



User's Guide

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The information contained in this document is believed to be correct, but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient-connected applications.

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



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SAFETY CONSIDERATIONS



This device is marked with the international Caution symbol. It is important to read this manual before installing or commissioning this device as it contains important information relating to Safety and EMC (Electromagnetic Compatibility).

Unpacking & Inspection



Unpack the instrument and inspect for obvious shipping damage. Do not attempt to operate the unit if damage is found.

This instrument is a panel mount device protected in accordance with Class I of EN 61010 (115/230 AC power connections). Installation of this instrument should be done by Qualified personnel. In order to ensure safe operation, the following instructions should be followed.

This instrument has no power-on switch. An external switch or circuit-breaker shall be included in the building installation as a disconnecting device. It shall be marked to indicate this function, and it shall be in close proximity to the equipment within easy reach of the operator. The switch or circuit-breaker shall not interrupt the Protective Conductor (Earth wire), and it shall meet the relevant requirements of IEC 947-1 and IEC 947-3 (International Electrotechnical Commission). The switch shall not be incorporated in the mains supply cord.

Furthermore, to provide protection against excessive energy being drawn from the mains supply in case of a fault in the equipment, an overcurrent protection device shall be installed.



- The **Protective Conductor** must be connected for safety reasons. Check that the power cable has the proper Earth wire, and it is properly connected. It is not safe to operate this unit without the Protective Conductor Terminal connected.



- Do not exceed voltage rating on the label located on the top of the instrument housing.
- Always disconnect power before changing signal and power connections.
- Do not use this instrument on a work bench without its case for safety reasons.
- Do not operate this instrument in flammable or explosive atmospheres.
- Do not expose this instrument to rain or moisture.
- Unit mounting should allow for adequate ventilation to ensure instrument does not exceed operating temperature rating.
- Use electrical wires with adequate size to handle mechanical strain and power requirements. Install without exposing bare wire outside the connector to minimize electrical shock hazards.

EMC Considerations

- Whenever EMC is an issue, always use shielded cables.
- Never run signal and power wires in the same conduit.
- Use signal wire connections with twisted-pair cables.
- Install Ferrite Bead(s) on signal wires close to the instrument if EMC problems persist.

ISOLATED PARALLEL BCD OPTION

1.0 GENERAL INFORMATION

The optional parallel BCD board works concurrently in two output modes: 6-digit parallel BCD (24 lines) and addressable 3-digit. In addition to the 6-digit BCD, this board outputs the alarm condition (High, Low and Go), polarity, overflow, and decimal point binary address signals. The outputs are three-state and electrically isolated from the main board. They are active when the appropriate address is applied on connector P4, pins L24, U24, L23, and U23. The inputs are internally connected to the main board via the interconnection of P5 with J5.

Outputs are available on P4, a 50-pin dual-row header at the rear of the board. The P4 mates with a standard, 50-pin mass-terminated connector. The P4 outputs can be frozen by making the **HOLD** input (P4-U21) low. Although the BCD outputs are always valid, the **DATA READY** signal goes active low for approximately 0.2 millisecond when BCD data is updated.

2.0 MECHANICAL INSTALLATION

The parallel BCD board is positioned as an upper board in the meter. Refer to the exploded view in the main board manual.



To avoid electrical shock be sure to disconnect the unit from its power supply.

To install:

1. Hold the board upside-down with components facing the main board.
2. Position the P5 pins to mate with the J5 connector on the power supply board.
3. Push the board downward until it rests on the upper rear panel and the display board.

3.0 ELECTRICAL CONNECTIONS

NOTE: The software switch SS3 of Configuration 2 must be set (XXX1XX) to activate the parallel BCD board. For more information, refer to Section 4.1 of the main board manual.

3.1 POWER

An isolated +5 V $\pm 10\%$ external power supply is required and should be connected to pin P4-L21 (+5 V) and pin P4-L19 (ISO GND). If isolation is not required, S5A, S5B, S6A, and S6B may be installed to power the parallel BCD option by the main board.

3.2 BCD OUTPUTS

The board is factory-set as 6-digit parallel BCD. Outputs are enabled when the binary address on the instrument select lines, pins L24, U24, L23, and U23, match the board address (set by pin group S1). The output polarity is normally positive true (reversible by S4) and each output can drive 10 LSTTL loads.

(N/C)	ALARM LOW	L1	U1	ALARM HIGH	(N/C)
(N/C)	N/C	2	2	ALARM GO	(N/C)
(N/C)	N/C	3	3	N/C	(N/C)
(N/C)	N/C	4	4	N/C	(N/C)
(N/C)	BCD 400 k	5	5	BCD 800 k	(N/C)
(N/C)	BCD 100 k	6	6	BCD 200 k	(N/C)
(ISO GND)	ISO GND	7	7	N/C	(N/C)
(N/C)	BCD 40 k	8	8	BCD 80 k	(N/C)
(N/C)	BCD 10 k	9	9	BCD 20 k	(N/C)
(N/C)	BCD 4 k	10	10	BCD 8 k	(N/C)
(N/C)	BCD 1 k	11	11	BCD 2 k	(N/C)
(ALARM HIGH)	D P 2	12	12	D P 4	(ALARM LOW)
(BCD 400 k)	BCD 400	13	13	BCD 800	(BCD 800 k)
(BCD 100 k)	BCD 100	14	14	BCD 200	(BCD 200 k)
(BCD 40 k)	BCD 40	15	15	BCD 80	(BCD 80 k)
(BCD 10 k)	BCD 10	16	16	BCD 20	(BCD 20 k)
(BCD 4 k)	BCD 4	17	17	BCD 8	(BCD 8 k)
(BCD 1 k)	BCD 1	18	18	BCD 2	(BCD 2 k)
(ISO GND)	ISO GND	19	19	D P 1	(OVERFLOW)
(DATA READY)	DATA READY	20	20	POLARITY	(ALARM GO)
	*ISO V+, 4.5 TO 5.5 V	21	21	*HOLD	(HOLD)
(N/C)	N/C	22	22	OVERFLOW	(N/C)
	*BOARD ADDR $\overline{B4}$	23	23	*BOARD ADDR $\overline{B8}$	
*(BCD 1-800 ENABLE)	BD ADDR $\overline{B7}$	24	24	*BD ADDR $\overline{B2}$ (BCD 1-800k ENABLE)	
(N/C)	N/C	L25	U25	N/C	(N/C)

() Output in addressable 3-digit-at-a-time mode

* An input

N/C No internal connection

To enable the outputs, install jumpers on the pin groups and apply the proper address on the instrument select lines as indicated below:

