MODEL 1280

FSK MODEM

INSTRUCTION MANUAL

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TMC21100

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TABLE OF CONTENTS

TABLE OF CONTENTS (cont.)

TABLE OF CONTENTS (cont.)

ILLUSTRATIONS

FIGURE

ILLUSTRATIONS (cont.)

TABLES

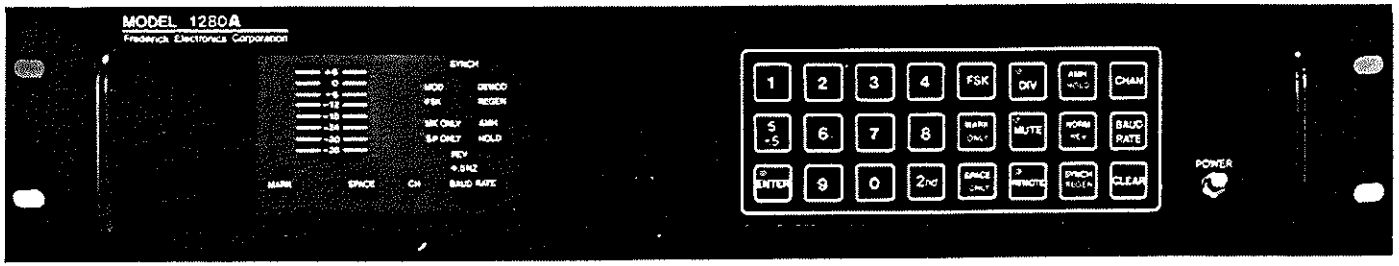


Figure 1-1. Model 1280A FSK Modem

SECTION I

INTRODUCTION

1.1 INTRODUCTION

The Model 1280 FSK Modem (Figure 1-1) is designed for use as a modem, a one or two channel modulator, or a one or two channel demodulator. It will accept input data of EIA-RS-232C, MIL-188C, or high level (20 to 60 milliamps) loop current. It operates in the FSK* mode with shifts of 60 to 200 Hz and in the FEK mode with shifts from 60 to 3000 Hz. Baud rates are selectable to 600.

1.2 GENERAL DESCRIPTION

The unit is microprocessor controlled. Operating parameters are entered by the front panel keypad (or a remote terminal) and displayed on the front panel plasma display.

The Modulator card(s) accepts high level current loop, RS-232, or MIL-188C data in and modulates it at the frequencies selected. The Demodulator card(s) receives the keyed tones and demodulates them as determined by the selected parameters with a resulting data output of RS-232, MIL-188C and optional high level current loop. The Control card serves as an interface between the keypad (or remote terminal) and the demodulator and modulator cards.

The location of the cards are depicted in Figure 1-2. The keypad and plasma display are located on the front panel.

* The modem offers true FSK as defined by FEC's U.S. Patent Number 4,317,209, which allows the change from mark to space to be made as a smooth progression of intermediate frequencies directly related to the selected keying rate. This reduces side band energy normally produced by the nearly instantaneous change from mark to space associated with the more commonly used FEK technique.

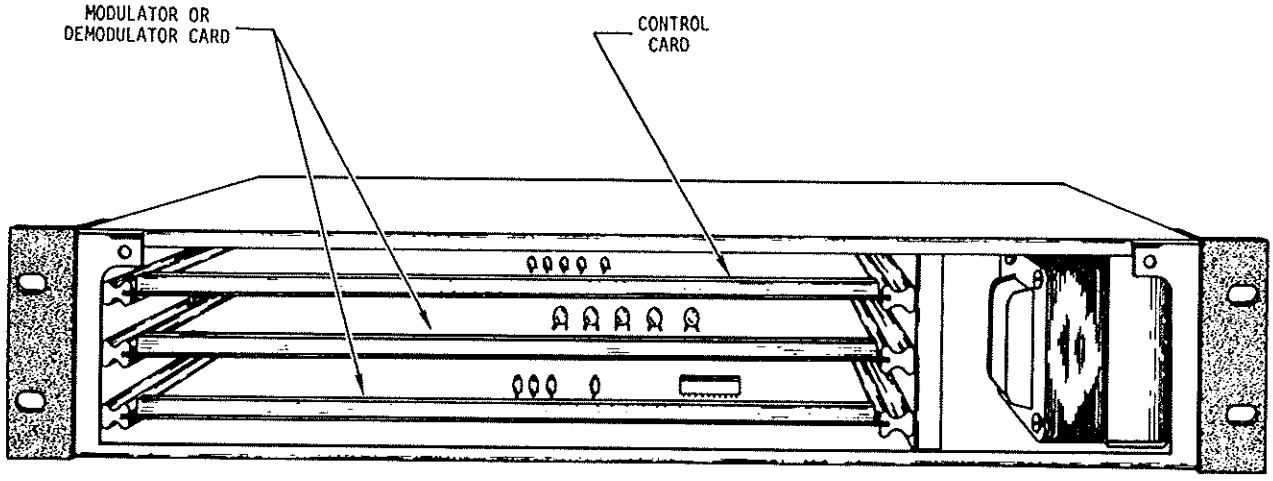


Figure 1-2. Unit With Front Panel Removed

The parameters selectable by the front panel keypad (or remote terminal) are as follows:

a. Channel (one or two)

b. Keying Type (FSK, Mark Only, Space Only, FEK)

c. Diversity

d. Mark Frequency

e. Space Frequency

f. Synchronous/Asynchronous mode

g. Mute

h. Baud Rate

i. Output Polarity (normal or reverse)

j. Auto Mark Hold/Hold (Standby)

A detailed functional analysis of each board is provided in Section IV, Theory of Operation.

Specifications are listed in Table 1-1.

Table 1-1. Model 1280 Specifications

ITEM	SPECIFICATION
MODULATOR	
Output Impedance	600 ohms ± 10% (Balanced and Isolated)
Output Level	Internally adjustable from -20 dBm to +6 dBm into 600 ohms.
Output Frequency Range	300-6000 Hz
Shift	60-200 Hz (FSK) 60-3000 Hz (FEK)
Mark and Space Tones	Selectable in 0.5 Hz Increments
Mute (Low Level Only)	Automatic (strap selectable) Manual (keypad selectable)
Input Data	EIA-RS-232C, MIL-188C or Optional High Level Loop
Sense	Selectable
Waveform Quality	Level of any harmonic will be less than -40 dB referenced to 0 dBm tone output. Maximum level of spurious output -60 dBm tone into 600 ohms
DEMODULATOR	
Input Impedance	600 or 10K ohms (Balanced and Isolated) (Strap Selectable)
Input Level	+6 to -45 dBm into 600 ohms
Input Frequency Range	300-6000 Hz
Mark and Space Frequency	Selectable in 0.5 Hz steps
Shift	60 to 3000 Hz
Baud Rate	Selectable 30 to 600
Diversity	Selectable in 2-channel DEMOD configuration

Table 1-1. Model 1280 Specifications (cont.)

ITEM	SPECIFICATION
DEMODULATOR (cont.)	
Data Output	Selectable (keypad or remote)
Synchronous Mode Asynchronous Mode	Regenerated RS-232 and MIL-188C Programmable 5, 6, 7, or 8 level RS-232 and MIL-188C
Auto Mark Hold	Strap Selectable -18 to -39 dBm into 600 ohms
Sense	Selectable (keypad or remote)
Indicators	Plasma display of energy in filter (Bar Graphs), frequency of mark/Space tones and baud rate
Synchronizer	Tracking Range ± 5% of Baud Rate
REMOTE CONTROL	
Device Number	Switch Selectable 01 thru 08.
Data In/Out	RS-232C Asynchronous (1 Start bit, 8 Data bits, 2 Stop bits)
Status	Received data only
Data Rate	Strap Selectable for 300, 600, 1200, 2400, 4800, 9600, or 19,200 baud
Frequency	300 to 6000 Hz (Must be 4-digit entry)
Baud Rate	To 600 baud (Must be 4-digit entry)

Table 1-1. Model 1280 Specifications (cont.)

ITEM	SPECIFICATION
GENERAL	
Dimensions	19 in (48.26 cm) W x 3.5 in (8.89 cm) H x 14 in (35.56 cm) D. 18 in (45.72 cm) D with High Level Option.
Weight	Approximately 12 lbs (5.44 Kg).
Voltage	115/230 Vac ± 15%, 47 to 440 Hz (switch card selectable)
Optional Voltage #1	10 to 16 Vdc at 4A maximum
Optional Voltage #2	20 to 32 Vdc at 2.5A maximum
ENVIRONMENTAL	
Operating Range	
Temperature	0° to 50°C (32° to 122°F)
Humidity	To 95% Non-condensing
Altitude	MSL to 10,000 feet
Non-Operating Range	
Temperature	-40° to +80°C
Humidity	To 95% Non-condensing
Altitude	MSL to 50,000 feet
OPTIONAL HIGH LEVEL	
Loop Power Supply	± 65 Vdc at 80 MA max. (non-regulated)
Keyer	Polar/Neutral contacts isolated 80 MA max.

SECTION II

INSTALLATION

2.1 GENERAL

This section contains instructions for unpacking, mounting and making all connections to the Model 1280 modem and its options.

2.2 UNPACKING AND INSPECTION

Open the shipping container. Do not use sharp metallic objects that might damage the contents. Remove the packing and the unit from the container and inspect for damage. If any damage is observed, file a written claim with the shipping agency and forward a copy of the claim to:

PLANTRONICS/Frederick Electronics Corporation
7630 Hayward Road, P.O. Box 502
Frederick, Maryland, 21701-0502

If packing for storage or reshipment is anticipated, replace the packing material in the shipping container and store for future use.

2.3 POWER REQUIREMENTS

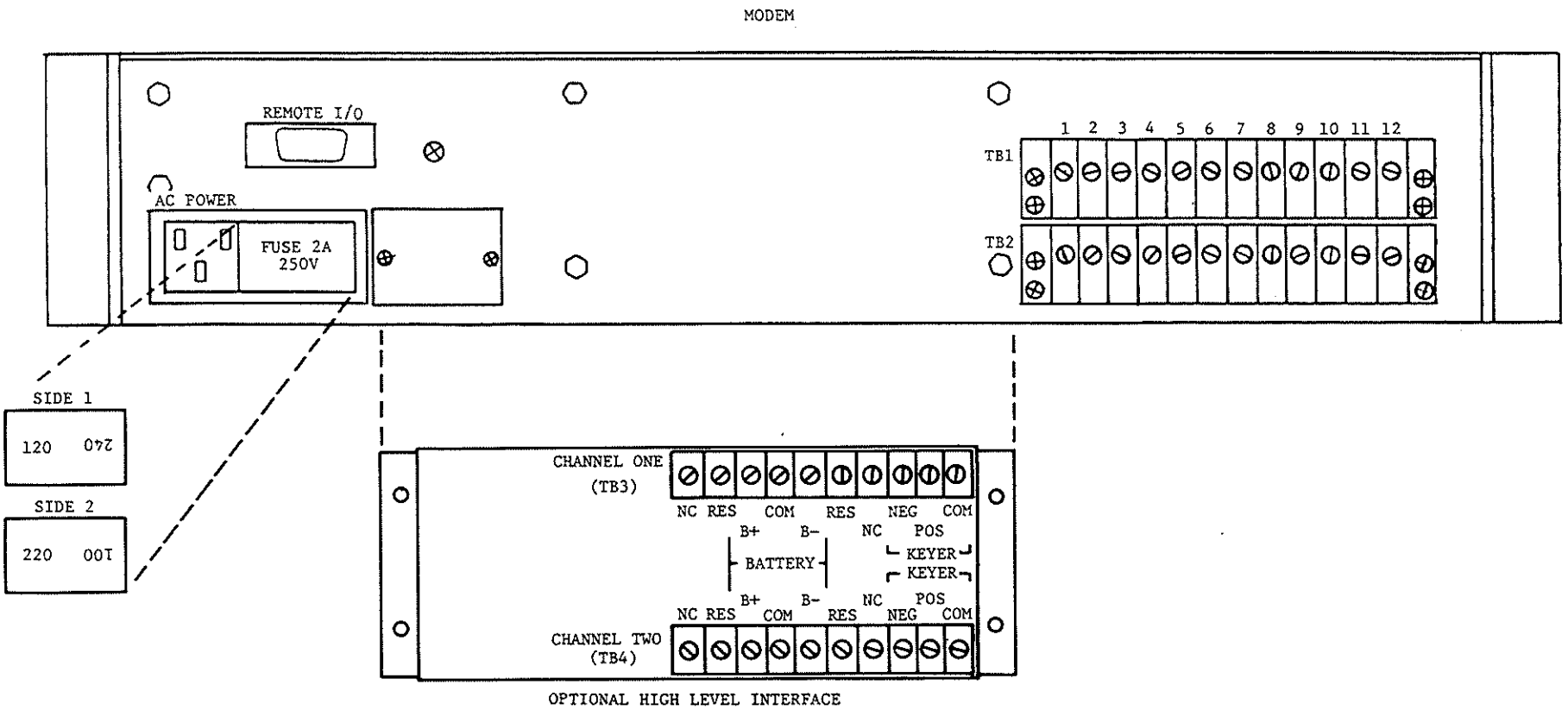
The Modem operates on either 115 or 230 Vac, ±15 percent, 47 to 440 Hz or with optional Direct Current (dc) supplies, 10 to 16 Vdc at 4 Amps. maximum or 20 to 32 Vdc at 2.5 Amps. maximum. The unit can be set to operate on 115 volts or 230 volts by the position of the printed circuit (switch) board, located behind the fuse (F1) on the lower right-hand side of the unit. (Refer to Figure 2-1.) Power switch (S1) is located on the front panel. Turn the switch to the ON position to apply power.

****
* W A R N I N G *
****

The AC input circuit of this unit contains voltages which may be hazardous to life. Exercise caution while working in the unit when protective cover is removed.

- - - - - - -
C A U T I O N
- - - - - - -

Insure the switch board is inserted correctly for the input voltage being used. Refer to Figure 2-1.



C A U T I O N

FOR 110-120V OPERATION INSERT SWITCH BOARD SIDE 1 UP AS ILLUSTRATED.

FOR 220-240V OPERATION INSERT SWITCH BOARD SIDE 1 UP, ROTATED 180°.

(SIDE 2 OF THE SWITCH BOARD IS NOT USED.)

Figure 2-1. Rear Panel Connections

2.4 MOUNTING

The Modem is designed to mount in a standard 19-inch (48.3 cm) rack. A vertical rack space of 3.5 inches (8.9 cm) is required.

2.5 SIGNAL CONNECTIONS

All signal connections to the Modem are made on the rear panel of the unit and optional High Level Keyer/Supply (Figure 2-1). Connections are listed in Table 2-1 and 2-2.

C A U T I O N

High level loop current must be externally limited to 80 ma maximum (60 ma typical) and arc suppression to less than 350 volts.

Table 2-1. Modem Signal Connections

Signal connections to TB1/TB2 are determined by the board type (modulator or demodulator) which is installed in each location.

PIN NUMBER TB1/TB2	EXPLANATION
Modulator	**Input/Output Signals**
1	- High Level Input
2	+ High Level Input
3	N.C.
4	N.C.
5	MARK Frequency Output
6	SPACE Frequency Output
7	Low Level Input
8	N.C.
9	Balanced Output
10	Balanced Output
11	Analog Ground
12	Analog Ground
Demodulator	**Input/Output Signals**
1	N.C.
2	N.C.
3	Data Mid-Bit Sample
4	N.C.
5	Undetected MARK
6	Undetected SPACE
7	Data Output RS-232-C
8	Data Output MIL-188-C
9	Balanced Audio Input
10	Balanced Audio Input
11	Ground
12	Ground

Table 2-1. Signal Connections (cont.)

	EXPLANATION
Remote I/O	**Remote Terminal Input/Output Connections**
1	Data Input
2	Data Output
3	Status Input (CTS)
4	Status Output (CTS)
5	Status Output (RTS)
6	Status Input (RTS)
7	Ground
8	N.C.
9	N.C.
AC POWER	**115 Vac/230 Vac/dc Power Connector**

Table 2-2. Optional High Level Keyer/Loop Supply Signal Connections

Signal connections to TB3/TB4 are identical and provide high level output(s) for corresponding demodulator(s).

PIN CONNECTION		EXPLANATION
NC		NC Connection
RES		External Current Limiting Resistor
B+	>	Internal Loop Positive (+) Battery (B+)
COM	> BATTERY	Internal Loop Common (BCOMM)
B-	>	Internal Loop Negative (-) Battery (B-)
RES		External Current Limiting Resistor
NC		N.C.
NEG	>	MARK Keyer Output (MK)
POS	> KEYER	SPACE Keyer Output (SP)
COM	>	Keyer Loop Common (LP COMM)

2.6 STRAPPING CONFIGURATION

Several switches and jumpers allow the Modem to be user modified to suit different applications and should be set before power is applied.

2.6.1 Input Impedance

Jumper W4 on the demodulator board (D5707), as shown in Figure 2-2. The input impedance is 600 ohms with the jumper in and 10 K ohms with the jumper out.

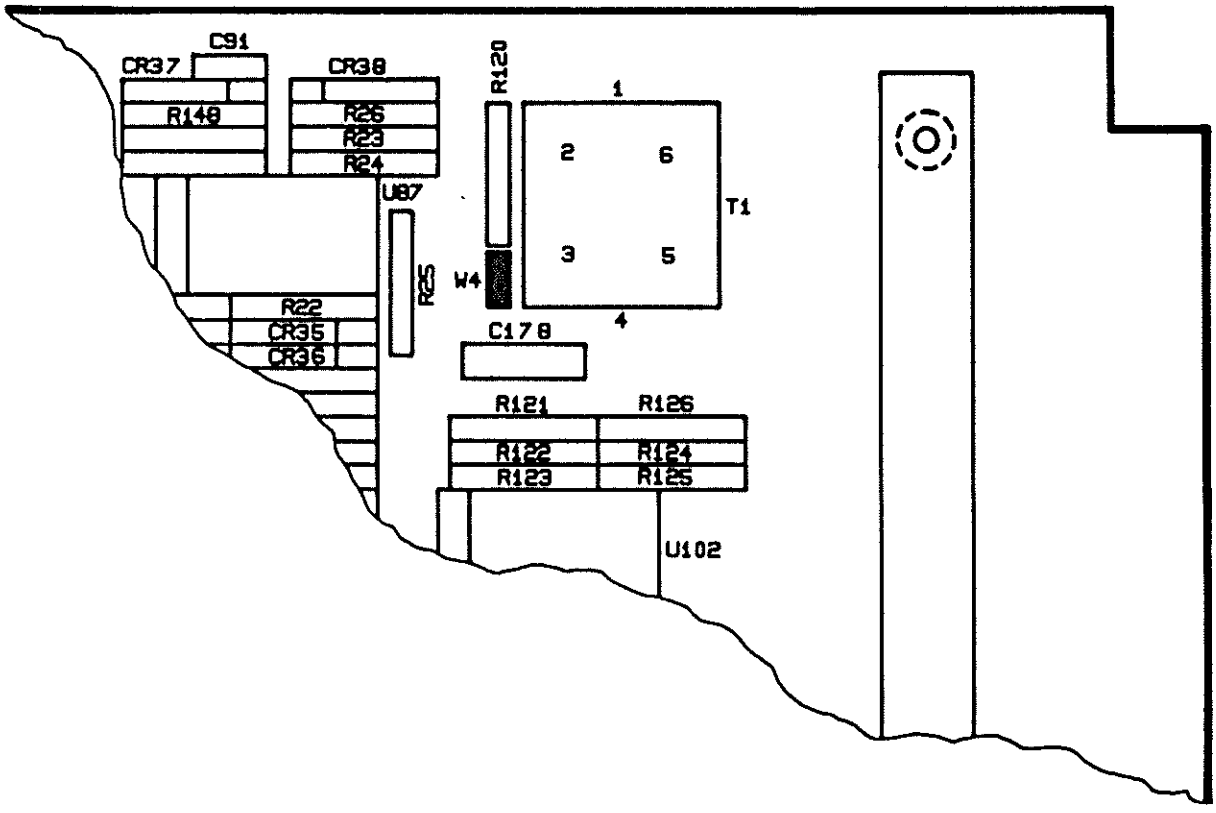


Figure 2-2. Input Impedance Selection Jumper Location

2.6.2 Auto Mark Hold (AMH) Threshold Switch

The auto mark hold threshold level is selected by switch S7 on the demodulator board. The threshold value is selectable between -18 dBm and -39 dBm in eight 3 dB steps as shown in Figure 2-3, which illustrates a -18 dB setting.

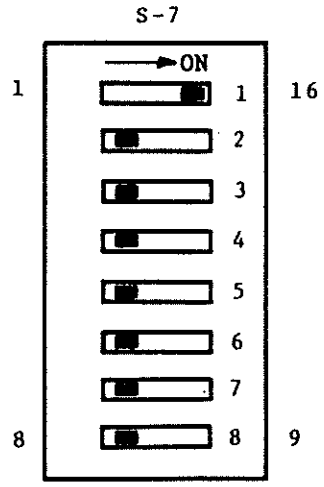


Figure 2-3. Auto Mark Hold Threshold Selection

2.6.3 Remote I/O Baud Rate Selection

The baud rate selection for the remote control device is accomplished by installing a jumper in the header U8 on the control board as shown in Figure 2-4. Labels beside U8 indicate the baud rate achieved by each jumper.

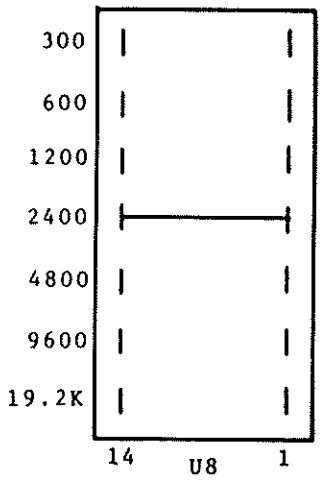
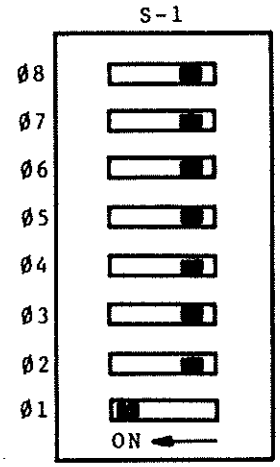


Figure 2-4. Remote I/O Baud Rate Selection

2.6.4 Remote I/O Device Address Selection

The remote control device address is selectable on the control board by switch S1 as shown in Figure 2-5. The address selected by each switch is labeled beside the switch from 01 thru 08.

This switch selects the identification number of the unit when more than one unit is being controlled by the same remote device.



CHANNEL ADDRESS SWITCH

Figure 2-5. Remote Device Address Selection

2.6.5 Strapping By PC Board

2.6.5.1 CONTROL BOARD. The following jumpers must be installed when less than five RS-232 loads are to be driven.

JUMPER	CONNECTION	SIGNAL
E1-E2	P1A12	Remote Data Output
E3-E4	P1B12	Status Output (RTS)
E5-E6	P1A13	Status Output (CTS)

Refer to Figure 2-6 for locations of jumpers.

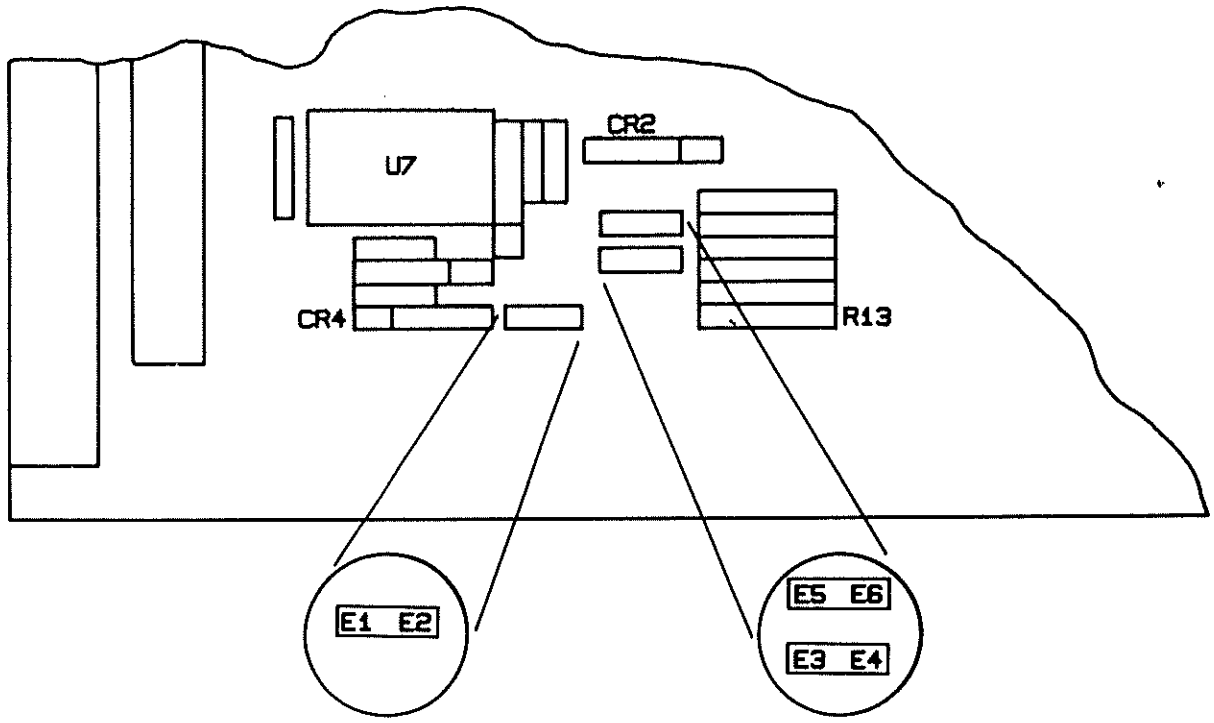


Figure 2-6. Expanded View of Control Board (D5697) Component Side

2.6.5.2 MODULATOR BOARD (D5725). The following jumpers, as shown in Figure 2-7 will yield the indicated results.

JUMPER	IN	OUT	RESULTS
W1	X		Test Probe Ground "Always Installed"
W2	X		Half-Duplex Operation
W2		X	Full-Duplex Operation
W3		X	RS-232-C Input
W3	X		MIL-188-C Input
W4	X		Auto Mute
W4		X	No Auto Mute
W5	X		Not Used "Always Installed"
W6	X		Not Used "Always Installed"
W7	X		60 ma Input Current Max.
W8	X		20 ma. Input Current Max.
W9	X		Test Probe Ground "Always Installed"

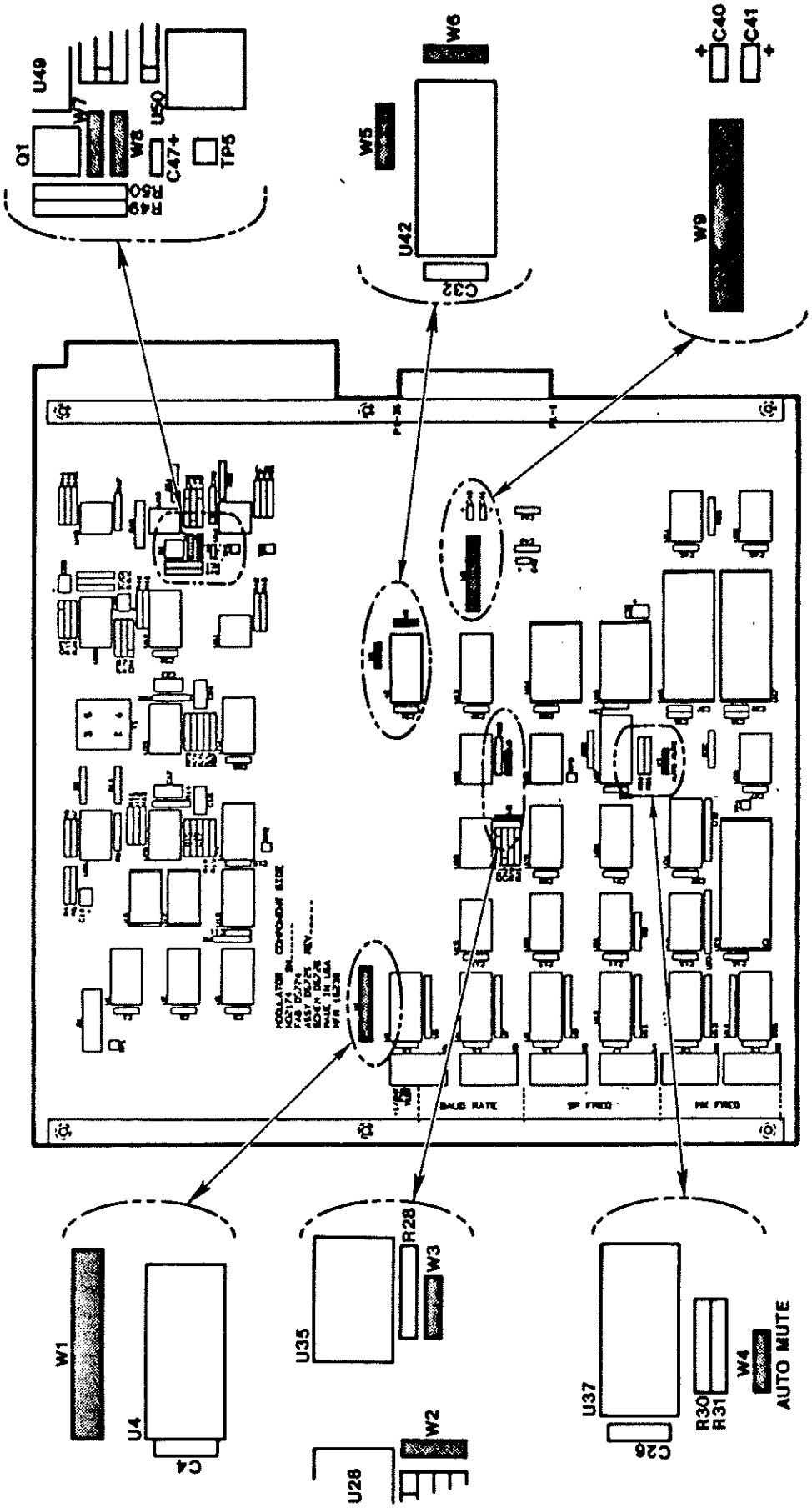


Figure 2-7. Expanded Component View of Modulator Showing Location of Jumpers

2.6.5.3 DEMODULATOR BOARD (D5707). The following jumpers, as shown in Figure 2-8 will yield the indicated results.

JUMPER	IN	OUT	RESULTS
W1	X		Commutating filter feedback "Normally Installed" - Removed for troubleshooting only.
W2	X		Commutating filter feedback "Normally Installed" - Removed for troubleshooting only.
W3	X		Test probe ground "Always Installed".
W4	X		600 ohm Input Impedance.
W4		X	10K ohm Input Impedance.

2.7 INSTALLATION

Signal Connections for typical operating conditions are illustrated in Figures 2-9 through 2-12.

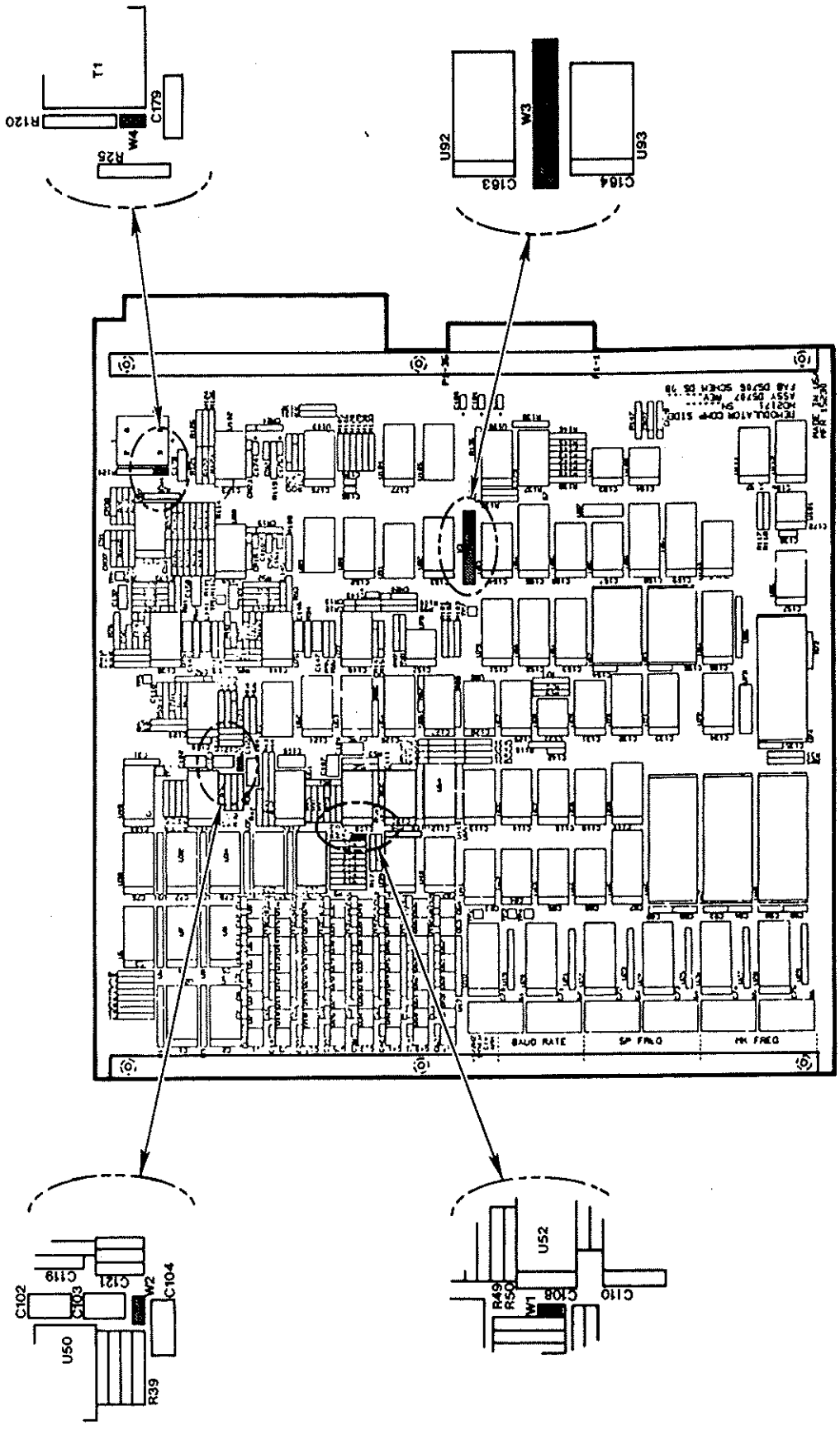


Figure 2-8. Expanded View of Demodulator Board Showing Jumper Locations

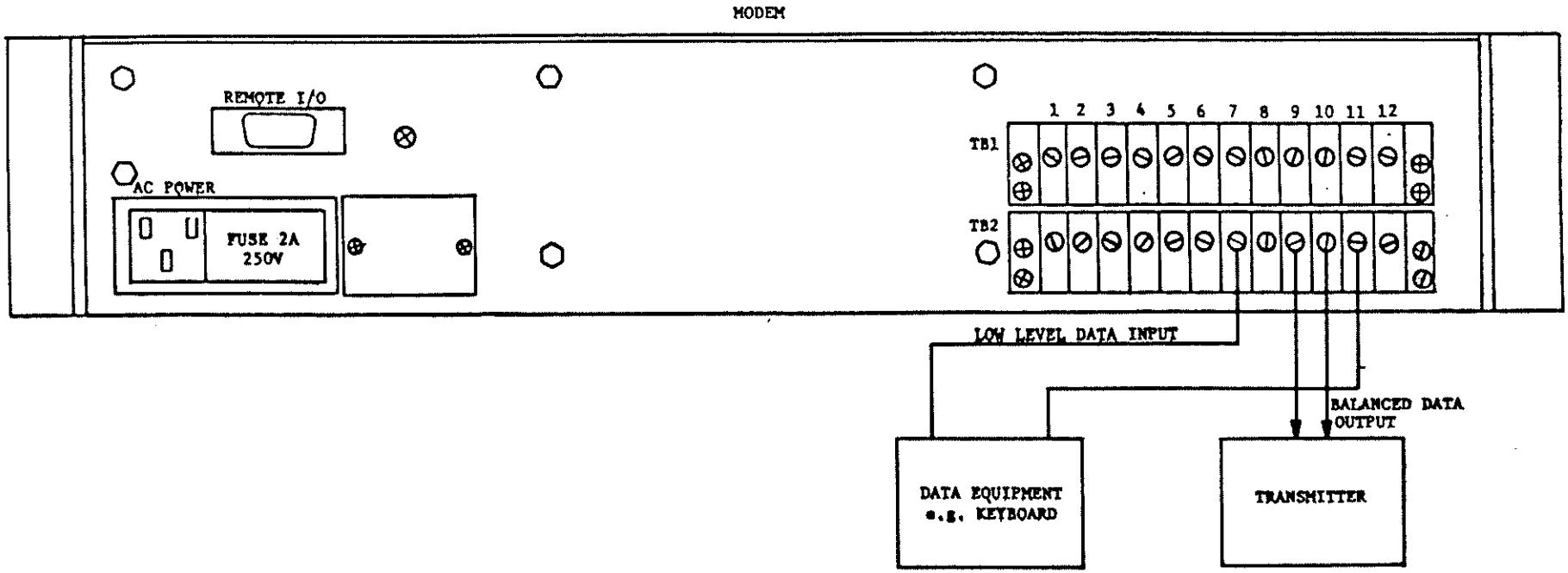


Figure 2-9. Typical Modulator Application

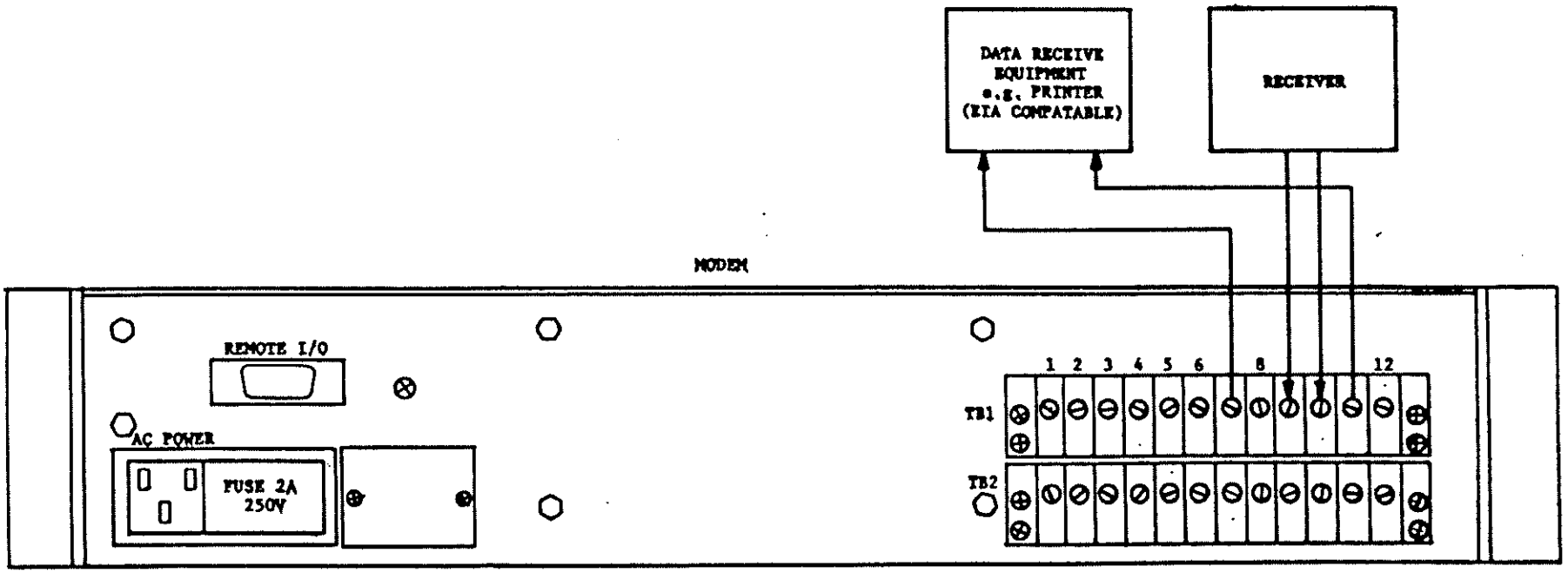


Figure 2-10. Typical Demodulator Application

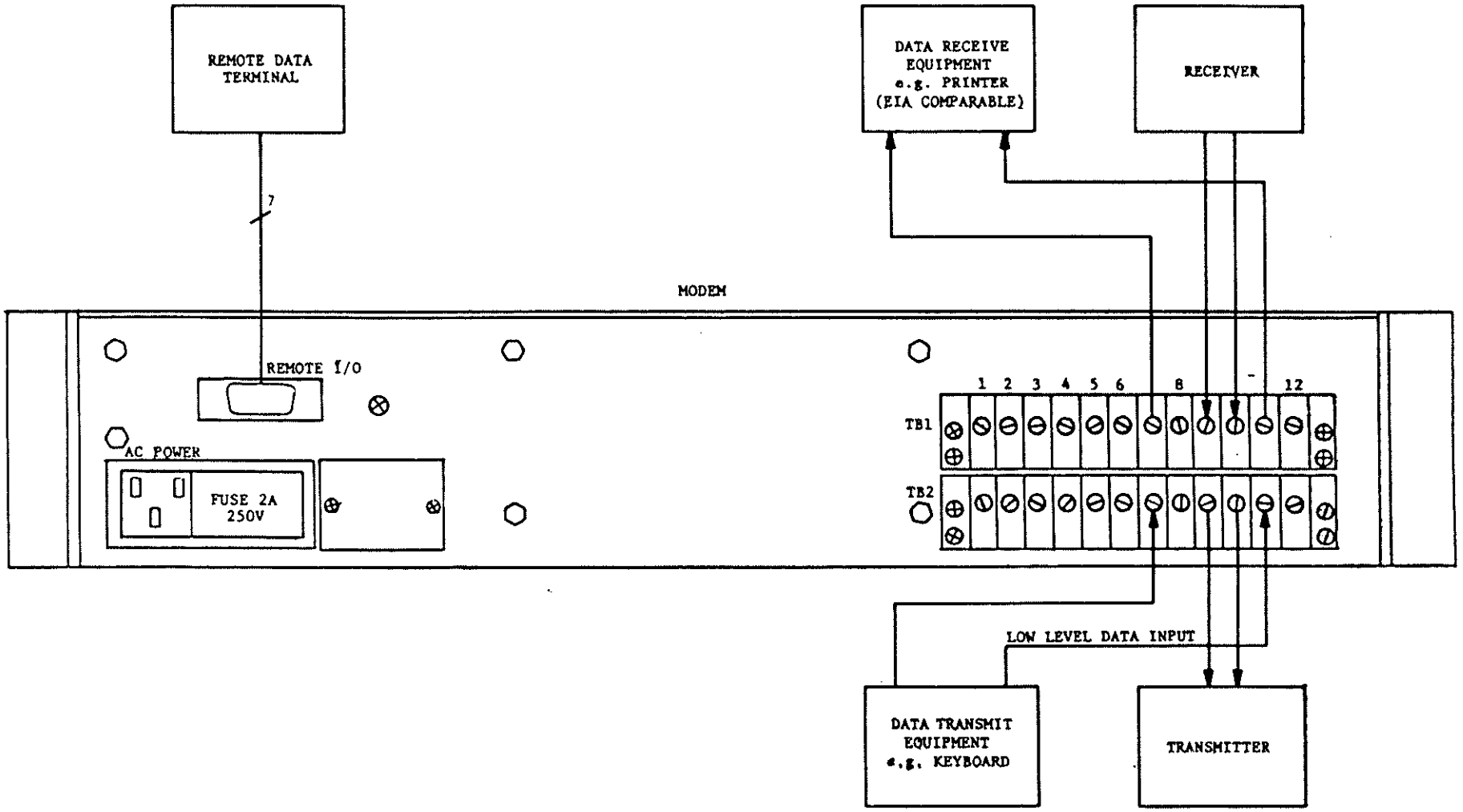
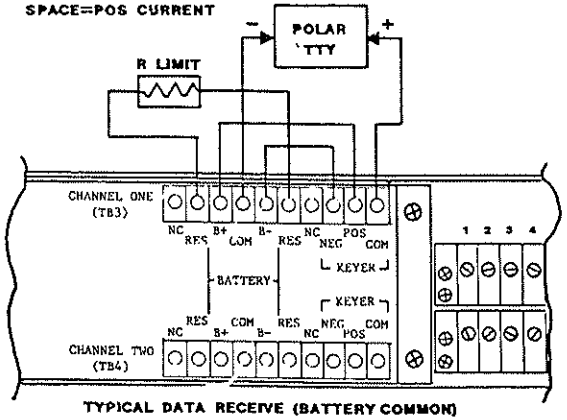
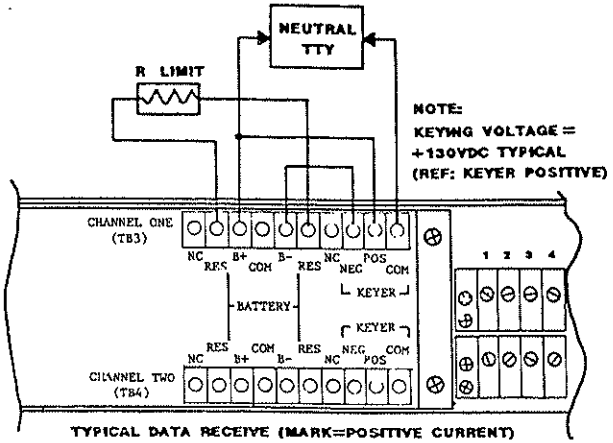


Figure 2-11. Remote Control Application

NOTE:
KEYING VOLTAGE =
±65 VDC TYPICAL
MARK=NEG CURRENT
SPACE=POS CURRENT



TYPICAL DATA RECEIVE (BATTERY COMMON)



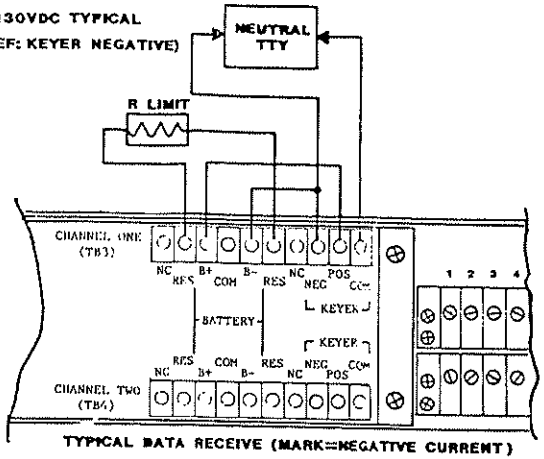
NOTE:
KEYING VOLTAGE =
+130VDC TYPICAL
(REF: KEYER POSITIVE)

TYPICAL DATA RECEIVE (MARK=POSITIVE CURRENT)

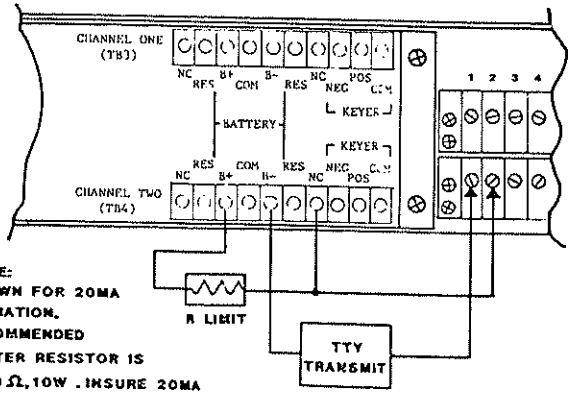
CAUTION

LOOP CURRENT MUST BE EXTERNALLY LIMITED TO 100 MA MAX (60 MA TYP) AND ARC SUPPRESSION TO LESS THAN 350 VOLTS

NOTE:
KEYING VOLTAGE=
−130VDC TYPICAL
(REF: KEYER NEGATIVE)



TYPICAL DATA RECEIVE (MARK=NEGATIVE CURRENT)



NOTE:
SHOWN FOR 20MA OPERATION. RECOMMENDED LIMITER RESISTOR IS 6500 Ω, 10W . INSURE 20MA JUMPER IS INSTALLED

TYPICAL DATA SEND

Figure 2-12. Typical High Level Applications

2.8 INITIAL CHECKOUT PROCEDURE

The initial checkout procedures verify operation of the Modem. They should be performed prior to connecting external signal cables. Should a fault occur during these procedures refer to Section V for troubleshooting procedures.

