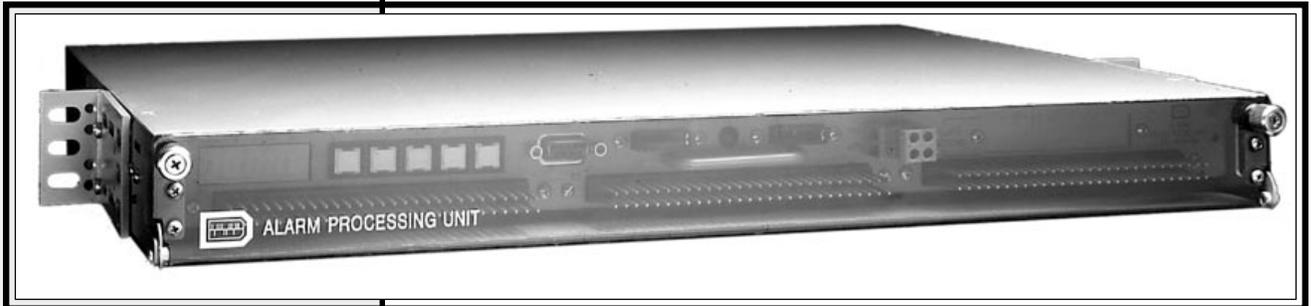


# 46131 ALARM PROCESSING UNIT (APU)



## Table of Contents

Ordering Information .....	2
General Description .....	2
Circuit Description .....	3
Installation .....	6
Operation .....	28
Subassembly Installation .....	31
Circuit Board Replacement .....	35
Technical Specifications .....	36
Warranty .....	38

### About this Practice:

This practice has been reissued to:

- Move Troubleshooting section to inside the **Installation** section.
- Document RS-485 capability on the receive side of responder ports 1 and 2, and the 8 TBOS ports (multiple references).
- Update discussion of port activity monitoring in the **Installation** and **Operation** sections.

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

**Issue date: May 1998**

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
A15-46131-00	Alarm Processing Unit; 32 discrete alarm inputs, 8 control outputs, 8 serial (TBOS) alarm interrogator ports, two RS-232/422/485 responder ports, one RS-232 configuration port
A15-46131-01	Alarm Processing Unit; 64 discrete alarm inputs, 16 control outputs, 8 serial (TBOS) alarm interrogator ports, 2 RS-232/422/485 responder ports, 1 RS-232 configuration port
A15-46131-20	Alarm Processing Unit; 32 discrete alarm inputs, 8 control outputs, 8 serial (TBOS) alarm interrogator ports, two RS-232/422/485 responder ports, one RS-232 configuration port, one 202 modem responder port
A15-46131-21	Alarm Processing Unit; 64 discrete alarm inputs, 16 control outputs, 8 serial (TBOS) alarm interrogator ports, 2 RS-232/422/485 responder ports, 1 RS-232 configuration port, one 202 modem responder port
A12-46130-00	Expansion Board subassembly; (upgrades -00 option to -01 option, or -20 option to -21 option)
A12-49030-00	202 Modem subassembly; (upgrades -00 option to -20 option, or -01 option to -21 option)
A05-00826-00	Wall-Mount Brackets

## GENERAL DESCRIPTION

The 46131 Alarm Processing Unit (APU) gathers alarm information from TBOS interrogator ports and local discrete alarm points. Three responder ports send the information to alarm reporting equipment in various protocols.

A front panel LED display shows if there are any alarms or failed TBOS displays.

Wiring is done at the back of the APU.

Before operating the APU, it must be configured. Connect a dumb terminal or programming paddle to an RS-232 configuration port on the APU. The configuration is backed-up by a battery.

**WARNING:** *When power is applied to the APU, negative battery voltage is present at pins 54 and 56 of connector P2 and at any alarm inputs wired to negative battery. For safety, cover these pins with protective insulation. Keep the plastic front panel cover closed during normal operation.*

# CIRCUIT DESCRIPTION

Fig.1 shows the functional schematic for the 46131 Alarm Processing Unit.

---

## DISCRETE ALARM INPUTS

---

### All options

The main APU circuit board has 32 discrete alarm inputs that are optically isolated. Alarms 1-24 each have a single input that requires a ground to activate the alarm circuitry. Alarms 25-32 each have two inputs, one for negative battery and one for positive battery.

---

### Options -01 and -21

Alarms 33-64 are on an Expansion Board subassembly that plugs into the main circuit board. These alarms have a single input that requires a ground to activate the alarm circuitry.

---

## TBOS ALARM INPUTS

---

### All options

Eight TBOS interrogator ports can poll TBOS equipment for alarm information. Each port can poll up to 8 displays of information for a total of 64 displays on all eight ports. The data interface standard on each port is RS-422/485.

Switches allow optional termination of the receive inputs.

---

## CONTROL OUTPUTS

---

### All options

The main APU circuit board has eight control outputs. Each output has two pins wired to normally open relay contacts.

---

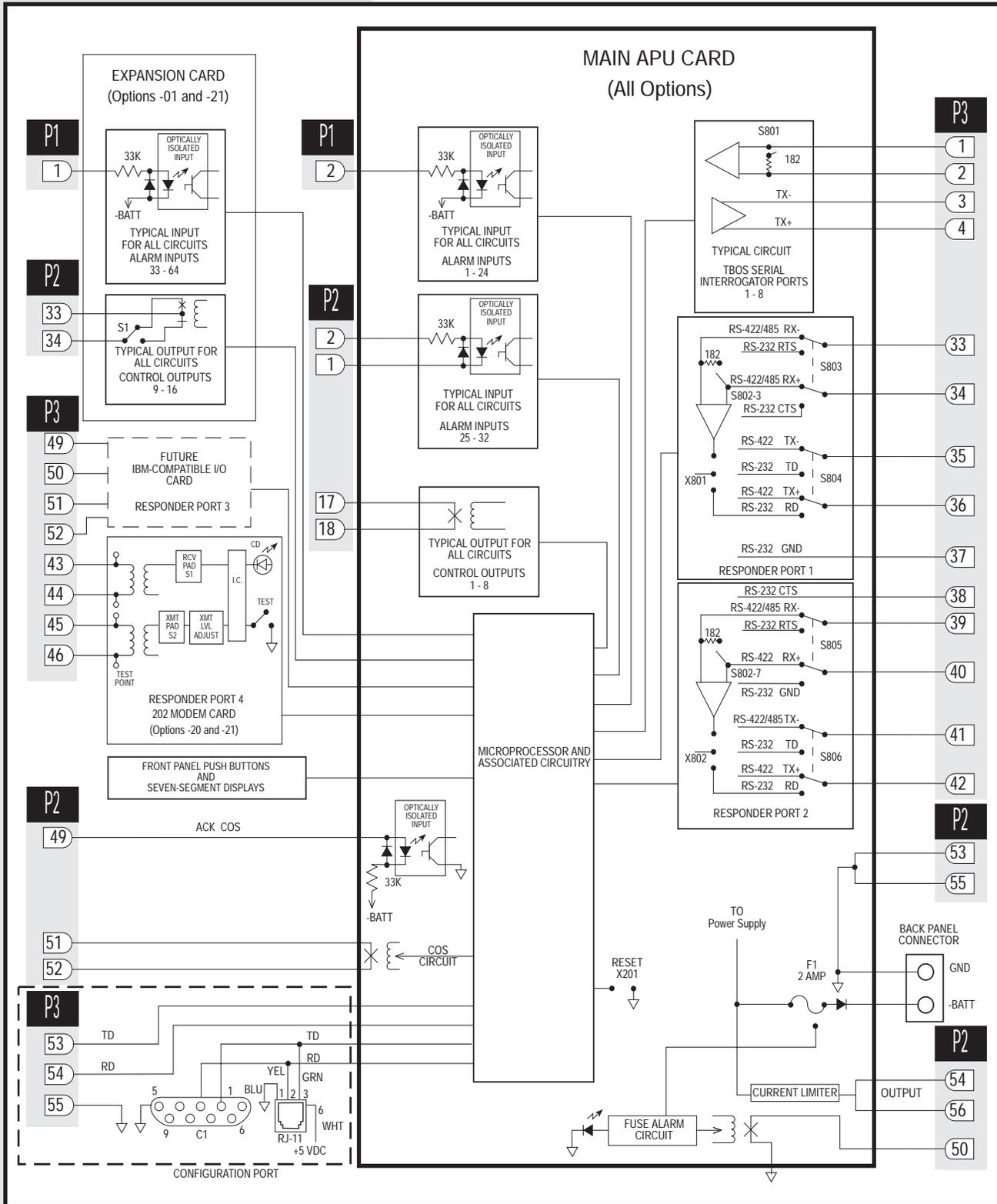
### Options -01 and -21

An Expansion Board subassembly has an additional eight control outputs that can be set with switches for normally open or normally closed contacts.

UPDATED

# CIRCUIT DESCRIPTION

Fig. 1 - FUNCTIONAL SCHEMATIC



UPDATED

# CIRCUIT DESCRIPTION

UPDATED

---

## RESPONDER PORTS

Responder ports send alarm information to alarm reporting equipment.

---

### All options

Ports 1 and 2 can be either an RS-422/485 or RS-232 interface. The RS-422/485 receive input can be terminated with 182 ohms (switch option).

If RS-232 is used on ports 1 or 2, RTS/CTS handshaking can be used. RTS/CTS handshaking enables communication through an external modem on ports 1 and 2.

Port 3 is not used.

---

### Options -20 and -21

Port 4 communicates through a optional 202 Modem subassembly that plugs into the main circuit board. The modem operates as a Bell 202 full-duplex tone modem. It has a data rate of 1200 baud. The modem provides:

- ◆ Test points to measure the transmit and receive signal levels.
- ◆ A potentiometer to adjust the transmit level.
- ◆ An LED to indicate when the carrier signal is present.