6-Digit Parallel BCD	S1 Positions	Connector P4 with Instrument Select Lines			
		U23	L23	U24	L24
Install jumpers on S2-A and S3-A; U5A and U6A on XU5A and XU6A sockets.	B8, B4, B2, B1*	0	0	0	0
	B8, B4, B2, $\overline{B1}$	0	0	0	1
	B8, B4, $\overline{B2}$, B1	0	0	1	0
	B8, B4, $\overline{B2}$, $\overline{B1}$	0	0	1	1
	B8, $\overline{B4}$, B2, B1	0	1	0	0
	B8, $\overline{B4}$, B2, $\overline{B1}$	0	1	0	1
	B8, $\overline{B4}$, $\overline{B2}$, B1	0	1	1	0
	B8, $\overline{B4}$, $\overline{B2}$, $\overline{B1}$	0	1	1	1
	$\overline{B8}$, B4, B2, B1	1	0	0	0
	$\overline{B8}$, B4, B2, $\overline{B1}$	1	0	0	1
	$\overline{B8}$, B4, $\overline{B2}$, B1	1	0	1	0
	$\overline{B8}$, B4, $\overline{B2}$, $\overline{B1}$	1	0	1	1
	$\overline{B8}$, $\overline{B4}$, B2, B1	1	1	0	0
	$\overline{B8}$, $\overline{B4}$, B2, $\overline{B1}$	1	1	0	1
	$\overline{B8}$, $\overline{B4}$, $\overline{B2}$, B1	1	1	1	0
	$\overline{B8}$, $\overline{B4}$, $\overline{B2}$, $\overline{B1}$	1	1	1	1

Addressable 3-Digit Parallel BCD	S1 Positions	Connector P4 with Instrument Select Lines			
		U23	L23	U24	L24
Install a jumper on S2-B and S3-B. U5A and U6A on XU5B and XU6B sockets.		ENABLES BCD 1 - 800 OVRFLW, HI,LO,GO		ENABLES BCD 1k - 800k D.P. 1,2,4, POL	
	X, X, B2, B1	X, X, X, 0		X, X, 0, 1	
	X, X, B2, $\overline{B1}$	X, X, X, 1		X, X, 0, 0	
	X, X, $\overline{B2}$, B1	X, X, X, 0		X, X, 1, 1	
	X, X, $\overline{B2}$, $\overline{B1}$	X, X, X, 1		X, X, 1, 0	

0 = Open or TTL High level (more than 2.0 V)

1 = Ground or TTL Low level (less than .8 V)

X = Don't Care

* = Default Setting

Table 3-1 Required Address to Enable Outputs

3.3 POLARITY OUTPUT

This three-state output is active when Digits 1, 2 and 3 are enabled. Signal polarity can be reversed by a push-on jumper at S4. With a jumper on S4-A, a high level corresponds to a positive display value.

3.4 DECIMAL POINT BINARY ADDRESS (D.P. 1, 2 AND 4)

These three-state outputs are enabled with Digits 1, 2 and 3. Signal polarity can be reversed by a push-on jumper at S4. With a jumper on S4-A, the outputs represent positive true binary address of a right-hand decimal point (see Table 3-2).

Decimal Point Position	D.P. 4	D.P. 2	D.P. 1
FFFFFF.	0	0	1
FFFFF.F	0	1	0
FFFF.FF	0	1	1
FFF.FFF	1	0	0
FF.FFFF	1	0	1
F.FFFFF	1	1	0

Table 3-2 Decimal Point Binary Address

3.5 OVERFLOW OUTPUT

This three-state output is active when Digits 4, 5 and 6 are enabled. S4 reverses the polarity. When a jumper is installed on S4-A, an overflow condition makes this output go high. **In this case, all of the digits of the parallel BCD board represent a "9" (BCD 1001).** The decimal point address corresponds to the point selected as Fixed Range decimal point. S7 connects this output to pin U22 of the P4 connector.

3.6 ALARM OUTPUTS (HI, LO, GO)

These three-state outputs are enabled with Digits 4, 5 and 6. S8, S9, and S10 connect HI, LO, and GO to P4-U1, L1 and U2, respectively. The polarity is positive true (high level corresponds to an alarm condition) when a jumper is installed on S4-A.

3.7 DATA READY OUTPUT

The output is always valid because the parallel BCD data updates synchronously with a single clock pulse. A negative true DATA READY signal goes high, however, for about 0.2 milliseconds when the parallel BCD data is updated.

3.8 INSTRUMENT SELECT INPUTS (P4-U23, L23, U24 AND L24)

These are TTL-compatible inputs with 47 k Ohms pull-up resistors. When the input logic levels match the instrument address (set by S1), the outputs are enabled. When the logic levels do not match, they are in high impedance. Refer to Table 3-1.

3.9 HOLD INPUT

When low, this input freezes the outputs and makes the DATA READY low true. The internal BCD data continues to update. The updated data replaces the outputs when HOLD goes high.*

* If the HOLD input goes high during transmission, the output update is postponed in order to prevent erroneous output. Each transmission requires approximately 10 milliseconds.

4.0 JUMPER SELECTION

Pin Group	Function
S1	Selects the binary address (Table 3-1).
S2	Jumper installed on A:* Board can be selected by four address lines on connector P4, pins L24, U24, L23 and U23. Jumper installed on B: A high or low level on L24 selects the board when S1-B1 or S1-B1 are installed respectively.
S3	Controls the <u>DATA READY</u> output. Jumper installed on A:* <u>DATA READY</u> is active low when the input address matches the board address. Jumper installed on B: <u>DATA READY</u> is active when P4-L24 matches S1-B1 or P4-U24 matches S1-B2.
S4	Inverts all output logics except <u>DATA READY</u> . S4-A* corresponds to positive true logic.
S5, S6	Jumpers installed on A and B of S5 and S6: The main board powers the parallel BCD board. The outputs are not isolated from the main board. Default setting of these jumpers is open.
S7, S8, S9, S10	Connects Overflow, High, Low and Go signals to connector P4, pins U22, U1, L1 and U2, respectively. Default setting of these jumpers is open.

* Default Setting.

5.0 CONTROLLER INTERCONNECTIONS

5.1 INTERCONNECTION WITH A PARALLEL BCD PRINTER

If printing the decimal point is not required or if the printer recognizes a positive true binary address for the decimal point, simply connect the 24 line BCD outputs (6 digits x 4) to the corresponding inputs of the printer. For negative true BCD and decimal point address, install S4-B. If the parallel BCD printer accepts more than 6 digits, tie the unused inputs (digits 7, 8, etc.) to GND or high level, as required, to print a BLANK on those positions.

