Dantel

Y2K Compliant

46004 VOLTAGE DETECTOR MODULE (VDM)

46004-00
VOLTAGE
DETECTOR

SELECT

+

-

ALM

XMT
DATA

RCV
DATA

Dantel
B11-46004-00 REV__

Table of Contents

About this Practice:

This practice has been reissued to:
- Update part number from A11-46004 to B11-46004.

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

Issue date: March 1999

UPDATED

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.

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
B11-46004-00	Voltage Detection Module (VDM)

GENERAL DESCRIPTION

The 46004 Voltage Detector Module (46004 VDM) monitors voltage levels between -60 VDC and +60 VDC for up to 16 individual channels. The module cycles through all active channels and reports voltage and alarm information to the operating system through the protocol port or to a dumb terminal through the user interface port.

You can configure channels to perform differential or single-ended (ground-referenced) measurements. Each channel has four user-defined voltage thresholds. When the monitored voltage crosses a defined threshold, the module reports the activity to the operating system.

You can configure the module to operate with the front panel push-button switches and display, a dumb terminal connected to the user interface port, or a configuration downloaded through the operating system.
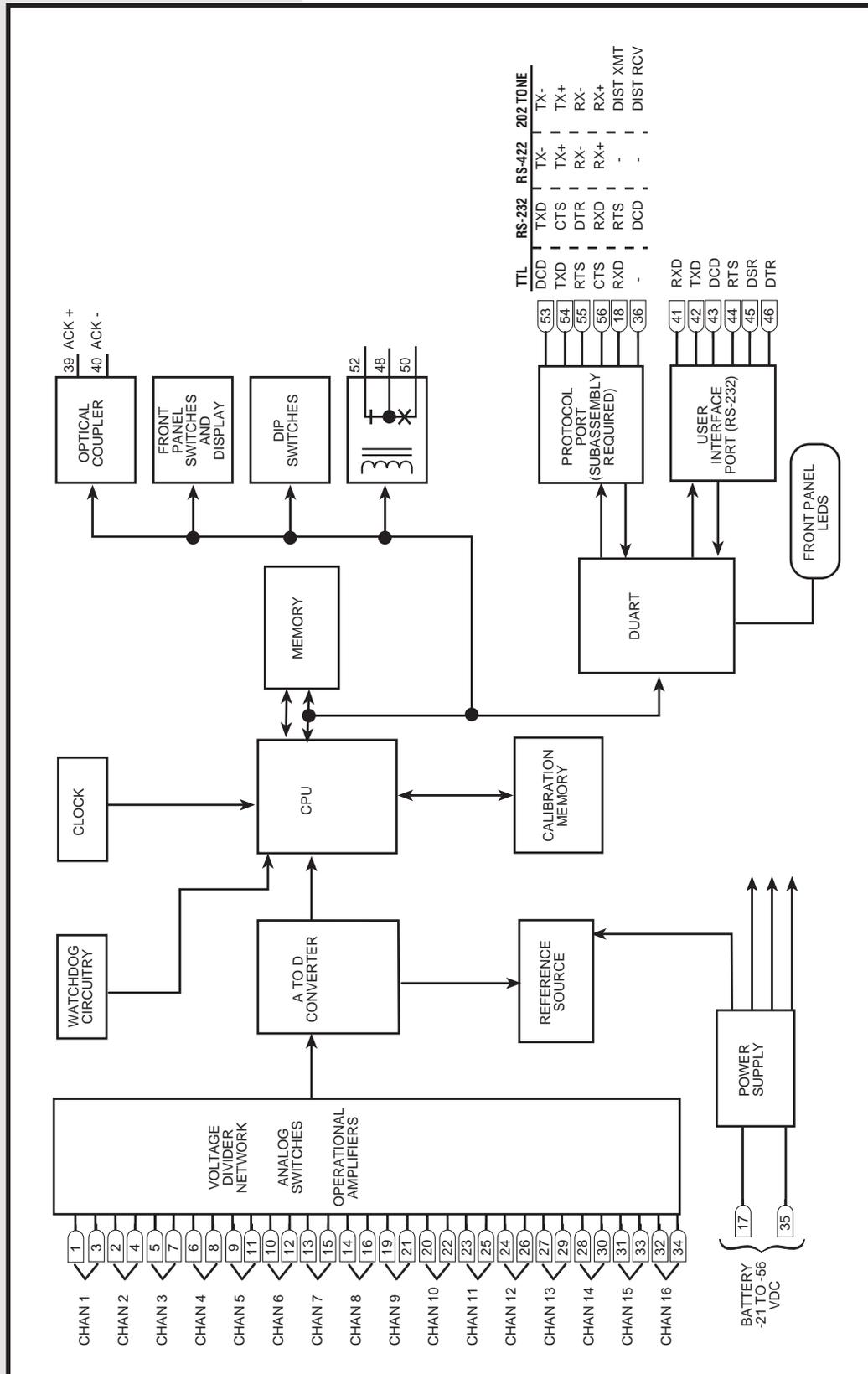
CIRCUIT DESCRIPTION

Fig. 1 shows the 46004 Voltage Detector Module functional schematic. The circuit consists of a microprocessor, switches, front panel display, LEDs and switches, input and output ports, voltage measurement circuitry, calibration memory and a power supply.

Microprocessor

A microprocessor operating at 10 MHz controls the 46004 VDM. A watchdog timer resets the module if the microprocessor malfunctions. An EPROM (Erasable Programmable Read-Only Memory) contains the microprocessor operating instructions. RAM (Random Access Memory) stores volatile data and has battery backup which prevents data loss when power fails.

CIRCUIT DESCRIPTION

FIG. 1 - FUNCTIONAL SCHEMATIC, 46004

CIRCUIT DESCRIPTION

Switches

The microprocessor reads three eight-position DIP switches for module configuration and address definition.

