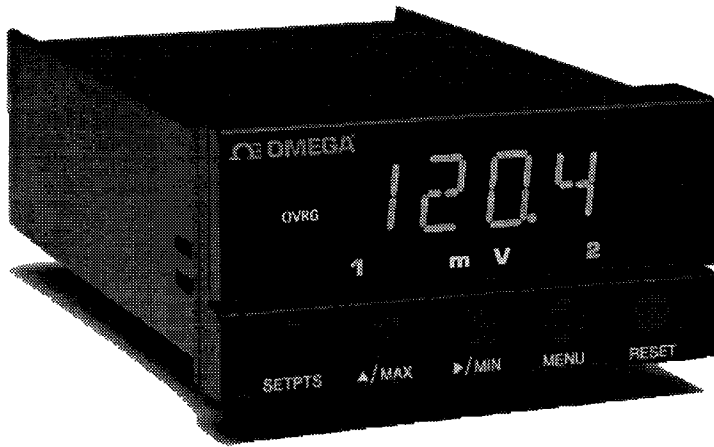


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User's Guide



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DP25-CRMS, DP25-VRMS SERIAL COMMUNICATION



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This device is marked with the international hazard symbol. It is important to read the Setup Guide before installing or commissioning this device as it contains important information relating to safety and EMC.

SERIAL COMMUNICATION MANUAL

INTRODUCTION

This manual describes the pertinent information for communication protocol used for the true RMS volt/current meter. This information describes all communication commands and their format in order to establish a serial link between a computer and/or a PLC and the meter. The information in the manual describes both the RS232 and RS485 serial interface card.

I. COMMUNICATION COMMAND AND RESPONSE FORMAT:

i. Command format:

* [nn]Ccc [data] [hh] <cr>

ii. Response format:

a. Correct response :

1. If UNIT is in echo mode (see list of commands for "BUS FORMAT:

[nn]Ccc [data] [hh] <cr> [<lf>]

2. If UNIT is not in echo mode :

- i. for the commands which require the data back:

[nn]data [hh] <cr> [<lf>]

- ii. for the commands which do not require the data:

NO RESPONSE

b. Error response :

- i. If UNIT is in echo mode :

[nn]?ee<cr> [<lf>]

- ii. If UNIT is in not in echo mode:

?ee<cr> [<lf>]

Where :

- [] Brackets indicate the enclosed item is used wherever applicable.
- * Is the security recognition character (this character can be changed, refer to the list of commands below).
- nn Is the device address in hexadecimal based when unit is in RS485 mode, and is from 00 to FF. 00 address is used for broadcasting from the host.
- C Is the command letter (1st character). Capitals are used for command letters.
- cc Command index is a hexadecimal number from 01 to FF.
- "W" For write to the EEPROM in hexadecimal base.
- "R" For read from the EEPROM in hexadecimal based.
- "P" For write into RAM in hexadecimal based.
- "G" For read from the RAM in hexadecimal based.
- "Z" For reset commands.
- "E" For enable commands.
- "D" For disable commands.
- "X" For reading the measurement values in decimal base.
- "U" For reading the status.
- "V" This command is used to make the unit send a stream of preselected data items such as measurement reading value, peak, valley, date, time and alarm status.
- data Is one to four bytes (2 to 8 characters respectively). It will be hexadecimal based except for reading the measurement/display values, time and date commands. When meter is transmitting display reading, time or date they will be transmitted as HEX-ASCII. This means that each byte is divided into two nibbles and the ASCII code for each nibble is transmitted separately. This is the preferred

method when working with printers .

hh Are checksum characters. (It will always be off in calibration mode).

<lf> Line feed.

?ee Special code indicating an error has occurred as :

1. Command error	?43
2. Format error	?46
3. Checksum error	?48
4. Parity error	?50
5. Address, recog.char errors	?56

Where :

- i. Command error occurs for invalid command letters and indexes.
- ii. Format error occurs if length of the data is either shorter or longer than it should be or any other value than "0-F" for hexadecimal.