2.8.1 Power Supply Checkout

Turn the power switch on. Display descriptors should be illuminated.

2.8.2 Front Panel Keypad and Display Checkout

The front panel plasma display must be capable of indicating channel number, baud rate, mark and space frequencies, channel function, keying type, output polarity, auto mark hold, hold, +.5 Hz function, synchronize mode, regenerative mode, and mark only and space only mode when entered from the keypad. Refer to Section III for function of each key and display.

N O T E

The Model 1280 may be used as a modem, a one or two channel modulator, or a one or two channel demodulator depending upon user requirements. The following procedure pertains to the modem with channel one a demodulator, and channel two a modulator.

a. Press 'CHAN' (channel) and '1' keys on keypad. Observe descriptor beside DEMOD illuminates on display; and digit 1 appears below CH on display.

b. Press 'FSK' on keypad. Observe FSK descriptor illuminates on display.

c. Press 'AMH' (Autom Mark Hold) on keypad. Observe AMH descriptor illuminates on display.

d. Press '2ND' and 'REV' (Reverse) on keypad. Observe REV descriptor illuminates on display.

e. Press 'BAUD RATE' and '7', '4' keys. Observe the digits 74 appears below BAUD RATE on display.

f. Press 'SPACE/ONLY' and '1', '3', '1', '7' keys. Observe the digits 1317 appear below SPACE on display.

g. Press 'MARK/ONLY' and '1', '2', '3', '2' keys. Observe the digits 1232 appear below MARK on display.

h. Press '2ND' (second function) and '5/+.5' keys.
Observe +.5 descriptor illuminates on display.

i. Press '2ND' (second function) and 'HOLD' keys.
Observe HOLD descriptor illuminates on display.

j. Press '2ND' (second function) and 'SYNCH/REGEN' keys.
Observe REGEN descriptor illuminates on display.

k. Press '2ND' (second function) and 'SPACE/ONLY' keys.
Observe SP ONLY descriptor illuminates on display.

l. Press '2ND' (second function) and 'MARK/ONLY' keys.
Observe MK ONLY descriptor illuminates and SP ONLY extinguishes on display.

m. Press 'SYNCH/REGEN' key on keypad.
Observe Mark, Space and Baud Rate digits disappear and L= appears below mark on display.

Press '0' and '5' keys. Observe digits 05 appear after L= on display.

n. Press 'DIV' key. Observe DIV key LED illuminates.

o. Press 'ENTER' key. Observe ENTER key LED extinguishes.

N O T E

The ENTER LED comes on when the parameters are keyed in.

p. Press 'CHAN' (channel) and '2' key on keypad.
Observe MOD descriptor illuminates on display; ENTER key LED illuminates; and digit 2 appears below CH on display.

q. Press 'MUTE' key on keypad.
Observe MUTE key LED illuminates.

r. Press 'ENTER' key on keypad.
Observe ENTER key LED extinguishes.

s. Press 'REMOTE' key on keypad.
Observe REMOTE key LED is illuminated.

N O T E

Whenever the REMOTE LED is illuminated, the Model 1280 is operable from a remote device ONLY. The keypad is disabled.

t. Verify that keypad is inoperative when REMOTE LED is illuminated by repeating step a.

2.8.3 Remote Control Verification

This procedure verifies the operation of the Model 1280 from a remote terminal. A Remote Terminal (RT) is any device that transmits and receives serial asynchronous digital messages. The digital messages consist of one start bit, eight data bits (ASCII characters), no parity, and two stop bits. When remote operating parameters are entered into the Model 1280 the front panel display changes to reflect the entered operating parameters. A status report occurs when: requested from the RT; an input error is recognized by the Model 1280.

a. Connect the RT to REMOTE I/O, on the rear panel of the Model 1280. Refer to Table 2-1. for pin connection assignments.

N O T E

RT must be RS-232 compatible.

b. Set the CHANNEL ADDRESS switch S1 on the control board (D5697) to 01. Refer to Paragraph 2.6.4 for an explanation of the CHANNEL ADDRESS switch settings.

c. Verify the BAUD RATE selection jumper on the control board (D5697) is compatible for the RT in use. Refer to Paragraph 2.6.3 for an explanation of the BAUD RATE jumper settings.

d. Perform each input command listed in Table 2-3 from the RT. Observe status and Model 1280 response.

Table 2-3. Remote Control Verification

INPUT COMMAND	MODEL 1280 RESPONSE
C1R1 (CR)	REMOTE key LED illuminates. DEMOD descriptor illuminates, digit '1' appears below CH on display.
J0 (CR)	FSK descriptor illuminates.
J1 (CR)	MK ONLY descriptor illuminates. FSK descriptor extinguishes.
J2 (CR)	SP ONLY descriptor illuminates. MK ONLY descriptor extinguishes.
A1 (CR)	AMH descriptor illuminates.
A0 (CR)	AMH descriptor extinguishes.
N1 (CR)	REV descriptor illuminates.
N0 (CR)	REV descriptor extinguishes.
B74 (CR)	Digits 74 appear below Baud Rate on displaay.
S1317 (CR)	Digits 1317 appear below SPACE on display.
M1232 (CR)	Digits 1232 appear below MARK on display.
E1 (CR)	+.5 Hz descriptor illuminates on display.
E0 (CR)	+.5 Hz descriptor extinguishes.
H1 (CR)	HOLD descriptor illuminates on display.
H0 (CR)	HOLD descriptor extinguishes.
D1 (CR)	DIV key LED illuminates.
D0 (CR)	DIV key LED extinguishes.
Y1 (CR)	REGEN descriptor illuminates on display.
Y0 (CR)	REGEN descriptor extinguishes.

Table 2-3. Remote Control Verification (cont.)

INPUT COMMAND	MODEL 1280 RESPONSE
W5 (CR)	SYNCH descriptor illuminates on display.
W0 (CR)	SYNCH descriptor extinguishes.
C2 (CR)	MOD descriptor illuminates, digit 2 appears below CH on diaplay.
U1 (CR)	MUTE key LED illuminates.
U0 (CR)	MUTE key LED extinguishes.

SECTION III

OPERATION

3.1 GENERAL

This section contains an explanation of the controls and display indicator elements used in the operation of the Model 1280 FSK MODEM. It also describes the location and function of each element, control input and status output in the operation of the Modem from a remote control device, and operating procedures for the Modem.

3.2 CONTROLS AND DISPLAY INDICATOR ELEMENTS

The Model 1280 can be controlled by a front panel keypad. The keypad numeric and function keys are used to set up specific operating parameters used by the Modem. Some keys are dual function keys. For example, numeric "5" key also selects "+.5 Hz." To select the latter function, the "2nd" key has to be pressed before the 5/+.5 key is pressed. Specified keys contain LEDs which indicate state of modem.

The front panel indicator element displays the state of the controlled channel(s) via bargraph displays, descriptor lights, and digital read-outs of frequency, baud rate, and channel selected.

Functional descriptions of the display element, keypad, and power switch are given in Table 3-1. Figure 3-1 is a front panel view of the Modem indicating the controls and indicators by item number.

Table 3-1. Model 1280 Controls and Indicators

ITEM	INDICATOR/CONTROL	DESCRIPTION
1	Display Elements	
	MARK Bar Graph	Indicates Mark tone input/filter output signal strength in dBm.
	SPACE Bar Graph	Indicates Space tone input/filter output signal strength in dBm.
	SYNCH Descriptor	Indicates channel in Synchronous mode when illuminated or Asynchronous mode when extinguished.
	MOD Descriptor	Indicates channel is a Modulator.
	DEMOD Descriptor	Indicates channel is a Demodulator.
	MK ONLY Descriptor	Indicates channel is in Mark Only mode (OOK).
	AMH Descriptor	Indicates Auto Mark hold selected.
	SP ONLY Descriptor	Indicates channel is in Space Only Mode (OOK).
	HOLD Descriptor	Indicates channel is in Hold (Standby) condition.
	REV Descriptor	Indicates channel in Reverse Sense operation.
	+.5 Hz Descriptor	Indicates channel frequencies selected in 1/2 Hz increments.
	BAUD Rate	Indicates selected baud rate.
	CH	Indicates selected Channel is 1 or 2.
	SPACE	Four-digit display indicating Space tone frequency.
	MARK	Four-digit display indicating Mark tone frequency.

Table 3-1. Model 1280 Controls and Indicators (cont.)

ITEM	INDICATOR/CONTROL	DESCRIPTION
2	Keypad Controls	
	CHAN X	Enables channel selection and control where X is numerical key 1 or 2.
	AMH/HOLD	AMH - Selects or removes Automark hold function. 2nd-HOLD - Selects or removes Hold (STAND-BY) function.
	DIV	Selects or removes diversity of controlled channel with adjacent channel; when selected DIV LED illuminates.
	FSK	Selects or removes FSK Function of frequency shifts 200 Hz and below for modulator. **N O T E** Anytime a shift above 200 Hz is selected the unit defaults to FEK mode.
	BAUD RATE XXXX	Enables selection of baud rate where XXXX are the four numerical keys.
	NORM/REV	Selects Normal or Reverse output polarity.
	MUTE	Selects or removes modulator Mute function; when selected mute descriptor illuminates.
	MARK/ONLY	MARK XXXX - Enables selection of mark tone frequency for selected channel where XXXX are the four numerical keys specifying frequency in hertz. 2nd Mark Only - Places selected channel in the Mark Only mode (OOK).

Table 3-1. Model 1280 Controls and Indicators (cont.)

ITEM	INDICATOR/CONTROL	DESCRIPTION
	Key Pad Controls (cont.)	
	CLEAR	Clears operating parameters prior to pressing 'ENTER' Key.
	SYNCH/REGEN	Selects or removes selected channel in the synchronous regenerated data mode.
	REMOTE	Enables or disables modem for remote control function; when selected descriptor illuminates it is enabled.
	SPACE/ONLY	Space XXXX - Enable selection of Space tone frequency of selected channel where XXXX are the four numerical keys specifying frequency in hertz. 2nd-Space Only - Places selected channel in the Space Only mode (OOK).
	2ND	Enables selection of 2nd functions for selected channel.
	1	Selects Numeric 1
	2	Selects Numeric 2
	3	Selects Numeric 3
	4	Selects Numeric 4
	5/+.5	5 - Selects Numeric 5 2nd +.5 - Selects 1/2 Hertz increment for Mark and/or Space frequencies.

Table 3-1. Model 1280 Controls and Indicators (cont.)

ITEM	INDICATOR/CONTROL	DESCRIPTION
	Key Pad Controls (cont.)	
	6	Selects Numeric 6
	7	Selects Numeric 7
	8	Selects Numeric 8
	9	Selects Numeric 9
	0	Selects Numeric 0
	ENTER	Enters selected parameters to initiate control of the selected channel. Descriptor illuminate whenever a channel function is selected and extinguishes when parameters are entered.
3	POWER	ON/OFF switch to provide unit power.

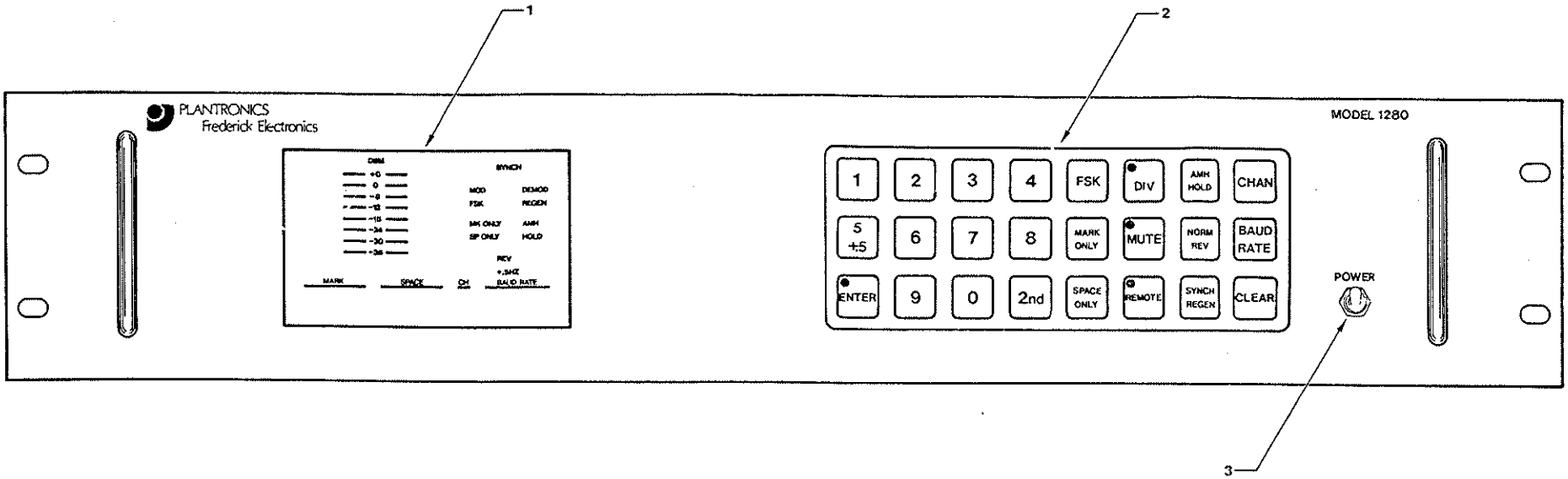


Figure 3-1. Model 1280 Front Panel

3.3 REMOTE CONTROL INPUT

The Model 1280 can also be controlled through a serial remote control input. This input requires an asynchronous, one start bit, 8 data bits (ASCII characters), and a two stop bit signal. Table 3-2 lists the remote control input commands for the Modem. Each entry command must be followed by a carriage return.

3.4 STATUS OUTPUT

The status response contains only relevant data corresponding to the data requested in the remote condition. A typical command/status would be as follows:

Command: C1G

Response:	Channel	= 1
	Mark Frequency	= 1500
	Space Frequency	= 2500
	Baud Rate	= 600

Any other parameters that are set.

Table 3-2. Model 1280 Remote Control Commands

COMMAND/RESPONSE	EXPLANATION
Input Commands	Note: Commands from remote terminal must be received correctly. The unit will not recognize deletions or rub-outs.
'C01'	Selects Channel One
'C02'	Selects Channel Two
'MXXXX'	Selects Mark frequency where XXXX is the desired mark frequency in hertz.
'SXXXX'	Selects Space frequency where XXXX is the desired space frequency in hertz.
'BXXXX'	Selects baud rate where XXXX is the desired baud rate.
'U0'	Disables Mute function.
'U1'	Enables Mute function.
'N0'	Places desired channel into Normal output polarity mode.
'N1'	Places desired channel into Reverse output polarity mode.
'J0'	Places desired channel into Frequency Shift Keying (FSK) mode.
'J1'	Places desired channel into Mark Only (OOK) mode.
'J2'	Places desired channel into Space only (OOK) mode.
'A0'	Disables desired channel Auto Mark Hold (AMH) function.
'A1'	Enables desired channel Auto Mark Hold (AMH) function.

Table 3-2. Model 1280 Remote Control Commands (cont.)

COMMAND/RESPONSE	EXPLANATION
Input Commands (cont.)	
'HØ'	Disables desired channel Hold function. (Data output normal)
'H1'	Enables desired channel Hold function. ((Data output in standby (constant state) condition))
'YØ'	Disables desired channel regenerator.
'Y1'	Enables desired channel regenerator.
'DØ'	Disables desired channel diversity function.
'D1'	Enables desired channel diversity function placing it into diversity with adjacent channel.
'RØ'	Places unit into Local mode.
'R1'	Places unit into Remote mode.
'WØ'	Places desired channel into synchronous mode.
'W5'	Places desired channel into asynchronous 5 level code operation.
'W6'	Places desired channel into asynchronous 6 level code operation.
'W7'	Places desired channel into asynchronous 7 level code operation.
'W8'	Places desired channel into asynchronous 8 level code operation.
'EØ'	Disables desired channel 1/2 Hz frequency increment mode.
'E1'	Enables desired channel 1/2 Hz frequency increment mode.

Table 3-2. Model 1280 Remote Control Commands (cont.)

COMMAND/RESPONSE	EXPLANATION
Input Commands (cont.)	
'G' 'L'	Request status for desired channel. RESPONSE **NOTE** Provides the following list of input commands available for remote control use. MK FREQ = MXXXX SP FREQ = SXXXX BD RATE = BXXXX CHAN = CX FSK = JØ MK ONLY = J1 SP ONLY = J2 SYN MODE = WØ ASYN 5L = W5 ASYN 6L = W6 ASYN 7L = W7 ASYN 8L = W8 For the following Commands Ø = OFF 1 = ON MUTE = UX DIV = DX REM = RX REV = NX HOLD = HX REGEN = YX 1/2 HZ = EX AMH = AX **NOTES** 1) When you exceed the units parameters for frequency or baud rate, response will be that your request was either too Low or too High and give you the minimum or maximum parameter. 2) When you input an invalid function character the unit will respond with the corresponding function "Input Error".

3.5 OPERATING PROCEDURES

The Model 1280 modem is controlled by two sources, either the front panel keypad or a remote terminal. The following procedures include start-up, standby, normal, and shut-down operation for local and remote function.

3.5.1 Local Operation

The front panel keypad is used to perform the Local operation. The commands may be selected in any sequence and entered by pressing the ENTER key. Each channel is selected by pressing the CHAN key and the Numeric key 1 or 2 for the desired channel. To clear an error in input commands, press the **CLEAR** key; do not press the ENTER key.

3.5.1.1 START-UP. Before power is supplied, refer to Section II to ensure that internal switch settings, jumpers, and cabling are properly set and connected.

3.5.1.2 NORMAL OPERATION. Turn power on and display elements illuminate. Any elements indicated were programmed prior to power off. Table 3-3 outlines the operation, key to be pressed, and results of operation for programming the Modem under normal operation.

3.5.1.3 STANDBY OPERATION. The following functions can place a channel in standby.

a. Enter '2ND - AMH/HOLD' to place the selected channel into standby mode. The HOLD (Standby) mode sets the output to a steady mark condition.

b. Enter 'AMH' to select auto mark hold for the selected channel. AMH sets the output to a steady mark when the input signal level drops below a preset level. Refer to Section II, Paragraph 2.6.2 for information required to select the AMH threshold level.

3.5.1.4 SHUT-DOWN. The Modem does not require any preparatory settings before power is turned off. Operating parameters displayed are stored in memory when power is removed.

3.5.2 Remote Operation

Refer to Section II, Paragraph 2.6.4 and Table 3-2 for setup, input commands and status responses for the Modem.

3.5.2.1 START-UP. When unit is turned on, remote operation can be accessed by either local or remote command. Entering 'REMOTE' from keypad places unit into remote operation. Command 'R1' from a remote terminal places unit into remote operation. In both cases the REMOTE LED will illuminate to indicate unit is in remote control operation. Any keypad entry, with the exception of REMOTE, will be disregarded by the unit when the REMOTE LED is illuminated.

a. Set 'CHANNEL ADDRESS' switch, S-1, for the proper channel identification setting.

b. Verify the remote baud rate header (U8) is properly jumpered to match requirements for the remote terminal (refer to Paragraph 2.6.3).

3.5.2.2 STANDBY OPERATION. The same standby operation in Paragraph 3.5.1.3 applies to the remote operation.

Table 3-3. Model 1280 Operating Procedures

OPERATION	PRESS KEY	RESPONSE
Select Channel	CHAN X (1 or 2)	ENTER key LED illuminates desired channel number appears below CH on display.
Select Desired Channel as a Modulator	MOD	MOD descriptor on display illuminates.
Enter FSK Operation	FSK (60 Hz to 200 Hz=FSK 60 Hz to 3000 Hz=FEK)	FSK descriptor on display illuminates for FSK and is extinguished for FEK.
	NOTE Anytime a shift above 200 Hz is selected, the unit defaults to FEK mode.	
Enter Desired Mark Frequency	MARK ONLY XXXX (300 to 6000 Hz)	Mark frequency appears below MARK on display. Each number displayed sequencially from right when keyed.
Enter Desired Space Frequency	SPACE ONLY XXXX (300 to 6000 Hz)	Space frequency appears below SPACE on display. Each number displayed sequencially from right when keyed.
Enter Desired Baud Rate	Baud Rate XXXX (30 to 600 baud)	Baud rate appears below baud rate on the display. Each number displayed sequencially from right when keyed.
Place Selected Channel in Mute Condition	MUTE	Mute key LED illuminates. (Removes output tone levels).
Remove Selected Channel from Mute Condition	MUTE	Mute key LED extinguishes. (Output tone levels return to previous set level.)

Table 3-3. Model 1280 Operating Procedures (cont.)

OPERATION	PRESS KEY	RESPONSE
Enable Selected Channel Auto Mark Hold	AMH/Hold	AMH descriptor illuminates. (Output goes to constant Mark condition when input level drops below a preset level.)
Disable Selected Channel Auto Mark Hold	AMH/Hold	AMH descriptor extinguishes.
Enable Selected Channel Diversity Function	DIV	DIV key LED illuminates. (Places selected channel into diversity with adjacent channel.)
Disable Selected Channel Diversity Function	DIV	DIV key LED extinguishes.
Reverse Selected Channel Output Polarity	2ND-NORM/REV	REV descriptor illuminates on display.
Change Selected Channel Output Polarity to Normal	NORM/REV	REV descriptor extinguishes.
Change from Local to Remote Operation	REMOTE	REMOTE key LED illuminates; keypad is disabled; remote control is enabled.
Change from Remote to Local Operation	REMOTE	REMOTE key LED extinguished; keypad enabled.
Change Operating mode from Asyn-chronous to Synchronous	SYNCH/REGEN	SYNCH descriptor on display illuminates.
Change Operating mode from Syn-chronous to Asynchronous	SYNCH/REGEN X	SYNCH descriptor on display extinguishes. (X= 5 thru 8; desired code level)

Table 3-3. Model 1280 Operating Procedures (cont.)

OPERATION	PRESS KEY	RESPONSE
Clear Improperly Keyed Input	CLEAR	Clears previous input. Returns elements to original parameters.
Enter Operating Parameters Selected	ENTER	ENTER key LED extinguishes; Operating parameters are entered.
Place Desired Channel Output to Hold Mode	2ND-AMH/HOLD	HOLD descriptor on display illuminates. (Output maintains constant Mark condition.)
Remove Hold Mode from Desired Channel Output	2ND-AMH/HOLD	HOLD descriptor on display extinguishes.
Place Desired Channel into Regenative Mode	2ND SYNCH/REGEN	REGEN descriptor on display illuminates.
Return Desired Channel from Regenative to Normal Operation Mode	2ND SYNCH/REGEN	REGEN descriptor on display extinguishes.
Place Desired Channel into Mark ONLY (OOK) Operation	2ND-MARK ONLY	MARK ONLY descriptor illuminates. SPACE ONLY descriptor extinguishes. FSK descriptor extinguishes.
Place Desired Channel into Space ONLY (OOK) Operation	2ND-SPACE ONLY	SPACE ONLY descriptor illuminates. MARK ONLY descriptor extinguishes. FSK descriptor extinguishes.
Enable MARK and SPACE Tones for 1/2 Hz Increment	2ND-5/+.5	+.5 descriptor illuminates.
Remove 1/2 Hz Increment for Mark and Space Tones	2ND-5/+.5	+.5 descriptor extinguishes.

SECTION IV

THEORY OF OPERATION

4.1 GENERAL

This section describes the theory of operation of the components of the modem including the FSK modulator, the FSK demodulator, the power supplies, the backplane, and the control board and displays.

4.2 FUNCTIONAL DESCRIPTION

Figure 4-1 is a general block diagram of the unit with one modulator and one demodulator installed. Other possible configurations are two modulators only (no demodulator) or two demodulators only (no modulator). Thus a unit will always contain one or two PC boards, a power supply, a control board and a control/indicator panel.

The modulator will accept current loop or RS-232/MIL-188C data in and modulate it at the frequencies and baud rates selected by the keypad or remote terminal selection. The output tones are 600 ohm balanced and of adjustable amplitude.

The demodulator receives the FSK tones on a 600/10K ohm balanced line and demodulates them based on the mark and space frequencies and baud rates set up by the front panel keypad. The resulting data is output at selectable levels compatible with MIL-188C, RS-232, or optional high level current loop.

All operating details of this unit can be programmed from the keypad on the front panel. This information and signal energy levels are displayed on the front panel. Remote operation is possible via an RS-232 input.

Selectable power supplies accept 115V/230V AC or optional 12V/24V DC inputs.

An optional high level loop power supply and keyer can be attached to the rear of the chassis and external to it.

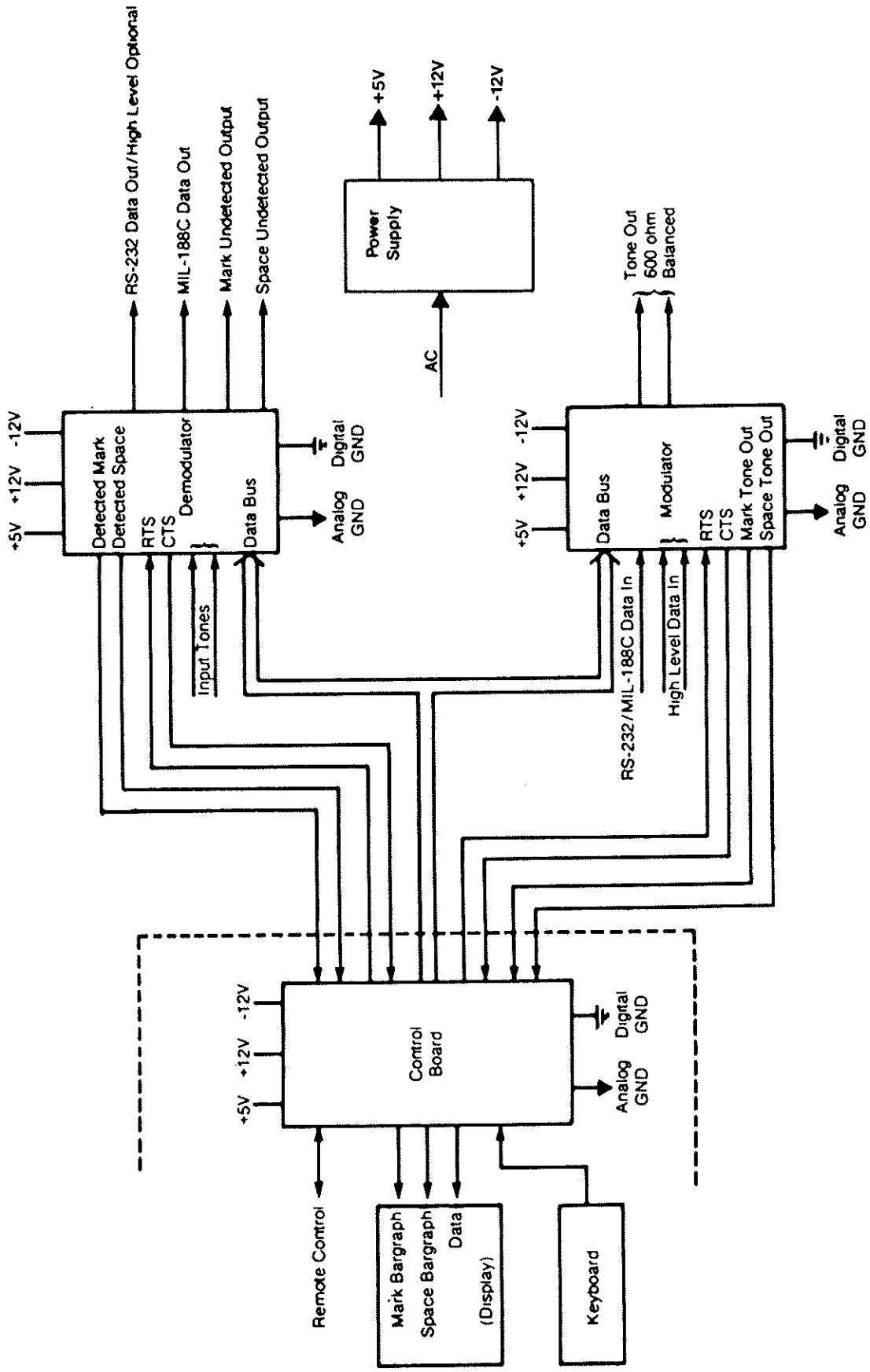


Figure 4-1. System Block Diagram

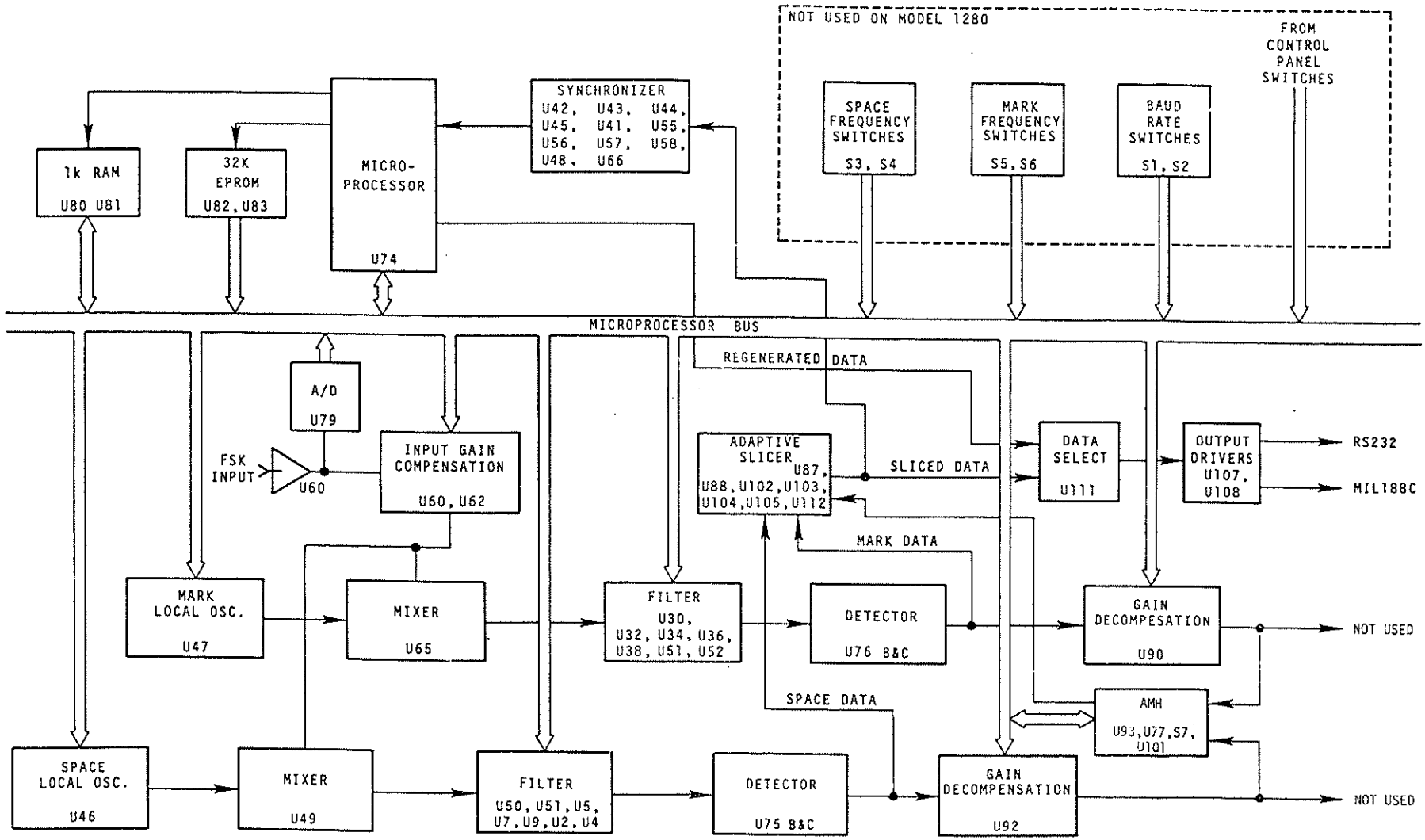


Figure 4-2. Demodulator Block Diagram

4.3 DETAILED FUNCTIONAL DESCRIPTION

4.3.1 Demodulator Board

A block diagram of this unit is shown in Figure 4-2. The following functional analysis describes the function of the demodulator block and the signals through them. Refer to Figure 4-2 for a block diagram description or the demodulator schematic diagram.

4.3.1.1 INPUT CIRCUIT. The circuit consists of an audio transformer (T1) with an input impedance strap (W4) selectable for 600 ohms or 10K ohms.

The signal is induced across T1 to amplifier U60-A. U60-A has a gain of 1.5. The output of U60-A is inverted and filtered by the 3-pole high-pass filter (C121, C122, C123, R68, and R65). The 3 dB point of the filters is 300 hertz to reduce low frequency noise. The buffer amplifier, U60-B, is noninverting and has unity gain.

The output of U60-B goes to U60-C which functions as a peak detector. The output, a DC level representing the level of the audio input goes to the A/D converter U79, where it is converted to an 8-bit word which the microprocessor uses to generate ACG information.

The output of U60-B also goes to the step attenuator composed of U61 and U62. Here the desired attenuation is introduced based on the AGC developed by the processor and latched by U63. Thus the output of U62 as buffered by U60-D will be a gain compensated audio input signal.

4.3.1.2 FREQUENCY SYNTHESIS. The local oscillator function is accomplished by a frequency synthesis technique involving a binary rate multiplier (BRM) driven by the processor in response to inputs from the control board.

The clock output of the microprocessor (4,194,304 Hz) is supplied to the BRM;s (U46 for the space frequency, U47 for the mark frequency, and U48 for the regeneration mode) and U69 where it is divided by 32 and provided to the filter circuit.

When the desired frequencies, programmable with one/half Hz resolution, are selected via the front panel keypad or a remote control device, the CPU calculates the local oscillator frequency necessary to up-convert the input signals to mark signal plus 16,384 Hz and space signal plus 16,384 Hz. The CPU sends 16 bits of control data (two 8-bit words) over data bus lines D_0 through D_7 to the BRM.

The CPU selects the appropriate chip for the mark or space tone of the input. The selected chip synthesizes the input frequency coming from the counter (U69) into the required local oscillator frequency.

The synthesizer chip select circuit consists of a 1-of-8 line decoder (U59). Address bus lines A0 through A3 from the CPU are decoded by the decoder. The 6 decoded output lines are tied to the BRM's LE inputs, two lines to each chip. When the decoder is strobed by the CPU (at address 78H), the address is decoded and one or the other of the 8 decoded address lines assigned to the selected BRM chip go low. While low the 8 bit data word from the processor is accepted, and latched when the line again goes high. Thus two successive 8-bit words yields the 16 bits of data needed to synthesize the desired frequency.

4.3.1.3 MIXER. The mixer is a chopper circuit consisting of an analog multiplexer (U65 for mark, U49 for space) and differential amplifier (U52-C, or U50-C). The incoming analog signal is mixed with the local oscillator (LO) signal from the synthesizer circuit. The output of the mixer is the sum and the difference of the mark (or space) and LO frequencies, and their harmonics (refer to Figure 4-3). The difference frequency is the intermediate frequency (IF) (16,384 Hz) of the demodulator. This signal is applied to the bandpass filter.

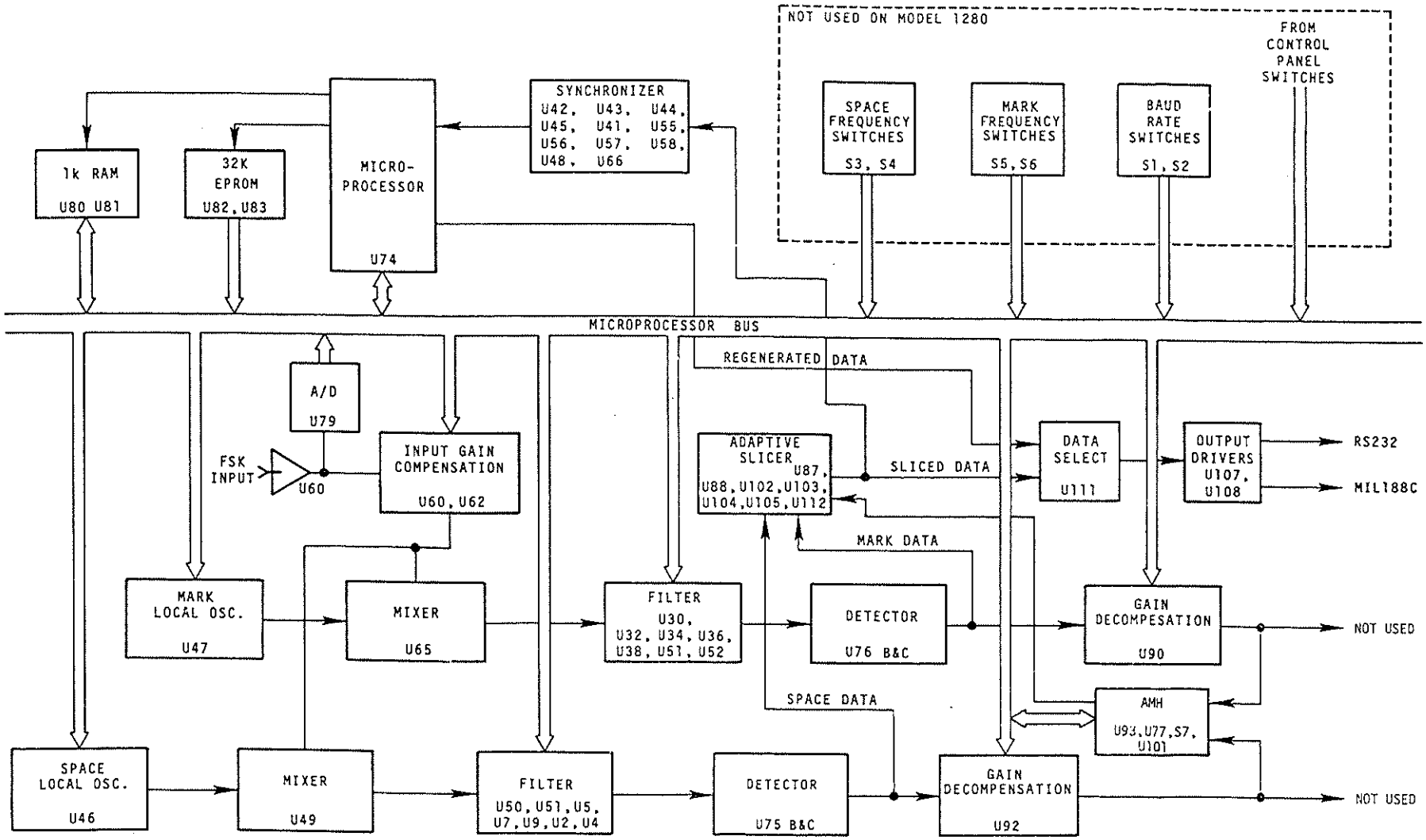


Figure 4-2. Demodulator Block Diagram

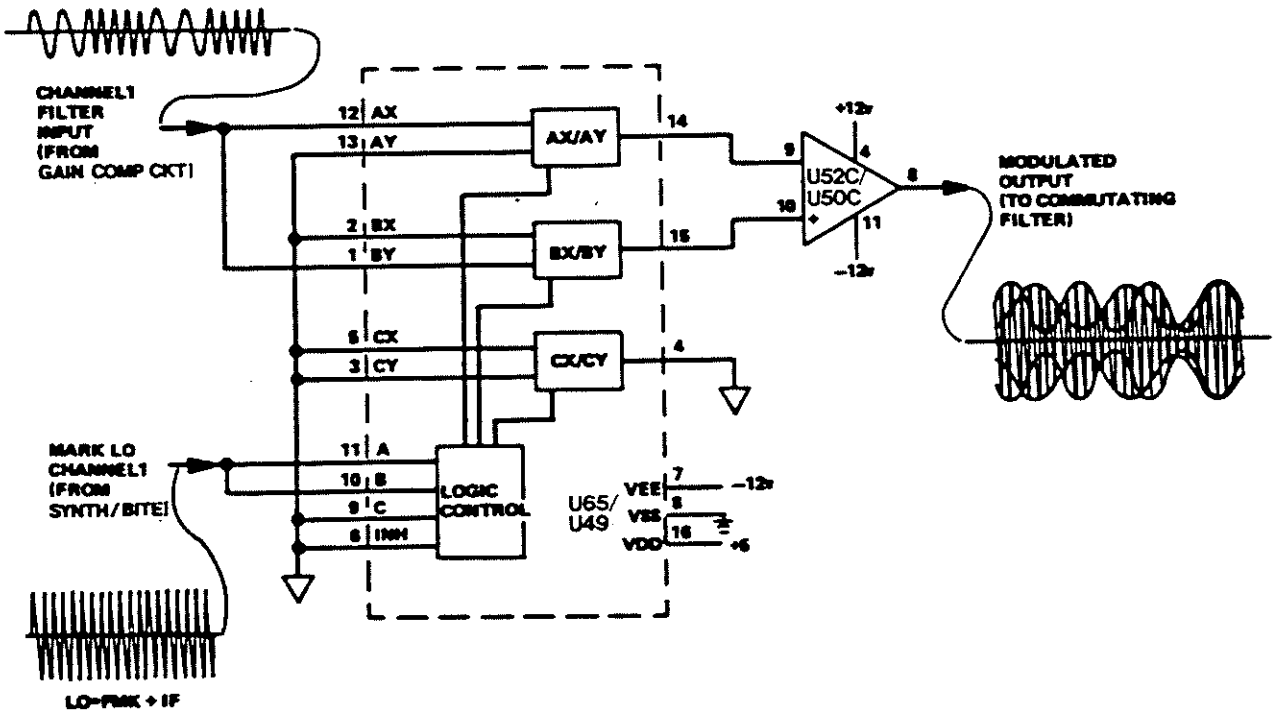


Figure 4-3. Mixer Logic and Waveforms

4.3.1.4 BANDPASS FILTER. The bandpass filter removes unwanted frequencies, allowing only the difference component to pass through.

The filter is a synchronously tuned, programmable bandwidth filter, consisting of four banks. Each bank consists of an eight-stage commutating circuit, a bandwidth selector, and an amplifier. The bandwidth of each bank is programmable to one of eight bandwidth values. The approximate 3 dB bandwidths for the baud rates and their associated filter bandwidths are as follows:

Baud Rate	Bandwidth
0-50 baud	55 Hz
51-75 baud	75 Hz
76-100 baud	110 Hz
101-150 baud	160 Hz
151-200 baud	220 Hz
201-300 baud	300 Hz
301-450 baud	450 Hz
451-600 baud	690 Hz

The signal flow for the mark filter is explained, the space is identical except for component designators. The output of the mixer enters the first bank of the filter. It passes through one of the eight bandwidth select resistors (U6) selected by a 1-of-8 line demultiplexer (U7). Selection is based on the control word from a latch (U64) when clocked by the microprocessor. Each of the eight resistors provides a different RC time constant with the fixed capacitors in the eight commutating stages in the bank.

The 131,072 Hz commutation clock, derived from the processor clock by U69, clocks a Johnson synchronous counter (U54). The eight discrete outputs of the counter assigned to the eight commutating stages, turn each transistor ON and OFF at the IF rate (16,384 Hz). The network of diodes, resistors, and amplifiers at the input of each transistor ensures that only one transistor is ON at a time. Refer to Figure 4-4 for waveforms of the commutating filter.

Each capacitor charges only when the associated transistor is ON, at a rate dependent on the RC time constant and the input signal frequency. The capacitors charge build-up is most significant when the local oscillator frequency minus input signal frequency equals the IF frequency. Therefore, the output of the first commutation stage produces a signal that follows only the difference frequency component of the mixer signal and its harmonics. The other components are shunted to ground. Note that the RC time consant is several charging cycles in length.

The output of the first stage passes through an amplifier (U52) to the second bank which is similar to the first bank, with the exception of some component values associated with the amplifiers. The third bank is similar to the second bank with the exception of some component values. The output of the fourth bank, tracked by a voltage follower (U52-D), provides the commutating filter output. The roll-off characteristics of the output improve as the signal passes through the successive banks.

The quality of the filter output is further improved by providing a shaping network, (U51-B and associated resistors) in the negative feedback loop from the output of the third bank to the input of the first bank.

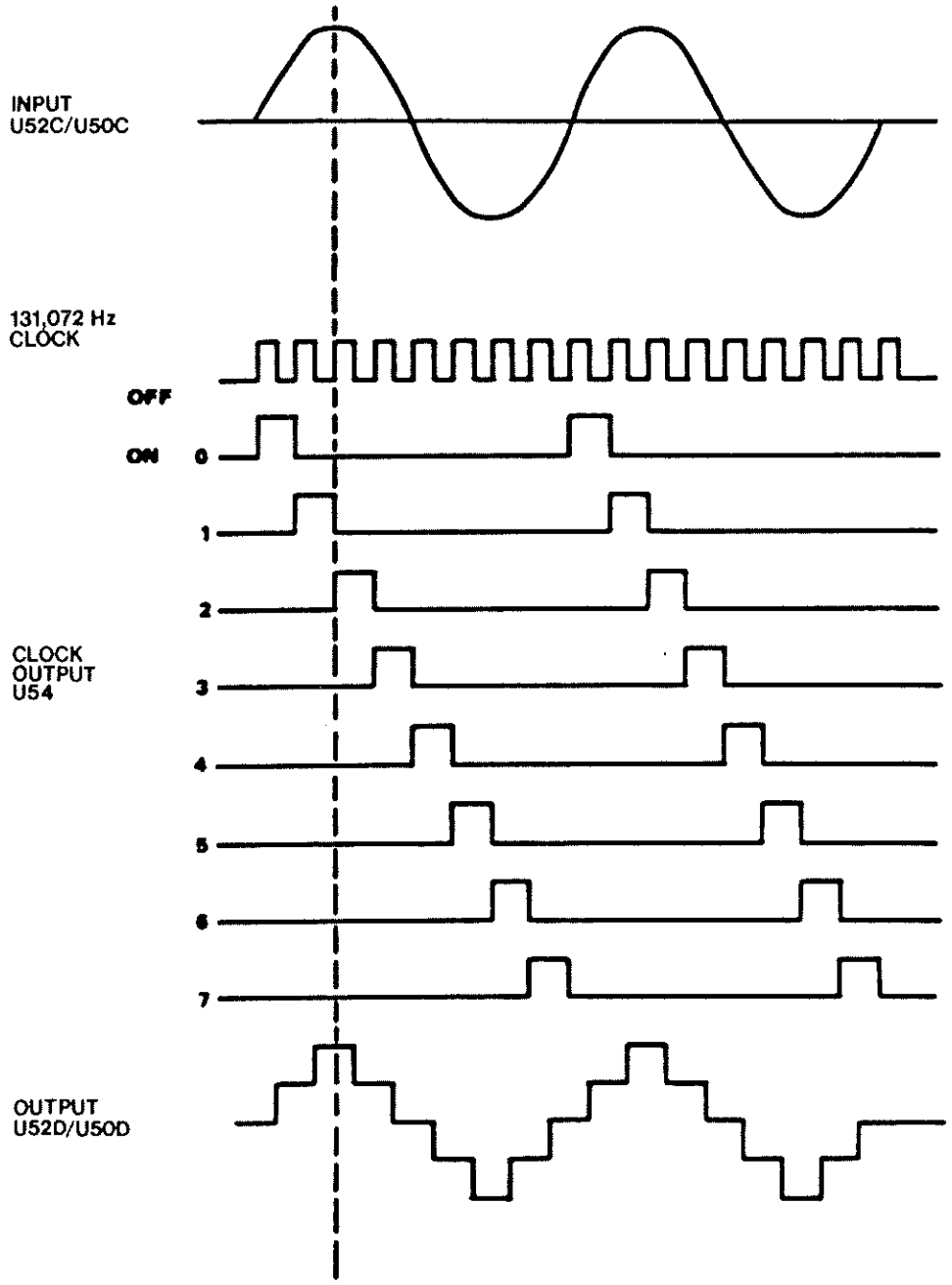


Figure 4-4. Commutating Filter Simplified Waveform Diagram

4.3.1.5 FILTER, DETECTOR AND GAIN COMPENSATION. The output of the commutation filter is a step approximation of the data. The bandpass filter (U76-A for mark, U75-A for space) smooths the waveform.