Front Panel Display

The front panel has an alphanumeric intelligent display for voltage monitoring, channel configuration, and so on. The display has 4 digits with 17 segments per digit and is under software control.

Front Panel LEDs and Switches

There are three front panel LEDs. One red LED indicates alarm activity on any configured channel. Two green LEDs indicate receive and transmit data activity and operate with the protocol port.

Three front panel push-button switches operate the module and configure individual channels. A recessed front panel push button switch performs a hardware reset.

Input/Output Ports

A DUART (Dual Universal Asynchronous Receiver/Transmitter) interfaces the module's circuitry with two input/output ports. The communications port (designated the protocol port) requires an optional on-board subassembly to complete communication. The user interface port provides an RS-232 interface to complete communication.

Voltage Measurement Circuitry

The voltage measurement circuitry consists of:

- ◆ Resistor voltage dividers
- ◆ Analog switches
- ◆ Operational amplifiers
- ◆ A voltage reference
- ◆ A 10-bit Analog to Digital (A to D) converter

Each channel provides a resistor divider arranged for single-ended (ground-referenced) or differential measurements and has an input impedance of approximately 104K Ohms to ground.

Received voltages attentuate from a maximum of 60 VDC to 2.5 VDC (the full range of the A to D converter), and can have a positive or negative value.

Analog switches route the voltages from the channels to the op-amp circuitry, which provides high impedance isolation and gain for measurements in lower voltage ranges.

CIRCUIT DESCRIPTION

The voltage reference supplies 2.5 V to the A to D converter which compares measured values to the reference. The corresponding binary vote with 10-bit resolution routes to the microprocessor for processing.

Calibration Memory

Microprocessor subassembly flash memory holds calibration constants. The factory sets calibration information.

Power Supply

An on-board regulated power supply uses -21 to -56 input power. The power supply provides regulated DC voltages for operation of the module's circuitry and the optional communication subassembly.

INSTALLATION

Installation consists of installing subassemblies, setting the switches, and installing the module.

1. Install the communication or other subassembly.

To install the communication subassembly:

1. Remove the three screws from the subassembly standoffs on the 46004 VDM. Refer to Fig. 2 for the communication subassembly location.

2. If you install a TTL subassembly, leave the blue hole plug in the VDM front panel. The TTL subassembly has no option straps.

*NOTE*:   *In most cases, the 46004 comes from the factory equipped with a TTL subassembly.*

3. If you install a 49008, 49013 or 49029 subassembly, refer to the subassembly documentation for option strap placement.

To install a different subassembly:

1. Remove the blue hole plug from the VDM front panel.

2. Remove the three screws from the subassembly standoffs. Refer to Fig. 2 for the subassembly location.

3. Separate the subassembly board from the main board. Be careful not to bend any connector pins.

4. Install the new subassembly board into the module connectors. Verify that the subassembly connector pins go into module receptacles J4 and J5.

5. Install three screws to fasten the subassembly.

FIG. 2 - SWITCH AND SUBASSEMBLY LOCATIONS, 46004
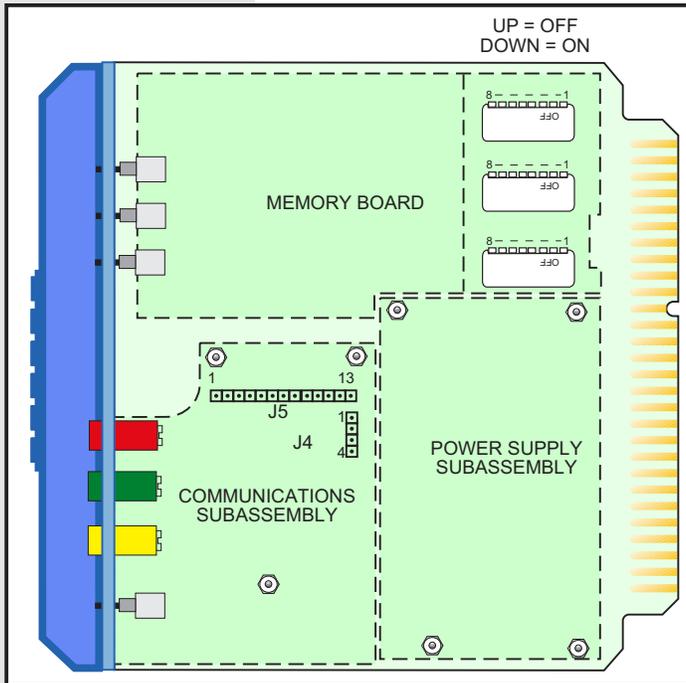
2. Set switches.

Set VDM switches S1 through S7. Refer to the ***Switch Settings*** section.

3. Install the module in the shelf.

Slide the VDM along the card guides of the correct slot. Firmly seat the module in the 56-pin edge connector.

