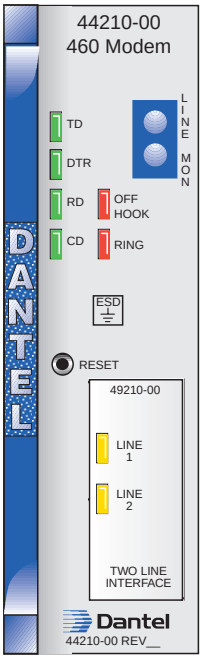
44210 460 MODEM & 49210 TWO-LINE INTERFACE SUBASSEMBLY



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CAUTION

- Install or remove modules from the shelf only when the power is off. If you install a module in the shelf with the power on, the internal circuitry may suffer damage and the product warranty will be void.
- Remove and install circuit boards only in a static-safe environment (use antistatic wrist straps, smocks, footwear, etc.).
- Keep circuit boards in their antistatic bags when they are not in use.
- Do not ship or store circuit boards near strong electrostatic, electromagnetic, magnetic, or radioactive fields.
- For more complete information on electrostatic discharge safety precautions, refer to Bellcore™ Technical Reference # TR-NWT-000870.

About this Practice:

This practice has been reissued to:

- Update Technical Specifications table.

Reissued Practices: Updated and new content can be identified by a banner in the right margin.

UPDATED

Issue date: July 1998

ORDERING INFORMATION

NOTE: This section lists the different options available for this product. To order any of the available options, contact Dantel Inside Sales through our toll-free number, **1-800-432-6835.**

OPTION NUMBER	FEATURES
B11-44210-00	Dial-up Modem
A12-49210-00	Two-line Interface Subassembly

GENERAL DESCRIPTION

The 44210 module provides single-line, dial-up modem service between components of Dantel's 460 Alarm and Control System (460 ACS). It also provides 212A-type digital interface for transmitting and receiving data between data sources that are remotely located. The optional 49210 subassembly provides an interface to two telephone lines; a primary and a backup.

The 44210 is a plug-in module that fits into any 400-type or similiar equipment housing. The front panel has status-indicating LEDs, normal-through and monitoring jacks, test points, level-setting potentiometers, and a subassembly cutout window. The optional 49210 subassembly has front panel LEDs which are visible through the cutout window when installed on the 44210 and a board-mounted line-select switch.

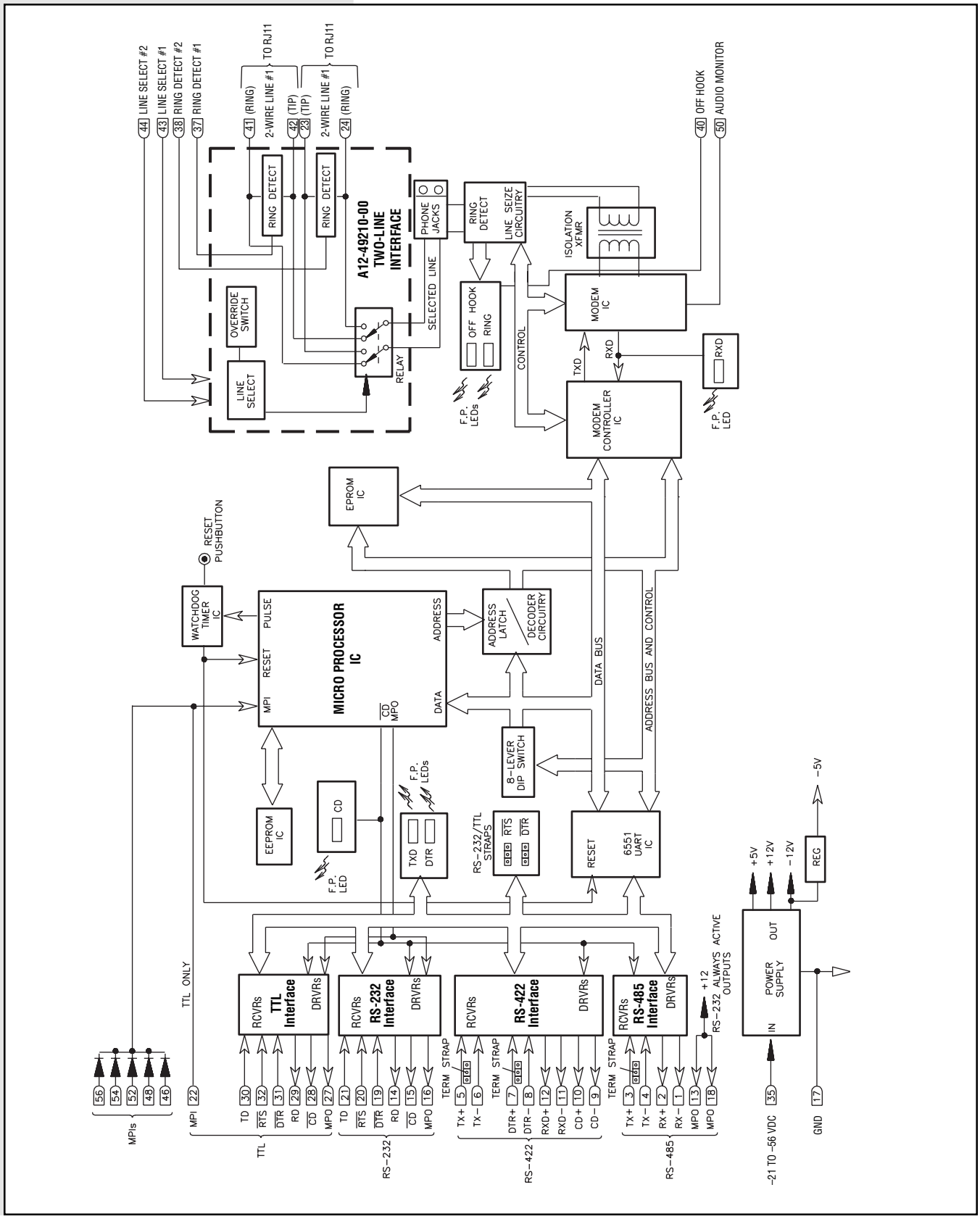
CIRCUIT DESCRIPTION

The 44210 460 Modem Module and 49210 Two-Line Interface Subassembly functional schematics are shown in Fig. 1.

44210 MODULE

The 44210 460 Modem module consists of a microprocessor, an 8K EPROM (Erasable/Programmable Read Only Memory), a 128-byte EEPROM (Electrically Erasable/Programmable Receiver/Transmitter), modem and controller ICs, UARTs (Univer-

FIG. 1 - FUNCTIONAL SCHEMATIC, 44210/49210



sal Asynchronous Receiver/Transmitter), TTL and RS-232 receivers/drivers, RS-422 and RS-485 receivers/drivers, MPI inputs, off-hook and TTL outputs, ring detect/line seize circuit, transformer, timer, eight-lever DIP switch, and regulated power supply.

Microprocessor

The microprocessor provides central processing power to coordinate virtually all on-board functions carried out by the 44210. When power is initially applied to the 44210, a watchdog IC resets the microprocessor and UART. The microprocessor must pulse the watch dog IC within 1.2 seconds, or the watchdog IC resets the microprocessor again. The microprocessor is also reset manually using a front panel RESET button.