Some printers or data acquisition systems can only accept a binary address of a left-hand decimal point (001 corresponds to XXXXX.X instead of XXXXXX.). For interconnection to such a system, connect each digit (4 BCD lines) to the next more significant digit input of the printer. (e.g., D1 → D2, D3 → D4, . . . D6 → D7) With this method, all of the digits are printed one position to the left; therefore, the decimal point prints in the correct position. Digit 1 input and other unused inputs of the printer should be tied to the appropriate level to print a BLANK or zero.

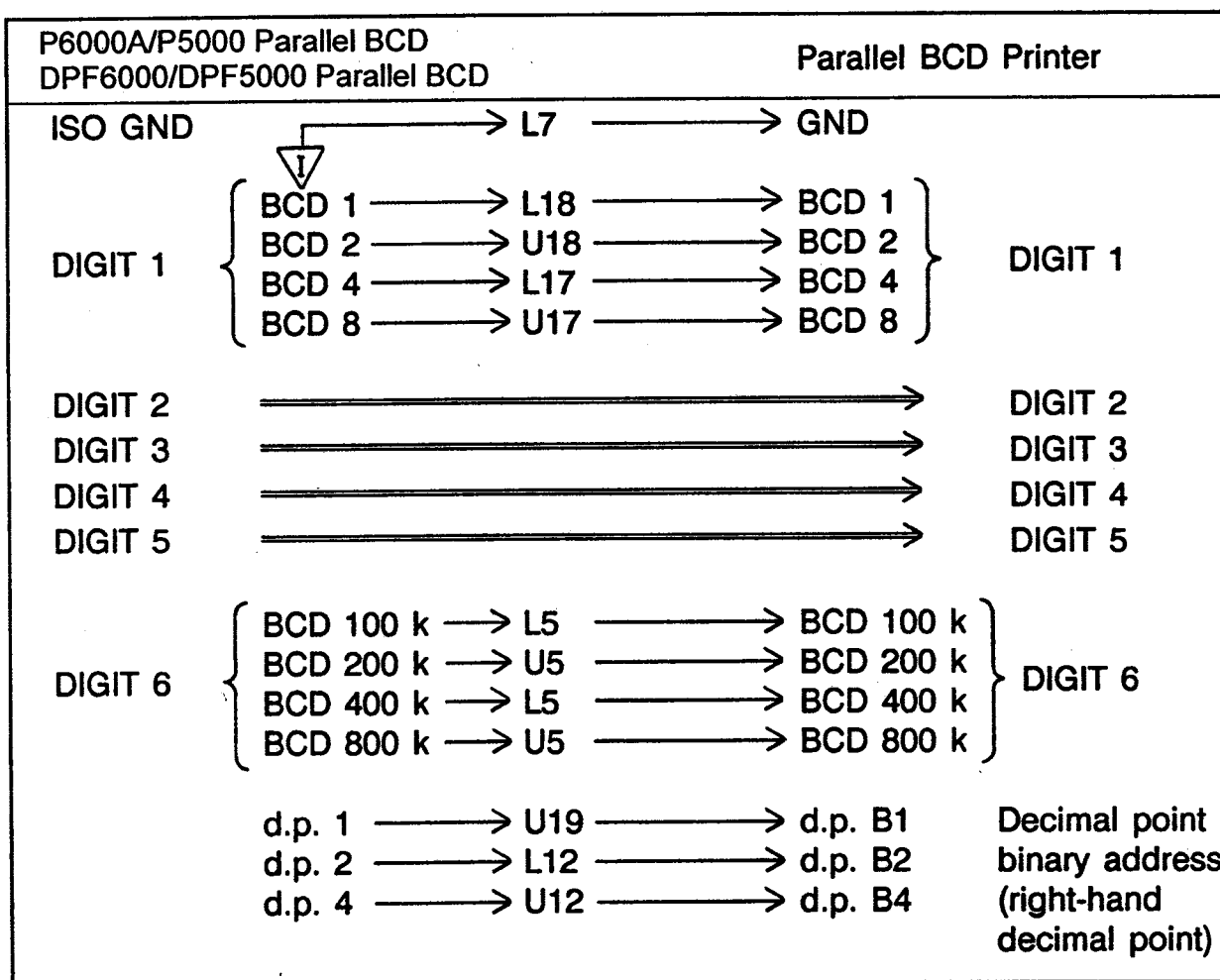


Figure 5-1 Connections with a Parallel BCD Printer
Using Right-hand Decimal Point