The resulting sinewave is presented to the detector (U76-B and C for mark, U75-B and C for space) which is essentially a full wave rectifier. The envelope of the resulting waveform is recovered by the low pass filter (U76-D or U75-D).

The output of the low pass filter also goes to the gain decompensation circuit (U90, U92, U78, U106) where the true signal levels are restored. This is accomplished by adjusting the gain of an amplifier (U106-B for mark, U106-A for space) by routing its feedback through one of the resistors in U89 or U91. The selection of the resistor is made by the multiplexers U90 or U92 based on the same processor data that inserted the gain compensation via U62. The decompensated signal goes to the Auto Mark Hold (AMH) comparator U77-D and U77-C for comparison against the AMH threshold selected by S7 and also goes to U35 of the control board for generation of bargraph levels.

The AMH command comes from the processor via the data bus. When this command has been entered from the keypad (see Paragraph 4.3.3) D6 goes true at address 60H and the output of U93 is latched high. U68-B, the resistor selected by S7 and R138 yield a threshold level for the signals to be passed by U77-C and D. The components on the output of these amplifiers effect a 5 second time constant on a change of state of the output of U101-B. This output is the signal to the processor, via U96 and D0 that the threshold has been exceeded. Thus brief signal interruptions or "hits" will not cause the activation of AMH.

4.3.1.6 ADAPTIVE SLICER. The mark and space signals out of U103-A and B go to the "adaptive slicer" circuits. The purpose of these circuits is to select the data (mark or space) having the most energy for use as the data output, to sharpen the transitions, and to correct the timing (jitter).

Following the path of the mark signal (space is identical), it is connected to the "positive" input of U88-A. This amplifier and its associated components CR18 and C160 functions as a peak detector, whose output follows the peak value of the incoming wave. In a similar manner U88-B's output follows the valley part of the incoming wave.

The output of the peak and valley detectors are summed at the junction of R112 and R111, thus the output of U88-C is the average D.C. value of the incoming waveform. This is used as a bias on the positive input of U88-D and the input wave is the negative input. Thus the output of U88-D is a reproduction of the input to the detectors except that the DC offset has been nulled out.

The circuits associated with U87 compose two identical pulse generators whose ultimate purpose is to assure proper operation of the slicer circuit when the constant mark condition occurs. It accomplishes this in the following manner: Using mark as an example the peak voltage from U88-A, Vp is applied to 87-B where it is inverted and multiplied by 2 yielding negative 2 Vp. U87-A compares this voltage with the mark input; when signalling is in progress a pulse is output for each mark and when no signalling is present the output is low. This output is the "A" control input to the analog switch U105.

The output of the "A" section of U105 is the input to U88-B described earlier. It is switched between the the mark input and the negative 2 Vp level such that when signalling is in progress U88-B sees the mark input and when constant mark is present it sees negative 2 Vp. This switching is necessary to prevent the gradual charging of C161 during the constant mark condition and the resultant rise of the summing point of R111 and R112 to near zero volts so that U88-C becomes sensitive to noise.

The mark and space signal output (U88-D, U102-D) are switched by U104 so that the output of U103-C represents a signal derived of: (0) mark and space data, (1) mark data only, (2) space data only, or, (3) mark and space data reversed. U103-C is a zero-crossing detector whose output is TTL compatible data.

4.3.1.7 MISCELLANEOUS CIRCUITS. The following sections describe circuits not covered in the previous paragraphs.

4.3.1.7.1 Output Selector/Blanker/Driver. The output of the demodulator board will be one of three possibilities: (1) none (blanked), (2) raw data from the detector U103-C, or (3) regenerated data from the serial output of the microprocessor, U74. The selection is accomplished by U111 as commanded by the microprocessor via the latch U112.

The selected signal is connected to the RS-232 line drivers U107 and U108. CR27 and CR28 limit the voltage excursions on one line to ± 6 volts.

4.3.1.7.2 Data Regeneration. The microprocessor, based on the baud rate selection made from the keypad and the data input from the slicer circuit can regenerate the data at precisely the required baud rate. This is accomplished by the use of a synchronizer circuit.

The synchronizer counter U44 runs when mark and space data are present from the slicer. The counting rate is determined by the BRM (U48) whose output is divided by 8 in U41 and gated to U44 by U57-A when data is present. The purpose of this is to give the processor a way to find the edges of the incoming data waveform. It accomplishes this by noting the count present on U44 (which is input to the data bus by U45) when a data transition occurs (the processor receives the data via its serial input port, pin 5). Knowing the count present at each transition the CPU knows the status of the input data relative to the programmed baud rate.

The outputs of the counter U55 are used to develop the sampling rate (8 samples per bit) and the mid-bit pulse which interrupt the processor as RST5.5 and RST6.5 respectively. This allows the processor to sample the bits of the incoming data stream eight times.

4.3.2 Modulator Board

The modulator board is described in the following paragraphs. Figure 4-5 is a block diagram of the modulator board. The functions of each block and their interrelationships are as follows. Refer to the modulator schematic diagram for a more detailed explanation.

4.3.2.1 INPUT LEVEL CONVERTER/DETECTOR. The Input Level Converter accepts input data, high or low level, detects the presence of mark and space data, conditions its amplitude and edges, and converts it to TTL logic levels for use by the microprocessor. When data is present at level converters (U49, U39), signals at TP6 exceed the thresholds of the level detectors U50A and U50B which effectively cancel any changes due to opposing polarities. Capacitor C47 inhibits any minor variations that might occur. When no data is present, TP6 is at a potential less than the threshold causing a positive at the detector outputs. This potential (with jumper W4 installed) is applied to the processor as a RST 5.5 interrupt. The processor, with auto mute selected, inhibts the output tones.

4.3.2.2 MICROPROCESSOR CIRCUIT. The microprocessor function is composed of the CPU (U24), which is an 8085 A-2, address latch, (U31), 16K PROMS (U44 and U45), 1K RAMs (U29 and U30), and Read/Write demultiplexers (U22 and U20).

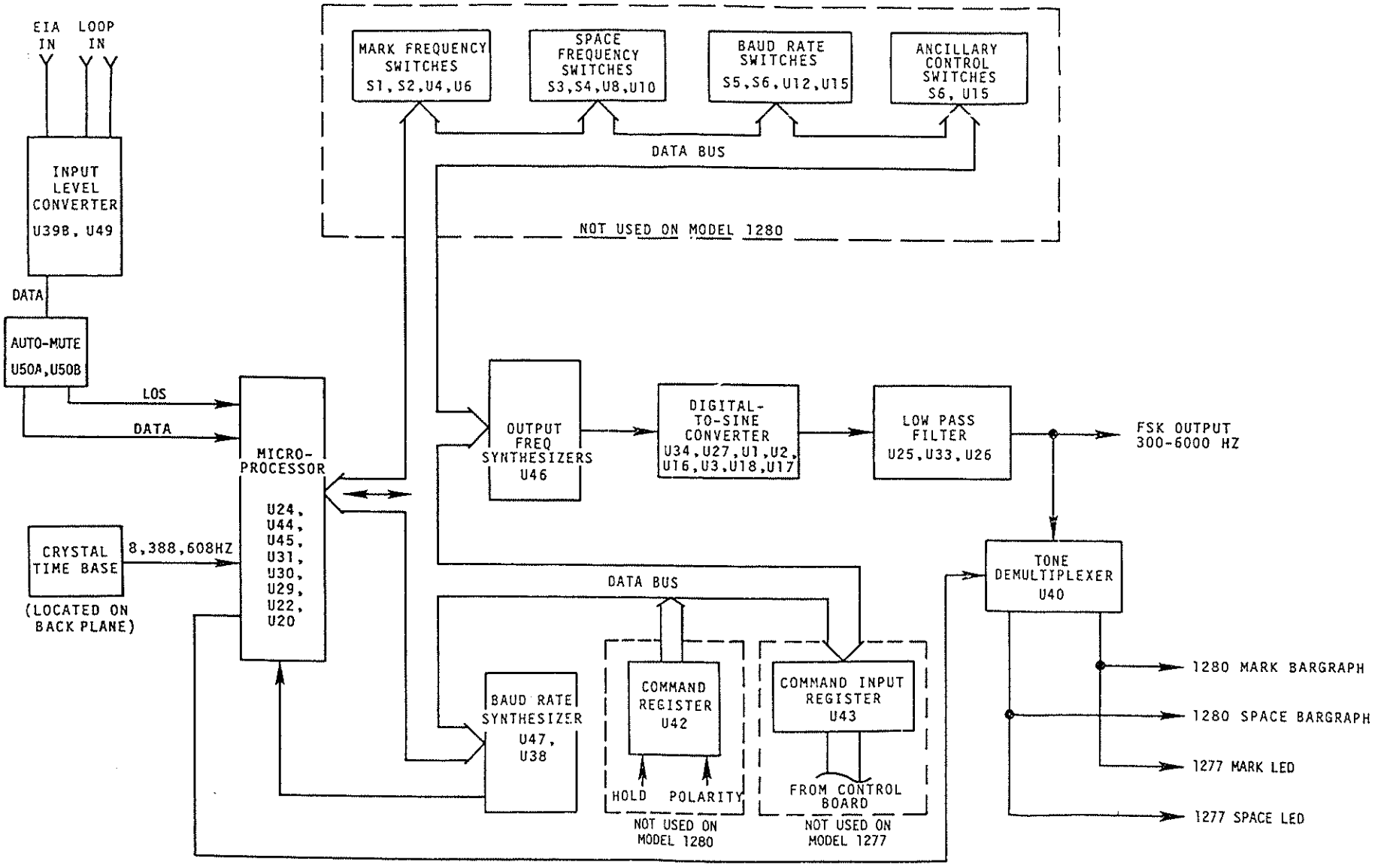


Figure 4-5. Modulator Block Diagram

The processor clock is generated on the backplane and is 8,388,608 Hz. It is used by the processors on the modulator and demodulator boards. Power up reset is also generated on the backplane and used by all processors.

The LO signals are used by the processor to inhibit the processor outputs used to generate the audio outputs. If there is no data into the modulator, there will be no FSK output.

The microprocessor converts the incoming digital data to the two FSK/FEK frequencies using a binary rate multiplier and a digital-to-sine wave converter. The microprocessor receives the desired baud rate, and mark and space frequencies from the control board via the eight data lines (DB0-7) as latched by U43. When the control board wishes to send data it interrupts the processor at RST6.5 via U51-A. Receipt of the data is acknowledged via U51-B.

As the incoming data is received and processed by the processor it yields a 16-bit word which is used by the binary rate multiplier U46 (Frequency Synthesizer) to produce a pulse train. The rate of these pulses is 32768 times the desired FSK frequency.

4.3.2.3 DIGITAL-TO-SINE WAVE CONVERTER. In the Digital-to-Sine converter the pulses from the frequency synthesizers (BRM) are divided by 8 in U34 to produce a shift register clock and also divided by 512 in U34 and U27 to produce a pulse which will be shifted through the register to yield a 64-step representation of a sine wave.

The result of this 64-step shift is shown in Figure 4-6. Each resistor, beginning with Section 1 of U3 applies +12V to a resistor in U17 or U16. These resistors are the top half of a voltage divider completed by R11. This voltage is the input to the amplifier U26-D. The resulting stepped sine wave is smoothed by the low pass filter composed of U26 A through C and U33. The resulting pure sine wave is applied to the output transformer T1 via the adjustable-gain amplifier U25A, B, and D.

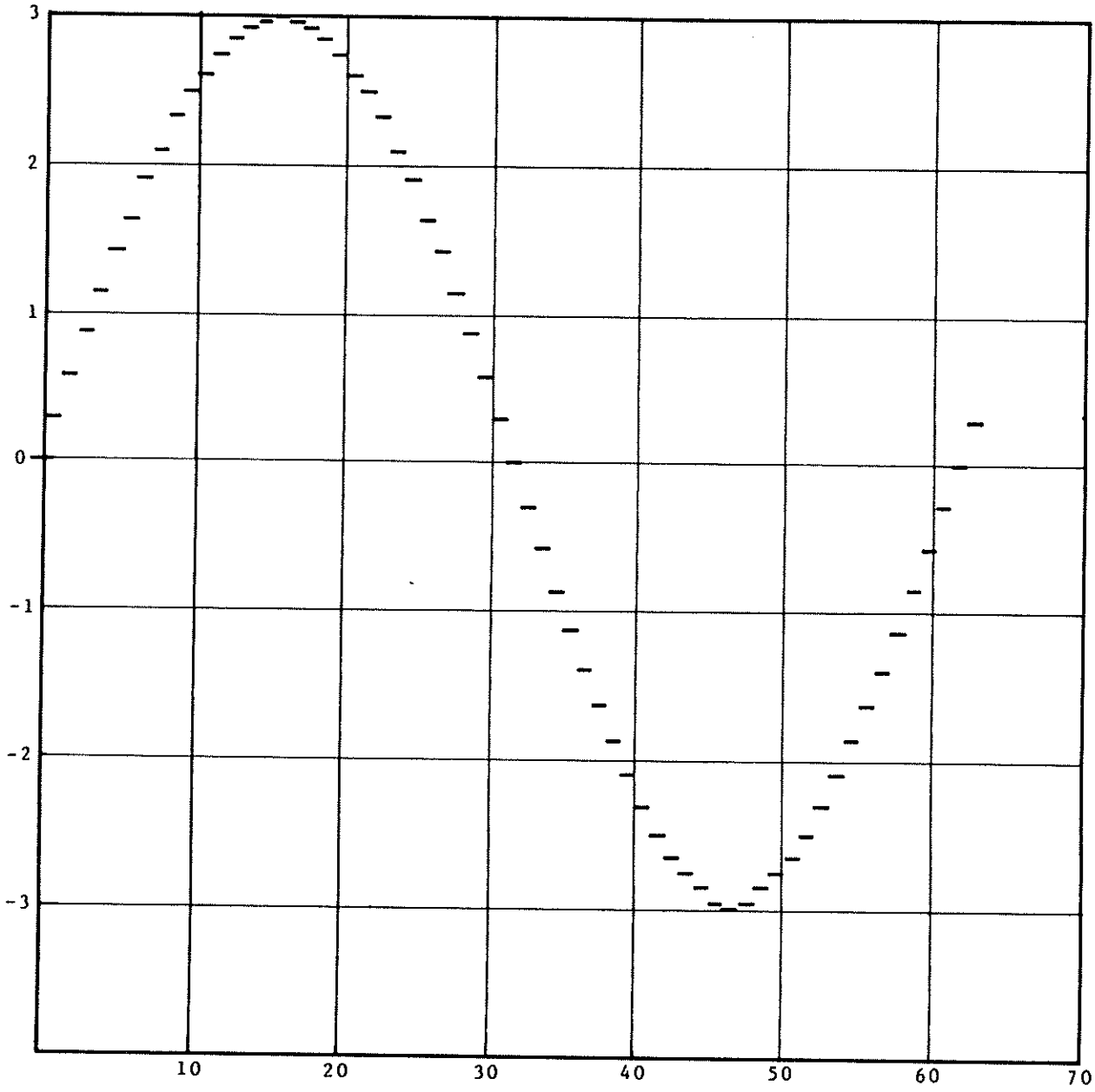


Figure 4-6. 64 Step Sinewave

4.3.2.4 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.

4.3.3 Control Board

The operation of the control board is described in the following paragraphs. Refer to Figure 4-7 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 64K of EPROM (U32, 33). The 256 bytes of non-volatile static RAM (U30, 31) 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 U34 and U42. Eight lines of control data are output from U34. The control "data ready" is output by U42. The modulator and demodulator boards identify themselves to this control board by setting the appropriate voltage levels at P1-27, 29, 31 and 32. These are interfaced to the processor via U38.

The front panel contains a keypad of 24 keys, four of which are illuminated, and a status display. The keypad is interfaced via the keyboard interface circuits U5 and U6 and the buffer U19. It connects to J2 on the control board. The keypad interrupts the processor via circuits including U4 and U12. The illuminated keys are driven from the data bus via U13 and U12. Information to be displayed is stored in the RAM (U23) by the processor via U22 and U14. 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 (U22 and U14). They also address the segments of the display digits via J1-1 thru J1-5.

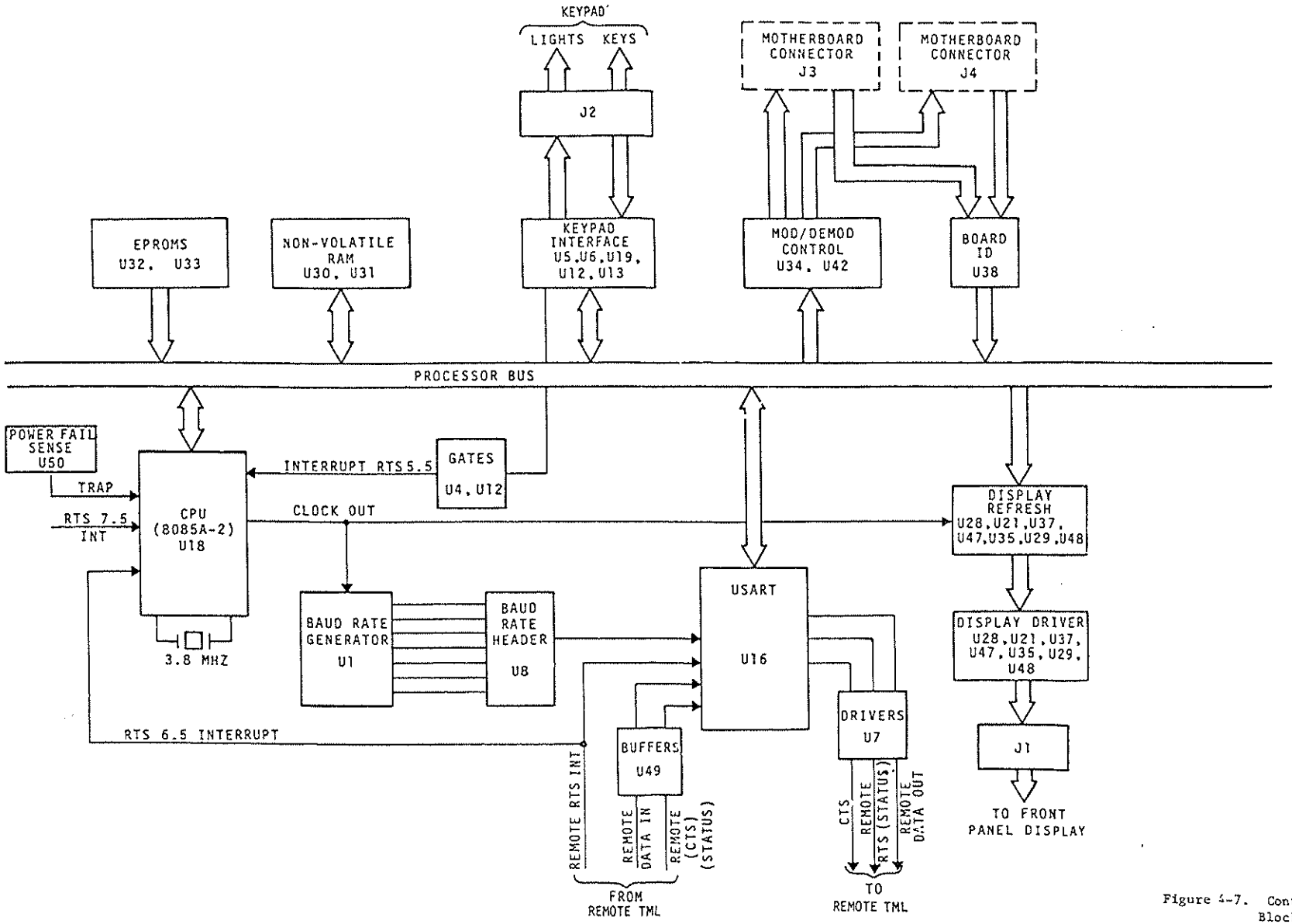


Figure 4-7. Control Board Block Diagram

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 U15.

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 U35 as directed by the processor via U26 and by the state of the refresh counter via U29 and U48. The selected sample is presented to the comparators U21, U28, U37 and U47. The comparators are supplied with reference voltages via U41 and the resistor strings R14 thru R22 and R25 thru R32. 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 (U16) is provided for this purpose. Data and control out to the remote station is via the interface driver U7. The output driver can be increased by removing jumpers E1-E2, E3-E4, and E5-E6. Received data and control are interfaced by U49. U1 is a baud rate generator whose output rate to the USART is selected by jumpers on a header installed in socket U8.

4.3.4 Front Panel Display Board

The purpose of this board is to interface the signals from the control board to the high voltage plasma display (refer to Figure 4-8). U1 and U2 interface to the anodes of the digits and the bars. U3, U4, and U5 interface to the cathodes of the individual bar segments and digit segments. For a detailed description of each pin of the plasma display see Table 4-1. The digit that will be driven (illuminated) during a given refresh cycle is controlled by U10, a 4:16 decoder driven by the outputs of the refresh counter (U9 and U10) on the control board. INHIBIT is active during the counter transitions and during the RAM (U23) update on the control board so that meaningless counter outputs do not produce a display. In similar fashion the shift register U9 which cycles through the segments of the digit is reset after the seventh segment, thus blanking the time between digits.

T1 is a 12 volt to $\pm$ 90 volt converter which produces the drive voltages for the plasma display.

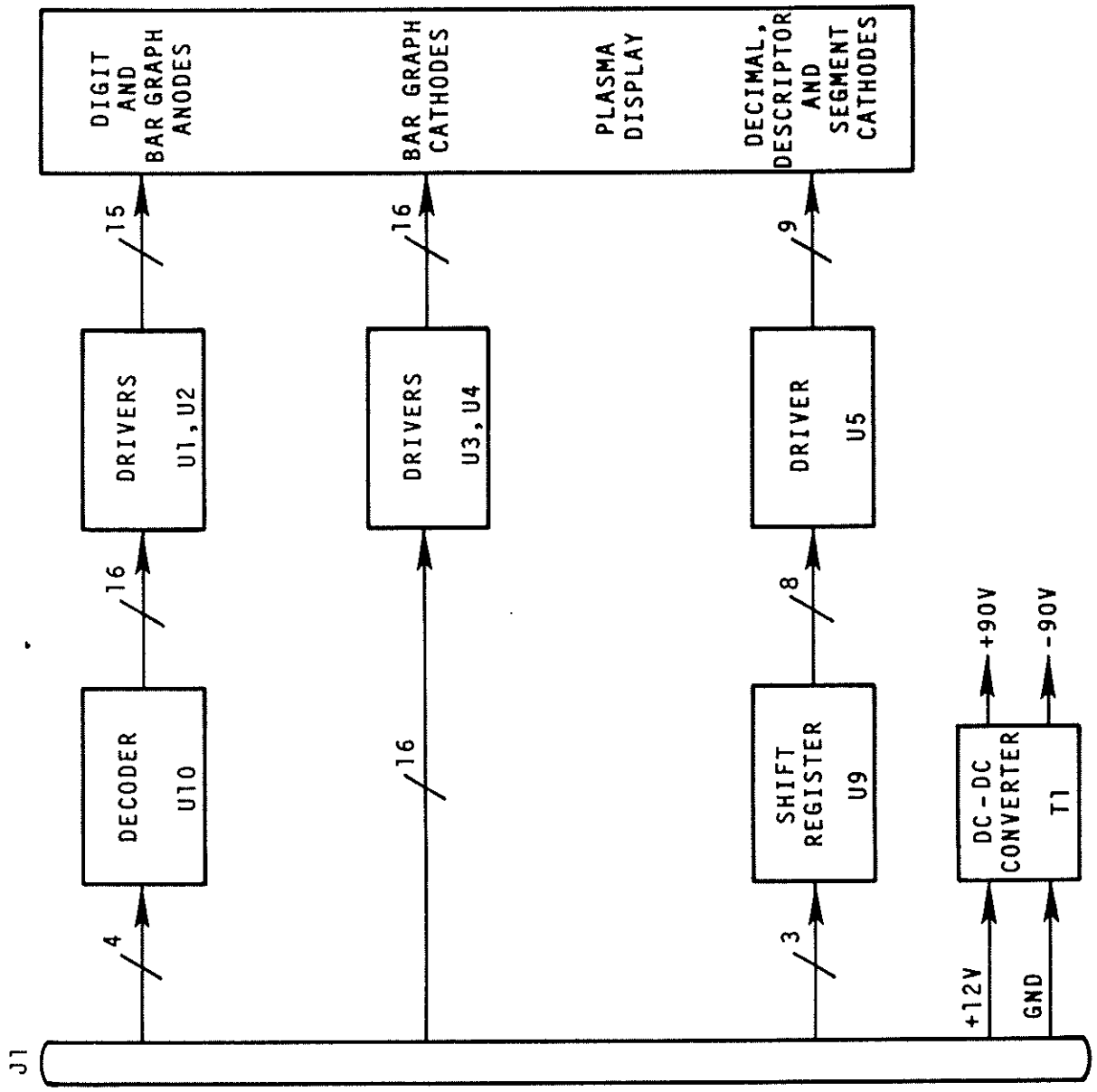


Figure 4-8. Front Panel Display Block Diagram

Table 4-1. Plasma Display Pin Functions

PIN #	DESCRIPTION
1	SEGMENT E CATHODE
2	DIGIT 1 ANODE
3	SEGMENT F CATHODE
4	DIGIT 2 AND DESCRIPTOR 11 ANODE
5	BAR 1 CATHODE
6	BAR 2 CATHODE
7	BAR 3 CATHODE
8	BAR 4 CATHODE
9	BAR 5 CATHODE
10	BAR GRAPH 1 ANODE
11	BAR 6 CATHODE
12	BAR 7 CATHODE
13	BAR 8 CATHODE
14	BAR 9 CATHODE
15	BAR 10 CATHODE
16	BAR 11 CATHODE
17	BAR GRAPH 2 ANODE
18	BAR 12 CATHODE
19	DIGIT 3 AND DESCRIPTOR 1 ANODE
20	BAR 13 CATHODE
21	KEEP ALIVE ANODE
22	NO CONNECTION
23	KEEP ALIVE CATHODE
24	BAR 16 CATHODE
25	DIGIT 4 AND DESCRIPTOR 2 ANODE
26	BAR 15 CATHODE
27	DIGIT 5 AND DESCRIPTOR 3 ANODE
28	BAR 14 CATHODE
29	DIGIT 6 AND DESCRIPTOR 4 ANODE
30	DESCRIPTOR CATHODES
31	DIGIT 7 AND DESCRIPTOR 5 ANODE
32	SEGMENT A CATHODE
33	DIGIT 8 AND DESCRIPTOR 6 ANODE
34	SEGMENT B CATHODE
35	DIGIT 9 AND DESCRIPTOR 10 ANODE
36	SEGMENT G CATHODE
37	DIGIT 10 AND DESCRIPTOR 9 ANODE
38	SEGMENT C CATHODE
39	DIGIT 12 AND DESCRIPTOR 8 ANODE
40	SEGMENT D CATHODE
41	DIGIT 13 AND DESCRIPTOR 7 ANODE
42	DECIMAL POINT CATHODE
43	DIGIT 11 AND DECIMAL POINT ANODE
44	NO CONNECTION

4.3.5 Power Supply

4.3.5.1 AC POWER SUPPLY. The AC power supply (Figure 4-9) consists of a Line filter-fuse-switch board assembly, (mounted on the rear of the chassis), an input transformer (mounted on the right front of the chassis), rectifiers, regulators, and a switching regulator.

The ac input is passed through the fused switch board to the transformer whose primary windings are tapped for 115 or 230V by the position of the switch board. The secondary has a center tap which is grounded. Full wave rectifiers CR2 and CR3 are connected to yield a negative voltage at their common point. This voltage is filtered and regulated to -12V by VR1. Fullwave rectifies CR6 and CR7 yield a positive voltage which is regulated to +12V by VR2 and to +5V by a switching regulator composed of U1, L1, L2, Q1 and their associated components.

The switching regulator functions as follows. U1 is a pulse-width modulation circuit including a voltage reference and an oscillator. The outputs E1 and E2 of U1 drive the FET switch Q1 which turns on to charge L1 until 5V appears at its output, as sensed by the voltage divider R1, R2 and in turn by an error amplifier in U1. When Q1 switches off the current stored in L1 continues to flow to the load. The switching action continues so the voltage at the output of L1 is held within the tolerance of the 5 volt output.

4.3.5.2 OPTIONAL DC POWER SUPPLY. Optional dc power supplies can be provided that will operate from 10-16 Vdc or 20-32 Vdc sources.

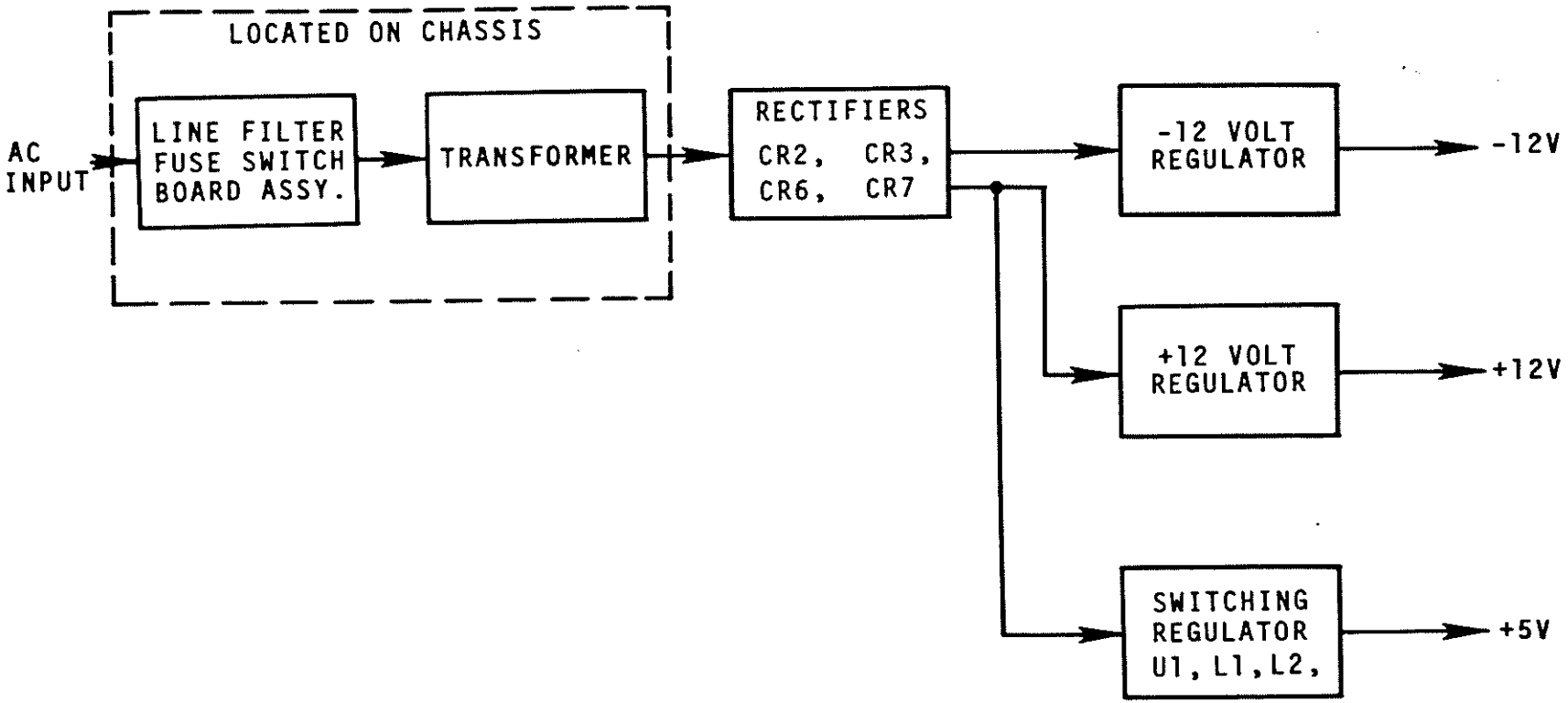


Figure 4-9. AC Power Supply Block Diagram

4.3.6 Mother Board

This board interconnects the control board (J2) and the other two (modulator or demodulator) boards (J3 and J4). It also contains the power up reset circuit and the master clock (refer to the backplane schematic diagram).

The power up reset circuit, U2-A, holds all the microprocessors on the various installed boards in the reset condition until the power supply has reached normal operating voltage levels. This is supplied to J2, J3 and J4. The master clock is generated by the crystal Y1 whose frequency is 8.388608 MHZ. It is provided to all boards via the driver U1-C.

J1 is the power supply connector, J5 is the optional high level loop connector, and J8 is the remote RS-232 connector.

4.3.7 Optional Loop Power Supply And Keyer

This unit consists of two PC boards; an AC input power supply which produces ± 65 Vdc output and a 2 channel keyer which can be connected for neutral or polar keying. (Refer to Figures 7-7 and 7-8.)

The loop supply consists of a transformer (T1), and full wave rectifier (CR1 thru CR4) which yield positive and negative 60 Vdc. Capacitors C1 and C2 filter these voltages which are then connected to terminals 2, 3 and 4 of the high level keyer circuit.

A circuit description of the Channel 1 keyer is provided. Channel 2 operation is identical. The EIA output of the demodulator is connected to terminals E1 and E2. The positive (mark) portion of the output will cause opto-isolator U1 to conduct. The negative (space portion) will cause U3 to conduct. The conduction action of U1 turns on switching transistors Q1 and Q2 providing a mark loop current output at TB1-8. The conduction of U3 will turn on switching transistors Q5 and Q6 providing a space loop current output at TB1-9.

- - - - - - -
C A U T I O N
- - - - - - -

Keyer current must not exceed 80 milliamps.

SECTION V

MAINTENANCE

5.1 GENERAL

The Model 1280 FSK MODEM is a solid-state device using microprocessors. The unit is designed to operate over long periods of time with little or no routine maintenance. Occasional inspection and cleaning are the only preventive maintenance procedures needed for the unit. If trouble should occur, the information provided in this section will be helpful to a qualified maintenance technician. The technician should be well acquainted with digital and analog intergrated circuitry and have a thorough understanding of microprocessors, RAMs, USARTS, multiplexers, and the theory of operation of the Model 1280 FSK MODEM before attempting any troubleshooting. A discussion of the theory of operation can be found in Section IV with assembly drawings and schematic diagrams in Section VI and VII.

5.2 PREVENTIVE MAINTENANCE

Since the modem is a solid-state, low power device, preventive maintenance is not recommended, except for periodic external visual inspections for indications of mechanical or electrical defects. Internal components inspection and cleaning are not recommended except during corrective maintenance.

5.3 REQUIRED TEST EQUIPMENT

The test equipment or its equivalent required to test and troubleshoot the modem is listed in Table 5-1.

No special tools other than those normally contained in an electronic technician's toolbox are required. The modem is supplied with its own board extender for ease of troubleshooting.

Table 5-1. Required Test Equipment

EQUIPMENT	MANUFACTURER
Standard Technicians Tool Kit	
Board Extender	
Multimeter	Simpson 260
Oscilloscope	Tektronics 465
AC Voltmeter	HP-400FL
Attenuator	HP-350D
Pattern Generator	Data Products PG303
Distortion analyzer	Data Products PMS303
Data Terminal	HP-2645A
Frequency Counter	HP-5307A

5.4 SYSTEM TESTS AND ADJUSTMENTS

The following tests provides complete system checkout. Should any test fail, refer to Paragraph 5.5 for troubleshooting procedures.

Refer to the appropriate table (Table 2-1 or 2-2) for rear panel connector pin assignments.

5.4.1 Power Supply Verification Test

This procedure verifies the voltage sources of the modem.

a. Requirements - Measure the output voltages supplied to motherboard J2 with respect to digital ground (J3-18). Measure the output voltages of the DC to DC converter on the front panel.

Table 5-2. Power Supply Voltages

TEST POINT	VOLTAGES	TOLERANCE	REMARKS
Demodulator Board U106	-5.0 Vdc	±0.50V	Pin 14
Mother Board J3	+5.0 Vdc	±0.50V	Pin 14
Mother Board J3	+12.0 Vdc	±1.2V	Pin 16
Mother Board J3	-12.0 Vdc	±1.2V	Pin 17
Mother Board J3	Digital Gnd	-	Pin 18
Front Panel Board CR1	+90.0 Vdc	±10.0V	Anode to grd (J1-34)
Front Panel Board CR2	-90.0 Vdc	±10.0V	Cathode to grd (J1-34)

b. Procedure - Perform the following procedure to verify the voltage sources.

(1) Remove front panel (do not disconnect cables) and connect power cord.

(2) Locate anode of CR1, cathode of CR2, and ground (J1-34).

(3) Turn power on and measure the voltages at test points listed in Table 5-2 for front panel board.

(4) Turn power off and remove control board, demodulator/modulator boards.

(5) Measure voltages on motherboard connector J3 as listed in Table 5-2 with respect to digital ground.

(6) Shut off power.

(7) Insert extender board in demodulator position and insert demodulator board into extender.

(8) Measure voltage on U106-14 with respect to digital ground (board pin 13).

(9) Replace top cover, modulator and control board.

5.4.2 Master Clock Verification

This procedure verifies the master clock frequency.

a. Requirements - Measure the frequency of the master system clock using a high impedance input frequency counter.

b. Procedure - Perform the following steps to verify and adjust master system clock frequency.

(1) With demodulator board extended locate pin 4 of IC U-99.

(2) Connect frequency counter between U-99 pin 4 and digital ground J3-18.

(3) Counter should read 8.388608 MHz ±400 Hz
NOTE: If frequency is incorrect locate and adjust C4 on the motherboard (Figure 6-7) to obtain correct frequency.

(4) Turn power off and remove demodulator board from extender board.

(5) Remove extender board and replace with demodulator board.

(6) Replace front panel assembly.

5.4.3 Modulator Verification

5.4.3.1 MARK AND SPACE FREQUENCY VERIFICATION. This procedure verifies the programmed mark and space frequencies are correct.

a. Requirements - Measure the frequency of the mark and space tone outputs.

b. Procedure - Perform the following steps to verify the frequency of the mark and space tones.

(1) Set-up the test equipment as indicated in Figure 5-1.

(a) Set message generator controls to the following.

Pattern Output - 5 level, 2-unit stop bit
Function - MK (MARK)
Baud Rate - 50

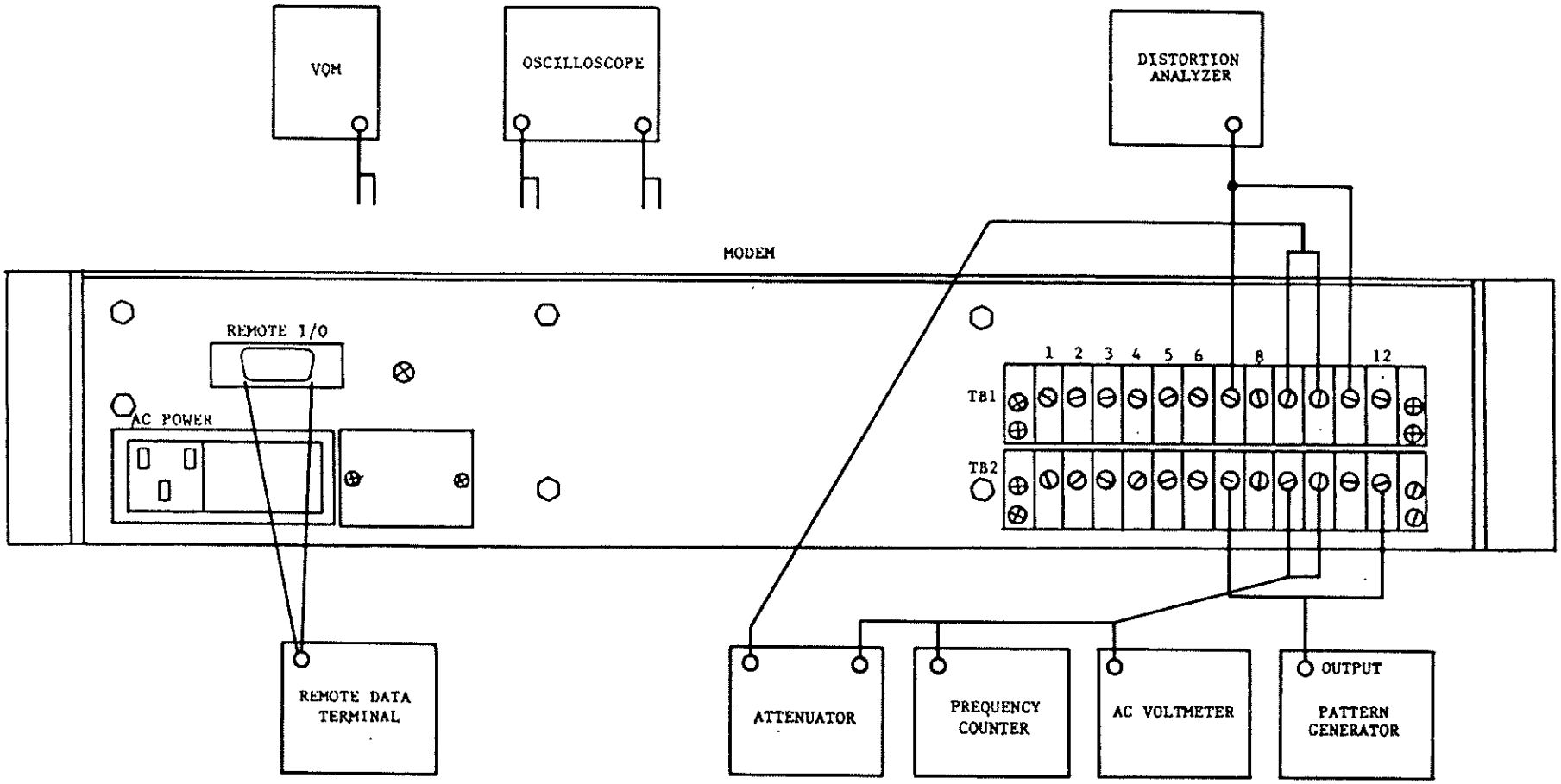


Figure 5-1. Test Setup

(2) Set-up unit parameters, either by keypad or remote terminal, as follows:

CHANNEL ONE - DEMOD
Mark Frequency - 1575 Hz
Space Frequency - 2425 Hz
Baud Rate - 50
Output Polarity - Normal

CHANNEL TWO - MOD
Mark Frequency - 1575 Hz
Space Frequency - 2425 Hz
Baud Rate - 50
Output Polarity - Normal

(3) Verify the following:

a. Mark frequency reading on frequency counter of 1575 Hz.

b. Channel 2 (modulator) mark bargraph illuminated.

(4) Set unit to display Channel 1 (Demodulator) and verify mark bargraph illuminated.

(5) Set message generator to SP (SPACE)and verify:

a. Space frequency reading on frequency counter of 2425 Hz.

b. Channel 1 (Demodulator) space bargraph illuminated.

(6) Set unit to display Channel 2 (Modulator) and verify space bargraph illuminated.

5.4.3.2 MARK AND SPACE FREQUENCY PLUS 1/2 HZ (+.5 HZ) VERIFICATION

a. Program Channel 2 for +.5 Hz function. Refer to Section III, Tables 3-2 or 3-3 for appropriate procedure.

b. Verify Space frequency reading of 2425.5 Hz on frequency counter.

c. Set message generator to MK (MARK).

d. Verify Mark frequency reading of 1575.5 Hz on frequency counter.

5.4.3.3 NORMAL/REVERSE OUTPUT VERIFICATION

a. Program Channel 2 for 'REV' function. Refer to Section III, Tables 3-2 or 3-3 for appropriate procedure.

b. Verify frequency counter now reads 2425.5 Hz.

c. Program Channel 2 for 'NORM' function. Refer to Section III, Tables 3-2 or 3-3 for appropriate procedure.

d. Verify frequency counter now reads 1575.5 Hz.

5.4.3.4 MUTE FUNCTION VERIFICATION

a. Program Channel 2 for 'MUTE' function. Refer to Section III, Tables 3-2 or 3-3 for appropriate procedure.

b. Verify output frequency disappears.

c. Verify Mark bargraph extinguishes.

d. Remove 'MUTE' function from Channel 2. Refer to Section III, Tables 3-2 or 3-3 for appropriate procedure.

e. Verify output frequency of 1575.5 Hz reappears.

f. Verify Mark bargraph illuminates.

5.4.3.5 TONE LEVEL OUTPUT VERIFICATION

a. Verify 0 dBm level indication on VTVM.
NOTE: If level is incorrect perform the following steps.

1. Remove front panel assembly from unit.

2. Locate R1 on modulator board.

3. Adjust R1 for required level output.

5.4.4 Demodulator Verification

5.4.4.1 DISTORTION VERIFICATION TEST. This procedure verifies the eight discrete filter bandwidths that are selected by the appropriate programmed baud rate. The procedure also verifies that distortion does not exceed acceptable limits for eight baud rates within the non-overlapping bandwidths.

a. Requirements - For baud rates of 50, 75, 100, 150, 200, 300, 450 and 600 baud. The total peak distortion of the output does not exceed the following:

25 percent for a +6 dBm input level
15 percent for a 0 dBm input level
25 percent for a -45 dBm input level

b. Procedure - Perform the following procedure to verify the peak distortion for the baud rates listed previously.

(1) Set-up the test equipment as indicated in Figure 5-1.

(2) Set-up the message generator as follows:

Pattern Output - 5 level, 2-unit stop bit length
Function - 1:1
Baud Rate - 50

(3) Set distortion analyzer to measure the levels indicated and connect distortion analyzer to RS-232 output (TB1-7 and TB1-1).

(4) Program both channels of the Model 1280 modem with the following parameters.

Mark Frequency - 1575 Hz
Space Frequency - 2425 Hz
Baud Rate - 50
Polarity - Normal
Mode - FEK

(5) Verify that distortion level meets or exceeds the requirements as indicated in Paragraph a.

(6) Repeat Steps b(2) through b(5) for the following baud rates: 75, 100, 150, 200, 300, 450, and 600.

5.4.4.2 DATA OUTPUT VERIFICATION. This procedure verifies the data output level and presence of RS-232, Military Standard 188C, undetected mark, undetected space and mid bit sample.

a. Requirement - Verify the level and presence of output data.

b. Procedure - Perform the following procedures to verify the level and presence of output data.

(1) Set-up test equipment as indicated in Figure 5-1.

(2) Set-up message generator as follows.

Pattern Output - 5 level, 2-unit stop bit length
Function - 1:1
Baud Rate - 50

(3) Program both channel of the Model 1280 Modem with the following parameters.

Mark Frequency - 1575 Hz
Space Frequency - 2425 Hz
Baud Rate - 50
Polarity - Normal
Mode - FEK

5.4.4.2.1 RS-232 Data Output Verification

a. Connect oscilloscope between TB1-7 and TB1-11.

b. Verify data is present at levels indicated in Figure 5-2.

