

3.4.3 Emergency Operation

Should a situation arise with the Modem where the Control Board or Front Panel Assembly fail and cannot be immediately repaired, the unit can be operated manually by the use of internally mounted programming switches.

To operate the unit manually the following procedures should be followed.

- a. Remove power from the unit.
- b. Remove the front panel and disconnect the two ribbon cables from front panel connectors J1 and J2.
- c. Remove the control board from the unit.
- d. Remove the modulator/demodulator cards from the unit and program the dip switches for the desired operating parameters.

NOTE

In this mode of operation the mark and space tones will be reversed. Set the space frequency on the MARK FREQUENCY switches and the mark frequency on the SPACE FREQUENCY switches.

- e. Install the modulator/demodulator boards.
- f. Install front panel and apply power to the unit.

Programming information for each internally mounted dip switch and slide position is provided in Tables 3-5 and 3-6. The location of the switches is illustrated in Figures 3-2 and 3-3.

NOTE

In this emergency mode, operation is limited to 600 baud operation with the standard configuration. With the D9087-1 version, operation greater than 600 baud causes the unit to default to 1200 baud operation.

Table 3-5. Modulator Board Switch Controls

ITEM	SWITCH CONTROLS	EXPLANATION
1	+.5 HZ S1-8	+.5 HZ = ON: selects +.5 Hertz increment for mark and space frequencies.
2	FSK S1-7 S1-6 S1-5	FSK = ON: selects FSK function for frequency shifts 200 Hertz and below. (ON = FSK, OFF = FEK) Not Used Not Used
3	Baud Rate S1-4 thru S1-1 Baud Rate S2-8 thru S2-5	Binary coded decimal equivalent of the third (hundreds) baud rate digit read from right to left. <u>EXAMPLE:</u> Baud rate of 600, S1-4 thru 1 settings will equal a BCD-6. Set S1 4 = OFF <u>NOTE</u> 3 = ON ON = 1 OFF = 0 2 = ON 1 = OFF Binary coded decimal equivalent of the second (tens) baud rate digit read from right to left. <u>EXAMPLE:</u> Baud rate of 600, S2-8 thru 5 setting will equal a BCD-0. Set S2 8 = OFF <u>NOTE</u> 7 = OFF ON = 1 OFF = 0 6 = OFF 5 = OFF

Table 3-5. Modulator Board Switch Controls (cont.)

ITEM	SWITCH CONTROLS	EXPLANATION
3 (cont.)	Baud Rate S2-4 thru S2-1	<p>Binary coded decimal equivalent of the first (ones) baud rate digit read from right to left.</p> <p><u>EXAMPLE:</u> Baud rate of 600, S2-4 thru 1 setting will equal a BCD-0.</p> <p>Set S2 4 = OFF <u>NOTE</u> 3 = OFF ON = 1 OFF = 0 2 = OFF 1 = OFF</p>
4	Space Frequency S3-8 thru S3-5	<p>Binary coded decimal equivalent of the fourth (thousands) space frequency digit read from right to left.</p> <p><u>EXAMPLE:</u> Space frequency of 2425 Hertz, S3-8 thru 5 setting will equal a BCD-2.</p> <p>Set S3 8 = OFF <u>NOTE</u> 7 = OFF ON = 1 OFF = 0 6 = ON 5 = OFF</p>
	Space Frequency S3-4 thru S3-1	<p>Binary coded decimal equivalent of the third (hundreds) space frequency digit read from right to left.</p> <p><u>EXAMPLE:</u> Space frequency of 2425 Hertz, S3-4 thru 1 setting will equal a BCD-4.</p> <p>Set S3 4 = OFF <u>NOTE</u> 3 = ON ON = 1 OFF = 0 2 = OFF 1 = OFF</p>

Table 3-5. Modulator Board Switch Controls (cont.)

ITEM	SWITCH CONTROLS	EXPLANATION
4 (cont.)		
	Space Frequency S4-8 thru S4-5	<p>Binary coded decimal equivalent of the second (tens) space frequency digit read from right to left.</p> <p><u>EXAMPLE:</u> Space frequency of 2425 Hertz, S4-8 thru 5 setting will equal a BCD-2.</p> <p>Set S4 8 = OFF <u>NOTE</u> 7 = OFF ON = <u>1</u> OFF = 0 6 = ON 5 = OFF</p>
	Space Frequency S4-4 thru S4-1	<p>Binary coded decimal equivalent of first (ones) space frequency digit read from right to left.</p> <p><u>EXAMPLE:</u> Space frequency of 2425 Hertz, S4-4 thru 1 setting will equal a BCD-5.</p> <p>Set S4 4 = OFF <u>NOTE</u> 3 = ON ON = <u>1</u> OFF = 0 2 = OFF 1 = ON</p>
5	Mark Frequency S5-8 thru S5-5	<p>Binary coded decimal equivalent of the fourth (thousands) mark frequency digit read right to left.</p> <p><u>EXAMPLE:</u> Mark frequency 1575 Hertz, S5-8 thru 5 setting will equal a BCD-1.</p> <p>Set S5 8 = OFF <u>NOTE</u> 7 = OFF ON = <u>1</u> OFF = 0 6 = OFF 5 = ON</p>

Table 3-5. Modulator Board Switch Controls (cont.)