<cr> Carriage return is always transmitted by the UNIT for the last character.

II. SINGLE COMMANDS:

COMMAND		DESCRIPTION	# OF	# OF
PREFIX	INDEX (HEX)		BYTES	CHARS
-----	-----	-----	-----	-----
GPRW	01	Setpoint 1 value	3	6
GPRW	02	Setpoint 2 value	3	6
GPRW	03	Reading offset	3	6
RW	04	Output offset	3	6
RW	05	Frequency/Input range	1	2
--	06	Error	0	0
RW	07	Coupling	1	2
--	08	Error	--	--
GPRW	09	Decimal point	1	2
GPRW	0A	Unit/Filter time constant	1	2
GPRW	0B	Error	--	--
GPRW	0C	Reading scale	3	6
--	0D	Error	--	--
GPRW	0E	Setpoint 1 Config	1	2
GPRW	0F	Setpoint 2 Config	1	2
GPRW	10	Setpoint 1 dead band	2	4
GPRW	11	Setpoint 2 dead band	2	4
--	12	Error	--	--
RW	13	Output Configuration	1	2
RW	14	Analog Output Scale	3	6
--	15-1F	Error	--	--
RW	20	Communication Parameters	1	2
GPRW	21	Communication Bus format	1	2
GPRW	22	Communication Data Format	1	2
GPRW	23	Communication address	1	2
GPRW	24	Communication transmit time	2	4
GPRW	25	Communication Recognition ch.	1	2
GPRW	26	Time	3	6
GPRW	27	Date	4	8
GPRW	28	Date ID	1	2
--	29	Error	--	--
GPRW	2A	Clock calibration	2	4
-----	-----	-----	-----	-----

NOTES :

1. G, P, R, W means read from RAM, write to RAM, read from EEPROM, write to the EEPROM respectively.
2. When writing to the EEPROM it is necessary to reset the meter for the new value to take effect.

3. Examples: assume "*" as recognition character, echo mode, meter address is 15 decimal or 0F hex.

a. To change SETPOINT # 1 DEADBAND to 1.00

Assuming system decimal point is 2. For deadband we only need to send the value excluding decimal point therefore value is 100 decimal or 0064 hex.

1. To change the RAM content in RS232 mode :

Send : *P100064<CR>
meter will respond : P10<CR>

2. To change the EEPROM content in RS232 mode :

Send : *W100064<CR>
meter will respond : W10<CR>

3. To change the RAM content in RS485 mode :

Send : *0FP100064<CR>
meter will respond : 0FP10<CR>

b. To read the above value :

1. From RAM in RS232 mode:

Send : *G10<CR>
meter will respond : G100064<CR>

2. From EEPROM in RS485 mode:

Send : *0FR10<CR>
meter will respond : 0FR100064<CR>

III. BLOCK COMMANDS:

These commands are for more than one item as:

COMMAND		DESCRIPTION OF ITEMS INCLUDED	# OF	# OF
PREFIX INDEX	(HEX)	(HIGHEST TO LOWEST BYTES)	BYTES	CHAR
GPRW	80	ID-Date-time	7	14
RW	81	OUT.OFF, OUT.SCL, RDG.OFF, RDG.SCL SP1, SP2.	18	36
RW	82	Spare(one byte), Comm. recog. char., Comm. transmission time, Data format, Bus format, Comm. address, Comm. parameter, Setpt 2 dead band, Setpt 1 dead band, Setpt 2 config., Setpt 1 config., Output config., spare(one byte) Unit/Filter time. Decimal point, Freq/Input, Coupling	20	40
RW	83	1st set of reading scale & offset IN1-RD1	6	12
RW	84	2nd set of reading scale & offset IN2-RD2	6	12
RW	85	1st set of output scale at offset DSP1-OUT1	6	12
RW	86	2nd set of output scale at offset DSP2-OUT2	6	12