128-byte EEPROM

The 128-byte EEPROM provides non-volatile memory for storing user specified data, such as telephone numbers and passwords. The contents of the EEPROM may be changed by the user.

8K-byte EPROM

The 8K-byte EPROM provides non-volatile memory for the microprocessor programming.

Address Latch and Decoder

The address latch and decoder reads the address switch setting and programs the microprocessor to recognize that address. The latch holds (latchs) the port while data is being transmitted and received.

UART

The UART provides control of all data input/output to and from the microprocessor and the TTL, RS-232, RS-422, and RS-485 buses. The operation of the UART is initialized by the microprocessor after startup.

TTL and RS-232 Receivers/Drivers

The TTL and RS-232 interfaces have two data lines: a TXD (transmit data) receiver and an RXD (receive data) driver. There also are four handshaking and/or control lines: RTS (Request To Send) and DTR (Data Terminal Ready) receivers and CD (Carrier Detect) and MPO (Multi-Purpose Output) drivers. Strapping points for termination of the differential receivers are located on the circuit board and must be placed in the TERM position for the interface being used. For interfaces not being used, the termination straps must be in the OFF position. Front panel LEDs are provided on the module to indicate RVD, TXD, CD, and DTR activity.

RS-422 and RS-485 Receivers/Drivers

The RS-422 and RS-485 interfaces are differential receivers and drivers. They are used when the modem is located greater distances from the data terminal equipment. The RS-422 and RS-485 interfaces do not use the RTS handshaking lines. When using the RS-485 interface, only a TXD receiver and RXD driver is available. When the TXD receiver recognizes a driver from the terminal equipment, DTR is activated on the modem. When a carrier is detected on the facility side, the CD signal on the modem enables the RXD driver. Using this interface (RS-485) requires only two pairs of wires for TXD and RXD, and no wires are required for DTR and CD. The circuit board has two strapping points to force RTS and DTR to the active (ON) state if these handshaking lines are not used by the data terminal equipment connected to the modem. If handshaking is used, the straps should be in the OFF position. Strapping points for termination of the differential receivers are located on the circuit board and must be placed in the TERM position for the interface being used. For interfaces not being used, the termination straps must be in the OFF position. Front panel LEDs are provided on the module to indicate RXD, TXD, CD, and DTR activity.

MPI Inputs

Six MPI inputs directly interface the microprocessor on the 44210 using edge connector pins. When an MPI input becomes active, the microprocessor's input goes to a low state, causing the microprocessor to perform a dial-out. One of the MPI inputs (pin 22) is TTL/CMOS-compatible and is activated by grounding (ground to 1.5 VDC) and inactive when left open (3.0 to 5.0 VDC). The other five MPI inputs (pins 46, 48, 52, 54, and 56) are ground activated (ground to -2.0 VDC) and inactive when left open or at minus battery voltage (-21 to -56 VDC).

Modem and Controller

This circuit converts data to tones and tones to data between the line-side facility (tones) and the data terminal equipment (DTE). The controller contains a full Hayes^{tm}-compatible command set in internal ROM and controls all of the modem's functions. The modem has PSK and FSK modulators and demodulators for both 300 and 1200 baud operation. It also contains a DTMF generator and call-progress-mode filters. The audio output of the circuit may be monitored by edge connector pins or front panel jacks.

Ring Detect/Line-Seize Circuit

This circuit detects ringing tones and seizes the circuit and holds the line active for the modem and controller.

Transformer

The transformer provides protective isolation between the line-side facility and the module's modem tones-generating circuitry.

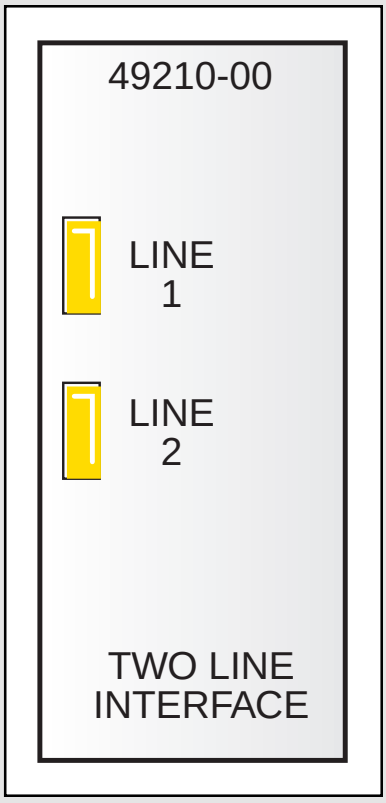
Eight-Lever DIP Switch

The switch provides programming for mode selection and interface parameters (for example: data bits, stop bits, baud rate, and so forth).

Regulated Power Supply

The power supply provides regulated +/-12 VDC and +/-5 VDC output power for the module's circuits from -21 to -56 VDC input power.

49210 SUBASSEMBLY



The subassembly's circuits consist of two ring detectors, two line-select inputs, a line-switching relay, indicating LEDs, control logic, and an over-ride switch.

Ring Detectors

Each of the two ring detectors provides ring detection for one of the two lines. The output of a detector goes to a low (0 volts) logic state when ringing voltage is detected on its associated line. When there is no ringing voltage detected, the output remains at a high (+5 VDC) logic state.

Line-Select Inputs

The line-select inputs control the line-switching relay. When the line-select input for line 1 is grounded, (with input 2 open or at a high logic level), the line-switching relay is OFF and line 1 remains connected to the 44210 modem. When the line-select input for line 2 is grounded (with input 1 open or high), the relay is ON and line 2 is connected to the 44210 modem. If both line-select inputs are open or at a high level, the relay remains in the state appropriate to the last selected line. If both line-select inputs are grounded, the relay is OFF, and line 1 is connected to the 44210 modem.

Line-Switching Relay

The relay is operated by the line-select inputs and is the dry-contact type.

LEDs

Front panel LEDs are provided to indicate two things: which line is currently connected to the 44210 modem and/or the presence of ringing voltage. If an LED is ON continuously, it indicates that line has been selected and is connected to the 44210 modem through the line-switching relay. If an LED is

CIRCUIT DESCRIPTION

flashing (approximately 2 seconds ON and 4 seconds OFF), it indicates detection of interrupted ringing voltage and that the line is not connected to the 44210 modem.

Control Logic

The control logic provides logic gating between the line-select inputs and also between their respective status-indicating LEDs.

Override Switch

The switch overrides the relay and line selectors, connecting only the selected line to the 44210 modem. If the override switch is in the center (OFF) position, then line selection is done by the line selectors.

APPLICATION INFORMATION

NOTE:
The 44210 modem configured for Master Mode must be equipped with a 49210 Two-line Interface Subassembly.

Applications for the 44210 consist of providing dial-up modem functions for Dantel's 460 Alarm and Control System (460 ACS) for the distant transmission of alarm system data between remote locations and a central processing center. The 44210 is also used to provide standard Hayes™-compatible modem functions and can be connected directly to a computer, dumb terminal, or other Data Terminal Equipment (DTE) for communication with a remote DTE's modem.