The test points and potentiometer are accessible through a window in the back panel of the APU.

All the responder ports communicate with either DCP, DCPF, TBOS, or TABS protocol.

---

## CONFIGURATION PORT

To program the APU to operate, connect a programming paddle or dumb terminal to the RS-232 configuration port. The paddle plugs into the RJ-11 connector on the front panel. The dumb terminal connects to C1 on the front panel or at P3 on the back panel.

---

## LOCAL ALARM AND ACKNOWLEDGEMENT

Wire external audible or visual devices, such as a bells or lights, to the APU for local alarm monitoring. When there is an alarm, a relay in the change-of-state (COS) circuit operates the device. If the alarm device is operating and another alarm occurs, the relay will pulse once.

Depending on how the APU has been programmed, the relay returns to its non-alarm state either (1) when all the alarms clear or (2) when a timer expires after 15 minues. Manually reset the relay either by applying a ground at the ACK COS input or by pushing the front panel acknowlege button.

# CIRCUIT DESCRIPTION

## PUSH BUTTONS AND LED DISPLAY

On the front panel are five push buttons and five seven-segment LED displays. They:

- ◆ Show if there are alarms or failed TBOS displays.
- ◆ Indicate if the TBOS interrogator ports are transmitting and receiving data.
- ◆ Reset the APU's microprocessor.
- ◆ Acknowledge alarms.
- ◆ Indicate alarm location.

### WARNING:

When power is applied to the APU, negative battery voltage is present at pins 54 and 56 of connector P2 and at any alarm inputs wired to negative battery. For safety, cover these pins with protective insulation. Keep the plastic front panel cover closed during normal operation.

## POWER

The APU operates on -21 to -56 VDC applied at a connector on the front panel. Power goes through fuse F1 (two amperes) to an on-board power supply. Power also goes to wire-wrap pins 54 and 56 of connector P2. Use pins 54 and 56, which are limited to 15 mA of current, to provide power to alarm inputs 25-32.

If the fuse fails, the fuse alarm (FA) LED on the front panel lights. A relay also operates an external alarm.

# INSTALLATION

This section describes those steps necessary to install the 46131 APU. These include Equipment Mounting, Switch and Strap Settings, Wiring, Configuration, 202 Modem Checkout, and Troubleshooting.

## EQUIPMENT MOUNTING

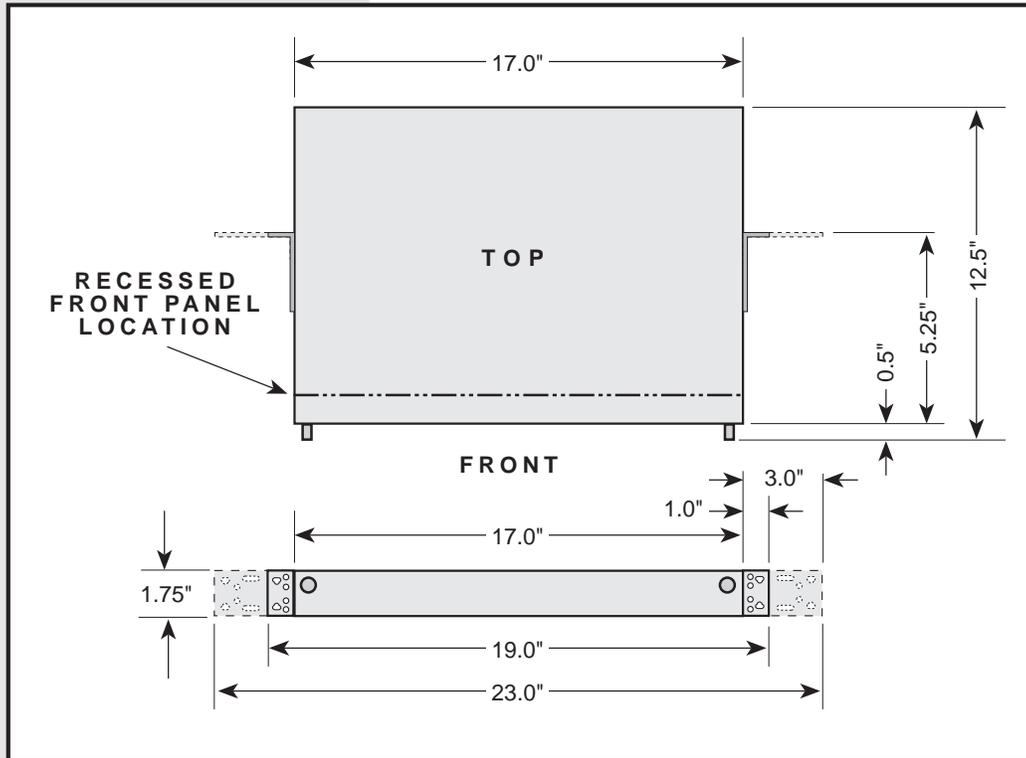
Brackets on the side of the shelf are installed for mounting the APU in a 19-inch equipment rack. Refer to Fig. 2 for overall dimensions of the APU.

- ◆ For mounting in a 23-inch equipment rack, remove the brackets and reinstall them with the long sides extending out from the shelf.
- ◆ For flush mounting, remove the brackets and reinstall them with the mounting ears even with the front of the APU.
- ◆ For wall mounting, replace the brackets with special wall mount brackets furnished as loose parts. The long side of each bracket mounts to the APU.

**NOTE:** *The special brackets are supplied only when specifically ordered. Refer to the **Ordering Information** section.*

# INSTALLATION

FIG. 2 - DIMENSIONS



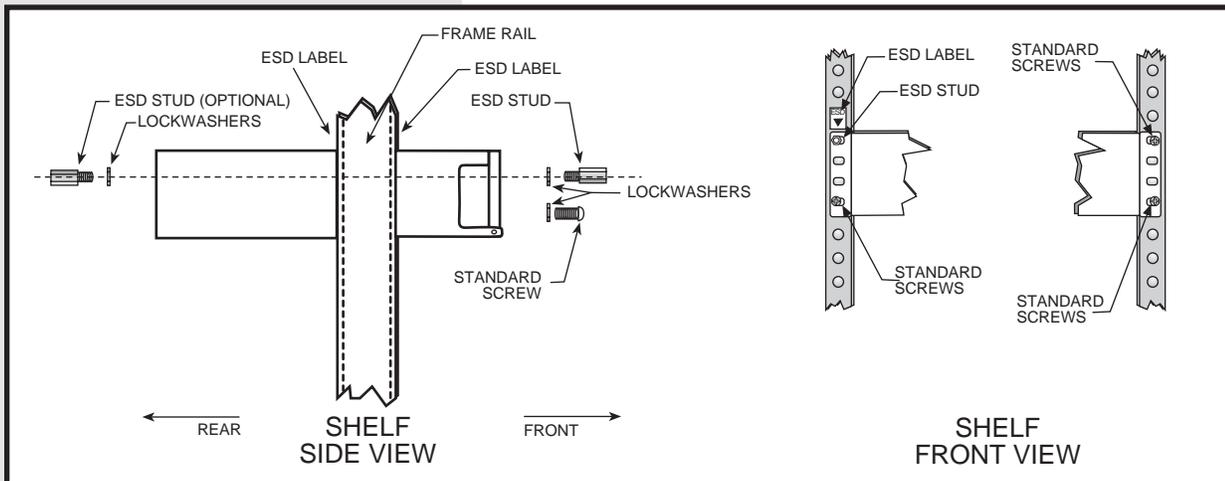
For wall mounting, attach the APU where desired. Hardware is not supplied.

Refer to Fig. 3 for mounting the APU in an equipment rack and follow the instructions below. Mounting hardware is supplied in a bag attached to the side of the shelf.

1. Facing the frame rail, place the APU in the rack in the desired location. Fasten with three Phillips screws and lockwashers - two on the right side and one on the lower left side.
2. Install one ESD stud, with lockwasher, in the upper left corner.
3. Tighten the screws and ESD stud snugly. Make sure the stud is properly grounded to the frame rail.
4. Place an ESD label next to the ESD stud.
5. From the rear of the APU, install the other ESD stud and lockwasher into the frame next to the APU. Secure tightly, ensuring proper grounding of the ESD stud.
6. Place an ESD label next to the ESD stud.
7. End of equipment mounting.

# INSTALLATION

FIG. 3 - MOUNTING THE APU



## SWITCH AND STRAP SETTINGS

**WARNING:**

Any time the main board is removed, take care when re-installing it to avoid pinching the power wires in the rear connector.

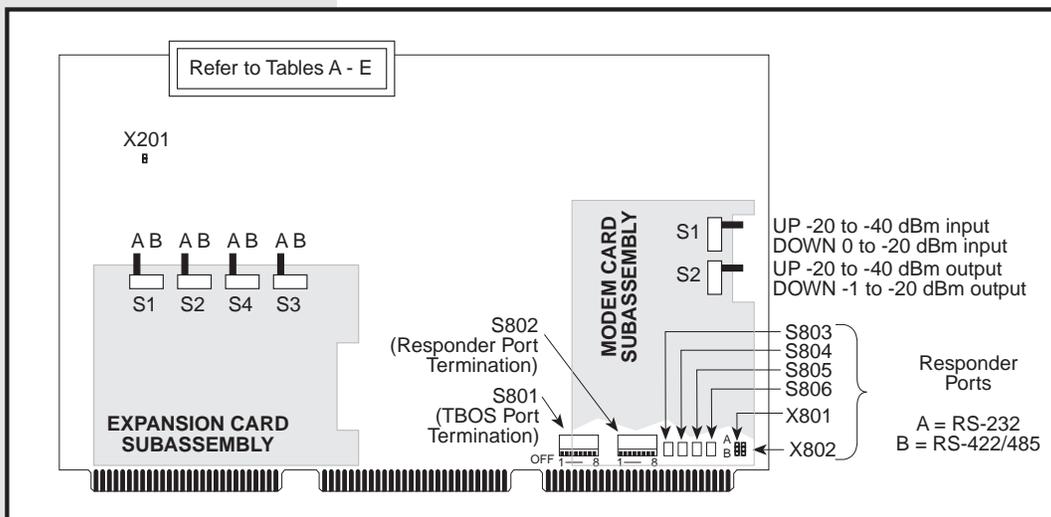
Switches and straps are provided for terminating the receive ports of the TBOS serial interrogator inputs, setting the electrical interface of the responder ports, and setting the signal levels of the 202 modem port (-20 and -21 options only).

