OM302 SERIES

Thermocouple Digital Data Logger

Operator's Manual

OMEGA ENGINEERING, INC.
An OMEGA Technologies Company

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2. **Model and Serial numbers.**
3. **Repair instructions.**

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SERIES OM-302 THERMOCOUPLE DIGITAL DATALOGGER
OPERATING MANUAL

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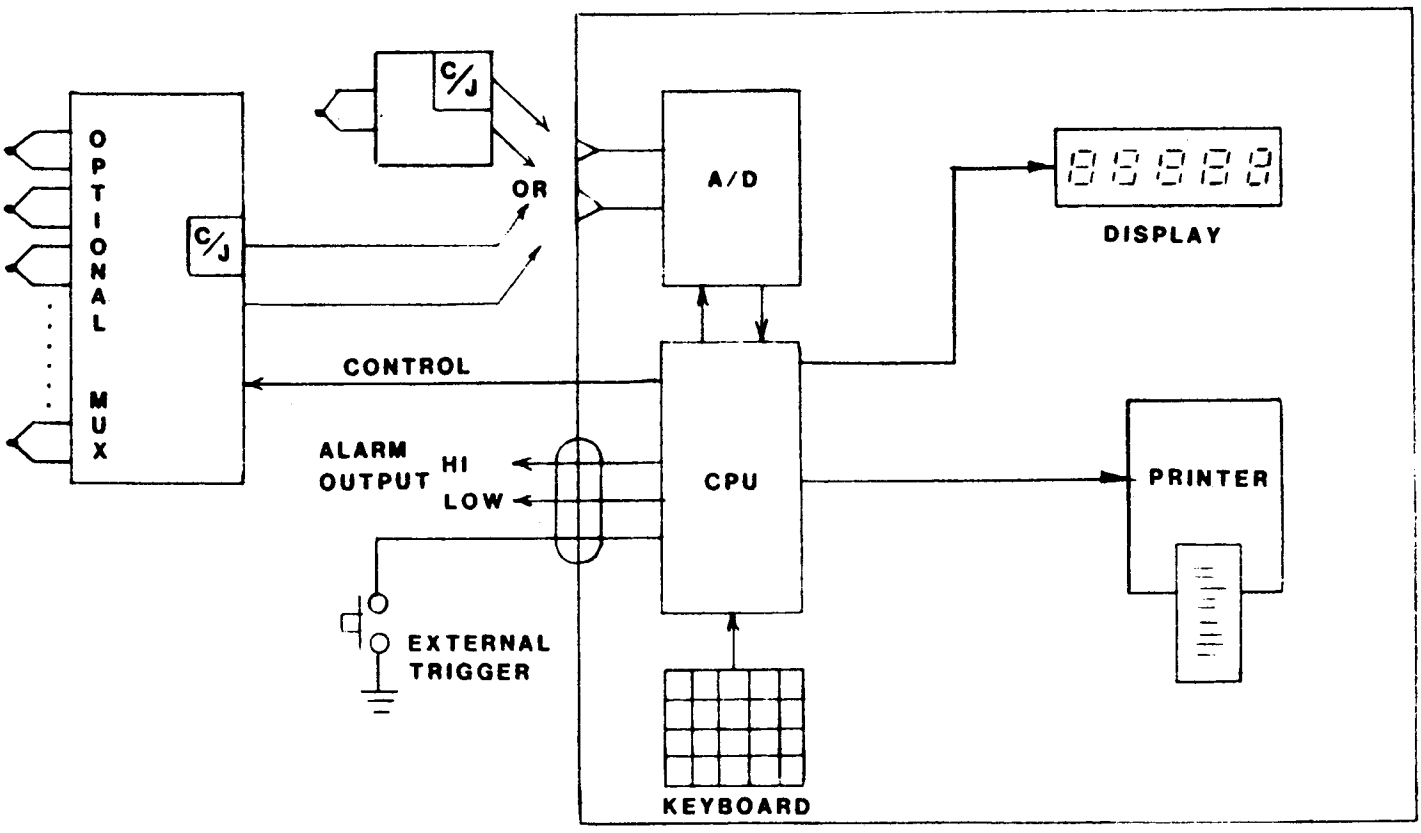
SERIES OM-302 THERMOCOUPLE DIGITAL DATALOGGER
OPERATING MANUAL

1.0 GENERAL DESCRIPTION

The OM-302 Thermocouple Datalogger is designed to read and record digitally, as temperatures, the microvolt inputs generated by either Types J, K, T or E thermocouples. Through use of the keyboard, the user is able to program print rate, High - Low limits, thermocouple type, engineering units (°C or °F), time, day of the year and many other useful functions. If power is lost during operation, important programming information is saved and accurate time information is maintained. Through the addition of optional multiplexers (MUX), up to 40 sensors can be continuously monitored.

2.0 SYSTEM OPERATION



The OM-302 and its options are diagrammed above. As can be seen, the system can be divided into a single or multiple channel input device and associated cold junction sensors (C/J); the analog to digital conversion section (A/D); the CPU; the keyboard; the printer; and the display.

2.1 THE INPUT DEVICE (SINGLE OR MULTICHANNEL)

The input device consists of a place to connect the thermocouple (T/C's) and a sensor to measure the temperature of this connection. In the case of the multichannel inputs switching relays and associated control logic are included to allow the CPU to select which thermocouple is being read. In the case of the single channel unit the cold junction is part of the single channel adapter assembly.

2.2 A/D

This section amplifies and conditions the analog thermocouple input voltages and the cold junction voltages into digital information the CPU can process. The CPU controls which reading is being taken and how often.

2.3 CPU

The CPU controls all the other parts of the system. It takes the digital thermocouple information from the A/D and mathematically linearizes and scales the output before sending them to the display and printing. The CPU monitors the keyboard for inputs, keeps time accurately (within 1 second) and performs limit checking, etc.

2.4 DISPLAY

The display's left two digit places show current channel number being read, and the right 6 digit places show the current temperature in °F or °C.

2.5 PRINTER

The printer records a hard copy of the input temperature(s) on demand or at preprogrammed intervals. It documents program changes as they are made, and alarm conditions when high and low alarm points are exceeded.

3.0 INSTALLATION AND SET-UP

3.1 QUICK HOOK-UP

Sections 3.3 through 3.5 provides most basic information on installing your Series OM-302 Datalogger. Section 6 describes how to program the unit.

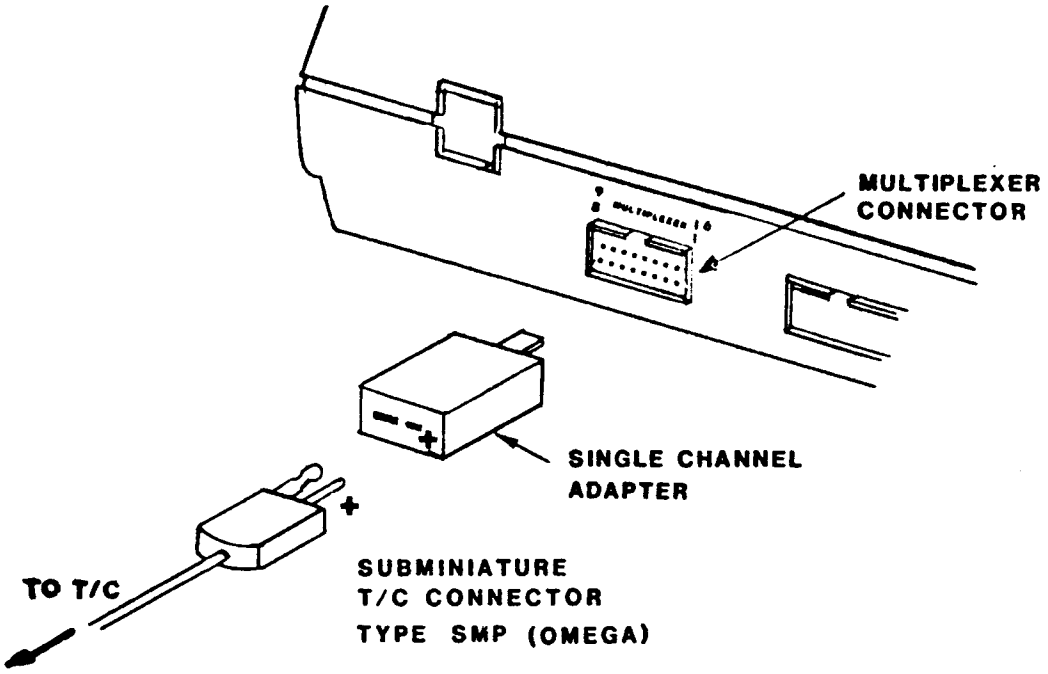
3.2 SHIPPING BOX AND UNPACKING

Carefully inspect the Series OM-302 Datalogger for shipping damage. Report any damage immediately to the carrier, submit a claim to the carriers and notify OMEGA Customer Service Department at (203) 359-1660.

