

OM400 SERIES Multichannel Data Logger

Operator's Manual

 **OMEGA**
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1.0 GENERAL DESCRIPTION

The OMEGA OM400 Series Multichannel Data Logger is a programmable automatic data logger designed to read and record (digitally) temperature information from thermocouple types J, K, T, E, R, and S. The OM400 Series Data Loggers come with a multiplexer capable of reading up to 10 or 40 transducers. Through use of the keyboard, the user is able to program print rate, HI - LOW limits, day and time, number of channels to be sampled, engineering units and many other useful functions. If power is lost during operation, important programming information is saved and accurate time information is maintained.

2.0 SYSTEM OPERATION

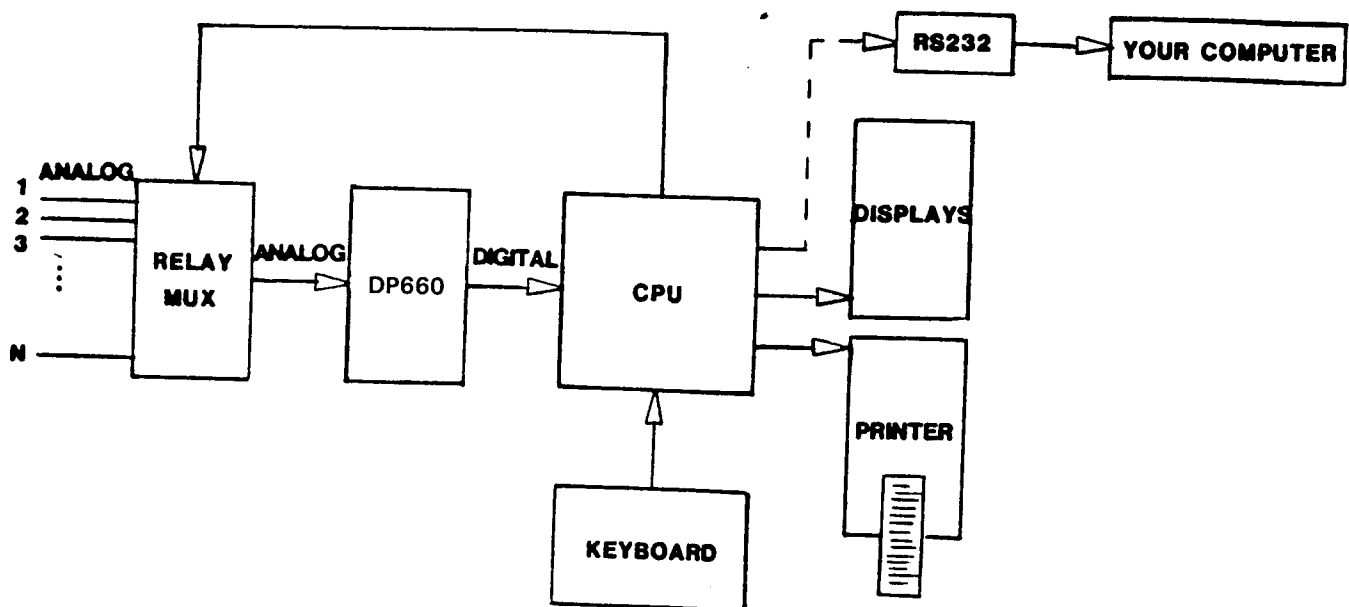


Figure 2-1 Block Diagram

2.1 DATA LOGGER

The OM400 can be diagramed as seven logical blocks: the Digital Panel Instrument (DPI, OMEGA Model DP660) multiplexer (MUX), CPU, display system, printer, keyboard, and optional RS232 output. The CPU controls and is responsible for all of the programmable functions available in the OM400 Series Data Loggers. It monitors the DPI, and keyboard and sends the necessary information to the printer, display, and RS232 output. In addition, the CPU maintains all programmed functions and time-keeping during a power failure. When power returns the CPU will restore the system back to the same programming that was in effect just before the power was lost. (See Figure 2-1.)

2.2 MULTIPLEXER

The multiplexer consists of two individual parts; the control board and the relay board. The control board receives and interprets digital information from the data logger CPU and drives the selected relay on the relay board. The relay board then switches the chosen channel through to the DPI. Relays are used to obtain high isolation between channels and high reliability switching in addition to over-voltage protection. The relay board also provides cold junction compensation information for thermocouple applications.

2.3 DPI (OMEGA DP660)

The DPI acts as a front end or analog to digital (A/D) converter of the OM400 Series Data Loggers. It converts the analog signals from the MUX into digital signals which can be read by the CPU. The DPI performs linearization for specific thermocouple types (J, K, T, E, R and S).

2.4 OPTION RS232

The RS232 Data Output Port sends data in the standard RS232 serial format in either current loop or $\pm 12V$ levels. The same characters, plus the necessary return and line feeds, that appear on the printer will be transmitted via the RS232 data port. This port will remain active at all times even when the interval printer is disabled.

3.0 INSTALLATION AND SET-UP

3.1 QUICK HOOK-UP

Sections 3.3 through 3.5 provide most basic information on installing your Series OM400 Data Logger. Section 7 describes how to program the unit.

3.2 SHIPPING BOX AND UNPACKING

Carefully inspect the OM400 Series Data Logger for shipping damage. Report any damage immediately to the carrier, submit a claim to the carriers and notify OMEGA.

3.3 CONNECTING THERMOCOUPLE INPUTS

All analog inputs are connected to the MUX relay board located under the top cover. Removing the top two #6 screws in the back panel will allow the top panel to be slid back revealing the MUX relay board. All channels are labeled as to their channel number and polarity. Use a small screwdriver to attach wires in the pressure grip lugs.

Connect thermocouple leads -- red lead to negative terminal, color-coded lead to positive terminal. Only one thermocouple per channel.

For the 10 channel model of the OM400, the MUX relay has 10 clusters of four connection points. For each cluster, position 1 is positive, and position 4 is negative (position 2 and 3 are not used). See Figure 7-6. For the 40 channel model of the OM400, the MUX relay board has 40 sets of two connection points, (marked positive and negative) and each channel is clearly marked (see Figure 7-9).

WARNING

WHEN THIS EQUIPMENT IS USED IN THE FLOATING OR UNGROUNDED MODE, METAL SURFACES MAY HAVE LETHAL ELECTRICAL POTENTIALS. THEREFORE, IT IS RECOMMENDED THAT THE UNIT BE USED ONLY IN THE GROUNDED CONFIGURATION AND THAT THE USER AVOIDS TOUCHING SUPPLIES OF HIGH POTENTIAL AND THE UNIT AT THE SAME TIME.

3.4 DIGITAL PANEL INSTRUMENT OMEGA DP660 SETUP

Refer to the OMEGA DP660 Digital Panel Instrument manual (M108) for operation information and for selecting thermocouple type.

3.5 CONNECTING POWER

Connect to standard 110V-120VAC 3-wire outlet. Power Option 220V is available for 220VAC operation.

3.6 INSTALLATION OF PAPER ROLL

Fold the end of the paper roll back about 2" and insert folded edge into the printer at (1) and hit PAPER ADVANCE twice (see section 5.11.4) to feed paper out of front panel at (2). Replace paper holder/door by placing tongue (3) under slot in front rail and secure with thumb screw (4). (See Figure 3-1.)

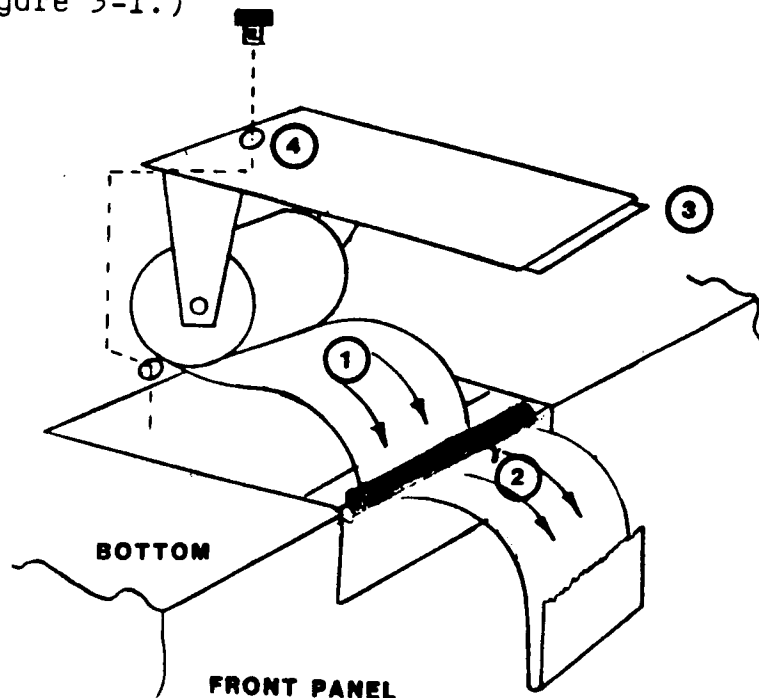


Figure 3-1. Paper Installation

3.7 CONNECTING ACCESSORIES

Several external features are available through the accessories socket. With the plug provided, access to these features can be obtained. The chart below shows the configurations of these connectors. (See Figures 3-2 thru 3-4.)