If necessary, refer to Fig. 1 for a functional schematic showing the switches and straps.

**To set the switches and straps:**

1. Open the plastic cover on the front of the APU. Remove the two screws securing the front panel of the APU.
2. Pull out the printed circuit board to expose the switches and straps. Refer to Fig. 4 for the locations.

FIG. 4 - SWITCH AND STRAP LOCATIONS



UPDATED

CONTINUED . . .

# INSTALLATION

UPDATED

3. Leave strap X201 open.
4. Refer to Table A to terminate the TBOS receive ports with 182 ohms as needed. The factory settings are terminated.

**TABLE A - SWITCH SETTINGS TO TERMINATE TBOS RECEIVE PORTS WITH 182 OHMS (ALL OPTIONS)**

DIP SWITCH	PORT NUMBER	POSITION
S801-1	Port 1 Terminated	ON *
	Port 1 Not Terminated	OFF
S801-2	Port 2 Terminated	ON *
	Port 2 Not Terminated	OFF
S801-3	Port 3 Terminated	ON *
	Port 3 Not Terminated	OFF
S801-4	Port 4 Terminated	ON *
	Port 4 Not Terminated	OFF
S801-5	Port 5 Terminated	ON *
	Port 5 Not Terminated	OFF
S801-6	Port 6 Terminated	ON *
	Port 6 Not Terminated	OFF
S801-7	Port 7 Terminated	ON *
	Port 7 Not Terminated	OFF
S801-8	Port 8 Terminated	ON *
	Port 8 Not Terminated	OFF
* Factory Settings		

**NOTE:** To change the switches or straps, remove the 202 modem subassembly (options -20 and -21 only).

5. Refer to Table B to set the switches and straps for Responder Port 1 (all options). The factory setting is RS-232.

**TABLE B - RESPONDER PORT 1 SWITCH AND STRAP SETTINGS (ALL OPTIONS)**

STRAP OR SWITCH	DESCRIPTION	POSITION
Strap X801	RS-232 Interface	RS-232 *
	RS-422/485 Interface	RS-422
S803	RS-232 Interface	RS-232 *
	RS-422/485 Interface	RS-422
S804	RS-232 Interface	RS-232 *
	RS-422/485 Interface	RS-422
S802-3	RS-422/485 Receive Terminated	ON *
	RS-422/485 Receive Not Terminated	OFF
* Factory Settings		

**NOTE:** To change the switches, remove the 202 modem subassembly (options -20 and -21 only). Terminate a port (switch ON) if it is not used.

CONTINUED . . .

UPDATED

# INSTALLATION

- Refer to Table C to set the switches and straps for Responder Port 2 (all options.) The factory setting is RS-232.

**TABLE C - RESPONDER PORT 2 SWITCH AND STRAP SETTINGS (ALL OPTIONS)**

STRAP OR SWITCH	DESCRIPTION	POSITION
Strap X802	RS-232 Interface	RS-232 *
	RS-422/485 Interface	RS-422
S805	RS-232 Interface	RS-232 *
	RS-422/485 Interface	RS-422
S806	RS-232 Interface	RS-232 *
	RS-422/485 Interface	RS-422
S802-7	RS-422/485 Receive Terminated	ON *
	RS-422/485 Receive Not Terminated	OFF
* Factory Settings		

**NOTE:** To change the switches or straps, remove the 202 modem subassembly (options -20 and -21 only).

- Refer to Table D to set the switches for Responder Port 4, the 202 modem port (options -20 and -21). The factory settings are DOWN.

**TABLE D - RESPONDER PORT 4 (MODEM) SWITCH SETTINGS (OPTIONS -20 AND -21)**

SWITCH POSITION	DESCRIPTION
S1 DOWN *	Receive input level can be between 0 and -20 dBm
S1 UP	Receive input level can be between -20 and -40 dBm
S2 DOWN *	Transmit output adjustable from -1 to -20 dBm
S2 UP	Transmit output adjustable from -20 to -40 dBm
* Factory Settings	

- Refer to Table E to set the switches for control outputs 9-16 (options -01 and -21). The factory settings are Position A.
- End of Switch and Strap Settings.

**TABLE E - CONTROL OUTPUT SWITCH SETTINGS (OPTIONS -01 AND -21)**

SWITCH POSITION	DESCRIPTION
S1 Position A *	Control Outputs 9-10 Normally Open
S1 Position B	Control Outputs 9-10 Normally Closed
S1 Position A *	Control Outputs 11-12 Normally Open
S1 Position B	Control Outputs 11-12 Normally Closed
S1 Position A *	Control Outputs 13-14 Normally Open
S1 Position B	Control Outputs 13-14 Normally Closed
S1 Position A *	Control Outputs 15-16 Normally Open
S1 Position B	Control Outputs 15-16 Normally Closed
* Factory Settings	

UPDATED

# INSTALLATION

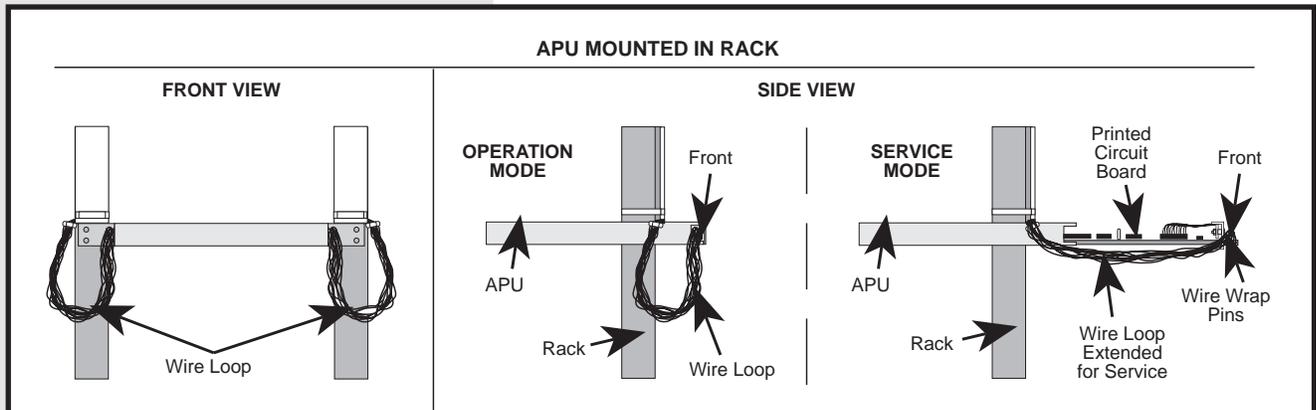
## WIRING

**CAUTION:** To avoid possible damage to the unit, do not make any connections to the APU if the power is connected and turned on.

**NOTE:** When cabling to the APU, leave sufficient slack in the cabling to permit the internal printed circuit board to slide out from the front panel (refer to Fig. 5). This allows replacement of the circuit board without having to rewire the connectors.

If the wire bundle extending out one side of the unit is too thick to permit closing the plastic front cover, divide the wiring so some of it comes out the right side of the unit and some of it extends out the left side of the unit.

FIG. 5 - WIRE SERVICE LOOP

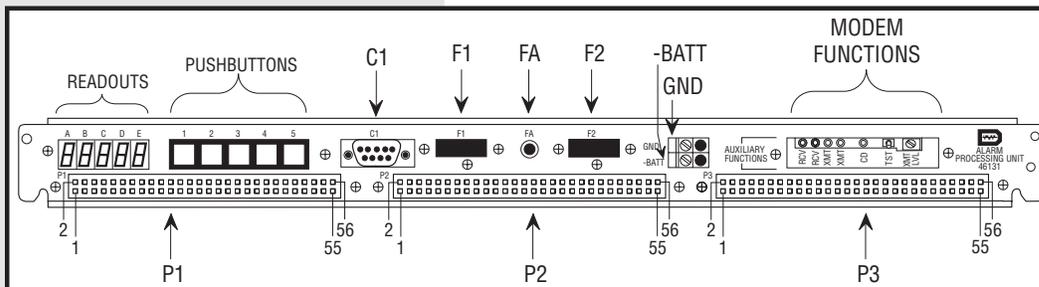


### Wire connectors P1, P2, and P3:

Refer to the Functional Schematic, Fig. 1, if necessary.

1. Wire connector P1 (refer to Fig. 6) according to Table F and Fig. 7. Wire P1 to discrete alarm inputs 1-24 (all options) and 33-64 (options -01 and -21). Wire the inputs to equipment that puts out a ground signal when there is an alarm. P2 is available for ground reference.

FIG. 6 - CONNECTOR LOCATIONS FOR WIRING



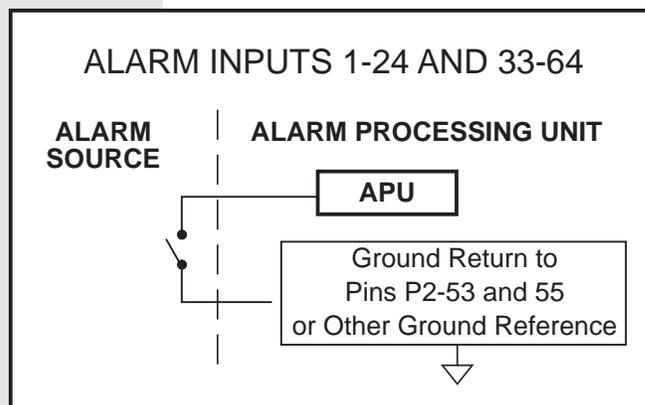
CONTINUED . . .