3.3 CONNECTING THE INPUTS

3.3.1 1 CHANNEL INSTALLATION

The unit is supplied with a white connector which plugs into the single channel adapter which plugs into the multiplexer connector in the rear of the OM-302.



Note: the system is supplied with a Copper-Copper connector. Slightly better performance may be realized if you use a connector specific to the thermocouple type you are using. The part numbers and color codes are listed below.

MALE INLINE THERMOCOUPLE CONNECTORS

TYPE	COLOR
J	Black
K	Yellow
T	Blue
E	Purple
Uncompensated	White

3.3.2 MULTICHANNEL INSTALLATION (10 and 40 CHANNEL)

Use cable connector supplied with the multiplexer to connect the MUX to the datalogger. This cable carries both analog and digital information. Basically, there are two types of wiring connections which have to be made for multiplexer operation.

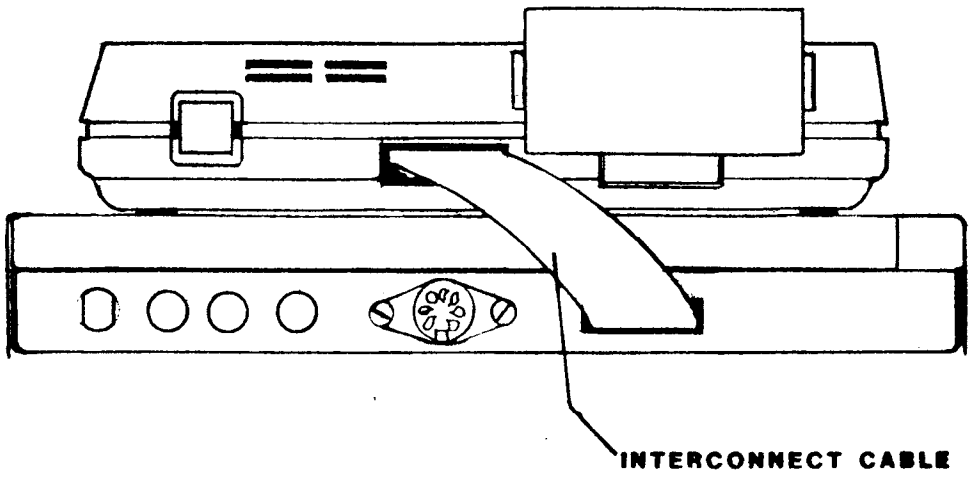
1. ANALOG SIGNAL INPUT. To make these connections the top of the multiplexer case must be removed by loosening the four screws on the sides of the case. When the connections have been made, the top of the case is replaced and the wires are run out the slot on the back right side of the case. Connections for each channel are made via the 10 terminal blocks in the rear of the unit. For 10 channel installation, the terminal block has 10 sets of four connections each. Terminal 1 is positive and terminal 4 is negitive (terminals 2 and 3 are not used). For 40 channel installation the terminal block has 40 sets of two connections each (one marked positive and one marked negative), each channel is clearly marked.

WARNING

WHEN THIS EQUIPMENT IS USED IN THE "FLOATING 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.

There is a another purpose for the anodized aluminum bar located between the terminal strips. Aluminum is a thermally conductive material which is used in this unit to equalize temperature between terminals for thermocouple applications. It is in close proximity to the terminal strip and is thermally (but not electrically) connected to the circuit traces running between the terminal blocks and the relays. For thermocouple applications a cold junction sensor will be attached to the bar for common ice point compensation.

2. CONNECTION, DATALOGGER TO MULTIPLEXER. The connection is via a ribbon cable running from the back of the datalogger to the back of the multiplexer. Plug the ribbon cable into the socket located in the middle of the datalogger so that the cable extends straight out the back. The other end of this ribbon cable plugs into the back of the multiplexer.



3.4 CONNECTING POWER SOURCE

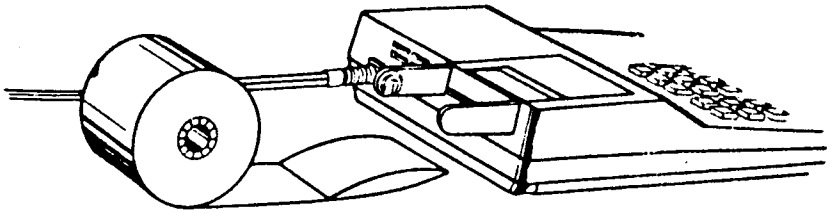
Connect supply cord to standard 110-120VAC, 60Hz, 3-wire outlet to datalogger and MUX (if used).

3.5 INSTALLATION OF PAPER ROLL

3.5.1 Locate the power switch on the right side of the data logger and turn it off by pressing the switch side opposite the dot.

3.5.2 Use OM-302-RP (Black) thermal print paper. Position the roll of paper behind the datalogger so that it unrolls from the bottom, loose end toward the unit. Fold over about 2 inches of paper and make a sharp crease as shown.

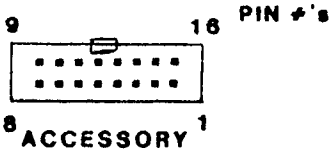
3.5.3 Insert the creased end of the paper into the printer slot located at the back of the unit until it meets resistance. Turn on the unit by pressing the switch side with the dot. Press the paper advance key twice until the paper is in printing position. Place the roll of paper in the paper holder and roll in the slack.



3.6 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.