3.7.1 ACCESSORIES CONNECTOR PORT

1. nc (+6)
2. nc (+6B)
3. (serial out)
4. (aux out 1)
5. (serial clock)
6. (aux input 1)
- * 7. EXTERNAL TRIGGER INPUT (47K pull-up to +6V internal)
- * 8. DIGITAL GROUND (use for trigger and alarm outputs)
- 9.
- 10.
11. (aux input 2)
- 12.
13. (aux output 2)
- * 14. LOW ALARM OUTPUT (CMOS 5MA MAX)
- * 15. HI ALARM OUTPUT (CMOS 5MA MAX)
16. (serial input)

NOTE: Only the "*" pin numbers are supported by the 0M400 Series software.

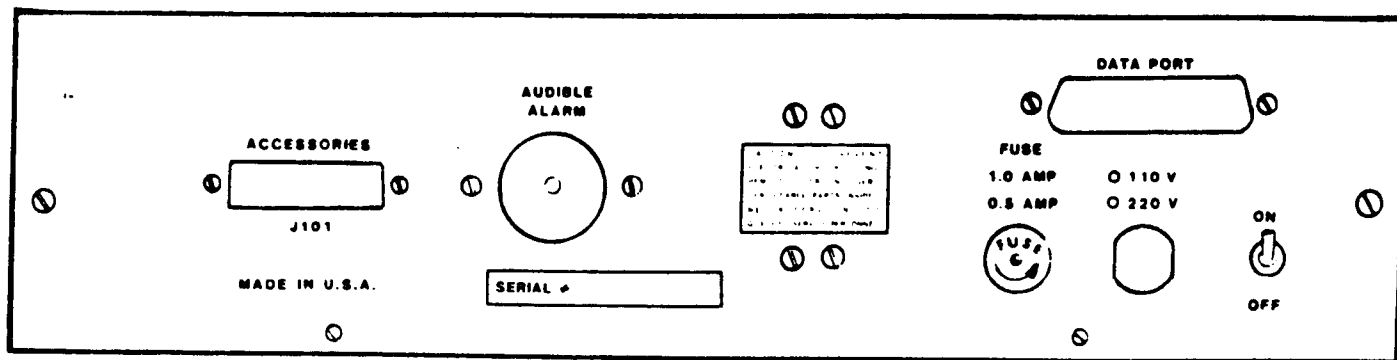


Figure 3-2. Rear Panel View

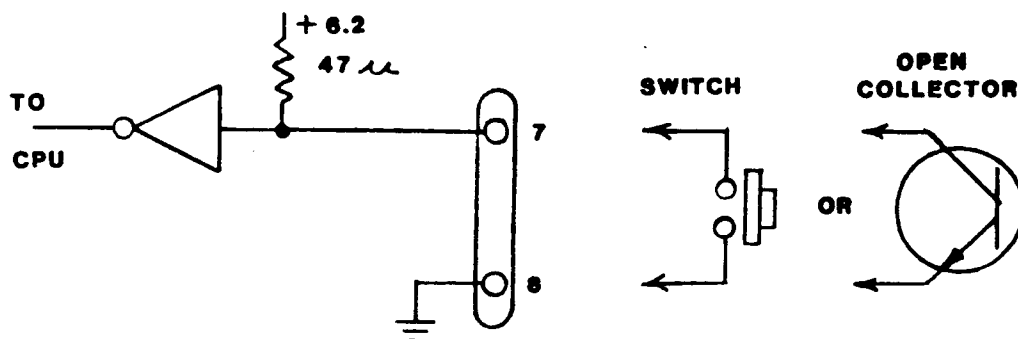


Figure 3-3. Connecting External Trigger

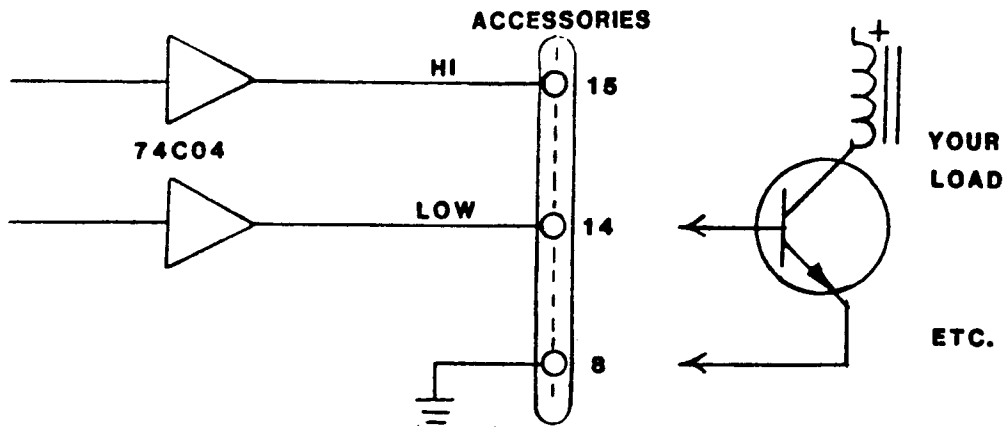


Figure 3-4. Connecting External Alarms

3.8 CONNECTING RS232 (Optional)

The RS232 Data Output Port uses a standard 25 pin "D" connector. Wiring configuration is listed below.

3.8.1 DATA PORT

PIN #

- 1 - Ground
- 2 - Transmit Data +12V, -5V output
- 5 - Clear to send +12V, 5V input
- 7 - Ground
- 9 - + clear to send 20 mA loop sink
- 10- - clear to send
- 24- + transmit data 20 mA sink
- 25- - transmit data

3.9 RACK MOUNT (Option OM400-RM)

The rack mount option is provided for panel mounting of the OM400 Series Data Loggers. (See Figure 3-5.)

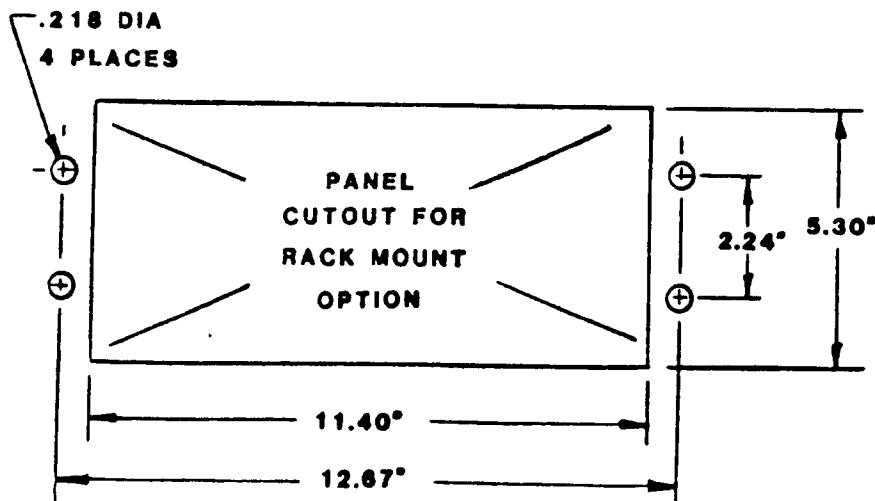


Figure 3-5. Rack Mount Dimensions

4.0 FRONT PANEL (See Figure 4-1).

4.1 PRINTOUT

	02 +0210HH	
	001:2325	
	02 +0153.F	
	02 +1231.F	
1. DWELL time/channel	001:2315	
set by user defaults		
to 3 seconds upon		
clear	02 -200. L	5. CHANNEL ALARM
	02 +200. H	Channel #
	CHANNEL ALARMS	Alarm point sign
		Data value from alarm
		point
		HI/LO designation
2. Channels set by user.	7 +0000.	
Default to 10 upon	6 +0000.	
clear	5 +0000.	6. ALARM POINTS set by
	4 +0000.	user. Defaults to
	3 +0000.	0000 upon clear.
	2 +0000	
	1 +0200	
	0 NO ALARM	
3. MINimum data value	ALARM POINTS	7. INTERVAL time set by
seen on any channel		user in hours, minutes
since last list.		and seconds. Defaults
Defaults to 0000 upon	10.03 CH.DWELL	to 1 hour upon clear.
clear. Will be set	0100.00 INTERVAL	
to first data value	+0000. MIN	
read upon power up.	+1>>>. MAX	8. TIME of day user pro-
	0002 TIME	grammed. Defaults to
4. MAXimum data value	001 DAY	0000 upon clear.
seen on any channel	=== OMEGA OM410TC ===	
since last list.		
Defaults to 0000 on clear.		
Will be set to first data		9. DAY of year user pro-
value read upon power up.		grammed. Defaults to
(>>> indicates overrange reading)		001 on clear.