The shelf is usually wired at the factory, and you do not have to wire the 56-pin edge connector. If it is necessary for you to wire it, refer to Table A and Fig. 3.
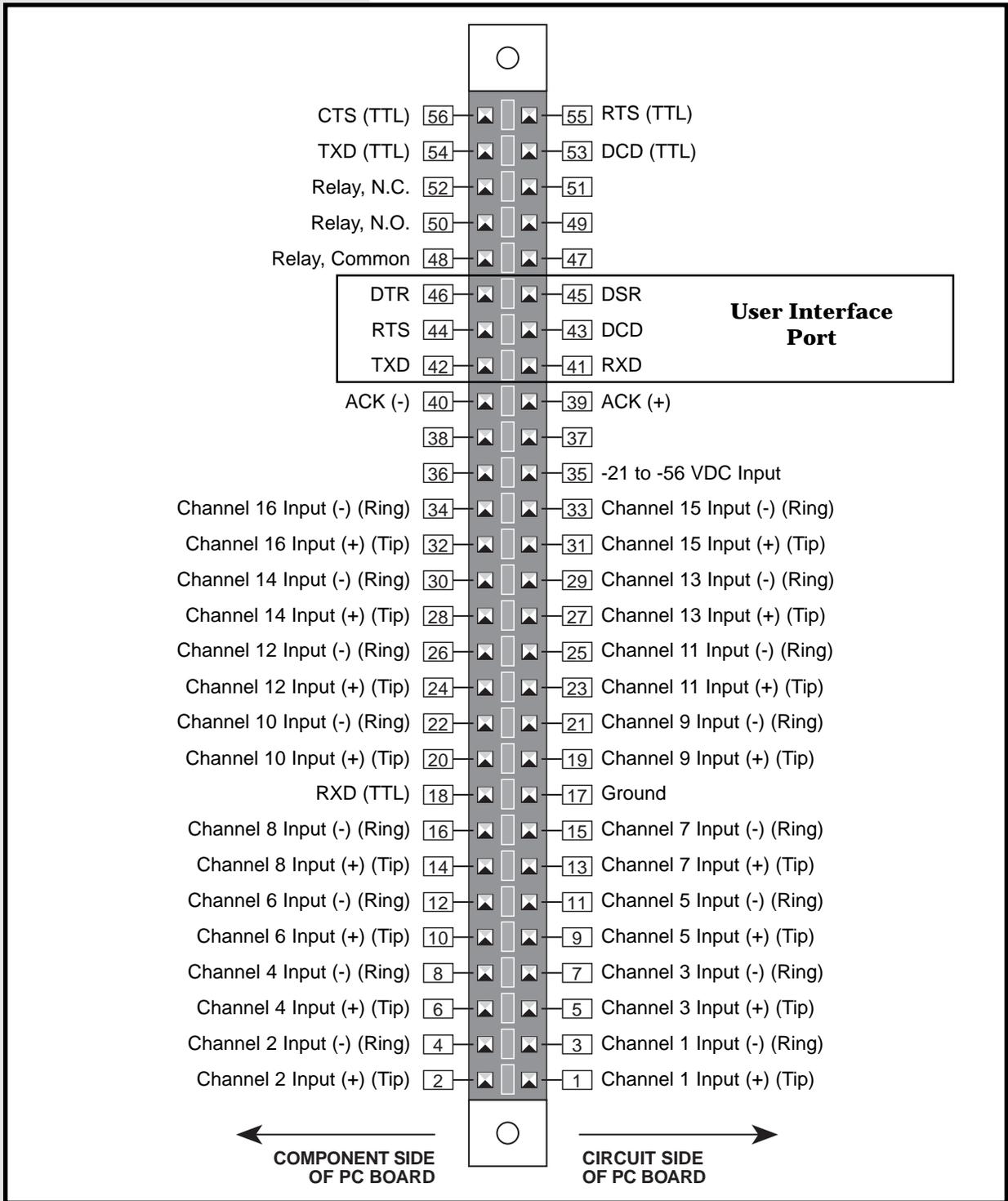
NOTE: *The VDM is pin compatible with the 46009 and 46010 Multiple Alarm Transmitters (MATs). Certain applications involving the 46010 MAT wire the even-numbered pins between 2-16 and 20-34 to a common bus. If the VDM plugs into a shelf previously wired for a 46010 MAT and the even numbered pins between 2-16 and 20-34 are bused together, you* cannot *use VDM channels 2, 4, 6, 8, 10, 12, 14 and 16 if the VDM performs differential measurements.*

TABLE A - SUBASSEMBLY PIN DESIGNATIONS

SUBASSEMBLY	MODULE EDGE CONNECTOR PIN NUMBER					
	PIN 18	**PIN 36**	**PIN 53**	**PIN 54**	**PIN 55**	**PIN 56**
49008 (RS-422/485)	n/a	n/a	TX-	TX+	RX-	RX+
49013 (202 Tone)	n/a	n/a	XMT	XMT	RCV	RCV
49029 (RS-232)	RTS	DCD	TD	CTS	DTR	RD

INSTALLATION

FIG. 3 - PIN DESIGNATIONS, 46004

CTS (TTL) [56]		[55] RTS (TTL)
TXD (TTL) [54]		[53] DCD (TTL)
Relay, N.C. [52]		[51]
Relay, N.O. [50]		[49]
Relay, Common [48]		[47]
DTR [46]		[45] DSR
RTS [44]		[43] DCD
TXD [42]		[41] RXD
ACK (-) [40]		[39] ACK (+)
[38]		[37]
[36]		[35] -21 to -56 VDC Input
Channel 16 Input (-) (Ring) [34]		[33] Channel 15 Input (-) (Ring)
Channel 16 Input (+) (Tip) [32]		[31] Channel 15 Input (+) (Tip)
Channel 14 Input (-) (Ring) [30]		[29] Channel 13 Input (-) (Ring)
Channel 14 Input (+) (Tip) [28]		[27] Channel 13 Input (+) (Tip)
Channel 12 Input (-) (Ring) [26]		[25] Channel 11 Input (-) (Ring)
Channel 12 Input (+) (Tip) [24]		[23] Channel 11 Input (+) (Tip)
Channel 10 Input (-) (Ring) [22]		[21] Channel 9 Input (-) (Ring)
Channel 10 Input (+) (Tip) [20]		[19] Channel 9 Input (+) (Tip)
RXD (TTL) [18]		[17] Ground
Channel 8 Input (-) (Ring) [16]		[15] Channel 7 Input (-) (Ring)
Channel 8 Input (+) (Tip) [14]		[13] Channel 7 Input (+) (Tip)
Channel 6 Input (-) (Ring) [12]		[11] Channel 5 Input (-) (Ring)
Channel 6 Input (+) (Tip) [10]		[9] Channel 5 Input (+) (Tip)
Channel 4 Input (-) (Ring) [8]		[7] Channel 3 Input (-) (Ring)
Channel 4 Input (+) (Tip) [6]		[5] Channel 3 Input (+) (Tip)
Channel 2 Input (-) (Ring) [4]		[3] Channel 1 Input (-) (Ring)
Channel 2 Input (+) (Tip) [2]		[1] Channel 1 Input (+) (Tip)

User Interface Port (pins 46/45 DTR/DSR, 44/43 RTS/DCD, 42/41 TXD/RXD)

← COMPONENT SIDE OF PC BOARD

CIRCUIT SIDE OF PC BOARD →

SWITCH SETTINGS

The 46004 VDM provides three eight-position DIP switches that define how the module operates. You should set the switches prior to module installation.