IV. OTHER COMMANDS:

COMMAND PREFIX INDEX		MEANING
D	01	Disable alarms.
D	02	Disable all front panel push buttons.
D	03	Disable menu push button.
D	04	Display hold.
D	05	Measurement hold.
E	01	Enable alarms.
E	02	Enable all front panel push buttons.
E	03	Enable menu button.
E	04	Display run.
E	05	Enable measurement.
E	06	Activate alarm state.
E	07	Peak on display.
E	08	Valley on display.
E	09	Reading on display.
Z	01	Reset latched alarms.
Z	03	Power on reset.
Z	03	Hard reset.
Z	04	Reset peak.
Z	05	Reset valley.
U	01	Send alarms status.
U	02	Send peak/valley status.
U	03	Send program version.
X	01	Send reading.
X	02	Send peak.
X	03	Send Valley.
X	04	Send time.
X	05	Send date.
V	01	Send string of data.

NOTE:

When reading alarm status or peak and valley, the meter responds by sending a special character which must be decoded according to the following table.

symbol	alarm 1	alarm 2
@	off	off
A	off	on
B	on	off
C	on	on

symbol	peak	valley
@	no	no
A	no	yes
B	yes	no
C	yes	yes

V. DESCRIPTION OF ITEMS:

1. Setpoint 1, Setpoint 2, Reading offset, Output offset:
These are 3 bytes each in hex. format. (bits 0 to 23). Bits 0 to 19 are data in Hex format.
Bits 20,21,22 are decimal point = 1,2,3,4 for set points and 1,2,3,4,5,6,7 for offsets. call it DP. Bit 23 is sign. (=0/1 for positive/negative)

Set points notes:

- a. Min/max values : -1999 to 9999.
- b. Decimal point: same as display. program will update setpoint decimal point if different from display without changing its values.
- c. Decimal point value meaning: (VALUE) x 10**(1-DP)

Offsets notes:

- a. Min/max values : ±999999.
- b. Decimal point : independent will be reformatted by the meter for max resolution.
- c. Decimal point meaning: (value) x 10 **(2-DP)

2) Frequency/input range:

This is one byte as:

input range: bits 0 to 2 = 0 : 100mV or 1mA
= 1 : 1V or 10mA
= 2 : 10V or 100mA
= 3 : 100V or 1A
= 4 : 750V or 5A

Frequency: bits 4,5 = 0 : 50Hz
= 1 : 60Hz
= 2 : ALL

3. Coupling is one byte as:

bit 0 = 0 DC coupling
= 1 AC coupling

4. Decimal Point is one byte:

This is the display decimal point = 1,2,3,4 for positions 1,2,3,4.

Any change to the system decimal point will update setpoint decimal point without changing its value.

5. Unit/Filter time constant: 1 byte as: time constant

Bit 0,1,2 = 0 0
= 1 4
= 2 8
= 3 16
= 4 64

Bit 3 not used set to zero

unit on display
Bit 4-5 =00 for V or A
=01 for mV or mA
=10 for no unit
=11 not used

6. Reading and output scales: These are 3 bytes each in hex

format, bits 0 to 23 as:

Bits 0 to 18 are data in hex format

Bits 19 is sign bit.

Bits 20,21,22,23 are decimal point values.

Notes:

a. min/max values: ± 500000

b. decimal point meaning: $(VALUE) \times 10^{(1-DP)}$

7. **Setpoint 1 or Setpoint 2 configuration:** these are 1 byte each as:

bit 0 = 0 active above
 1 active below
bit 1 = 0 Nonlatch
 = 1 Latch

8. **Setpoint 1 or Setpoint 2 deadbands:** these are 2 bytes each in HEX. format.

Notes:

- a. Min/max : 0 to 9999.
- b. Unit of measure and decimal point same as display.