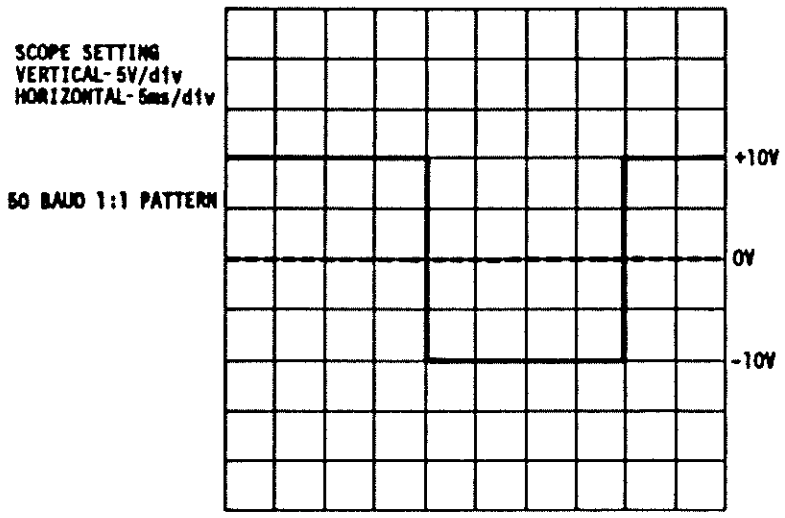


Figure 5-2. RS-232 Data Output

5.4.4.2.2 Military Standard 188C Data Output Verification

a. Connect oscilloscope between TB1-8 and TB1-11.

b. Verify data is present at levels indicated in Figure 5-3.

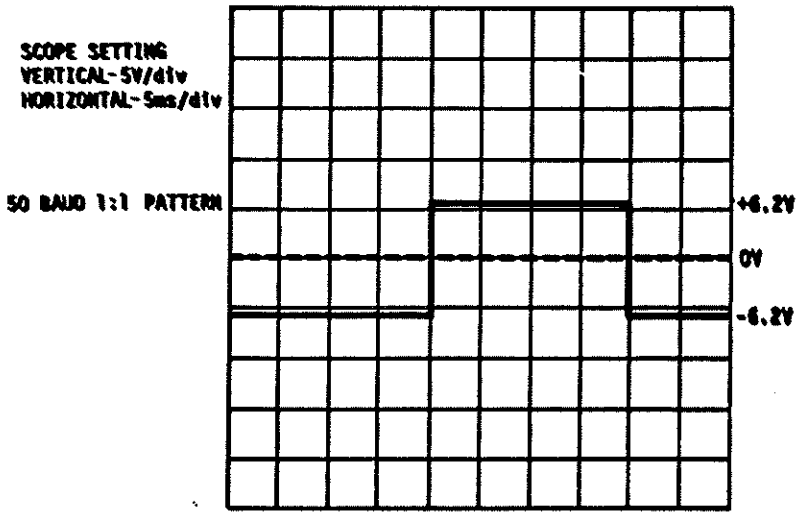


Figure 5-3. MIL-188C Data Output

5.4.4.2.3 Undetected Mark Output Verification

a. Connect oscilloscope between TB1-5 and TB1-11.

b. Verify output is present at levels indicated in Figure 5-4.

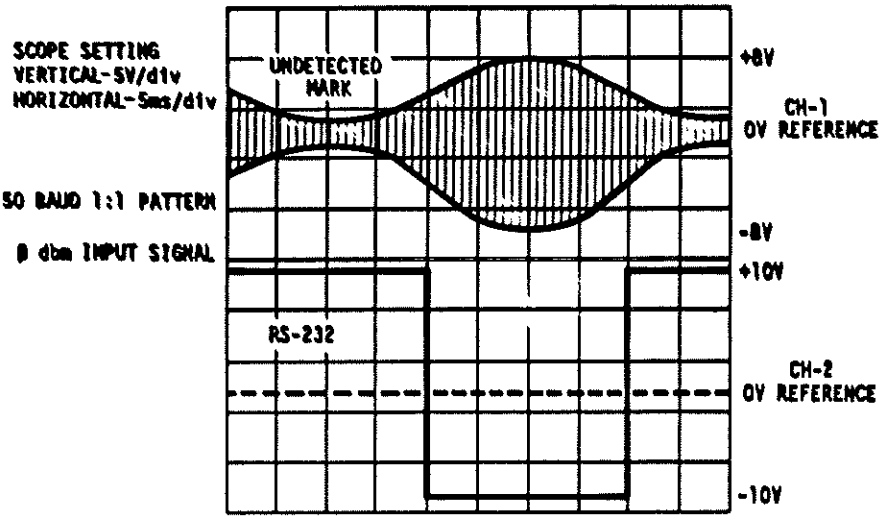


Figure 5-4. Undetected Mark Output

5.4.4.2.4 Undetected Space Output Verification

a. Connect oscilloscope between TB1-6 and TB1-11.
b. Verify output is present at levels indicated in Figure 5-5.

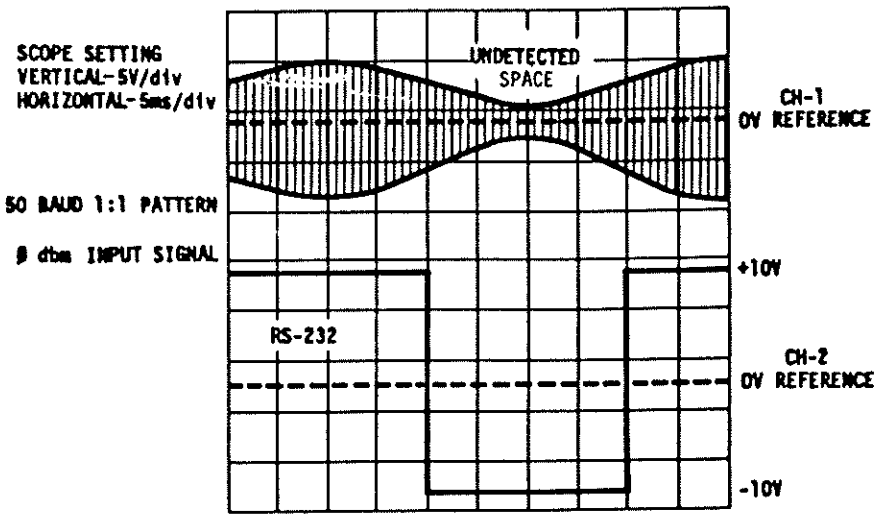


Figure 5-5. Undetected Space Output

5.4.4.2.5 Mid-Bit Sample

a. Using a two channel oscilloscope set for alternate function.
   (1) Place Channel 1 probe between TB1-7 and TB1-11.
   (2) Place Channel 2 probe between TB1-3 and TB1-12.
b. Verify output present and levels appears as shown in Figure 5-6.

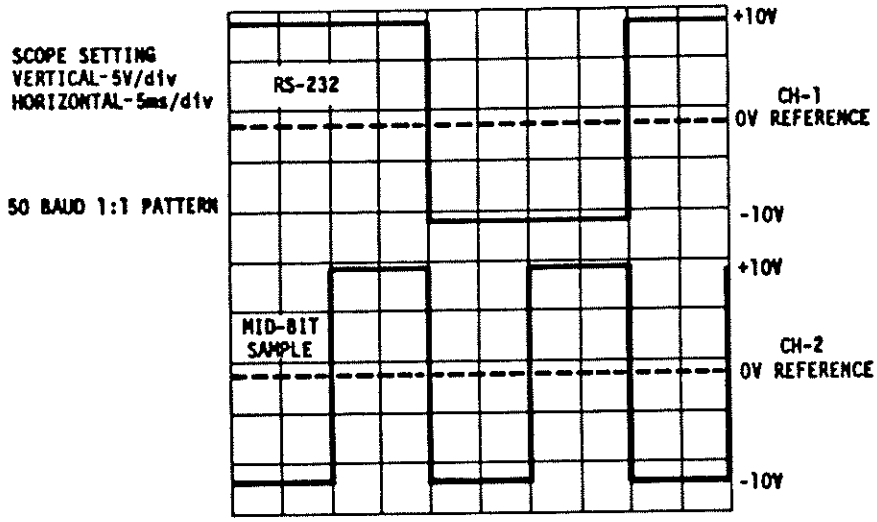


Figure 5-6. Mid-Bit Sample

5.4.4.3 AUTO MARK HOLD (AMH) OUTPUT VERIFICATION TEST. This procedure verifies the AMH function of the modem. The AMH threshold levels are switch selectable on the demodulator board.

a. Requirements - The keyed DC output defaults to a mark hold state +3 dBm about the AMH threshold 5 seconds after losing the input signal. The keyed DC output resumes normal data output immediately after the input signal exceeds the selected AMH threshold by 3 dBm.

b. Procedure - Perform the following procedure to verify the timing and on/off levels of AMH.

(1) Set-up test equipment as indicated in Figure 5-1.

(2) Program both channel of the Model 1280 Modem with the following parameters. Refer to Section III, Table 3-2 and 3-3 for appropriate procedures.

Mark Frequency	- 1575 Hz
Space Frequency	- 2425 Hz
Baud Rate	- 50
Polarity	- Normal
Mode	- FSK
Auto Mark Hold	- On

(3) Set-up Message Generator as follows:

Pattern Output	- 5 level, 2-unit stop bit length
Function	- Message
Baud Rate	- 50

(4) Turn power off to Model 1280.

(a) Remove front panel assembly.

(b) Remove demodulator board and insert extender board.

(c) Insert demodulator board into extender board.

(5) Connect oscilloscope between TB1-7 (keyed DC output) and TB1-11 (ground).

(6) Turn power ON. Verify keyed DC output present.

(7) Locate S7 on demodulator board. Note original settings and clear switch positions. Reset position 8 (-39 dBm level) on S7 to ON.

(8) Adjust attenuator for -42 dBm (AMH ON). Verify the keyed DC output changes to a mark condition after approximately 5 seconds.

(9) Adjust attenuator for -36 dBm (AMH OFF). Verify the key DC output returns to a normal data output.

(10) Select each position one at a time on S7 as listed in the following.

S7 Position	Selected Threshold	Tolerance MAX	Tolerance MIN
8	-39 dBm	-42 dBm	-36 dBm
7	-36 dBm	-39 dBm	-33 dBm
6	-33 dBm	-36 dBm	-30 dBm
5	-30 dBm	-33 dBm	-27 dBm
4	-27 dBm	-30 dBm	-24 dBm
3	-24 dBm	-27 dBm	-21 dBm
2	-21 dBm	-24 dBm	-18 dBm
1	-18 dBm	-21 dBm	-15 dBm

(11) Repeat Steps (7) through (10) for each level.

(12) Disable AMH and return switch position to original setting noted in Step (7) upon completion of this procedure.

5.5 TROUBLESHOOTING

In troubleshooting the Modem, as in all electronic equipment, the technician relies on the fact that a signal progresses in a predetermined fashion from input to output of the unit, while being processed or acted upon in some manner.

The troubleshooting procedures outlined in this section, along with the block and schematic diagrams and the functional descriptions contained in this manual will enable a qualified technician to isolate a trouble.

5.5.1 Printed Circuit Board Isolation

Possible symptoms and suspected PCBs required to correct problems that may occur are listed in Table 5-3. The conditions listed assume fault to be in one channel only, however the fault could occur in both channels.

Table 5-3. Printed Circuit Board (PCB) Isolation

SYMPTOM	SUSPECTED PCB/CONNECTIONS
Front Panel Display Malfunctions	
No Lights and No Keypad Function	1) Power Supply 2) Front Panel 3) Plasma Display 4) Control
Channels Inoperative	1) Power Supply 2) Backplane 3) Control 4) Modulator 5) Demodulator
No Bargraphs	1) Front Panel 2) Plasma Display 3) Demodulator Input Signal 4) Modulator Input Signal
No Power Loss Memory	1) Control
Front Panel Numeric and Descriptor Malfunction	1) Front Panel 2) Plasma Display 3) Keypad 4) Control

Table 5-3. Printed Circuit Board (PCB) Isolation (cont.)

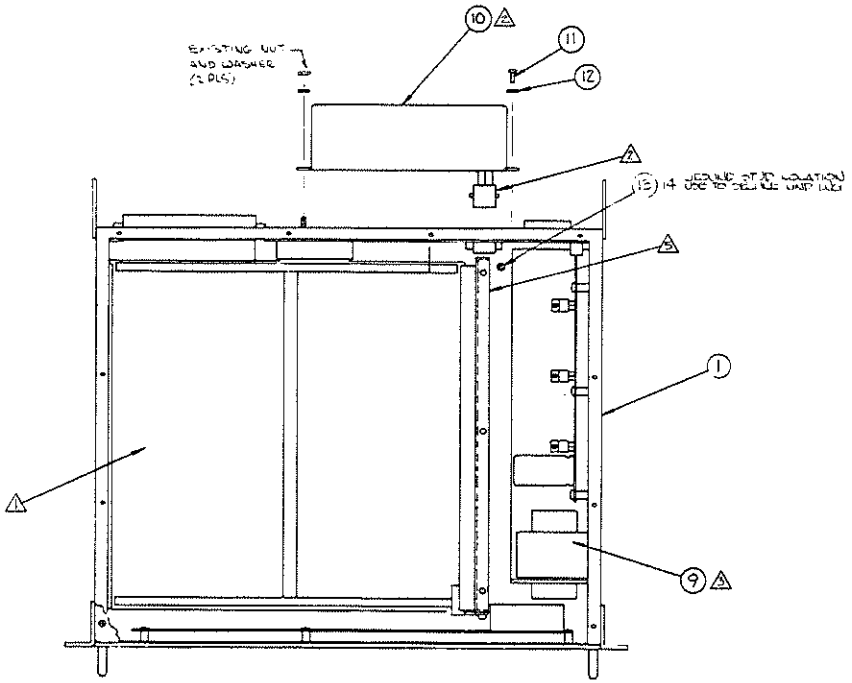
SYMPTOM	SUSPECTED PCB/CONNECTIONS
Reports From Other Units	
No Remote Control	1) Control 2) Signal Connections
No Analog Output	1) Modulator 2) Signal Connections 3) Backplane (Master Clock) 4) Control Board
No Keyed DC	1) Demodulator 2) Signal Connections 3) Backplane (Master Clock) 4) Control
Distorted or Garbled Output	1) Demodultor 2) Control 3) Backplane
Normal/Reverse Response Inoperative	1) Control 2) Demodulator 3) Modulator 4) Keypad
Mute Response Inoperative	1) Control 2) Modulator 3) Keypad
AMH Response Inoperative	1) Control 2) Demodulator 3) Keypad
SYNCH/REGEN Response Inoperative	1) Control 2) Demodulator 3) Keypad

SECTION VI

ASSEMBLY DRAWINGS

AND

PARTS LISTS



INTERCONNECTIONS

FROM	REF DES	TO	REF DES	CABLE	
POWER FILTER	P2	POWER SWITCH	J1	—	
POWER FILTER	P3	POWER SUPPLY	J1	—	
POWER FILTER	J2	POWER SUPPLY	SEE'S Bd	—	
HIGH LEVEL INTERFACE	J1	LOOP SUPPLY CONNECTOR	P1	—	OPTIONAL
CONTROL BD	J1	DISPLAY BD	J1	C4079	
CONTROL BD	J2	KEY BD.	J1	C4079	
POWER TRANS	W1	GROUND STUD W/ LUGS	—		

NOTES:

1. TOP SLOT IS EXTENDER BD, ITEM 5
   2ND SLOT IS CONTROL BD, ITEM 4
   FOR SLOT 3 AND BOTTOM, SELECT 1 OR 2 DEMOD BD ITEM 3 OR 1 OR 2 MOD. BD. ITEM 2 OR 1 OF EACH
2. IF HIGH LEVEL OPTION IS SELECTED, REMOVE COVER PLATE FROM REAR OF CHASSIS. PLUG IN CONNECTOR AND ATTACH HIGH LEVEL ASSY (ITEM 10) AS SHOWN
3. IF DC VERSION IS SELECTED, REMOVE AC POWER SUPPLY (STANDARD) AND REPLACE WITH DC SUPPLY ITEM 9
4. ITEM 6
5. ROUTE WIRES THROUGH CABLE CLAMPS

Figure 6-1. Assembly, Model 1280 D5715B

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	D5679	1		ASSY CHASSIS	FEC		
	2	D5707	Ø		ASSY MODULATOR BD.	FEC	N02174	
	3	D5725	Ø		ASSY DEMODULATOR BD	FEC	N02171	
	4	D5698	1		ASSY CONTROL BD	FEC	N02169	
	5	D5864	1		ASSY EXTENDER BD	FEC	N02211	
	6	D5703	1		ASSY FRONT PANEL	FEC		
	7	AK1280	1		ACCESSORY KIT	FEC		
	8	C4079	2		INTERCONNECT CABLE	FEC		
	9	D5841	Ø		ASSY DC POWER SUPPLY	FEC		
	10	D5865	Ø		ASSY HIGH LEVEL INTERFACE	FEC		
	11	404361	Ø		SCREW #6-32x1/4 PH	T&C		
	12	404893	Ø		WASHER, INT TOOTH #6	T&C		

Figure 6-1. Parts List

PLD5715B

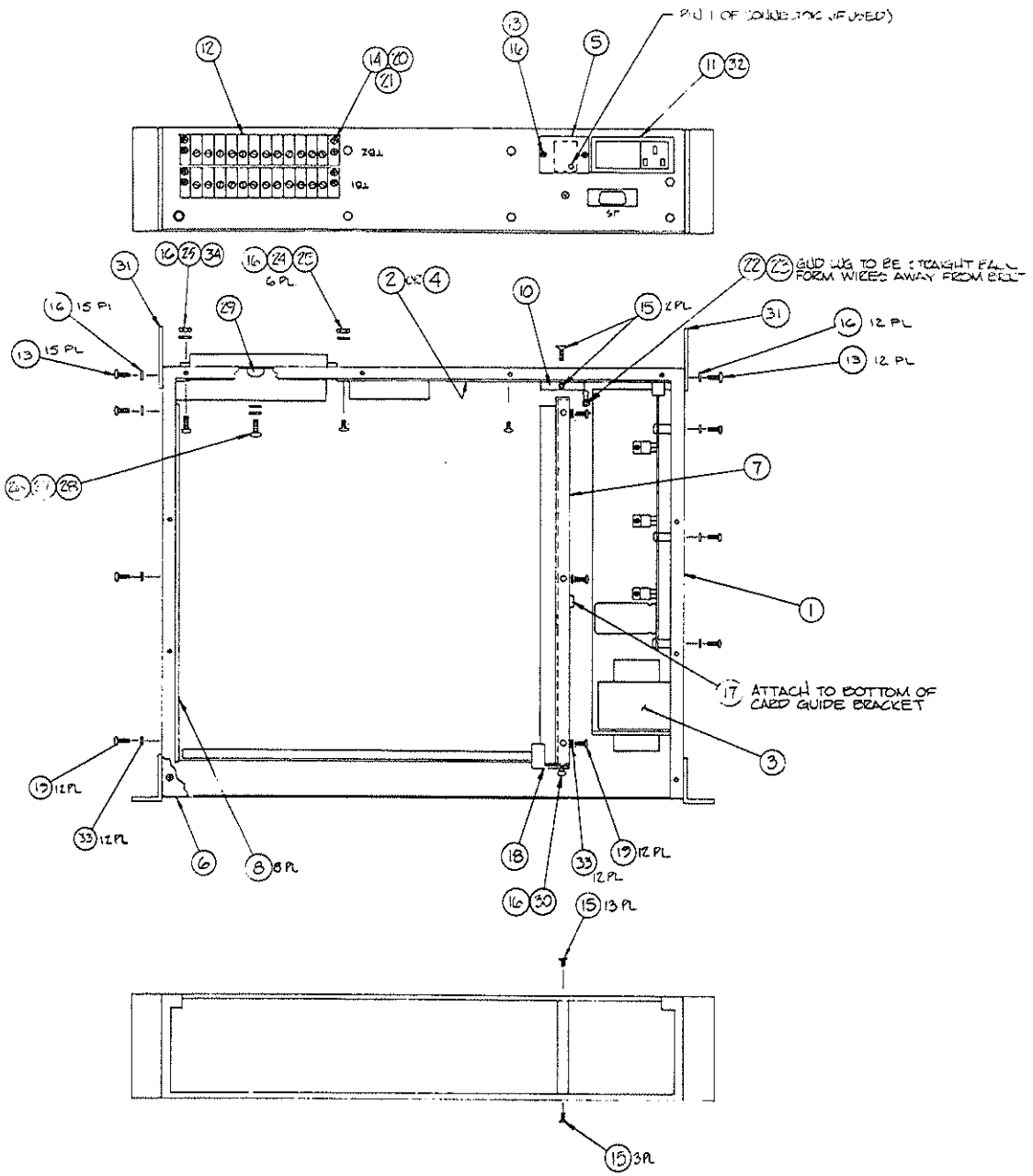


Figure 6-2. Chassis Assembly D5679F

CARD CODE	ITEM NO.	FEC PART NO	QUANTITY		-1		CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	D5711			1	1		CHASSIS	FEC		
	2	D9010			-	1		ASSY BACKPLANE	FEC	NO2249	
	3	D5810			1	1		ASSY. AC POWER SUPPLY	FEC		
	4	D9090			1	-		ASSY BACKPLANE	FEC	NO2267	
	5	B2689			1	1		COVER PLATE	FEC		
	6	D5713			1	1		TOP COVER	FEC		
	7	C4053			1	1		PC GUIDE BRACKET	FEC		
	8	B2691			8	8		CARD GUIDE	FEC		
	9										
	10	B2697			1	1		CONNECTOR BRACKET	FEC		
	11	C4083			1	1		ASSY. FILTER	FEC		
	12	100863			2	2		TERMINAL BLOCK	AMP	350883-1	
	13	404361			15	15		SCREW 6-32x1/4 PH	T&C	MS51957-26	
	14	404373			8	8		SCREW 6-32x3/8 PH	T&C	MS51957-28	

Figure 6-2. Parts List, Sheet 1 PLD5679F

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
					-1						
	15	404354			18	18		SCREW 6-32X3/16	T&C	MS51959-25	
	16	404893			25	25		WASHER INT TOOTH #6	T&C	MS35333-71	
	17	184557			1	1		CABLE CLAMP	GC	34-404-C	
	18	B2696			1	1		PC LOCK BRACKET	FEC		
	19	404194			24	24		SCREW 4-40 x .250	T&C	MS51957-13	
	20	404895			8	8		WASHER, SPLITLOCK #6	T&C	MS35338-136	
	21	404896			8	8		WASHER, FLAT #6	T&C	MS15795-805	
	22	404917			1	1		WASHER,SPLITLOCK, #10	T&C	MS35338-138	
	23	404914			1	1		WASHER, FLAT #10	T&C	MS15795-809	
	24	404405			6	6		SCREW 6-32 x .75	T&C	MS51959-32	
	25	403035			7	7		NUT 6-32x.18	T&C	NAS671-C6	
	26	404210			1	1		SCREW 4-40 x .38	T&C	AN515C-4-R6	
	27	404877			1	1		WASHER #4 FLAT	T&C	AN960-C4	
	28	404880			1	1		WASHER #4 SPLITLOCK	T&C	MS35338-135	

Figure 6-2. Parts List, Sheet 2

PLD5679F

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY		-1		CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	29	160891			1	1		RUBBER FOOT	SMITH	2194	
	30	404369			2	2		SCREW 6-32 x .31	T&C	MS51957-27	
	31	B2174			2	2		REAR MTG PLATE	FEC		
	32	368300			1	1		2 AMP STD. FUSE	LITTELFUSE	312002	(INSTALL IN ITEM 11)
	33	404878			24	24		WASHER #4 INT TOOTH	T&C	MS35333-70	
	34	404381			1	1		SCREW 6-32 x 7/16 P.H.	T&C	MS519517-29	

Figure 6-2. Parts List, Sheet 3

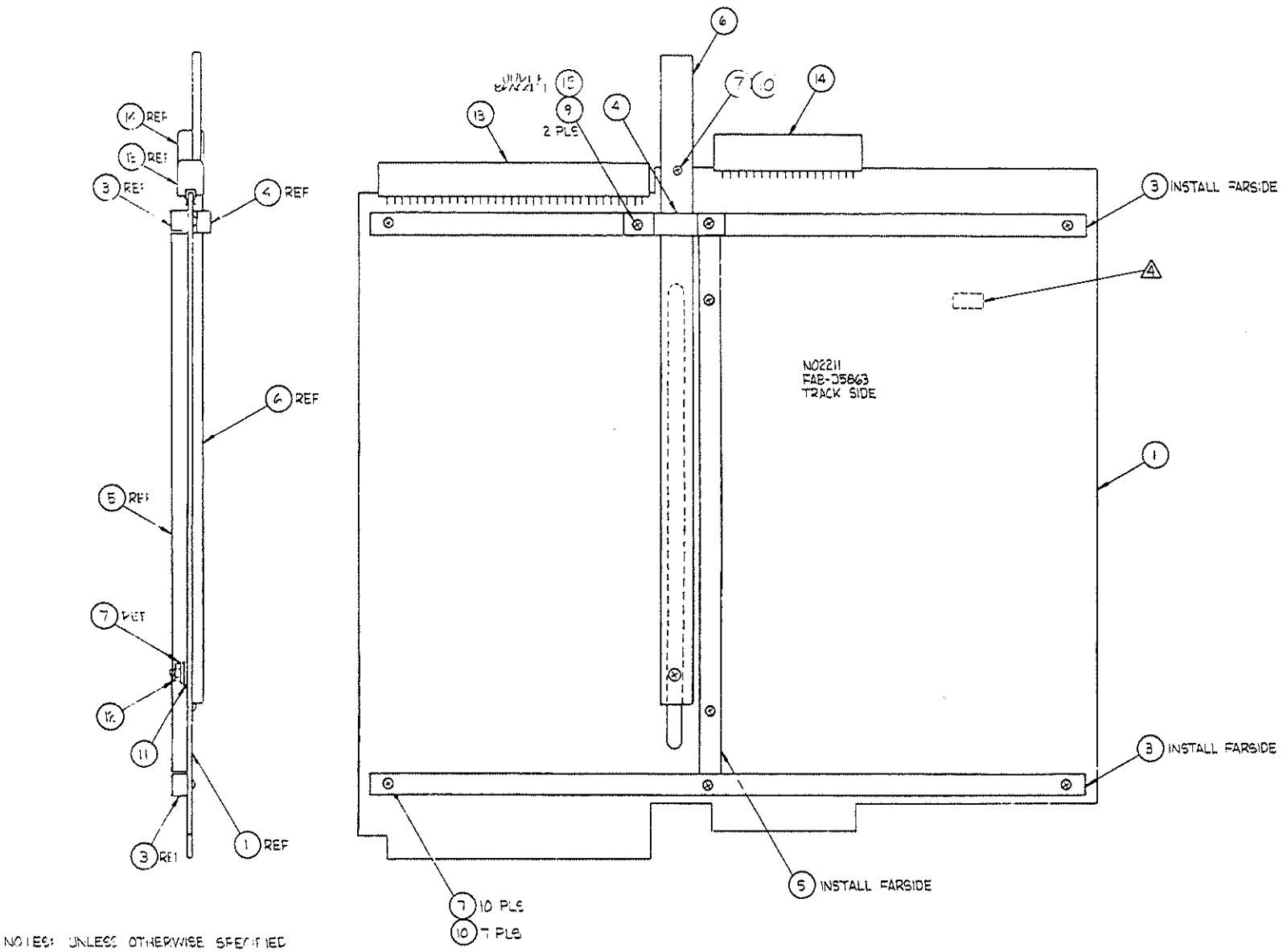
PLD5679F

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	C4092				1		ASSY TEST CABLE, POWER SWITCH	FEC		
	2	C4076				2		TEST CABLE	FEC		
	3	TMC21100				1		TECHNICAL MANUAL	FEC		
	4	366020				1		LINE CORD	BELDEN	17250	
	5	241192				1		CONNECTOR PLUG	AMP	205204-1	
	6	744810				9		CONTACT, MALE, CRIMP	AMP	66506-4	

Figure 6-3. Accessory Kit AK1280A

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	NO2211	1		P.W.B	FEC		
	2	D5863	REF		FABRICATION DWG	FEC		
	3	C4104-1	2		STIFFNER	FEC		FOR ITEM 1
	4	B2702	1		SUPPORT BAR BRACKET	FEC		FOR ITEM 1
	5	C4104-2	1		STIFFNER	FEC		FOR ITEM 1
	6	B2699	1		SLIDE SUPPORT	FEC		
	7	404878	11		WASHER, INT TOOTH, NO4	T&C	NO. 4 WASHER	TO MOUNT ITEMS 3,4 & 5 TO ITEM 1
	8	801190	A/R		TORQUE SEAL	ORGANIC PRODUCTS	F900, GREY	
	9	404203	2		SCREW,SST,NO.4,5/16"	T&C	PH4-40x5/16	TO MOUNT ITEM 4 TO ITEM 1
	10	404194	8		SCREW,SST,NO.4,1/4"	T&C	MS51957-13	TO MOUNT ITEMS 3 & 5 TO ITEM 1
	11	404892	1		WASHER, FLAT #6 CRES	T&C	AN960-C6	
	12	403030	1		NUT, HEX 4-40x1/4AF CS	T&C	MS35649-244	
	13	241200	1		CONNECTOR,DUAL,34 POS	AMP	1-530265-2	
	14	241199	1		CONNECTOR,DUAL 18 POS	AMP	530290-5	

Figure 6-4. Parts List, Sheet 1 PLD5864C



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   P.C. BOARD - N0221I
   FABRICATION: DWG-D5863
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING WHITE EPOXY INK APPROXIMATELY WHERE SHOWN.

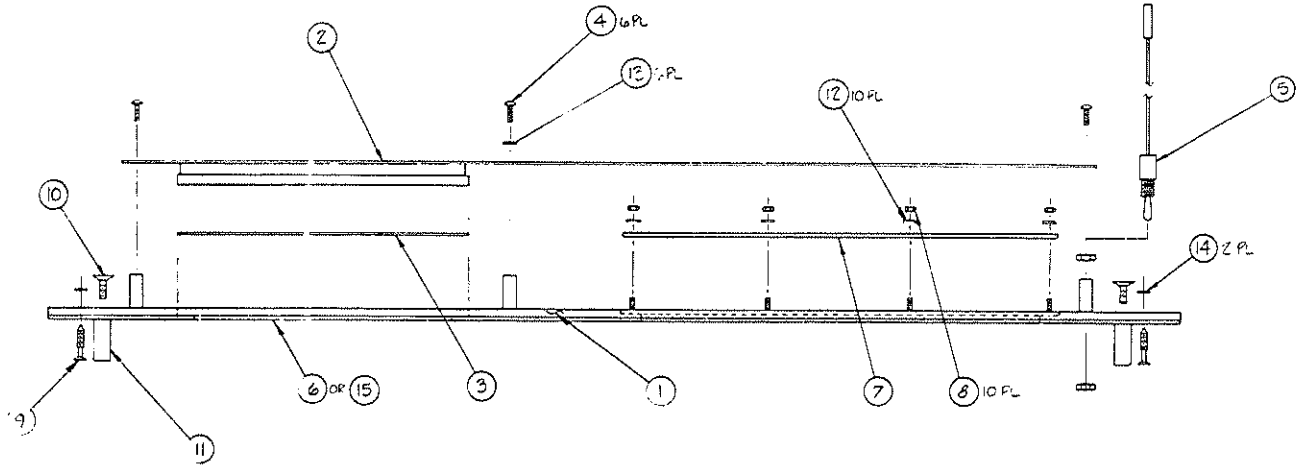
Figure 6-4. Extender PWB Assembly

L_864C

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15	404875	2		WASHER, NYLON, FLAT	SMITH	2514	

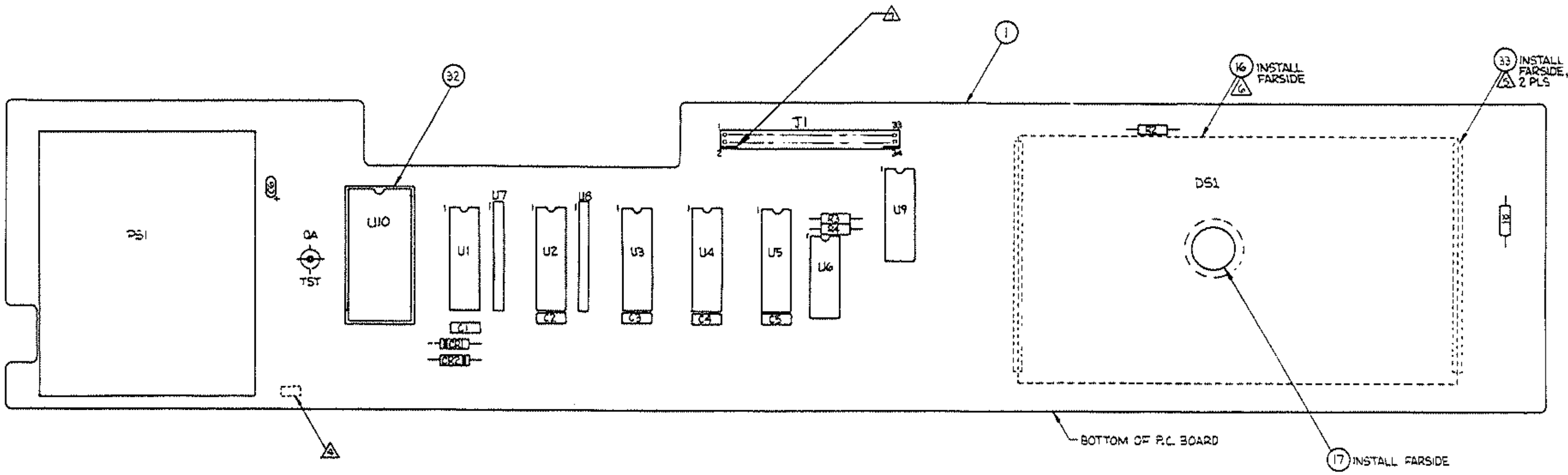
Figure 6-4. Parts List, Sheet 2

PLD5864C



-1	QUAN	ITEM	PART NO	DESCRIPTION	MFR	MFR P/N
1	X	15	D7078	OVERLAY	FEC	
2	2	14	404477	E TYPE RETAINING RING	[illegible]	1000-12
6	6	13	404480	WASHER, SPLIT LOK #4	FEC	MS35338-135
10	10	12	404361	WASHER, SPLIT LOK #2	FEC	MS35338-134
2	2	11	407153	HANDLE	AMATOM	0805-A-7032
4	4	10	401363	SCREW #6-32 x .31 FH SC	T&C	
2	2	9	401372	CAPTIVE SCREW #6-32	AMATOM	4212-[illegible]-0632-428
10	10	8	403010	NUT HEX 2-56 ± 3/16 AE	T&C	MS35649-274
1	1	7	SC492	KEYBOARD	FEC	
X	1	6	05840	OVERLAY FRONT PANEL	BRADY	
1	1	5	C4084	ASSY POWER SWITCH	FEC	
6	6	4	404217	SCREW #4-40 x 7/16 PH	T&C	MS 75[illegible]-2
1	1	3	C4080	PLEXIGLASS WINDOW	FEC	
1	1	2	D5701	ASSY. FRONT PANEL 60	FEC	402170
1	1	1	D5710	FRONT PANEL	FEC	

Figure 6-5. Front Panel Assembly D5703B



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   P.C. BOARD-Nº2170
   FABRICATION DWG-D5700
   SCHEMATIC DWG-D5702
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING WHITE EPOXY INK, APPROXIMATELY WHERE SHOWN.
5. INSTALL STRIP SOCKET WITH NARROW SIDE TOWARDS LARGE HOLE.
6. INSTALL PLASMA DISPLAY WITH DIGITAL READ OUT TOWARDS THE BOTTOM OF THE PC BOARD.
7. INSTALL J1 AS SHOWN WITH KEYING TAB SIDE TOWARD I.C.'S.

Figure 6-6. Front Panel PWB Assembly D5701A

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	NO2170A			1			P.W.B.	FEC		
	2	D5700			REF			FABRICATION DWG.	FEC		
	3	D5702			REF			SCHEMATIC	FEC		
	4										
	5	021880			5			CAPACITOR, .1uf, 50VDC	KEMET	C630C104M5X5CA	C1-C5
	6	028581			1			CAPACITOR, 22uf, 15V	KEMET	T368B226K015AS	C6
	7										
	8										
	9	040770			2			DIODE	MOT	1N4740A	CR1,CR2
	10										
	11										
	12	626020			2			RESISTOR, 453K,1/8W,1%	DALE	CCF554533F	R1,R2
	13	625673			1			RESISTOR,40.2K,1/8W,1%	DALE	CCF554022F	R3
	14	625597			1			RESISTOR,26.7K,1/8W,1%	DALE	CCF552672F	R4

Figure 6-6. Parts List, Sheet 1 PLD5701A

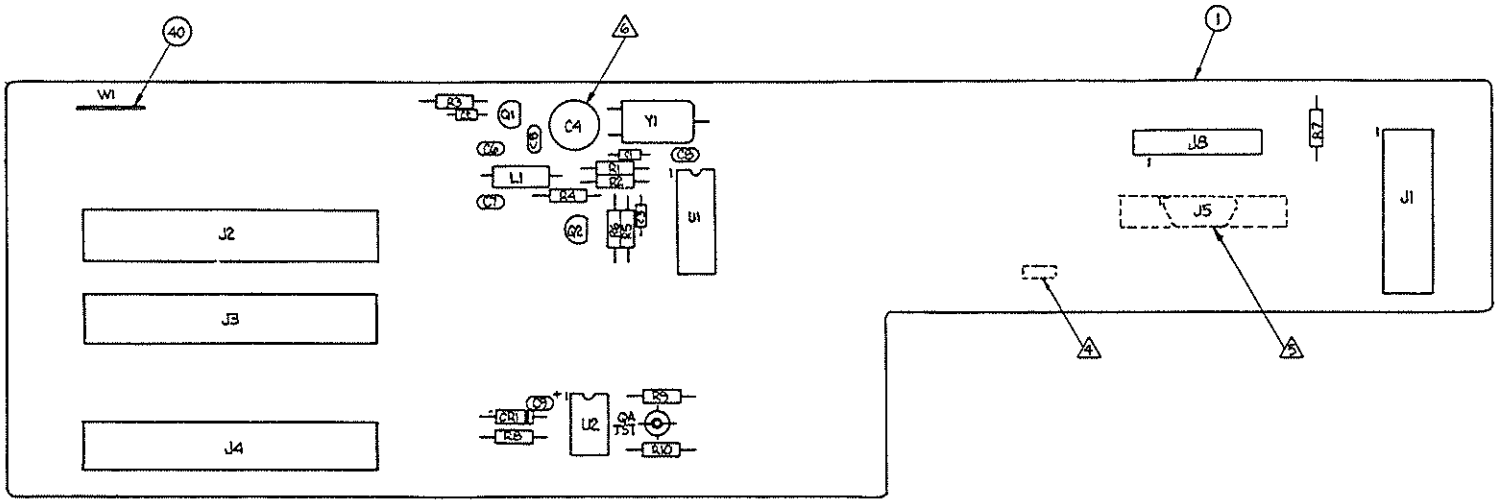
CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15										
	16	085066			1			PLASMA DISPLAY	DALE	SC263	DS1
	17	400010			1			NON-THREADED CAP	BANICO INC.	SERIES-W3	USE WITH ITEM 16
	18	241936			1			CONNECTOR, 34 POS	AMP	1-87586-3	J1
	19										
	20	580480			1			DC-DC CONVERTER	TI	200ZDCP88101	PS1
	21										
	22										
	23	061887			2			I.C., DISPLAY DRIVER	SPRAGUE	UDN6184A	U1,U2
	24	061890			2			I.C., DISPLAY DRIVER	SPRAGUE	UDN7186A	U3,U4
	25	061889			1			I.C., DISPLAY DRIVER	SPRAGUE	UDN7180A	U5
	26	062933			1			R/NET, DIP,14 PIN, 82K	DALE	MDP1403-8236	U6
	27	062714			2			R/NET, SIP,10 PIN,100K	DALE	MSP10A-01-104G	U7,U8
	28	0611907			1			I.C., SHIFT REGISTER	RCA	CD4015BE	U9

Figure 6-6. Parts List, Sheet 2

PLD5701A

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	29	061891			1			I.C., 4-16, MUX	RCA	CD4514BE	U10
	30	*									
	31										
	32	248468			1			SOCKET, 24 PIN	AUGAT	244-AG-29D	USE WITH ITEM 29
	33	241435			2			STRIP SOCKET, 22 PIN	AMP	1-583773-0	USE WITH ITEM 16
	34										
	35										
	36										
	37										
	38										
	39										
	40										
	41										
	42										

Figure 6-6. Parts List, Sheet 3 PLD5701A



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   P.C. BOARD-N°2172
   FABRICATION DWG-D5716
   SCHEMATIC DWG-D5718
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING WHITE EPOXY INK, APPROXIMATELY WHERE SHOWN.
5. INSTALL FARSIDE.
6. INSTALL AFTER P.C. BOARD HAS BEEN INSTALLED.

Figure 6-7. Backplane PWB Assembly D5717C

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	NO2172B	1		P.W.B.	FEC		
	2	D5716	REF		FABRICATION DWG	FEC		
	3	D5718	REF		SCHEMATIC DWG	FEC		
	4							
	5							
	6	021880	3		CAPACITOR, .1uf, 50VDC	KEMET	C630C104M5X5CA	C1,C2,C3
	7	029650	1		CAPACITOR, TRIM CAP, 5-50pf	MEPCO	2810-C5-R-55Q-H02F	C4
	8	026179	1		CAPACITOR, 15pf	SANGAMO	D105C150J0	C5
	9	026315	1		CAPACITOR, 50pf	SANGAMO	D105C500J0	C6
	10	026630	2		CAPACITOR, 300pf	SANGAMO	D105C301J0	C7,C8
	11	028581	1		CAPACITOR, 22uf, 15V	KEMET	T368B226K015AS	C9
	12							
	13	040638	1		DIODE, ZENER, 4.3V	MOT	MZ4623	CR1
	14							

Figure 6-7. Parts List, Sheet 1

PLD5717C

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15							
	16	241879	1		CONNECTOR, PACE, 20 POS	AMP	2-530844-6	J1
	17	241878	3		CONNECTOR, PACE, 36 POS	AMP	2-530844-8	J2,J3,J4
	18	241929	1		CONNECTOR, 10 POS	AMP	499460-1	J8
	19	241921	1		CONNECTOR, 9 POS	AMP	745455-1	J5
	20							
	21							
	22	760025	1		CHOKE, 2.2mH	J.W.MILLER	70F223AL	L1
	23							
	24	080473	2		TRANSISTOR	FAIRCHILD	PN2369A	Q1,Q2
	25							
	26	625270	1		RESISTOR, 10K,1/8W,1%	CORNING	RN55D1002F	R1
	27	625035	1		RESISTOR, 5.62K,1/8W,1%	CORNING	RN55D5621F	R2
	28	624641	1		RESISTOR, 3.32K,1/8W,1%	CORNING	RN55D3321F	R3

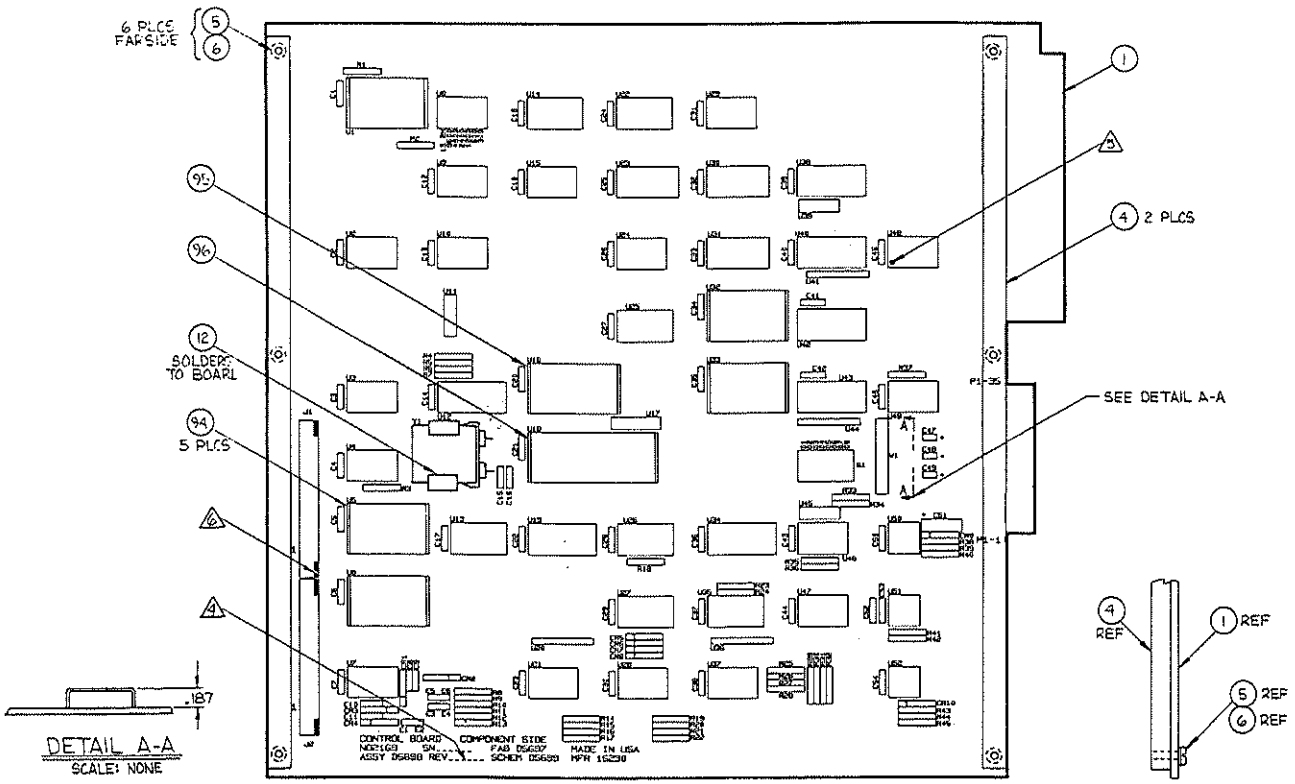
Figure 6-7. Parts List, Sheet 2

PLD5717C

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	29	625377			2			RESISTOR, 15K,1/8W,1%	CORNING	RN55D1502F	R4,R6
	30	624219			1			RESISTOR, 681Ω,1/8W,1%	CORNING	RN55D6810F	R5
	31	624299			2			RESISTOR, 1K,1/8W,1%	CORNING	RN55D1001F	R7,R10
	32	625597			1			RESISTOR, 26.7K,1/8W,1%	CORNING	RN55D2672F	R8
	33	625746			1			RESISTOR, 57.6K,1/8W,1%	CORNING	RN55D5762F	R9
	34										
	35										
	36	059014T			1			I.C., HEX HYS RCVR	NAT	DM74LS14N	U1
	37	060103T			1			I.C., DUAL COMPARATOR	NAT	LM393N	U2
	38	304855			1			XTAL 8.388608 MHZ	ERIE	SC251	Y1
	39										
	40	366960				A/R		BUSS WIRE, 18 GA	ALPHA	296	W1
	41										
	42										

Figure 6-7. Parts List, Sheet 3

PLD5717C



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   P.C. BOARD-№2169
   FABRICATION DWG-D5697
   SCHEMATIC DWG-D5699
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.

△3 MARK CURRENT REVISION LEVEL IN J2 HIGH CHARACTERS USING WHITE EPOXY INK, APPROXIMATELY WHERE SHOWN.

△4 PIN 1 ORIENTATION TYPICAL, DENOTED BY SQUARE PAD ON PWB.

△6 INSTALL J1 AND J2 WITH KEYING TABS IN TOWARD BOARD.