# INSTALLATION

**TABLE F - PIN ASSIGNMENTS FOR CONNECTOR P1**

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	Discrete Input 33	29	Discrete Input 47
2	Discrete Input 1	30	Discrete Input 15
3	Discrete Input 34	31	Discrete Input 48
4	Discrete Input 2	32	Discrete Input 16
5	Discrete Input 35	33	Discrete Input 49
6	Discrete Input 3	34	Discrete Input 17
7	Discrete Input 36	35	Discrete Input 50
8	Discrete Input 4	36	Discrete Input 18
9	Discrete Input 37	37	Discrete Input 51
10	Discrete Input 5	38	Discrete Input 19
11	Discrete Input 38	39	Discrete Input 52
12	Discrete Input 6	40	Discrete Input 20
13	Discrete Input 39	41	Discrete Input 53
14	Discrete Input 7	42	Discrete Input 21
15	Discrete Input 40	43	Discrete Input 54
16	Discrete Input 8	44	Discrete Input 22
17	Discrete Input 41	45	Discrete Input 55
18	Discrete Input 9	46	Discrete Input 23
19	Discrete Input 42	47	Discrete Input 56
20	Discrete Input 10	48	Discrete Input 24
21	Discrete Input 43	49	Discrete Input 57
22	Discrete Input 11	50	Discrete Input 58
23	Discrete Input 44	51	Discrete Input 59
24	Discrete Input 12	52	Discrete Input 60
25	Discrete Input 45	53	Discrete Input 61
26	Discrete Input 13	54	Discrete Input 62
27	Discrete Input 46	55	Discrete Input 63
28	Discrete Input 14	56	Discrete Input 64

**FIG. 7 - ALARM INPUTS**



**CONTINUED . . .**

# INSTALLATION

2. Wire connector P2 (refer to Fig. 6) according to Table G.
  - ◆ Wire discrete alarm inputs 25-32 (all options). There are two wires for each input (+ and -). Refer to Fig. 8 for typical wiring circuits.
  - ◆ Wire the control relay outputs 1-16 (1-8 for all options, 9-16 for options -01 and -21).
  - ◆ Wire the change-of-status (COS) relay, COS acknowledge, and fuse alarm (all options).

**WARNING:** *When power is applied to the APU, negative battery voltage is present at pins 54 and 56 of connector P2 and at any alarm inputs wired to negative battery. For safety, cover these pins with protective insulation.*

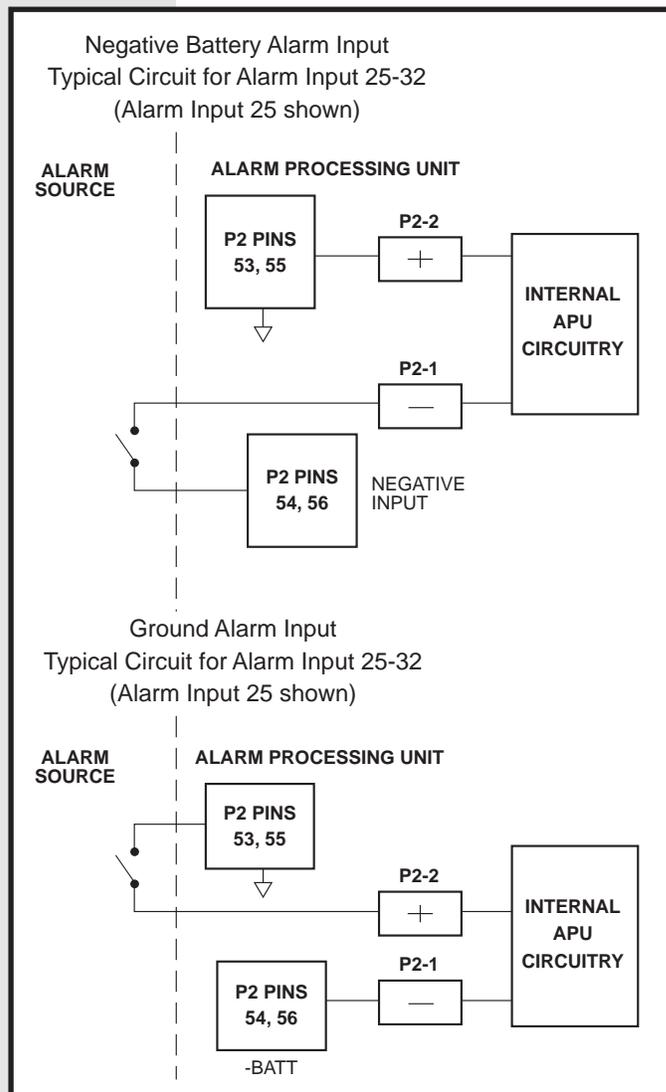
**TABLE G - PIN ASSIGNMENTS FOR CONNECTOR P2**

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	Discrete Input 25 (-)	31	Control Relay Output 8
2	Discrete Input 25 (+)	32	Control Relay Output 8
3	Discrete Input 26 (-)	33	Control Relay Output 9
4	Discrete Input 26 (+)	34	Control Relay Output 9
5	Discrete Input 27 (-)	35	Control Relay Output 10
6	Discrete Input 27 (+)	36	Control Relay Output 10
7	Discrete Input 28 (-)	37	Control Relay Output 11
8	Discrete Input 28 (+)	38	Control Relay Output 11
9	Discrete Input 29 (-)	39	Control Relay Output 12
10	Discrete Input 29 (+)	40	Control Relay Output 12
11	Discrete Input 30 (-)	41	Control Relay Output 13
12	Discrete Input 30 (+)	42	Control Relay Output 13
13	Discrete Input 31 (-)	43	Control Relay Output 14
14	Discrete Input 31 (+)	44	Control Relay Output 14
15	Discrete Input 32 (-)	45	Control Relay Output 15
16	Discrete Input 32 (+)	46	Control Relay Output 15
17	Control Relay Output 1	47	Control Relay Output 16
18	Control Relay Output 1	48	Control Relay Output 16
19	Control Relay Output 2	49	Acknowledge COS
20	Control Relay Output 2	50	Fuse Alarm (Gnd for alarm)
21	Control Relay Output 3	51	COS Relay
22	Control Relay Output 3	52	COS Relay
23	Control Relay Output 4	53	Ground Out (use for alarm point ground reference)
24	Control Relay Output 4	54	Negative Battery Out (for alarm points 25-32 if battery reference is needed.)
25	Control Relay Output 5	55	Ground Out (use for alarm point ground reference)
26	Control Relay Output 5	56	Negative Battery Out (for alarm points 25-32 if battery reference is needed.)
27	Control Relay Output 6		
28	Control Relay Output 6		
29	Control Relay Output 7		
30	Control Relay Output 7		

CONTINUED . . .

# INSTALLATION

FIG. 8 - TYPICAL CIRCUIT FOR ALARM INPUT



3. Wire connector P3 (refer to Fig. 6) according to Table H. Wire P3 to the eight TBOS serial interrogator ports, the three responder ports, and the configuration port.

The wiring is for all options except for the 202 modem responder port, which is for options -20 and -21 only.

4. End of this wiring section.

# INSTALLATION

TABLE H - PIN ASSIGNMENTS FOR CONNECTOR P3

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	TBOS Serial Port 1 RX-	33	Responder Port 1 RS-422/485 RX- or RS-232 RTS
2	TBOS Serial Port 1 RX+	34	Responder Port 1 RS-422/485 RX+ or RS-232 CTS
3	TBOS Serial Port 1 TX-	35	Responder Port 1 RS-422 TX- or RS-232 TD
4	TBOS Serial Port 1 TX+	36	Responder Port 1 RS-422 TX+ or RS-232 RD
5	TBOS Serial Port 2 RX-	37	Responder Port 1 RS-232 GND
6	TBOS Serial Port 2 RX+	38	Responder Port 2 RS-232 CTS
7	TBOS Serial Port 2 TX-	39	Responder Port 2 RS-422/485 RX- or RS-232 RTS
8	TBOS Serial Port 2 TX+	40	Responder Port 2 RS-422/485 RX+ or RS-232 GND
9	TBOS Serial Port 3 RX-	41	Responder Port 2 RS-422 TX- or RS-232 TD
10	TBOS Serial Port 3 RX+	42	Responder Port 2 RS-422 TX+ or RS-232 RD
11	TBOS Serial Port 3 TX-	43	Responder Port 4 202 Modem RCV+
12	TBOS Serial Port 3 TX+	44	Responder Port 4 202 Modem RCV-
13	TBOS Serial Port 4 RX-	45	Responder Port 4 202 Modem XMT+
14	TBOS Serial Port 4 RX+	46	Responder Port 4 202 Modem XMT-
15	TBOS Serial Port 4 TX-	47	Not Used
16	TBOS Serial Port 4 TX+	48	Not Used
17	TBOS Serial Port 5 RX-	49	Not Used
18	TBOS Serial Port 5 RX+	50	Not Used
19	TBOS Serial Port 5 TX-	51	Not Used
20	TBOS Serial Port 5 TX+	52	Not Used
21	TBOS Serial Port 6 RX-	53	Configuration Port TXD
22	TBOS Serial Port 6 RX+	54	Configuration Port RXD
23	TBOS Serial Port 6 TX-	55	Configuration Port GND
24	TBOS Serial Port 6 TX+	56	Not Used
25	TBOS Serial Port 7 RX-		
26	TBOS Serial Port 7 RX+		
27	TBOS Serial Port 7 TX-		
28	TBOS Serial Port 7 TX+		
29	TBOS Serial Port 8 RX-		
30	TBOS Serial Port 8 RX+		
31	TBOS Serial Port 8 TX-		
32	TBOS Serial Port 8 TX+		

UPDATED

# INSTALLATION

## Wire power

Wire power to the connector between P2 and P3 on the back panel of the APU (refer to Fig. 6).