9. **Output configuration:** this is one byte in hex format as:

bit 0 = 0 analog out volt mode.
 1 analog out current mode.
bit 1 = 0 default output scale and offset
 = 1 program output scale and offset.

Notes:

- a. If program selected then output scale and offset should be entered. (index items 04, 14)
- b. Default will use following values:
 Disp1: 0000 Out.1 = 00.00V (04.00 mA)
 Disp2: 9999 Out.2 = 10.00V (20.00 mA)

10. **Communication parameter is one byte hex format as:**

bit 0,1,2 = 0 300 band
 = 1 600 band
 = 2 1200 band
 = 3 2400 band
 = 4 4800 band
 = 5 9600 band
 = 6 19200 band
 = 7 19200 baud

bit 3-4 = 0 no parity
 = 1 odd parity
 = 2 even parity
 = 3 even parity

bit 5 = 0 7 data bit
 = 1 8 data bit

bit 6 = 0 1 stop bit
 = 1 2 stop bit

bit 7 not used set to zero

NOTE:

1. Always one stop bit except for 7 data bit and no parity, where unit defaults to 2 stop bit.
2. When 8 data bit selected, only NO PARITY allowed.

11. Communication bus format is one byte in hex format as:

```
bit 0 = 0 no check sum
        = 1 check sum
bit 1 = 0 no LF
        = 1 LF
bit 2 = 0 no echo
        = 1 echo
bit 3 = 0 RS232C
        = 1 RS485
bit 4 = 0 Continuous mode
        = 1 Command mode
bit 5 = 0 Space between data items
        = 1 CR between data items
bit 6 = 0 Newport protocol
        = 1 Mod Bus
bit 7 = not used set to zero
```

12. Communication data format is one byte in hex format as:

```
Bit 0 = 0 do not send AL/Peak Valley status
        = 1 Send AL/Peak Valley status
bit 1 = 0 do not send reading
        = 1 Send reading
bit 2 = 0 do not send peak
        = 1 Send peak
bit 3 = 0 do not send valley
        = 1 Send valley
bit 4 = 0 do not send time
        = 1 Send time
bit 5 = 0 do not send date
        = 1 Send date
bit 6 = 0 do not send unit
        = 1 Send unit
bit 7 = 0 do not send data ID
        = 1 Send ID for data
```

DATA ID: If this mode enabled then measurement data will be transmitted as:

```
" R: data <CR> " or
" P: data <CR> " or
" V: data <CR>"
```

Where R, P, V stand for READING, PEAK, and VALLEY respectively.

13. **Communication address is one byte:**
From 01 to C7 Hex (199 decimal). Address 00 is for broadcasting.

14. **Communication transit time:**
Is 2 byte from 1 to 9999 seconds in hex format.
0 means transmit as fast as possible, about 3 times a second.

15. **Communication recognition character:**
Is the hex value of a character in ASCII table except: A, CARET, E, R, W, P, G.

16. **TIME:**
Is 3 bytes in decimal format (24 hour system) as:
(Hour) (Minute) (Second)

Example: you want to update meter's time to 9:12:35 pm.
execute following :

*P26211235<CR>

17. **DATE:**
Is a 4 bytes (2 characters for DATE ID, 6 characters for the date) in decimal format.
The first 2 characters are DATE ID and it specifies the date format for the meter. 01 is for American format and 00 is for else. The remainder 3 bytes are date data.

(ID) (DAY/MONTH) (MONTH/DAY) (YR)

Example: you want to update the meter's date to 22 Oct. 94

Execute the following:

*P2701102294<CR> : 10/22/94

or

*P2700221094<CR> : 22/10/94

Note: for years 2000 and more you will send 00,01, ...