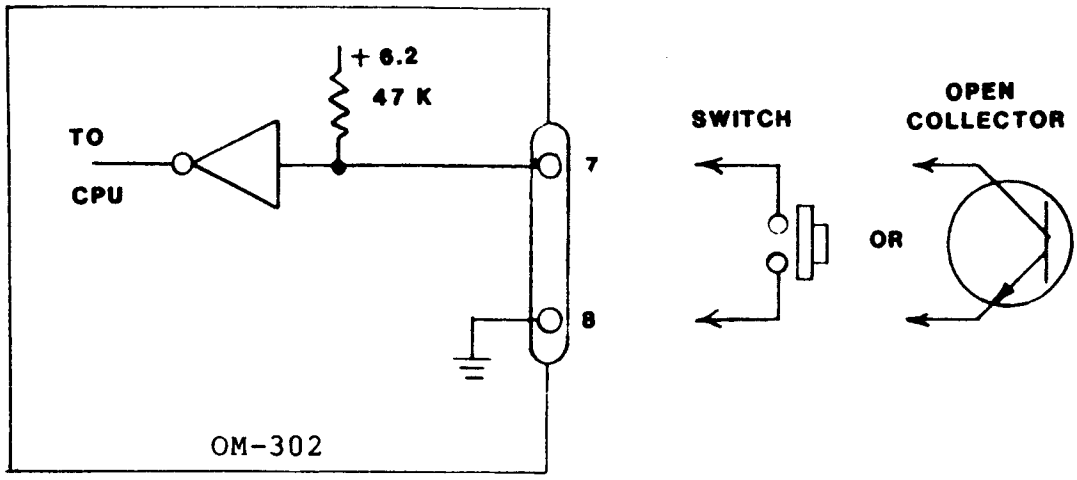
3.6.1 ACCESSORIES CONNECTOR PORT



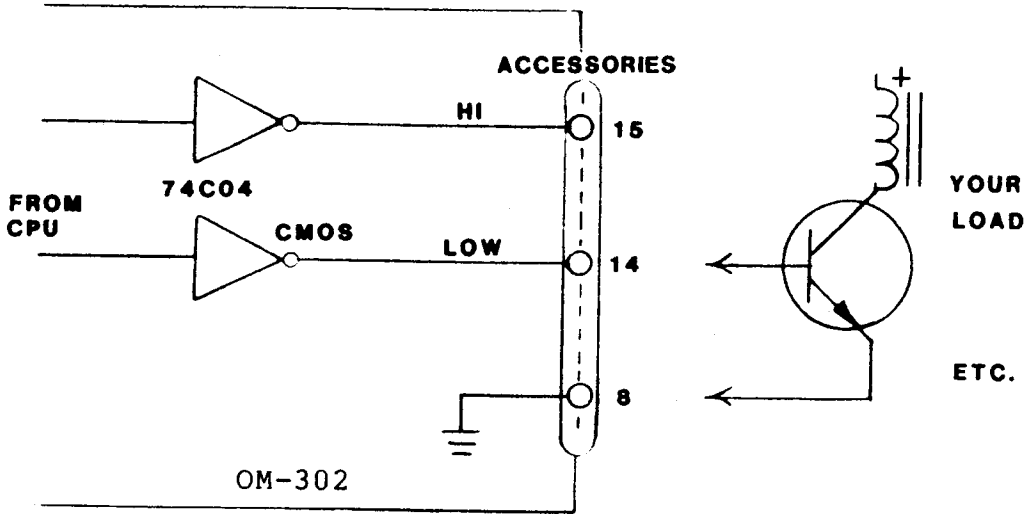
1. nc (+6)
2. nc (+6B)
3. (serial out)
4. (aux out 1)
5. (serial clock)
6. (aux input 1)
* 7. **EXTERNAL TRIGGER INPUT (47K pull-up to +6v internal)**
* 8. **DIGITAL GROUND (use for trigger and alarm outputs)**
9.
10.
11. (aux input 2)
12.
13. (aux output 2)
* 14. **LOW ALARM OUTPUT (CMOS 6V, 5MA MAX)**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

NOTE: Only the "*" pin numbers are supported by the Series OM-302 software.

3.6.2 CONNECTING EXTERNAL TRIGGER

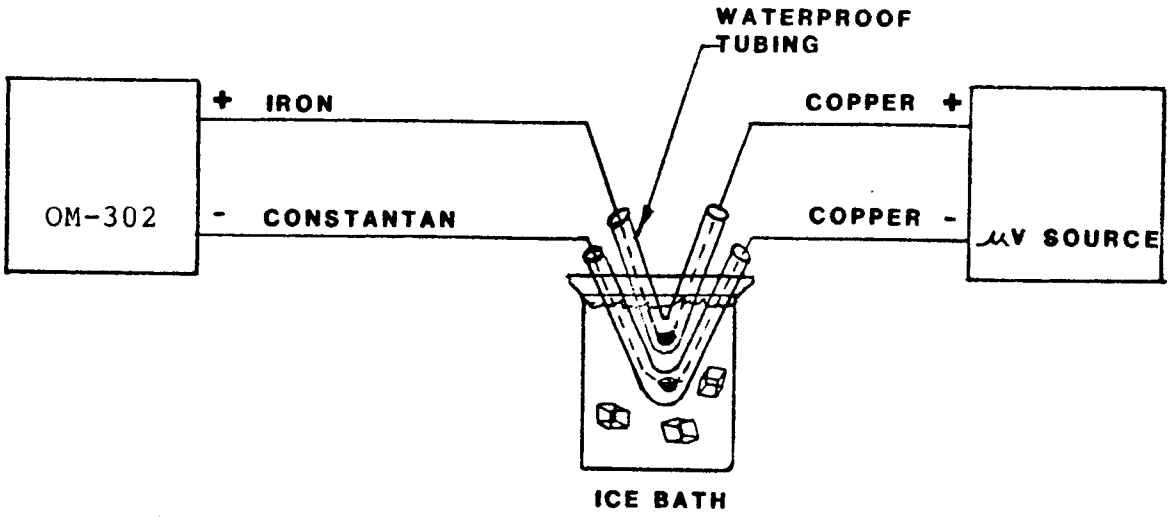


3.6.3 CONNECTING EXTERNAL ALARMS



4.0 CALIBRATION

4.1 METHOD A: uVOLT SOURCE (No Junction Compensation)



4.1.1 Select Type J (Iron-Constantan (-)) thermocouple wire no more than 3 feet long.

4.1.2 Connect the Iron to the (+) input terminal and the Constantan to the (-) input terminal.

NOTE: When calibrating the OM-302 Datalogger with a MUX option, set the datalogger to hold on channel #1 and make your connections through that channel.

4.1.3 Braze the other ends of the Type J wires to copper leads and cover the junctions with waterproof tubing.

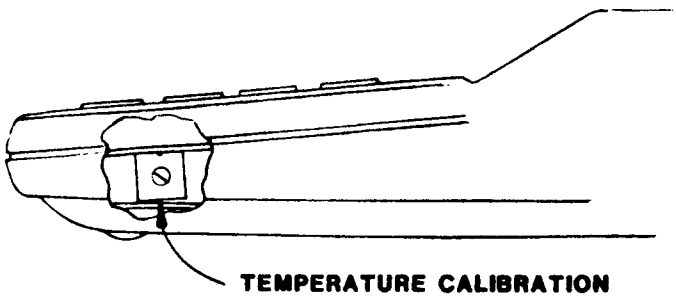
4.1.4 Connect the copper leads to a precision uVolt source with the Iron-Copper junction to (+) and the Constantan-Copper junction to (-).

4.1.5 Immerse the test cable thermocouple junctions into an ice bath (or ice-point reference). Be certain that the wires remain separate and that the water temperature stays at 0°C by keeping fresh-water ice cubes stirred in.

4.1 METHOD A: uVOLT SOURCE (No Junction Compensation) cont.

4.1.6 Gain access to the OM-302 calibration pot by removing the two screws on the bottom of the case. (See diagram below.)

4.1.6 CALIBRATION POT



4.1.7 Turn power on to the OM-302 first, then the uVolt source

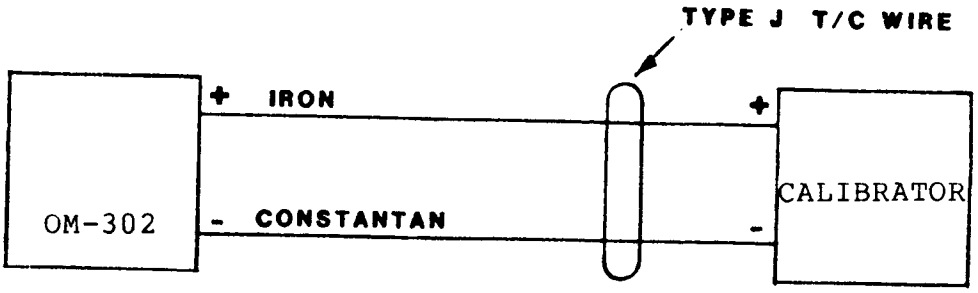
4.1.8 Adjust uVolt Source to 42,744 uV.

4.1.9 Set the OM-302 to type J thermocouple range and F. scale. (See Programming Instructions)

4.1.10 Adjust the OM-302 Calibration Pot to read 1395 F.

4.1.11 Wait approx 10 seconds. If reading changes (after 10 seconds) without adjustment of calibration source or the OM-302 calaibration pot, them repeat steps 4.1.10 and 4.1.11. Be sure to wait at least 10 seconds between adjustments of the OM-302 Calaibration Pot. This allows programming to adjust to the new calibration. When no changes occurs after 10 seconds, then the calibration is complete.