P6000A/P5000 Parallel BCD
DPF6000/DPF5000 Parallel BCD

Parallel BCD Printer

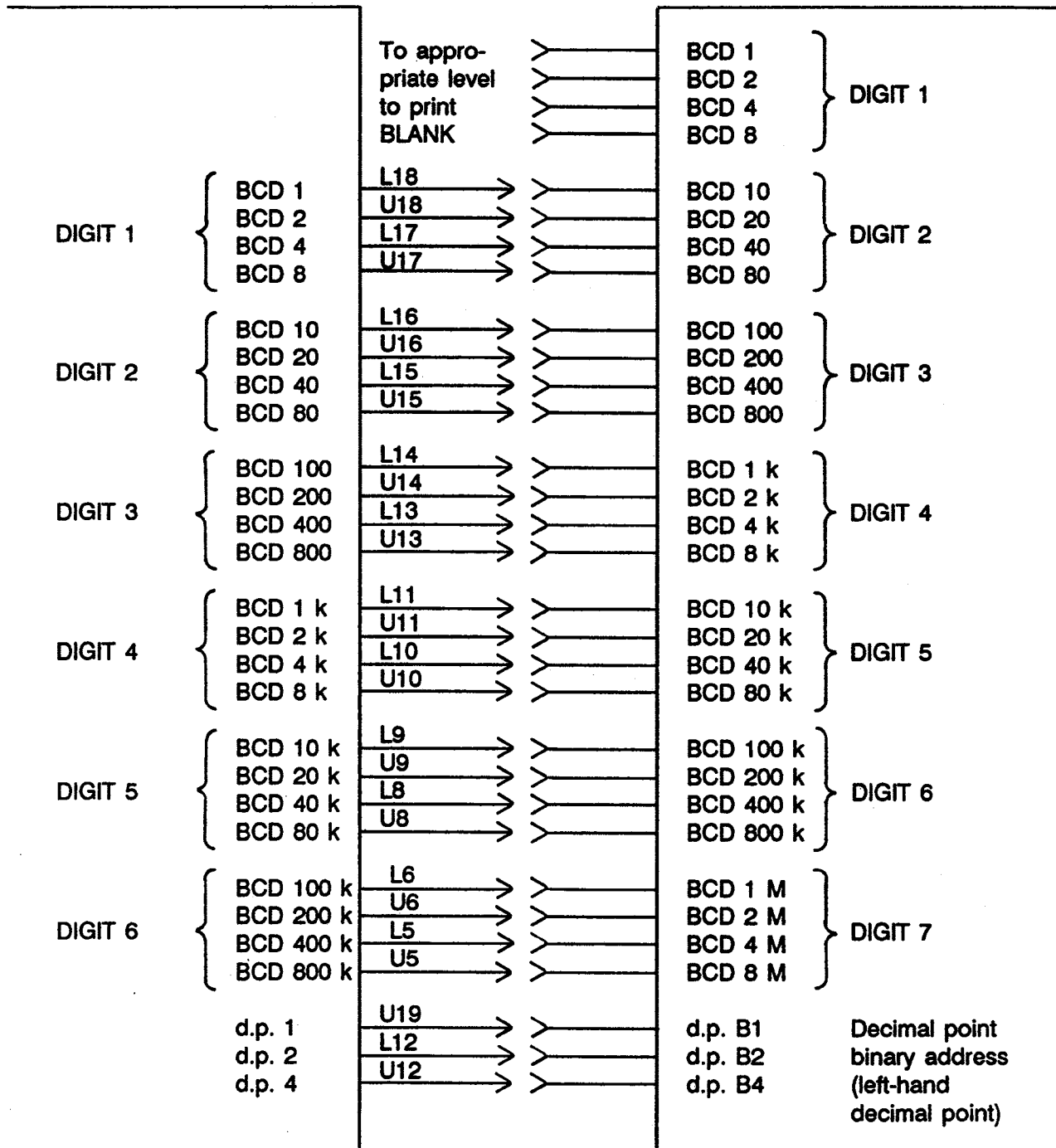


Figure 5-2 Connections with a Parallel BCD Printer
Using Left-hand Decimal Point

5.2 INTERFACE WITH PROGRAMMABLE CONTROLLERS

If the controller can accept 24 bits of BCD data (32 bits if other data is also required), the 6-digit parallel BCD mode can be used.

In addressable 3-digit-at-a-time mode, only half of the I/O lines are required. In this mode, digits 4, 5, and 6, Overflow, High, Low, and Go signals can be accessed on the same lines of Digits 1, 2, and 3, D.P. 1, D.P.2, D.P. 4 and Polarity signals. Parallel BCD board can be configured as an addressable 3-digit-at-a-time BCD as follows:

1. Move U5A and U5B integrated circuits (IC) to U5B and U6B sockets.
2. Install a jumper on S2-B and S3-B.

The outputs can be enabled by an appropriate logic level on U24 and L24 pins of P4 (see Table 3-1).

6.0 PARALLEL BCD DRAWINGS

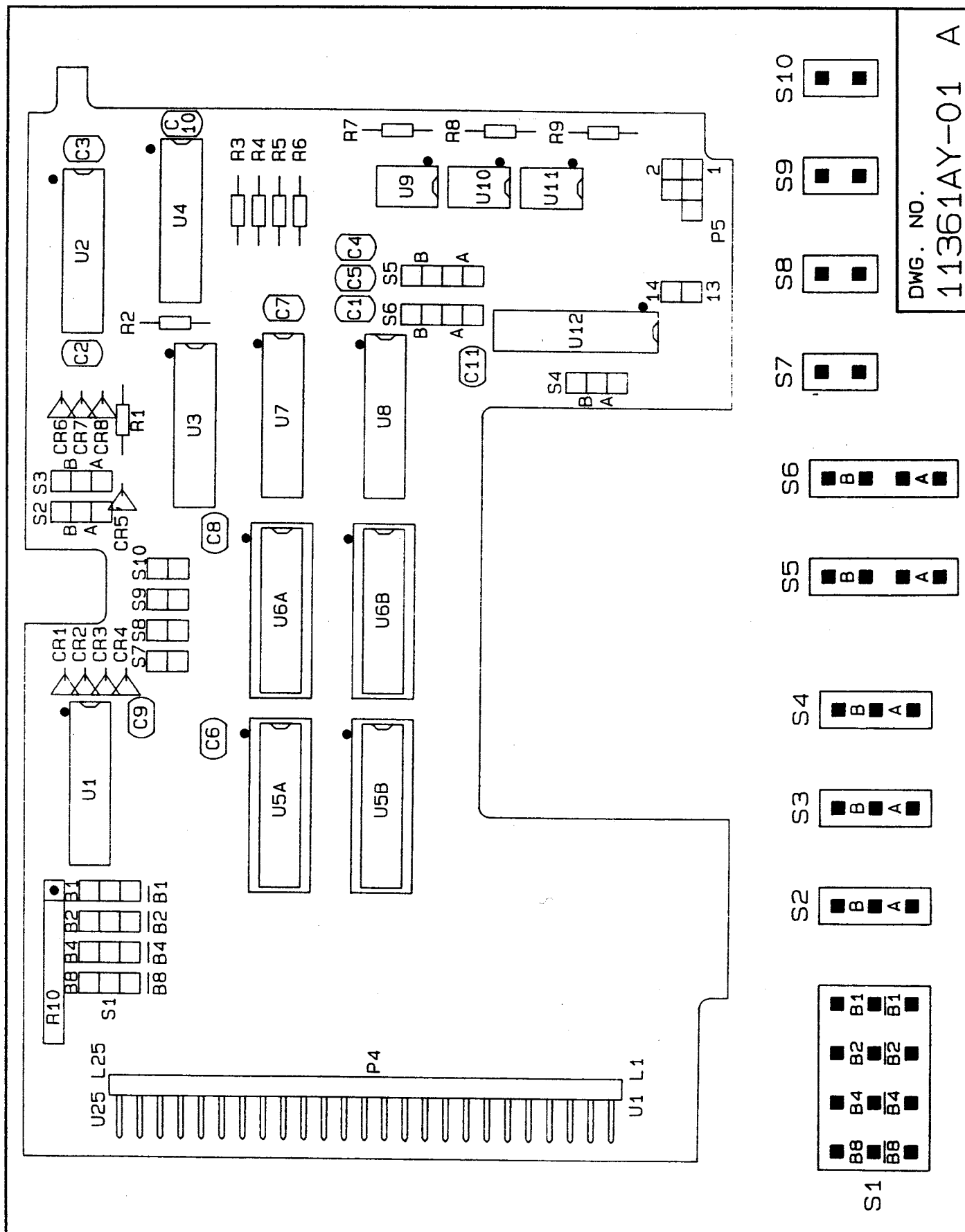


Figure 6-1 Parallel BCD Board Assembly Diagram

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

DUAL 8 A RELAY OPTION

1.0 GENERAL INFORMATION

The relay option provides two Form-C relays corresponding with LO and HI setpoints of the meter. The inputs are internally connected and the outputs are available on TB4, a 6-position barrier. TB4J, a mating screw-clamp connector, is standard.