460 ACS Master and Remote Modes

Refer to Fig. 2. One 46020 Multiple Alarm Processor (MAP) is equipped with 46800-58 firmware and is communicating through a 44210 located at a central processing center (master site). The 44210 at the master site is connected by phone lines to other 44210 modules located at individual remote sites. The remote 44210s are interfaced to 46009 or 46010 Multiple Alarm Transmitters (MATs) and 46028 Control Point Modules (CPMs) using TTL, RS-232 or RS-422.

The modem at the master site is configured by switches for Master Mode operation and those at the remote sites are configured for Remote Mode. The master modem controls all remote modems. Each remote modem has an exclusive phone number and is accessed by the master modem only.

The MAP initiates polling a remote site by sending a command to the 44210 modem to dial a remote site's phone number. The master modem dials the number and the remote modem at the remote site answers the call. Carrier signals between both modems then link the communications path, which allows the

NOTE:

All MATs located at remote sites must be configured for Annunciator Mode (S3-1 and 2, both ON). Refer to the 46009 or 46010 MAT documentation.

MAP to begin interrogating the MATs and CPMs at the remote site and receiving their responses. When the MAP is done interrogating the remote site, it commands the modem to hang up and receives verification from the modem's OFF HOOK output (pin 40 on the modem is connected to pin 26 of the MAP) that the master site modem has gone back on hook.

The MAP/44210 modem combination allows remote alarm and control sites to be polled continuously in any user-specified order or to be polled a single time at a user-specified time interval.

On the remote site 44210, one or more of the alarm level output relays (A through D) of a MAT are connected to the MPI inputs of the 44210. When an alarm occurs at the remote site, the ground output from the MAT's relay goes to the modem and turns it on. The modem retrieves the user-specified number to call, (the phone number unique to the master site), from the on-board, non-volatile memory and calls the master 44210 with the alarm data.

For operating information and command syntax for the 460 Alarm and Control System, refer to the 46800-58 MAP Firmware Manual.

Hayes™ Mode

Refer to Fig. 3. When the option switches and straps are set appropriately, the 44210 may be used as a Hayes™-type compatible modem for transmitting data from a computer's serial port to another computer or other DTE equipment that is equipped with a modem. When in this mode, the modem can be operated with almost any data communications software that uses a Hayes™-compatible command set. Refer to Table B or your computer's software manual for modem operating commands. Use the following table to connect the modem to the RS-232 port of a computer.

44210 PIN-OUTS	FUNCTION	DB-9 PINS	DB-25 PINS
21	TXD	3	2
14	RXD	2	3
17	GND	5	7
20	RTS	7	4
15	DCD	1	8
19	DTR	4	20

Auto-Answer

Refer to Fig. 2. When a 44210 is configured in this mode, it acts as an auto-answer modem (not Hayes™-compatible). It answers an incoming call and establishes communications only. There is no automatic call-out on alarm or password features. When it hangs up, it will send a garbage character to the device to which it is connected. If the modem calling into it is a Hayes™-type

modem, it must hang up itself after sending "+++". This mode is usually used when a 44210 is tied to a MAP's or 46062 General Purpose Processor's (GPP) Printer Port.

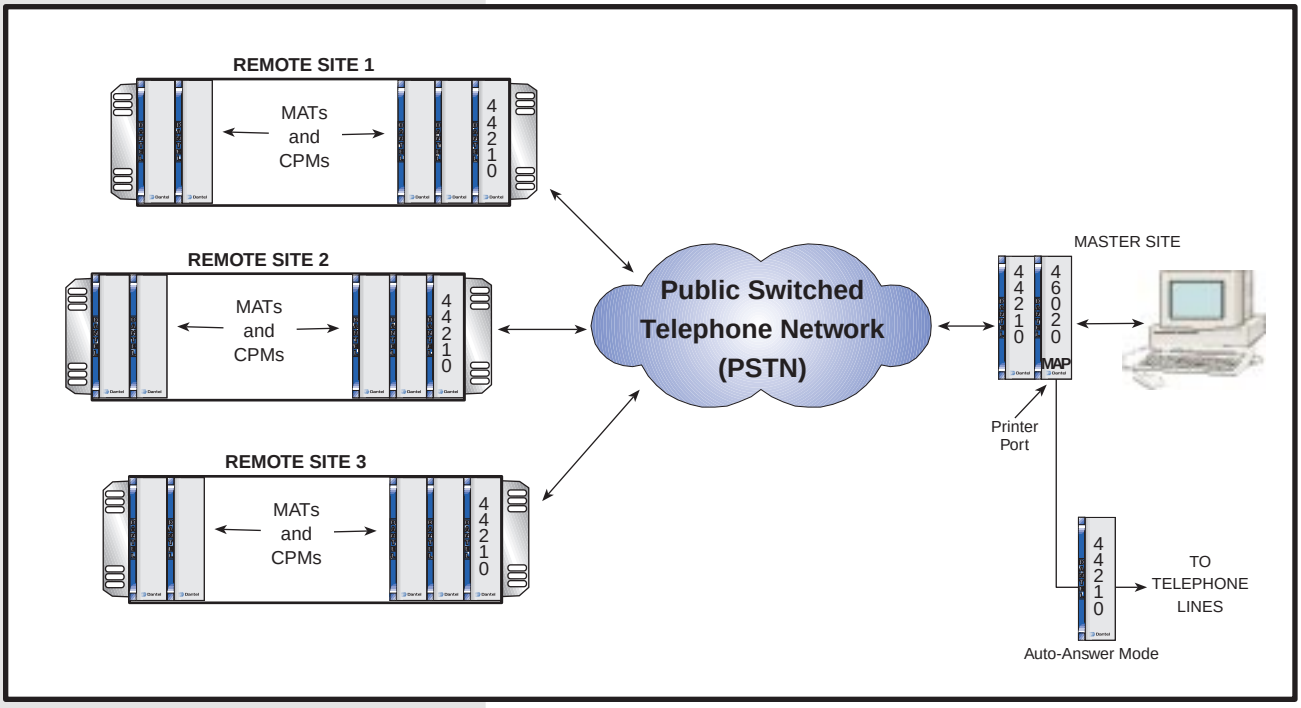
Option Strapping and Switch Settings

The 44210 has straps to configure the RS-422 and RS-485 ports and the operation of RTS and DTR. An eight-lever mini-DIP switch provides mode selection (212A Hayes™ compatible, 460 ACS Master Mode, 460 ACS Remote Mode, and Auto-Answer Mode), one or two stop bits, seven-bit or eight-bit data word, even or odd or no parity, and 300 or 600 baud operation. Refer to ***Installation*** section