In the above example: The DAY of the year is 1.
The TIME of day is 00 hours 02 minutes.
The MAXimum data value was overrange.
The MINimum data value was 0000.
The print INTERVAL is 1 hour, 00 minutes, 00 seconds.
The number of CHANNELS is 10.
The DWELL time is 3 seconds.
ALARM POINT 1 is set for 200 All others are set
to zero (default).
Channel 2 is assigned Alarm Point 1 (0200) as a
high limit and negated Alarm Point 1 (-0200) as a
low limit.
A HI alarm occurred on Channel 2 at 2325 hours of
Day 1 and the temperature was 210°F.

4.2 DISPLAYS

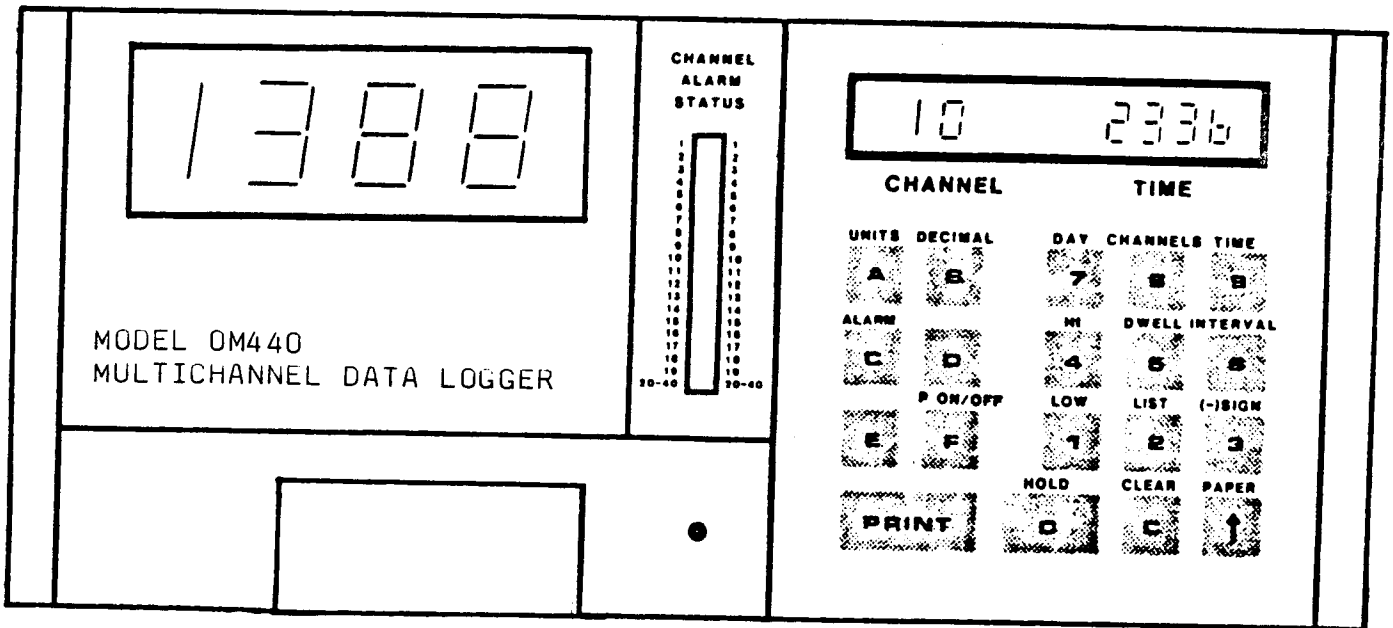


Figure 4-1. OM400 Series Front Panel

4.2.1 ALARM STATUS DISPLAY

This red display shows which channels are in an alarm state. Only the first 19 channels are shown independently. The status of channels 20 thru 40 is displayed together. If any channel (from 20 on) is in an alarm state the 20-40 LED will be lit.

4.2.2 CHANNEL/TIME & KEYBOARD INPUT DISPLAY

This blue display shows, in the left section, the channel number (0 - 40) currently being read. In the right section, it shows the current time in hours/minutes (0000 - 2359). When a key is pressed, a corresponding character will be displayed when acknowledged.

4.2.3 INTERVAL PRINT INDICATOR

This single LED display shows if the interval printer is enabled. If not lit, interval data is sent out on the data port only.

5.0 PROGRAMMING THE DATA LOGGER

PLEASE NOTE: When entering data or functions into the OM400 Series Data Loggers, be certain that upon pressing a key a "beep" is heard. This signals that the CPU has responded to the key stroke. Before entering the next key stroke, be certain the "beep" has stopped. If the "beep" has not stopped before the next key is pressed the CPU does not recognize this next entry causing incorrect data to be entered. However, do not delay more than 2 seconds otherwise the CPU will assume an error has been made and will resume according to the previous programming. ALL programming changes will be followed by a list function automatically documenting the change. Programming steps may be chained together to save time. (See Figure 5-1.)

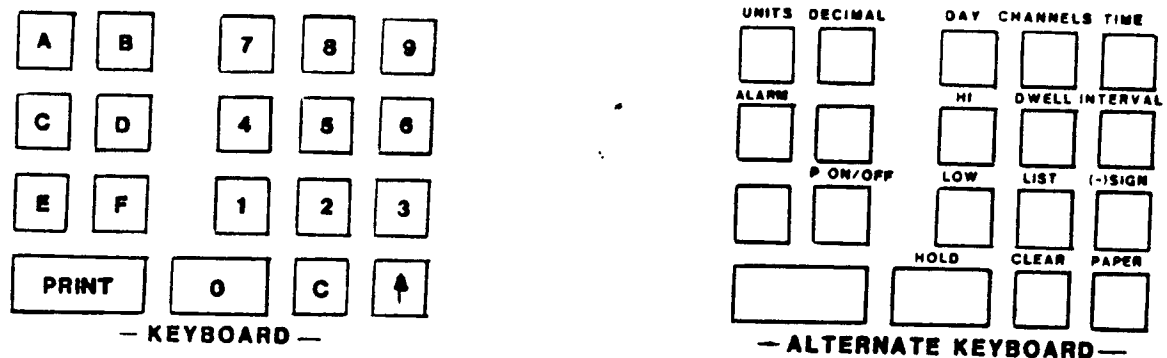


Figure 5-1. OM400 Series Keyboards

NOTE: In the following descriptions, **MSD** refers to the most significant digit, **LSD** to the least significant digit, etc.

5.1 TIME OF DAY

The time of day is 1 to 4 digit entry. The OM400 Series Data Loggers keep time in the 24 hour format. The entry procedure is as follows:

Example: to enter 15:23 (3:23 pm)

DESCRIPTION	KEY PRESSED	DISPLAY
MSD Hours* (tens)	1	1
LSD Hours* (units)	5	15
MSD Minutes* (tens)	2	152
LSD Minutes (units)	3	1523
Shift to alternate keyboard	"arrow"	1523
Store in time counter	TIME	1523

* Leading zeros do not need to be entered. Example: to enter 0059 (12:59 am) press 5, 9, "arrow", TIME.

5.2 DAY OF YEAR

The day of the year is a 1, 2, or 3 digit entry. The OM400 Series Data Logger will increment this counter upon passing from 23:59 to 0:00 hours. This counter will continue to 999 where it will then reset to 000. The entry procedure is as follows:

Example: to enter 205 as day of the year

DESCRIPTION	KEY PRESSED	DISPLAY
MSD Day * (hundreds)	2	2
NSD Day * (tens)	0	20
LSD Day (units)	5	205
Shift to alternate keyboard "arrow"		205
Store in day counter	DAY	205

* Leading zeros do not need to be entered. Example: Day 002
Enter 2, "arrow", DAY.