Figure 6-8. Control PWB Assembly (D5698D)

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	NO2169	1		PRINTED WIRING BOARD	FEC		
	2	D5697	REF		FABRICATION DWG	FEC		
	3	D5699	REF		SCHEMATIC DWG	FEC		
	4	B2686-1	2		BOARD STIFFENER	FEC		(FOR USE WITH ITEM 1)
	5	404203	6		SCREW,SST,NO. 4x5/16"	T&C	PH4-40x5/16	(TO MOUNT ITEM 4)
	6	404880	6		WASHER,SPLIT LOCK,NO. 4	T&C	NO. 4	(TO MOUNT ITEM 4)
	7							
	8	241196	2		CONNECTOR,34 PIN,SOLDER	AMP	499460-8	J1,J2 (SOLDER TO ITEM 1)
	9							
	10							
	11	304840	1		CRYSTAL,3686.400 KHZ	SC103		Y1
	12	305520	1		CRYSTAL SOCKET	AUGAT	8000-AG3	(USE TO MOUNT Y1) (SOCKET SOLDERS TO BOARD)
	13							
	14							

Figure 6-8. Parts List, Sheet 1

PLD5698D

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15	021880				44		CAP,.1UF,50WVDC	KEMET	C630C104M5X5CA	C1-C7,C12-C14,C17-C46,C50, C52-C54
	16	021210				4		CAP,DISC,500PF,1KV,10%	CENTRAL LABS	DD-501	C8-C11
	17	021030				2		CAP,DISC,20PF,1KV,10%	CENTRAL LABS	DD-200	C15,C16
	18	028581				3		CAP,22UF,15V,10%	KEMET	T368B226K015AS	C47-C49
	19	028308				1		CAP,2.2UF,20V,10%	KEMET	T110A225K020AS	C51
	20										
	21										
	22										
	23	040238				10		DIODE,SIGNAL	FAIRCHILD	1N914	CR1-CR10
	24										
	25										
	26										
	27	625098				1		RES,6.81K .1/8W,1%	CORNING	RN55D6811F	R1
	28	625270				15		RES,10K,1/8W,1%	CORNING	RN55D1002F	R2,R3,R18,R23,R24,R33-R37,R39 R41,R42,R44,R45

Figure 6-8. Parts List, Sheet 2

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	29	624146	4		RES,374Ω,1/8W,1%	CORNING	RN55D3740F	R4-R7
	30	625181	6		RES,8.06KΩ,1/8W,1%	CORNING	RN55D8061F	R8-R13
	31	624135	1		RES,150Ω,1/8W,1%	CORNING	RN55D1500F	R14
	32	624931	1		RES,107Ω,1/8W,1%	CORNING	RN55D1070F	R15
	33	624905	1		RES,301Ω,1/8W,1%	CORNING	RN55D3010F	R16.
	34	624118	1		RES,215Ω,1/8W,1%	CORNING	RN55D2150F	R17
	35	624070	1		RES,37.4Ω,1/8W,1%	CORNING	RN55D37R4F	R19
	36	624901	1		RES,53.6Ω,1/8W,1%	CORNING	RN55D53R6F	R21
	37	624093	1		RES,75Ω,1/8W,1%	CORNING	RN55D75R0F	R22
	38	624435	1		RES,1.69KΩ,1/8W,1%	CORNING	RN55D1691F	R25
	39	624559	1		RES,2.43KΩ,1/8W,1%	CORNING	RN55D2431F	R26
	40	624661	1		RES,3.4KΩ,1/8W,1%	CORNING	RN55D3401F	R27
	41	624882	1		RES,4.87KΩ,1/8W,1%	CORNING	RN55D4871F	R28
	42	624349	1		RES,1.21KΩ,1/8W,1%	CORNING	RN55D1211F	R29

Figure 6-8. Parts List, Sheet 3

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	43	624245				1		RES,866Ω,1/8W,1%	CORNING	RN55D8660F	R30
	44	624178				1		RES,604Ω,1/8W,1%	CORNING	RN55D6040F	R31
	45	624946				1		RES,432Ω,1/8W,1%	CORNING	RN55D4320F	R32
	46	625618				1		RES,30.1KΩ,1/8W,1%	CORNING	RN55D3012F	R38
	47	625811				1		RES, 100KΩ,1/8W,1%	CORNING	RN55D1003F	R40
	48	625341				1		RES, 13KΩ,1/8W,1%	CORNING	RN55D1302F	R43
	49	624122				1		RES, 100Ω,1/8W, 1%	CORNING	RN55D1000F	R20
	50										
	51										
	52										
	53										
	54	722201				1		SWITCH,DIP,8 POSITIONS	AMP	435166-5	S1
	55										
	56	061568				1		IC,BIT RATE GEN	MOTOROLA	MC14411P	U1 (USE WITH ITEM 94)

Figure 6-8. Parts List, Sheet 4

PLD5698D

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	57	059008T	4		IC,QUAD 2 INPUT POS GAT	TI	SN74LS08	U2,U4,U46,U48
	58	059032T	3		IC,2 INPUT OR GATE	TI	SN74LS32	U3,U24,U29
	59	061085	2		IC,KEYBOARD ENCODER	HARRIS	HD-1-0165-5	U5,U6 (USE WITH ITEM 94)
	60	060152	1		IC,LINE DRIVER	NATIONAL	LM1488J	U7
	61	248700	1		IC,SOCKET,14 PIN	AUGAT	514-AG11D	U8
	62	059393T	2		IC,4 BIT DECODE BINARY CNTR	TI	SN74LS393	U9,U10
	63	062706	3		IC,RESISTOR NETWORK,10K	DALE	MSP06A01-103G	U11,U39,U45
	64	059240T	5		IC,OCTAL BUFFER,3 STATE	TI	SN74LS240	U12,U19,U38,U42,U43
	65	059175T	2		IC,QUAD D EDGE FLIP-FLO	TI	SN74LS175	U13,U26
	66	059157T	2		IC,QUAD 2-1 SEL MUX	TI	SN74LS157	U14,U22
	67	059125T	1		IC,4 BUS BUFFER GATES	TI	SN74LS125	U15
	68	061593	1		IC,USART	INTEL	8251A	U16 (USE WITH ITEM 95)
	69	062723	1		IC,RESISTOR NETWORK,10K 7 RES.	DALE	MSP08A01-103G	U17
	70	061780T	1		IC,MICROPROCESSOR	INTEL	B8085A-2	U18 (USE WITH ITEM 96)

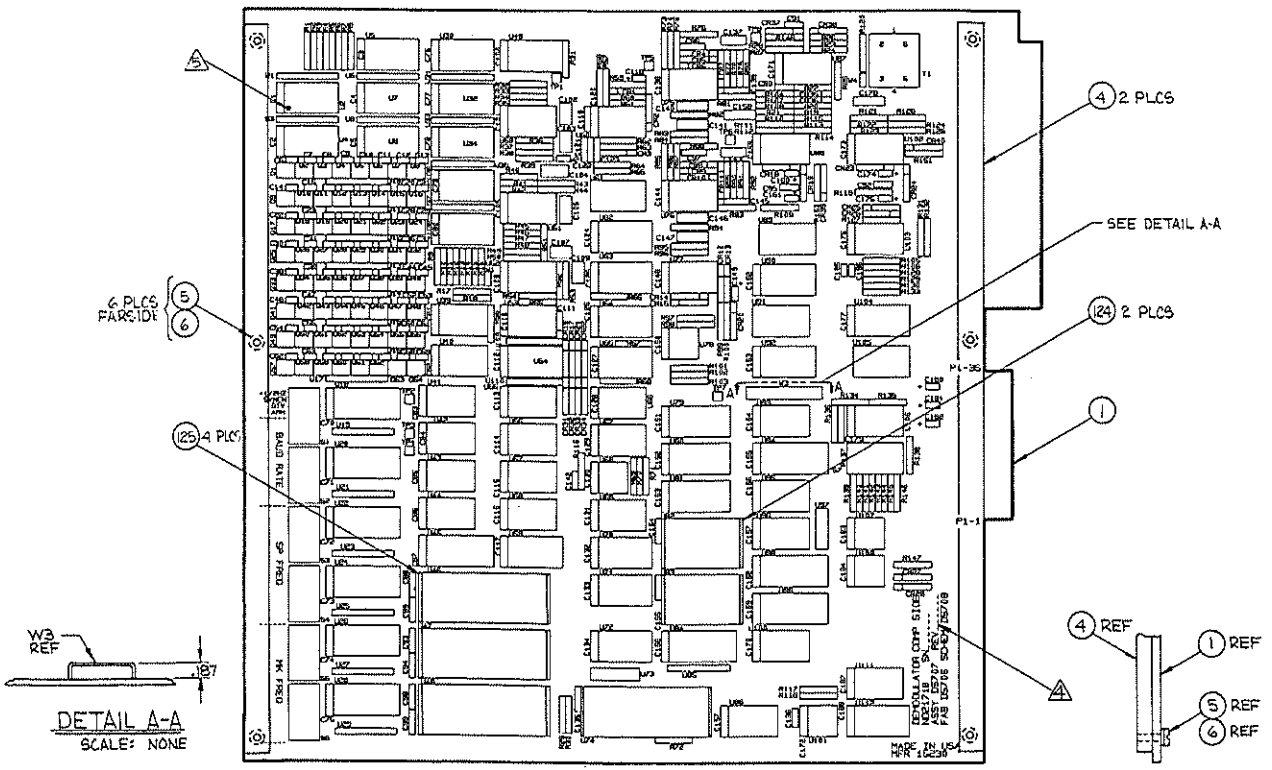
Figure 6-8. Parts List, Sheet 5 PLD5698D

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	71	062710				4		IC,RESISTOR NETWORK,10K, 9 RES.	DALE	MSP10A01-103G	U20,U36,U41,U44
	72	060102T				4		IC,QUAD COMPARATOR	NATIONAL	LM339NAT	U21,U28,U37,U47
	73	061778T				1		IC,1024x4 STATIC RAM	NEC	UPD2114LC-3	U23
	74	059138T				2		IC,3-8 LINE DECODE DEMUX	TI	SN74LS138	U25,U27
	75	061781				2		IC,256x4 STATIC RAM	XICOR	X2212	U30,U31
	76	SC582				2		IC,4Kx8 EPROM	FEC		U32,U33 (USE WITH ITEM 94)
	77	059374T				1		IC,OCTAL D TYPE FF	TI	SN74LS374	U34
	78	061246				1		IC,1/8 CHAN MUX	RCA	CD4051AE	U35
	79	059373T				1		IC,OCTAL TRAN LT 3 ST.	TI	SN74LS373	U40
	80	061827T				1		IC,QUAD LINE RCVR	NATIONAL	DS1489N	U49
	81	060103T				1		IC,DUAL COMPARATOR	NATIONAL	LM393NAT	U50
	82	060140				1		IC,OPERATIONAL AMP	NATIONAL	LM741CN	U51
	83	060143				1		IC,OPERATIONAL AMP	NATIONAL	LF351N	U52
	84										

Figure 6-8. Parts List, Sheet 6

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	85							
	86							
	87							
	88							
	89							
	90							
	91							
	92	366960	2"		WIRE,SOLID BUS,18 GA.	ALPHA	296	W1
	93							
	94	248468	5		SOCKET,IC,24 PIN	AUGAT	224-AG29D	INSTALL IN POSITIONS U1,U5,U6,U32,U33
	95	248470	1		SOCKET,IC,28 PIN	AUGAT	228-AG29D	INSTALL IN POSITION U16
	96	248472	1		SOCKET,IC,40 PIN	AUGAT	240-AG29D	INSTALL IN POSITION U18
	97							
	98							

Figure 6-8. Parts List, Sheet 7 PLD5698D



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   P.C. BOARD-№2171
   FABRICATION DWG-D5706
   SCHEMATIC DWG-D5708
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING WHITE EPOXY INK, APPROXIMATELY WHERE SHOWN.
5. PIN 1 ORIENTATION TYPICAL, DENOTED BY SQUARE PAD ON PWB.
6. DO NOT INSTALL U82, MAINTAIN POSITION FOR FUTURE USE.

Figure 6-9. Demodulator PWB Assembly (D5707D)

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	NO2171 B	1		PRINTED WIRING BD.	FEC		
	2	D5706	REF		FABRICATION DWG.	FEC		
	3	D5708	REF		SCHEMATIC DWG.	FEC		
	4	B2686-1	2		BOARD STIFFINER	FEC		(FOR ITEM 1)
	5	404203	6		SCREW, SST, NO.4 5/16 LG	T&C	PH4-40x5/16	(TO MOUNT ITEM 4)
	6	404880	6		WASHER, SPLIT-LOCK NO. 4	T&C	NO. 4 WASHER	(TO MOUNT ITEM 4)
	7							
	8							
	9							
	10							
	11	021880	89		CAP., .1uf, 50WVDC	KEMET	C630C104M5X5CA	C1-C5,C70-C80,C83-C89,C93,C94 C98-C101,C105,C108,C112-C117
								C119-C135,C138,C139,C144,C145 C148,C150-C157,C159,C162-C173
								C176,C177,C179,C183,C184,C187 C188
	12	029932	64		CAP, .047uf, 50WVDC	KEMET	C320C473K5R5CA	C6-C69

Figure 6-9. Parts List, Sheet 1 PLD5707D

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	13							
	14	029940	7		CAP, 1.0uf, 50V, 10%	KEMET	C330C105M5U1CA	C90-C92,C95,C111,C136,C142
	15	026439	4		CAP, 110pf, 500V	SANGAMO	D105C111JO	C102,C103,C107,C109
	16	026660	2		CAP, 330pf, 500V	SANGAMO	D155C331JO	C104,C106
	17	029947	2		CAP, .01uf, 50WVDC	KEMET	C312C103M15RCA	C185,C186
	18	028683	1		CAP, 33uf, 10V, 10%	KEMET	T368B336K010AS	C118
	19	029908	2		CAP, .015uf, 50V	IMB	BP6308G	C137,C143
	20	029983	4		CAP, .033uf, 50V	IMB	BP6309G	C140,C141,C146,C147
	21	028574	1		CAP, 15uf, 20V	KEMET	T368B156K020AS	C149
	22	028420	4		CAP, 4.7uf, 35V	SPRAGUE	196D475X9035JA1	C160,C161,C174,C175
	23	028581	3		CAP, 22uf, 15V, 10%	KEMET	T368B226K015AS	C180-C182
	24	021510	2		CAP, .005uf, 1KV, 10%	CENTRAL LAB	DD-502	C158,C178
	25				DO NO INSTALL (C81,C82,C110,C96,C97)			
	26	040238	36		DIODE, SIGNAL	FAIRCHILD	1N914	CR1-CR19,CR20-CR26,CR31-CR38 CR39,CR40.

Figure 6-9. Parts List, Sheet 2 PLD5707D

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	27	040682	2		DIODE, ZENER 5.6V	FAIRCHILD	1N4734A	CR27,CR28
	28	624010	2		RES, 10.2Ω 1/8W, 1%	CORNING	RN55D10R2F	R150, R151
	29	625880	1		RES, 182k, 1/8W ,1%	CORNING	RN55D1823F	R102
	30	625765	1		RES, 66.5KΩ, 1/8W, 1%	CORNING	RN55D6652F	R144
	31	625251	2		RES, 9.76KΩ, 1/8W, 1%	CORNING	RN55D9761F	R1,R9
	32	625471	2		RES, 18.7KΩ, 1/8W, 1%	CORNING	RN55D1872F	R2,R11
	33	625638	2		RES, 34.8KΩ, 1/8W, 1%	CORNING	RN55D3482F	R26,R108
	34	625383	2		RES, 15.8KΩ, 1/8W, 1%	CORNING	RN55D1582F	R4,R15
	35	625014	2		RES, 5.23KΩ, 1/8W, 1%	CORNING	RN55D5231F	R5,R10
	36	624690	2		RES, 3.57KΩ, 1/8W, 1%	CORNING	RN55D3571F	R6,R12
	37	624475	2		RES, 1.96K, 1/8W, 1%	CORNING	RN55D1961F	R7,R13
	38	625106	2		RES, 7.15KΩ, 1/8W, 1%	CORNING	RN55D7151F	R8,R16
	39	625270	61		RES, 10KΩ, 1/8W, 1%	CORNING	RN55D1002F	R17,R32-R35,R37,R39,R43,R45, R49,R50,R52,R53,R55,R57,R28,
							R124-R126,R128,R129 R130,R132,R133,R136 R121, ,R77,R89	R61,R66,R68-R70,R72 R75,R85 R87, R110,R103-R106,R113-R118 R73,R81,R93

Figure 6-9. Parts List, Sheet 3

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	40	624801				2		RES, 4.22KΩ, 1/8W, 1%	CORNING	RN55D4221F	R18,R36
	41	625987				2		RES, 200KΩ, 1/8W, 1%	CORNING	RN55D2003F	R19,R24
	42	625994				4		RES, 274KΩ, 1/8W, 1%	CORNING	RN55D2743F	R21,R25.R109,R119
	43	625811				2		RES, 100KΩ, 1/8W, 1%	CORNING	RN55D1003F	R20,R23,
	44	624891				2		RES, 4.99KΩ, 1/8W, 1%	CORNING	RN55D4991F	R27,R107
	45	624299				7		RES, 1KΩ, 1/8W, 1%	CORNING	RN55D1001F	R40,R48,R76, R88, R97, R101,R138.
	46	624161				2		RES, 475Ω , 1/8W, 1%	CORNING	RN55D4750F	R29,R30
	47	625701				3		RES, 47.5KΩ, 1/8W, 1%	CORNING	RN55D4752F	R31,R56,R67
	48	625367				2		RES, 14.3KΩ, 1/8W, 1%	CORNING	RN55D1432F	R38,R54
	49	625010				8		RES, 5.11KΩ, 1/8W, 1%	CORNING	RN55D5111F	R41,R51,R78,R80,R90,R92,R98, R100
	50	625790				2		RES, 75KΩ, 1/8W, 1%	CORNING	RN55D7502F	R44,R46
	51	625618				1		RES, 30.1KΩ, 1/8W, 1%	CORNING	RN55D3012F	R59
	52	625433				1		RES, 16.5KΩ, 1/8W, 1%	CORNING	RN55D1652F	R60
	53	624363				1		RES, 1.33KΩ, 1/8W, 1%	CORNING	RN55D1331F	R63

Figure 6-9. Parts List, Sheet 4

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	54	624882				1		RES, 4.87KΩ, 1/8W, 1%	CORNING	RN55D4871F	R64
	55	625760				1		RES, 64.9KΩ, 1/8W, 1%	CORNING	RN55D6492F	R65
	56	624641				4		RES, 3.32KΩ, 1/8W, 1%	CORNING	RN55D3321F	R22,R71,R127,R148
	57	625435				1		RES, 16.9 KΩ, 1/8W, 1%	CORNING	RN55D1692F	R140
	58	624905				1		RES, 301Ω , 1/8W, 1%	CORNING	RN55D3010F	R147
	59	625397				1		RES, 16.2KΩ, 1/8W, 1%	CORNING	RN55D1622F	R58
	60	625095				2		RES, 6.65KΩ, 1/8W, 1%	CORNING	RN55D6651F	R79,R91
	61	625614				2		RES, 29.4KΩ, 1/8W, 1%	CORNING	RN55D2942F	R3,R14
	62	624589				2		RES, 2.74kΩ, 1/8W, 1%	CORNING	RN55D2741F	R82,R94
	63	624069				2		RES, 36.5Ω, 1/8W, 1%	CORNING	RN55D36R5F	R83,R95
	64	625673				2		RES, 40.2KΩ,1/8W,1%	CORNING	RN55D4022F	R134,R135
	65	625104				2		RES, 6.98KΩ, 1/8W, 1%	CORNING	RN55D6981F	R42,R47
	66	625998				1		RES, 324KΩ, 1/8W, 1%	CORNING	RN55D3243F	R99
	67	625880				1		RES, 182KΩ, 1/8W, 1%	CORNING	RN55D1823F	R102

Figure 6-9. Parts List, Sheet 5 PLD5707D

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	68	625541	4		RES, 21.5KΩ, 1/8W, 1%	CORNING	RN55D2152F	R111,R112,R122,R123
	69	625377	1		RES, 15KΩ, 1/8W, 1%	CORNING	RN55D1502F	R62
	70	625571	1		RES, 24.3KΩ, 1/8W, 1%	CORNING	RN55D2432F	R141
	71	624948	2		RES, 66.5Ω, 1/8W, 1%	CORNING	RN55D66R5F	R131,
	72	624193	1		RES, 649Ω, 1/8W, 1%	CORNING	RN55D6490F	R120
	73	625358	1		RES, 14KΩ, 1/8W, 1%	CORNING	RN55D1402F	R137
	74	625635	1		RES, 34KΩ, 1/8W, 1%	CORNING	RN55D3402F	R142
	75	625704	1		RES, 48.7KΩ, 1/8W, 1%	CORNING	RN55D4872F	R143
	76	625505	2		RES, 20K , 1/8W 1%	CORNING	RN55D2002F	R74,R86
	77	625807	1		RES, 95.3KΩ, 1/8W, 1%	CORNING	RN55D9532F	R145
	78	625828	1		RES, 130KΩ 1/8W, 1%	CORNING	RN55D1303F	R146
	79	625305	1		RES, 11KΩ,1/8W,1%	CORNING	RN55D1102F	R139
	80	080473	64		TRANSISTOR, NPN, SI, HI SPD SW	NATIONAL	PN2369A	Q1-Q64
	81	722201	7		SWITCH, DIP, 8 SW	AMP	435166-5	S1-S7

Figure 6-9. Parts List, Sheet 6 PLD5707D

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	82	744550	8		TEST POINT, MALE PIN	BEADCHAIN	R62-3ET	TP1-TP8
	83	624132	2		RES, 274Ω, 1/8W, 1%	CORNING	RN55D2740F	R84, R96
	84	765035	1		TRANSFORMER, AUDIO, 10K	TNI	TI-267	T1
	85							
	86							
	87	062750	8		IC, CUSTOM RESISTOR NETWORK, 9 RES	DALE	(SC135)	U1,U3,U6,U8, ,U31,U33,U35,U37,
	88	061257T	13		IC, 1/8 CHANNEL MULTIPLEXER	RCA	CD4051BEX	U2,U4,U5,U7,U9,U30,U32,U34, U36,U38,U62,U90,U92
	89	062975	8		IC, RESISTOR NETWORK, 4.7K, 9 RES	DALE	MSP10A01-472G	U10-U17
	90	059240T	7		IC, OCTAL BUFFER, 3 STATE	TI	SN74LS240	U18,U20,U22,U24,U26,U28,U99
	91	061293T	3		IC, HEX NON INV BUFFER	NATIONAL	MM74C904NAT	U39,U40,U53
	92	059393T	4		IC, 4 BIT DECODE BINARY CTR	TI	SN74LS393	U41,U44,U55,U69
	93	059074T	4		IC, FLIP-FLOP	TI	SN74LS74	U42,U58,U66,U93
	94	059032T	2		IC, 2 INPUT OR GATE	TI	SN74LS32	U43,U100
	95	059244T	2		IC, OCTAL BUFFER	TI	SN74LS244	U45,U94

Figure 6-9. Parts List, Sheet 7

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	96	061795	3		IC, FREQUENCY SYNTHESIZER	HOLT	(SC140)	U46-U48
	97	061256T	3		IC, MULTIPLEXER	RCA	CD4053BE	U49,U65,U89
	98	061828T	12		IC, QUAD OP AMP	RAYTHEON	RC4156DB2	U50-U52,U60,U75-U77,U87,U88, U102,U103,U106
	99	061217	1		IC, DIV BY 8 CTR	RCA	CD4022BE	U54
	100	059002T	2		IC, QUAD 2 INPUT NOR GATES	TI	SN74LS02	U56,U111
	101	059001T	1		IC, QUAD 2 INPUT NAND GATES	TI	SN74LS00	U57
	102	059138T	4		IC, 3-8 LINE DECODE DEMULTIPLEXER	TI	SN74LS138	U59,U70-U72
	103	062996	3		IC, CUSTOM RESISTOR NETWORK, 8 RES	FEC	(SC498)	U61,U91,U105
	104	061206	2		IC, COS/MOS QUAD CL, D LATCH	RCA	CD4042BE	U63,U64
	105	061291	1		IC, HEX INV TTL BUFFER	NATIONAL	MM74C901N	U67
	106	060103T	3		IC, DUAL COMPARATOR	NATIONAL	LM393NAT	U68,U78,U101
	107	062723	1		IC, RESISTOR NETWORK 10K, 7 RES	DALE	MSP08A01-103G	U73
	108	061780	1		IC, MICROPROCESSOR	INTEL	B8085A-2	U74
	109	060610	1		IC, A TO D CONVERTER	NATIONAL	MM5357	U79

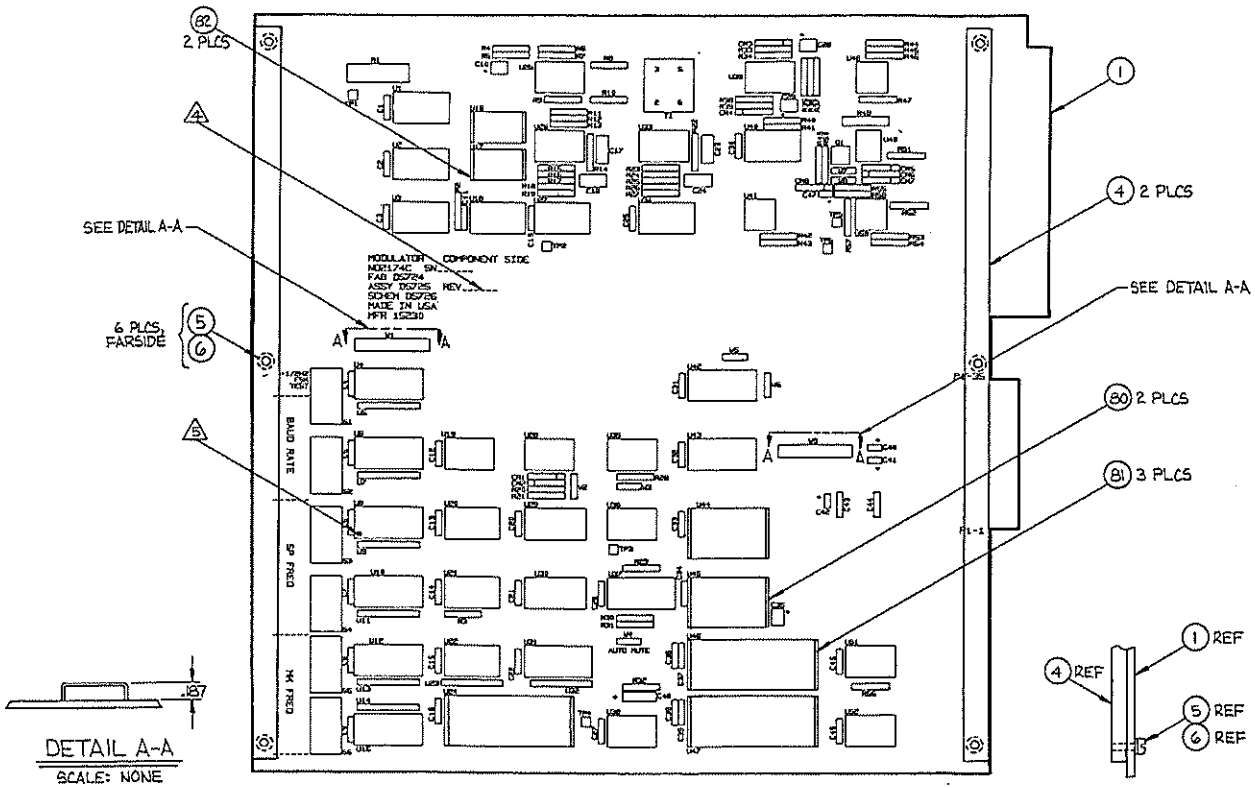
Figure 6-9. Parts List, Sheet 8 PLD5707D

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	110	061778T				2		IC, STATIC RAM, 1024x4	NATIONAL	MM2114NL	U80,U81
	111	SC583				1		IC, 16K EPROM	FEC		U83
	112	059373T				1		IC, OCTAL TRAN LT 3 STATE	TI	SN74LS373	U84
	113	059008T				1		IC, QUAD 2 INPUT POS GATE	TI	SN74LS08	U86
	114	062730				2		IC, RESISTOR NETWORK, 10K, 4 RES, 8 PIN	CTS	750-83-R10K	U109,U110
	115	061234T				1		IC, 4 CHANNEL MULTIPLEXER	RCA	CD4052B	U104
	116	061251T				1		IC, QUAD BILATERAL SWITCH	RCA	CD4066BEX	U95
	117	059125T				1		IC, 4 BUSS BUFFER GATES	TI	SN74LS125	U96
	118	062706				1		IC, RESISTOR NETWORK, 10K, 5 RES	DALE	MSP06A01-103G	U97
	119	059245T				1		IC, OCTAL TRCVR	TI	SN74LS245	U98
	120	061056				2		IC, 2 EIA LINE DRIVER 8 PIN DIP	TI	SN75150	U107,U108
	121	059174T				1		IC, HEX D FLIP-FLOP	TI	SN74LS174	U112
	122	062710				7		IC,RESISTOR NETWORK, 10K, 9RES.	CALE	MSP10A01-103G	U19,U21,U23,U25,U27,U29,U85
	123										

Figure 6-9. Parts List, Sheet 9 PLD5707D

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	124	248468				2		SOCKET, IC, 24 PIN	AUGAT	224-AG29D	INSTALL IN POSITIONS U82,U83
	125	248472				4		SOCKET, IC, 40 PIN	AUGAT	240-AG29D	INSTALL IN POSITIONS U46,U47, U48,U74
	126										
	127										
	128	366510				3		JUMPER, WIRE, INSULATED	SQUIRES	JO.250x.250T22	W1,W2,W4
	129	366960				2"		WIRE, BUSS, 18GA SOLID	ALPHA	296	W3 (JUMPER 1.000)
	130										
	131							NOTE: DO NOT INSTALL U82, MAINTAIN			
	132							POSITION FOR FUTURE USE.			
	133										
	134										
	135										
	136										
	137										

Figure 6-9. Parts List, Sheet 10 PLD5707D



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   P.C. BOARD-Nº 2174
   FABRICATION DWG-D5724
   SCHEMATIC DWG-D5726
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING WHITE EPOXY INK, APPROXIMATELY WHERE SHOWN.
5. PIN 1 ORIENTATION DENOTED BY SQUARE PAD ON PWB.
6. DO NOT INSTALL U45, MAINTAIN POSITION FOR FUTURE USE.

Figure 6-10. Modulator PWB Assembly (D5725D)

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	N02174C				1		PRINTED WIRING BOARD	FEC		
	2	D5724				REF		FABRICATION DWG	FEC		
	3	D5726				REF		SCHEMATIC DWG	FEC		
	4	B2686-1				2		STIFFENER,BOARD EDGE	FEC		(FOR ITEM 1)
	5	404203				6		SCREW,SST,No.4,5/16"	T&C	PH4-40x5/16	(TO MOUNT ITEM 4 TO ITEM 1)
	6	404880				6		WASHER,SPLIT-LOCK,No.4	T&C	No.4 WASHER	(TO MOUNT ITEM 4 TO ITEM 1)
	7										
	8										
	9										
	10	021880				35		CAP,.1UF,50 WVDC	KEMET	C630C104M5X5CA	C1-C9,C11-C16,C19-C22,C25-C27, C30-C34,C36-C39,C43-C46
	11	028397				2		CAP,3.3UF,15V	SPRAGUE	196D335X9015HA1	C10,C35
	12	029908				4		CAP,.015UF,POLYCARB	IMB	BP2B153G	C17,C18,C23,C24
	13	028230				2		CAP,1.0UF,35V	SPRAGUE	196D105X9035HA1	C28,C29
	14	028581				4		CAP,22UF,15V	KEMET	T368B226K015AS	C40-C42,C47

Figure 6-10. Parts List, Sheet 1 PLD5725D

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15	028013				1		CAP, .022UF, 35V	SPRAGUE	150D223X9035A2	C48
	16										
	17	040238				7		DIODE,SIGNAL	FAIRCHILD	1N914	CR1-CR4,CR6-CR8
	18	040550				1		DIODE,RECT,100V	MOTOROLA	1N4002	CR5
	19										
	20	080522				1		TRANSISTOR	MOTOROLA	2N2907	Q1
	21										
	22										
	23	627396				1		POTENTIOMETER,10KΩ	BOURNS	3067P-1-103	R1
	24	625559				1		RES,22.1KΩ,1/8W,1%	CORNING	RN55D2212F	R2
	25	625270				15		RES,10KΩ,1/8W,1%	CORNING	RN55D1002F	R3-R6,R7,R13,R20,R28,R30,R31,R34,R38,R52,R54,R56
	26										
	27	624178				2		RES,604Ω,1/8W,1%	CORNING	RN55D6040F	R8,R10
	28	624481				1		RES,2KΩ,1/8W,1%	CORNING	RN55D2001F	R9

Figure 6-10. Parts List, Sheet 2

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	29	624299				4		RES,1KΩ,1/8W,1%	CORNING	RN55D1001F	R11,R42,R45,R47
	30	625665				1		RES,33.2KΩ,1/8W,1%	CORNING	RN55D3322F	R12
	31	624497				4		RES,2.10KΩ,1/8W,1%	CORNING	RN55D2101F	R18,R19,R26,R27
	32	624435				1		RES,1.69KΩ,1/8W,1%	CORNING	RN55D1691F	R16
	33	624361				6		RES,1.30KΩ,1/8W,1%	CORNING	RN55D1301F	R14,R15, R17,R22,R23,R25
	34	624538				2		RES,2.21KΩ,1/8W,1%	CORNING	RN55D2211F	R21,R46,
	35	624221				1		RES,698Ω,1/8W,1%	CORNING	RN55D6980F	R24
	36	624161				1		RES,475Ω,1/8W,1%	CORNING	RN55D4750F	R29
	37	625701				1		RES,47.5KΩ,1/8W,1%	CORNING	RN55D4752F	R32
	38	624641				3		RES,3.32KΩ,1/8W,1%	CORNING	RN55D3321F	R35-R37
	39	624879				3		RES,4.75KΩ,1/8W,1%	CORNING	RN55D4751F	R40,R41,R43
	40	625825				1		RES,115KΩ,1/8W,1%	CORNING	RN55D1153F	R44
	41	604175				1		RES,47Ω,1/2W,10%	AB	RC20GF470K	R48
	42	624089				1		RES,68.1Ω,1/8W,1%	CORNING	RN55D68R1F	R49

Figure 6-10. Parts List, Sheet 3 PLD5725D

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	43	624046				1		RES,22.1Ω,1/8W,1%	CORNING	RN55D22R1F	R50
	44	625377				3		RES,15KΩ,1/8W,1%	CORNING	RN55D1502F	R51,R33,R39
	45	625095				1		RES,6.65KΩ,1/8W,1%	CORNING	RN55D6651F	R53
	46	625209				1		RES,8.25KΩ,1/8W,1%	CORNING	RN55D8251F	R55
	47	624613				2		RES,3.01K ,1/8W,1%	CORNING	RN55D3011F	R57,R58
	48	722201				6		SWITCH,DIP,8 POSITIONS	AMP	435166-5	S1-S6
	49										
	50										
	51	744550				6		TEST POINT,MALE PIN	BEAD CHAIN	R62-3ET	TP1-TP6
	52										
	53	766450				1		TRANSFORMER	SC493	T2144	T1
	54										
	55	061190T				4		IC,DUAL 4 STATIC SHIFT REG	RCA	CD4015BEX	U1-U3,U18
	56	059240T				8		IC,OCTAL BUF, 3 STATE	TI	SN74LS240	U4,U6,U8,U10,U12,U15,U37,U42

Figure 6-10. Parts List, Sheet 4

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	57	062710	8		IC,RES NETWORK,10K OHM, 9 RESISTORS	DALE	MSP10A01-103G	U5,U7,U9,U11,U13,U14,U23,U32
	58	062929	2		IC,RES NETWORK,CUSTOM, 15 RESISTORS	EPITEK	SC490	U16,U17 (USE WITH ITEM 82)
	59	059008T	1		IC,QUAD 2 IN POS GATE	TI	SN74LS08	U19
	60	059138T	3		IC,3-8 LINE DECODE DEMUX	TI	SN74LS138	U20-U22
	61	061780T	1		IC,MICROPROCESSOR	INTEL	B8085A-2	U24 (USE WITH ITEM 81)
	62	061828T	4		IC,QUAD OP AMP	RAYTHEON	RC4156DB2	U25,U26,U33,U39
	63	061259T	2		IC,12 STAGE CNTR	RCA	CD4040BCN	U27,U34
	64	059001T	1		IC,QUAD 2 IN NAND GATE	TI	SN74LS00	U28
	65	061778T	2		IC,RAM 1024x4	NEC	UPD2114LC-3	U29,U30
	66	059373T	1		IC,OCTAL TRAN LT 3 STATE	TI	SN74LS373	U31
	67	059032T	1		IC,2 IN OR GATE	TI	SN74LS32	U35
	68	059014T	1		IC,HEX HYS RCVR	TI	SN74LS14	U36
	69	060103T	2		IC,DUAL COMPARATOR	NATIONAL	LM393NAT	U48,U50
	70	059393T	1		IC,4 BIT DECODE BINARY CNTR	TI	SN74LS393	U38

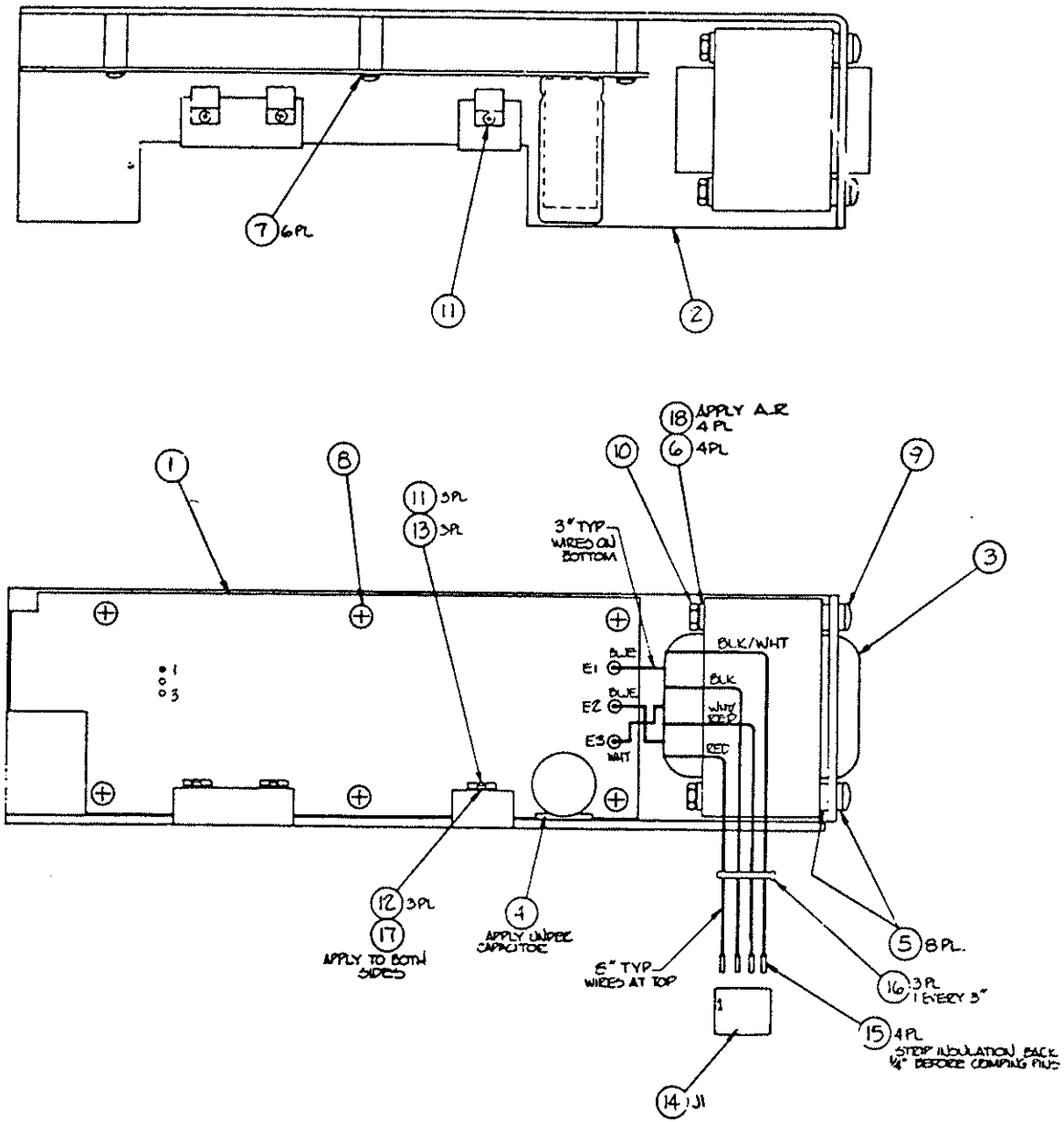
Figure 6-10. Parts List, Sheet 5

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	71	061256T				1		IC,MULTIPLEXER	RCA	CD4053BE	U40
	72	060140				1		IC,OP AMP	NATIONAL	LM741CN	U41
	73	059244T				1		IC,OCTAL BUFFER	TI	SN74LS244	U43
	74	SC584				1		IC,16K EPROM	NEC		U44 (USE WITH ITEM 80)
	75	061795				2		IC,FREQ SYNTH	HOLT	(SC140)	U46,U47 (USE WITH ITEM 81)
	76	060438				1		IC,PHOTO COUPLED ISOLATOR	GE	(SC005) H11A	U49
	77	059074T				1		IC,FLIP-FLOP	TI	SN74LS74	U51
	78	061291				1		IC,HEX INV	NATIONAL	MM74C901N	U52
	79										
	80	248468				2		SOCKET,IC,24 PIN	AUGAT	224-AG29D	INSTALL IN POSITIONS U44,U45
	81	248472				3		SOCKET,IC,40 PIN	AUGAT	240-AG29D	INSTALL IN POSITIONS U24, U46,U47
	82	248462				2		SOCKET,IC,16 PIN	AUGAT	216-AG29D	INSTALL IN POSITIONS U16,U17
	83	366960				4"		WIRE,18 GA.,SOLID BUSS	ALPHA	296	W1,W9
	84	366511				7		JUMPER,INSULATED	SQUIRES	J0.312x.250T24	W2-W8

Figure 6-10. Parts List, Sheet 6 PLD5725D

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	85				NOTE: DO NOT INSTALL U45. MAINTAIN			
					POSITION FOR FUTURE USE.			

Figure 6-10. Parts List, Sheet 7 PLD5725D



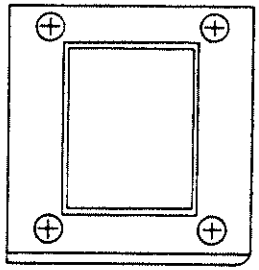


Figure 6-11. AC Power Supply Assembly

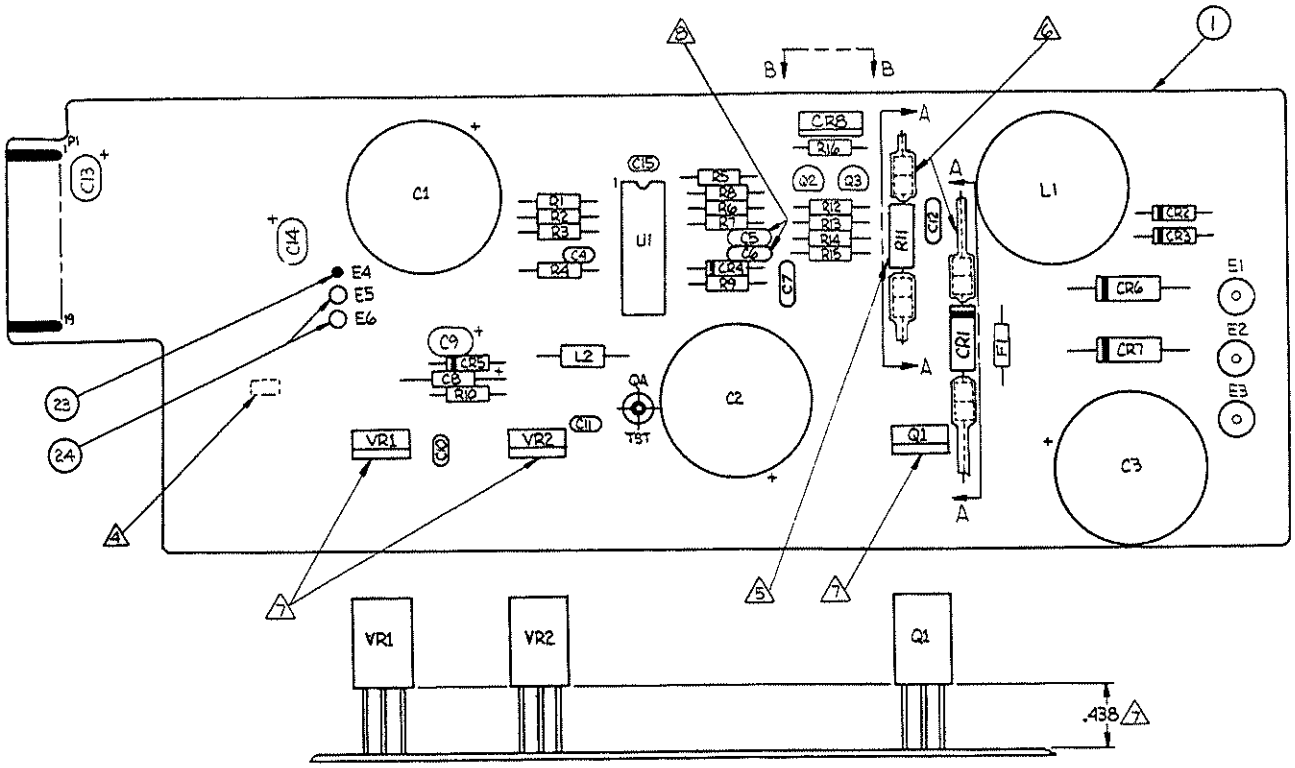
D5810A

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	D5805	1		ASSY. P/S BD.	FEC	NO2176	
	2	D5675	1		HEATSINK	FEC		
	3	SC497	1		TRANSFORMER	TNI	T2060 8240	
	4	801141	1.75		FOAM TAPE DOUBLE SIDED	3M	4016	
	5	404856	8		SHOULDER WASHER #10	SMITH	2156	
	6	404915	4		INT TOOTH WASHER #10	T&C	MS35333-73	
	7	404895	6		SPLITLOCK WASHER #6	T&C	MS35338-136	
	8	404395	6		SCREW PH #6-32x9/16	T&C	MS51957-123	
	9	404701	4		SCREW PH #10-32x2.0	T&C	MS51958-71	
	10	403055	4		NUT, HEX #10-32x5/16	T&C	NAS671C10	
	11	403985	3		SHOULDER WASHER	THERMALLOY	7721-7	
	12	080857	3		INSULATOR	THERMALLOY	43-77-9	
	13	404212	3		SCREW PH 4-40x3/8	T&C	MS51957-15	
	14	246186	1		CONNECTOR, 4 POS PLUG	MOLEX	03-09-1042	

Figure 6-11. Parts List, Sheet 1 PL-D5810A

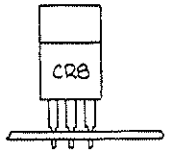
CAGE CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15	744431	4		PIN, FEMALE CRIMP	MOLEX	02-09-1103	
	16	184750	3		TIE WRAP	PANDUIT	SST-1M	
	17	801665	AR		HEAT SINK COMPOUND	PYTRONICS	340	
	18	801190	AR		TORQUE SEAL	ORGANIC PRODUCTS	F900, GREY"	

Figure 6-11. Parts List, Sheet 2



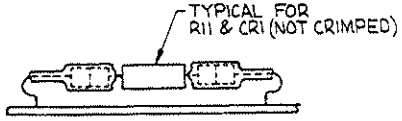
NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   P.C. BOARD-№2176
   FABRICATION DWG-D5804
   SCHEMATIC DWG-D5806
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING BLACK EPOXY INK, APPROXIMATELY WHERE SHOWN.
5. R11 SHOULD BE RAISED OFF BOARD 1/4".
6. INSTALL 2 FERRITE BEADS (ITEM 21) ON EACH SIDE OF R11 AND CR1, AND INSTALL HEATSHRINK TUBING (ITEM 22) OVER BEADS. SEE VIEW A-A.
7. VR1, VR2, AND Q1 ARE TO BE FIXTURED WITH A DUMMY PANEL.
8. DO NOT CRIMP C5 & C6.



VIEW B-B
SCALE: NONE

NOTE:
MOUNT ON BOARD SO THAT FLAT PART OF LEAD REST ON BOARD



VIEW A-A
SCALE: NONE

NOTE:
TUBING AND FERRITE BEADS CANNOT MOVE BETWEEN COMPONENT BODY AND BEND IN LEADS. TUBING TO BE INSTALLED TO THE END OF THE BEND.