2.0 MECHANICAL INSTALLATION

The relay board is positioned as an upper board in the meter. Refer to the exploded view in the main board manual.



To avoid electrical shock be sure to disconnect the unit from its power supply.

To install:

1. Hold the relay board upside-down with components facing the main board.
2. Position the P5 pins to mate with the J5 connector on the power supply board.
3. Push the board downward until it rests on the upper rear panel and the display board.

3.0 ELECTRICAL CONNECTIONS AND JUMPER SELECTION

3.1 RELAY OUTPUTS

These outputs are available on the TB4 connector (Figure 3-1). The relay board is rated for 8 A current with resistive and 3 A with inductive loads. Push-on jumpers must be removed from pin groups S1 and S2 (Figure 3-2) when the meter is powered by an external battery (connected to V+ of P2) with a voltage higher than 9 volts.

Two Form C relays: Rated 8A at 30 Vdc, resistive load (pf=1)
Rated 8A at 240 Vac, resistive load (pf=1)

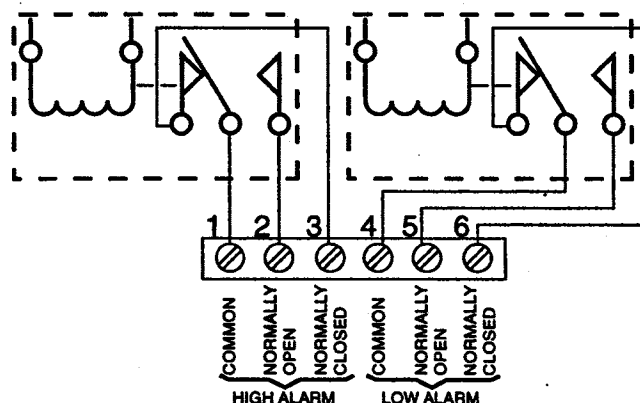


Figure 3-1 TB4 Connector with Electrical Connections

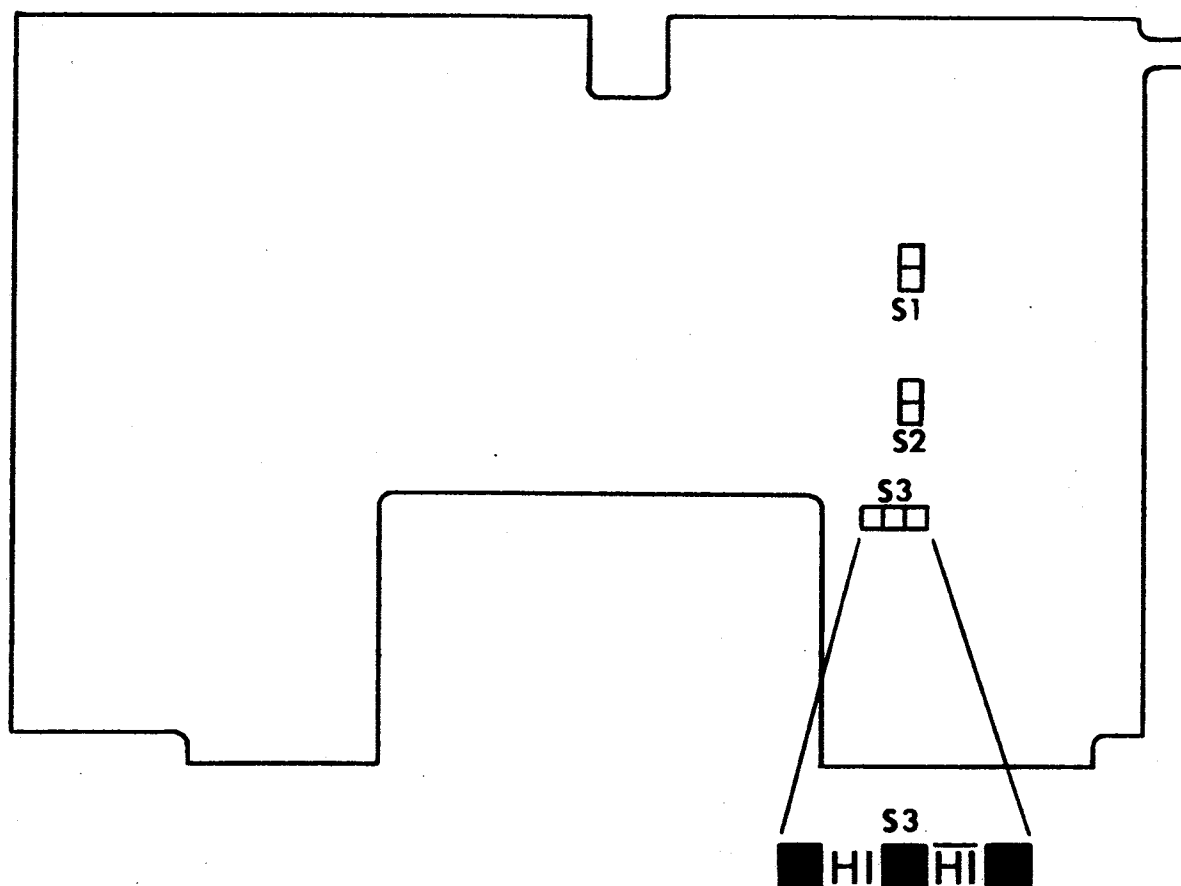


Figure 3-2 Relay Board Pin Groups

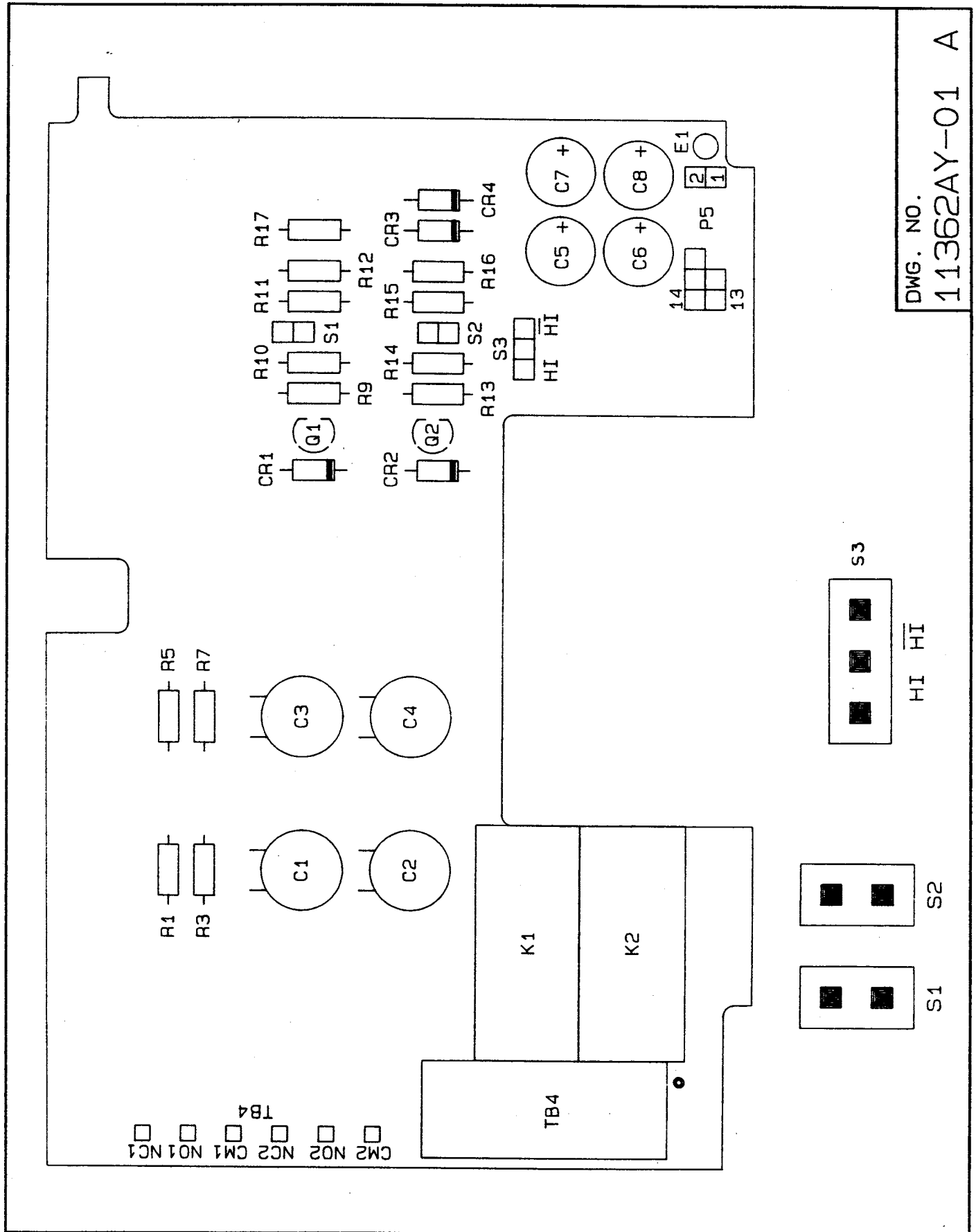
3.2 S3 OF THE RELAY BOARD

If a jumper is installed on the HI position, high relay is energized when high alarm is active.

If a jumper is installed on $\overline{\text{HI}}$, the relay is energized when high alarm is not active (LO or GO active). Also, with the jumper on $\overline{\text{HI}}$, the high setpoint should be higher than the low setpoint.

NOTE: Refer to the main board owner's manual for low alarm polarity reversal.

4.0 RELAY BOARD DRAWINGS



DWG. NO.

11362AY-01 A

Figure 4-1 Relay Board Assembly Diagram