4.2 METHOD B: JUNCTION COMPENSATED THERMOCOUPLE SIMULATOR



4.2.1 Using Type J (Iron-Constant) thermocouple wire, connect the Iron conductor from (+) output to (+) input of the OM-302 Datalogger. Connect Constantan conductor from (-) output of calibrator to (-) input of OM-302.

NOTE: When calibrating the OM-302 Datalogger with a MUX option, set the datalogger to hold on channel #1 and make your connections through that channel.

4.2.2 Set Calibrator for °F, Type J Thermocouple range in the calibration mode.

4.2.3 Gain access to the OM-302 calibration pot by using a small screwdriver (1/8" or less) through the hole in the right side of the OM-302.

4.2.4 Turn power on to the OM-302 first, then calibrator.

4.2.5 Adjust calibrator to 1395°F.

4.2.6 Set the OM-302 to Type J thermocouple range and °F scale. (See Programming Instructions)

4.2.7 Adjust the OM-302 Calibration Pot to read 1395°F.

4.2.8 Wait approx. 10 seconds. If reading changes (after 10 seconds) without adjustment of calibration source or the OM-302 calibration pot, then repeat step 4.2.7.

4.2.9. Be sure to wait at least 10 seconds between adjustments of the OM-302 Calibration Pot. This allows programming to adjust to the new calibration. When no changes occur after 10 seconds, then the calibration is complete.

5.0 THE FRONT PANEL

5.1 PRINTER OUTPUT

5.1.1 LIST

```
(1)       === OM-302-J-F ===

(2)             001  DAY
(3)            0009  TIME
(4)          +0150.  HI LIMIT
(5)          +0<<<.  LO LIMIT
(6)          +0143.  MAX
(7)          -1>=>.  MIN
(8)         0100.00  INTERVAL
(9)           10.03  CH.DWELL
```

1. Model # - T/C Type - Scale
   The model is OM-302.
   The thermocouple type set by the user as J, K, T, or E.
   The scale set by the user as C or F.

2. **DAY** of the year set by the user from 000 to 999.

3. **TIME** of day (hours, minutes) set by the user from 0000-2359.

4. **HI LIMIT** set by the user from -1999 to +1999.
   +0<<< indicates no alarm flag set.

5. **LO LIMIT** set by the user from -1999 to +1999.
   +0<<< indicates no alarm flag set.

6. **MAX**imum data value seen on any channel since the last list.
   ±1>>> shows that the T/C temperature was beyond its calibrated range.
   ±1>=> shows that the A/D converter reached its maximum count.

7. **MIN**imum data value seen on any channel since the last list.
   ±1>>> shows that the T/C temperature was beyond its calibrated range.
   ±1>=> shows that the A/D converter reached its maximum count.

8. **INTERVAL** time (hours, minutes, seconds) set by the user from 0000.00 to 2359.59. The time between printout of temperature data.

9. **CH**annel.**DWELL**
   CHannels set by the user from 1-10 or 1-40.
   DWELL time set by the user from 2 to 9 seconds.

5.1.2 INTERVAL PRINTOUT

```
(1)    001:1722
(2)          01+0048. °F
(3)          02+0140. °F
(4)          03+0021. °F
```

1. Day and time of the print interval.
2. Channel 1 and its data value.
3. Channel 2 and ist data value.
4. Channel 3 and its data value.

5.1.3 ALARM PRINTOUT

```
(1)    001:2134
(2)          01-0058.■L
(3)    001:2134
(4)          01+0214.■H
```

1. Day and time the low alarm limit was reached.
2. Channel and value which caused the alarm.
3. Day and time the high alarm limit was reached.
4. Channel and value which caused the alarm.

5.2 DISPLAY

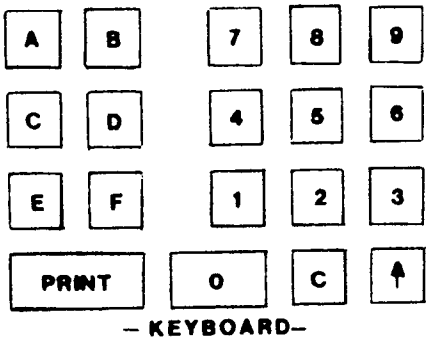
```
03 +0143°F
```

Left two digits indicated the channel selected.
Right digits indicated temperature and scale.

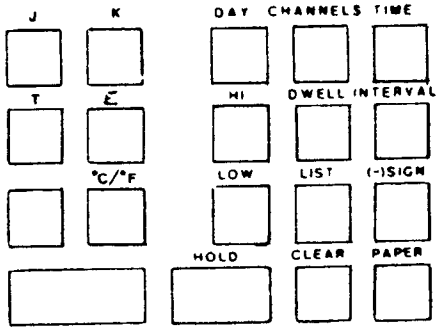
6.0 PROGRAMING THE DATALOGGER

PLEASE NOTE: When entering data or functions into OM-302 Recorder, **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.

6.0 PROGRAMING THE DATALOGGER cont.



— KEYBOARD —



— ALTERNATE KEYBOARD —

6.1 TIME OF DAY

The time of day is a 1 to 4 digit entry. The Series OM-302 Datalogger keeps time in the 24 hour format. The entry procedure is a 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.

6.2 DAY OF YEAR

The day of the year is a 1, 2, or 3 digit entry. The Series OM-302 Datalogger 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:

==========

NOTE: MSD = most significant digit
NSD = next significant digit
LSD = least significant digit

6.2 DAY OF YEAR cont.

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.

6.3 PRINT INTERVAL

The print interval is a 1 to 6 digit entry. The Series OM-302 Data Logger will log on intervals from 1 second to 23 hours, 59 minutes, 59 seconds. (2 seconds is probably the lowest useful interval due to settling time of the A/D converter.) 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.

6.4 NUMBER OF CHANNELS

The number of channels is a 1 or 2 digit entry. The Series OM-302 Datalogger will allow you to select from 1 to the number of channels available on the MUX. The Series OM-302 Datalogger always scans from 1 to the number of channels selected and returns to 1. The entry procedure is as follows:

6.4 NUMBER OF CHANNELS cont.

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.

6.5 DWELL TIME PER CHANNEL

The dwell time per channel is a 1 digit entry. The Series OM-302 Datalogger can be programmed to dwell on each channel in order to allow the A/D to settle on the new reading being taken after switching to a new channel. Minimum recommended dwell time is 2 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

6.6 HI ALARM LIMIT

NOTE: for negative limits refer to 6.8

The HI alarm limit is a 1 to 4 digit entry. The OM-302 Data Logger will allow you to set any value from -1999 to +1999 as a HI limit. The entry procedure is as follows:

Example: to enter 140 as a HI Limit

DESCRIPTION	KEY PRESSED	DISPLAY
MSD Limit*	1	1
NSD Limit*	4	14
LSD Limit	0	140
Shift to alternate keyboard	"arrow"	140
Store in HI Limit register	HI	140

* Leading zeros do not need to be entered.

6.7 LOW ALARM LIMIT

Note: for negative limit refer to 6.8

The LOW alarm limit is a 1 to 4 digit entry. The OM-302 Data Logger will allow you to set any value from -1999 to +1999 as a LOW limit. The entry procedure is as follows:

Example: to enter 36 as a LOW Limit

DESCRIPTION	KEY PRESSED	DISPLAY
MSD Limit*	3	3
LSD Limit	6	36
Shift to alternate keyboard	"arrow"	36
Store in LOW Limit register	LOW	36

* Leading zeros do not need to be entered.

6.8 CHANGING (-)SIGN OR NEGATIVE LIMITS

Sign changes may be made on data values being entered to the HI and LOW limit registers. The entry procedure is as follows:

Example: to enter -140 as a LOW Limit

DESCRIPTION	KEY PRESSED	DISPLAY
MSD Limit*	1	1
NSD Limit*	4	14
LSD Limit	0	140
Shift to alternate keyboard	"arrow"	140
Change sign	(-)SIGN	140
Store in LOW Limit register	LOW	140

* Leading zeros do not need to be entered.