1. Insert the negative battery lead in the lower opening on the right side of the connector. Tighten the connection with the screw on the front of the connector.
2. Insert the ground lead in the upper opening on the right side of the connector. Tighten the connection with the screw on the front of the connector.

## CONFIGURATION

The APU must be configured with a programming paddle or dumb terminal before it will operate properly. The configuration is battery backed-up.

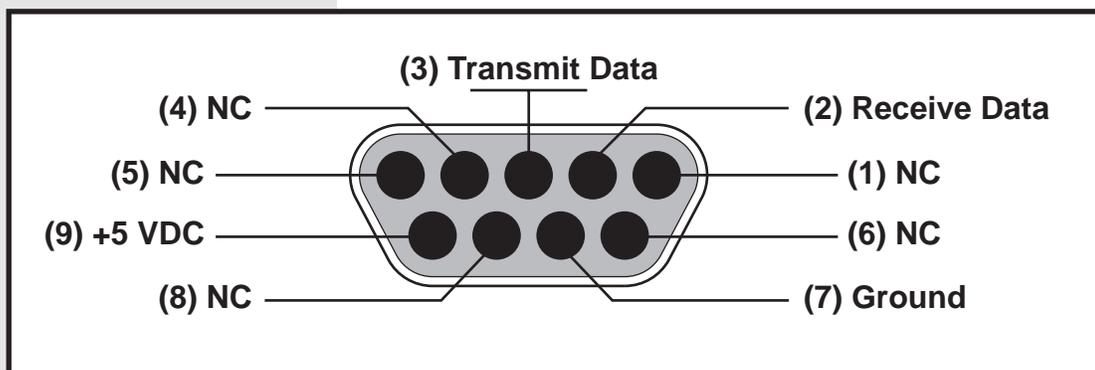
### To use a programming paddle:

Connect the programming paddle to the RJ-11 connector on the front on the panel.

### To use a dumb terminal:

Connect a dumb terminal or computer operating as a dumb terminal to wire-wrap pins 53, 54 and 55 of connector P3 on the back panel (refer back to Table H) or connect it to C1 on the front panel. Refer to Fig. 9 for a drawing showing how connector C1 is wired. Set up the dumb terminal or computer for 9600 baud, eight data bits and one stop bit.

FIG. 9 - DB9 CONNECTOR WIRING



**WARNING:** Do not connect a dumb terminal or a computer emulating a dumb terminal directly to the DB9 connector. The DB9 connector is not a true RS-232 interface when connecting to a terminal. Pin 9 has +5 VDC on it. A special cable is available from Dantel that has pin 9 open. You can order the cable by part number A15-46133-00.

# INSTALLATION

## To configure the APU remotely:

Connect RJ-11, C1, or wire-wrap pins 53, 54, and 55 of P3 to your network. Before going to the remote site to configure the APU, apply power to the APU. Press push button 5 on the front of the APU until the letters "Pad" appear on the LED display if you are going to use a programming paddle or the letters "Crt" appear if you are going to use a dumb terminal. Connect the programming paddle or dumb terminal at the remote site.

## CONFIGURATION USING A HAND-HELD PROGRAMMING PADDLE

1. Apply power to the APU.
2. Configure the paddle to communicate with the APU:
  - ◆ Press the SHIFT, CTRL and F1 keys on the paddle at the same time.
  - ◆ Set the baud rate for 9600, data bits for 8, parity for none and stop bits for 1. Use the F2 key to change the parameter and the F1 key to change the value.
  - ◆ When the values are set, press the F5 key to save them.
3. Configure the ports on the APU:
  - ◆ Press push button 5 on the front of the APU until the letters "Pad" appear on the APU's LED display.

---

**NOTE:** *If the APU is being configured from a remote site, press F3 on the paddle to establish communications with the APU. When the Main Menu appears on the paddle, press F3 again.*

---

The Main Menu appears on the programming paddle:

F1 - TBOS

F2 - RESP

F3 - EXPB

F4 - XXXX

F5 - HELP

◆ Press Help (F5) from the Main Menu and the on-line help appears on the screen and the function keys described below are active.

F1 - Moves the Help screen up one line.

F2 - Moves the Help screen down one line.

F5 - Exits the Help screen.

◆ Configure the interrogator ports, responder ports, and the expansion board as described on the next page.

4. End of section.

# INSTALLATION

## CONFIGURING THE INTERROGATOR PORTS

1. From the Main Menu, press F1 (TBOS) to select the Interrogator Menu. In the Interrogator Menu, the following function keys are active:
  - F1 - CHNG. Changes the parameter value.
  - F2 - NXT PORT. Changes to the next port.
  - F3 - PREV. Backs up to the previous parameter.
  - F4 - NEXT. Advances to the next parameter.
  - F5 - EXIT. Exits the port configuration menu.
2. Use the F1 through F4 keys to configure the eight TBOS ports:
  - ◆ Select the desired data rate. Valid entries are 300, 600, 1200, 2400, 4800, and 9600.
  - ◆ Set the parity for odd.
  - ◆ Set the stop bits for 1.
  - ◆ Enable the displays to be used.

**NOTE:** *If TBOS protocol is used on any of the responder ports, enter the displays in the Interrogator Ports chart of the Configuration Worksheet (Table I) at the end of this chapter. This will help you configure the responder ports.*

## CONFIGURING THE RESPONDER PORTS

1. From the Main Menu, press F2 (RESP) to select the Responder Menu. The APU has three responder ports that may be configured independently: ports 1, 2, and 4 (ports 1 and 2 are RS-232/422/485, port 3 is not used, and port 4 is the 202 modem port).  
In the Responder Menu, the following function keys are active:
  - F1 - CHNG. Changes the parameter value.
  - F2 - NXT PORT. Changes to the next port.
  - F3 - PREV. Backs up to the previous parameter.
  - F4 - NEXT. Advances to the next parameter.
  - F5 - EXIT. Exits the port configuration menu.
2. Configure each responder port as described below for DCPF, DCP, TBOS, or TABS protocol.

### To configure a responder port for DCPF protocol:

Use the F1 through F4 keys on the paddle to configure the port.

1. Verify the DCPF protocol is selected.

UPDATED

CONTINUED . . .

# INSTALLATION

2. Enter the base (first) address to which the port will respond. Refer to Fig. 9. Valid entries are 1 - 253. Hold down the F1 key to speed through the addresses.
3. Enter the desired baud. Valid entries are 300, 600, 1200, 2400, 4800, and 9600. For port 4, the 202 modem port, the baud must be 1200.
4. Verify the parity is set for none.
5. Verify the stop bits are set for 1.

---

### To configure a responder port for DCP protocol:

Use the F1 through F4 keys on the paddle to configure the port.

1. Verify the DCP protocol is selected.
2. Enter the base (first) address to which the port will respond. Refer to Fig. 10. Valid entries are 1 - 253. Hold down the F1 key to speed through the addresses.
3. Enter the desired baud. Valid entries are 300, 600, 1200, 2400, 4800, and 9600. For port 4, the 202 modem port, the baud must be 1200.
4. Verify the parity is set for none.
5. Verify the stop bits are set for 1.

---

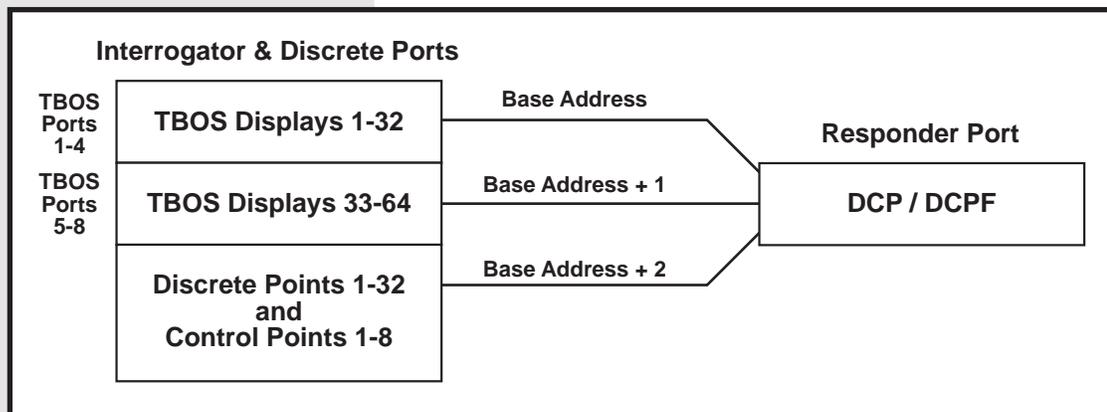
**NOTE:** *With DCP protocol, certain address combinations result in reporting failures. The problem, a loss of synchronization in the addressing sequence, is inherent in DCP.*

*Dantel recommends DCPF protocol because it maintains synchronization.*

---

6. End of section.

FIG. 10 - DCP AND DCPF ALARM REPORTING



# INSTALLATION

---

## To configure a responder port for TBOS protocol:

Use the F1 through F4 keys on the paddle to configure the port.

1. Verify the TBOS protocol is selected.
2. Enter the desired baud. Valid entries are 300, 600, 1200, 2400, 4800, and 9600. For port 4, the 202 modem port, the baud must be 1200.
3. Verify the parity is set for odd.
4. Verify the stop bits are set for 1.
5. Enter the type of alarm information the display will contain. Valid entries are 1-64 for TBOS displays, null, and discretes. Hold down the F1 key to speed through the TBOS displays. The null and discrete entries follow the TBOS displays.

Refer to the Configuration Worksheet (Table I) at the end of this chapter to help configure the port.

---

## To configure a responder port for TABS protocol:

Use the F1 through F4 keys on the paddle to configure the port.