ITEM	SWITCH CONTROLS	EXPLANATION
5 (cont.)	<p>S5-4 thru S5-1</p> <p>Mark Frequency S6-8 thru S6-5</p> <p>Mark Frequency S6-4 thru S6-1</p>	<p>Binary coded decimal equivalent of the third (hundreds) mark frequency digit read right to left.</p> <p><u>EXAMPLE:</u> Mark frequency 1575 Hertz, S5-4 thru 1 setting will equal a BCD-5.</p> <p>Set S5 4 = OFF 3 = ON <u>NOTE</u> 2 = OFF ON = 1 OFF = 0 1 = ON</p> <p>Binary coded decimal equivalent of the second (tens) mark frequency digit read right to left.</p> <p><u>EXAMPLE:</u> Mark frequency of 1575 Hertz, S6-8 thru 5 setting will equal a BCD-7.</p> <p>Set S6 8 = OFF <u>NOTE</u> 7 = ON ON = 1 OFF = 0 6 = ON 5 = ON</p> <p>Binary coded decimal equivalent of the first (ones) mark frequency digit read right to left.</p> <p><u>EXAMPLE:</u> Mark frequency of 1575 Hertz, S6-4 thru 1 setting will equal a BCD-5.</p> <p>Set S6 4 = OFF <u>NOTE</u> 3 = ON ON = 1 OFF = 0 2 = OFF 1 = ON</p>
6	Output Level Adjust (R1)	Adjusts output tone level from -20 to +6 dBm with a 600 ohm load.

Table 3-6. Demodulator Board Switch Controls

ITEM	SWITCH CONTROLS	EXPLANATION
1	+.5 Hz S1-8	+.5 Hz = ON; Selects +.5 Hertz increment for mark and space frequencies.
2	SYNCH S1-7	SYNCH = ON; Synchronous Mode: regenerated data output RS-232C and MIL Standard 188C. SYNCH = OFF; Asynchronous Mode: demodulated data output RS-232C and MIL Standard 188C.
3	DIV S1-6	Two channel demodulator configuration only; DIV = ON Selects adjacent channel diversity operation.
4	AMH S1-5	AMH = ON; Selects Auto Mark Hold function.
5	Baud Rate S1-4 thru 1 and S2	Function identical to modulator rate. See Table 3-5 Item 3.
6	SPACE Frequency S3 and S4	Function identical to modulator SPACE frequency. See Table 3-5 Item 4.
7	MARK Frequency S5 and S6	Function identical to modulator MARK frequency. See Table 3-5 Item 5.
8	AMH Threshold S7	Threshold value selectable between -18 dBm and -39 dBm in eight 3 dB steps. Slide 1 (-18 dB) to Slide 8 (-39 dB).