6.9 T/C TYPE SELECTION

The Series OM-302 allows you to select any of 4 common thermocouple types (J, K, E, and T). The entry procedure is as follows:

Example: to select thermocouple type J

DESCRIPTION	KEY PRESSED	DISPLAY
Shift to alternate keyboard	"arrow"	N/A
Select T/C Type	Type J	N/A

6.10 CHANGING TEMPERATURE SCALE (°C/°F)

The Series OM-302 allows you to select from °C to °F temperature scales. The entry procedure to change scales is as follows:

DESCRIPTION	KEY PRESSED	DISPLAY
Shift to alternate keyboard	"arrow"	N/A
Switch temp. scales	°C/°F	N/A

6.11 FUNCTIONS

The Series OM-302 Data Logger offers several functions which are not part of the programming steps but increase overall usefulness of the Series OM-302 Data Logger.

6.11.1 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	

6.11.2 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 6.4). 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.

6.11.2 HOLD cont.

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	

6.11.3 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	

6.11.4 PAPER ADVANCE

The Paper Advance function allows approximately 1" of paper to be feed 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	"arrow"	N/A
Paper Advance	PAPER	

6.11.5 PRINT

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

7.0 SPECIFICATION

7.1 DIMENSIONS

7.5 inches wide x 8.0 inches deep x 2.5 inches high
19.0 cm wide x 20.3 cm deep x 6.4 cm high

7.2 WEIGHT

2.5 pounds
1.14 kg.

7.3 POWER REQUIREMENTS

110/120 VAC, 50-60 Hz
Export Power Options available

7.4 ENVIRONMENTAL

7.4.1 OPERATING TEMPERATURE:

32° to 122°F
0° to 50°C

7.4.2 HUMIDITY

0 to 90%, non-condensing

7.5 INPUT TERMINATIONS

Rear-panel connector with cold-junction compensation

7.6 PRINTER

16 column alpha-numeric
Full ASCII character set
5x7 dot matrix
2.25 inch wide thermal print paper
1 line/second maximum print rate

7.7 KEYBOARD

19 key - 16 hexadecimal, 3 special function

7.8 DISPLAY

8-digit vacuum fluorescent - 2-digit, channel #; 5-digit, ± sign and temperature; 1-digit, °C/°F display

7.9 PRINTING INTERVAL:

Programmable, infinitely variable in 1-second steps from 2 seconds to 2359 hours - or, initiated by external trigger or manual print key.

7.10 PRINTED OUTPUT DATA

Julian Date (1-999, programmable)
Real-time clock (0000 to 2359, programmable)
Current temperature (see range table)
High and Low alarm times
Minimum and Maximum values (on demand)

7.11 BATTERY BACK-UP

24-hour hold time for program and timekeeping
15 hour charging

7.12 THERMOCOUPLE INPUTS

Thermocouple Types: J, K, T, and E
Input Impedance: >50 Megohms
External (Lead) Resistance Effect: <25mV/350 ohm lead resistance
Cold Junction Compensation Error: ±0.5°C max. (10-40°C)
Open Thermocouple: +1E0E Display

7.13 DIGITAL OUTPUTS

High Alarm: (5 volts CMOS)
Low Alarm: (5 volts CMOS)

7.14 DIGITAL INPUTS

External Trigger
External Power (+28 Volts)

7.15 ACCURACY

Temperature Resolution: 1°C/1°F
Readout Accuracy: ±1/2 digit + comformity error (see table)
Conformity error: (See Table)

7.16 RANGE TABLE

THERMOCOUPLE TYPE	°F	°C	CONFORMITY in °C ERROR @25°C
J	-265 +1400	-165 +760	.8
K	-150 +2282	-101 +1250	1
T	-158 +752	-105 +400	1
E	-220 +1400	-140 +760	.9

7.17 MUX SPECIFICATIONS (Optional)

7.17.1 FUNCTION

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

7.17.2 CHANNELS

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

7.17 MUX SPECIFICATIONS (Optional) cont.

7.17.3 INPUTS

Sensors must be similarly scaled, since all inputs will be switched through a common signal conditioning circuit. Sensors can be grounded or floating, thermocouple or copper wire.

7.17.4 WIRE ATTACHMENT

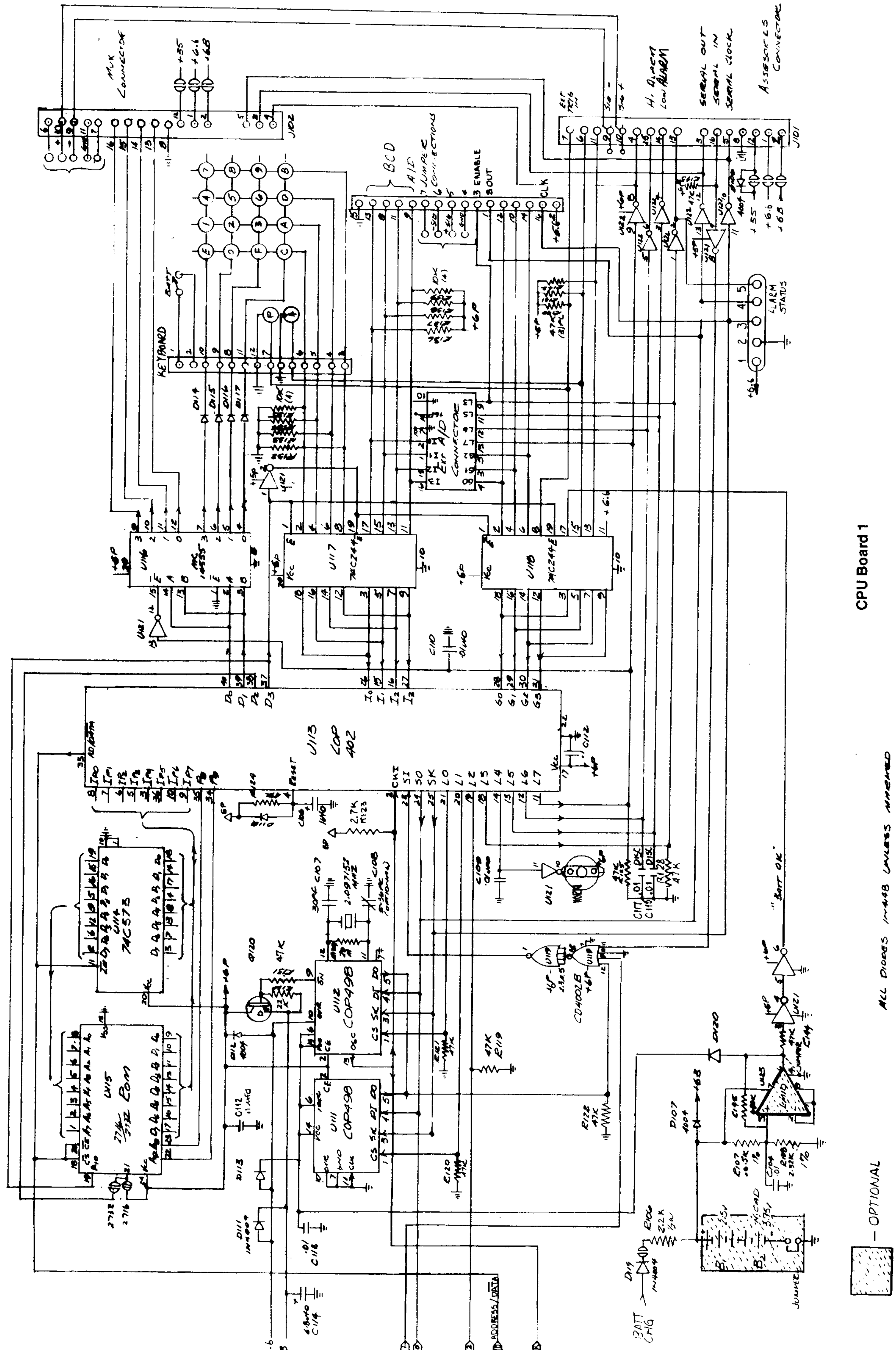
Segmented vise-jaw terminals receive up to #14 AWG wires. Additional terminals for current shunts and input attenuators are available on the 10 channel models.