1. Verify the TABS protocol is selected.
2. Enter the desired baud. Valid entries are 300, 600, 1200, 2400, 4800 and 9600. For port 4, the 202 modem port, the baud must be 1200.
3. Enter the address. Valid entries are 0 - 31. Hold down the F1 key to speed through the addresses.
4. Verify the parity is set for odd.
5. Verify the stop bits are set for 1.

---

## CONFIGURING THE EXPANSION BOARD

Only options -01 and -21 have an Expansion Board subassembly.

1. From the Main Menu, press F3 (EXPB) to select the Expansion Board Menu.
2. Press F1 to toggle the status. It must be ON for options -01 and -21. It must be OFF for options -00 and -20.
3. Press F5 to exit the menu.

---

## CONFIGURATION USING A TERMINAL

1. Apply power to the APU and the dumb terminal or computer.
2. Press push button 5 on the front of the APU until the letters "Crt" appear on the APU's LED display.

CONTINUED . . .

# INSTALLATION

---

**NOTE:** *If the APU is being configured from a remote site, press F3 on the paddle to establish communications with the APU. When the Main Menu appears on the paddle, press F3 again.*

---

The APU's configuration appears on the terminal screen. The screen displays the current configurations of the eight interrogator (TBOS) and three responder ports, and the status of the expansion board.

3. Configure the interrogator ports, responder ports, expansion board, COS relay, and COS timer as described on the next page.

---

## CONFIGURING THE INTERROGATOR PORTS

1. Type 1 at the configuration screen to display the interrogator (TBOS) port prompts.
2. SELECT PORT NUMBER - Type the port number to be configured. Valid entries are 1-8.

For the following selections, type S or press ENTER to skip to the next selection, type F to save changes and exit the port configuration, or type Q to quit the port configuration without saving any changes.

3. SELECT BAUD RATE - Enter the desired baud rate. Valid entries are 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5 = 4800, 6 = 9600.
4. SELECT PARITY - Set for odd. Type 2 if the parity is not set for odd.
5. SELECT STOP BITS - Set for 1. Type 1 if the stop bits are not set for 1.
6. SELECT DISPLAY ON/OFF INFO FOR DISPLAY # - Type 1 to disable the specified display; type 2 to enable the specified display. At display 8, changing the value, typing S or F, or pressing ENTER saves any changes and brings up the configuration screen.
7. If TBOS protocol is used on any of the responder ports, enter the displays in the Interrogator Ports chart of the Configuration Worksheet (Table I) at the end of this chapter. This will help configure the responder ports.

---

## CONFIGURING THE RESPONDER PORTS

The APU has three independently configurable responder ports: ports 1, 2 and 4 (ports 1 and 2 are RS-232/422/485, port 3 is not used, and port 4 is the 202 modem port).

Configure each responder port for DCP, DCPF, TBOS, or TABS protocol. The configuration steps for each protocol are listed separately below.

UPDATED

# INSTALLATION

---

## Configuring a responder port for DCPF protocol:

1. Type 2 at the configuration screen to display the responder port prompts.
2. SELECT PORT NUMBER - Type the port number to be configured. Valid entries are 1, 2, or 4.  
  
For the following selections, type S or press ENTER to skip to the next selection, type F to save changes and exit the port configuration, or type Q to quit the port configuration without saving any changes.
3. SELECT PROTOCOL - Set for DCPF. Type 1 if the protocol is not set for DCPF.
4. SELECT BASE ADDRESS - Enter the base (first) address to which the port will respond. Valid entries are 1-253. Refer to Fig. 9. If a new address is entered, press the ENTER key.
5. SELECT BAUD RATE - Enter the desired baud rate. Valid entries are 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5 = 4800, 6 = 9600. For port 4, the 202 modem port, the baud must be 1200.
6. SELECT PARITY - Set for none. Type 1 if the parity is not set for none.
7. SELECT STOP BITS - Set for 1. Type 1 if the number of stop bits is not set for 1. Changing the value, typing S or F, or pressing ENTER saves any changes and brings up the configuration screen.
8. SELECT RTS/CTS HANDSHAKE - Default is 1 (OFF). Typing 2 enables RTS/CTS handshaking.

---

## Configuring a responder port for DCP protocol:

1. Type 2 at the configuration screen to display the responder port prompts.
2. SELECT PORT NUMBER - Type the port number to be configured. Valid entries are 1, 2, or 4.  
  
For the following selections, type S or press ENTER to skip to the next selection, type F to save changes and exit the port configuration, or type Q to quit the port configuration without saving any changes.
3. SELECT PROTOCOL - Set for DCP. Type 2 if the protocol is not set for DCP.
4. SELECT BASE ADDRESS - Enter the base (first) address to which the port will respond. Valid entries are 1-253. Refer to Fig. 9. If a new address is entered, press the ENTER key.
5. SELECT BAUD RATE - Enter the desired baud rate. Valid entries are 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5 = 4800, 6 = 9600. For port 4, the 202 modem port, the baud must be 1200.
6. SELECT PARITY - Set for none. Type 1 if the parity is not set for none.

# INSTALLATION

7. SELECT STOP BITS - Set for 1. Type 1 if the number of stop bits is not set for 1. Changing the value, typing S or F, or pressing ENTER saves any changes and brings up the configuration screen.
8. SELECT RTS/CTS HANDSHAKE - Default is 1 (OFF). Typing 2 enables RTS/CTS handshaking.

---

**NOTE:** *With DCP protocol, certain address combinations result in reporting failures. The problem, a loss of synchronization in the addressing sequence, is inherent in DCP.*

*Dantel recommends DCPF protocol because it maintains synchronization.*

---

## **Configuring a responder port for TBOS protocol:**

1. Type 2 from the configuration screen to display the responder port prompts.
2. SELECT PORT NUMBER - Type the port number to be configured. Valid entries are 1, 2, or 4.

For the following selections, type S or press ENTER to skip to the next selection, type F to save changes and exit the port configuration, or type Q to quit the port configuration without saving any changes.

3. SELECT PROTOCOL - Set for TBOS. Type 3 if the protocol is not set for TBOS.
4. SELECT BAUD RATE - Enter the desired baud rate. Valid entries are 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5 = 4800, 6 = 9600.
5. SELECT PARITY - Set for odd. Type 2 if the parity is not set for odd.
6. SELECT STOP BITS - Set for 1. Type 1 if the stop bits are not set for 1.
7. SELECT DISPLAY MAPPING INFORMATION FOR TBOS DISPLAY # - Enter the type of alarm information the display will contain. Valid entries are 0 = Off, 1 - 64 = TBOS Displays, D = Discretes.
8. SELECT RTS/CTS HANDSHAKE - Default is 1 (OFF). Typing 2 enables RTS/CTS handshaking.

Refer to the Configuration Worksheet (Table I) at the end of this chapter to help configure the port.

Make an entry for each of the eight displays on the TBOS responder port. If a new value is entered, press the ENTER key.

At display 8, changing the value, typing S or F, or pressing ENTER saves any changes and brings up the configuration screen.

9. End of section.

# INSTALLATION

---

## Configuring a responder port for TABS protocol:

1. Type 2 from the configuration screen to display the responder port prompts.
2. SELECT PORT NUMBER - Type the port number to be configured. Valid entries are 1, 2, or 4.  
  
For the following selections, type S or press ENTER to skip to the next selection, type F to save changes and exit the port configuration, or type Q to quit the port configuration without saving any changes.
3. SELECT PROTOCOL - Set for TABS. Type 4 if the protocol is not set for TABS.
4. SELECT ADDRESS - Enter the address. Valid entries are 0 - 31. If a new address is entered, press the ENTER key.
5. SELECT BAUD RATE - Enter the desired baud rate. Valid entries are 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5 = 4800, 6 = 9600.
6. SELECT PARITY - Set for odd. Type 2 if the parity is not set for odd.
7. SELECT STOP BITS - Set for 1. Type 1 if the stop bits are not set for 1. Changing the value, typing S or F, or pressing ENTER saves any changes and brings up the configuration screen.
8. SELECT RTS/CTS HANDSHAKE - Default is 1 (OFF). Typing 2 enables RTS/CTS handshaking.

---

## CONFIGURING THE EXPANSION BOARD

Only options -01 and -21 have an Expansion Board subassembly. Type 3 at the configuration screen to toggle the status of the expansion board. It must be ON for options -01 and -21. It must be OFF for options -00 and -20.

---

## CONFIGURING THE COS RELAY

Type 4 at the configuration screen to toggle the status of the COS (change of status) relay between LIVE and COS.

In the LIVE mode, the relay (pins P2-51 and P2-52) will close at the first alarm. If additional alarms occur, the relay will pulse once whenever there is a new alarm. The relay will open either when all the alarms clear or when the alarms are acknowledged. Acknowledge alarms either by applying a ground at the ACK COS input or by pressing button 4 on the front panel of the APU.

In the COS mode, the relay will close at the first alarm. If additional alarms occur, the relay will pulse once whenever there is a new alarm. The relay will open either when the COS timer expires in 15 minutes or when the alarms are acknowl-

# INSTALLATION

edged. Acknowledge alarms either by applying a ground at the ACK COS input or by pressing button 4 on the front panel of the APU.

---

## CONFIGURING THE COS TIMER

Type 5 at the configuration screen to toggle the status of the COS timer between ON and OFF. When the timer is ON, the COS relay will open after 15 minutes. The COS timer is available only when the relay is in the COS mode.

---

## 202 MODEM CHECKOUT - (OPTIONS -20 AND -21)

Set the proper signal levels on the 202 tone modem subassembly.