Subassembly

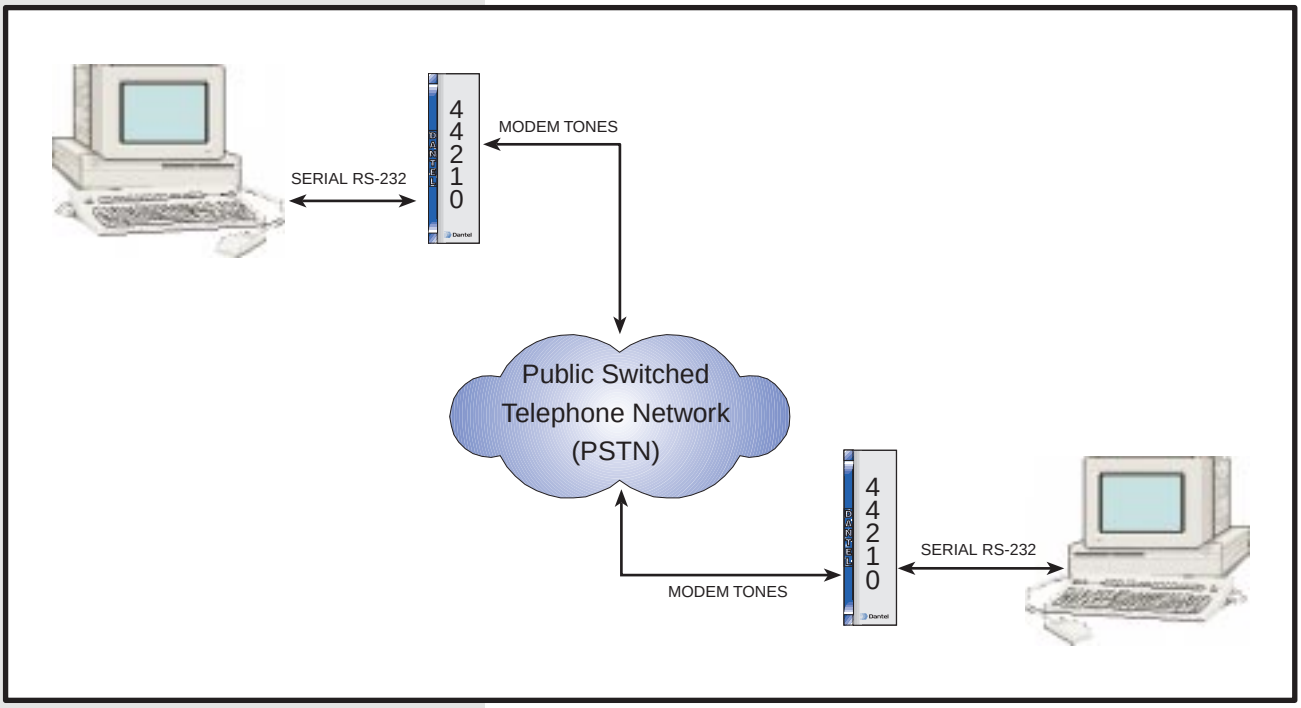
The 44210 accepts a plug-in subassembly, the 49210 Two-Line Interface Subassembly. It provides an additional backup line so system data may still be transmitted/received in the event of a line failure. The 49210 has a single on-board switch to select either two-line or single-line operation. The subassembly may be ordered factory-installed or may be installed in the field. Refer to ***Installation*** section

FIG. 2 - EXAMPLE APPLICATION, 460ACS MODE



APPLICATION INFORMATION

FIG. 3 - EXAMPLE APPLICATION, HAYES™ MODE



INSTALLATION

NOTE:
If a bypass card is installed in the place of the 49210 Two-line Interface, use only line 1 (pins 41 and 42).

Verify that the proper switch and strap settings have been made. Refer to Table A and Figs. 5-8.

Wiring

In most cases, the 56-pin edge connector is prewired at the factory. If custom wiring is required, refer to Fig. 9 for module edge connector pin designations or contact Dantel. Wire the connector in the shelf or housing as required.

Subassembly Mounting

The front panel plug of the 44210 is removable to allow the subassembly front panel to appear in the front panel cutout. The optional 49210 subassembly replaces a subassembly bypass card that is plugged into connector J5 of the 44210. Four screws must be removed prior to mounting the 49210 on connectors J4, J5, and J6. Refer to Fig. 4. After mounting the 49210 on the 44210 module, replace the same four screws to hold the subassembly securely in place.

Checkout

Refer to the firmware manual, 46800-58, for command syntax and operating instructions when using the modem in 460 ACS mode. If the 44210 is used in Hayes-compatible mode, refer to Table B or the instruction manual of the communications software in use. Checkout of the 44210 is done by placing the 44210 in operation with one or more 44210s or similiar modems at the distant end that are known to be good. Monitor their operation by sending and receiving data between them. Monitor the front panel LEDs to verify proper operation. Refer to Table C for front panel LED operating information.

When performing the initial module/subassembly checkout, care should be taken that the switch and strap settings are correct for the application. Refer to Table A and Figs. 5-8.

Checkout procedures for the optional 49210 subassembly consist of dialing through both lines of the unit under test and verifying proper operation by the computer or DTE that is interfaced to the 44210 modem. The front panel LEDs of the 49210 should be monitored as well. Refer to Table C for front panel LED operating information.

TABLE A - SWITCH AND STRAP SETTINGS, 44210/49210

44210 MODULE		
STRAP	**POSITION**	**DESCRIPTION**
422TXD	TERM	180-ohm termination across RS-422 TXD inputs (pins 5 and 6). Use only when RS-422 TXD is used.
	GND	Grounds the RS-422 TXD negative (-) input (pin 6). Use when the RS-422 TXD is not used.
422DTR	TERM	180-ohm termination across RS-422 DTR inputs (pins 7 and 8). Use only when RS-422 DTR is used.
	GND	Grounds the RS-422 DTR negative (-) input (pin 8). Use when the RS-422 DTR is not used.
485TXD	TERM	180-ohm termination across RS-485 TXD inputs (pins 3 and 4). Use only when RS-485 TXD is used.
	GND	Grounds the RS-485 TXD negative (-) input (pin 4). Use when the RS-485 TXD is not used.
RTS	EXT	RTS activated by pin 32 (TTL) or 20 (RS-232)
	ON	RTS always active. Use when RTS is not required or when using RS-422 or RS-485.
DTR	EXT	DTR activated by pin 31 (TTL), pin 19 (RS-232), pins 7 and 8 (RS-422), or when RS-485 is used.
	ON	DTR always active. Use when DTR is not used.

CONTINUED . . .

TABLE A CONTINUED - SWITCH AND STRAP SETTINGS, 44210/49210

OPERATING MODE (SEE NOTE BELOW)		
MASTER MODE		
SWITCH	**SETTING**	**DESCRIPTION**
S1-1	ON	Required for Master Mode
S1-2	ON	1200 Baud Operation
	OFF	300 Baud Operation
S1-3 thru 7	ALL OFF	Master ID #1
S1-8	ON	Required for Master Mode
460 ACS REMOTE MODE, AUTO-ANSWER MODE, OR HAYES-COMPATIBLE MODE		
SWITCH	**SETTING**	**DESCRIPTION**
S1-1	OFF	460 Remote Mode or Auto-Answer Mode
	ON	Hayes Mode
S1-2	OFF	Not Used
S1-3	ON	1200 Baud on DTE side
	OFF	300 Baud on DTE side
S1-4	ON	1 Stop Bit
	OFF	2 Stop Bits
S1-5	ON	8-bit Word Length
	OFF	7-bit Word Length
S1-6,7	ON,ON	Even Parity
	OFF,ON	Odd Parity
	ON,OFF	Reserved
	OFF,OFF	No Parity
S1-8	ON	Auto-Answer Mode
	OFF	460 Remote Mode
49210 SUBASSEMBLY		
SWITCH	**POSITION**	**DESCRIPTION**
S1	1	Only line 1 connected to 44210 modem
	2	Only line 2 connected to 44210 modem
	OFF	Whichever line receives ringing voltage is connected to 44210 modem.