Refer to Tables B through F for switch settings.

SWITCH S5

Switch S5 defines the protocol port data rate and protocol, the user interface port data rate, and determines how the 46004 VDM transmits data. Refer to Table B for the switch settings.

TABLE B - SWITCH S5

OPTION	S5-1	S5-2	S5-3	S5-4	S5-5	S5-6	S5-7	S5-8
Data Rate (Protocol Port)								
9600 Baud (2400 baud, if TBOS)	ON							
1200 Baud	OFF							
Protocol (Protocol Port)								
DCM		OFF	OFF					
DCPF		ON	OFF					
TBOS		OFF	ON					
DCMX		ON	ON					
Mode								
Two-Display Mode				ON				
One-Display Mode				OFF				
Analog Lines								
Report in DCPF					ON			
Do not report in DCPF					OFF			
Not Used						OFF	OFF	
Data Rate (User Interface Port)								
9600 Baud								ON
1200 Baud								OFF

NOTE: Switches S5-6 and S5-7 are not used and should be left in the OFF position.

SWITCH S6

Switch S6 defines the VDM address. The module address depends on the selected protocol. Refer to Tables C, D and E for switch settings.

TABLE C - SWITCH S6 (DCM PROTOCOL)

TABLE D - SWITCH S6 (TBOS PROTOCOL)

TABLE E - Switch S6 (DCPF and DCMX Protocols)

0 WILL ANSWER AS ADDRESS 1

The following numbered entries (0 through 129) each show a DIP switch diagram with switches labeled 1 2 3 4 5 6 7 8 and positions OFF/ON:

0 (OFF / ON), 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129

CONTINUED . . .

TABLE E (CONTINUED) - SWITCH S6 (DCPF AND DCMX PROTOCOLS)

SWITCH SETTINGS

Switch S7 defines module operation. Refer to Table F for switch settings.

TABLE F - SWITCH S7

OPTION	S7-1	S7-2	S7-3	S7-4	S7-5	S7-6	S7-7	S7-8
Threshold								
Electrical Potential	OFF							
Number Line	ON							
Not Used		OFF						
Relay Timeout								
No Timeout			OFF	OFF				
30 Seconds			ON	OFF				
5 Minutes			OFF	ON				
30 Minutes			ON	ON				
Continuous Transmit Mode*								
Yes					ON			
No					OFF			
CPM Functions								
Yes						ON		
No						OFF		
Automatic Transmit of Values**								
Function Off							OFF	OFF
Every 30 Minutes							ON	OFF
Every 1 Hour							OFF	ON
Every 2 Hours							ON	ON

 * *Available in DCM protocol mode only.*
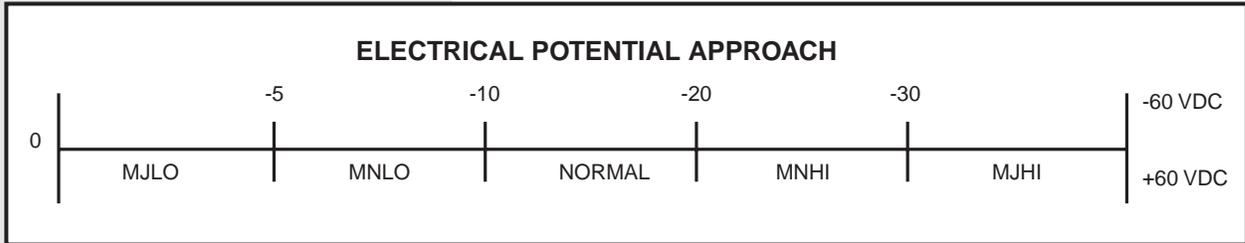** *Available only when CPM functions are ON and 2-display mode is ON.*

Switch S7-1 defines threshold representation. Set switch S7-1 ON for the number-line approach. Set switch S7-1 OFF for the electrical-potential approach.

The electrical-potential approach operates on the principle that -60 VDC has the same potential for work as +60 VDC. As the absolute value of the voltage loses potential (gets closer to zero), the voltage exceeds Minor Low and Major Low thresholds which generates an alarm. If the potential increases, the voltage exceeds the Minor High and Major High thresholds which generates an alarm. Refer to Fig. 4.

NOTE: *Assigned thresholds and monitored voltages should all have the same sign (all positive or all negative voltages). The VDM treats opposite sign voltages from the threshold as Major Low alarms.*
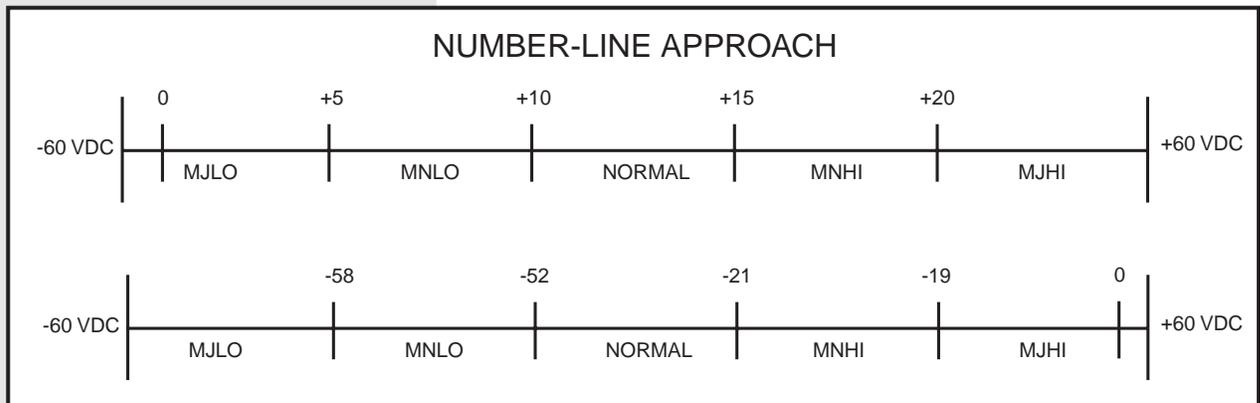
SWITCH SETTINGS