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

ISOLATED ANALOG OUTPUT OPTION

1.0 GENERAL INFORMATION

The isolated analog output option provides 0 to 10 V, 0 to 20 mA or 4 to 20 mA jumper-selectable output ranges with 500 V isolation from the analog ground of the main meter assembly.

Zero and span are each set with push-on jumpers on the circuit board for coarse ranges plus a fine adjustment pot, which is accessible from the back of the meter. The coarse-span ranges are such that a span as narrow as 500 counts or as wide as 9999 counts (the right four digits) can produce the maximum 10 V or 20 mA analog output. **A NEGATIVE READING IS TREATED AS A ZERO READING.**

The unit is further jumper-programmable to read either the left four digits (for displays such as 198800) or the right four digits (for displays such as 001988).

2.0 SPECIFICATIONS

2.1 Power and Signals	Supplied by basic meter via internal board connector (150 mA maximum)
2.2 Environment	Same as the basic meter
2.3 Output Control	
Analog Voltage Range	0 to 10 V @ 20 mA
Analog Current Ranges	0 to 20 mA, 4 to 20 mA sourcing with 12 V compliance
Offset Ranges	4 coarse ranges of 0 to 25%, 25 to 50%, 50 to 75%, 75 to 100% with fine adjustment pot accessible from back of meter
Span Ranges	12 coarse ranges for 500 to 9999 counts (when the right four digits are selected) to produce the maximum 10 V or 20 mA output with fine adjustment pot accessible from back of meter
Turndown Ratio	20:1
Zero Tempco	325 nA or 100 μ V/ $^{\circ}$ C
Span Tempco	0.0075% / $^{\circ}$ C
Load Regulation	$\pm 0.1\%$
Full-scale Step Response	50 ms or less, 10 to 90%
Resolution	0.05% of the output span
Accuracy (10 to 40 $^{\circ}$ C)	$\pm 0.1\%$
Isolation	500 V from analog output to meter ground