NOTE: *Refer to the **Application Information** section for a complete discussion of operating modes.*

FIG. 4 - SWITCH AND STRAP LOCATIONS, 44210/49210

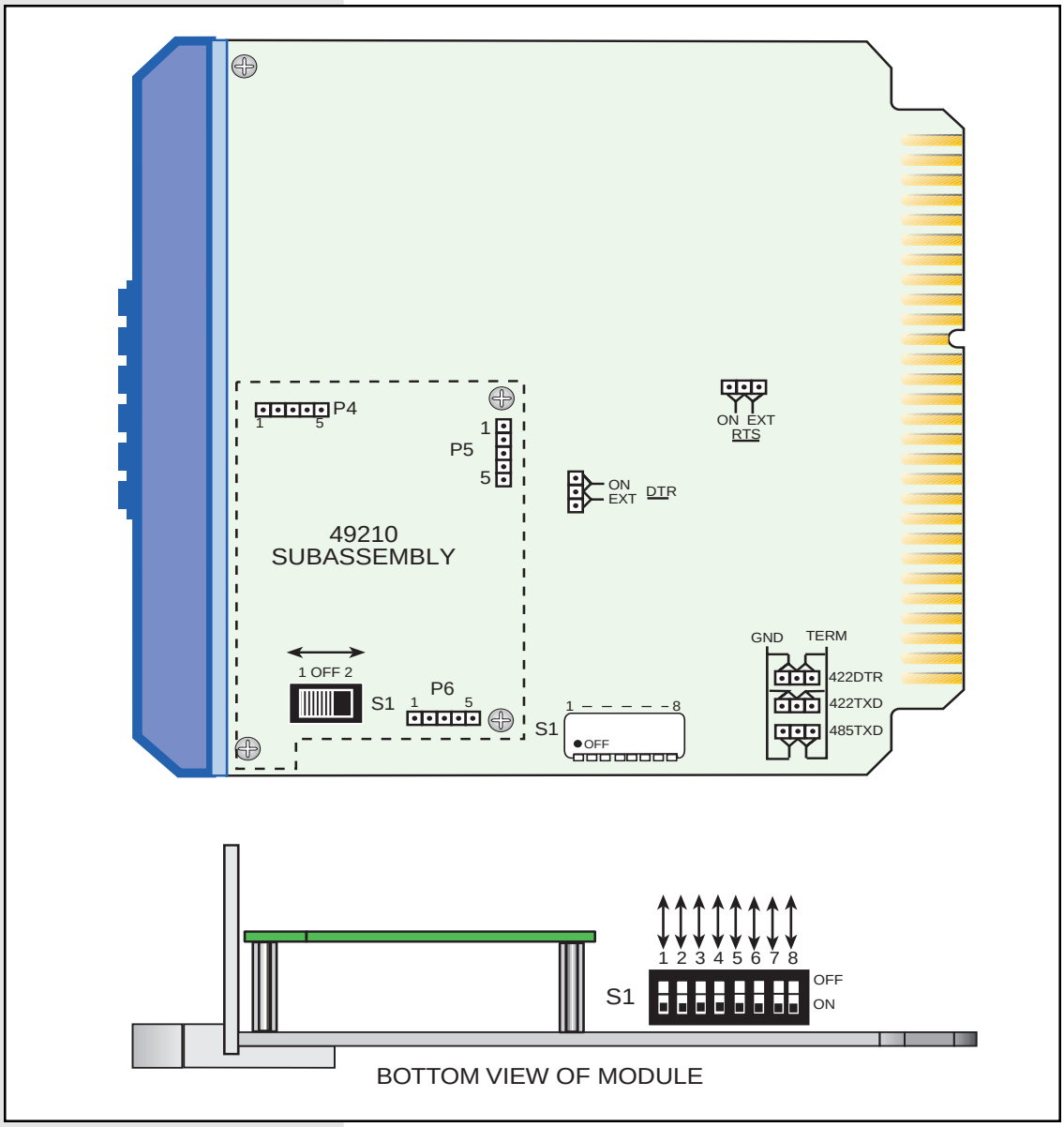


FIG. 5 - SWITCH SETTINGS, 460 ACS MASTER MODE

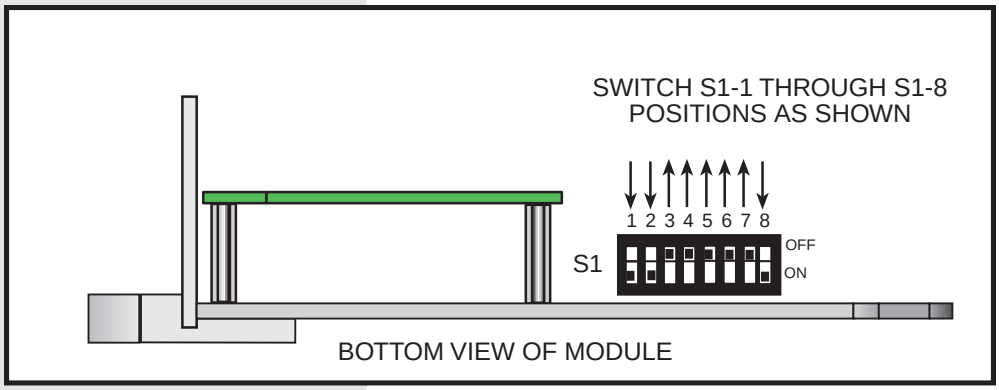


FIG. 6 - SWITCH SETTINGS, 460 ACS REMOTE MODE

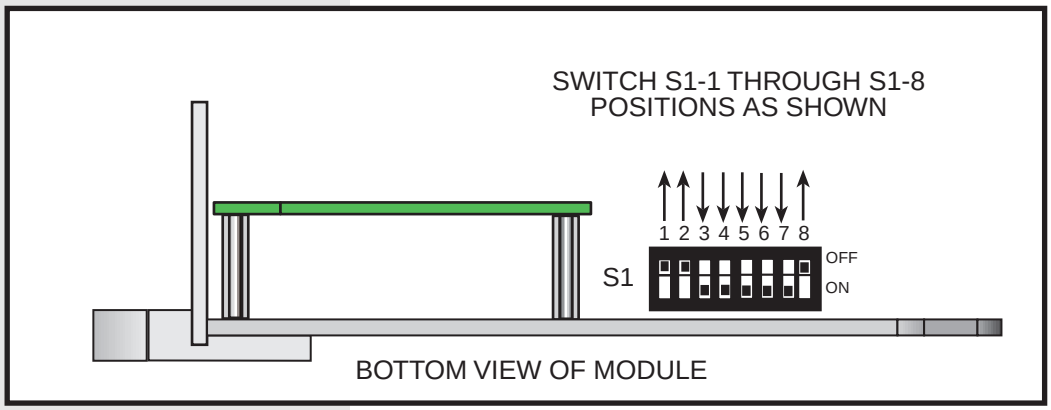


FIG. 7 - SWITCH SETTINGS, 460 ACS HAYES MODE

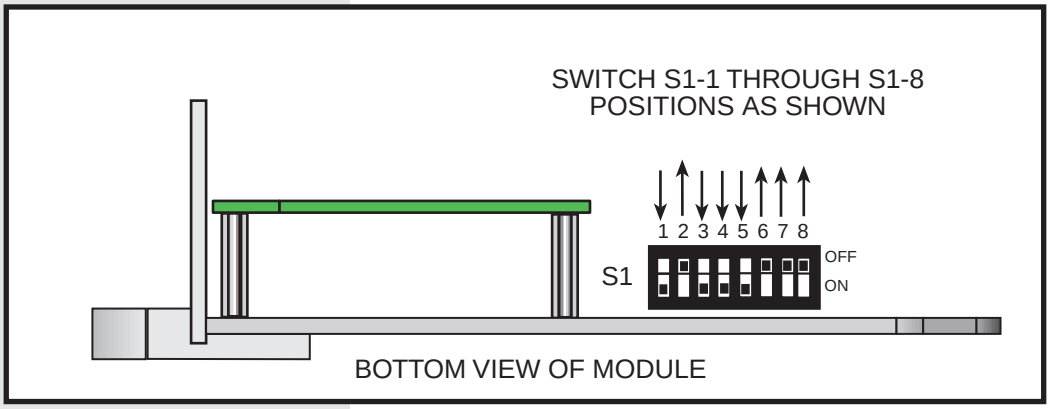


FIG. 8 - SWITCH SETTINGS, 460 ACS AUTO-ANSWER MODE

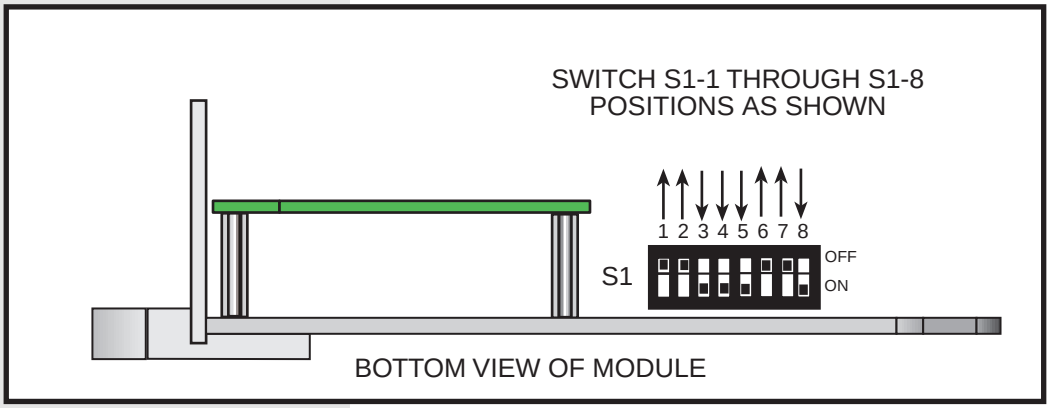