18. **DATE ID:**
Date ID is: 00 or 01
00 is for Elsewhere date format: DAY/MONTH/YEAR
01 is for American date format: MONTH/DAY/YEAR

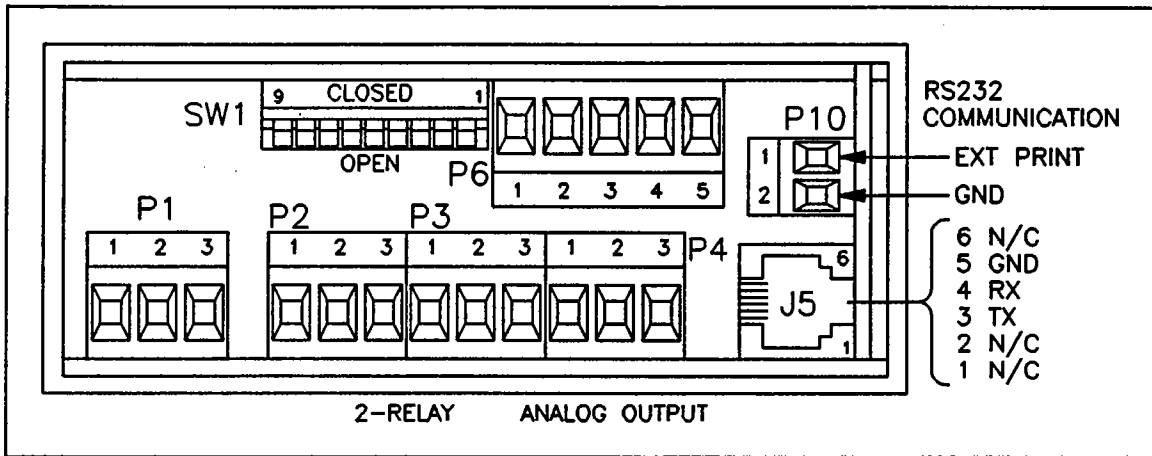