5.3 PRINT INTERVAL

The print interval is a 2 to 6 digit entry. The OM400 Series Data Loggers will log on intervals from 1 second to 23 hours, 59 minutes, 59 seconds. (5 seconds is probably the lowest useful interval due to settling time of the DP660 panel meter. Entry procedure is as follows:

Example: to enter 11 hours and 45 minutes as print interval

DESCRIPTION	KEY PRESSED	DISPLAY
MSD Hours*	1	1
LSD Hours*	1	11
MSD Minutes*	4	114
LSD Minutes*	5	1145
MSD Seconds	0	11450
LSD Seconds	0	114500
Shift to alternate keyboard "arrow"		114500
Store in interval counter	INTERVAL	114500

* Leading zeros do not need to be entered. Example: 1 hour, 10 seconds. Enter 1, 0, 0, 1, 0, "arrow", INTERVAL.

5.4 NUMBER OF CHANNELS

The number of channels is a 1 or 2 digit entry. The OM400 Series Data Loggers will allow you to select from 1 to the number of channels available on the MUX. The OM400 Data Logger always scans from 1 to the number of channels selected and returns to 1. The entry procedure is as follows:

Example: to enter channels 1 to 34 to be scanned

DESCRIPTION	KEY PRESSED	DISPLAY
MSD # of channels*	3	3
LSD # of channels	4	34
Shift to alternate keyboard	"arrow"	34
Store in channels counter	CHANNELS	34

* Leading zeros do not need to be entered.

5.5 DWELL TIME PER CHANNEL

The dwell time per channel is a 1 digit entry. The OM400 Data Logger can be programmed to dwell on each channel in order to allow the DPI to settle on the new reading being taken after switching to a new channel. Minimum recommended dwell time is 3 seconds. Maximum dwell time is 9 seconds. The entry procedure is as follows:.

Example: to enter 6 seconds as dwell time

DESCRIPTION	KEY PRESSED	DISPLAY
MSD Dwell time in seconds	6	6
Shift to alternate keyboard	"arrow"	6
Store in dwell register	DWELL	6

5.6 SETTING ALARM POINTS

Setting the alarm points is a 5 digit entry. The OM400 Series Data Logger has seven 4-digit registers, called alarm points, numbered 1 through 7, which can be assigned any value from 0 to 9999. Alarm point 0 (NO ALARM) is provided to allow the user to disable a channel alarm. These alarm points can then be assigned to any of the available channels (between channels 1 to 20). The alarm points are absolute values only. The minus sign is added when assigning these points to a given channel. The entry procedure is as follows:

Example: to enter alarm point 2 as the value of 3005

DESCRIPTION	KEY PRESSED	DISPLAY
Alarm Point	2	2
MSD Data value*	3	23
NSD Data value	0	230
NSD Data value	0	2300
LSD Data value	5	23005
Shift to alternate keyboard	"arrow"	23005
Store in alarm register	ALARM	23005

* Unlike previous examples, leading zeros MUST be entered.

5.7 ASSIGNING ALARM POINTS TO CHANNELS

Assigning alarm points to a channel is a 3 digit entry. The OM400 Series Data Logger will allow the user to assign any one of the seven alarm points, or the NO ALARM point, to any or all of the first 20 channels as either a high or a low limit, and as either a positive or negative value. Assigning alarm point 0 will disable that high or low limit.

NOTE: Channels 20 - 40 have a common high and low alarm point.

5.7.1 HI ALARMS

The entry procedure for assigning HI alarms is as follows:

Example: to assign Alarm point 2 as high limit for channel 7

DESCRIPTION	KEY PRESSED	DISPLAY
Alarm point	2	2
MSD Channel #*	0	20
LSD Channel #	7	207
Shift to alternate keyboard "arrow"		207
Store as HI limit for this channel	HI	207

* Leading zero MUST be included.

5.7.2 LOW ALARMS

The entry procedure for assigning LOW alarms is as follows:

Example: to assign Alarm point 5 as low limit for channel 17

DESCRIPTION	KEY PRESSED	DISPLAY
Alarm point	5	5
MSD Channel #*	1	51
LSD Channel #	7	517
Shift to alternate keyboard "arrow"		517
Store as LOW limit for this channel	LOW	517

* Leading zero MUST be included.

5.8 CHANGING (-)SIGN

Sign changes may be made while assigning an alarm point to a channel. The OM400 Series Data Logger will allow the user to negate any one of the seven alarm points effectively making 7 more alarm points with the same absolute value of the original 7. The negative alarm points can be assigned as either a HI or LOW limit and the procedure for entering is the same for both HI or LOW. The entry procedure for changing the sign is as follows:

Example: to enter alarm point 7 as a negative LOW limit on channel 3

DESCRIPTION	KEY PRESSED	DISPLAY
Alarm point	7	7
MSD Channel #*	0	70
LSD Channel #	3	703
Shift to alternate keyboard "arrow"		703
Change to minus (-)SIGN		703
Store as LOW Limit for this channel	LOW	703

* Leading zeros MUST be included.

5.9 DECIMAL PLACEMENT

Moving the decimal is a one digit entry. The OM400 Series Data Logger allow the user to customize the readout to fit the format of the data being recorded. The decimal point can be position to any one of five places within the data value field. Position #4 is the left-most position (.xxxx) and position #0 is the right-most position (xxxx.). The entry procedure is as follows:

Example: to place the decimal point in position #1 (xxx.x)

DESCRIPTION	KEY PRESSED	DISPLAY
Decimal position (0-4)	1	1
Shift to alternate keyboard "arrow"		1
Store in decimal register	DECIMAL	1

5.10 UNITS

A unit change is a 2 or 4 digit entry. The OM400 Series Data Loggers allow the user to customize the readout to fit the format of the data being recorded. The engineering units (the two right-most characters of the data value printout can be changed to any of the standard ASCII characters shown in Table 5-1).

TABLE 5-1
UNIT TABLE

UNIT CODES FOR OM400 SERIES DATA LOGGERS

20 space	30 0	40 @	50 P	60 `	70 p
21 !	31 1	41 A	51 Q	61 a	71 q
22 "	32 2	42 B	52 R	62 b	72 r
23 #	33 3	43 C	53 S	63 c	73 s
24 \$	34 4	44 D	54 T	64 d	74 t
25 %	35 5	45 E	55 U	65 e	75 u
26 &	36 6	46 F	56 V	66 f	76 v
27 ^	37 7	47 G	57 W	67 g	77 w
28 (38 8	48 H	58 X	68 h	78 x
29 *	39 9	49 I	59 Y	69 i	79 y
2A)	3A \	4A J	5A Z	6A j	7A z
2B +	3B ,	4B K	5B [6B k	7B (ohm)
2C ,	3C <	4C L	5C /	6C l	7C (degree)
2D -	3D =	4D M	5D]	6D m	7D
2E .	3E >	4E N	5E ■	6E n	7E ?
2F /	3F ↓	4F O	5F _	6F o	7F ↓

The entry procedure to change units is as follows:

NOTE: The code for the LSD second ASCII character is automatically sent to the computer by the DP660 Digital Panel Instrument. The code will either be a 6 (for °F) or a 3 (for °C), depending upon what the DP660 is set for (°F or °C, See DP660 operator's manual M108).

DESCRIPTION	KEY PRESSED	DISPLAY
MSD First ASCII character*	7	7
LSD First ASCII character*	C	7C
MSD Second ASCII character	4	7C4
LSD Second ASCII character	6	7C46
Shift to alternate keyboard "arrow"		7C46
Store in units register	UNITS	7C46

* These two entries can be ignored if only one ASCII character is desired.

5.11 FUNCTIONS

The OM400 Series Data Loggers offer several functions which are not part of the programming steps but increase overall usefulness of the data logger.

5.11.1 CLEAR

The Clear function allows resetting all registers to default values. This is useful when an entirely new program is desired or when improper data is stored due to battery failure. The entry procedure is as follows:

DESCRIPTION	KEY PRESSED	DISPLAY
Shift to alternate keyboard	"arrow"	N/A
Clear command	CLEAR	

5.11.2 HOLD

The Hold function allows the user to stop or hold the MUX at any available channel within the range of channels selected by the user during the NUMBER OF CHANNELS programming (section 5.4.) To hold on one channel, the entry procedure is as follows:

Example: to hold on channel 14

DESCRIPTION	KEY PRESSED	DISPLAY
MSD Channel #*	1	1
LSD Channel #	4	14
Shift to alternate keyboard	"arrow"	14
Enter Hold mode	HOLD	14

* Leading zero does not need to be entered.

The Hold mode will be released when print interval is reached or can be released by the following procedure:

DESCRIPTION	KEY PRESSED	DISPLAY
Shift to alternate keyboard	"arrow"	N/A
Release Hold mode	HOLD	

5.11.3 LIST

The list function allows the user to print out all current programmed values, alarm points, and channel alarms. A list will occur upon any change in programmed values, alarm points, or channel alarms automatically.