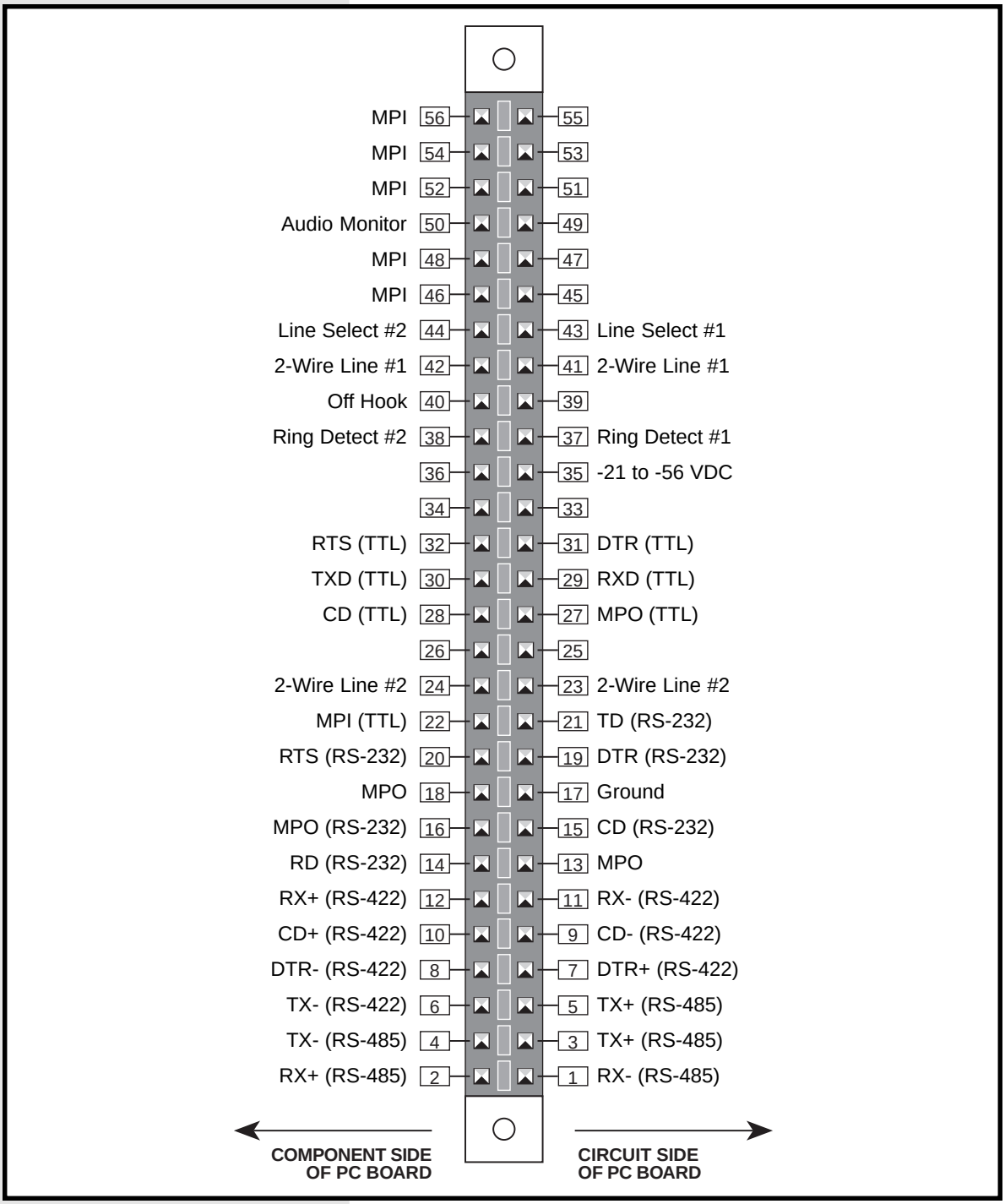


FIG. 9 - PIN DESIGNATIONS, 44210 MODEM



OPERATION

Operation of the 44210 is a function of the module's firmware programming and/or modem communication software. For information on using the modem with Dantel's 460 Alarm and Control System (460 ACS), refer to Fig. 10 and the *Application* section of this manual. For information on using the 44210 as a Hayes™-compatible modem, or dumb 202 modem, refer to Table B, and the documentation specific to the communication software being used. For a description of Hayes mode, refer to the Application section.

