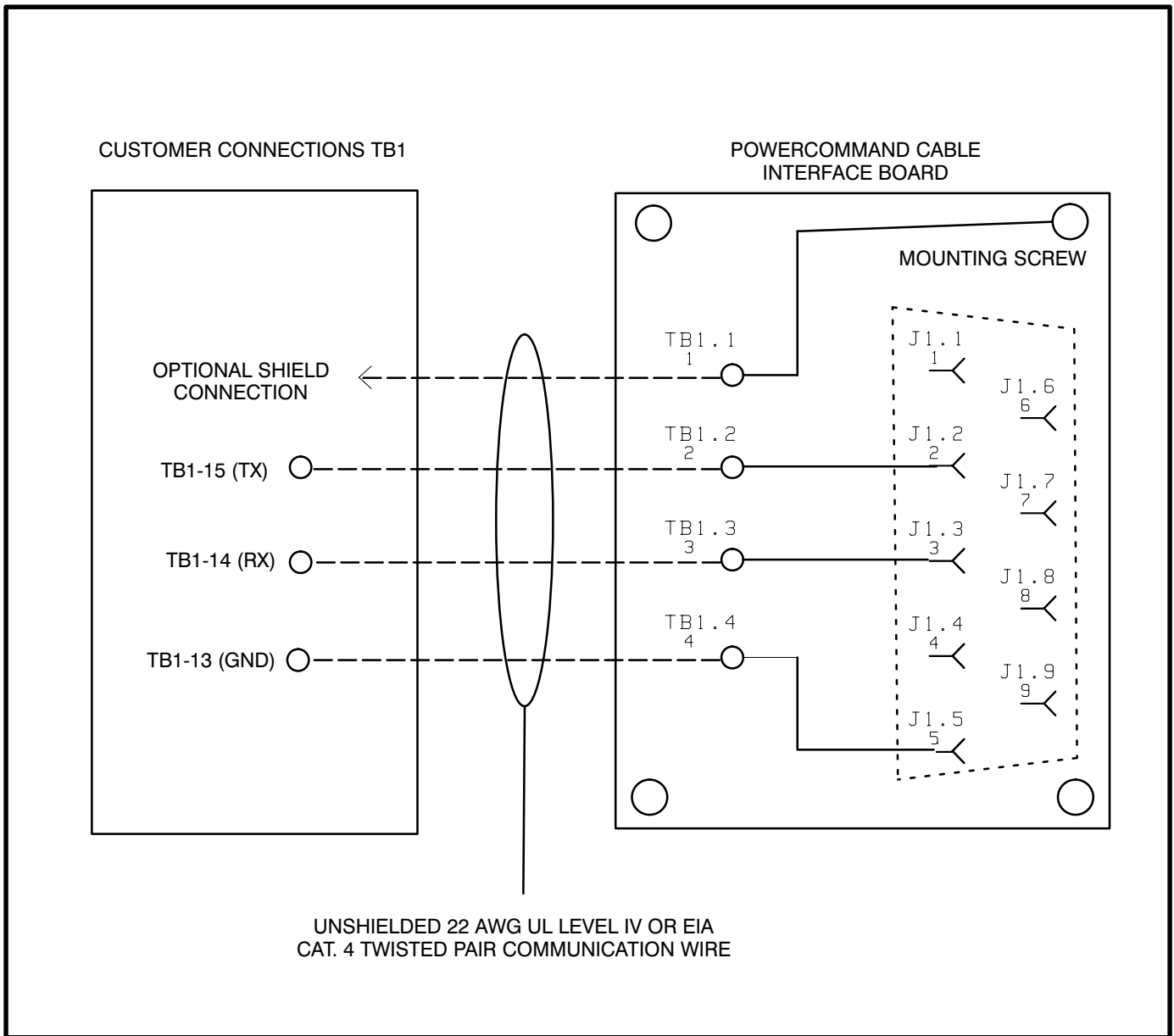


FIGURE 3-6. GENSET (TB1) TO POWERCOMMAND CABLE INTERFACE CONNECTIONS SCHEMATIC

WIRING CONNECTIONS

Serial data wiring connections are made between TB1 in the accessory box (Figure 3-7) and TB1 on the PowerCommand Cable Interface. Refer to Figure 3-6 for the connection diagram. Use unshielded

22 AWG UL level IV or EIA CAT. 4 twisted pair communication wire.

For Local Connection to Host PC: Use Null Modem Cable (Figure 3-8).