Figure 6-12. Power Supply PWB Assembly D5805F

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	NO2176D	1		P.W.B.	FEC		
	2	D5804	REF		FABRICATION DWG	FEC		
	3	D5806	REF		SCHEMATIC DWG	FEC		
	4							
	5	023772	1		CAPACITOR, 6,800uf,16V	NICHICON	80D682P016HD2	C1
	6	023587	1		CAPACITOR, 2,200uf,35V	NICHICON	80D222P035JA2	C2
	7	023771	1		CAPACITOR, 6,800uf,35V	NICHICON	80D682P035JE2	C3
	8	029899	1		CAPACITOR, .01uf, 50V	KEMET	C321C103K5R5CA	C4
	9							
	10	029940	4		CAPACITOR, 1uf, 50V	KEMET	C330C105M5U1CA	DO NOT CRIMP C5 & C6 C5-C7, C12
	11	028506	1		CAPACITOR, 10uf, 20V	KEMET	T110B106K020AS	C8
	12	028624	3		CAPACITOR, 22uf, 35V	KEMET	T368C226K035AS	C9,C13,C14
	13	029936	3		CAPACITOR, .1uf, 50V	KEMET	C320C104K5R5CA	C10,C11,C15
	14							

Figure 6-12. Parts List, Sheet 1

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15							
	16	040890	1		DIODE, 5 AMP	GI	SB550	CR1
	17	040572	2		DIODE, RECT 400V	FAIRCHILD	1N4004	CR2,CR3
	18	040238	2		DIODE, SILICON	FAIRCHILD	1N914	CR4,CR5
	19	040230	2		DIODE,	MOT	MR821	CR6,CR7
	20	080895	1		XSTR N CHAN	MOT	2N6400	CR8
	21	440280	8		FERRITE BEAD	FERROXCUBE CORP	K500100/3B	USE WITH ITEMS 16 & 43
	22	500565	1.19"		THERMO-FIT TUBING, BLK	RAYCHEM	TAT 3/16	USE WITH ITEM 21
	23	744550	1		PIN, MALE	BEADCHAIN	R62-3ET	E4
	24	744555	2		PIN, FEMALE	BEADCHAIN	M93-102ET	E5,E6
	25	368362	1		FUSE, 5 AMP PECO	LITTELFUSE	275.005	F1
	26							
	27	760052	1		CHOKE, 220uH	RENCO	RL-1256-3-220	L1
	28	760025	1		CHOKE, 2.20MH	J.W.MILLER	70F223AL	L2

Figure 6-12. Parts List, Sheet 2

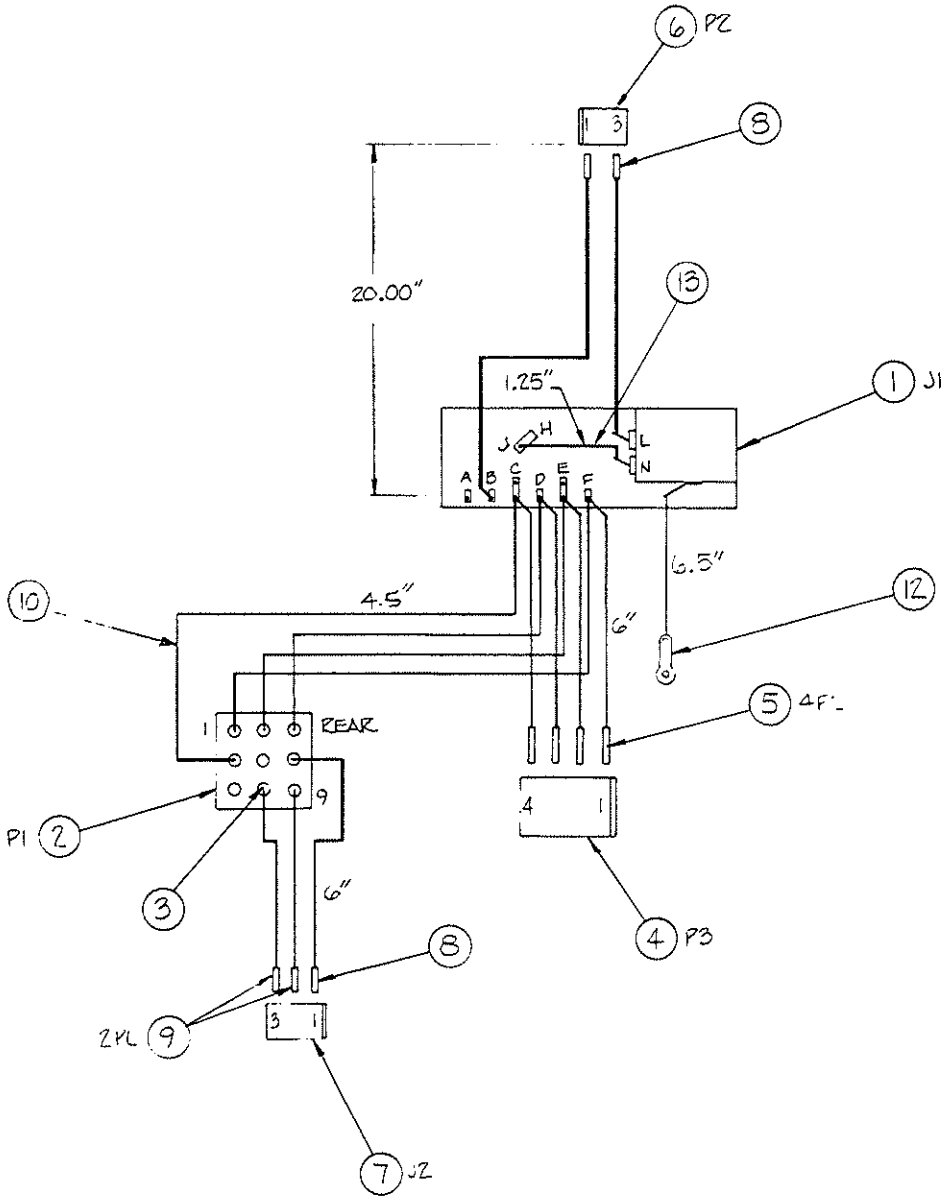
CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	29										
	30	080803			1			TRANSISTOR	RCA	RCA9230A	Q1
	31	080525			2			XSTR PNP SI	FAIRCHILD	PN2907	Q2, Q3
	32										
	33	624822			1			RESISTOR,4.42K,1/8W,1%	CORNING	RN55D4421F	R1
	34	624709			1			RESISTOR,3.74 K,1/8W,1%	CORNING	RN55D3741F	R2
	35	601882			1			RESISTOR,220K,1/4W,5%	A/B	RC07GF224J	R3
	36	601416			2			RESISTOR,4.7K,1/4W,5%	A/B	RC07GF473J	R4, R13
	37	624940			1			RESISTOR,267Ω,1/8W,1%	CORNING	RN55D2670F	R5
	38	624879			1			RESISTOR,4.75K,1/8W,1%	CORNING	RN55D4751F	R6
	39	625035			1			RESISTOR,5.62K,1/8W,1%	CORNING	RN55D5621F	R7
	40	624946			1			RESISTOR 432Ω,1/8W,1%	CORNING	RN55D4320F	R8
	41	601256			2			RESISTOR, 1K,1/4W,5%	A/B	RC07GF102J	R9, R16
	42	601544			2			RESISTOR, 10K,1/4W,5%	A/A	RC07GF103J	R10, R15

Figure 6-12. Parts List, Sheet 3

PLD5805F

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	43	622003			1			RESISTOR, .025Ω, 3W	AMF	LO-3-025-3-BP	R11
	44	624538			1			RESISTOR, 2.21K, 1/8 W, 1%	CORNING	RN55D2211F	R12
	45	625311			1			RESISTOR, 11.5K 1/8 W, 1%	CORNING	RN55D1151F	R14
	46	061901			1			PWM, VOLTAGE REGULATOR	TI	TL594IN	U1
	47										
	48										
	49	060018			1			VOLTAGE REGULATOR	FAIRCHILD	uA79M12UC	VR1
	50	060098			1			VOLTAGE REGULATOR	FAIRCHILD	uA7812UC	VR2
	51										
	52										
	53										
	54										
	55										
	56										

Figure 6-12. Parts List, Sheet 4



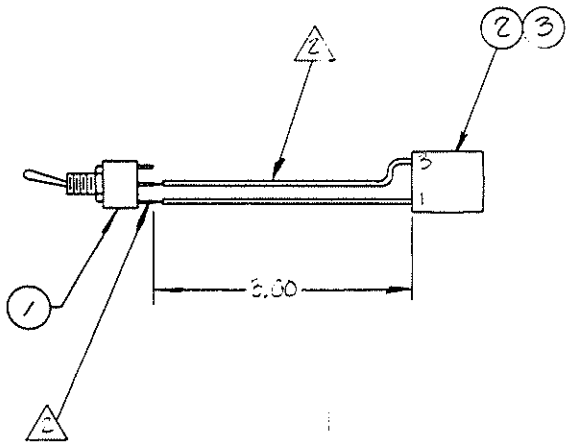
1. STRIP AND TIN ALL LEADS ¼" PRIOR TO ASSY
2. APPLY ½" HEAT SHRINK TUBING (ITEM 11) TO LINE TERMINALS
3. LABEL PER SC437

Figure 6-13. Power Filter Assembly C4083A

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	365515				1		POWER LINE FILTER	CORCOM	6J4	
	2	241197				1		CONNECTOR HIGH VOLT. 9 POS	AMP	350782-1	
	3	744875				7		PIN, FEMALE, CRIMP	AMP	350550-1	
	4	246185				1		CONNECTOR, 4 POS	MOLEX	03-09-2042	
	5	744432				4		PIN, MALE, CRIMP	MOLEX	02-09-2042	
	6	246250				1		CONNECTOR, 3 POS	MOLEX	1625-3P1	
	7	246275				1		CONNECTOR. 3 POS	MOLEX	1625-3R1	
	8	744410				3		PIN, CRIMP, FEMALE	MOLEX	02-06-1101	
	9	744400				2		PIN, MALE, CRIMP	MOLEX	02-06-2101	
	10	366685				AR		WIRE, 18 GA STR WHITE	ALPHA	1857-WHT-18GA	
	11	500590				4"		HEAT SHRINK TUBING 1/4	MARKEL	1/4 WHITE	
	12	242750				1		GROUND LUG #10	SMITH	1414-10	
	13	366960				—		1.25" 18GA BUSS WIRE	ALPHA	296	

Figure 6-13. Parts List

PLC4083A



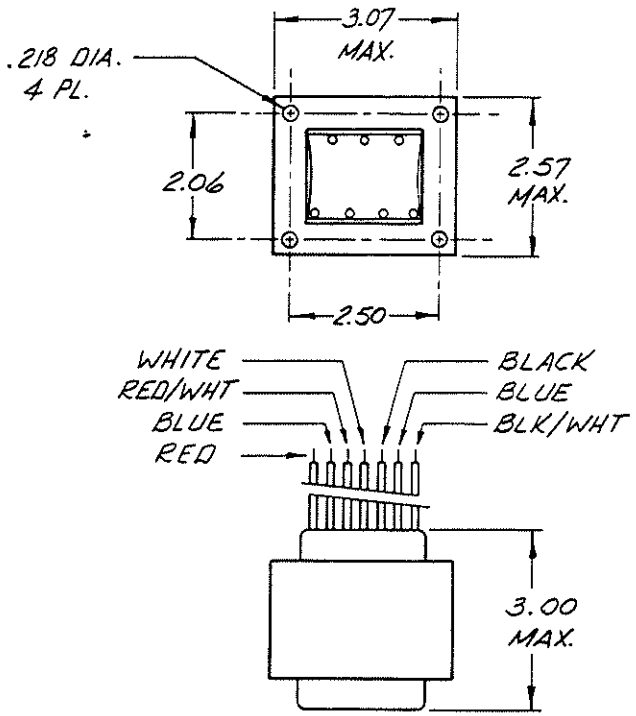
NOTES

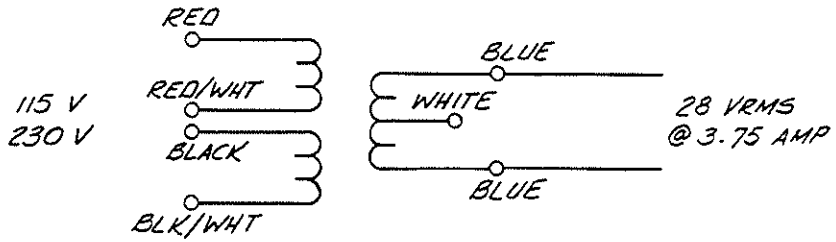
1. LABEL PER SC437
2. ADD SHRINK TUBING TO ITEM 1 SPL

QUAN	ITEM	PART NO.	DESCRIPTION	MFR	MFR P/N
1"	6	500588	THERMOFIT TUBING Y8		Y8 WHITE
A/R	5	184750	CABLE TIE	PANDUIT	SST-1M
6"	4	366685	WIRE, 18 GA. STRANDED, WHT	ALPHA	1857
2	3	744400	PIN, MALE, CRIMP	MOLEX	02-06-2101
1	2	346275	CONNECTOR, 3 POS.	MOLEX	03-06-1032
1	1	727410	SWITCH	JBT	MPC-123

LIST OF MATERIAL

Figure 6-14. Power Switch Assembly C4084A





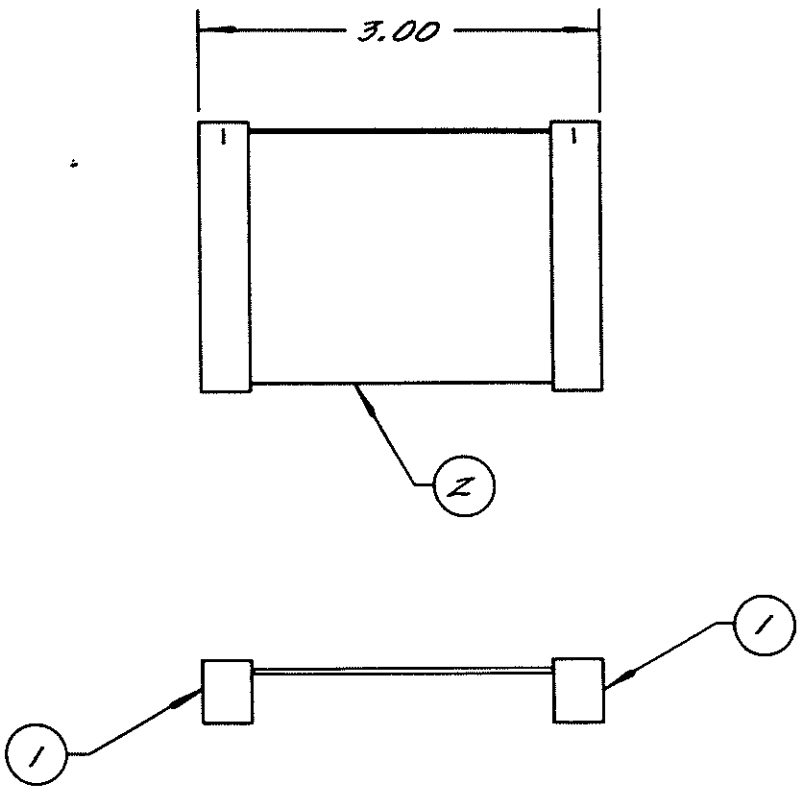
HIGHPOT 1000 VDC

WDG TO WDG.
WDG'S TO CORE

NOTES:

1. ALL LEADS ARE 22 GA. UL LEAD-IN-WIRE 12" MIN. FINISHED LENGTH FROM BOBBIN. TINNED 1/2".
2. FEC 765965

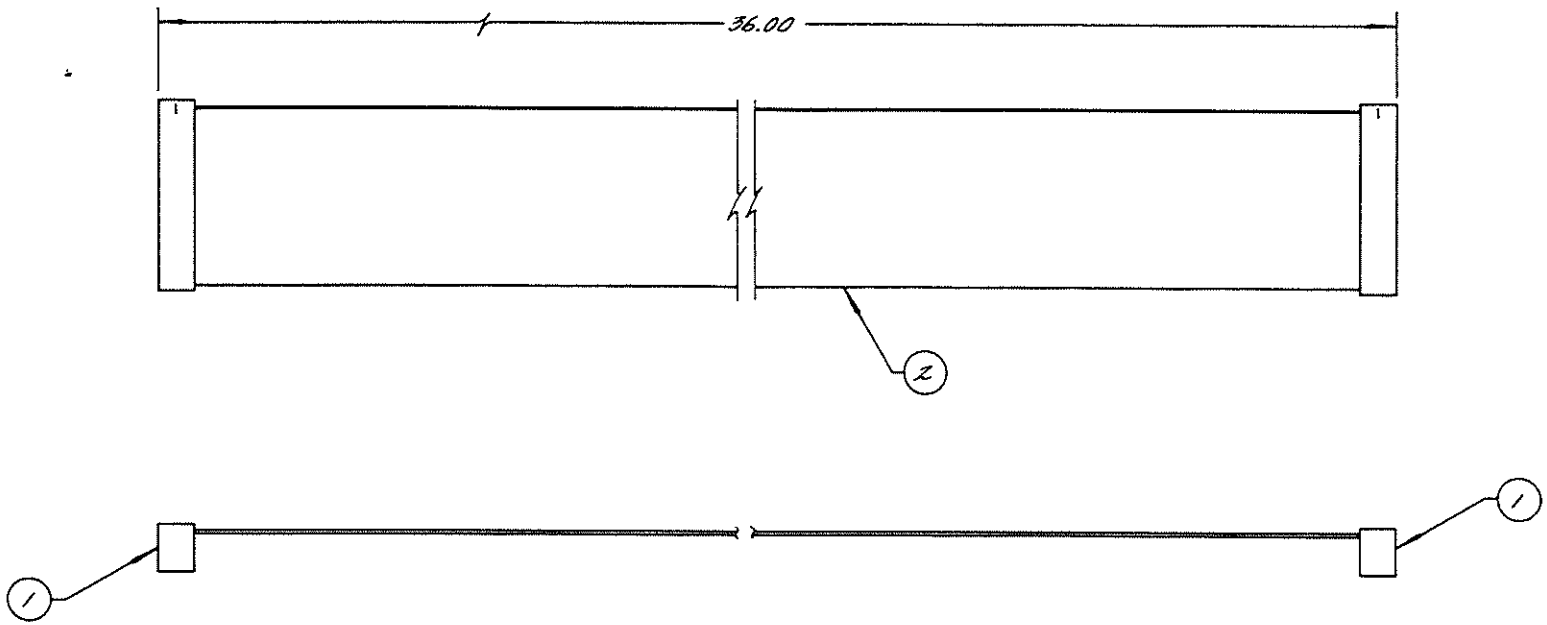
Figure 6-15. Transformer SC497



QUAN	ITEM	PART NO.	DESCRIPTION	MFR	MFR P/N
3"	2	366988	RIBBON CABLE, 34 COND.	ANSLEY	171-34
2	1	241115	CONNECTOR, 34 PIN	AMP	499579-9

LIST OF MATERIAL

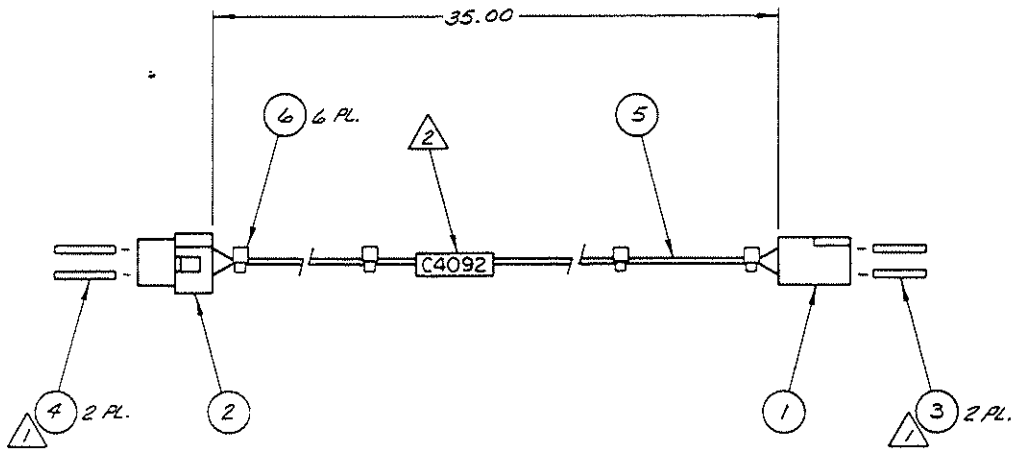
Figure 6-16. Interconnect Cable C4079



QUAN	ITEM	PART NO.	DESCRIPTION	MFR	MFR P/N
36"	2	366988	RIBBON CABLE, 34 COND.	AUSLEY	171-34
2	1	241115	CONNECTOR, 34 PIN	AMP	499579-9

LIST OF MATERIAL

Figure 6-17. Test Cable C4076



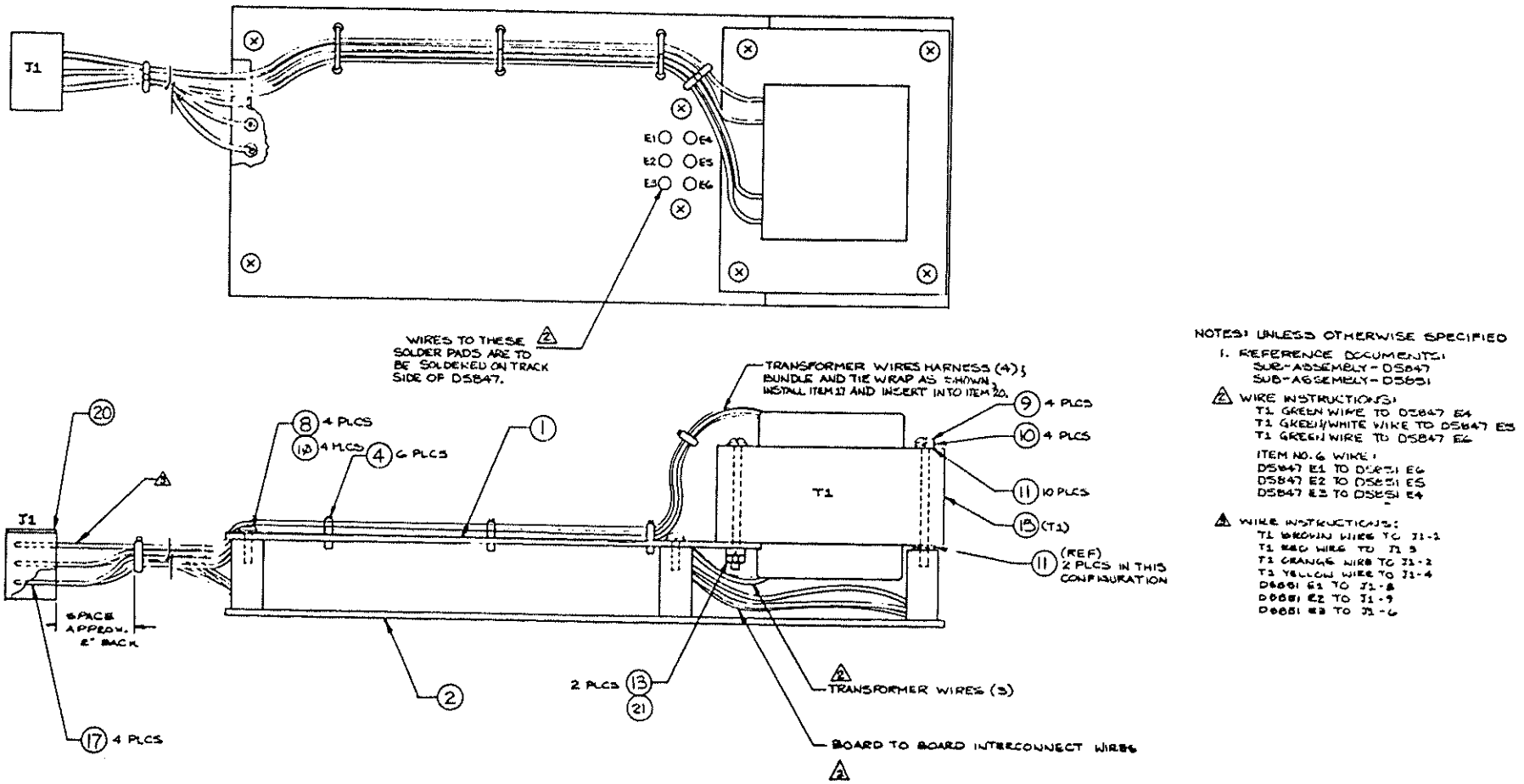
NOTES:

1. INSTALL ITEMS 3 AND 4 IN POSITIONS 1 AND 3.
2. LABEL ASSY PER SC437.

QUAN	ITEM	PART NO.	DESCRIPTION	MFR	MFR P/N
6	6	184750	TIE WRAP	PANDUIT	SST-1M
72"	5	366685	WIRE, 18 GA. WHT. STRANDED	ALPHA	1857-WHT-18GA.
2	4	744410	PIN, FEMALE, CRIMP	MOLEX	02-06-1101
2	3	744400	PIN, MALE, CRIMP	↓	02-06-2101
1	2	246250	CONNECTOR, 3 POS, FEMALE	↓	1625-3P1
1	1	246275	CONNECTOR, 3 POS, MALE	MOLEX	1625-3R1

LIST OF MATERIAL

Figure 6-18. Power Switch Test Cable C4092A



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   SUB-ASSEMBLY - D5847
   SUB-ASSEMBLY - D5851

2 WIRE INSTRUCTIONS:
T1 GREEN WIRE TO D5847 E4
T1 GREEN/WHITE WIRE TO D5847 E5
T1 GREEN WIRE TO D5847 E6

ITEM NO. 6 WIRE:
D5847 E1 TO D5851 E6
D5847 E2 TO D5851 E5
D5847 E3 TO D5851 E4

3 WIRE INSTRUCTIONS:
T1 BROWN WIRE TO J1-1
T1 RED WIRE TO J1-3
T1 ORANGE WIRE TO J1-2
T1 YELLOW WIRE TO J1-4
D5851 E1 TO J1-8
D5851 E2 TO J1-9
D5851 E3 TO J1-6

Figure 6-19. Optional High Level Assembly D5853A

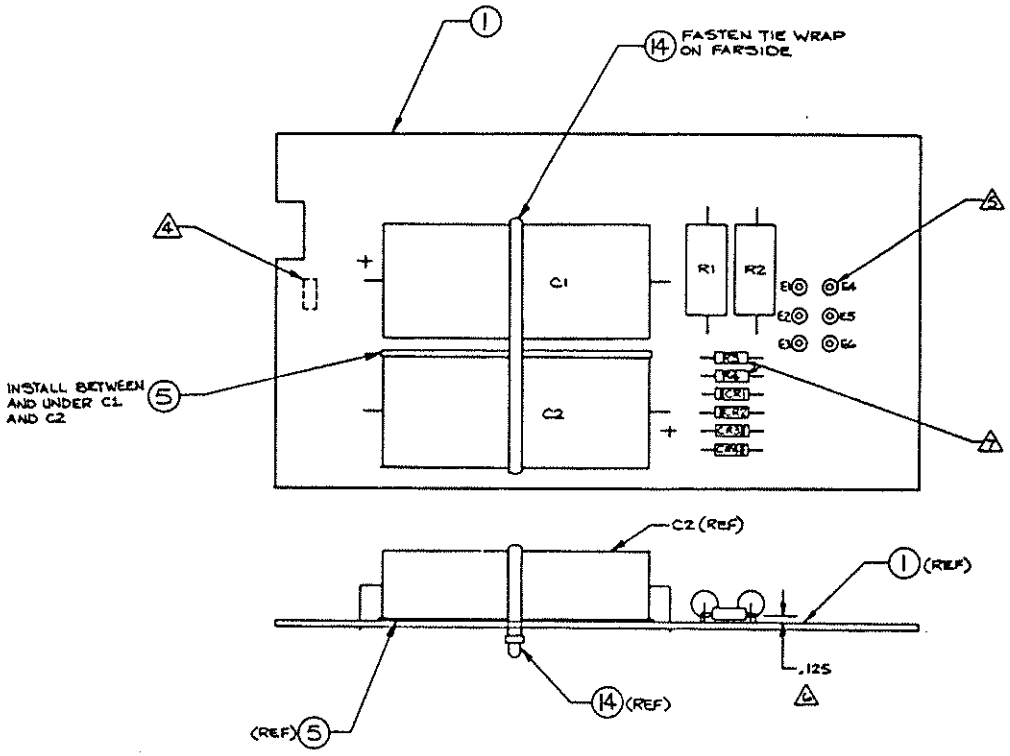
CAGE CODE	ITEM NO.	FEC PART NO.	QUANTITY	CRS CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	D5847	1		SUB-ASSY LOOP PWR SUPPLY	FEC		
	2	D5851	1		SUB-ASSY QUAD HIGH LEVEL KEYER	FEC		
	3							
	4	184750	5		SMALL TIE WRAP	PANDUIT	SST-1M	
	5							
	6							
	7							
	8	404369	4		SCREW, PHB-32x5/16	T&C	MS51957-27	TO MOUNT ITEM 1 TO 2
	9	404433	4		SCREW, PHB-32x1 3/8	T&C	MS51957-125	TO INSTALL T1
	10	404895	8		WASHER, SPLIT-LOCK,#6	T&C	MS35338-136	USED WITH ITEM 9
	11	404891	10		WASHER, FLAT, #6	T&C Q	AN960-C6L	USE WITH ITEM 8 & 9 AND USE BETWEEN ITEM 2 & 15
	12							
	13	403035	2		NUT, HEX, 6-32	T&C	NAS671-C6	USE WITH ITEM 9
	14							

Figure 6-19. Parts List, Sheet 1

CAGE CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15	766625	1		TRANSFORMER, TM3144	SC024 TRANSM IN	TM-3144	T1
	16							
	17	744876	4		PIN, MALE, CRIMP	AMP	350690-1	USE WITH ITEM 20
	18							
	19							
	20	241198	1		AMP CONNECTOR, PLUG	AMP	350720-1	UES WITH ITEM 17
	21	801190	A/R		TORQUE SEAL	ORGANIC PRODUCTS	F900, GREY	
	22							
	23							
	24							
	25							
	26							
	27							
	28							

Figure 6-19. Parts List, Sheet 2

PL-D5853A



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   PC BOARD - NO2205
   FABRICATION DWG - D5846
   SCHEMATIC DWG - D5848
   FULL ASSEMBLY DWG - D5833
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING WHITE EPOXY INK, APPROXIMATELY WHERE SHOWN.
5. THIS BOARD ASSEMBLES TO D5851 (NO2207) USE ASSEMBLY DRAWING D5853.
6. SPACE 2W RESISTORS APPROXIMATELY .125 OFF BOARD.
7. SPACE R3 AND R4 APPROXIMATELY .500 OFF BOARD.

Figure 6-20. Optional Loop Power Supply Sub-Assembly D5847A

CAT'Y CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	N02205A	1		PRINTED WIRING BOARD	FEC		
	2	D5846	REF		FABRICATION DWG.	FEC		REFERENCE DOCUMENT
	3	D5848	REF		SCHEMATIC DWG.	FEC		REFERENCE DOCUMENT
	4							
	5	801915	A/R		FOAM TAPE	3M	4032	USE BETWEEN AND UNDER C1 AND C2
	6	023464	2		CAPACITOR, 580uf, 75VDC	SANGAMO	066HL581T075B	C1,C2
	7							
	8	040594	4		DIODE, RECT, 500V	MOTOROLA	1N4005	CR1-CR4
	9							
	10	601065	2		RESISTOR,22 OHMS,1/4W,5	AB	RC07GF220J	(CARBON FILM RESISTOR ONLY) R3,R4
	11							
	12	608585	2		RESISTOR, 6.8K, 2W, 10%	AB	RC42GF682K	R1,R2
	13							
	14	184755	1		TIE WRAP	PANDUIT	SST-2M	(FOR USE WITH ITEM 1 & 6) TIE ON FARSIDE

Figure 6-20. Parts List

PL-D5847A

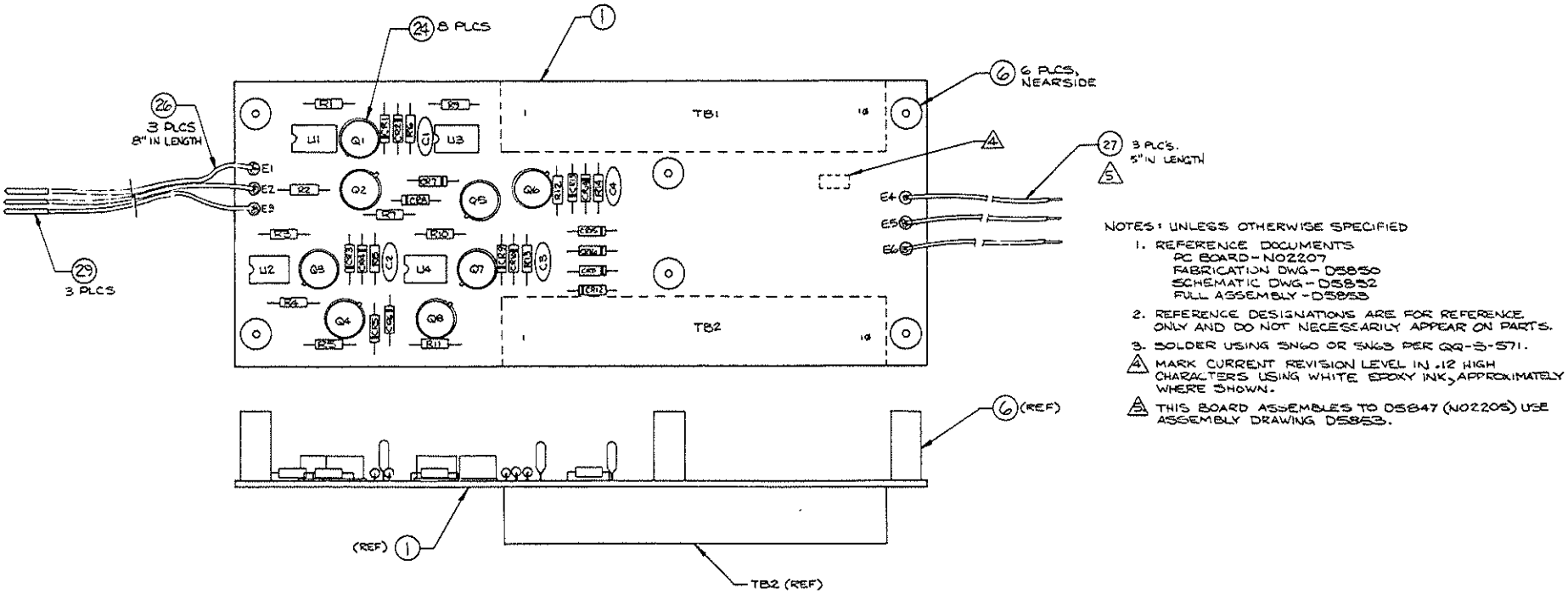


Figure 6-21. Optional Quad High Level Keyer Subassembly D5851C

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	NO2207B	1		PRINTED WIRING BOARD	FEC		
	2	D5850	REF		FABRICATION DWG.	FEC		REFERENCE DOCUMENT
	3	D5852	REF		SCHEMATIC DWG.	FEC		REFERENCE DOCUMENT
	4	D5853	REF		FULL ASSEMBLY	FEC		REFERENCE DOCUMENT
	5							
	6	683210	6		STANDOFF, .625,6-23TAP	CAMB.	1246-14	(INSTALL ON ITEM 1 COMPONENT SIDE)
	7	184750	2		TIE WRAP	PANDUIT	SST-1M	USE WITH ITEM 26
	8	100370	2		TERMINAL BLOCK 10POSITION	REED DEVICES	6PCV-10	TB1, TB2 (INSTALL ON ITEM 1 TRACK SIDE)
	9							
	10	021390	4		CAPACITOR, .003uf, 1KV, DISC	CENTRAL LAB	DD-302	C1-C4
	11							
	12	040238	8		DIODE, SWITCHING	GE	1N914	CR1-CR4,CR9,CR10,CR13,CR14
	13	040594	8		DIODE, RECT, 500V	MOTOROLA	1N4005	CR5-CR8,CR11,CR12,CR15,CR16
	14							

Figure 6-21. Parts List, Sheet 1

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15	601870	4		RESISTOR, 150KΩ, 1/4W, 5%	AB	RC07GF154J	R1,R3,R9,R10
	16	601172	2		RESISTOR, 270Ω, 1/4W, 5%	AB	RC07GF271J	R2,R4
	17	601544	4		RESISTOR, 10KΩ, 1/4W, 5%	AB	RC07GF103J	R5,R7,R11,R12
	18	601888	4		RESISTOR, 330KΩ, 1/4W, 5%	AB	RC07GF334J	R6,R8,R13,R14
	19							
	20	060448	4		IC, OPT. COUPLER	GE	4N35	U1-U4
	21							
	22	080889	4		TRANSISTOR, PNP, SI, TO-5	MOTOROLA	2N5416	Q1,Q3,Q5,Q7
	23	080566	4		TRANSISTOR, NPN, SI, TO-5	MOTOROLA	2N3439	Q2,Q4,Q6,Q8
	24	080836	8		TRANSISTOR, MTG PAD, INSULATOR	ROSS	A10020	(USE WITH Q1-Q8)
	25							
	26	366767	24"		WIRE, 22GA, WHT, STRANDED	ALPHA	M16878E/1A-8-F-8	CUT TO 3 8" PIECES AND STRIP BOTH ENDS .250, E1,E2,E3
	27	366767	15"		WIRE, 22GA, WHT, STRANDED	ALPHA	M16878E/1A-8-F-8	CUT TO 3 5" LENGTHS AND STRI BOTH ENDS .250, E4,E5,E6
	28							

Figure 6-21. Parts List, Sheet 2 D5851C

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	29					2		PIN, MALE, WIRE, CRIMP	AMP	350547-1	USE WITH ITEM 26
	30										
	31										
	32										
	33										

Figure 6-21. Parts List, Sheet 3

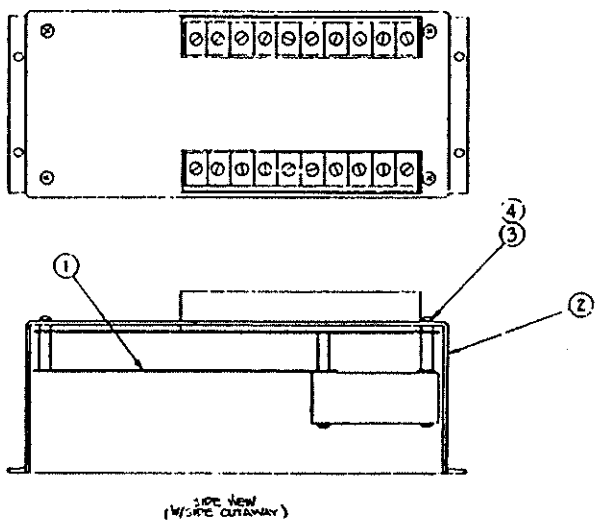


Figure 6-22. Optional High Level Interface Assembly D5865

CAP CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	D5853	1		ASSY. HIGH LEVEL BDS	FEC		
	2	C4072	1		ENCLOSURE	FEC		
	3	404381	4		SCREW 6-32x7/16	T&C	MS51957-29	
	4	404893	4		WASHER INT TOOTH #6	T&C	MS35333-71	

Figure 6-22. Parts List PLD5865

SECTION VII

SCHEMATIC DIAGRAMS

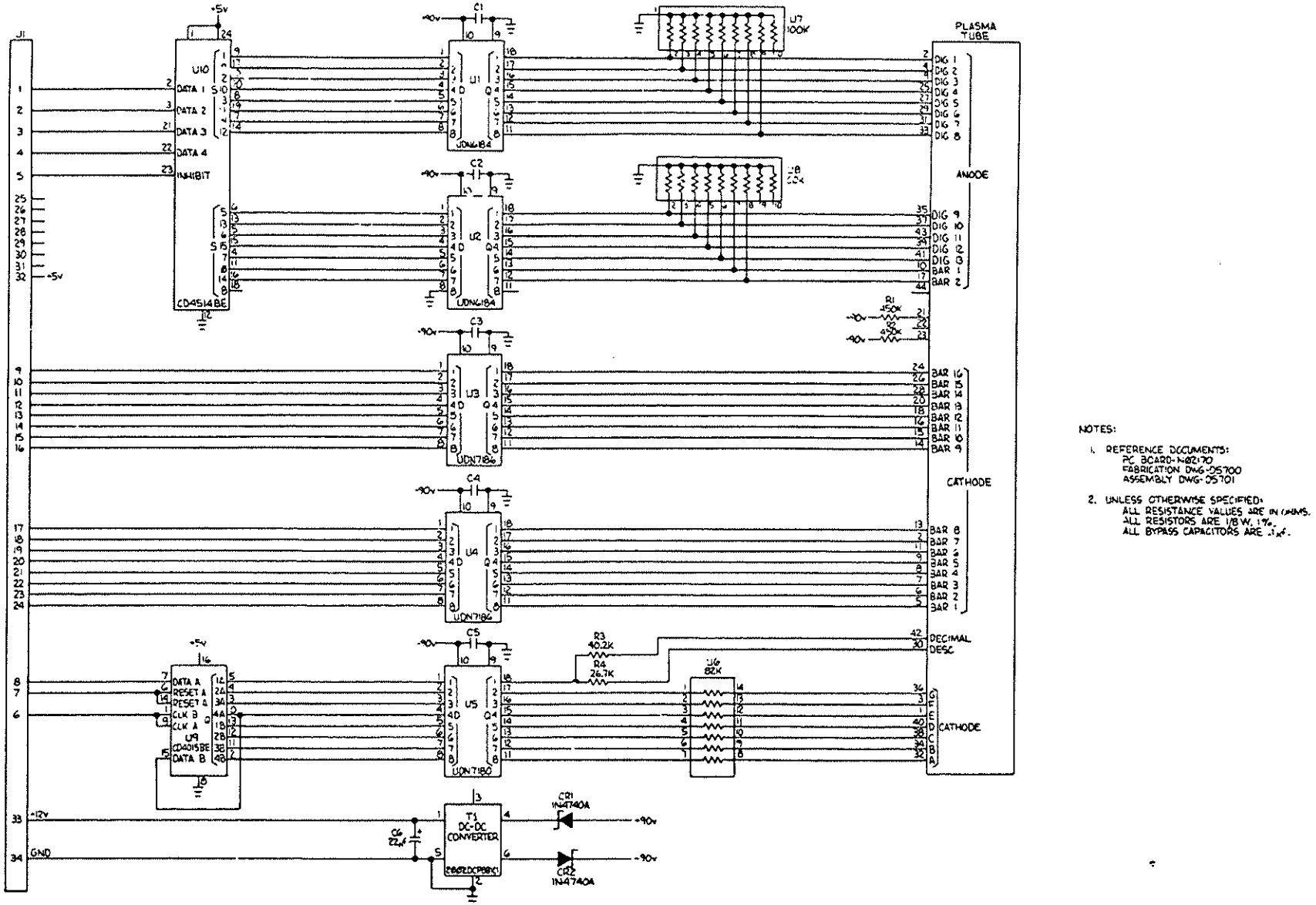
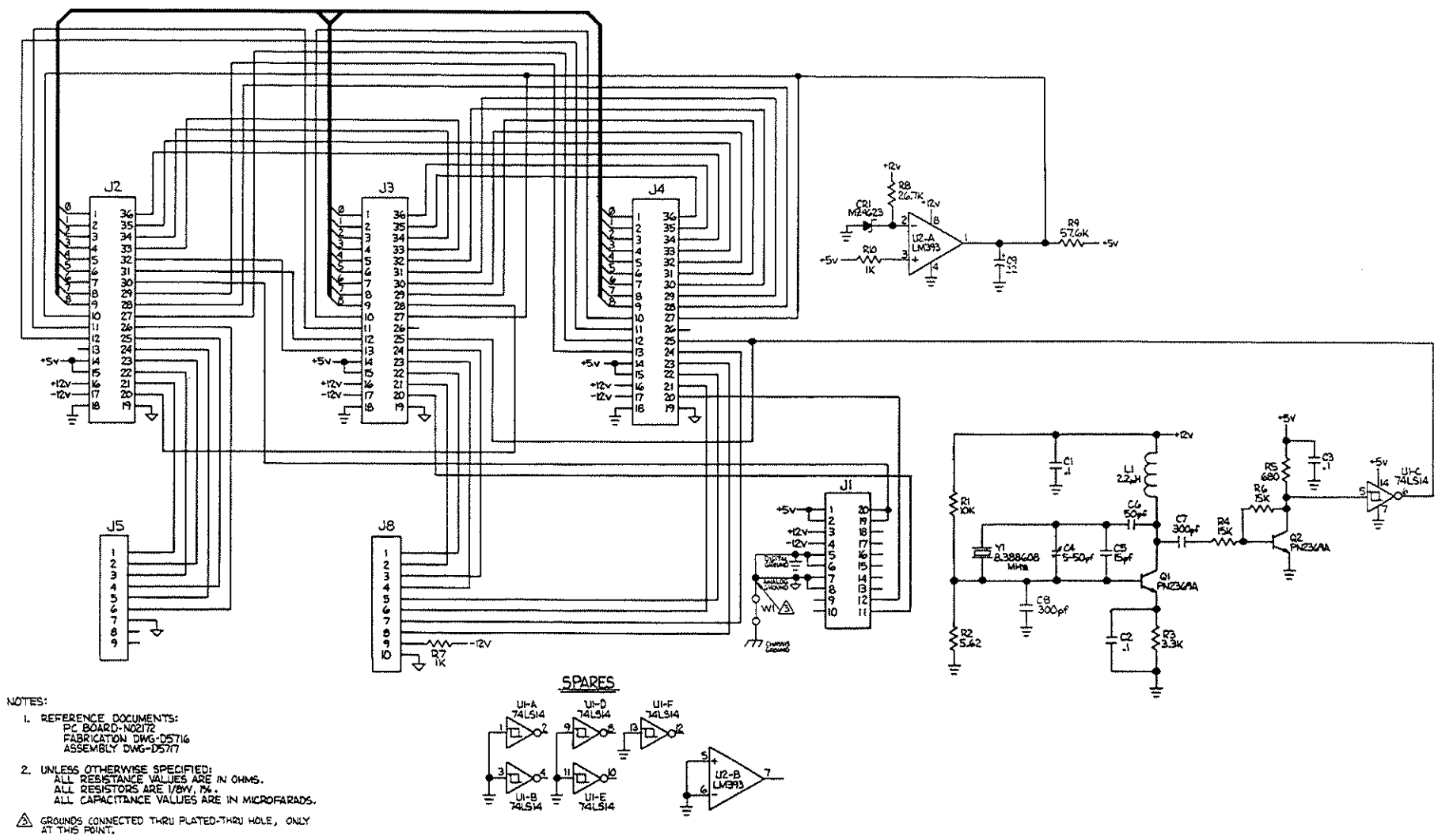


Figure 7-1. Front Panel Board Schematic D5702



NOTES:

1. REFERENCE DOCUMENTS:
   PC BOARD-N02172
   FABRICATION DWG-D5716
   ASSEMBLY DWG-D5717

2. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTANCE VALUES ARE IN OHMS.
   ALL RESISTORS ARE 1/8W, 5%.
   ALL CAPACITANCE VALUES ARE IN MICROFARADS.