ELECTRICAL POTENTIAL APPROACH

```
            -5          -10         -20         -30       -60 VDC
    0 |------|-----------|-----------|-----------|----------|
      MJLO      MNLO        NORMAL       MNHI        MJHI    +60 VDC
```

The number-line approach uses a standard number-line format with a range between -60 VDC and +60 VDC. The normal range is located somewhere within the range. As the value of the voltage decreases below the Normal range, the voltage exceeds the Minor Low and Major Low thresholds which generates an alarm. Refer to Fig. 5.

NUMBER-LINE APPROACH

```
                0        +5         +10        +15        +20
  -60 VDC |------|---------|----------|----------|----------|------| +60 VDC
            MJLO     MNLO       NORMAL      MNHI        MJHI
```

```
               -58       -52        -21        -19          0
  -60 VDC |------|---------|----------|----------|----------|------| +60 VDC
            MJLO     MNLO       NORMAL      MNHI        MJHI
```

OPERATION

When the 46004 Voltage Detector Module powers up, the module performs a cold restart. During a cold restart, the system display shows *ON* followed by a flashing ****. The VDM maintains configuration data after a cold start.

Each time the module powers up the VDM performs a check of the code area. If the VDM detects a problem, the VDM attempts to display a warning on the protocol port.

NOTE: *The VDM power-up cycle takes approximately three seconds to complete. If a device performs an automatic configuration scan of the VDM during that time, the VDM will not respond. The device will not poll the VDM until the device completes its next configuration cycle.*

OPERATION

Operation of the VDM consists of observing the front panel display, front panel LEDs, and configuring the module using front panel switches or a computer terminal.

MANUAL CONFIGURATION

The front panel includes three momentary pushbuttons, a reset button, three LEDs, and a four-digit alphanumeric display.

MOMENTARY PUSHBUTTONS

The front panel has three momentary pushbuttons used with the display. When the display shows the flashing ****, press any of the front panel buttons (Select, +, –), which places the VDM in the ROOT of the local menu. If you press no buttons, the module defaults to the ROOT display after five minutes.

The local menu contains top level menu items which configure and monitor individual channels. Cycle through the top level menu items by pressing the + or – button. Access the top level menu item shown on the display by pressing the Select button.

RESET BUTTON

Pressing the recessed Reset (RST) button performs a cold restart. All configured channels are turned on and all alarm data are cleared from memory.

NOTE: *Pressing the RST button is the same as removing and reapplying power to the module.*

The RST button can also clear all configuration and alarm information.

1. Depress and hold the – button while pressing and releasing the RST button.

2. Keep the – button pressed until the VDM display shows *ON*.

LED OPERATION

One red LED labeled ALARM illuminates when the VDM detects an alarm or other abnormal condition. The LED does not follow the relay or any acknowledgement procedures.

Two green LEDs labeled XMT DATA and RCV data illuminate when there is communication activity on the protocol port.

OPERATION

ALPHANUMERIC DISPLAY

The front panel display provides a four-digit, alphanumeric readout for configuring channels and monitoring voltages. Voltage readings show the sign (+ or –) sharing the same location as the decimal point. For example, 24-3 represents a voltage of -24.3 VDC, 1+65 represents 1.65 VDC, and -025 represents -.025 VDC.

NOTE: *If you do not access the front panel for 30 minutes, the display reverts to a scrolling decimal point to conserve power. Return the VDM to the ROOT display by pressing the + and – buttons together.*

LOCAL MENU - TOP LEVEL MENU ITEMS

The local menu consists of seven top level menu items. The following is a list of these menu items and a brief description of each:

Root

This is the default display for the module. On power-up, the module will cycle through all enabled channels, first displaying the channel number and then the voltage reading. If no channels are enabled, the scrolling decimal points with an occasional IDLE will be displayed.

ACKN

The alarm relay is acknowledged by selecting this menu item.

ALRM

Selecting this menu item will cause the display to show all channels in alarm alone with the voltage reading.

CH##

This menu item allows you to enable or disable a specific channel and define whether the input will perform a single-ended or differential measurement.

DELY

Selecting this menu item allows you to set or change the alarm delay time for a specific channel/threshold.

THRS

This item allows you to set the specific thresholds for alarm conditions.

OPERATION

RELY

This allows you to set which thresholds will affect the on-board relay. This menu item is used to set the time period for which the alarm must exist to activate the relay.

MANUAL CONFIGURATION USING FRONT PANEL SWITCHES

You can configure the VDM using the front panel buttons and display. The Local Menu consists of seven top level menu items.

NOTE: *Pressing the + and – buttons together at any time aborts the display procedure and returns to the ROOT menu.*

ROOT

The ROOT display is the VDM default display. If you do not access the front panel for five minutes, the VDM automatically reverts to the ROOT display.

The VDM cycles through all channels, displaying the channel number first, then the voltage reading. Each channel displays for approximately five seconds. Disabled channels show – – – – in place of the voltage. If you enable no channels, the display shows a scrolling decimal point and occasionally shows IDLE.

Skip to the next enabled channel by pressing the Select button. The VDM will stay locked on that channel until you press the Select button. Cycle through the channel by pressing the + or – button. The VDM continues to monitor all channels while you are locked to a channel.