For Remote Connection via Modem: Use Modem Cable (Figure 3-8).

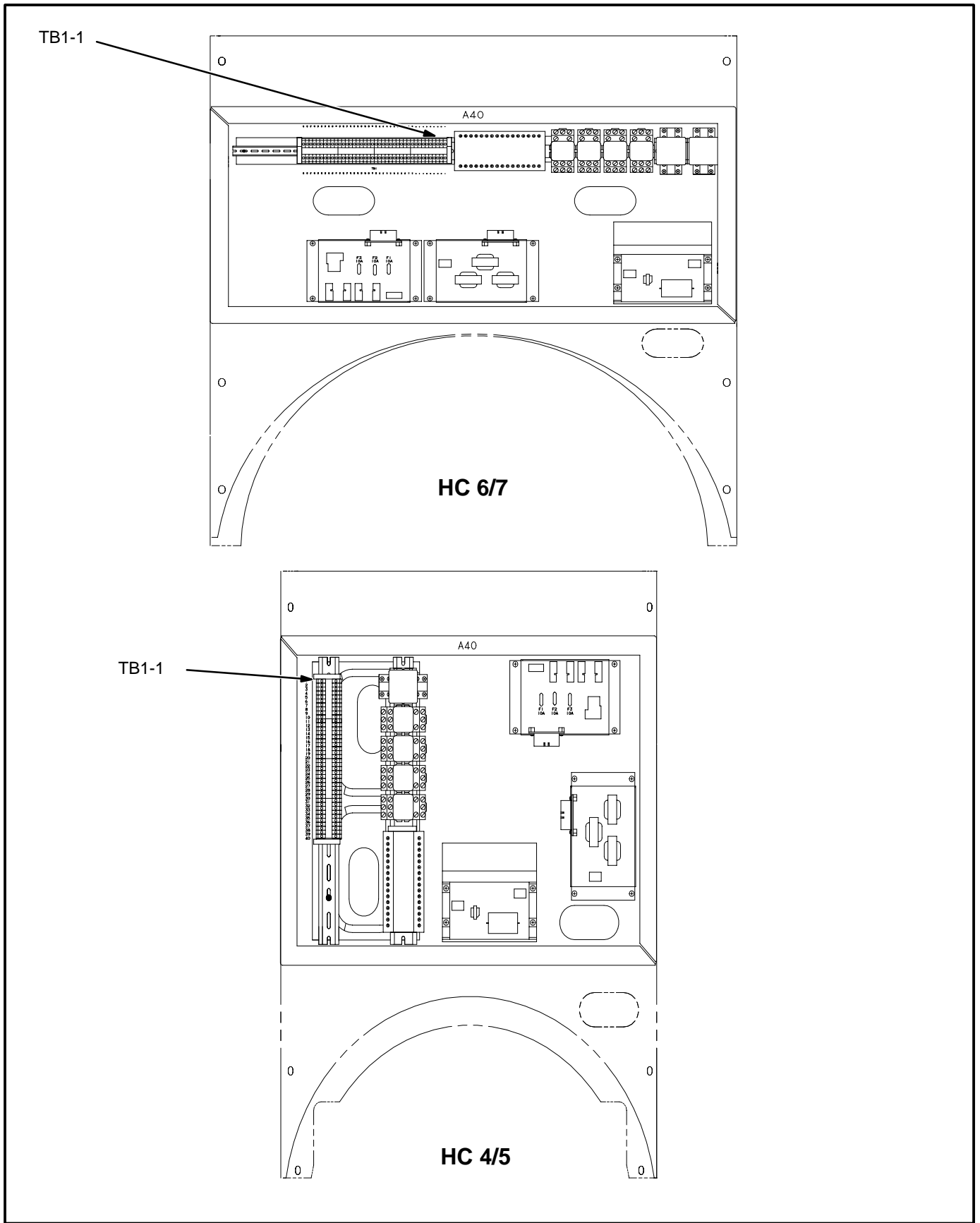


FIGURE 3-7. ACCESSORY BOX

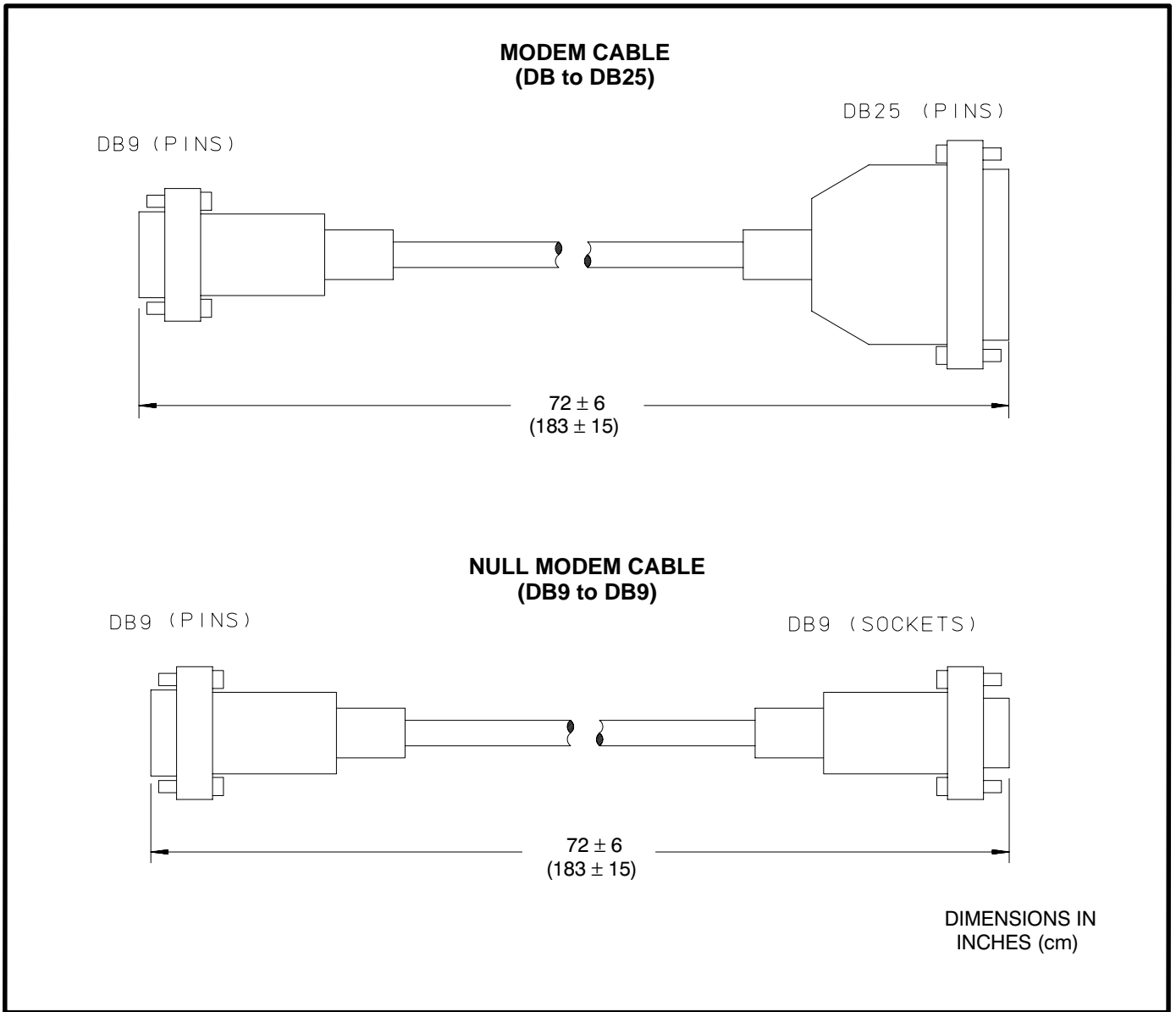


FIGURE 3-8. WIRE HARNESS DRAWINGS

**TABLE 3-1. RS232 (SERIAL) D CONNECTOR
PINOUTS**

25 – Pin D Connector		9 – Pin D Connector	
Pin	Descriptor	Pin	Descriptor
2	TX	1	DCD
3	RX	2	RX
4	RTS	3	TX
5	CTS	4	DTR
6	DSR	5	GND
7	GND	6	DSR
8	DCD	7	RTS
20	DTR	8	CTS
22	RI	9	RI