7.17.5 SCAN RATE

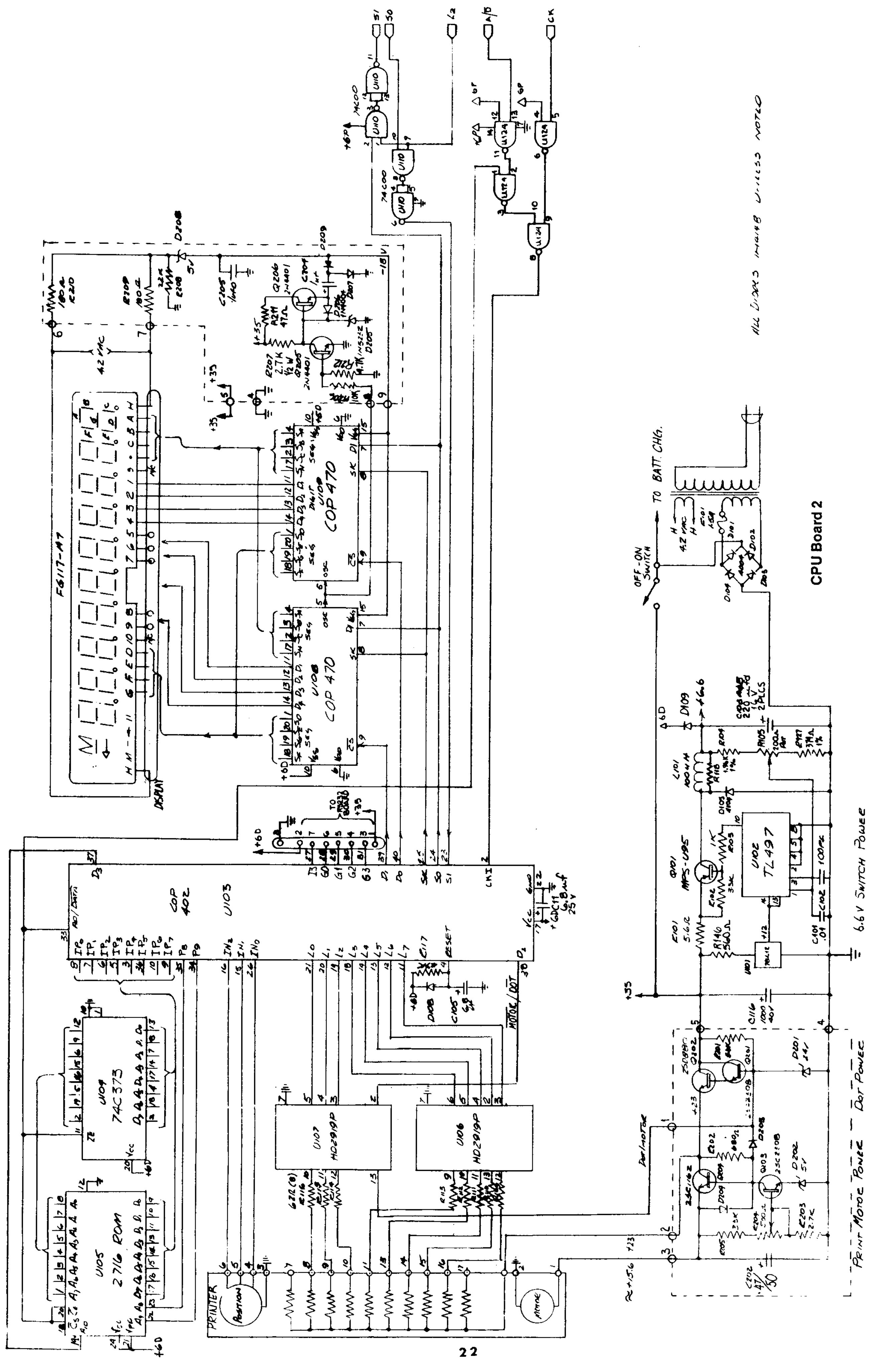
Programmable between 2 and 9 seconds per channel. Scan rate will be determined by user requirements and the settling time of the signal for the specific application.

7.17.6 RELAY LIFE

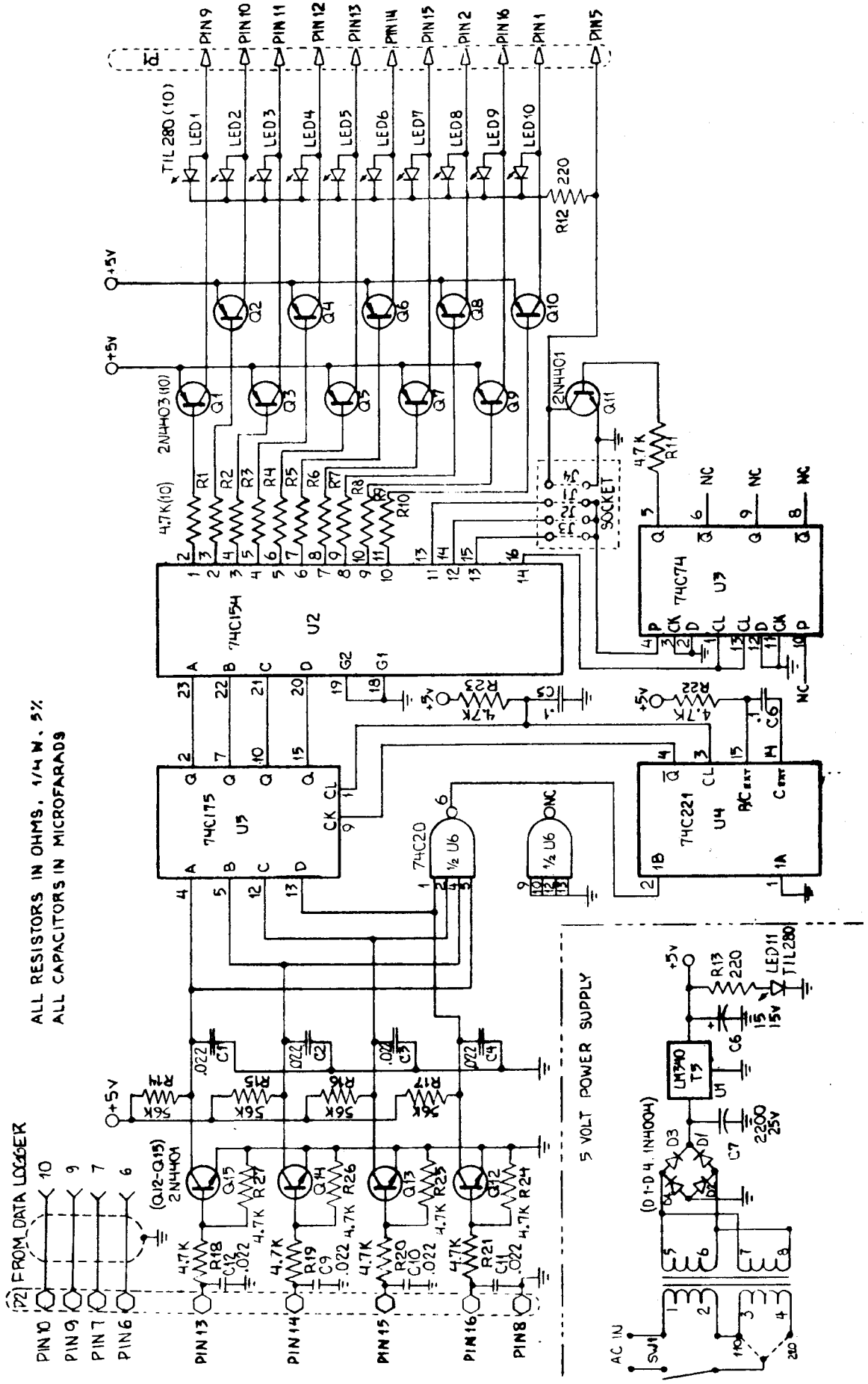
3×10^8 cycles.