ACKN

ACKN acknowledges the alarm relay and the display shows RELY. Pressing Select resets the external relay to its default (no alarm) state.

ALRM

ALRM shows all channels in alarm condition whether the alarm has been acknowledged or not. Channels not in alarm condition are not displayed in the cycle. If no channels are in the alarm condition, the display responds with a flashing NONE/ALRM. Return to the ROOT display by pressing the Select button.

CH##

CH## allows you to enable or disable a specific channel and configure an enabled channel. The display shows channel one. Cycle through the channels by pressing the + or – button. Select a channel by cycling through the channels and pressing the Select button.

The display shows the channel state as ON or OFF. Toggle the channel state by pressing the + or – button.

If you enable a channel, you must configure the channel for a single-ended or differential input. Choose SNGL or DIFF by pressing the + or – button then pressing Select.

NOTE: *Single-ended measurements compare the voltage readings to an on-board reference, whereas differential measurements require an external reference.*

DELY

DELY allows you to set or change the alarm delay time for a specific channel or threshold.

To select the channel:

The display shows the channel number. Cycle through the channel numbers by pressing the + or – button. Choose the channel by pressing the Select button.

To select the threshold:

Once you select the channel, the display shows MJLO. Cycle through the thresholds (MJLO, MNLO, MNHI, MJHI) by pressing the + or – keys. Select the threshold by pressing the Select button.

To select the delay:

Once you select the threshold, the VDM displays NOR DELY. NOR refers to the delay prior to alarm release (returning to normal condition). Pressing the + button cycles the display to ALM DELY. ALM refers to the delay prior to alarm activation (threshold violation). Cycle to the appropriate delay and press the Select button.

To set the upper and lower digits:

After you select the delay, the display shows the specific channel and threshold settings. Change the upper digit value by pressing the + or – buttons. Set the upper digit by pressing the Select

button. Repeat the process for lower digits. The relay value range is zero to fifteen minutes, in one-quarter second intervals. The default state is no delay.

After you set the upper and lower digits, you return to the CH## display.

THRS

THRS sets thresholds for alarm conditions. The display shows the affected channel. Cycle through the channels by pressing the + or – buttons. Select the channel by pressing the Select button.

To select the threshold:

When you select the channel, the display shows MJLO. Cycle the display through the four thresholds by pressing the + or – buttons. Select the threshold by pressing the Select button.

To enter the voltage:

Once you select the threshold the display shows +000. Increment or decrement the tens-place digit by pressing the + or – button. Select the desired number by pressing the Select button. Reposition the decimal point for setting the ones, tenths and hundredths places by pressing the Select button. Enter the three-digit decimal voltage by pressing the Select button twice.

The lowest position you can enter is the thousandths place. The DVM allows for five significant digits when you use the front panel push buttons, but the VDM accepts and displays only the first three significant digits. You must enter a digit or a zero (by pressing the Select button) in each of the five positions. Once you enter the desired voltage, press the Select button until the display flashes the configured channel number.

NOTE: *Because of hardware limitations, entered values are adjusted to the closest increment the VDM can read.*

RELY

RELY sets the thresholds that affect the on-board relay operating external annunication devices.

To select the threshold:

When you cycle to the desired channel and press the Select button, the display shows the threshold. Scroll through the available thresholds by pressing the + or – button. Choose the threshold by pressing the Select button.

To choose the ALRM or NRML function:

Once you select the threshold, the display shows ALRM. Cycle the display between ALRM and NRML by pressing the + or – buttons. ALRM is the delay period for activation of the relay. (That is, the duration an alarm condition must exist before the relay is activated.) NRML is the amount of time an alarm condition must be cleared before the relay is deactivated. Choose the desired function by pressing the Select button.

To select the time period:

When you select the function, the display cycles between RTME and 000. Enter the time period by first setting the hundreds location. The range is between 0 and 255 seconds, and press the + button until you reach the desired time. Repeat this procedure for the tens and ones locations. When you reach the desired time, press the Select button. The VDM enters the setting and returns to the RELY display.

COMPUTER CONFIGURATION

When you connect a dumb terminal to the user-interface port, you access the Main Menu, a menu-driven system for configuring and monitoring the VDM. The Main Menu also has a quick access menu for accessing specific, commonly used commands. Refer to Table G.

You can choose from three different menus:

1. Configuration Menu

2. Alarms Menu

3. Utilities Menu

Each menu provides additional selections you can choose from. Make your selection by pressing the number associated with the menu item. You can return to the Main Menu from anywhere in the program by pressing the Esc key.

When the system asks you for information, type in the information then press Enter. If what you typed in is not valid, the system reports BAD RESPONSE PLEASE TRY AGAIN. When you are in a submenu, return to the Main Menu by pressing the 0 (zero).

NOTE: *The VDM occasionally prompts you to PRESS ANY KEY TO CONTINUE. To proceed, press any of the keys on the keyboard.*

TABLE G - MAIN MENU MAP

MAIN MENU		QUICK ACCESS CODE
1	**CONFIGURATION MENU**	
	1. Enable/Disable a Channel	CO
	2. Change Thresholds	TH
	3. Change Alarm Delays	DL
	4. Change Relay Delays	
	5. Continuous Transmit Mode	
	6. Clear Configuration	
	7. Display Configuration	DC
2	**ALARMS MENU**	
	1. Show Alarms	SA
	2. Acknowledge Alarms	AA
3	**UTILITIES MENU**	
	1. Watch Protocol	
	2. Channel Performance Menu	
	1. Display Channel Performance	
	2. Reset Channel Performance Counters	
	3. Show Version/Revision	
	4. Change Logger State	
	5. Clock Menu	
	1. Set Time/Date	
	2. Turn Clock Off	
	6. Voltage Readings	DR
	7. Password Menu	
	1. Lock	LO
	2. Unlock	UN
	3. Enter New Password	
	4. Clear Password	
	8. Terminal Characteristics Menu	
	1. Set Screen Clear Character	
	2. Set Screen Blanker Time	

1. CONFIGURATION MENU

You can select from seven choices:

1. Enable/Disable a Channel

2. Change Thresholds

3. Change Alarm Delays

4. Change Relay Delays

5. Continuous Transmit Mode

CONTINUED . . .