TABLE B - HAYES-COMPATIBLE COMMAND SET, RESPONSE CODES, AND REGISTERS USED

COMMAND SET	
COMMAND	**DESCRIPTION**
AT	Attention Prefix. Precedes all commnad lines except "+++" (escape) and "A/" (repeat) commands.
A/	Causes the last command line to be repeated. This command is not repeated by a carriage return.
+++	Escape code. The modem goes from on line state to command state (one second pause before and after escape code entry). This command is not followed by a carriage return.
D	Dial. Precedes the phone number that is to be dialed. The last digit of the phone number is followed by a carriage return.
P	Pulse. Causes a pulse to be sent.*
T	Touch tone. Initialize the modem for touch tone dialing.
'	Pause. Causes a pause to be inserted in a command string (i.e., between the area code and the seven digit phone number, etc.).
!	Flash. Causes a hook flash.
/	Causes a 1/8 second wait before the command is acted upon.
@	Causes the modem to wait for silence on the line before doing a command.
W	Causes the unit to wait for a second dial tone before acting on a command.
;	Returns the modem to the command state after dialing.
R	Reverses the mode to call an originate-only modem.
A	Causes the modem to answer a call without waiting for a ring.
B/B0	Puts the modem in CCITT V.22 mode.
B1	Puts the modem in BELL 103 and 212A mode.
C/C0	Turns OFF the transmit carrier signal.
C1	Turns ON the transmit carrier signal.*
E/E0	Characters entered via the keyboard are not echoed to the computer or dumb terminal screen.
E1	Characters are echoed to the computer or dumb terminal screen.
F/F0	Half duplex operation.
F1	Full duplex operation.*
H/H0	On hook (hang up).
H1	Off hook - line and auxiliary relay.
H2	Off hook - line relay only.

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TABLE B CONTINUED - HAYES-COMPATIBLE COMMAND SET, RESPONSE CODES, AND REGISTERS USED

COMMAND SET	
COMMAND	**DESCRIPTION**
I/I0	Request product I.D. code.
I1	Request firmware revision number.
I2	Test the internal memory.
L/L1	Set the speaker volume LOW.
L2	Set the speaker volume MEDIUM.*
L3	Set the speaker volume HIGH.
M/M0	Set the speaker always LOW.
M1	Set the speaker ON until carrier is detected.*
M2	Set the speaker always ON.
O	Go to an on line state.
O1	Set remote digital loopback OFF.*
O2	Request a remote digital loopback.
Q/Q0	Display the result codes.*
Q1	Do NOT display the result codes.
Sr?	Request the current value of register r.
Sr=n	Sets the register r to the value of n.
V/V0	Digit result codes ON.
V1	Word result codes ON.
X/X0	Unit set to be compatible with Hayes-type 300 baud modems.*
X1	Result code CONNECT 1200 enabled.
X2	Enables dial tone detection
X3	Enables busy signal detection.
X4	Enables both dial tone and busy signal detection.
Y/Y0	Long space disconnect disabled.*
Y1	Long space disconnect enabled.
Z	Software reset. Restores all default settings.

RESULT CODES		
DIGIT CODE	**WORD CODE**	**DESCRIPTION**
0	OK	Command executed.
1	CONNECT	Connect at 300 or 1200 bps.
2	RING	Ringing signal detected.
3	NO CARRIER	Carrier signal is not detected or has been lost.
4	ERROR	Illegal command, there is an error in the command line, the command line exceeds the buffer (40 characters including punctuation), or it is an invalid character format at 1200 bps.
5	CONNECT 1200	Connect at 1200 bps. Result from X1, X2, X3, or X4 command only.
6	NO DIAL TONE	A dial tone was not detected and subsequent commands not processed. Result from X2 or X4 command only.
7	BUSY	Busy signal detected and subsequent commands not processed. Result from X3 or X4 command only.
8	NO ANSWER	Silence not detected and subsequent commands not processed. Result from @ command only.

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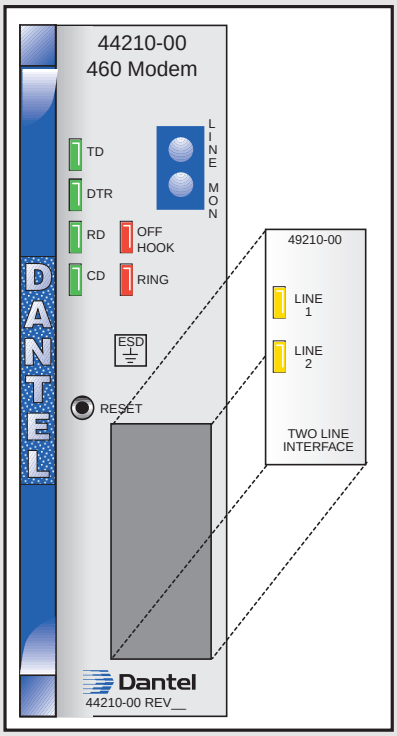
TABLE B CONTINUED - HAYES-COMPATIBLE COMMAND SET, RESPONSE CODES, AND REGISTERS USED

SOFTWARE REGISTERS USED BY THE COMMAND SET			
REGISTER	**RANGE/UNITS**	**DEFAULT**	**DESCRIPTION**
S0	0-255 Rings	0	Ring to answer telephone on.
S1	0-255 Rings	0	Number of rings.
S2	0-127 ASCII	43(+)	Escape code character.
S3	0-127 ASCII	13(CR)	Character recognized as carriage return.
S4	0-127 ASCII	10(LF)	Character recognized as linefeed.
S5	0-32, 127 ASCII	8(BS)	Character recognized as backspace.
S6	2-255 Sec.	2	Wait time for dial tone.
S7	1-255 Sec.	30	Wait time for carrier.
S8	0-255 Sec.	2	Pause time caused by comma.
S9	1-255 1/10 Sec.	6	Carrier detect response time.
S10	1-255 1/10 Sec.	7	Delay between loss of carrier and hang up.
S11	50-255 m.s.	70	Duration and spacing of touch tones.
S12	2-250 1/50 Sec.	50	Escape code guard time.
S13	Bit Mapped	none	UART status register.
S14	Bit Mapped	none	Option register.
S15	Bit Mapped	none	Flag register.
S16	0, 1, 2, 4	0	Test modes.

FIG. 10 - FRONT PANEL VIEWS



The 44210 has front panel LEDs that indicate TD (Transmit Data), DTR (Data Terminal Ready), RD (Receive Data), CD (Carrier Detect), OFF HOOK, and RING. These LEDs will illuminate when that function becomes active. The unit also has front panel phone jacks, a reset button, and a subassembly cutout window to view the front panel of an optional 49210 Two-Line Interface Subassembly. When no subassembly is mounted on the 44210, a bypass card is mounted in place of the subassembly and a plastic insert fills the cutout opening. Refer to Fig. 10 and Table C.