---

### To set the levels:

1. Make sure the modem is connected to another modem at the other end of the communications line.
2. Apply power to the APU and the modem at the distant end.
3. Place the front panel TEST (test) switch on the APU modem subassembly in the on (down) position. Verify that the front panel CD (Carrier Detect) LED at the distant end indicates data transmission activity.
4. With a dB meter (bridging), check the signal level at the XMT test points on the APU modem subassembly. Adjust the XMT LVL to obtain the level required for the application.
5. Place the front panel TST (test) switch in the off (up) position.
6. Check the incoming signal level at the RCV test points on the APU modem subassembly with a dB meter (bridging). The signal level should be 0 to -40 dBm, depending on the setting of switch S1 on the modem subassembly. There is no other adjustment for this circuit.

---

## TROUBLESHOOTING

---

### FUSES

There is a two-ampere fuse on the front panel of the APU. It protects power going to the APU and to pins P2-54 and P2-56.

UPDATED

# INSTALLATION

---

## PORT ACTIVITY

Button 2 shows the activity of the interrogator and responder ports on the LED display. Press the button repeatedly to cycle through the ports sequentially to the port you want to monitor. The LED display shows the activity of the selected port. To return to the alarm mode, press button 1.

---

### Interrogator Ports

The LED display shows the letter “P” on the first LED and the number of the interrogator port on the second LED. The fourth LED flashes the letter “t” when the port is transmitting data. The fifth LED flashes the letter “r” when the port is receiving data.

---

### Responder Ports

The LED display shows the letter “r” on the first LED and the number of the responder port on the second LED. The fourth LED flashes the letter “t” when the port is transmitting data. The fifth LED flashes the letter “r” when the port is receiving data.

---

## DEVICE FAILURES

The DCP and DCPF protocols support point 64 for displaying device failures and point 64 for displaying status line device failures of TBOS devices.

---

## SYSTEM RESET

If the APU does not seem to be operating properly, reset the unit by pressing the front panel buttons 1, 3, and 5 simultaneously.

---

## LED TEST

To test the operation of the front panel LEDs, press the front panel buttons 1 and 3 simultaneously. A “8” will appear on each LED display if all the segments of that LED are working.

UPDATED

# INSTALLATION

**TABLE I - CONFIGURATION WORKSHEET**

INTERROGATOR PORTS								
PORT #	1st DISPLAY	2nd DISPLAY	3rd DISPLAY	4th DISPLAY	5th DISPLAY	6th DISPLAY	7th DISPLAY	8th DISPLAY
ONE	1	2	3	4	5	6	7	8
TWO	9	10	11	12	13	14	15	16
THREE	17	18	19	20	21	22	23	24
FOUR	25	26	27	28	29	30	31	32
FIVE	33	34	35	36	37	38	39	40
SIX	41	42	43	44	45	46	47	48
SEVEN	49	50	51	52	53	54	55	56
EIGHT	57	58	59	60	61	62	63	64

RESPONDER PORTS											
TBOS RESP. PORT #	BAUD RATE	PARITY	STOP BITS	DISPLAY No. 1	DISPLAY No. 2	DISPLAY No. 3	DISPLAY No. 4	DISPLAY No. 5	DISPLAY No. 6	DISPLAY No. 7	DISPLAY No. 8
1	2400	ODD	1								
2	2400	ODD	1								
3	NOT USED										
4	1200	ODD	1								

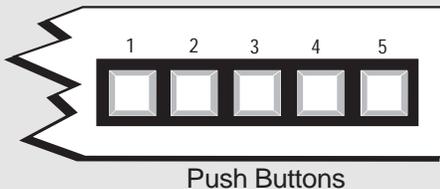
1. Mark the Interrogator Ports chart with the displays you will use.
2. Use the Interrogator Ports chart as a guide to fill out the Responder Ports chart.
  - Only fill in the responder ports that will use TBOS protocol.
  - You can fill in the displays in any order; for example: 1, 2, NULL, 29, 14, DISCRETES, 5, 6. Only one display can have discrete alarms.

# OPERATION

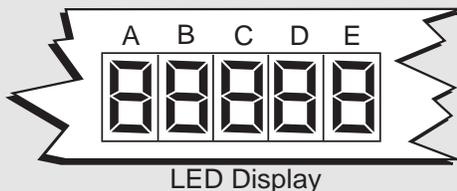
This section contains descriptions on the front panel push buttons, control point operation, alarm reporting, and the 202 modem.

## FRONT PANEL PUSH BUTTONS

Five push buttons on the front panel select the type of alarm information that appears on the LED display.



Push Buttons



LED Display

### ALARM MODE

Alarm mode is the default mode. Normally the display is in this mode, but if it is not, press button 1 to enter the alarm mode. There are four possible readouts in the alarm mode:

#### Readout 1 - No alarms and no failed displays.

The LED display shows a rotating dash that moves from left to right. If button 1 is pressed, "Cnt" appears on the display.

#### Readout 2 - Alarms and no failed displays.

The LED display shows the letters "AL" and the number of alarms present.

#### Readout 3 - No alarms and failed displays.

The LED display shows the letters "Fd" and the number of failed displays.

#### Readout 4 - Alarms and failed displays.

The LED display toggles between the failed display statement and the alarm display statement.

### ALARM LOCATION

Press button 3. The APU scans all alarm points, stopping when an active alarm is reached. Read the display as follows:

1. **Pxyz**

where P = TBOS port  
x = TBOS port number (1-8)  
y = Display number within port  
zz = Point number within display

-or-

2. **Dzz**

where D = Discrete  
zz = Discrete number

If there are no more alarms, "LOC" appears on the display.

# OPERATION

---

## ALARM ACKNOWLEDGEMENT

Press button 4 to acknowledge alarms and reset the change-of-status (COS) relay to the non-alarm mode. “AuCLr” appears on the display.

---

## PORT ACTIVITY

Button 2 shows the activity of the interrogator and responder ports on the LED display. Press the button repeatedly to cycle through the ports sequentially to the port desired. The LED display shows the activity of the selected port. To return to the alarm mode, press button 1.

UPDATED

---

### Interrogator Ports

The LED display shows the letter “P” on the first LED and the number of the interrogator port on the second LED. The fourth LED flashes the letter “t” when the port is transmitting data. The fifth LED flashes the letter “r” when the port is receiving data.

---

### Responder Ports

The LED display shows the letter “r” on the first LED and the number of the responder port on the second LED. The fourth LED flashes the letter “t” when the port is transmitting data. The fifth LED flashes the letter “r” when the port is receiving data.

---

## HAND-HELD PROGRAMMING PADDLE OR TERMINAL SELECT

Button 5 selects the method used to configure the APU. If a programming paddle will be used, press the button until the LED display shows “Pad”. Press the button until the LED display shows “Crt” if a dumb terminal will be used. When the button is released, the LED display returns to the alarm mode.

---

## SYSTEM RESET

Press buttons 1, 3, and 5 simultaneously.

---

## LED TEST

Press buttons 1 and 3 simultaneously. All “8”s appear on the LED display if all the segments are working.

# OPERATION

## CONTROL POINT OPERATION

Operate control points from a computer that has the appropriate protocol software.

If the protocol of the responder port is either DCP or DCPF, the commands to operate control points are the following:

- ◆ **DLON** (direct latch on)
- ◆ **DLOF** (direct latch off)
- ◆ **DMON** (direct momentary on)
- ◆ **SLON** (select latch on)
- ◆ **SLOF** (select latch off)
- ◆ **SMON** (select momentary on)
- ◆ **EXCC** (execute)

The EXCC command executes any of the select commands.

If the protocol of the responder port is either TBOS or TABS, the commands to operate the control points are OPR (operate), RLS (release), and MOM (momentary).

## ALARM REPORTING

When using DCP or DCPF protocols on a responder port, the APU reports alarms as follows:

- ◆ Base Address = TBOS ports 1-4 (32 displays)
- ◆ Base Address + 1 = TBOS ports 5-8 (32 displays)
- ◆ Base Address + 2 = Discrete alarms - Lines 1, 2
- ◆ Base Address + 2 = Controls - Line 65

## 202 MODEM

**To check the 202 tone modem (options -20 and -21):**

1. Make sure the modem is connected to another modem at the other end of the communications line.
2. Apply power to the APU and the modem at the distant end.
3. Place the front panel TEST (test) switch on the APU modem subassembly in the on (down) position. Verify that the front panel CD (Carrier Detect) LED at the distant end indicates data transmission activity.
4. With a dB meter (bridging), check the signal level at the XMT test points on the APU modem subassembly. Adjust the XMT LVL to obtain the level required for the application.
5. Place the front panel TST (test) switch in the off (up) position.

CONTINUED . . .

# OPERATION

6. Check the incoming signal level at the RCV test points on the APU modem subassembly with a dB meter (bridging). The signal level should be 0 to -40 dBm, depending on the setting of switch S1 on the modem subassembly. There is no other adjustment for this circuit.

# SUBASSEMBLY INSTALLATION

The 46131 APU has four options:

1. **-00**  
32 discrete alarm inputs  
8 serial (TBOS) alarm interrogator ports  
8 control outputs  
2 RS-232/422/485 responder ports  
1 RS-232 configuration port
2. **-01**  
64 discrete alarm inputs  
8 serial (TBOS) alarm interrogator ports  
16 control outputs  
2 RS-232/422/485 responder ports  
1 RS-232 configuration port
3. **-20**  
32 discrete alarm inputs  
8 serial (TBOS) alarm interrogator ports  
8 control outputs  
2 RS-232/422/485 responder ports  
1 202 modem responder port  
1 RS-232 configuration port
4. **-21**  
64 discrete alarm inputs  
8 serial (TBOS) alarm interrogator ports  
16 control outputs  
2 RS-232/422/485 responder ports  
1 202 modem responder port  
1 RS-232 configuration port

## Upgrading

Upgrade the -00 and -20 options to 64 alarm inputs and 16 control outputs by ordering an Expansion Board subassembly.

Upgrade the -00 and -01 options to include a modem by ordering a 202 Modem subassembly.

# SUBASSEMBLY INSTALLATION

The A12-46130-00 Expansion Board subassembly has 32 alarm inputs and 8 control outputs. Each alarm has a single input that requires a ground to activate the alarm circuitry. The eight control outputs can be set with switches for normally open or normally closed contacts.