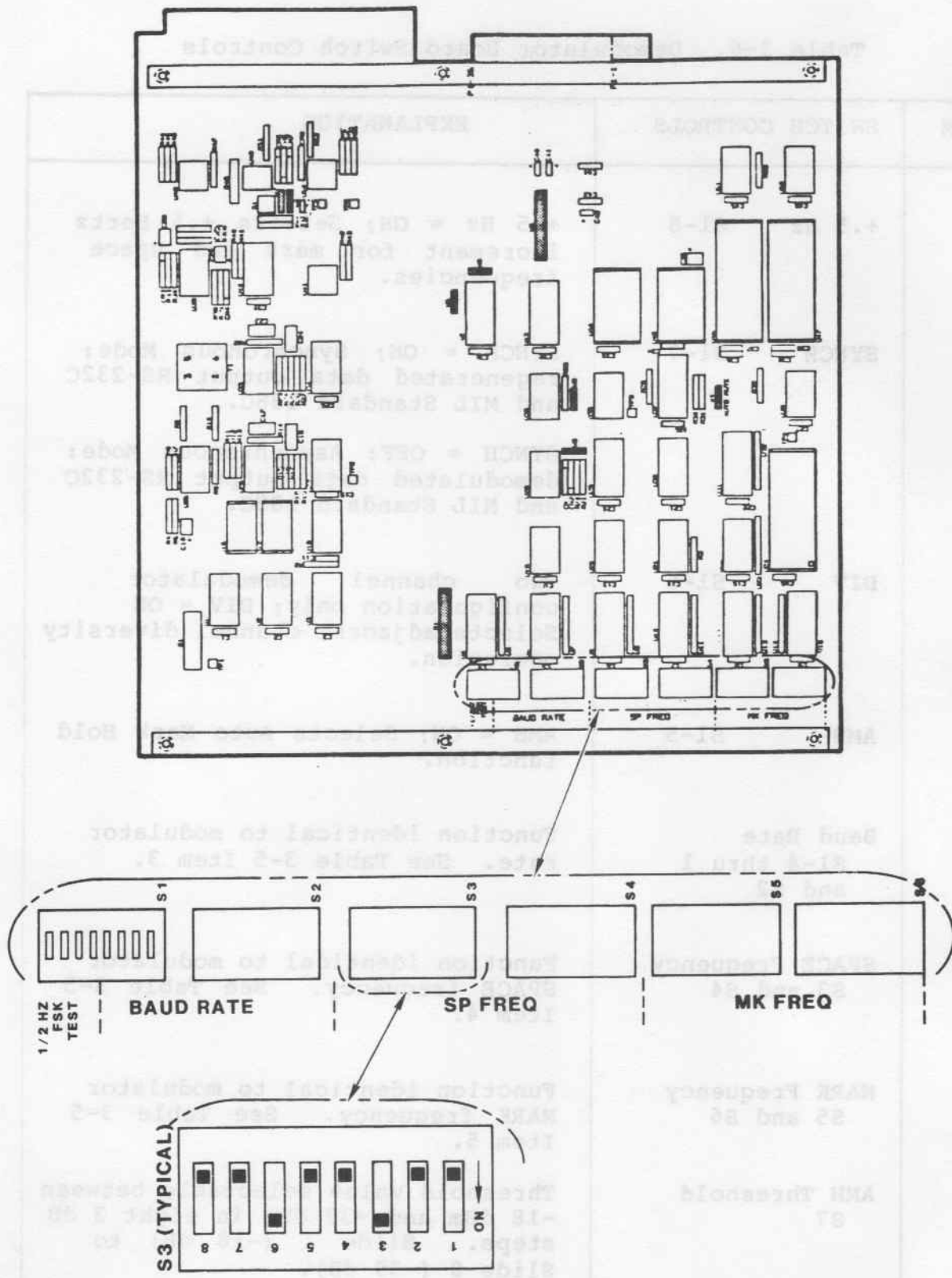


Figure 3-2. Modulator Switch Locations

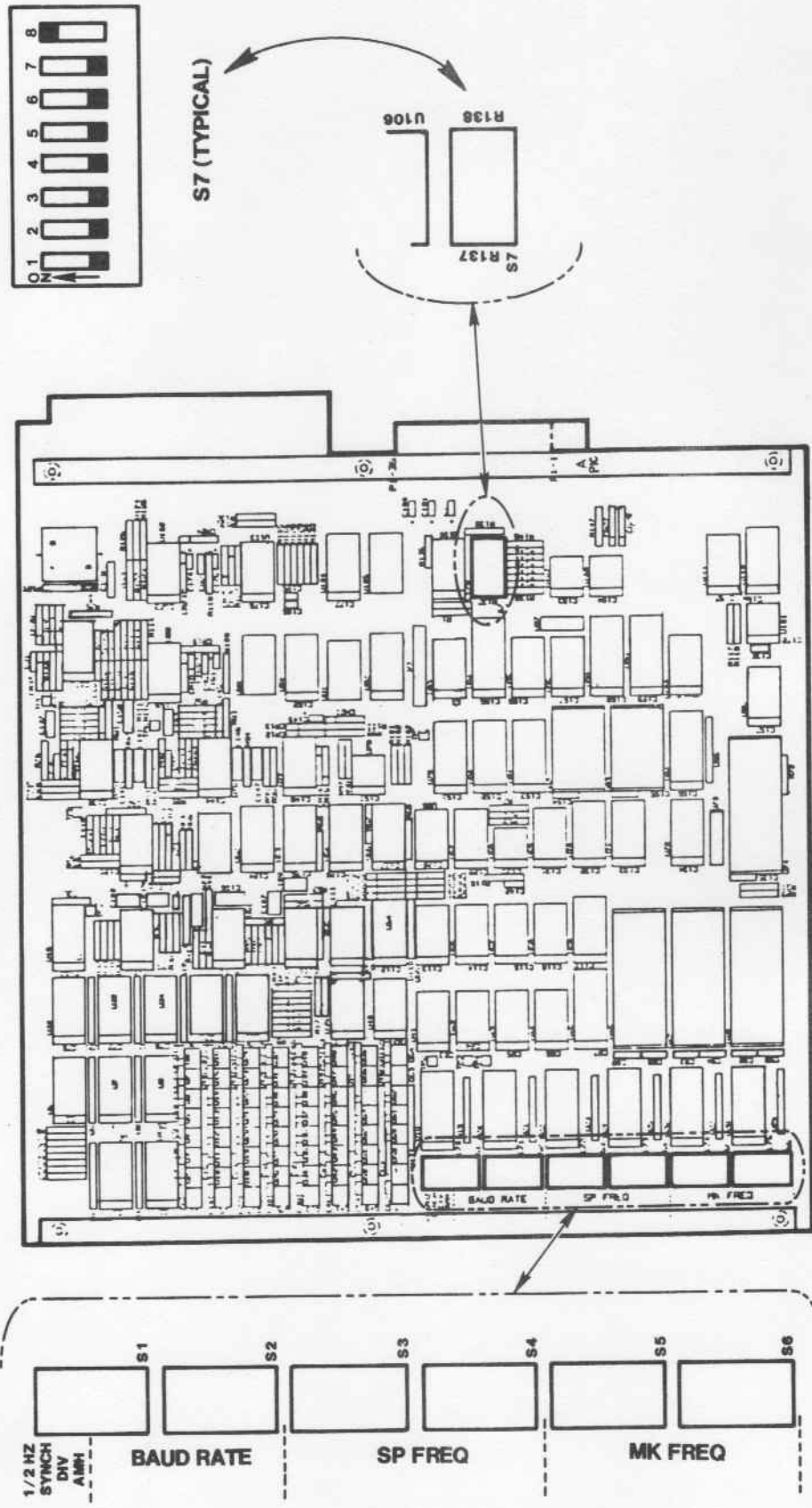


Figure 3-3. Demodulator Switch Locations

4.3.2.6 TONE DEMULTIPLEXER. A sample of the output sine wave is presented to the demultiplexer U40 which routes it to the mark or space indicators as directed by the serial output line of the processor.

When this unit is operated in the FSK mode (function not used in FEK mode) the frequency change between mark and space is not stepped abruptly but rather occurs gradually over a period of time determined by the baud rate. This function is accomplished by the Binary Rate Multiplexer U47. The data inputs to U47 are set according to the selected baud rate. The resulting output pulses interrupt the processor at regular intervals servicing a software routine which increments or decrements the data word provided to U46. The frequency shift between mark and space is actually accomplished in a series of small steps. The output of U47 also goes to counter U38 where it is divided by 64 (to yield the baud rate) and (with feature 001) through counter U53 and inverter U52A to provide the send clock output.

4.3.3 Control Board

The operation of the control board is described in the following paragraphs. Refer to Figure 4-8 and the control board schematic diagram. The control board functions under the control of an 8085 microprocessor who's data/address bus ties together the various functions. The processor program is stored in EPROM (U38, U39). The 256 bytes of non-volatile static RAM (U36, U37) is used for processor scratch pad and retention of such operating parameters as have been set in from the control panel (local or remote), even when power is not present. This latter characteristic occurs when the STORE command goes true as the processor senses power fail.