4. Alarm Setup

ABOUT THIS SECTION

This section describes procedures for using the PCC setup menu for Alarm Reporting. In order to perform this setup the PowerCommand Serial Communications Interface Board must be installed.

NOTE: For remote alarm reporting, the setup must be performed with the Serial Configuration Tool (SCT). Use the instructions provided with the SCT software. Also use SCT for installing a password (optional). The password default is eight nulls (Ø).

PCC SETUP MENU FOR ALARM REPORTING

The PCC Alarm Reporting Menu (Figure 4-1) will only appear if the serial communication module is installed.

SITE ID, and PHONE #1 are editable fields in the Setup Menu. Refer to the generator set service manual Control Service and Calibration section for instructions on entering the Setup Menu.

A maximum of 8 digits can be entered for SITE ID, and 16 digits for PHONE #1. A carriage return must be entered as a **termination character** at the end of the phone number. The symbol for a carriage return is a 'ê' (an 'e' with a cap on it). Scroll past the numbers to reach the special characters. Without this termination character, the phone number is invalid and the PCC will not dial out.

NOTE: When SCT is used to configure the Phone #1, the termination character is automatically added.

PCW COMM ON/OFF: Enables or disables the alarm reporting protocol.

MODEM COMM ON: Enables remote communication using the alarm reporting protocol.

MODEM COMM OFF: Enables direct serial connection using the alarm reporting protocol.