MUX CONNECTOR
ASSESSORS CONNECTOR
KEYBOARD
ALARM STATUS
BCD
A/D
ENABLE
CLK
U113 COP 402
U117 74C244
U118 74C244
U114 74C573
U115 ROM
U112 COP498
U111 COP498
CD4002B
"BATT OK"
BATT CHG
NICAD
JUMPER
ADDRESS/DATA
ALL DIODES IN4148 UNLESS MARKED
– OPTIONAL

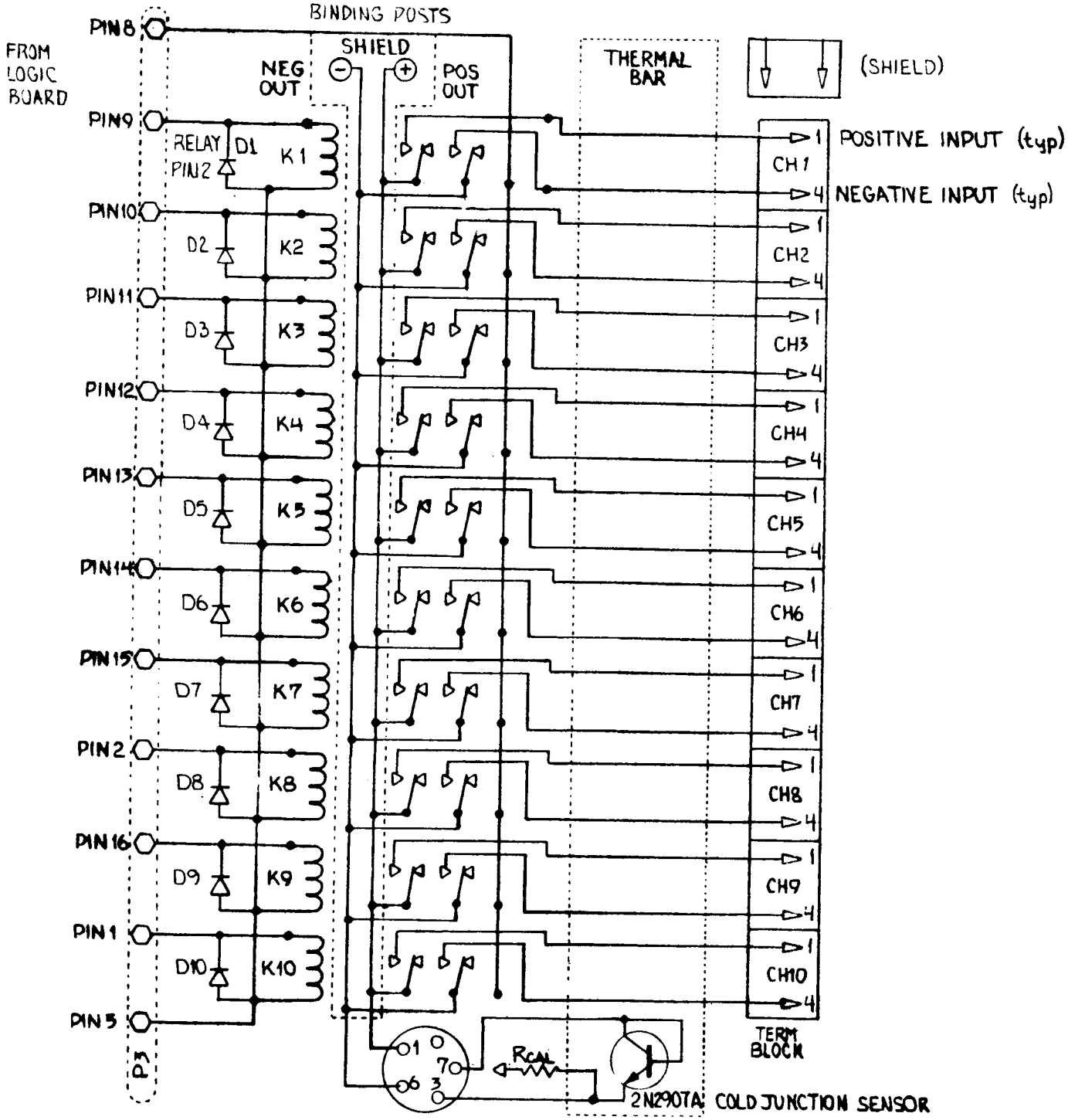
CPU Board 1


COP 402
U103
COP 470
U108
U109
2716 ROM
U105
74C373
U104
HD2919P
U106
U107
TL497
U102
FG117-A7
PRINTER
TO BATT. CHG.
OFF-ON SWITCH
6.6V SWITCH POWER
PRINT MOTOR POWER — DOT POWER