The control interface with the modulator and demodulator boards is accomplished via U41 and U47. Eight lines of control data are output from U41. The control "data ready" is output by U47. The modulator and demodulator boards identify themselves to this control board by setting the appropriate voltage levels at P1-35, 37, 39 and 40. These are interfaced to the processor via U44.

The front panel contains a keypad of 24 keys, four of which are illuminated, and a status display. Opto-couplers U63 and U64, in conjunction with CR1 thru CR4, provide isolation between the remote device and the 1280A allowing a tri-state condition to exist between the terminal and the 1280A. The static +12V tie point is current limited and provides a termination point for Busy In handshake line when not used in remote connections. Refer to Addendum A for additional information concerning remote control operation. Information to be displayed is stored in the RAM (U27) by the processor via U26 and U17. The display is refreshed at a 2.150 ms rate by the counter (U9 and U10) whose

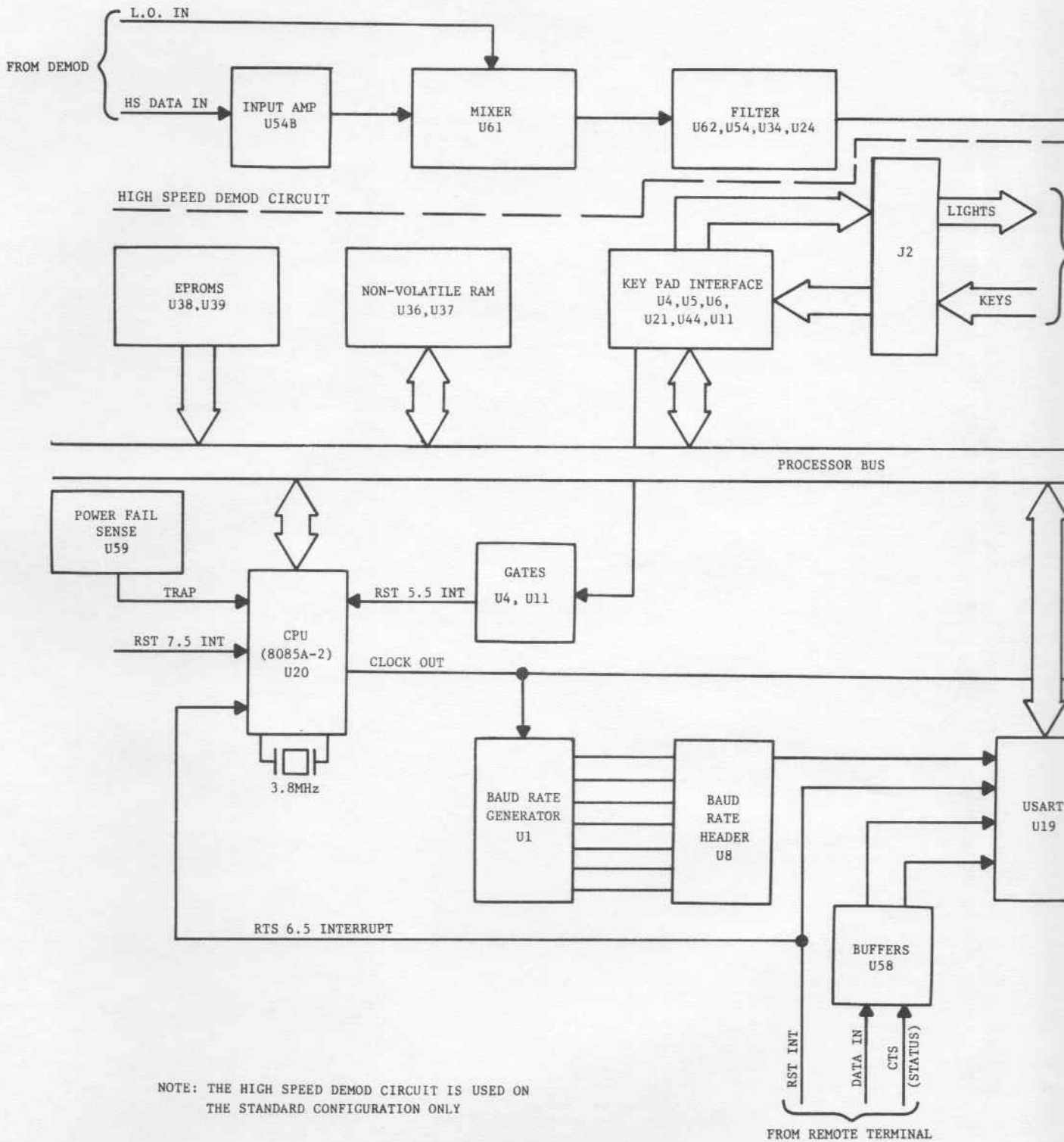
outputs address the RAM via the two input multiplexers (U26 and U17). They also address the segments of the display digits via J1-1 thru J1-5.

The processor accesses the RAM only when a change is to be made to the displayed data. This is accomplished via address 68H which switches the multiplexer to the processor address and gates bit 0 of the data bus to the RAM I/O bit 0 via gate U18.

The bar graph display is developed as follows: Samples of FSK mark and space amplitudes are received from the Modulator or Demodulator board at P1-36, 34 or P1-35, 36. One of the four is selected by U60 as directed by the processor via U30 and by the state of the refresh counter via U35 and U57. The selected sample is presented to the comparators U15, U22, U32 and U42. The comparators are supplied with reference voltages via U55 and the resistor strings on the negative input of each driver. Each comparator has a reference voltage which corresponds to the signal level represented by the bar segment to which it is connected. For a given sample those comparators whose reference voltage is lower than the sample will be in conduction, illuminating the bars to which they are connected.