3.0 ELECTRICAL CONNECTIONS AND ADJUSTMENT LOCATIONS

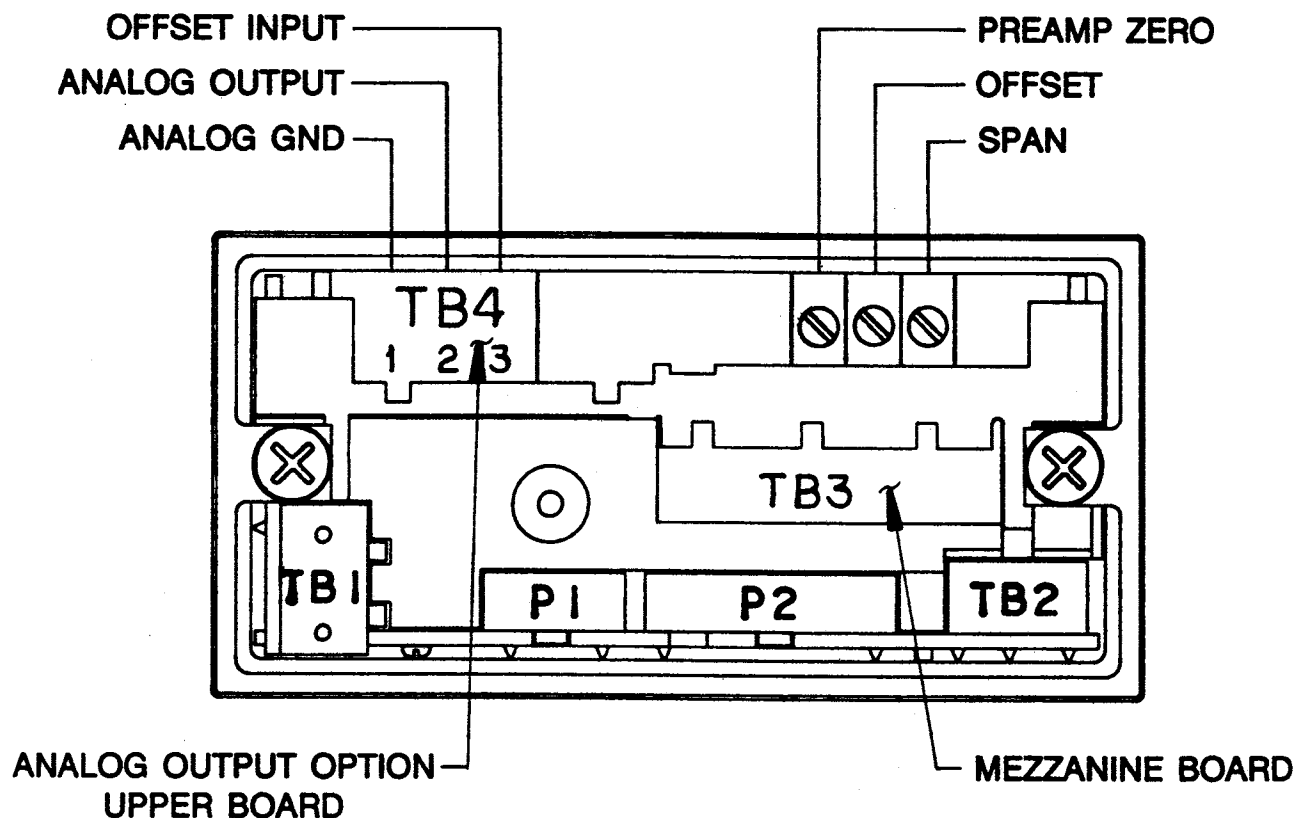


Figure 3-1 Isolated Analog Output Option Rear View

4.0 CONFIGURATION PROCEDURE

Use this procedure to determine the configuration of the isolated analog output option. If reconfiguring is required, first remove all push-on jumpers.

NOTE: Unless otherwise specified, the unit is shipped in the default condition with $0 - 1M = 0 - 10 V$ or $1 mV/100$ counts.

4.1 Output Range Selection

Select one of the ranges from the Output Range Table (see Table 4-1). Then install push-on jumpers as required.

4.2 Display Range Selection

Select one of the ranges from the Display Table (see Table 4-2), left 4 digits (4 MSD) or right 4 digits (4 LSD). Then install push-on jumpers as required.

RANGE	OUTPUT	S1	S3
*V01	0-10 V	ABE	B
I01	0-20 mA	ABE	A
I02	4-20 mA	AB	A

* Default Setting

FULL-SCALE RANGE	S4	GAIN WITH DEFAULT SCALE & OFFSET
4 LSD	A	1mV/count
*4 MSD	B	1mV/100 counts

*Default Setting

Table 4-1 Output Ranges

Table 4-2 Display Ranges

4.3 Span Range Selection

Using lower output (LO), upper output (UO), lower display (LD), and upper display (UD), calculate the gain in counts/output.

$$\text{counts/output} = \frac{(\text{UD} - \text{LD})}{(\text{UO} - \text{LO})}$$

Select one of the ranges from the Span Table (see Table 4-3). Then install push-on jumpers as required.

4.4 Offset Range Selection

Using the same LO, UO, LD, and UD numbers, calculate the zero offset using the appropriate formula below:

$$V01 \text{ \& I01 Offset} = \frac{LD \times (UO - LO)}{(UD - LD)}$$

$$I02 \text{ Offset} = \frac{LD \times (UO - LO)}{(UD - LD)} + 1$$

Select one of the ranges from the Offset Table (see Table 4-4) which includes the calculated offset. Then reposition push-on jumpers S1-A, S1-B, S1-C, and S1-D as required.

NOTE: S1-E must be in, except on I02 range.

VOLTAGE RANGE	COUNTS/VOLT	CURRENT RANGE	COUNTS/mA	S2
VR1	48.0 - 63.0	CR1	27.2 - 35.7	CF
VR2	62.5 - 82.0	CR2	35.4 - 46.5	DF
VR3	81.5 - 106.5	CR3	46.2 - 60.3	E
VR4	106.0 - 138.5	CR4	60.1 - 78.5	BE
VR5	138.0 - 180.0	CR5	78.2 - 102.0	AF
VR6	179.5 - 234.0	CR6	101.7 - 132.6	CE
VR7	233.5 - 304.0	CR7	132.3 - 172.2	BDE
VR8	303.5 - 395.0	CR8	171.9 - 223.8	--
VR9	394.5 - 513.5	CR9	223.5 - 290.9	AE
VR10	513.5 - 667.5	CR10	290.9 - 378.2	C
VR11	667.0 - 867.5	CR11	377.9 - 491.5	BD
*VR12	867.0 - 1127.5	CR12	491.2 - 638.8	A

* Default Setting

NOTE: When using the default (S4-B selecting the 4 MSD), divide display counts by 100 before using Table 4-3.

Table 4-3 Span Ranges

OFFSET RANGE	VOLTAGE	CURRENT	S1
*Z01	0.0 - 2.5 V	0.0 - 4.4mA	AB
Z02	2.5 - 5.0 V	4.4 - 8.8mA	AC
Z03	5.0 - 7.5 V	8.8 - 13.2mA	BD
Z04	7.5 - 10.0 V	13.2 - 17.7mA	CD

* Default Setting

Table 4-4 Offset Ranges

5.0 MECHANICAL INSTALLATION

The analog board is positioned as an upper board in the meter. Refer to the exploded view in the main board manual.

To install:

1. Hold the board upside-down with components facing the main board.
2. Position the P5 pins to mate with the J5 connector on the power supply board.
3. Push the board downward until it rests on the upper rear panel and display board.

6.0 FRONT PANEL SETUP

NOTE: The software switch SS3 of Configuration 2 must be set (XXX1XX) to activate the analog output board. For more information, refer to Section 4.1 of the main board manual.

7.0 CALIBRATION

Be sure to use the four display digits during calibration as selected in Section 4.2 .

NOTE: Calibration is possible without an input signal by setting FUNCTION to TOTAL and then OFFSET to the appropriate display reading.