NOTE: Executing the LIST function, clears the minimum and maximum registers. To execute a list, the key entry procedure is as follows:

DESCRIPTION	KEY PRESSED	DISPLAY
Shift to alternate keyboard	"arrow"	N/A
Execute List	LIST	

5.11.4 PAPER ADVANCE

The Paper Advance function allows approximately 1" of paper to be fed out to allow easy tear off without destroying any documentation. It's also useful when loading paper to start it through the shuttle. To advance paper, the entry procedure is as follows:

DESCRIPTION	KEY PRESSED	DISPLAY
Shift to alternate keyboard Paper Advance	"arrow" PAPER	N/A

5.11.5 PRINTER ON/OFF

The Printer ON/OFF function allows the user to turn the printer on and off. When off, the printer will continue to print all list functions, but will not print on timed intervals or channel alarms. The RS232 is not affected by this function. To turn off the printer when it is presently on, the entry procedure is as follows:

DESCRIPTION	KEY PRESSED	DISPLAY
Shift to alternate keyboard Turn printer off	"arrow" PRINTER ON/OFF	N/A

To turn the printer back on, repeat above procedure.

5.11.6 PRINT

Pressing the PRINT key causes a forced print interval. Timed intervals will not be affected by the function.

6.0 SPECIFICATIONS

6.1 PRINTER

Shuttle type, self cleaning, thermal print 5 x 7 dot matrix
16 column printer

6.2 POWER

120VAC, 1 Amp

220VAC, 0.5 Amp Power Option 220V

6.3 BATTERY BACKUP .

24 hour minimum hold time for programming and time.
15 hour charging time.

6.4 RS232 (Optional)

Baud Rates: 300, 600, 1200, 2400, 4800, 9600
Output Format: Outputt same data as printer
Levels: 20 mil current loop and 0 - 5V TTL

6.5 ENVIRONMENTAL

Operating Range: 0°C - 50°C
Storage: -40°C - 70°C
Humidity: 0 to 90% non-condensing

6.6 DIMENSIONS

Case: 6" high x 14" depth x 11.5" width
15.24 cm x 35.56 cm x 29.21 cm

With, Rack Mounting Option installed:
6" high x 15.5" depth x 13.5" width
15.24 cm x 39.37 cm x 34.29 cm

Weight: 12 lbs.
5.5 kg.

6.7 MUX SPECIFICATIONS

6.7.1 FUNCTION

Accepts voltages from ± 10 microvolts to ± 10 volts full scale, and currents from ± 5 microamperes to one microampere full scale. Thermocouple junctions are temperature equalized and ice-point compensated.

6.7.2 CHANNELS

10 or 40 switched channel with relay-isolated closures for high and low terminals.

6.7.3 INPUTS

Sensors must be similarly scaled, since all inputs will be switched through a common signal conditioning circuit. Sensors can be grounded or ungrounded thermocouples.

6.7.5 SCAN RATE

Programmable between 1 and 9 seconds per channel. Scan rate will be determined by user requirements and the settling time of the signal for the specific application (3 Second Minimum Recommended.)

6.7.6 RELAY LIFE

3×10^8 cycles.

6.8 DIGITAL PANEL INSTRUMENT (DP660) SPECIFICATIONS

See DP660 Digital Panel Meter Operator's Manual (M108).

6.9 THERMOCOUPLE SPECIFICATIONS

THERMOCOUPLE INPUTS

THERMOCOUPLE TYPES:

J, K, T, E, S, and R

INPUT IMPEDANCE:

>100Mohms

EXTERNAL (LEAD) RESISTANCE EFFECT:

<20uV per 350 ohm of Lead resistance

COLD JUNCTION COMPENSATION ERROR:

±0.5°C max. (10 to +40°C)

OPEN THERMOCOUPLE:

+EEE Display

THERMOCOUPLE SHORT TO AC LINE:

Internal Protection Provided to 300V peak, (200Vac RMS)

COMMON MODE VOLTAGE:

1400V peak (DC or AC), Between Input and Power Line Ground

COMMON MODE REJECTION RATIO:

>130dB with 250 ohm Source Imbalance (DC to 60Hz)

NORMAL MODE REJECTION RATION:

>80dB @ 50/60Hz

ACCURACY

TEMPERATURE RESOLUTION:

1°C/1°F

RANGE TEMPERATURE COEFFICIENT:

±25ppm/°C typ., ±ppm/°C max.

All Ranges Are Guaranteed Monotonic.

TYPE	RANGE	READOUT	ACCURACY @ 25C*
J	-165° to 760°C	±0.7°C	±1/2 LSD
J	-265° to 1400°F	±1.3°F	±1/2 LSD
K	-50° to 1250°C	±0.9°C	±1/2 LSD
K	-58° to 1999°F	±1.6°F	±1/2 LSD
T	-150° to 400°C	±0.8°C	±1/2 LSD
T	-238° to 752°F	±1.4°F	±1/2 LSD
E	-100° to 870°C	±1.0°C	±1/2 LSD
E	-148° to 1598°F	±2.0°F	±1/2 LSD
S,R	+300° to 1760°C	±1.5°C	±1/2 LSD
	0° to 299°C	±6.0°C	±1/2 LSD
S,R	+572° to 1999°F	±3.0°F	±1/2 LSD
	+32° to 571°F	±12.0°F	±1/2 LSD

* Readout Accuracy Includes All Conformity Errors, CJC Errors, Gain Errors and Offset Errors.

7.0 SCHEMATICS

- 7.1 DATA LOGGER, CPU BOARD - Sheet 1 and 2
- 7.2 KEYBOARD DISPLAY
- 7.3 METER INTERFACE
- 7.4 POWER DISTRIBUTION
- 7.5 10 CHANNEL SCANNER LOGIC
- 7.6 10 CHANNEL THERMOCOUPLE MUX BOARD (Optional)
- 7.7 40 CHANNEL POWER SUPPLY (Optional)
- 7.8 40 CHANNEL MUX CONTROLLER (Optional)
- 7.9 40 CHANNEL MUX RELAYS (Optional)