The 49210 has front panel LEDs that indicate activity for each of the two lines. The LEDs are designated LINE 1 and LINE 2 and are visible through a cutout on the front panel of the 44210 module. Refer to Fig. 10 and Table C.

TABLE C - FRONT PANEL LED OPERATION

44210		
DESIGNATION	**NAME**	**OPERATION**
TD	Transmit Data	Flashes when the module receives transmitted data from the DTE side.
DTR	Data Terminal Ready	Comes ON when the module recognizes a DTR handshaking signal from the DTE side.
RD	Receive Data	Flashes when the module is receiving tones from a data source on the line side.
CD	Carrier Detect	Comes ON when carrier tones are detected from a data source on the line side.
OFF HOOK	Off Hook	Comes ON, and remains ON, as long as the modem is off-hook to the line (the line has been seized). When a call has been terminated and the line released, the OFF HOOK LED goes OFF.
RING	Ring	Comes ON when ringing voltage is detected. Goes OFF when ringing voltage is no linger detected.
49210		
DESIGNATION	**NAME**	**OPERATION**
LINE 1	Line 1	Comes ON, and stays ON, as long as line 1 of the 49210 subassembly is active.
LINE 2	Line 2	Comes ON, and stays ON, as long as line 2 of the 49210 subassembly is active.
NOTE: If an LED is flashing (approximately 2 seconds ON and 4 seconds OFF) it indicates detection of interrupted ringing voltage and that the line is NOT connected to the modem.		

FCC REQUIRED INFORMATION

The following are requirements of Part 68 of FCC Rules:

1. The installer of this equipment is responsible for notifying the telephone company that it is being connected or disconnected.
2. This equipment is not to be connected to party lines or coin telephone service.
3. The telephone company has the right to temporarily discontinue service (Section 68.108) and to change facilities and services which may affect the operation of this equipment. Adequate written notice will be provided to the user to maintain uninterrupted service (Section 68.110B).
4. In case of trouble, contact the manufacturer's authorized agent.
5. When the installation of this device requires connection or changes to the internal wiring of registered telephones or other registered devices, such changes and connections can be made only by the registered grantee or authorized agents, equipment manufacturers, registered telephone refurbishers, telephone companies, and those qualified for the installation of KN and PN systems under Section 68.215 of the rules. The installer of this equipment is advised, in the interest of safety, that the host equipment be disconnected from all power sources and the telephone network when the installation is being made.
6. Installation of this equipment as an adjunct can be made only with permission of the owner of the host equipment.

FCC required information pertaining to this module:

Registration Number: **DPH622-60575-MD-E**

TECHNICAL SPECIFICATIONS

DESCRIPTION	VALUE
POWER REQUIREMENTS	
Input Voltage	-21 to -56 VDC
Input Current (±5%; add 18mA when 44210 is e/w 49210)	152mA max. @ -21 VDC 140mA max. @ -24 VDC 97mA max. @ -48 VDC 91mA max. @ -56 VDC
Heat Dissipation (add 0.4 Btu when 44210 is e/w 49210)	10.4 Btu/Hr max @ -21 VDC 10.9 Btu/Hr max @ -24 VDC 15.1 Btu/Hr max @ -48 VDC 16.5 Btu/Hr max @ -56 VDC
AUDIO LEVELS	
2-Wire Line XMT Carrier Output Level (600 ohms)	-10.3 dBm, ±1 dB
Audio Output Level (median, 600 ohm termination)	-18 dBm, ±1 dB
2-Wire Line RCV Carrier Input Level (carrier detect)	0 to -36 dBm
DIGITAL INTERFACE LEVELS	
TTL/CMOS	
Input Voltage	0 to 1.5V Low; 3.0 to 5.0V High
Input Current	20mA Source at 2.5V Minimum Output 20mA Sink at 0.5V Maximum Output
RS-422	
Receivers	
Differential Input Threshold Voltage	±0.2V, referenced to ground
Common Mode Input Voltage	±7V, referenced to ground
Drivers	
Differential Output Voltage	±4V no load; ±2V min., 100 ohm load, referenced at inverting output.
Short Circuit Current	150mA max.
Maximum Load Resistance	100 ohms
MPI INPUTS	
RS-232 (pins 46, 48, 52, 54, 56)	Ground to +1.5VDC (active); -21 to -56VDC (inactive)
TTL/CMOS (pin 22)	Ground to +1.5VDC (active); Open or +3.0 to +5.0VDC max.
MPO OUTPUTS	
RS-232 (pin 16)	+3 to +12VDC (active) -3 to -12VDC (inactive)
TTL/CMOS (pin 27)	Ground (active); Open or +5VDC max.
WEIGHT	
44210 only	11.5 ounces
44210 w/ 49210 Subassembly	17.6 ounces
PHYSICAL MEASUREMENTS	
With or without 49210 Subassembly	1.4" x 6.0" x 5.6"
Operating Temperature Range	0° to 55° C.

UPDATED

WARRANTY

LIMITED WARRANTY

The Seller warrants that the standard hardware products sold will be free from defects in material and workmanship and perform to the Seller's applicable published specifications for a period of 18 months for hardware, and 3 months for software, from the date of the original invoice. The liability of the Seller hereunder shall be limited to replacing or repairing, at its option, any defective products which are returned F.O.B. to the Seller's plant, (or, at the Seller's option, refunding the purchase price of such products). In no case are products to be returned without first obtaining permission and a customer return authorization number from the Seller. In no event shall the Seller be liable for any consequential or incidental damages.

Equipment or parts which have been subject to abuse, misuse, accident, alteration, neglect, unauthorized repair or installation are not covered by warranty. The Seller shall make the final determination as to the existence and cause of any alleged defect. No warranty is made with respect to custom equipment or products produced to the Buyer's specifications except as specifically stated in writing by the Seller in the contract for such custom equipment.

This warranty is the only warranty made by the Seller with respect to the goods delivered hereunder, and may be modified or amended only by a written instrument signed by a duly authorized officer of the Seller and accepted by the Buyer.

Warranty and remedies on products not manufactured by the Seller are in accordance with warranty of the respective manufacturer. THE SELLER MAKES NO OTHER WARRANTY OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED; AND ALL IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEEDS THE AFORESAID OBLIGATIONS IS HEREBY DISCLAIMED BY THE SELLER.

IN CASE OF DIFFICULTY

If you experience difficulty with this equipment, check the following, as appropriate:

1. **Switch settings**
2. **Signal levels**
3. **Software configuration**
4. **Connections between Dantel's equipment and your equipment.**

If there is still a problem, substitute equipment that is known to be good. For additional assistance, call Dantel's Technical Field Service Department weekdays, 6 A.M. to 5 P.M. pacific time:

1-800-4DANTEL (1-800-432-6835).

If a thorough checkout shows a piece of equipment has malfunctioned, you may return it to the factory. For repairs and emergency replacements, obtain a Return Material Authorization (RMA) number from the Customer Service Representative at **1-800-4DANTEL** (1-800-432-6835).

To ensure expedient processing of your order, provide a purchase order number and shipping and billing information when requesting an RMA number. Also, when the units are returned to Dantel, include a description of the failure symptoms for each unit returned. Send defective equipment to:

Dantel, Inc. • 2991 North Argyle Avenue • Fresno, California 93727-1388