FIGURE 1 - P10 & J5 RS232 OUTPUT CONNECTIONS

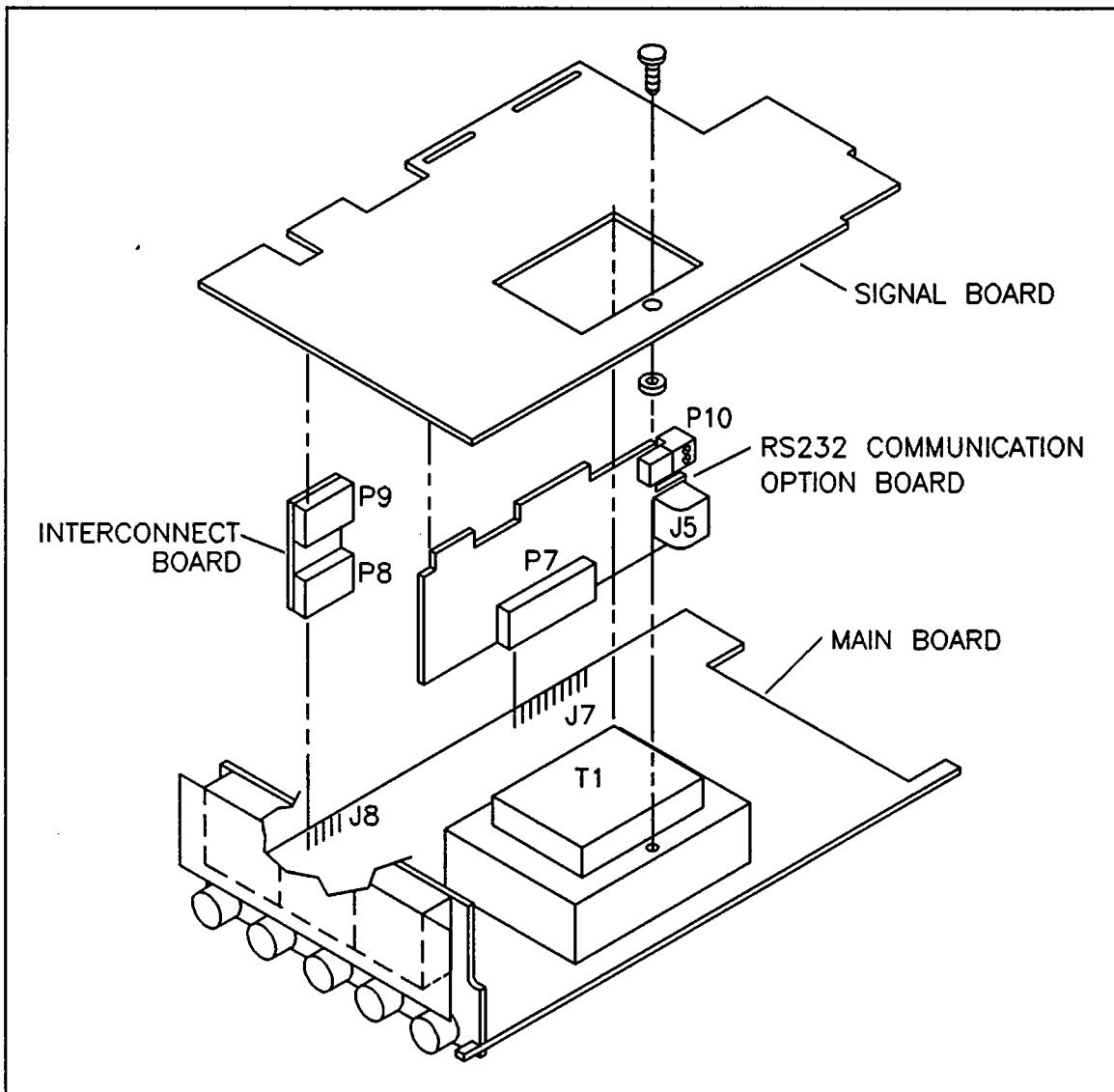


FIGURE 2 - SECURING THE SIGNAL BOARD WITH RS232 CARD

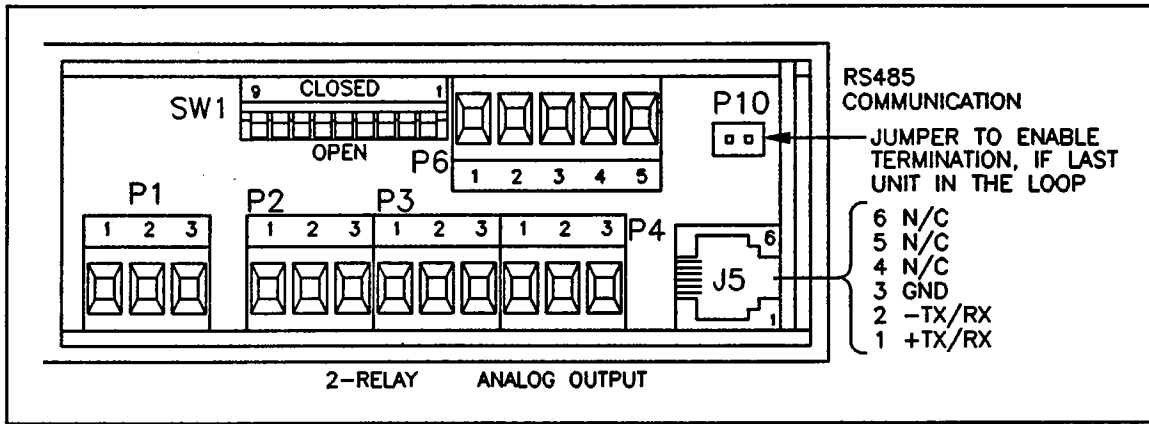