Remote control is accomplished via an RS-232 link. A USART (U19) is provided for this purpose. The keypad interface to the control board is provided by a combination of 8-to-3 line encoders (U5, U6, U65, U66) AND gates (U67, U68) and drivers (U21A & B). When a key is pressed, the line associated with the key is pulled low and the processor is strobed. The information from the encoders is presented as an 8 bit word to the data bus through the line drivers. The illuminated keys are driven by line inverter, driver U11 from information on the data bus passed by latch U13. Received data and control are interfaced by U58. U1 is a baud rate generator whose output rate to the USART is selected by jumpers on a header installed in socket U8.

4.3.3.1 CONTROL PIGGY-BACK BOARD. Some M1280A's contain a piggy-back board that mounts on the Control board. This board contains the Keypad Interface circuits which replace U5 and U6 on the Control board. When installed, the board mounts directly into U5 and U6 headers. There is no change to the operation of the Control board.



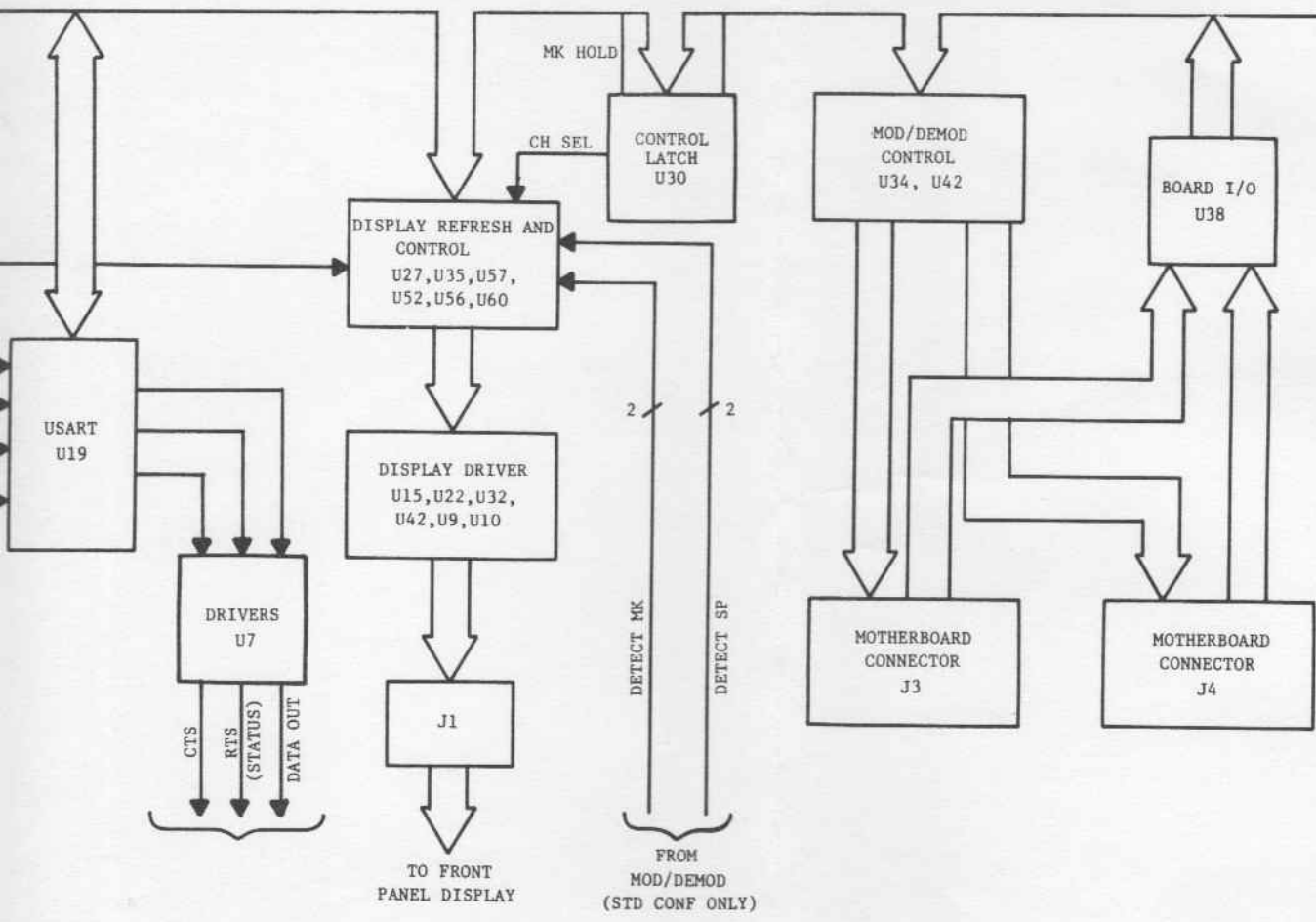
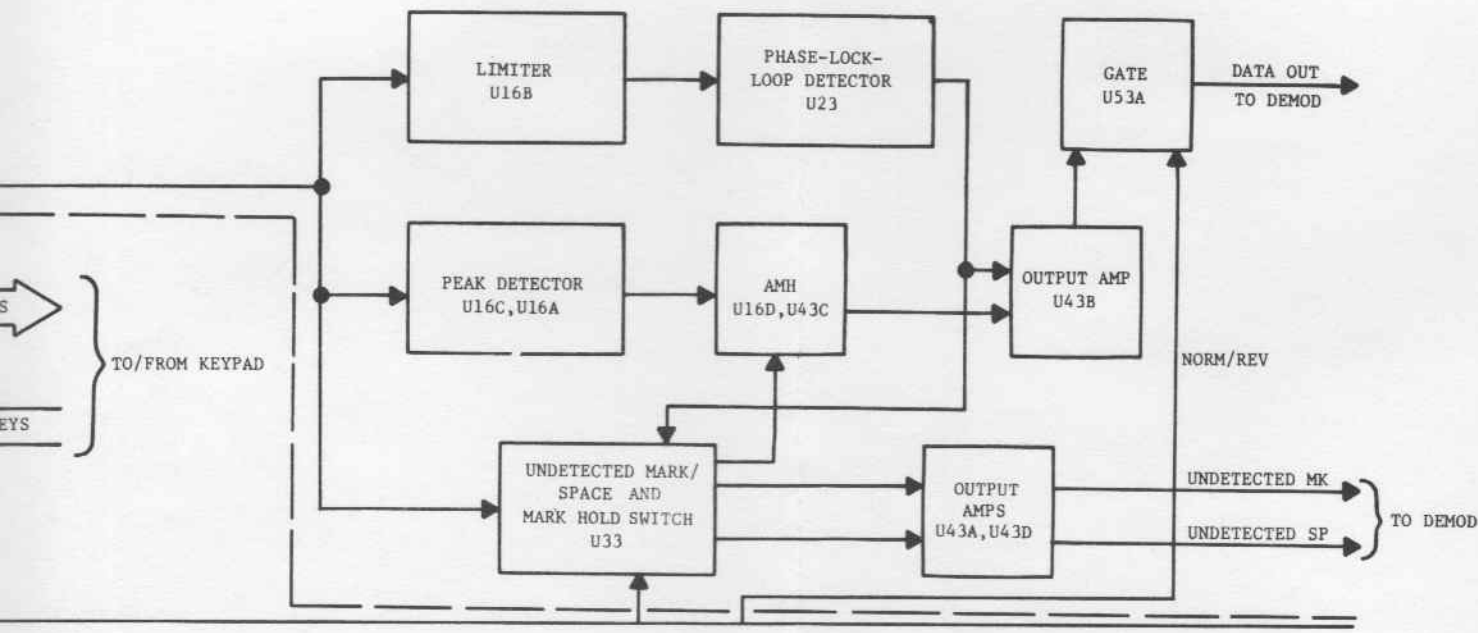
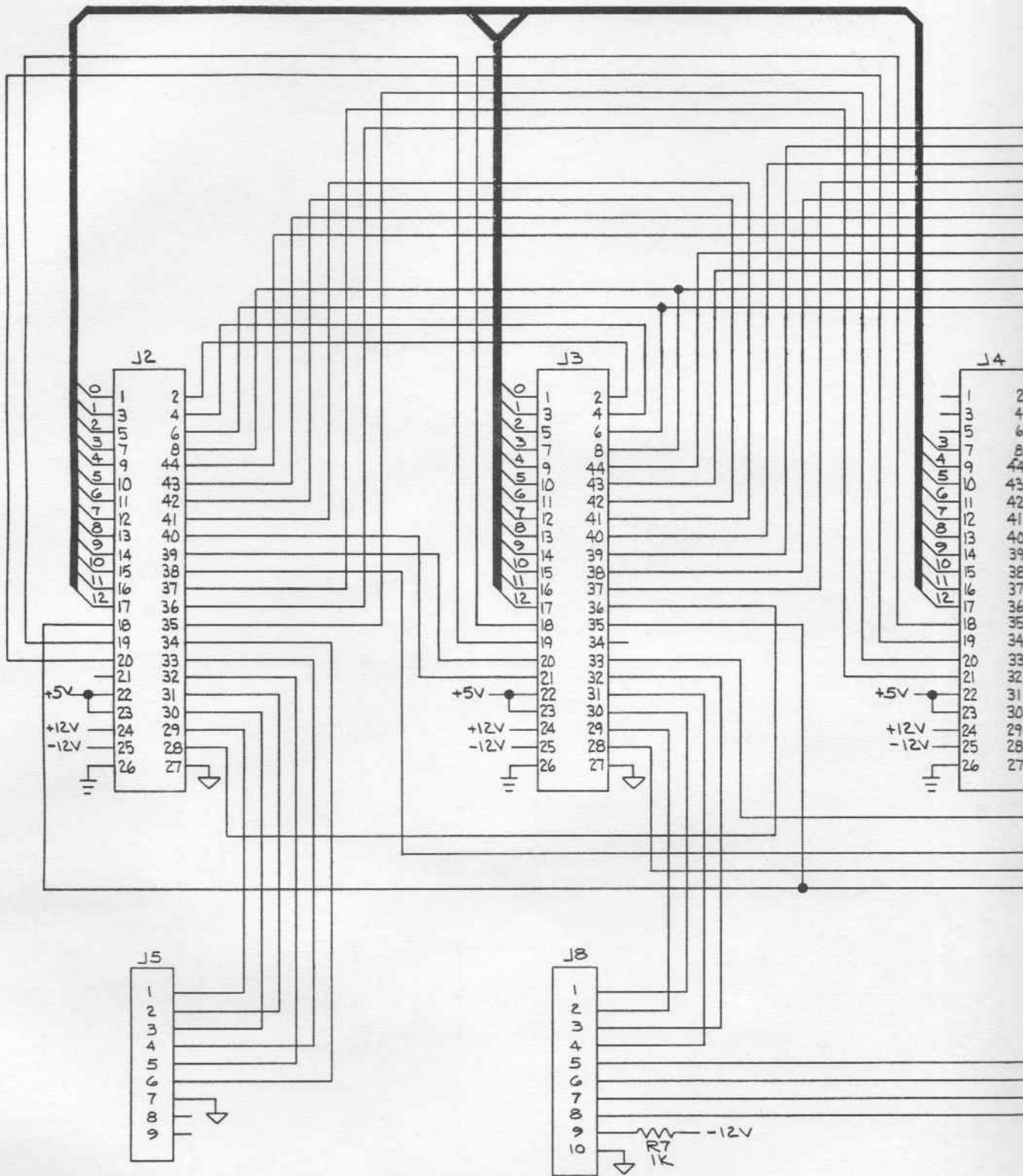
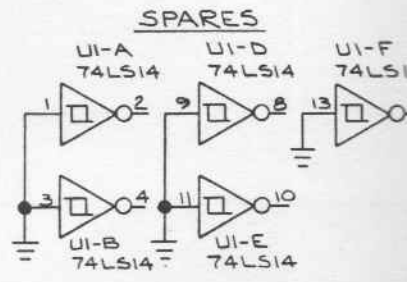