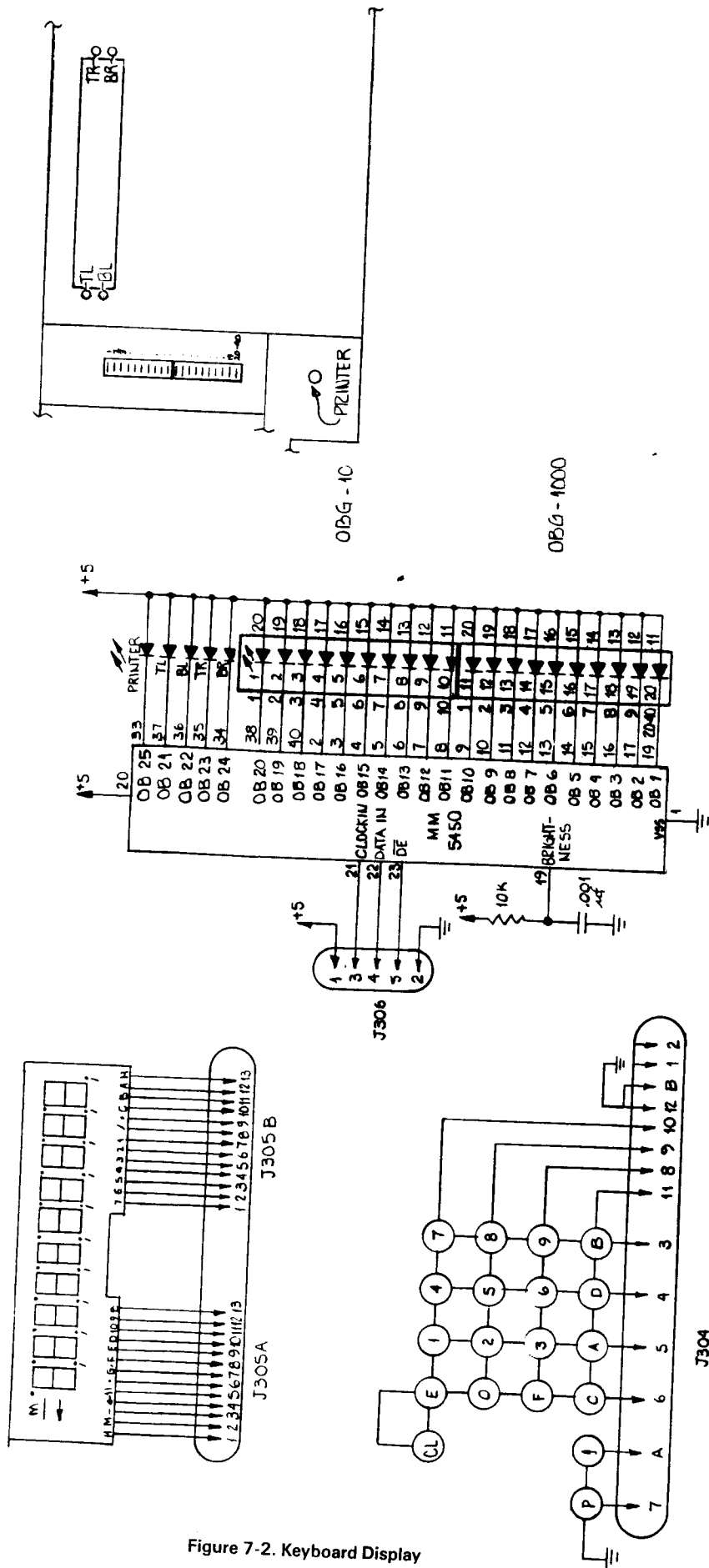


Figure 7-2. Keyboard Display

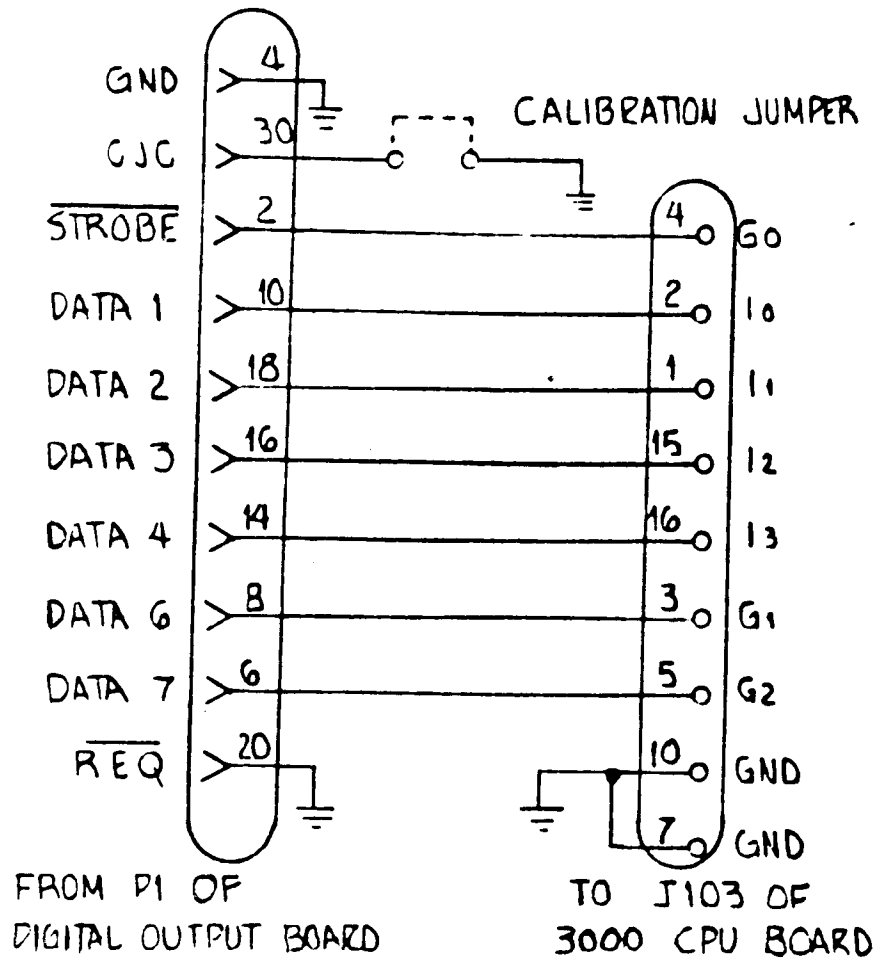


Figure 7-3. Meter Interface

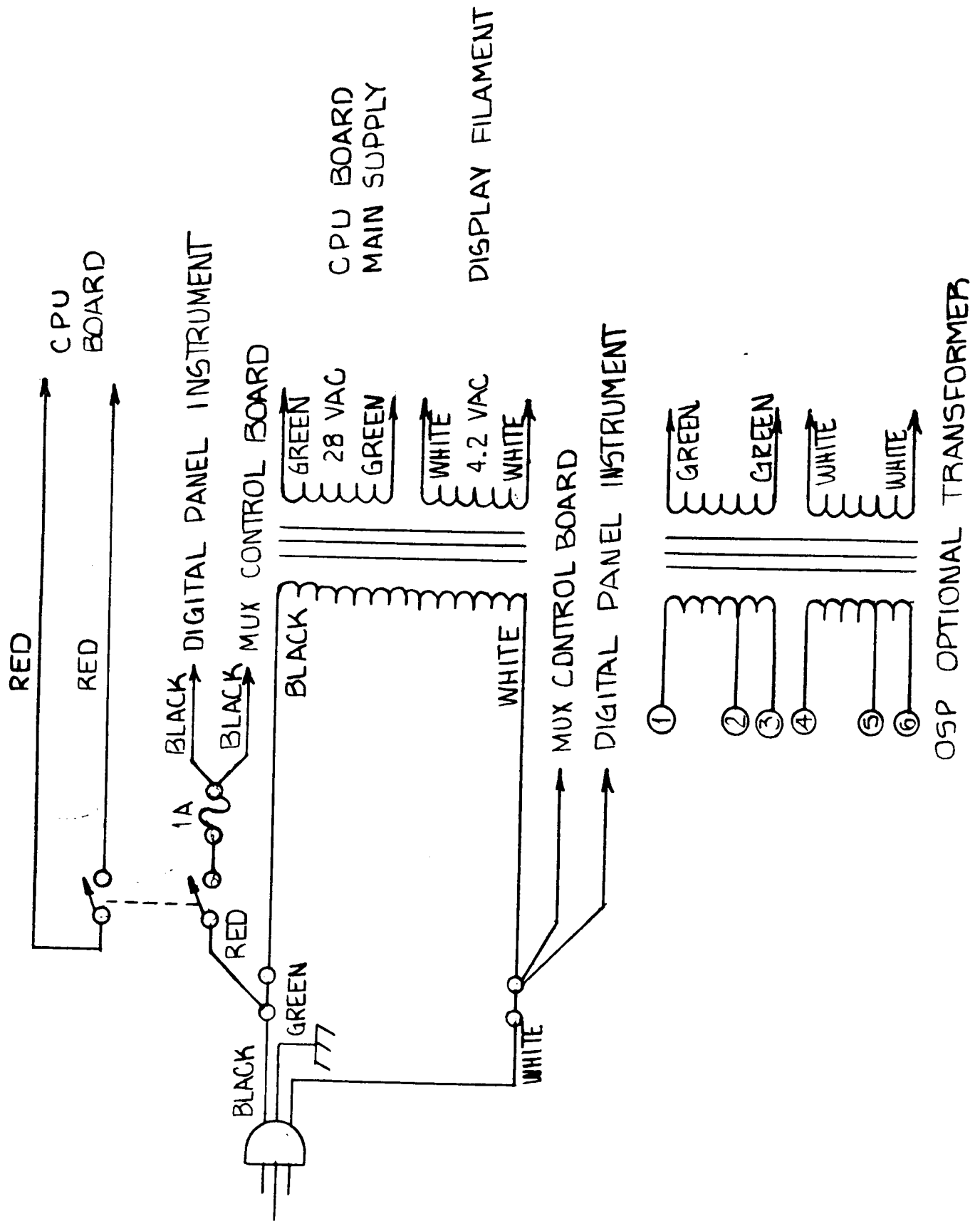
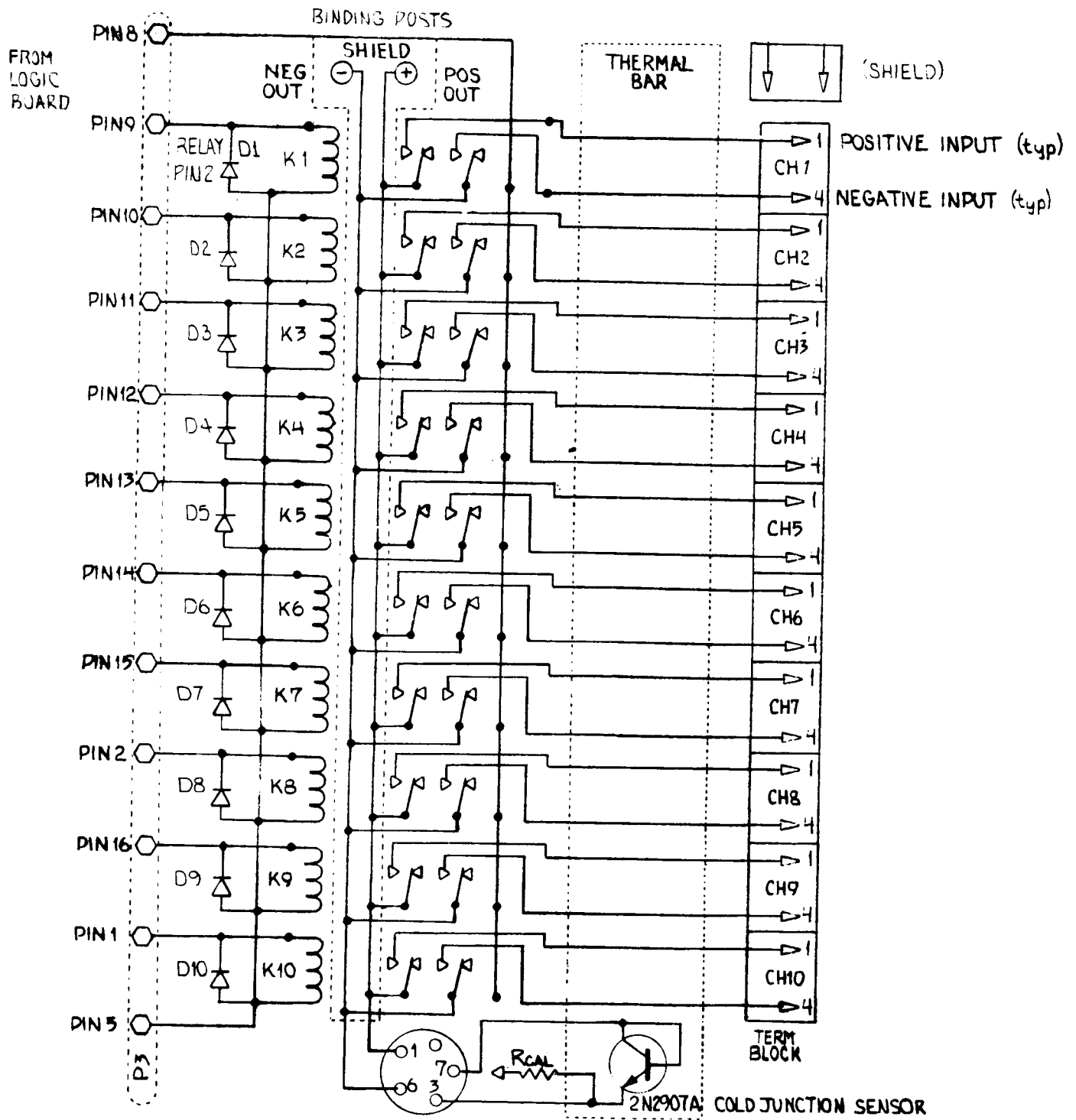