FIGURE 3 -- P10 & J5 HALF-DUPLEX RS485 OUTPUT CONNECTIONS

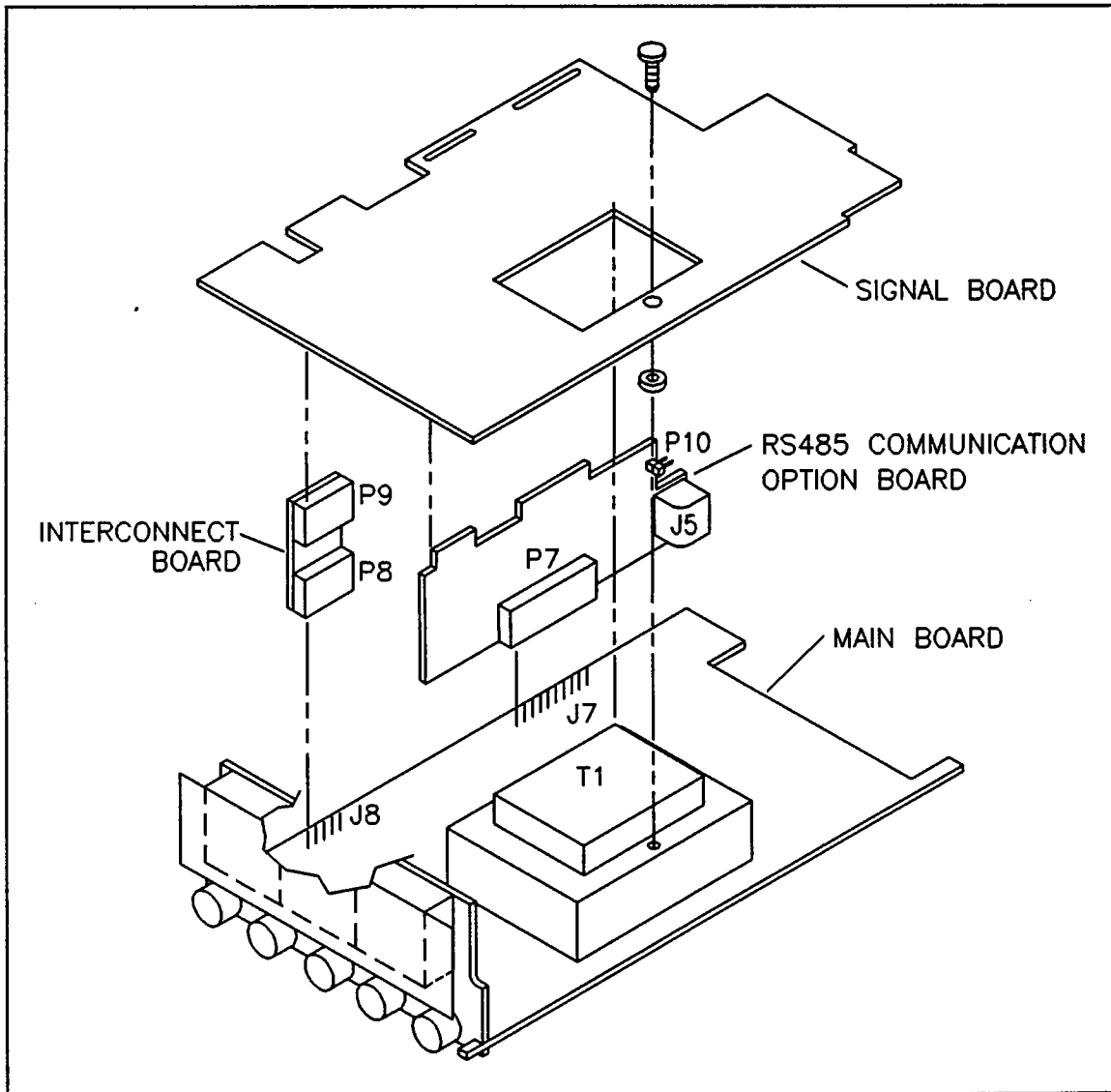


FIGURE 4 -- SECURING THE SIGNAL BOARD WITH RS485 CARD



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