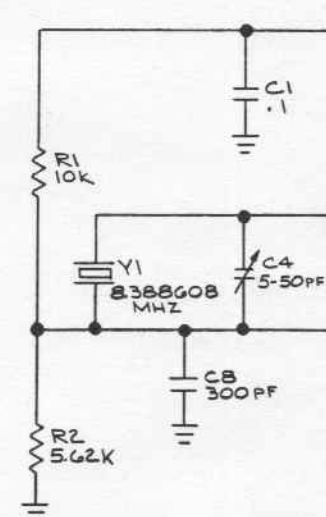
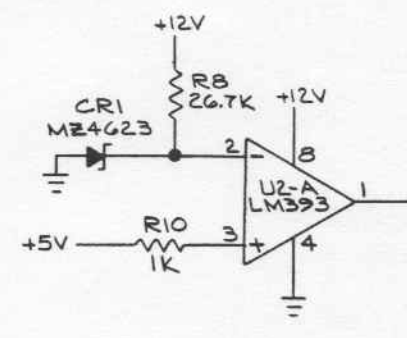
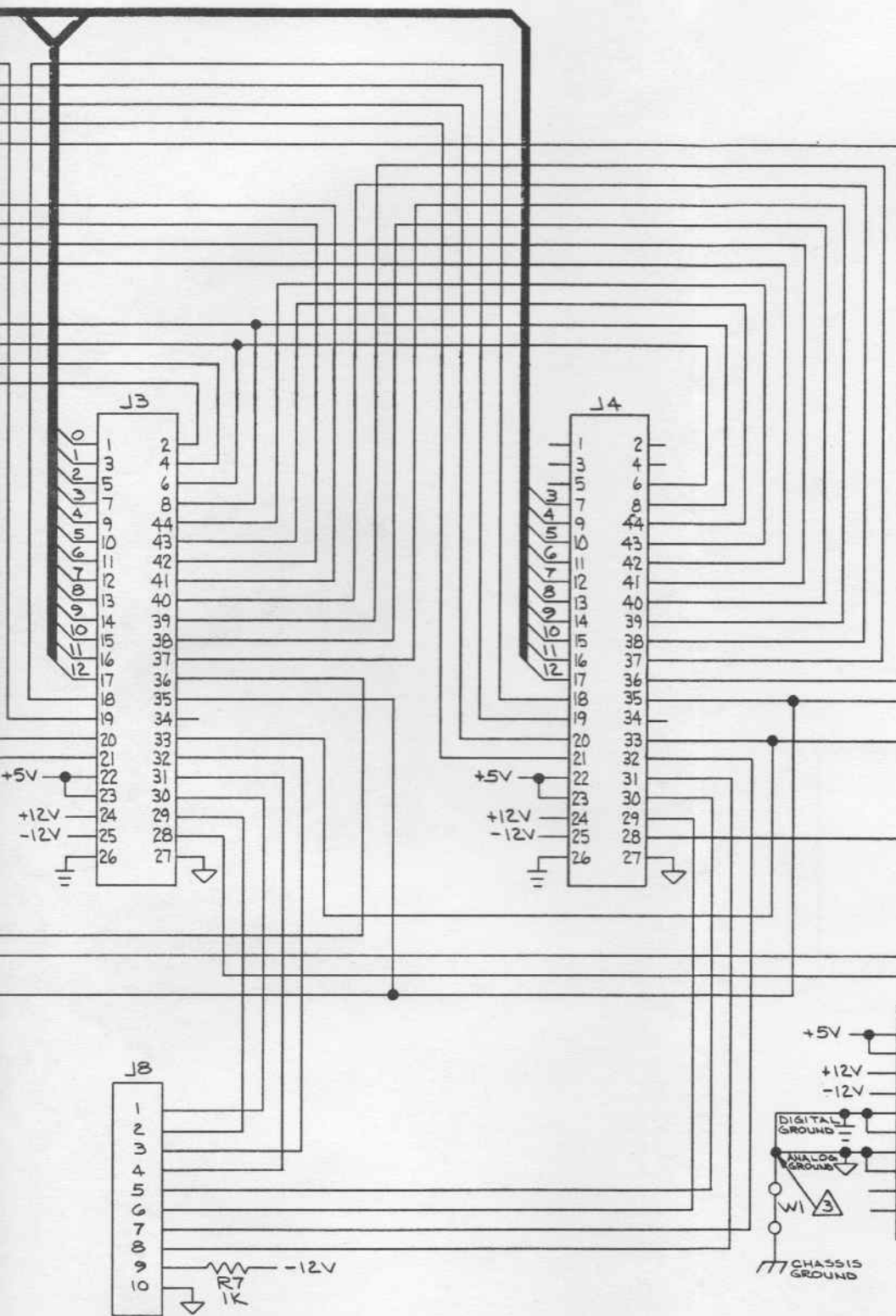
Figure 4-8. Control Board Block Diagram