7.1 Voltage output (V01)

1. Attach a voltmeter (4 1/2 digit or more) with the negative lead to TB4-1 and the positive lead to TB4-2 on the rear panel of the unit.
2. Set the voltmeter range to 10 V dc full scale.
3. Apply a signal to the input which displays the lower display reading (LD) and adjust R8 (Z) to read the lower output voltage (LO) on the voltmeter.
4. Apply a signal to the input which displays the upper display reading (UD) and adjust R7 (S) to read the upper output voltage (UO) on the voltmeter.
5. Repeat steps 3 and 4 above.

7.2 Current Output (I01)

1. Attach an ammeter (4 1/2 digit or more) with the negative lead to TB4-1 and the positive lead to TB4-2 on the rear panel of the unit.
2. Set the ammeter range to 20 mA full scale.
3. Apply a signal to the input which displays the lower display reading (LD) and adjust R8 (Z) to read the lower output current (LO) on the ammeter.
4. Apply a signal to the input which displays the upper display reading (UD) and adjust R7 (S) to read the upper output current (UO) on the ammeter.
5. Repeat steps 3 and 4 above.

7.3 Current Output (I02)

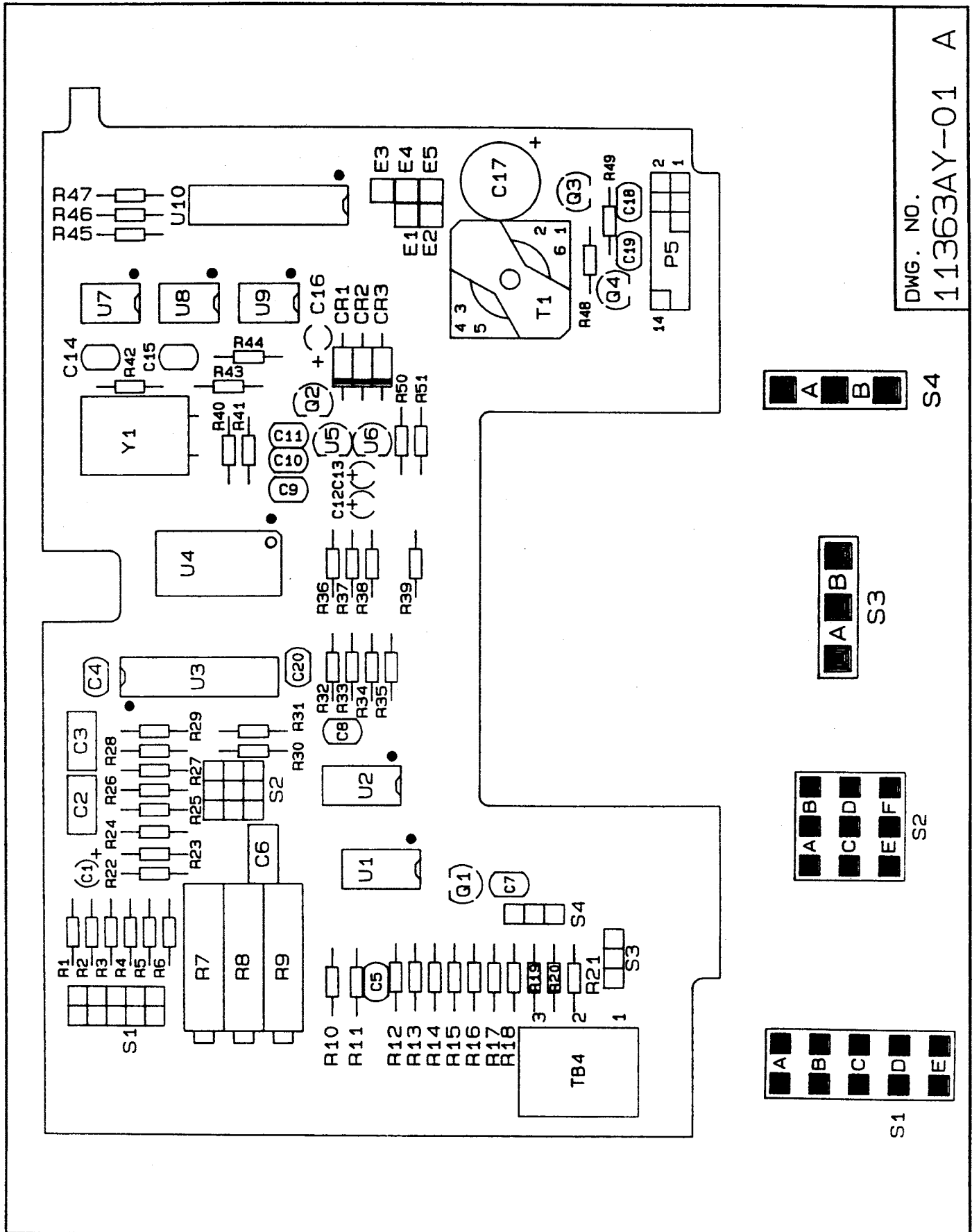
1. Attach an ammeter (4 1/2 digit or more) with the negative lead to TB4-1 and the positive lead to TB4-2 on the rear panel of the unit.
2. Connect a jumper wire between TB4-1 and TB4-3.
3. Set the ammeter range to 20 mA full scale.
4. Apply a signal to the input which displays zero.
5. Record the ammeter reading (5.0 mA is typical).
6. Apply a signal to the input which is equal to the display span (UD - LD) and adjust R7 (S) on the ammeter to read the output span (UO - LO) plus the offset recorded in step 5 ($16.0 + 5.0 = 21.0$ mA is typical).
7. Remove the jumper between TB4-1 and TB4-3.
8. Apply a signal to the input which displays the lower display reading (LD) and adjust R8 (Z) to read the lower output current (LO) on the ammeter.
9. Apply a signal to the input which displays the upper display reading (UD) and adjust R7 (S) to read the upper output current (UO) on the ammeter.
10. Repeat steps 8 and 9 above.

7.4 Preamp Zero Adjust (R9)

The preamp zero has been adjusted at the factory and should not require adjustment unless it has been adjusted by mistake. If necessary, use the following adjustment procedures:

1. For output ranges V01 and I01, apply a signal to the input which displays zero on the selected display range (4 LSD OR 4 MSD). Jumper TB4-1 to TB4-3 and adjust R9 for zero output on the voltmeter or ammeter. Proceed to Section 7.1 or 7.2 .
2. For output range I02, you must add S1-E push-on jumper before performing step 1 above. After completing step 1, you must remove S1-E before proceeding to Section 7.3 .

8.0 ISOLATED ANALOG OUTPUT DRAWINGS



DWG. NO.
11363AY-01 A

Figure 8-1 Isolated Analog Output Assembly Diagram



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from the date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

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1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

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