OPERATION

6. Clear Configuration

7. Display Configuration

NOTE: *Abort the current command and return to the Main Menu by pressing Esc.*

ENABLE/DISABLE A CHANNEL

Turns a specific channel on or off. If you are turning on a channel, you must define whether the input is a single-ended or differential input.

CHANGE THRESHOLDS

Enters or changes a desired threshold voltage for a specific channel or channels.

NOTE: *When you enter thresholds, you must enter a + sign if the value is positive. Otherwise the value defaults to a negative voltage reading.*

CHANGE ALARM DELAYS

This option sets:

♦ The amount of time the module delays reporting an alarm after a threshold has been exceeded.

♦ A delay for clearing an alarm after the alarm condition returns to normal.

Choose the time for each delay by selecting the delay minutes (1-15), the delay seconds (0-59) and the delay quarter seconds (1-3).

CHANGE RELAY DELAYS

Sets the external relay operation delay. You can set the delay for:

♦ Activating the delay when receiving an alarm.

♦ Resetting the relay when the alarm condition returns to normal.

The delay range is from 0 to 254 seconds. Setting the delay for 255 seconds turns the relay off.

OPERATION

CONTINUOUS TRANSMIT MODE

Chooses continuous transmit of data.

CLEAR CONFIGURATION

Clears all channel configuration data. The system asks if you are sure before deleting the data. If you answer yes, the data clears.

CAUTION: *You cannot recover data once it clears the system.*

DISPLAY CONFIGURATION

Displays all information pertaining to the module including configuration data, switch settings, operating parameters, and so on.

2. ALARMS MENU

You can select from two choices:

1. Show Alarms
2. Acknowledge Alarms

SHOW ALARMS

Shows the current alarm states for every channel.

ACKNOWLEDGE ALARMS

Acknowledges all alarms and shows the alarm states for each channel.

3. UTILITIES MENU

You can select from eight choices:

1. Watch Protocol
2. Channel Performance
3. Show Version/Revision
4. Change Logger State
5. Clock Menu
6. Voltage Readings
7. Password Menu
8. Terminal Characteristics Menu

WATCH PROTOCOL

Allows you to watch the data received or transmitted via the protocol port. Stop viewing the data and return to the Utilities Menu by pressing any key.

CHANNEL PERFORMANCE

You can choose from two options:

1. Display Channel Performance

2. Reset Channel Performance Counters

The VDM monitors communications over the protocol port, detecting accumulated frame errors, overrun errors, and parity errors. The module monitors each of these errors, counting them as they occur. The counters accumulate up to 255 errors each before rolling over to zero.

Display Channel Performance displays the current error counts. Reset Channel Performance Counters displays the counts and then resets the counters to zero.

SHOW VERSION/REVISION

Shows the current version of installed firmware in the module.

CHANGE LOGGER STATE

Creates a log that indicates when alarms initiate and when they return to normal. The default is on when the VDM powers up. When you use the Main Menu for long periods of time, turning the logger state to OFF prevents new alarm activity from interrupting you.

CLOCK MENU

You can choose from two options:

1. Set Time/Date

2. Turn Clock Off

Set Time/Date lets you set the internal clock. The screen prompts you for the month, day and year, followed by the hours, minutes and seconds. Hours must be entered in military format (0-23). Turn Clock Off turns the clock off.

NOTE: *If you store the module for an extended period of time, you should turn the clock function off to avoid unnecessary drain on the internal battery.*

OPERATION

VOLTAGE READINGS

Displays the voltage readings for all 16 channel inputs. The readings update to the current value approximately every five seconds. You can set the display to monitor a single channel. In single channel mode, the display shows continuous voltage readings for the specified channel. Pressing any key halts operation.

PASSWORD MENU

You can choose from four options:

1. Lock

2. Unlock

3. Enter New Password

4. Clear Password

You can assign a password to prevent an unauthorized user from gaining access to the VDM. When you lock the VDM, the user can only access items that do not affect VDM operation.

You cannot lock the VDM if you do not assign a password.

When entering a new password, you must enter an eight character password. Characters can be any key on the keyboard. Once you enter the password, you must enter the password again as you previously entered it. When the VDM accepts your new password, the display acknowledges the new password by displaying the current time.

Clear Password clears the existing password when the system is unlocked.

TERMINAL CHARACTERISTICS MENU

You can choose from two options:

1. Set Screen Clear Character

2. Set Screen Blanker Time

Refer to your specific terminal manual for setting the screen clear character. Set Screen Blanker Time clears the screen after the designated time period (1 to 255 minutes).

OPERATION

You can remotely configure the VDM using control point commands through the operating system. You can use a dumb terminal or a separate T/Shell program, VDM Editor, to remotely configure the VDM.

Configure the module using these commands by selecting DCM protocol and set CPM functions (switch S7-6) ON.

The control display consists of four sets of 16 control points each (CPMs 1-4).

SET 1 (CPM 1)

Selects the channel or channels affected when setting thresholds or delays.

SET 2 (CPM 2)

Displays the current settings and depends on points set in CPM 4. When CPM 4 points 1 or 2 are ON, CPM 2 displays enabled or differential channels. When CPM 4 points 4, 5 or 6 are ON, CPM 2 displays the data indicated by CPM 4 for the lowest channel selected in CPM 1. When CPM 4 point 15 is ON, CPM 2 shows the binary equivalent of $A501.

SET 3 (CPM 3)

Inputs values which must be converted to their binary equivalent. The values depend on CPM 4 settings.

Relay Delay

Points 1-8 set the relay delay. The relay delay range is 0-255. Selecting 255 disables the relay for channels selected in CPM 1.