Figure 7-4. Power Distribution



PINOUTS FOR K1 ARE TYPICAL
ALL DIODES 1N4004

Figure 7-6. 10 Channel Thermocouple Mux Board

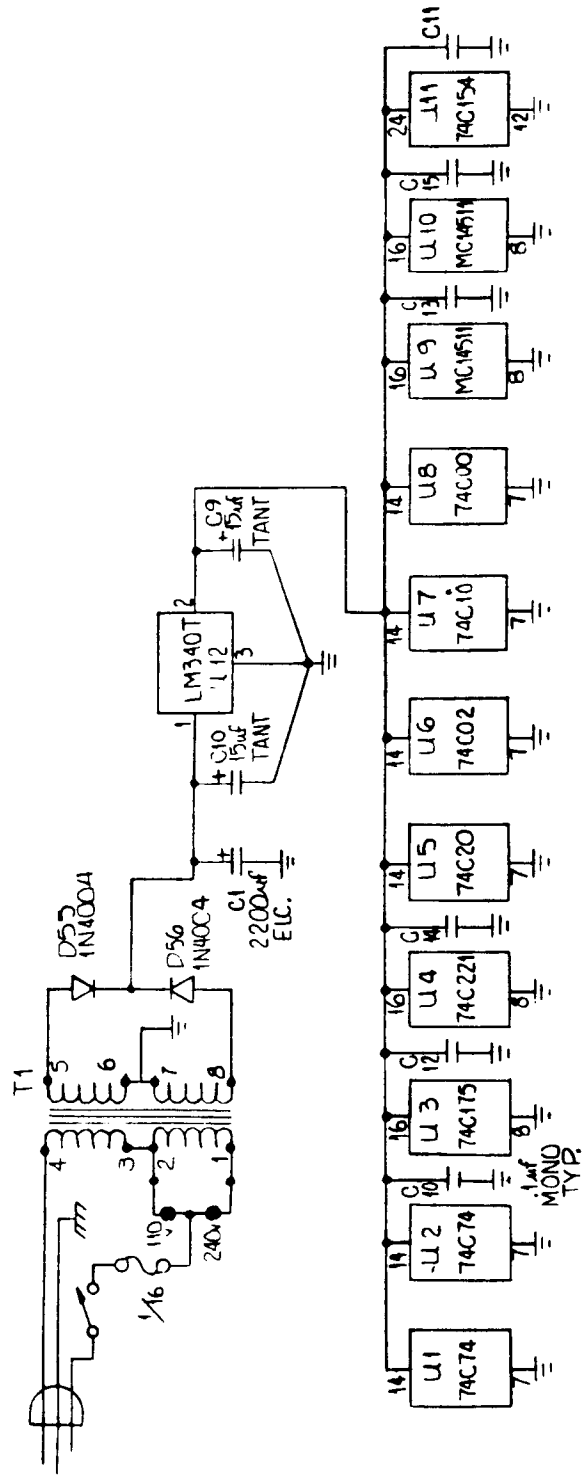


Figure 7-7. 40 Channel Power Supply

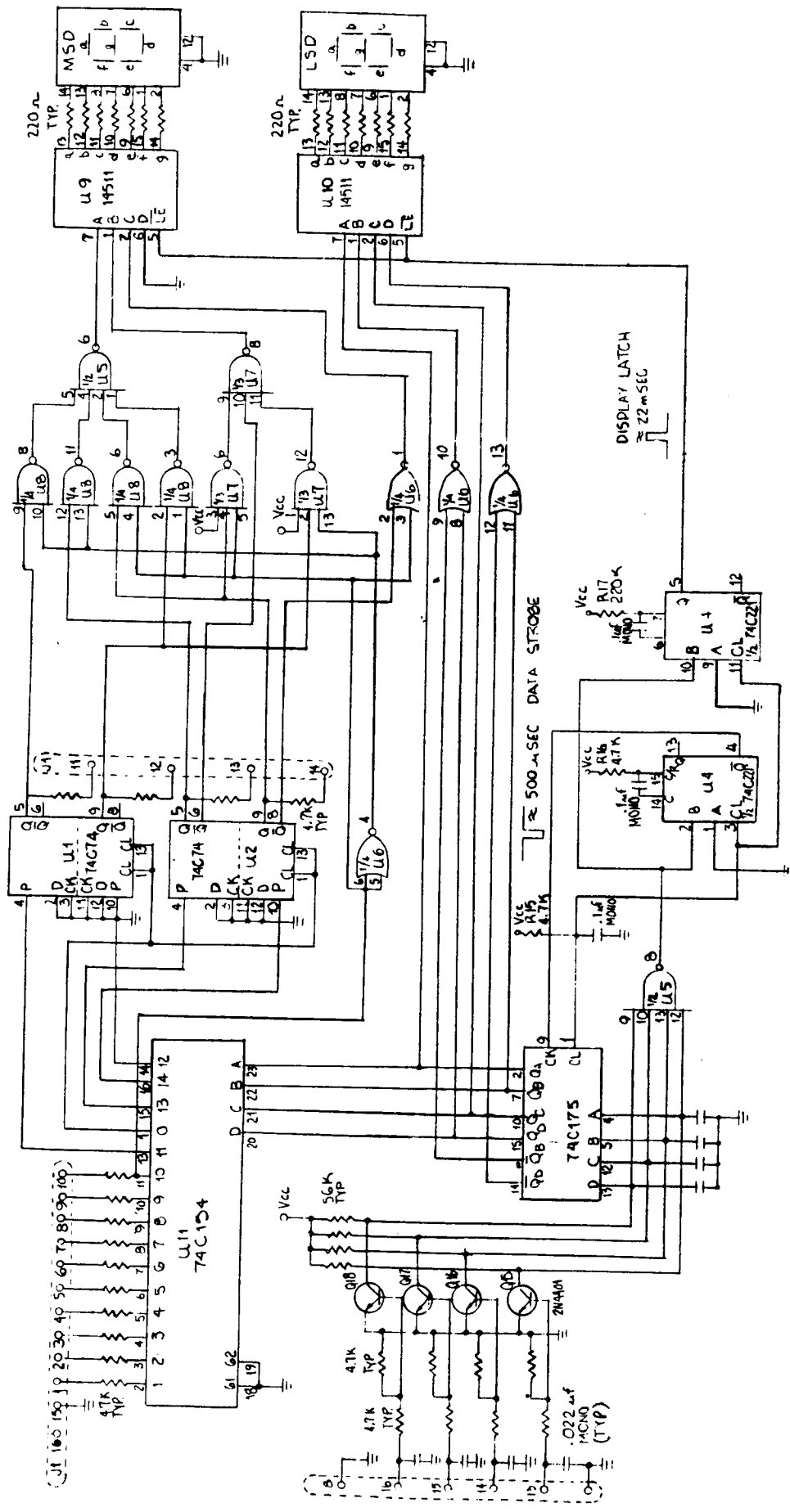