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

Figure 7-2. Backplane Board Schematic D5718A

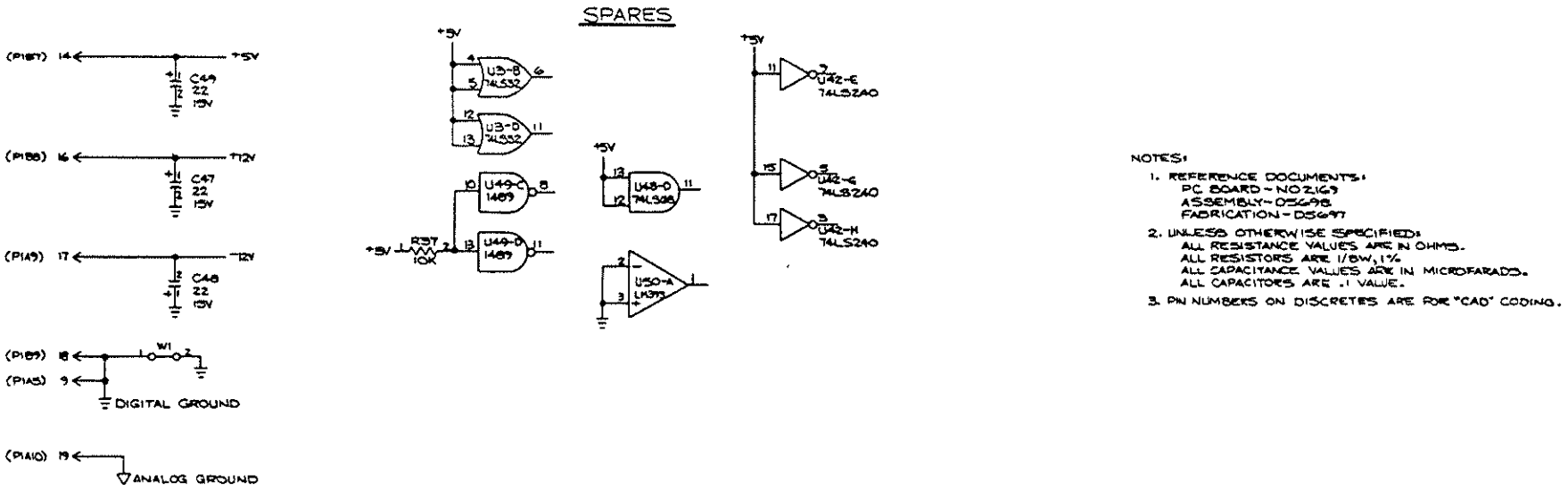


Figure 7-3. Control Board Schematic, Sheet 1 D5699A

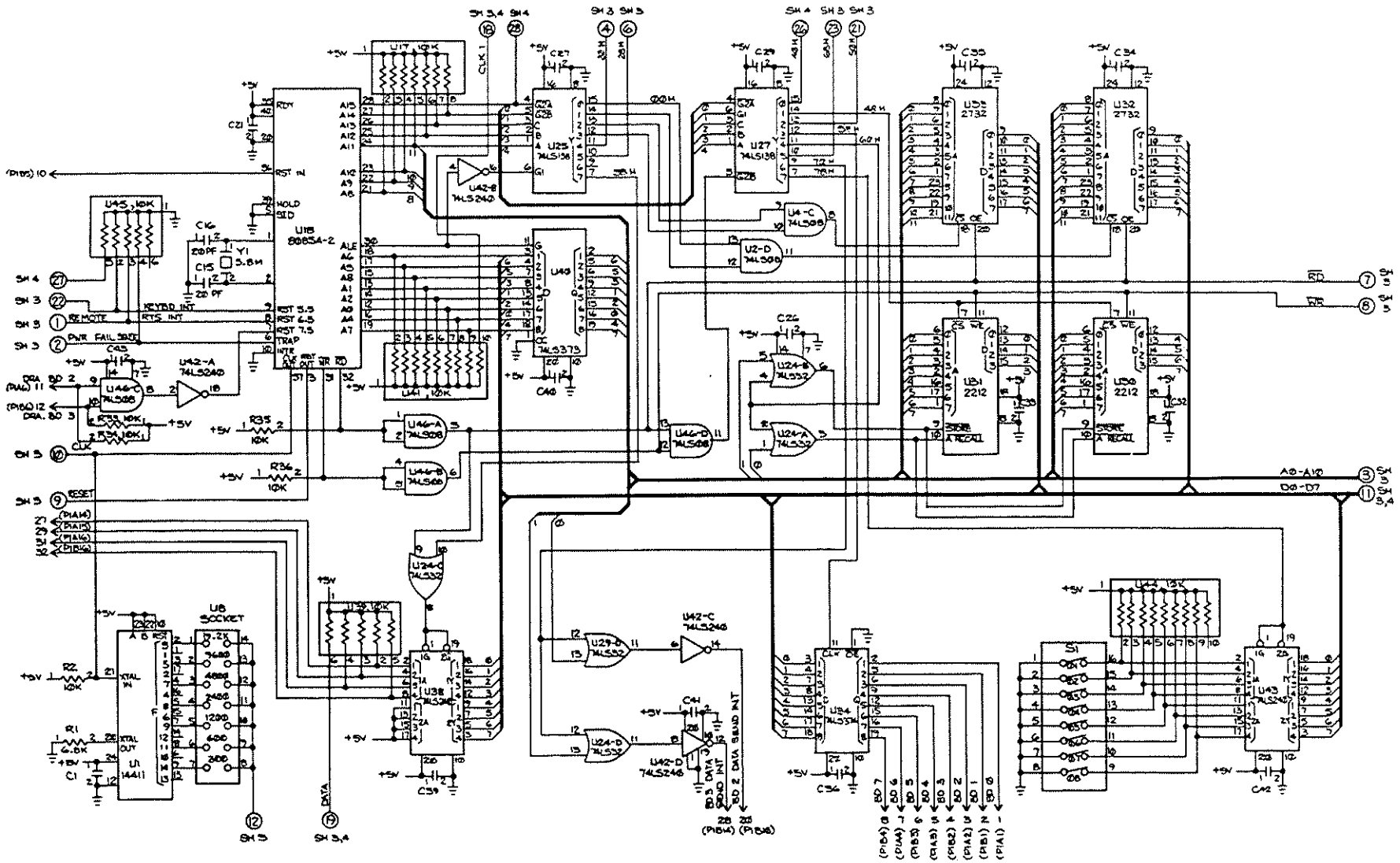


Figure 7-3. Control Board Schematic, Sheet 2 D5699A

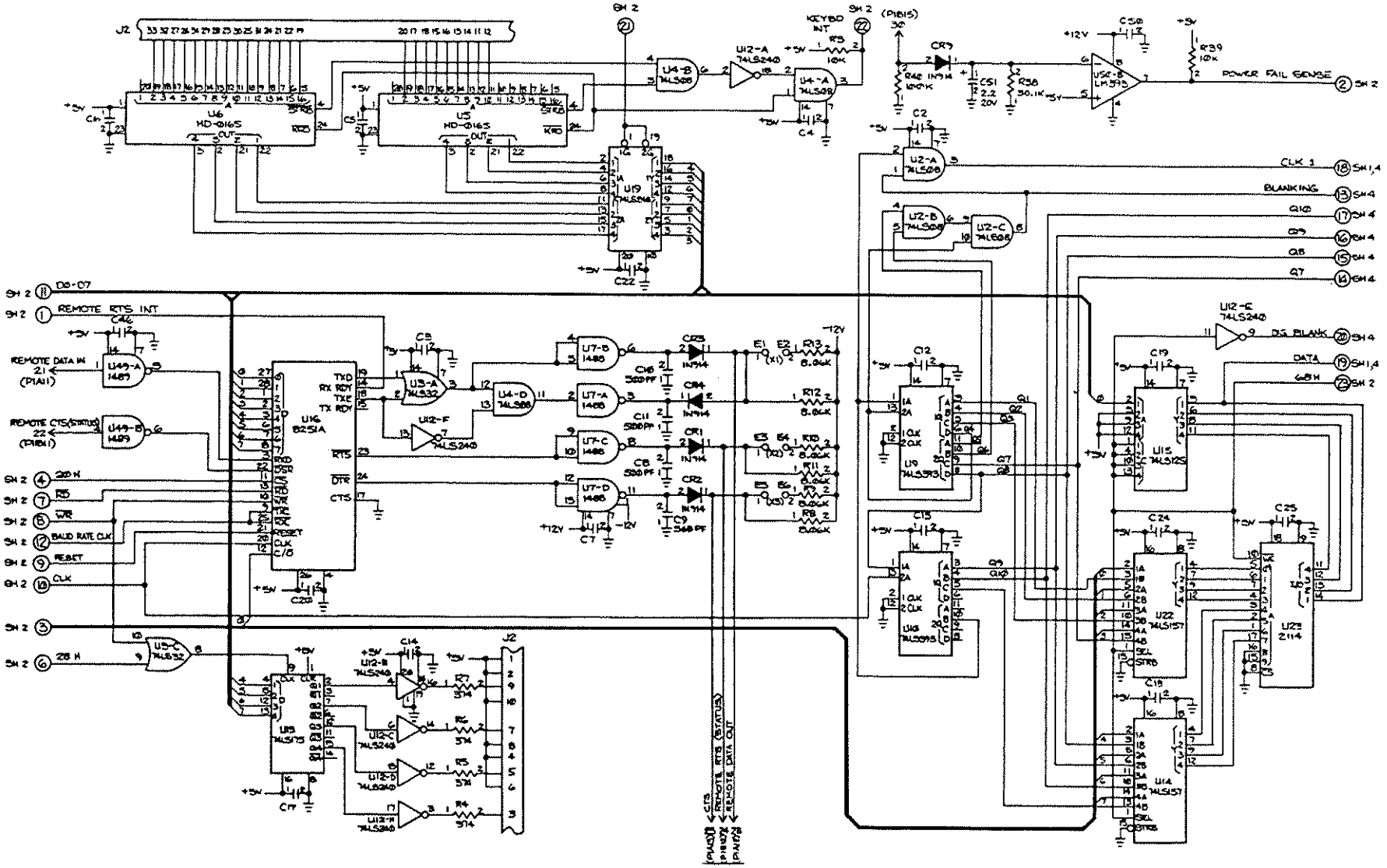


Figure 7-3. Control Board Schematic, Sheet 3 D5699A

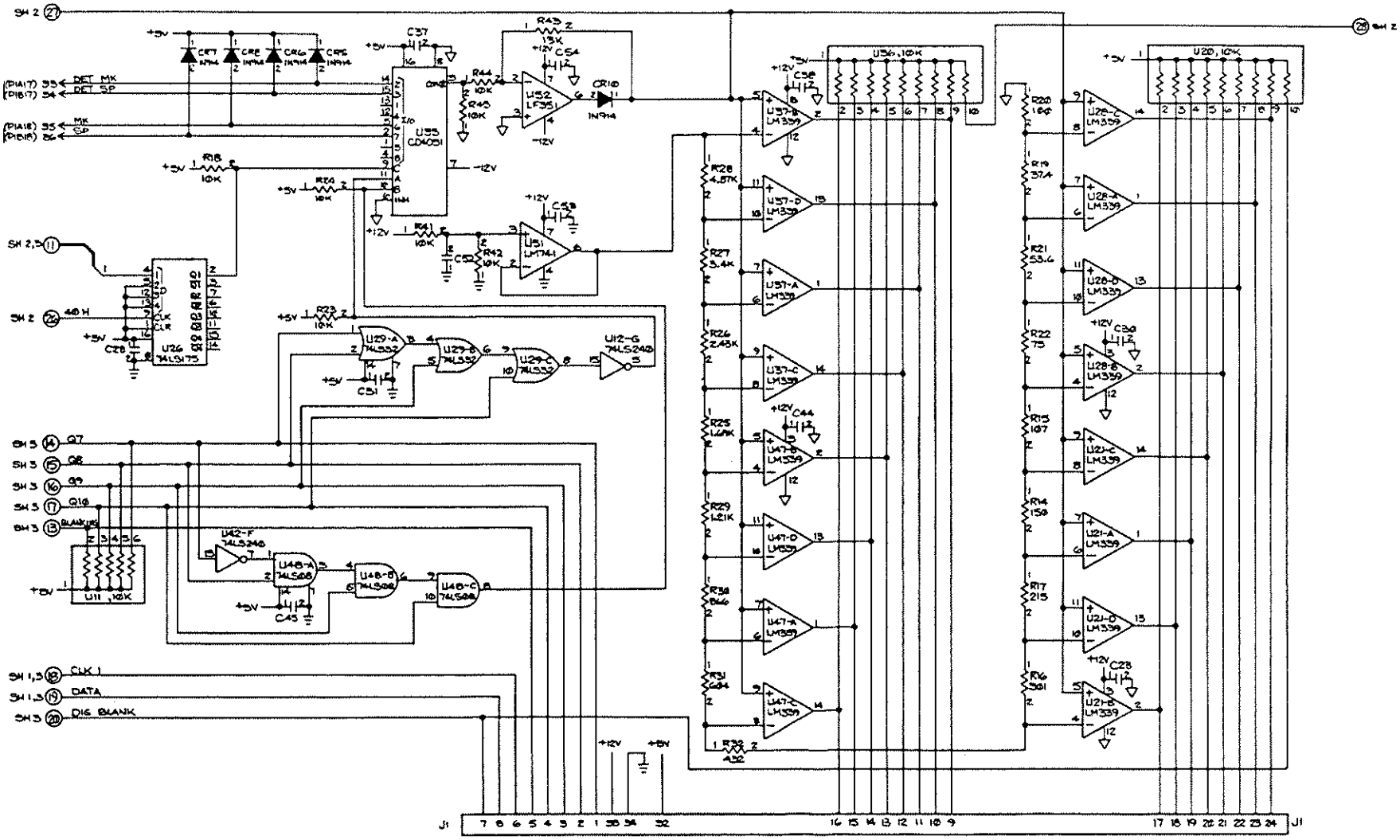
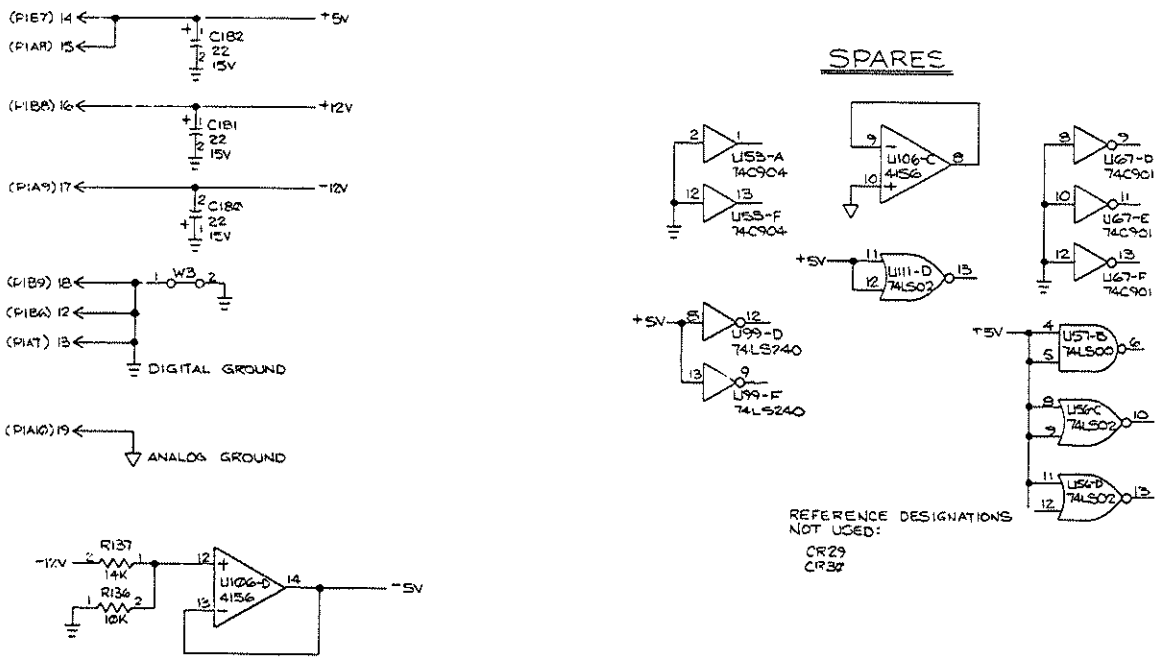


Figure 7-3. Control Board Schematic, Sheet 4 D5699A



NOTES:

1) REFERENCE DOCUMENTS:
   PC BOARD - N02171
   FAB DWG - D5706
   ASSEMBLY - D5707
2) UNLESS OTHERWISE SPECIFIED:
   ALL RESISTANCE VALUES ARE IN OHMS.
   ALL RESISTORS ARE 1/8W, 1%.
   ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   ALL CAPACITORS ARE .1 VALUE.

(A) CAD CODING INFORMATION:
   PIN NUMBERS ON ALL DISCREETS ARE FOR CODING.
   ALL CAPACITORS WITH CALLOUT (A) ARE CODED AS PART OF THE IC, USING THE IC NAME AND LAST TWO PIN NUMBERS, THE CAPACITOR NAMES ARE TEXT ON THE ARTWORK.

(A) DO NOT INSTALL C96 AND C97.

Figure 7-4. Demodulator Board Schematic, Sheet 1 D5708C

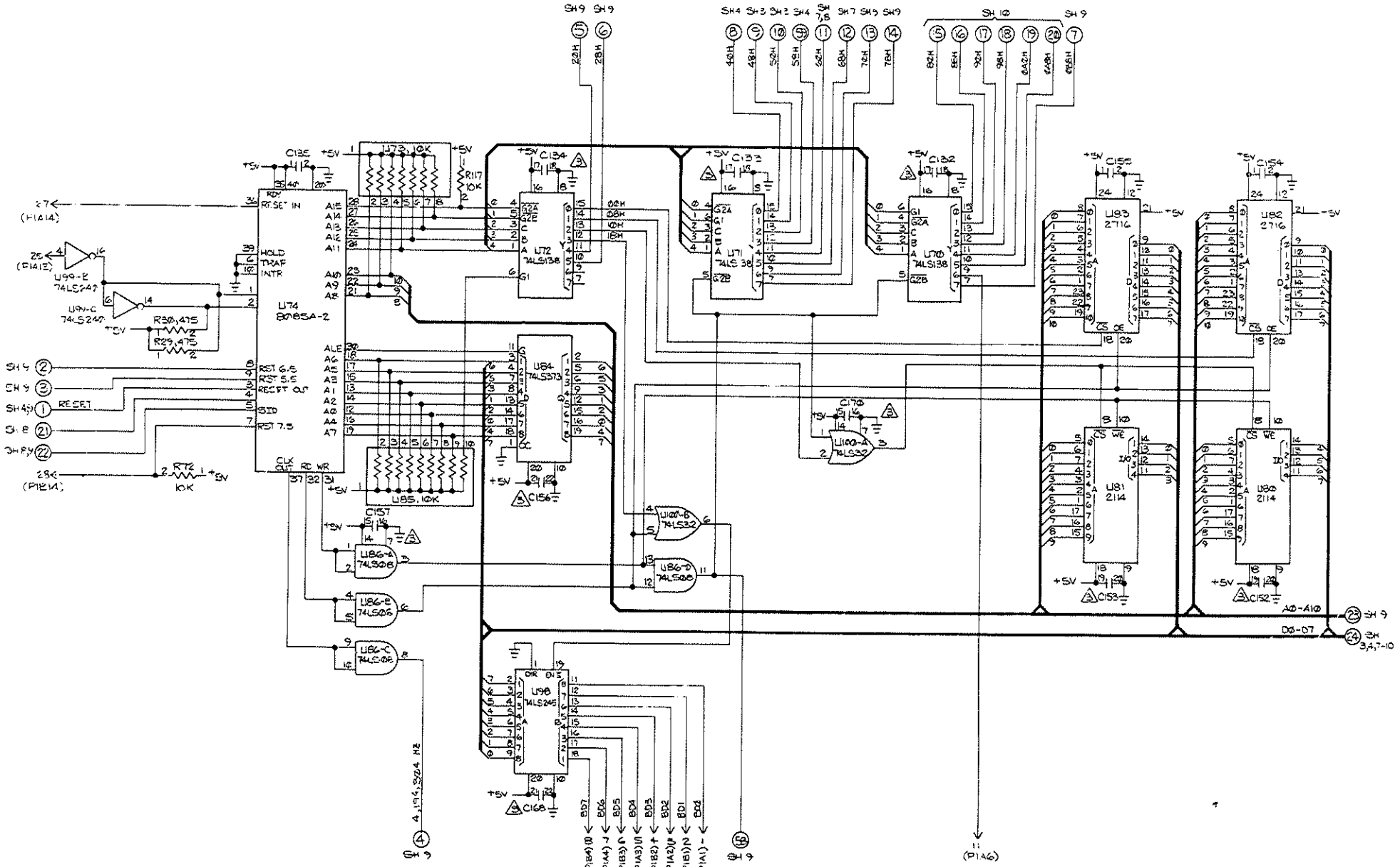


Figure 7-4. Demodulator Board Schematic, Sheet 2 D5708C

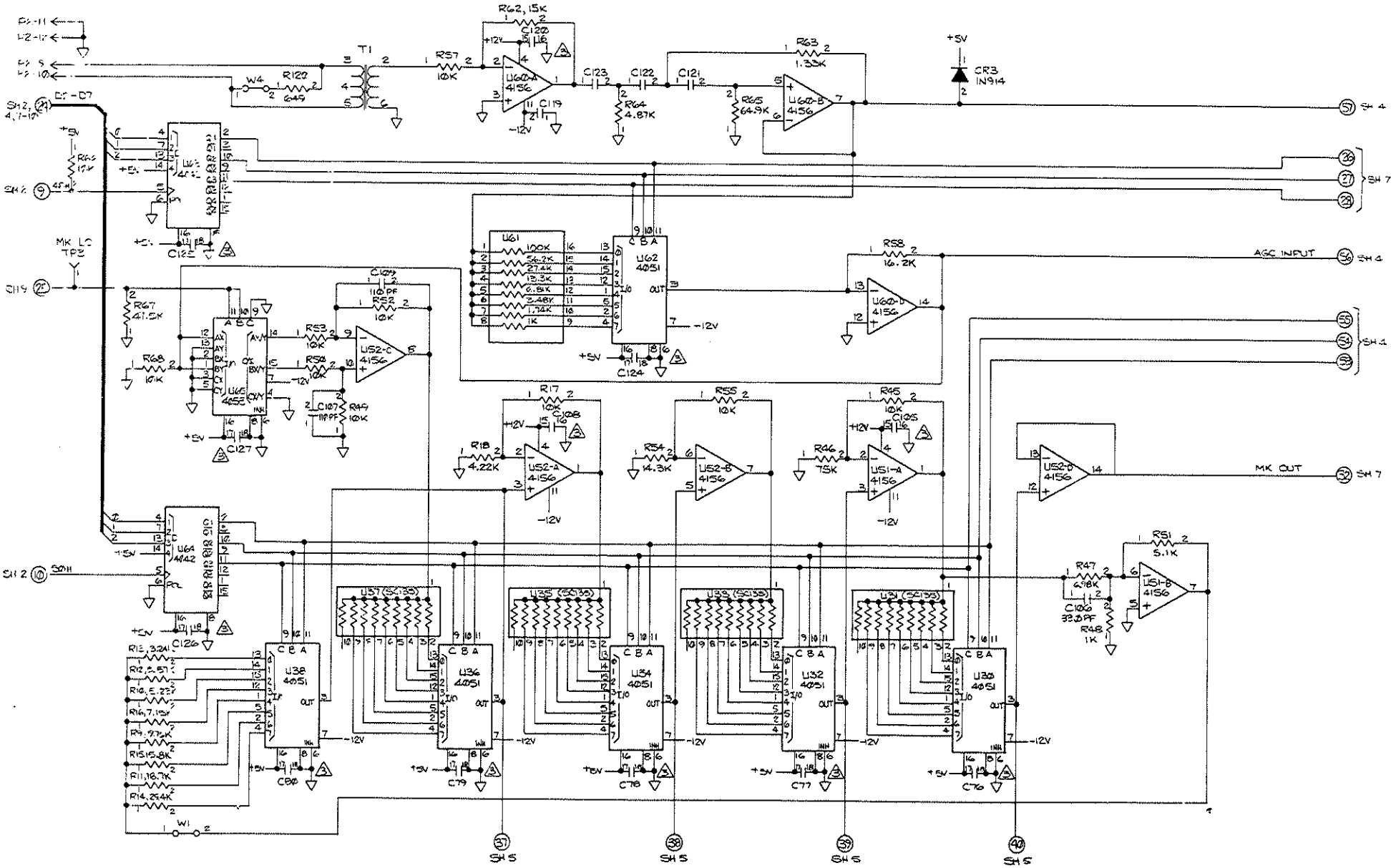


Figure 7-4. Demodulator Board Schematic, Sheet 3 D5708C

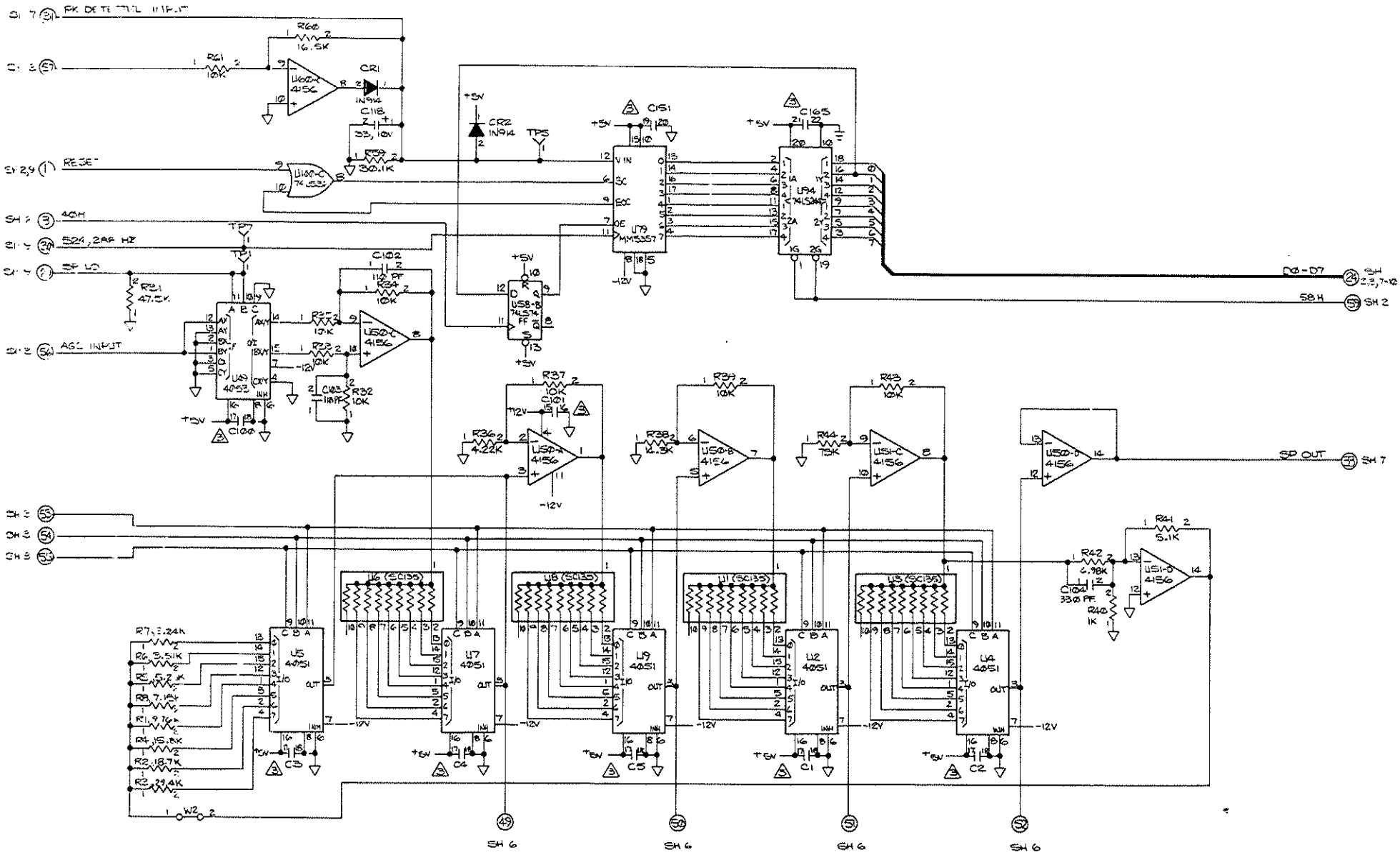


Figure 7-4. Demodulator Board Schematic, Sheet 4 D5708C

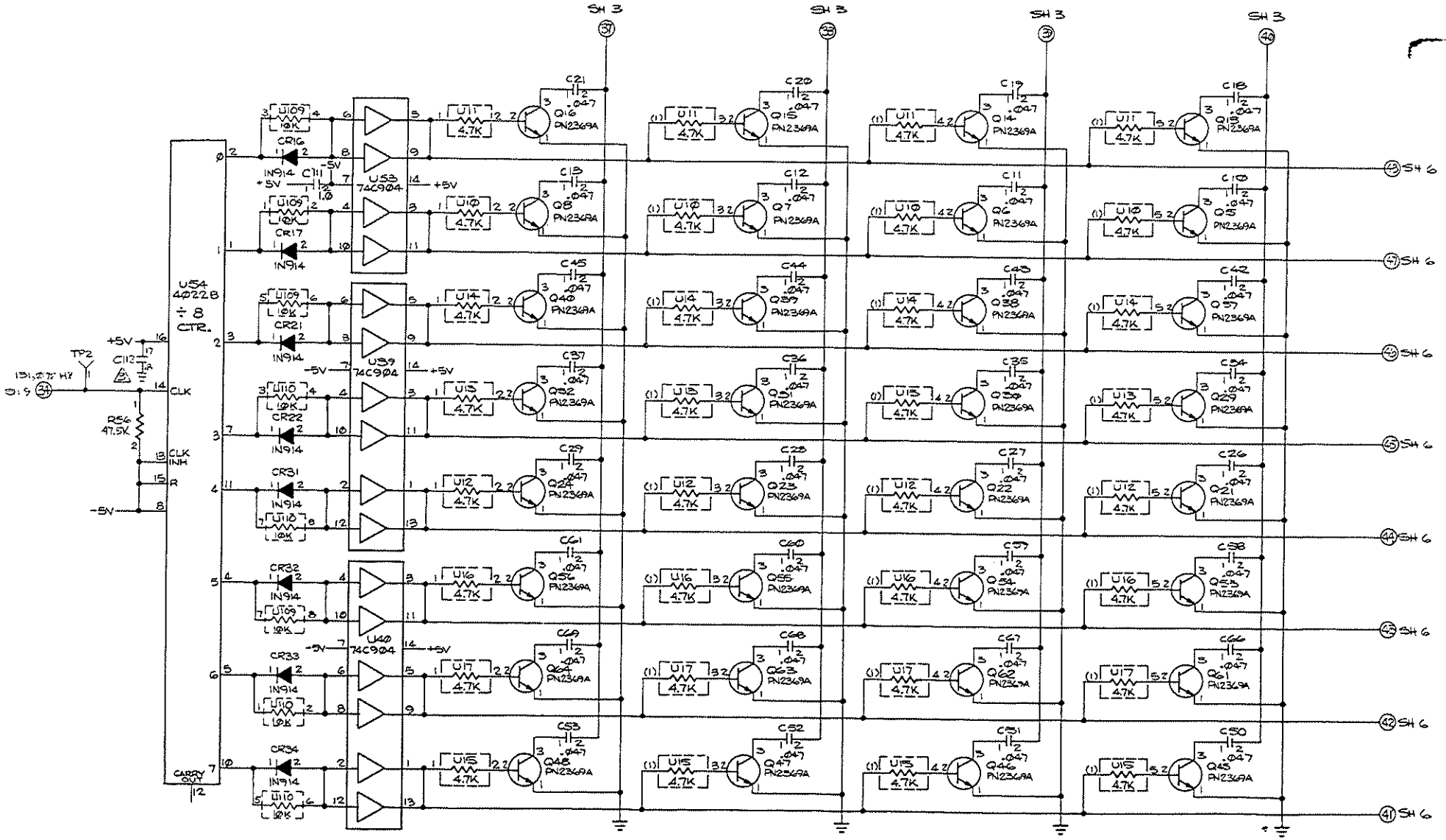


Figure 7-4. Demodulator Board Schematic, Sheet 5 D5708C

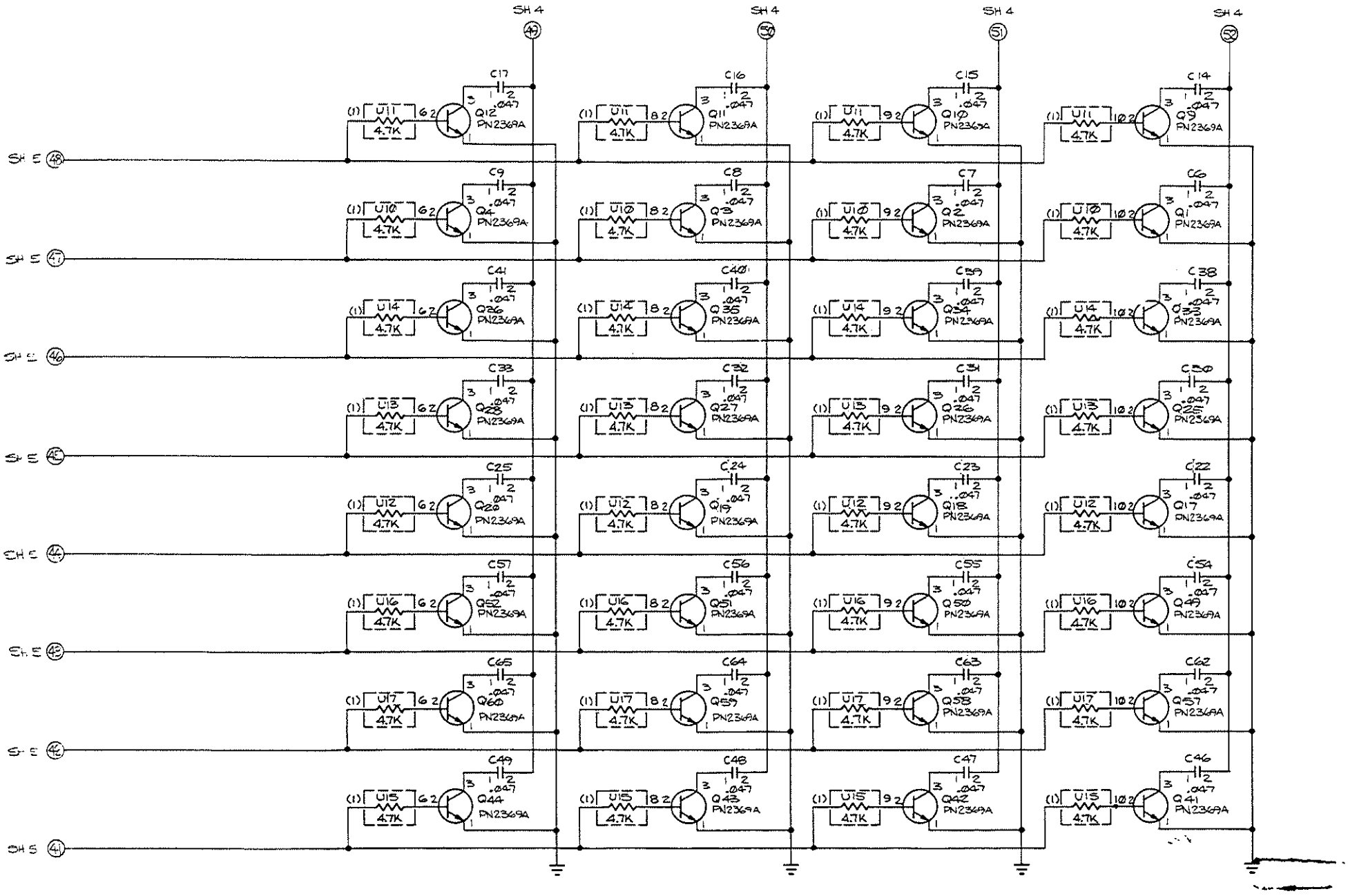


Figure 7-4. Demodulator Board Schematic, Sheet 6 D5708C

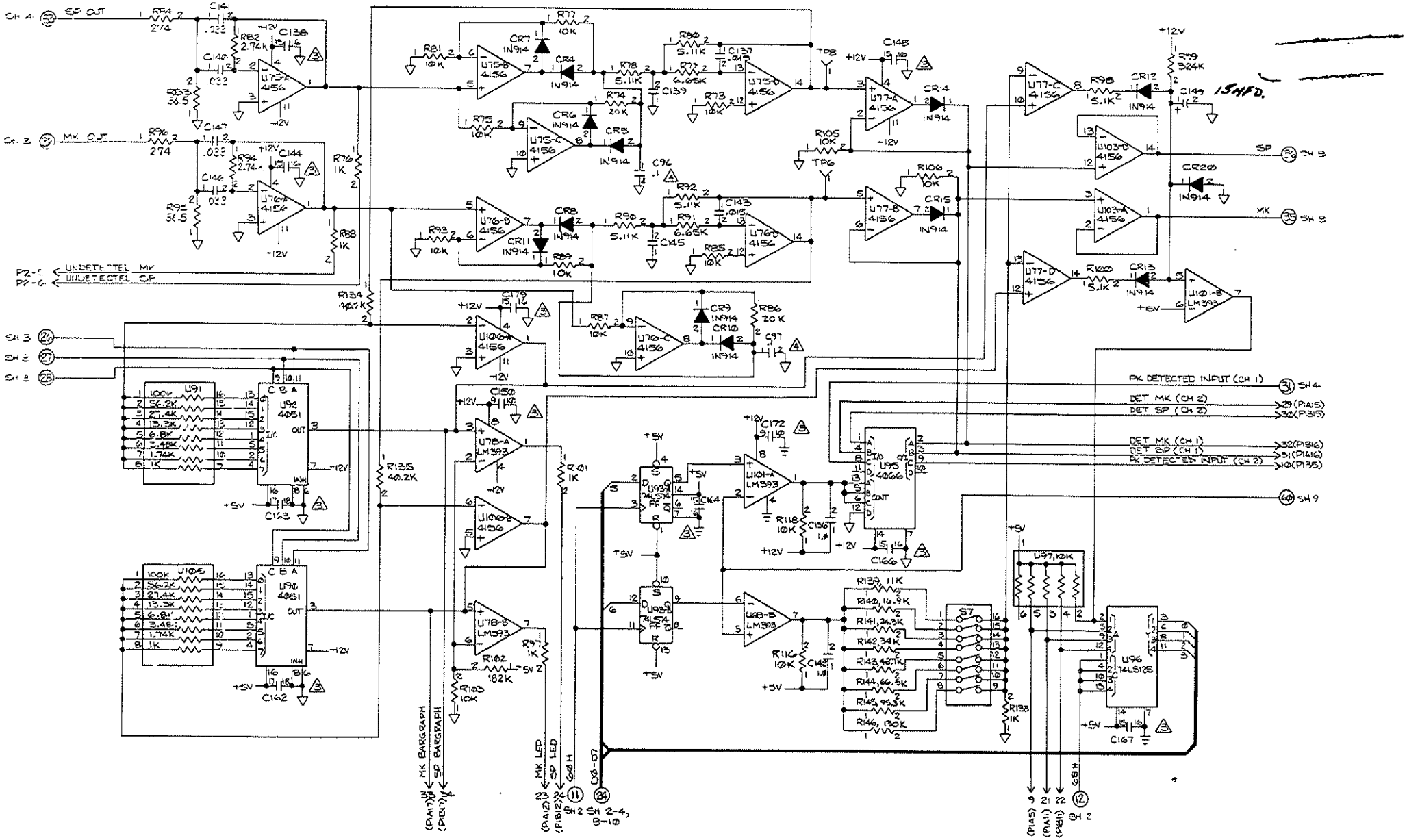


Figure 7-4. Demodulator Board Schematic, Sheet 7 D5708C

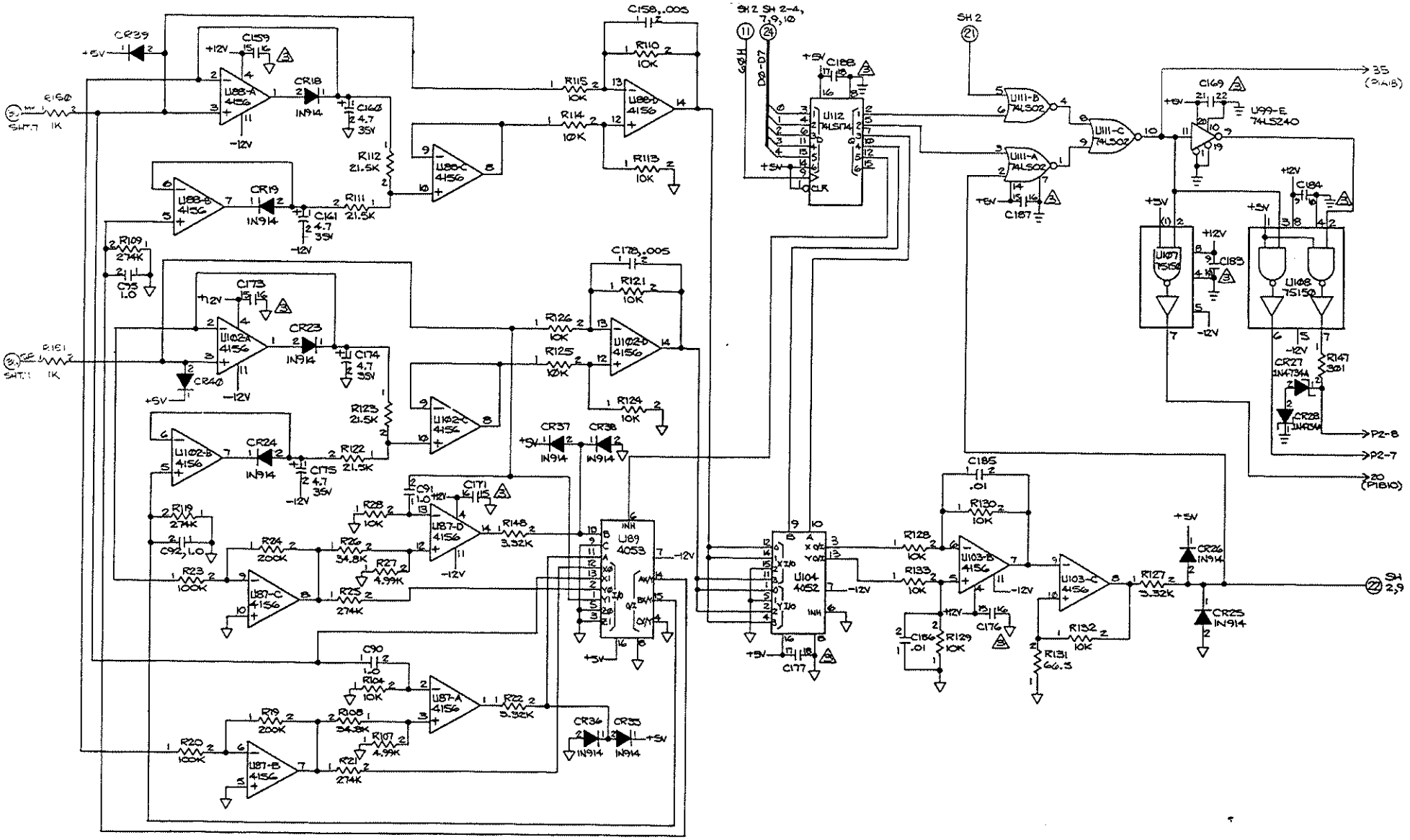


Figure 7-4. Demodulator Board Schematic, Sheet 8 D5708C

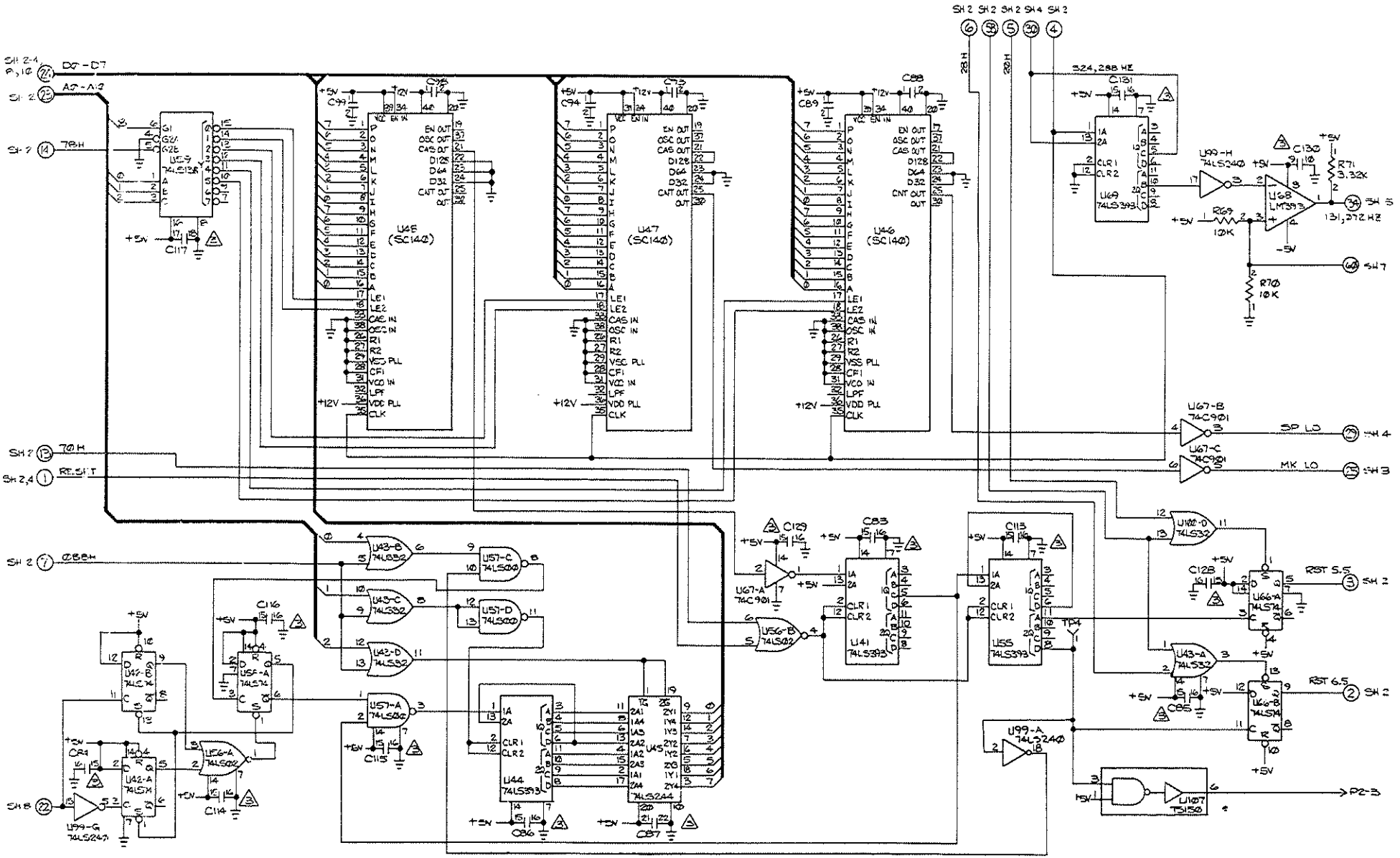


Figure 7-4. Demodulator Board Schematic, Sheet 9 D5708C

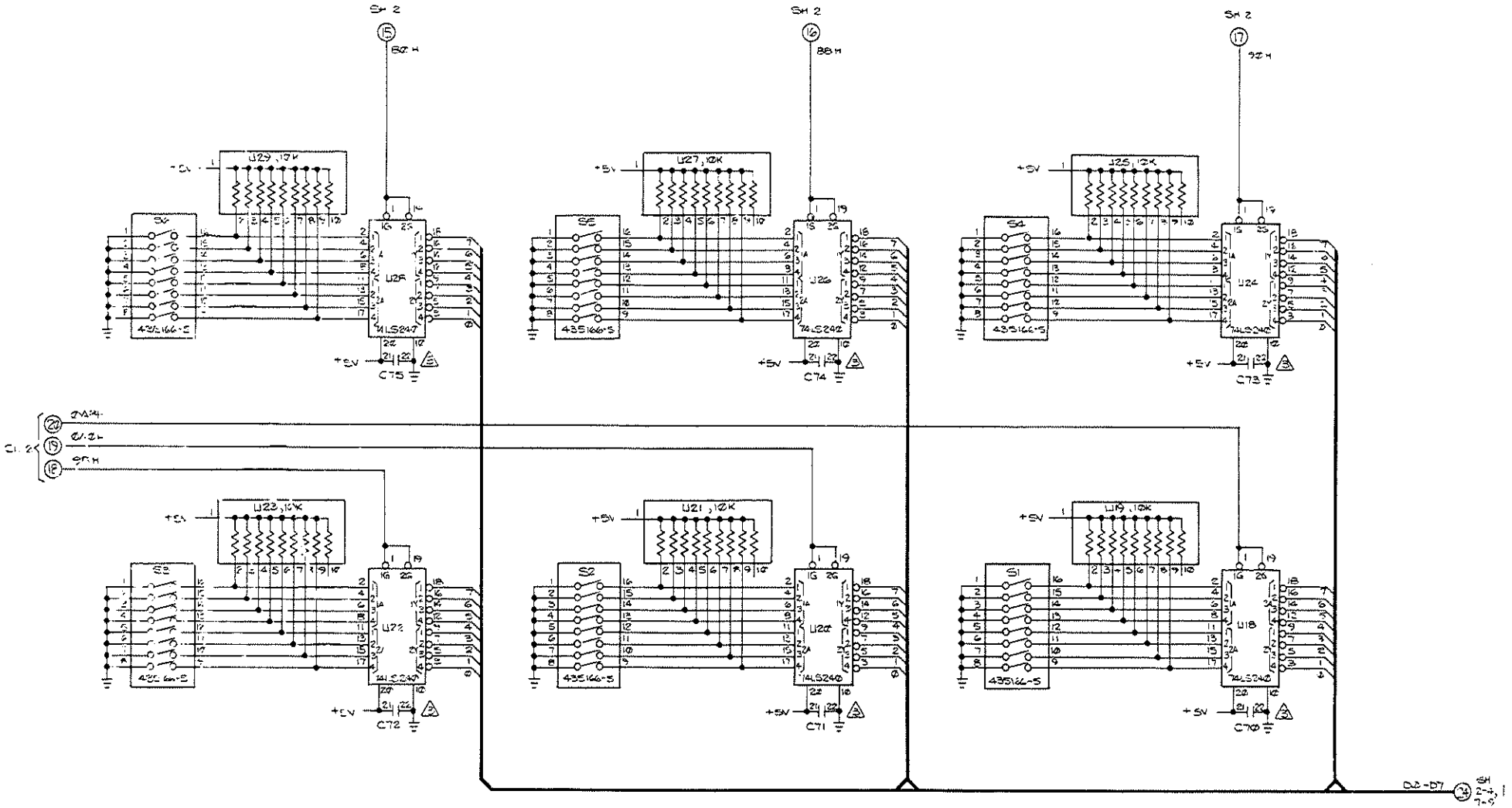
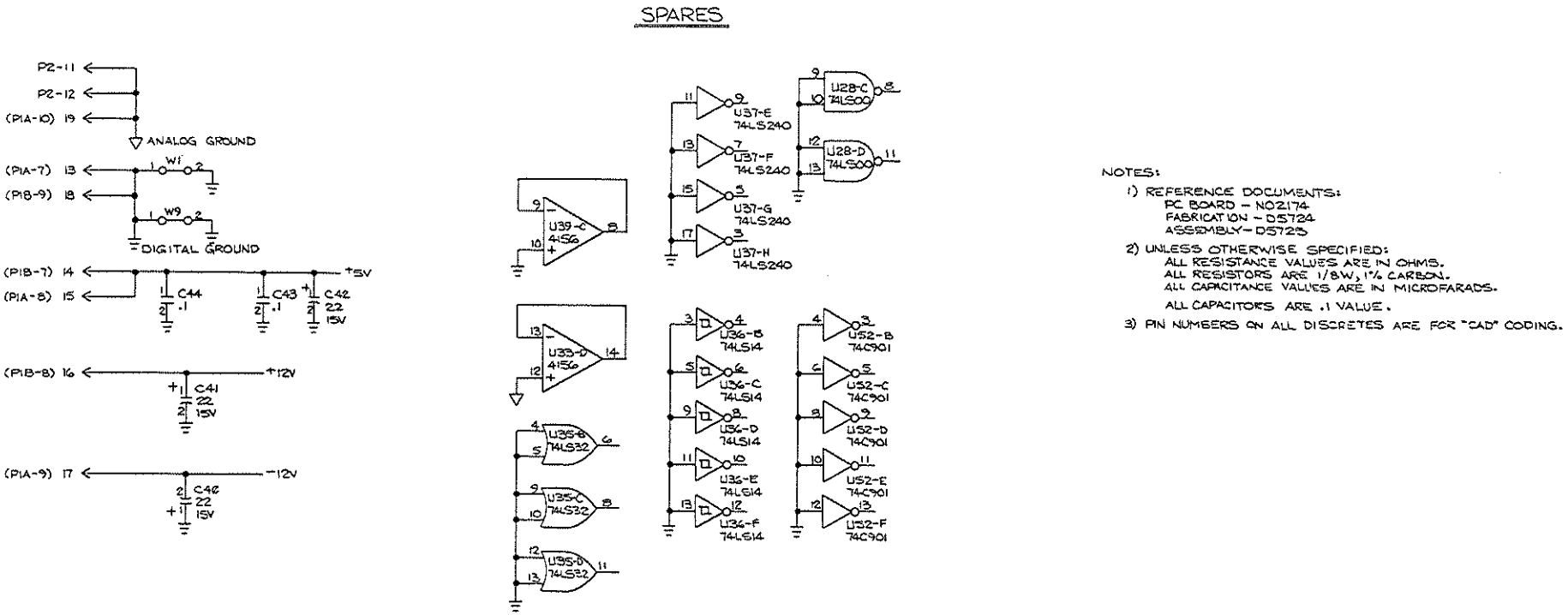


Figure 7-4. Demodulator Board Schematic, Sheet 10 D5708C



NOTES:

1) REFERENCE DOCUMENTS:
   PC BOARD – N02174
   FABRICATION – D5724
   ASSEMBLY – D5725
2) UNLESS OTHERWISE SPECIFIED:
   ALL RESISTANCE VALUES ARE IN OHMS.
   ALL RESISTORS ARE 1/8W, 1% CARBON.
   ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   ALL CAPACITORS ARE .1 VALUE.
3) PIN NUMBERS ON ALL DISCRETES ARE FOR "CAD" CODING.