Threshold Delay

Points 1-13 set the threshold delay. The delay sets in .25 second intervals up to approximately 17 minutes.

Thresholds

Points 1-10 enter the threshold value. Enter points 1-10 along with the scale and sign points (see below). You must convert the threshold value to a binary equivalent using the formula Threshold/(Scale/1024).

Scale

Points 13 and 14 determine the scale for setting threshold values:

OFF	OFF = 3.2 volt scale	(3.2 volts = 3.192875)
ON	OFF = 6.4 volt scale	(6.4 volts = 6.39375)
OFF	ON = 12.8 volt scale	(12.8 volts = 12.7875)
ON	ON = 64 volt scale	(64 volts = 63.9375)

NOTE: *When you enter threshold values, you cannot enter the maximum allowable upper limit for each scale. The upper limit is indicated in the parentheses).*

Sign - Point 16 determines the threshold(s) voltage polarity. ON = −, OFF = +.

SET 4 (CPM 4)

Determines what parameters change for CPM 1 selected channels. The options are:

♦ Pt. 1 - Enable/Disable (1=Enable, 0=Disable)

♦ Pt. 2 - Differential/Single (1=Differential; 0=Single-ended)

♦ Pt. 3 - Activate/Deactivate
(1=Activation Delay; 0=Deactivation Delay)

♦ Pt. 4 - Relay Delay

♦ Pt. 5 - Threshold Delay

♦ Pt. 6 - Threshold

♦ Pt. 7-8 - Threshold Type
OFF	OFF =	Major Low
ON	OFF =	Minor Low
OFF	ON =	Minor High
ON	ON =	Major High

♦ Pt. 10 - Data Stable - Indicates when all CPMs have been polled following a change to the CPMs.

♦ Pt. 12 - Voltage - The display shows the current voltage reading for the channel selected.

♦ Pt. 14 - Configuration Check Sums - When this point is ON, CPM 2 shows the CRC-CCITT configuration data for a VDM channel. The check sum reflects the entire VDM database when there is no selected channel.

♦ Pt. 15 - Generate Pattern - CPM 2 echoes the pattern $A501.

♦ Pt. 16 - DO IT - Executes the desired instruction in CPMs 1, 3 and 4.

OPERATION

Only one of points 1, 2, 4, 5 and 6 may be ON at a time. Setting multiples of these points automatically clears CPM 4. Settings for points 3, 7 and 8 are data-type modifiers and you can set or clear them independently.

EXAMPLE CONTROL POINT COMMANDS CONFIGURATION

Refer to Fig. 6 in this example. In this example, we are setting a threshold value of 5.0 volts for channel 1.

To configure the VDM using control point commands:

1. Create a blank table.

2. There is a threshold value of 5.00 volts for channel 1. The VDM controls are listed in display 16.

3. Place an X in box 1 (CPM 1, point 1). This tells the VDM to access channel 1.

4. Place an X in box 54 (CPM 4, point 6). This tells the VDM that the CPM 3 values reflect a threshold value.

5. Place an X in box 45 (CPM 3, point 13) for the 6.4 volt scale.

6. To enter the threshold value, convert 5.00 volts to a binary number using the formula Threshold/(Scale/1024): 5.00/(6.4/1024) = 800. In binary, 800 is equivalent to 1100100000.

7. Starting from the lowest position (the right of the binary number), place an X in each box (CPM 3, points 1-10) where a 1 in located (CPM 3, points 38, 41 and 42).

8. Execute the command by placing an X in box 64 (CPM 4, point 16).

9. Set each point marked with an X by using the control point set commands.

FIG. 6 - EXAMPLE CONFIGURATION USING VDM CONTROL POINT COMMANDS

DISPLAY __16__

CPM 1 - CHANNEL SELECT (1-16)

CPM 2 - OUTPUT DISPLAY

CPM 3 - INPUT DISPLAY

CPM 4 - OPTIONS DISPLAY

OPERATION

CONFIGURATION DISPLAY

If your system can display control point status, set the VDM to operate in one-display mode. Alarm information appears in the alarm display and configuration information appears in the location allocated for control points.

If your system does not report control point status, set the VDM to operate in two-display mode. Alarm information appears in the first display and configuration information appears in the second display.

ALARM DATA REPORTING

Alarms reported to your monitor appear as follows:

DISPLAY #1 ALARM POINTS	CHANNELS 1 THRU 16
1-16	Major Low Alarms
17-32	Minor Low Alarms
33-48	Major High Alarms
49-64	Minor High Alarms

TECHNICAL SPECIFICATIONS

DESCRIPTION	VALUE
Input Voltage	-21 to -56 VDC
Input Current (±10%)	
@ -21 VDC	213 mA
@ -56 VDC	110 mA
Heat Dissipation (±10%)	
@ -21 VDC	15.3 Btu/Hr
@ -56 VDC	21.0 Btu/Hr
Channel Inputs	
Input Voltage	-60 VDC to +60 VDC
Impedance	104K Ohms
Maximum Allowable Voltage	100V RMS
Acknowledge Input (Opto-Coupler)	
Voltage Range	-21 to -56 VDC
Current Range	600 uA to 2.0 mA
Resistance	33K Ohms + 1 Diode (0.6 Volt)
Relay Output	
Contact Type	Single Form-C Dry Contact
Contact Ratings (max.)	1 Amp @ 28 VDC; 0.5 Amp @ 120 VAC
Available Data Protocols	DCM, DCPF, DCMX, TBOS
Data Rates	
DCM, DCPF, DCMX	1200, 9600 Baud
TBOS	1200, 2400 Baud
Weight	13.5 oz.
Physical Dimensions	1.4" x 6.0" x 5.6"
Operating Temperature Range	0° to 55° C.

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

Dantel

P.O. Box 55013 • Fresno, CA 93747-5013   Phone (559) 292-1111   Fax (559) 292-9355   http://www.dantel.com