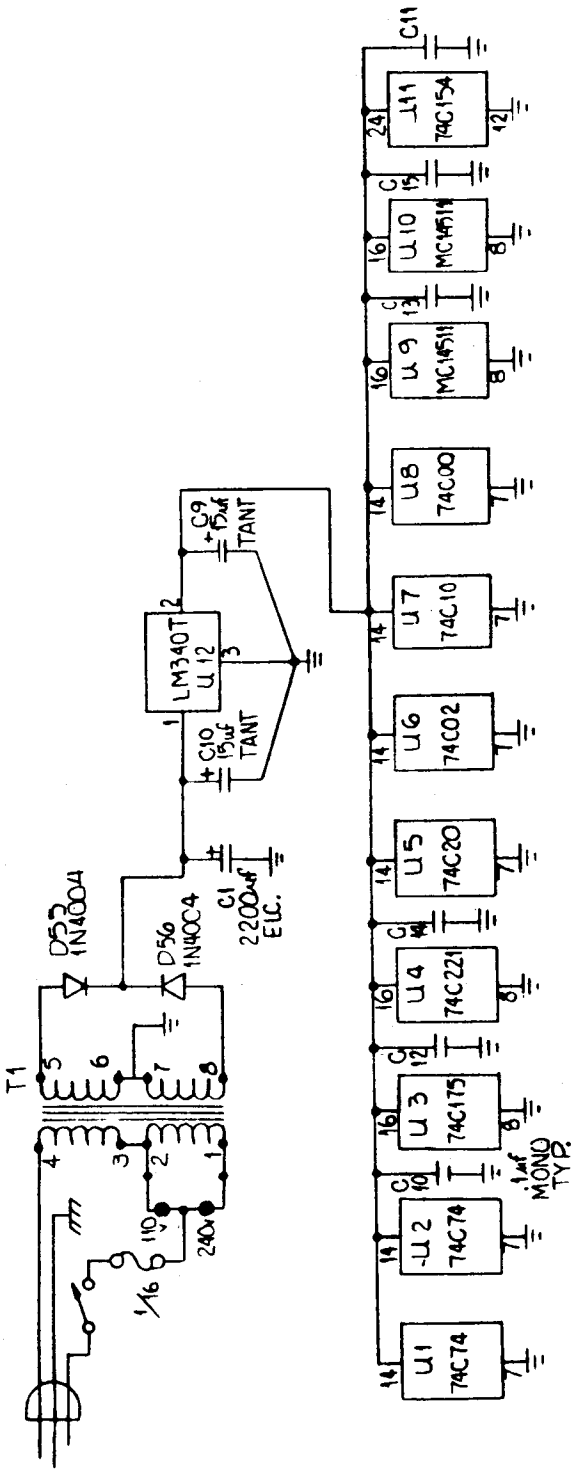
CPU Board 2



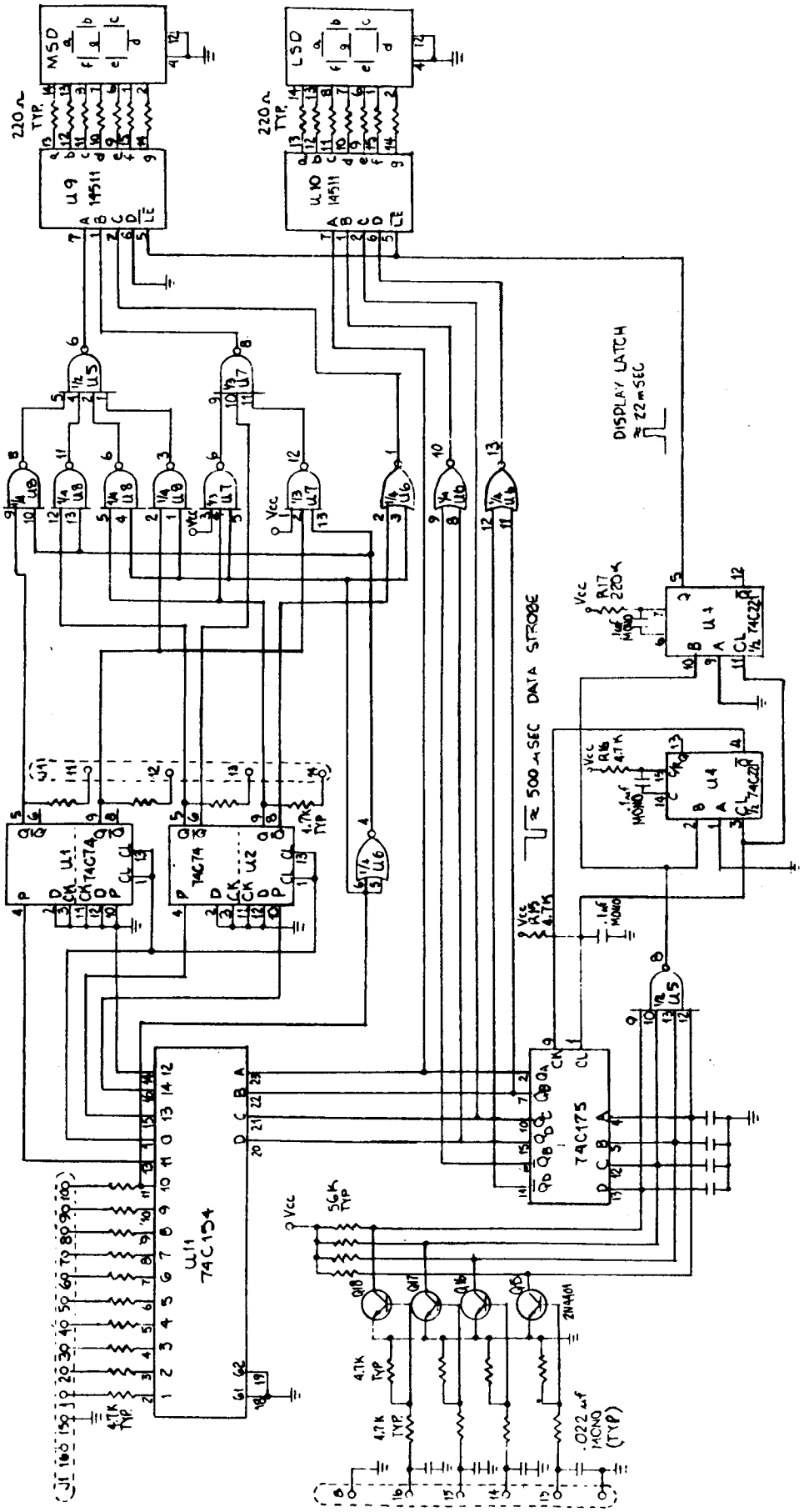
10 Channel Scanner Logic



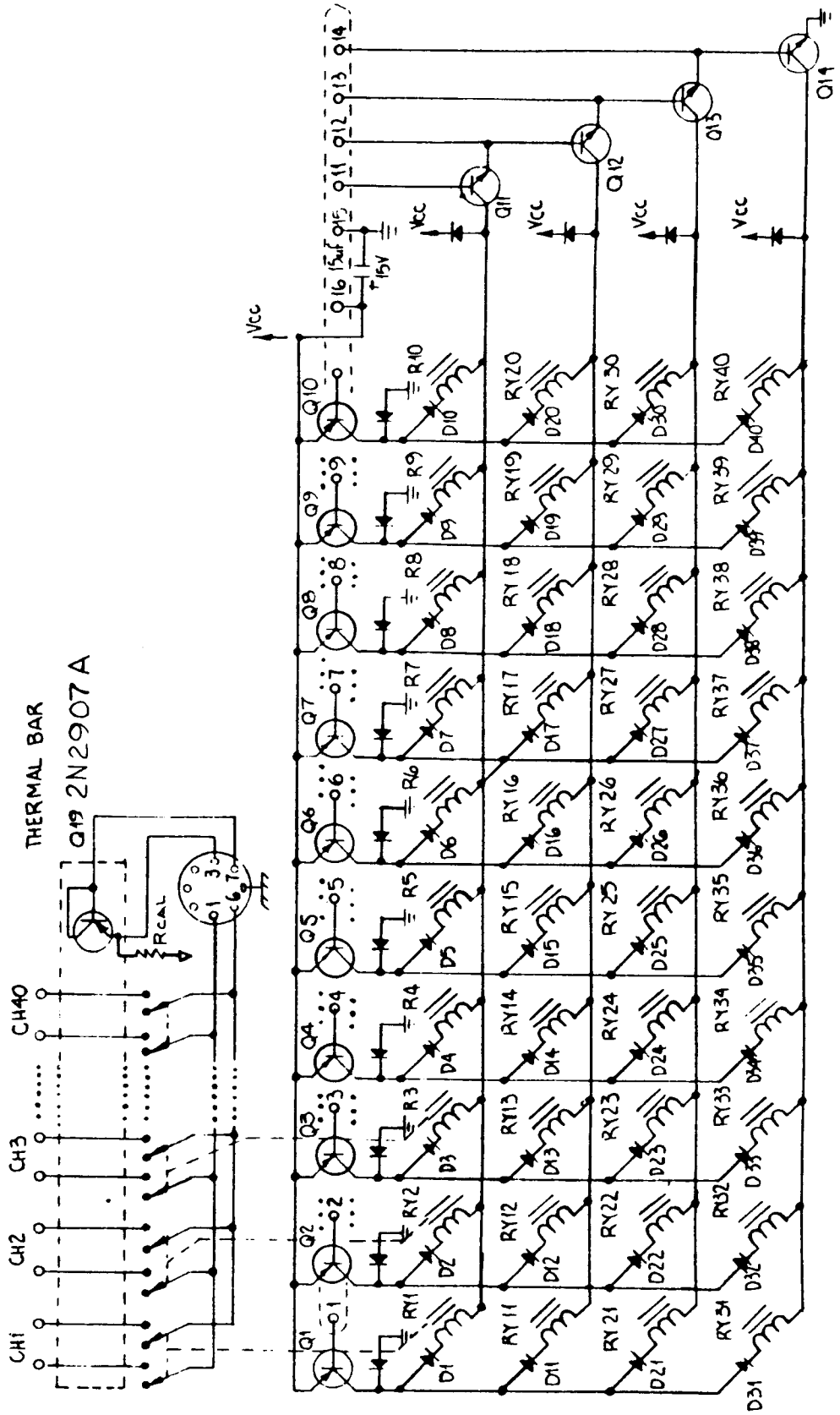
10 Channel Thermocouple MUX Board



40 Channel Power Supply



40 Channel MUX Controller



40 Channel MUX Relays

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- ☐ Wire: Thermocouple, RTD & Thermistor
- ☐ Calibrators & Ice Point References
- ☐ Recorders, Controllers & Process Monitors

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- ☐ Load Cells & Pressure Gauges
- ☐ Instrumentation

FLOW

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pH

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