Figure 7-8. 40 Channel Mux Controller

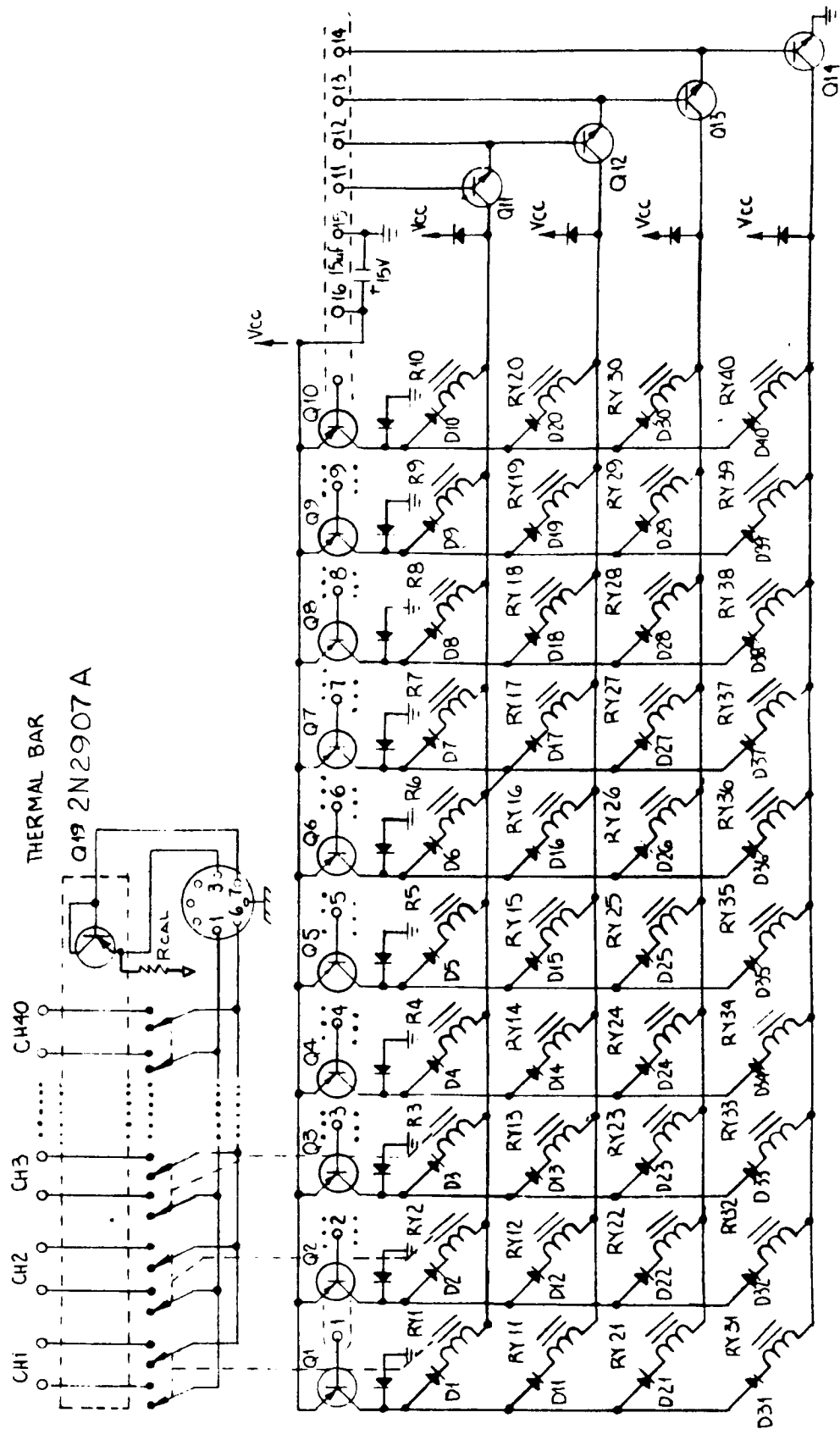
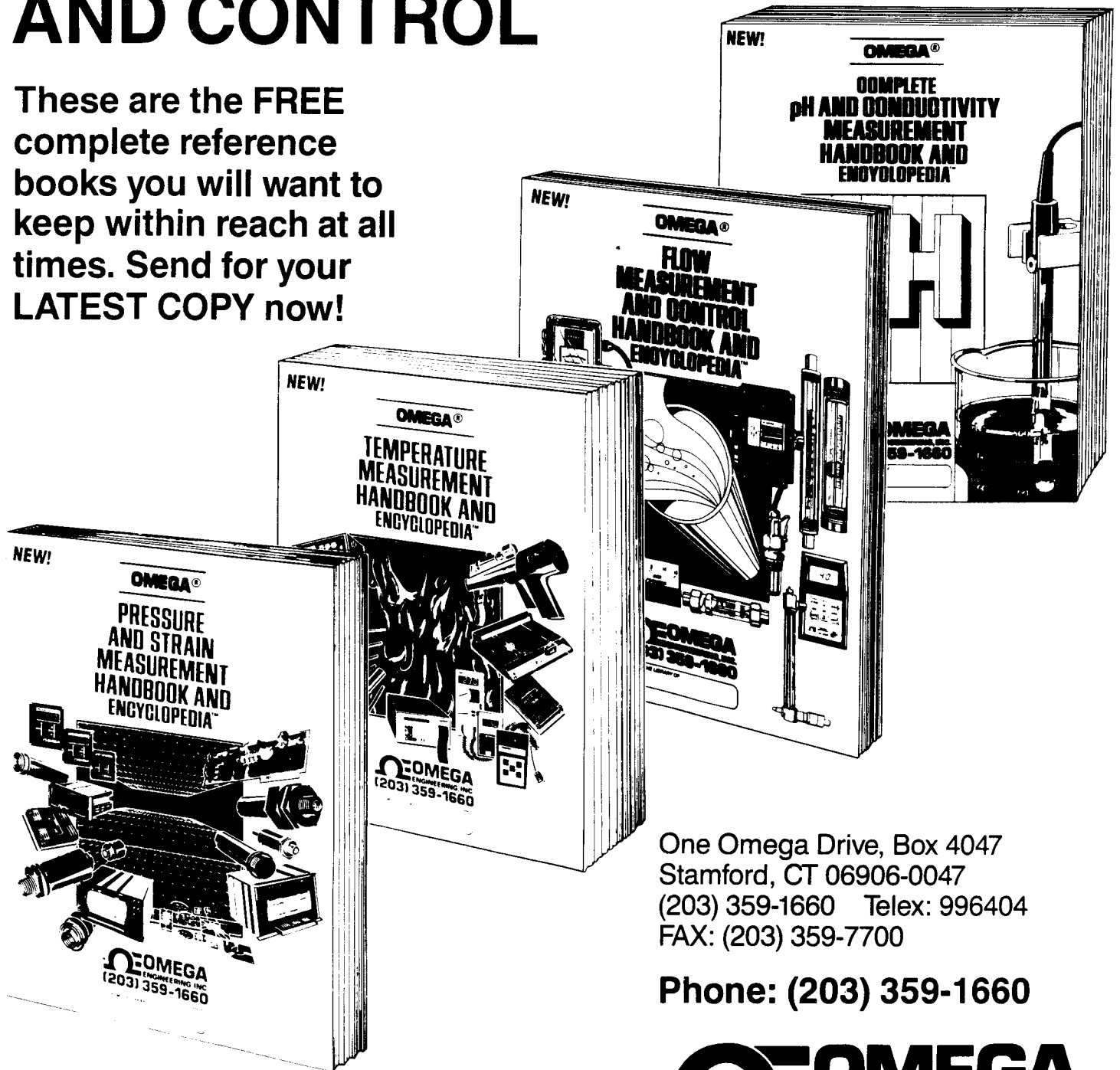


Figure 7-9. 40 Channel Mux Relays

NOTES

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