The A12-49030-00 202 Modem subassembly operates as a Bell 202 full-duplex tone modem. It has a data rate of 1200 baud. There are test points to measure the transmit and receive signal level, a potentiometer to adjust the transmit level, and an LED to indicate when the carrier signal is present.

Refer to Fig. 1 in the *Circuit Description* section for a functional schematic of the subassemblies.

## UPGRADE ORDERING INFORMATION

- ◆ To upgrade the -00 option to a -01 option, order the following:  
**A12-46130-00 Expansion Board subassembly**
- ◆ To upgrade the -00 option to a -20 option, order the following:  
**A12-49030-00 202 Modem subassembly**
- ◆ To upgrade the -00 option to a -21 option, order the following:  
**A12-46130-00 Expansion Board subassembly**  
**A12-49030-00 202 Modem subassembly**
- ◆ To upgrade the -01 option to a -21 option, order the following:  
**A12-49030-00 202 Modem subassembly**
- ◆ To upgrade the -20 option to a -21 option, order the following:  
**A12-46130-00 Expansion Board subassembly**

## INSTALLATION

### To install a subassembly:

1. Turn off power to the APU.
2. Open the plastic front cover.
3. Remove the two screws in the lower left and lower right corners of the front panel.
4. Pull the front panel and circuit boards out from the housing.
5. Disconnect the 10-position connector in the middle of the main circuit board.
6. Disconnect the 20-position connector on the left side of the main circuit board.
7. Pull the main circuit board out of the three 56-pin edge connectors on the front panel.

CONTINUED . . .

# SUBASSEMBLY INSTALLATION

8. **Expansion Board Subassembly** - Refer to Table E and Fig. 4 in the *Installation* chapter for setting the switches on the subassembly for control outputs 9-16.  
**202 Modem Subassembly** - Refer to Table D and Fig. 4 in the *Installation* chapter for setting the transmit and receive level switches on the subassembly.
9. **Expansion Board Subassembly** - On the front panel of the APU, stick the bar code label in the box labeled "Exp. Card." It is the same as the bar code on the subassembly.  
**202 Modem Subassembly** - On the front panel of the APU, stick the bar code label in the box labeled "Sub. Assy." It is the same as the bar code on the subassembly.
10. **Expansion Board Subassembly** -
  - ◆ Refer to Fig. 4 in the *Installation* chapter for the location to install the subassembly.
  - ◆ Install the Expansion Board subassembly: With the component side up, carefully insert the subassembly into the connectors on the main circuit board. Examine the connector pins to be sure each one goes straight into the sockets.
  - ◆ Install the six screws in the mounting standoffs.**202 Modem Subassembly** -
  - ◆ Refer to Fig. 4 in the *Installation* chapter for the location to install the subassembly.
  - ◆ Remove the modem hole cover from the front panel of the APU.
  - ◆ Install the 202 Modem subassembly: With the component side down, carefully insert the subassembly into the connector on the main circuit board. Examine the connector pins to be sure each one goes straight into the socket.
  - ◆ Install the four screws in the mounting standoffs.
11. Reconnect the front panel to the main circuit board and slide them partway into the card guides of the APU.
12. Reconnect the connectors disconnected in steps 5 and 6.
13. Push the circuit board all the way into the APU. If you installed a 202 Modem subassembly, the front panel of the subassembly should appear straight in the opening in the front panel of the APU.
14. Reinstall the two screws in the lower left and lower right corners of the front panel.

CONTINUED . . .

# SUBASSEMBLY INSTALLATION

15. On the back of the APU place the sticker with the new option number over the existing sticker. The options are defined as follows:
- |              |  |
|--------------|--|
| A15-46131-01 | APU with A12-46130<br>Expansion Board subassembly  |
| A15-46131-20 | APU with A12-49030-00<br>202 Modem subassembly   |
| A15-46131-21 | APU with A12-46130-00<br>Expansion Board subassembly and<br>A12-49030-00 202 Modem subassembly |
16. **Expansion Board Subassembly -**
- ◆ Refer to Table F and Figs. 6 and 7 in the *Installation* chapter for wiring alarm inputs 33-64.
  - ◆ Refer to Table G and Fig. 6 for wiring control outputs 9-16.
  - ◆ Close the plastic front cover. Installation is complete.
- 202 Modem Subassembly -**
- Refer to Table H and Fig. 6 in the *Installation* chapter for wiring the 202 modem transmit and receive lines.
17. **202 Modem Checkout -**
- ◆ Make sure the modem is connected to another modem at the other end of the communications line.
  - ◆ Apply power to the APU and the modem at the distant end.
  - ◆ Place the front panel TEST (test) switch on the APU modem subassembly in the on (down) position. Verify that the front panel CD (Carrier Detect) LED at the distant end indicates data transmission activity.
  - ◆ With a dB meter (bridging), check the signal level at the XMT test points on the APU modem subassembly. Adjust the XMT LVL to obtain the level required for the application.
  - ◆ Place the front panel TST (test) switch in the off (up) position.
  - ◆ Check the incoming signal level at the RCV test points on the APU modem subassembly with a dB meter (bridging). The signal level should be 0 to -40 dBm, depending on the setting of switch S1 on the modem subassembly. There is no other adjustment for this circuit.
18. Close the plastic front cover. Installation is complete.

# CIRCUIT BOARD REPLACEMENT

You can replace the printed circuit boards inside the APU without having to remove any wiring from the back panel connectors.

## To replace a circuit board:

1. Turn off power to the APU.
2. Open the plastic front cover.
3. Remove the screws in the lower left and lower right corners of the front panel.
4. Pull the front panel and circuit boards out from the housing.
5. Disconnect the 10-position connector in the middle of the main circuit board.
6. Disconnect the 20-position connector on the left side of the main circuit board.
7. Pull the main circuit board out of the three 56-pin edge connectors on the front panel.
8. Remove the screws for the Expansion Board subassembly (-01 and -21 options) and/or the 202 Modem subassembly (-20 and -21 options), and carefully pull the board(s) up and out of the plug-in connectors.
9. Refer to the **Switch and Strap Settings** section of the **Installation** chapter to set the switches and straps on the replacement board.
10. Install the Expansion Board subassembly and/or the 202 Modem subassembly on the main circuit board.
11. Push the main circuit board into the three 56-pin edge connectors on the front panel.
12. Connect the 20-position connector on the left side of the main circuit board.
13. Connect the 10-position connector in the middle of the main circuit board.
14. Push the front panel and circuit boards into the housing.
15. Replace the screws in the lower left and lower right corners of the front panel.
16. Close the plastic front cover.
17. Apply power to the APU.
18. If you replaced the main circuit board, refer to the **Configuration** section of the **Installation** chapter to configure the APU.
19. If you replaced the 202 modem subassembly, refer to the **202 Modem Checkout** section of the **Installation** chapter to set the signal levels.
20. End of section.

# TECHNICAL SPECIFICATIONS

## TECHNICAL SPECIFICATIONS - 46131 APU

DESCRIPTION	VALUE
Input Voltage	-21 to -56 VDC
Input Current, max. ( $\pm 15\%$ )	
@ -21 VDC	520 mA
@ -24 VDC	490 mA
@ -48 VDC	395 mA
@ -56 VDC	390 mA
Heat Dissipation, max. ( $\pm 15\%$ )	
@ -21 VDC	37.3 Btu/Hr
@ -24 VDC	40.1 Btu/Hr
@ -48 VDC	64.7 Btu/Hr
@ -56 VDC	74.5 Btu/Hr
Fuse	2 Amp., GMT Type
Auxillary Power Output	
Voltage	Equal to DC Input Voltage
Current	15 mA max.
-DC pins	P2-54, 56
GND pins	P2-53, 55
Serial Alarm Input Ports	
Number available	8
Max. TBOS Displays per Port	8 (512 points)
Protocol	TBOS
Interface	RS-422/485
Data Rate	300, 600, 1200, 2400, 4800, and 9600 baud
Discrete Alarm Inputs	
Number available	
-00,-20 options	32
-01,-21 options	64
Input	Optical Coupler Isolated, 33K ohms in series
Signal Input	
Points 1-24	Ground Input
Points 25-32	Current Flow (both sides of optical coupler brought out)
Points 33-64 (-01,-21 options)	Ground Input
Responder Ports	
Number available	3
Protocols	DCP, DCPF, TBOS, TABS
Ports 1 & 2	
Interfaces	RS-232, RS-422/485
Data Rates	300, 600, 1200, 2400, 4800, and 9600 baud
Port 4 (202 modem, -20,-21 options)	
Data Rate	1200 baud
Input Level Range	0 to -20 dBm; -20 to -40 dBm
Output Level Range	-1 to -20 dBm; -20 to -40 dBm
Operating Frequencies	
Mark	1200 Hz
Space	2200 Hz

CONTINUED . . .

UPDATED

# TECHNICAL SPECIFICATIONS

## TECHNICAL SPECIFICATIONS - 46131 APU (CONTINUED)

DESCRIPTION	VALUE
Configuration Port Communications Interface Data Rate	ASCII RS-232 9600 baud
Change-of-State (COS) Relay Contact Type Contact Ratings Pins	Normally Open, Dry Contact 1A @ 24 VDC; 0.5A @ 125 VAC P2-51, 52
Fuse Alarm Relay Contact Type Contact Ratings Pins	Normally Open, Dry Contact (one side tied to ground) 1A @ 24 VDC; 0.5A @ 125 VAC P2-50
Control Output Relays Contact Type Contact Ratings	8 Normally Open, Dry Contact; 8 Normally Open or Closed 1A @ 24 VDC; 0.5A @ 125 VAC
Weight	5.8 pounds
Physical Dimensions	1.75"H x 17.0"W x 12.5"D
Operating Temperature Ranges	0° to 60° 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**