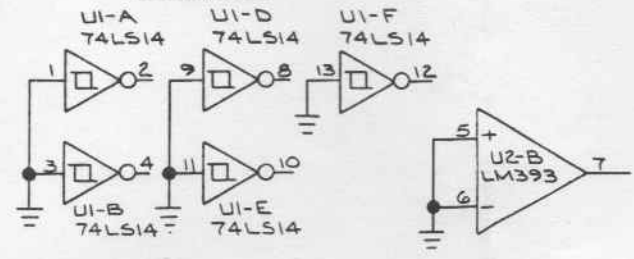
- NOTES:**
1. REFERENCE DOCUMENTS:
 PC BOARD - NO2267
 FABRICATION DWG D9089
 ASSEMBLY DWG D9090
 2. UNLESS OTHERWISE SPECIFIED:
 ALL RESISTANCE VALUES ARE IN OHMS.
 ALL RESISTORS ARE 1/8 W, 1%.
 ALL CAPACITANCE VALUES ARE IN MICROFARADS.

⚠ GROUND CONNECTED THRU PLATED-THRU HOLE, ONLY AT THIS POINT.





SPARES



RADS.
HOLE, ONLY

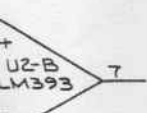
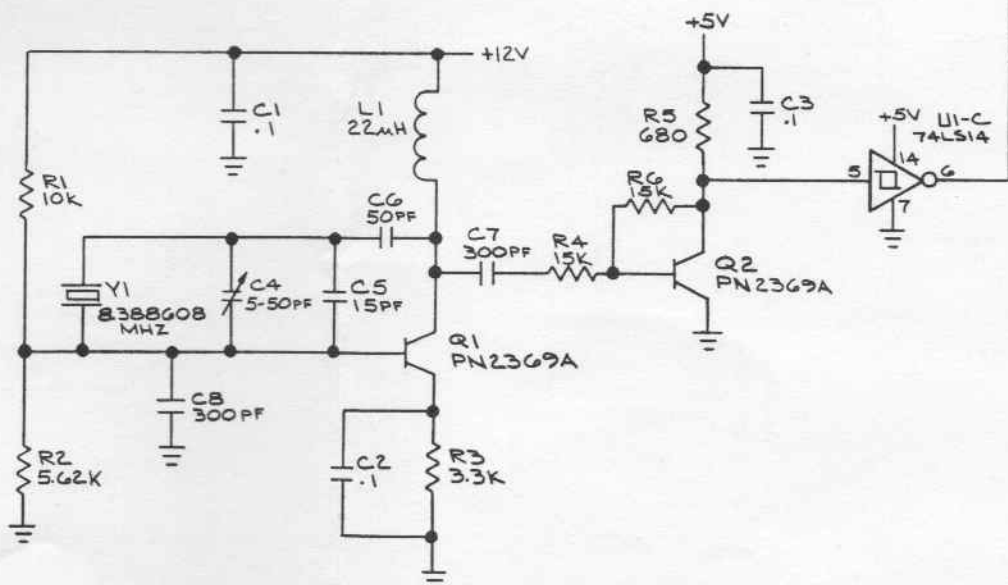
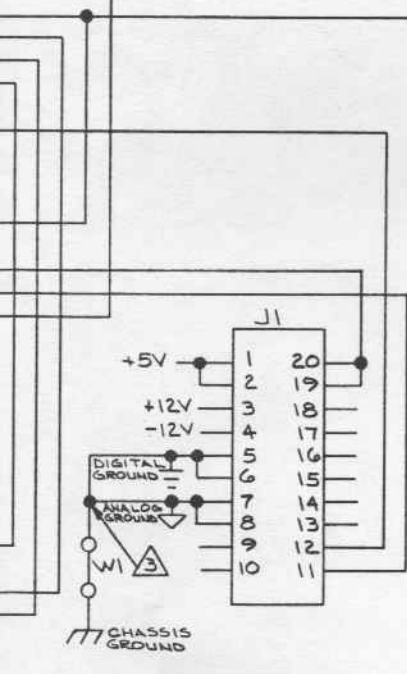
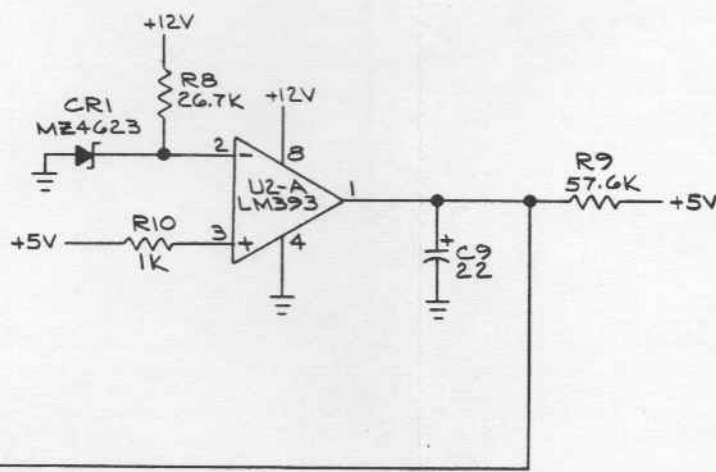
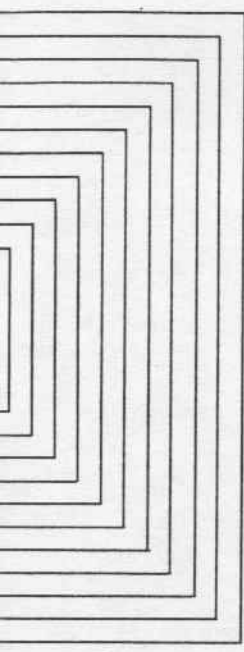


Figure 6-12. Backplane Schematic (D9091)