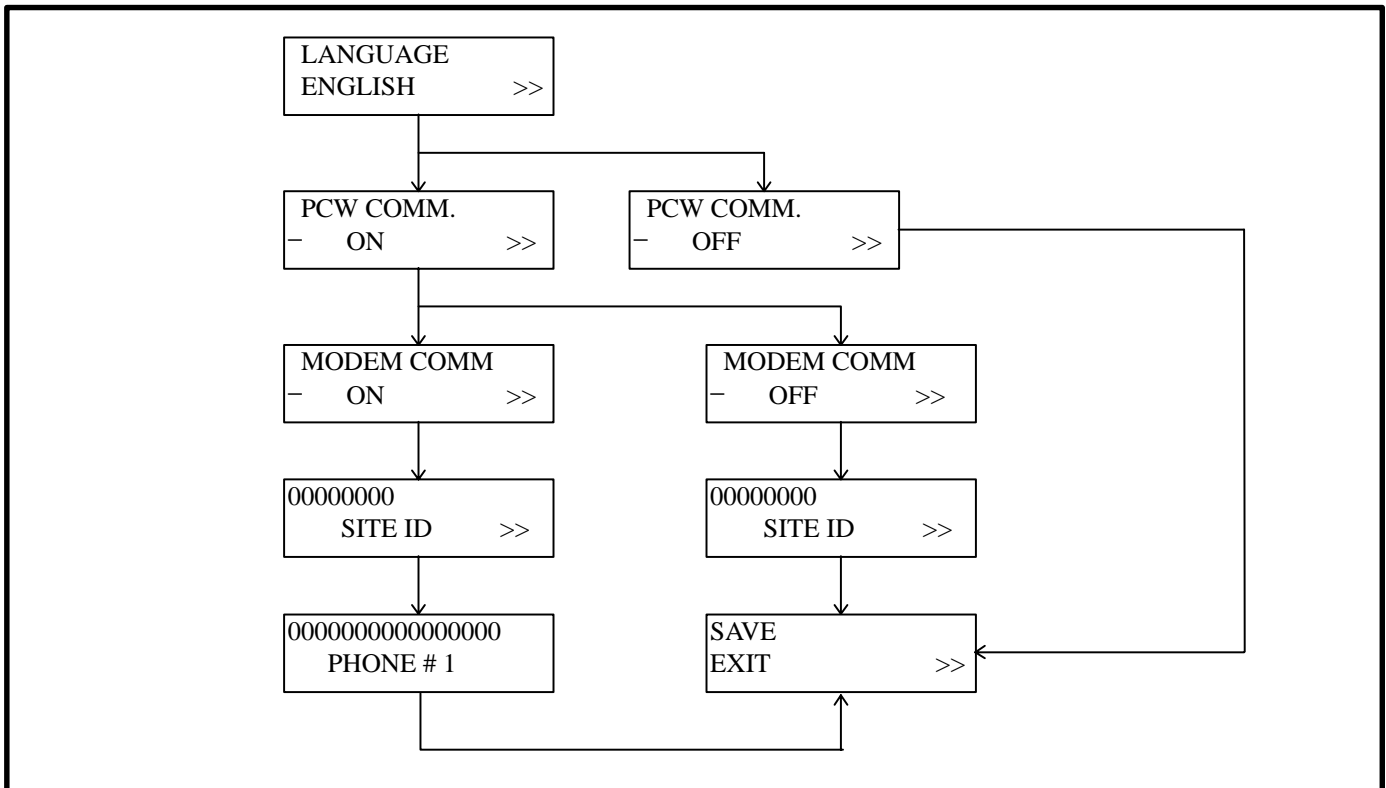


FIGURE 4-1. PCC ALARM REPORTING SETUP MENU

Direct Serial Communication

From the PCC Setup Menu, set PCW COMM to ON and set the MODEM COMM to OFF. This allows the PCC to enable the alarm reporting protocol and initiate the communication in the direct serial connection.

Remote Serial Communication

From the PCC Setup Menu, set both the PCW COMM and MODEM COMM to ON. A phone number followed by a carriage return ('ê') must be entered in PHONE #1. This allows the PCC to enable the alarm reporting protocol and the PCC to initiate the remote communications, such as dialing out alarms.

PHONE #1 can be entered into the PCC either by the service tool (SCT) or the PCC Setup menu.

PCC Setup Variables(for Alarm Reporting)

Table 4-1 lists the PCC Setup Variables and provides a description of how they are configured. Note three variable (not shown) the MODEM INIT STRING, DIAL_PREFIX, and PASSWORD can only be configured with the Serial Configuration Tool (SCT). Refer to the instructions provided with the SCT software.

NOTE: The password default is eight nulls (Ø). The only way it can be changed is with the Serial Configuration Tool (SCT).

TABLE 4-1. PCC SETUP VARIABLES

VARIABLES	DESCRIPTION
SITE_ID	The site_id is a 8 character (byte) ASCII string, This string is intended to define the actual genset site location. The site_id is passed as part of the alarm message by the alarm reporting protocol. e.g. SITE_ID = {"Onan"}
PHONE_NO_1	The Phone No 1 is a 16 character (byte)ASCII string. This string should be numbers only, but will take any character the modem will recognize as valid for a dial string. This string contains the phone number of the location the PCC will call in case of an alarm. This location should be a Computer with a modem set to auto-answer. If the phone number is not terminated by a carriage return the PCC will not call out. Therefore the phone number can be a maximum of 15 digits long with the last character in the phone string being a carriage return. MODEM COMM in the Setup menu of the PCC must be set to ON, to enable the PCC to dial out. e.g. PHONE_NO_1 = {6125745400,0x0D} Note: 0x0D = 'ê'

INSTALLATION CHECKOUT

Record the site ID and phone number for the site. If used, also record the password, modem init string, and dial prefix. Keep this information in a safe place.

To checkout the site thoroughly, the installer will need to have PowerCommand for Windows (PCW) beginning at version 1.1. Refer to the PCW manual (900-0365) for instructions on installing and running

PCW. Operate PCW to thoroughly check out the installation.

If installation problems are detected, make sure that all electrical connections are making good contact, check the password (if used), and return to SCT to check the configuration settings.

If error messages or warnings are displayed in the PCC display, refer to the appropriate service manual Troubleshooting section.

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