Figure 7-5. Modulator Board Schematic, Sheet 1 D5726C

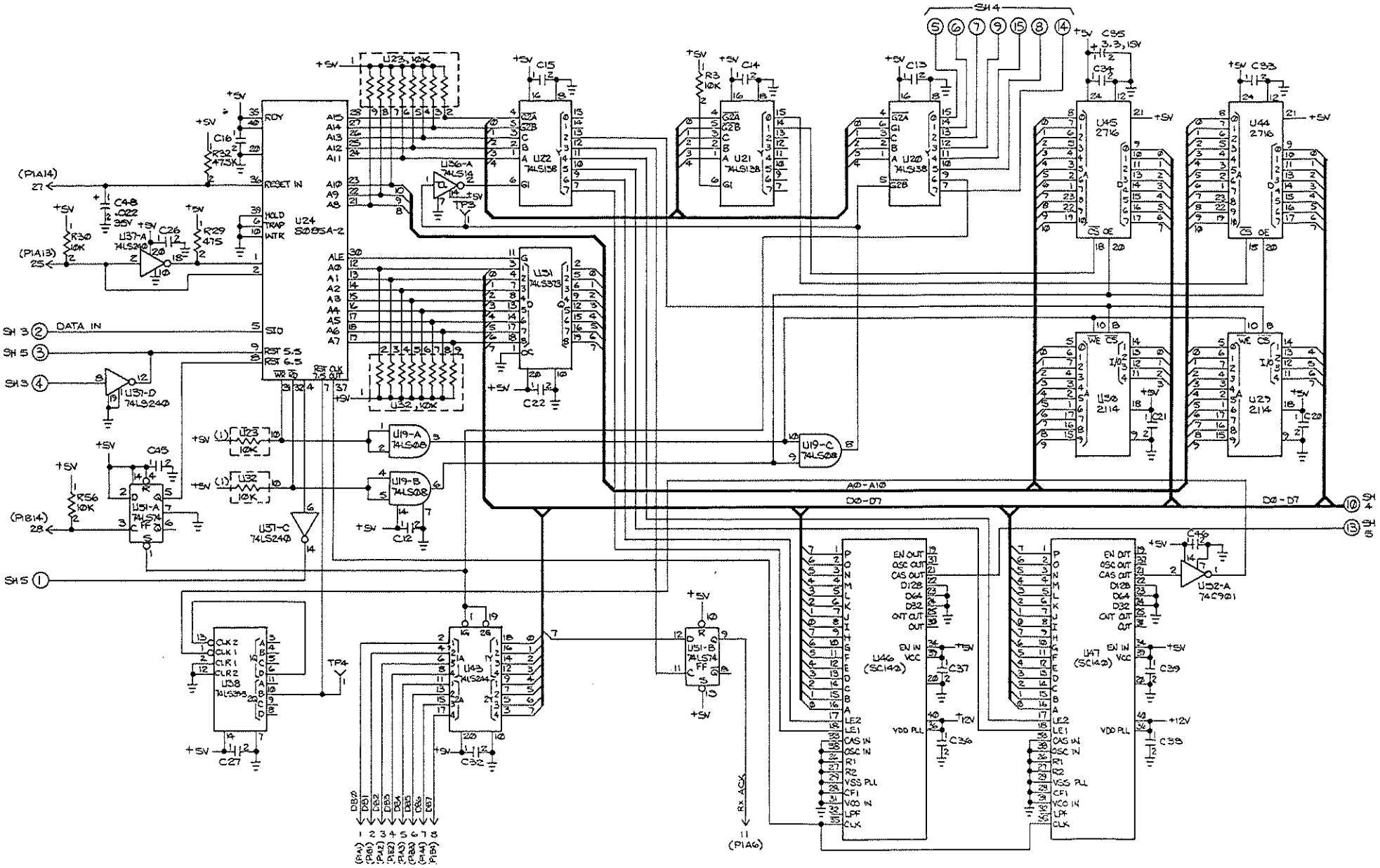


Figure 7-5. Modulator Board Schematic, Sheet 2 D5726C

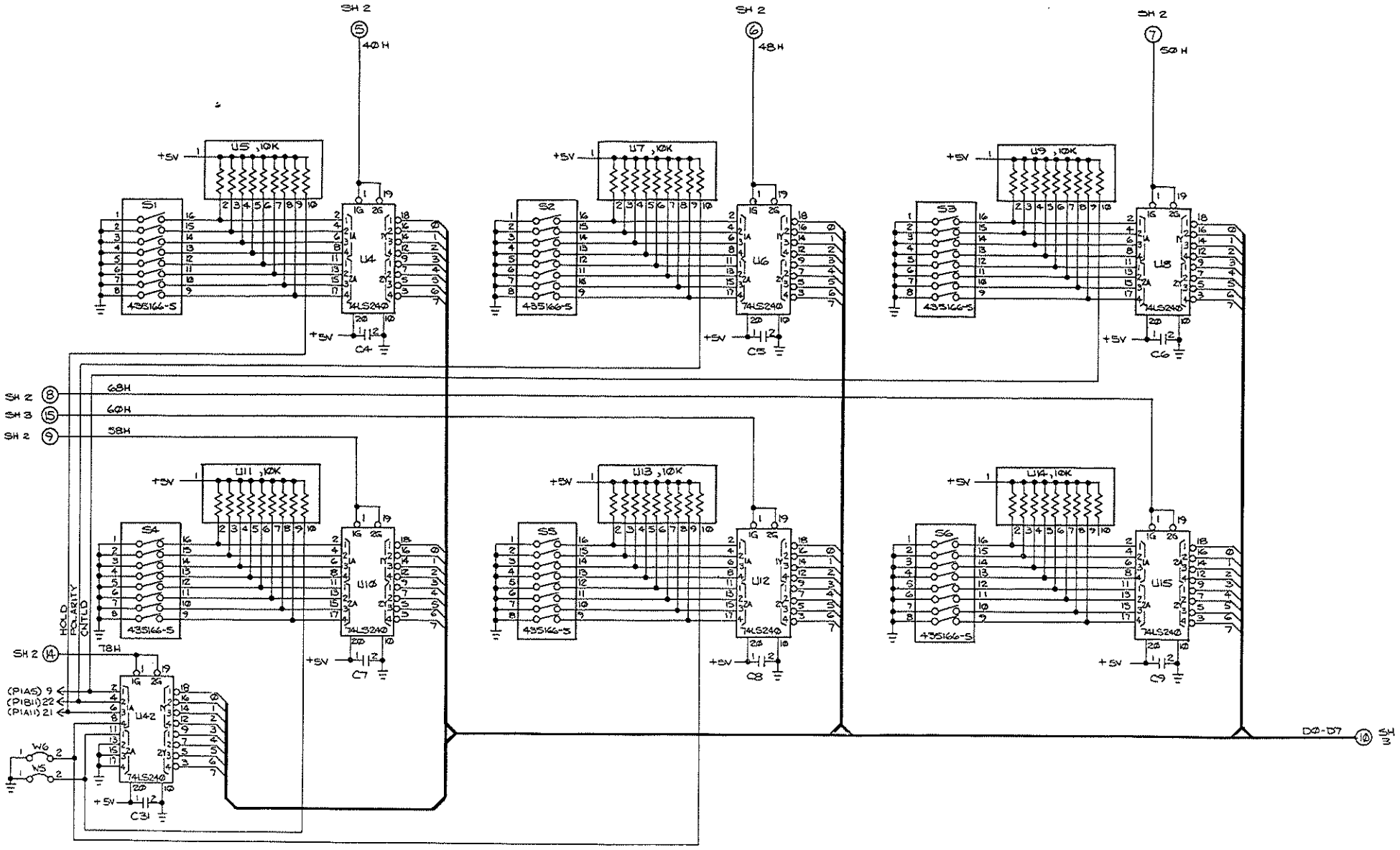


Figure 7-5. Modulator Board Schematic, Sheet 3 D5726C

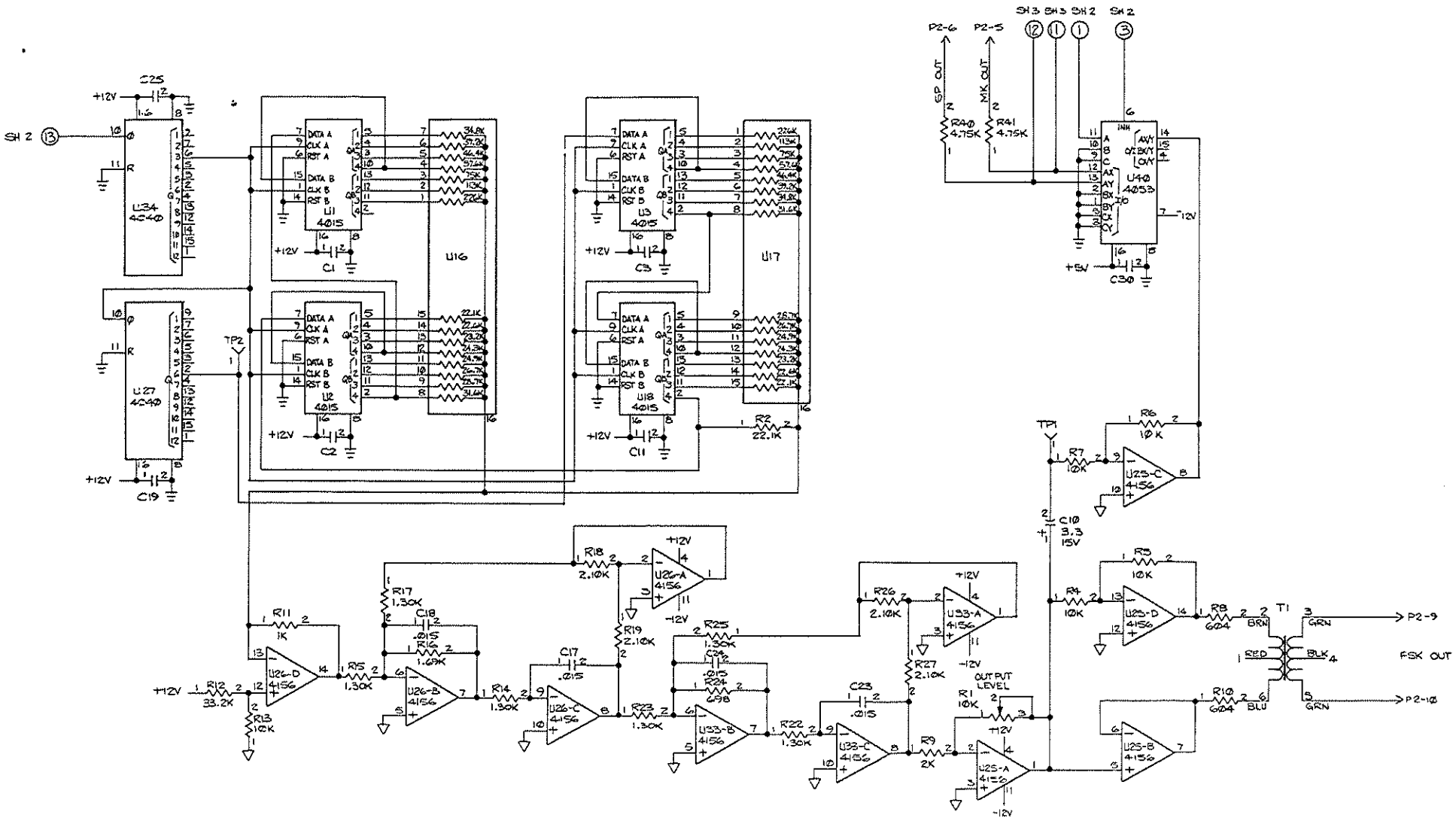


Figure 7-5. Modulator Board Schematic, Sheet 4 D5726C

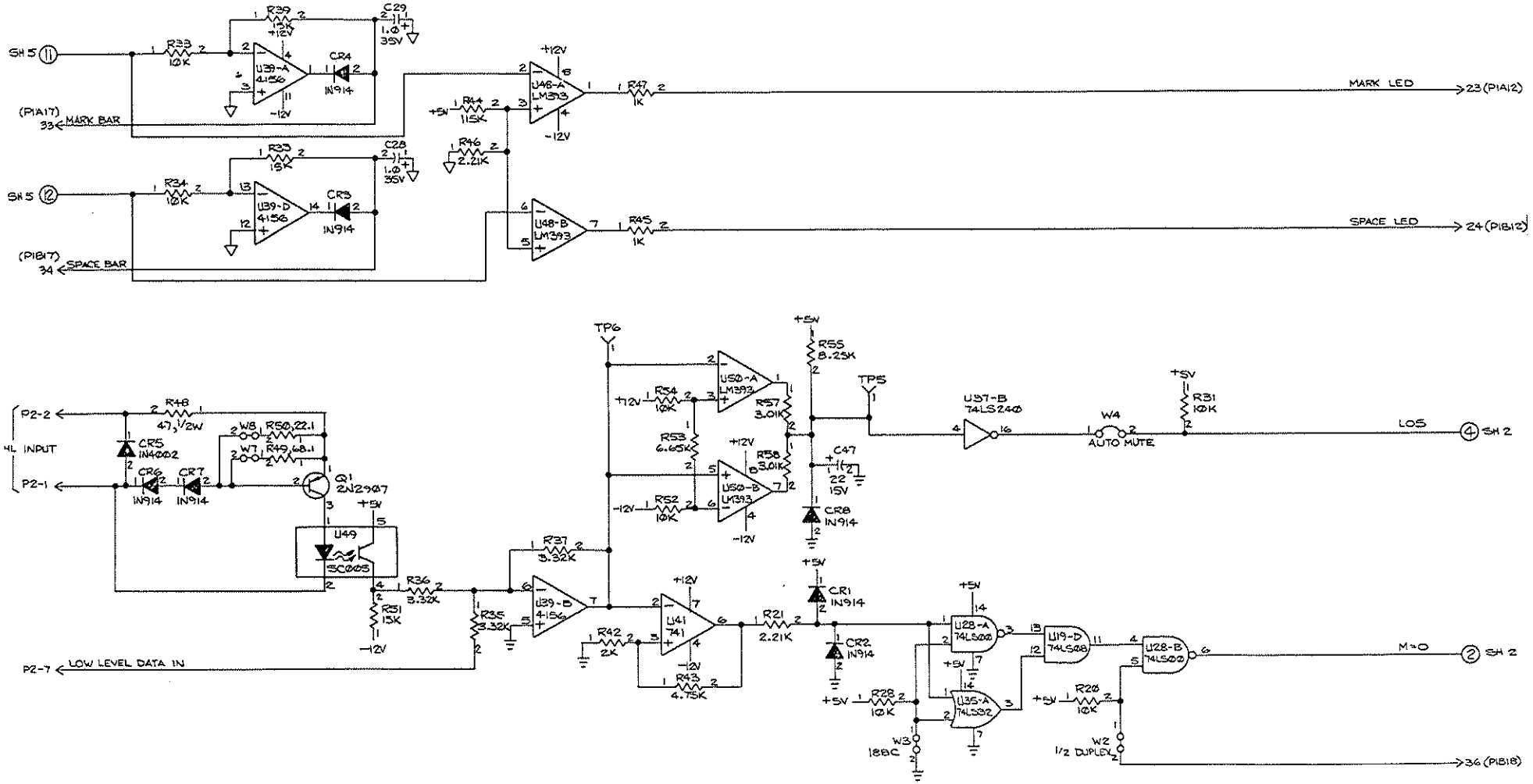
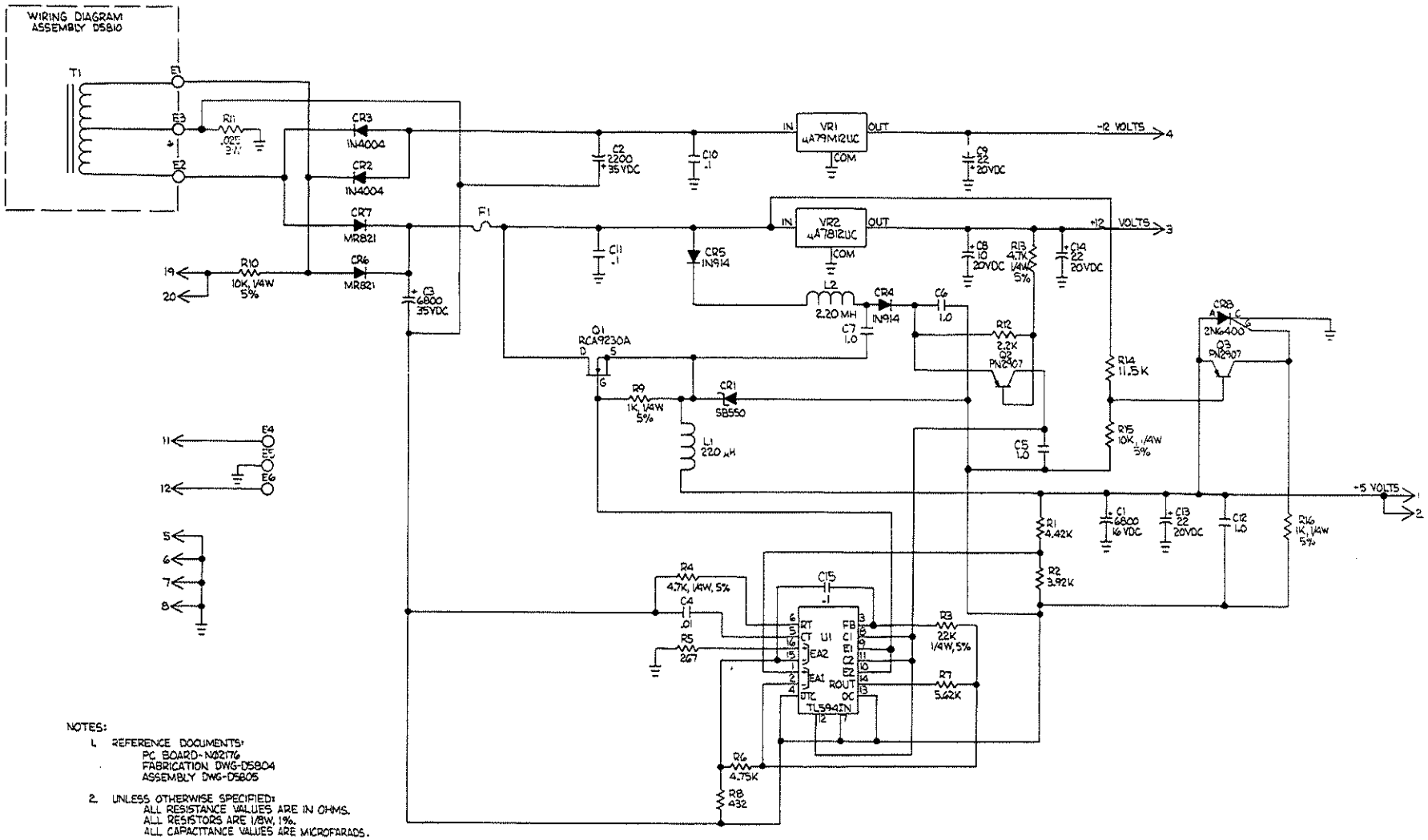


Figure 7-5. Modulator Board Schematic, Sheet 5 D5726C

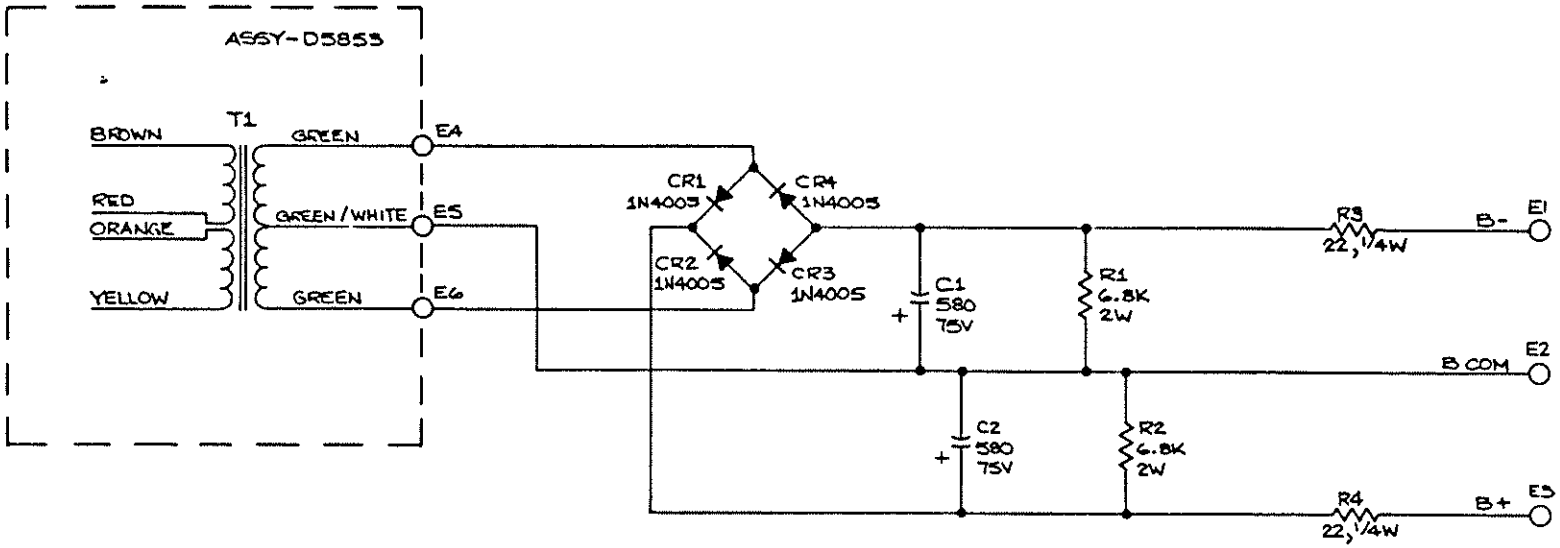


NOTES:

1. REFERENCE DOCUMENTS:
   PC BOARD- N02176
   FABRICATION DWG-D5804
   ASSEMBLY DWG-D5805

2. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTANCE VALUES ARE IN OHMS.
   ALL RESISTORS ARE 1/8W, 1%.
   ALL CAPACITANCE VALUES ARE MICROFARADS.

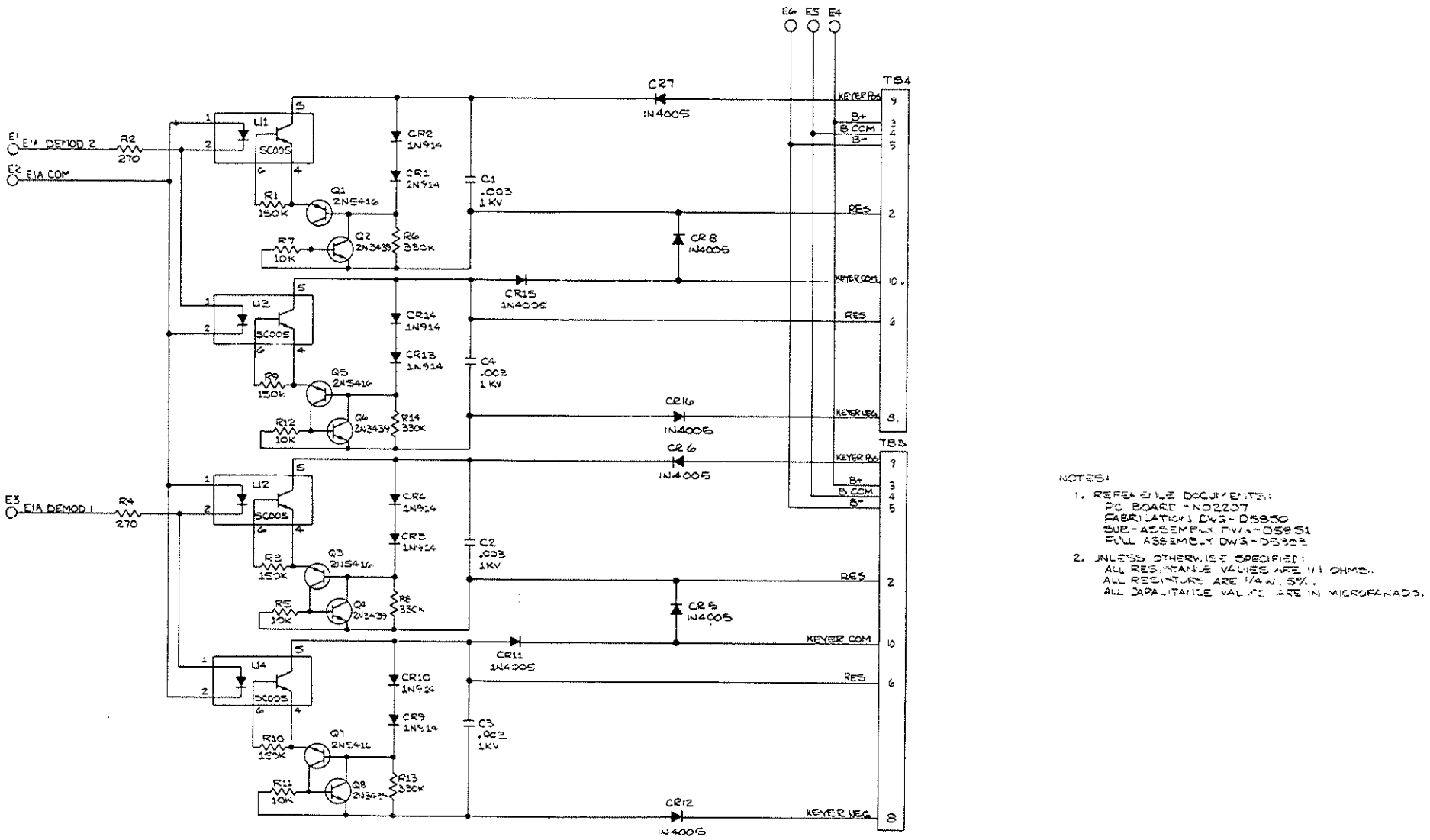
Figure 7-6. Power Supply Board Schematic D5806C



NOTES:

1. REFERENCE DOCUMENTS:
   PC BOARD - N02205
   SUB-ASSEMBLY DWG - D5847
   FULL ASSEMBLY DWG - D5853
   FABRICATION DWG - D5846
2. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTANCE VALUES ARE IN OHMS.
   ALL CAPACITANCE VALUES ARE IN MICROFARADS

Figure 7-7. Optional Loop Power Supply Schematic D5848A



NOTES:

1. REFERENCE DOCUMENTS:
   PC BOARD - ND2207
   FABRICATION DWG - D5850
   SUB-ASSEMBLY DWG - D5851
   FULL ASSEMBLY DWG - D5852
2. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTANCE VALUES ARE IN OHMS.
   ALL RESISTORS ARE 1/4 W, 5%.
   ALL CAPACITANCE VALUES ARE IN MICROFARADS.

Figure 7-8. Optional Quad High Level Keyer Schematic D5852B

APPENDIX A

MODEL 1280 MODEM

EMERGENCY (MANUAL) OPERATION

Should a situation arise with the Model 1280 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.

1. Remove power from the unit.
2. Remove the front panel and disconnect the two ribbon cables from front panel connectors J1 and J2.
3. Remove the control board from the unit.
4. Remove the modulator/demodulator cards from the unit and program the dip switches for the desired operating parameters.
5. Install the modulator/demodulator boards.
6. Install front panel and apply power to the unit.

Programming information for each internally mounted dip switch and slide position is provided in Tables A-1 and A-2. The location of the switches is illustrated in Figures A-1 and A-2.

Table A-1. Model 1280 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	FSK = ON: selects FSK function for frequency shifts 200 Hertz and below. (ON = FSK, OFF = FEK)
	S1-6	Not Used
	S1-5	Not Used
3	Baud Rate S1-4 thru S1-1	Binary coded decimal equivalent of the third (hundreds) baud rate digit read from right to left. EXAMPLE: Baud rate of 600, S1-4 thru 1 settings will equal a BCD-6. Set S1 4 = OFF 3 = ON 2 = ON 1 = OFF NOTE ON = 1 OFF = 0
	Baud Rate S2-8 thru S2-5	Binary coded decimal equivalent of the second (tens) baud rate digit read from right to left. EXAMPLE: Baud rate of 600, S2-8 thru 5 setting will equal a BCD-0. Set S2 8 = OFF 7 = OFF 6 = OFF 5 = OFF NOTE ON = 1 OFF = 0

Table A-1. Model 1280 Modulator Board Switch Controls (cont.)

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

Table A-1. Model 128Ø Modulator Board Switch Controls (cont.)

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

Table A-1. Model 1280 Modulator Board Switch Controls (cont.)

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

Table A-2. Model 1280 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 2-1 Item 3.
6	SPACE Frequency S3 and S4	Function identical to modulator SPACE frequency. See Table 2-1 Item 4.
7	MARK Frequency S5 and S6	Function identical to modulator MARK frequency. See Table 2-1 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).

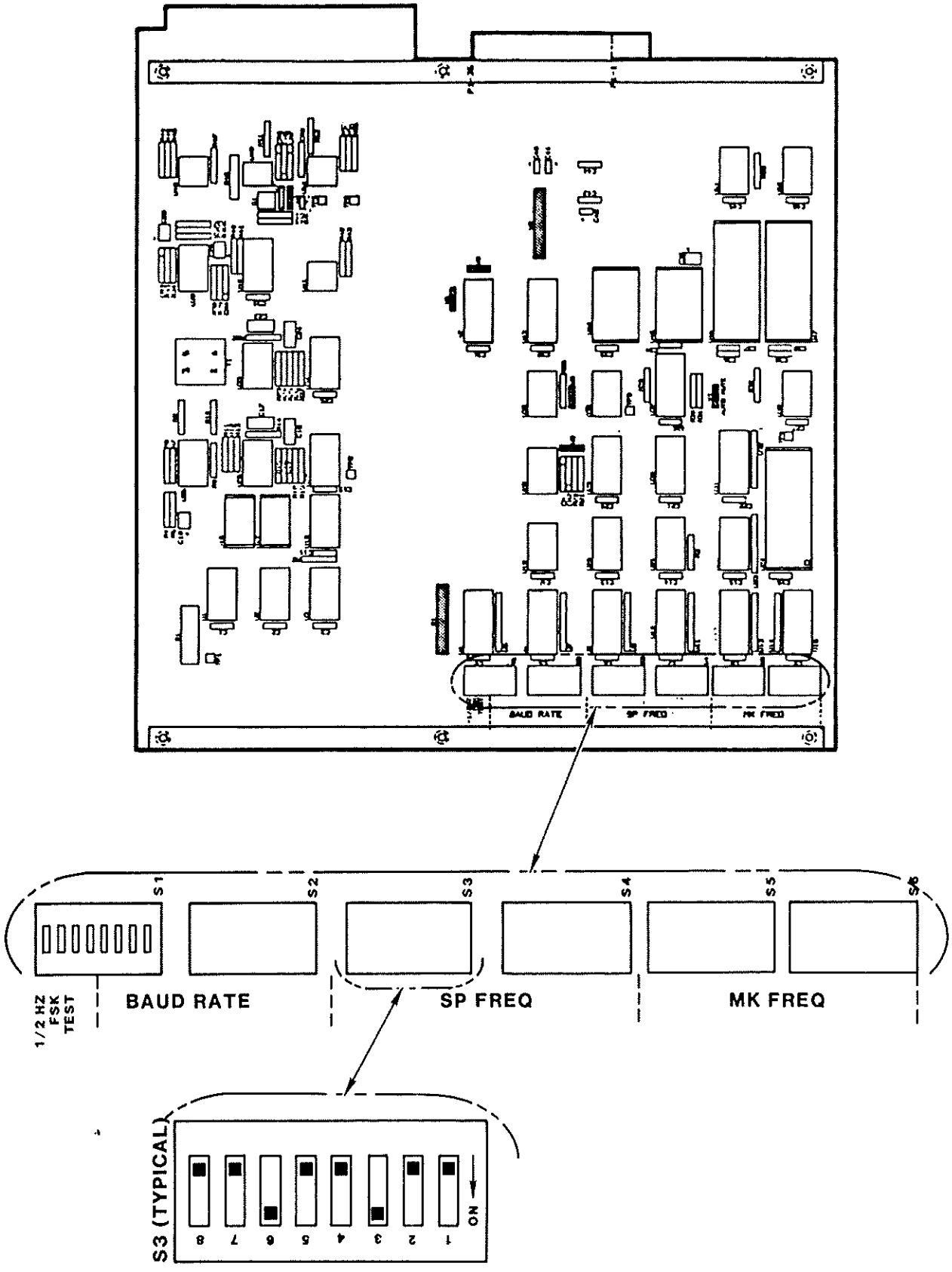


Figure A-1. Modulator Switch Locations

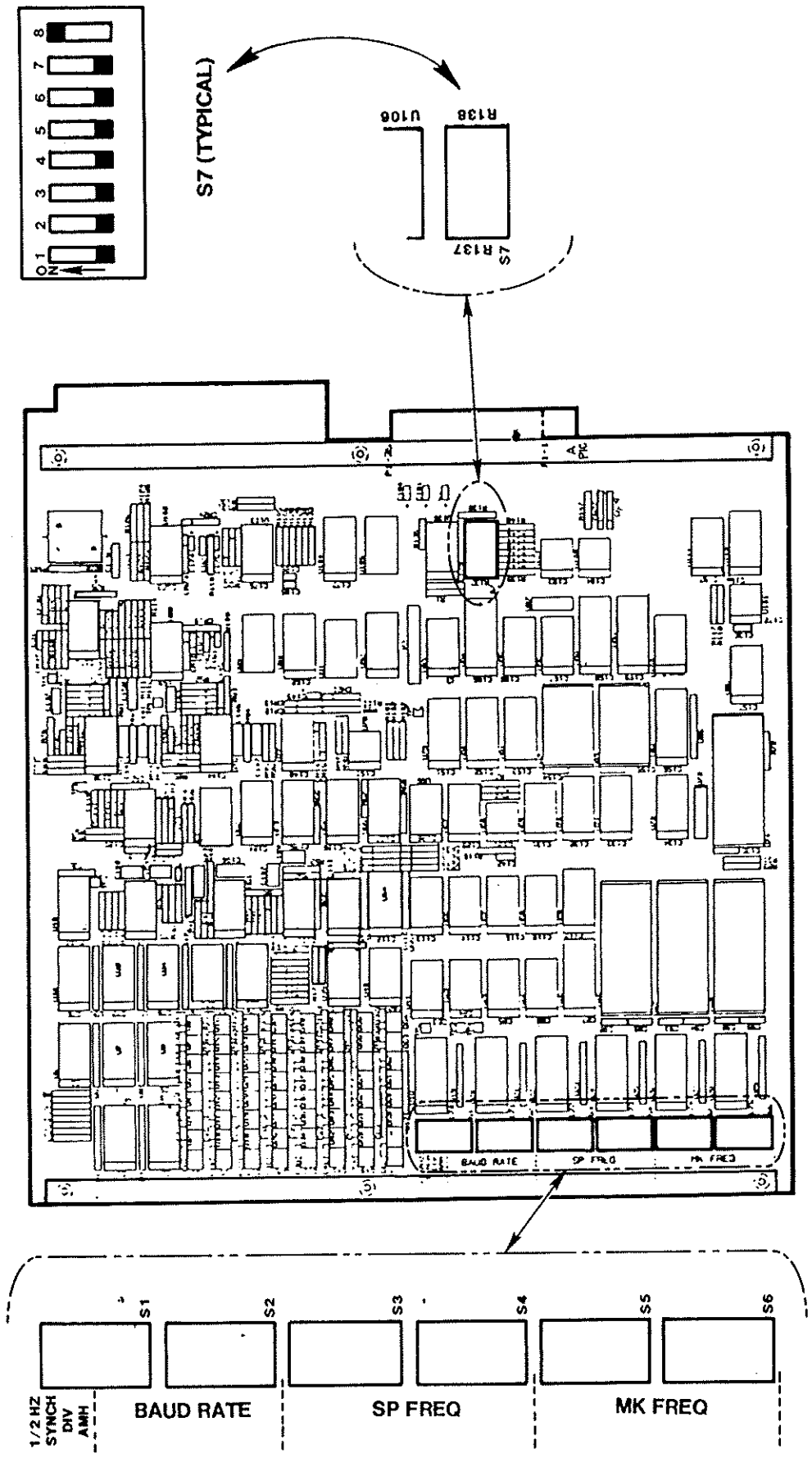
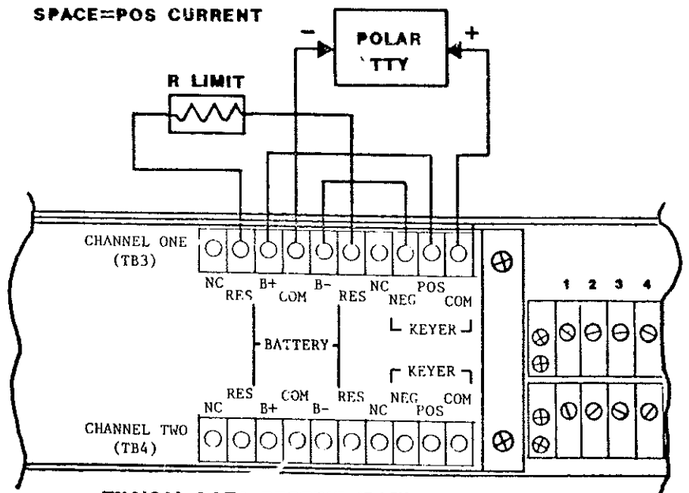


Figure A-2. Demodulator Switch Locations

NOTE:
KEYING VOLTAGE =
±65 VDC TYPICAL
MARK=NEG CURRENT
SPACE=POS CURRENT

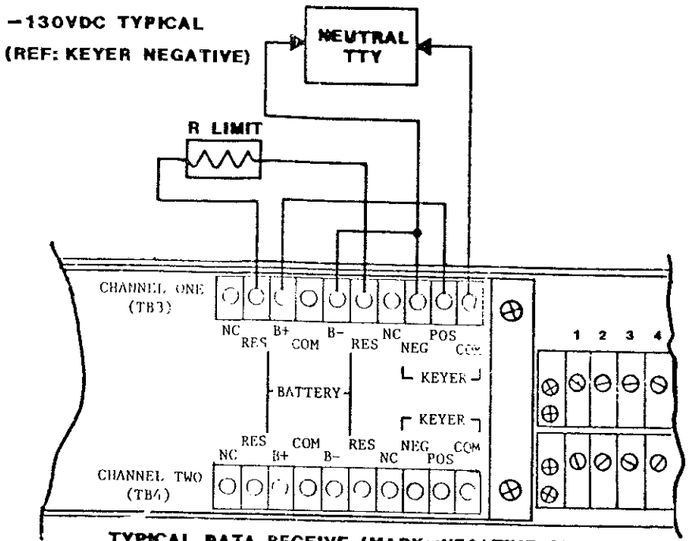


TYPICAL DATA RECEIVE (BATTERY COMMON)

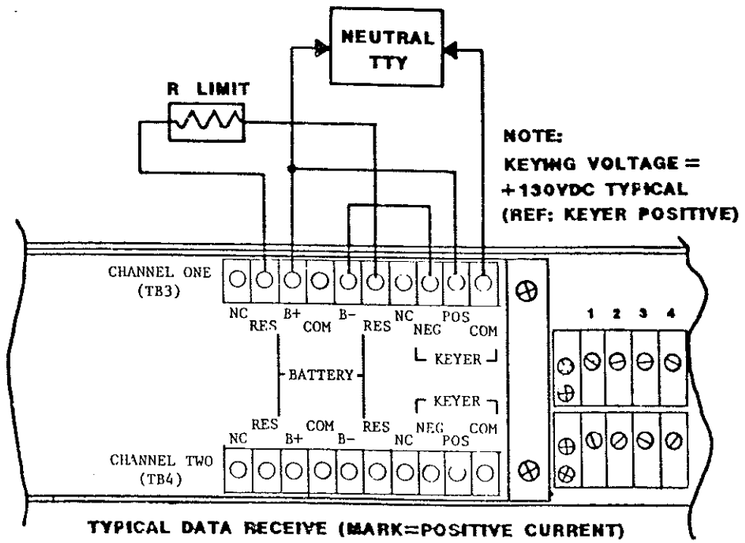
CAUTION

LOOP CURRENT MUST BE EXTERNALLY LIMITED TO 100 MA MAX (60 MA TYP) AND ARC SUPPRESSION TO LESS THAN 350 VOLTS

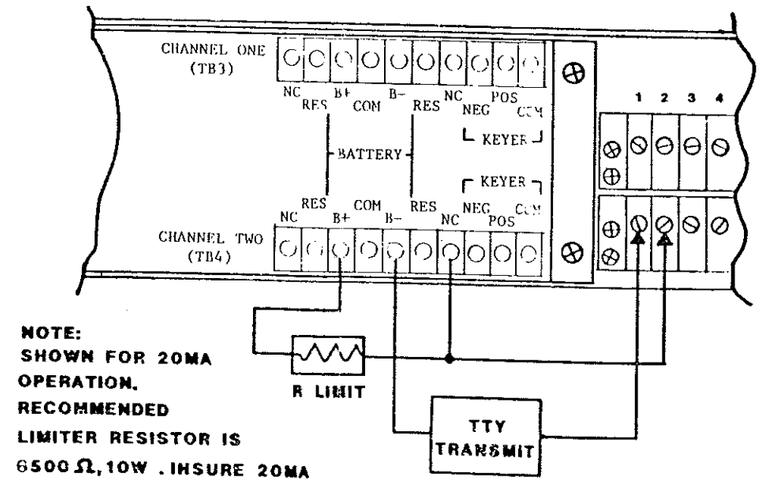
NOTE:
KEYING VOLTAGE=
−130VDC TYPICAL
(REF: KEYER NEGATIVE)



TYPICAL DATA RECEIVE (MARK=NEGATIVE CURRENT)



TYPICAL DATA RECEIVE (MARK=POSITIVE CURRENT)



TYPICAL DATA SEND

Figure 2-12. Typical High Level Applications

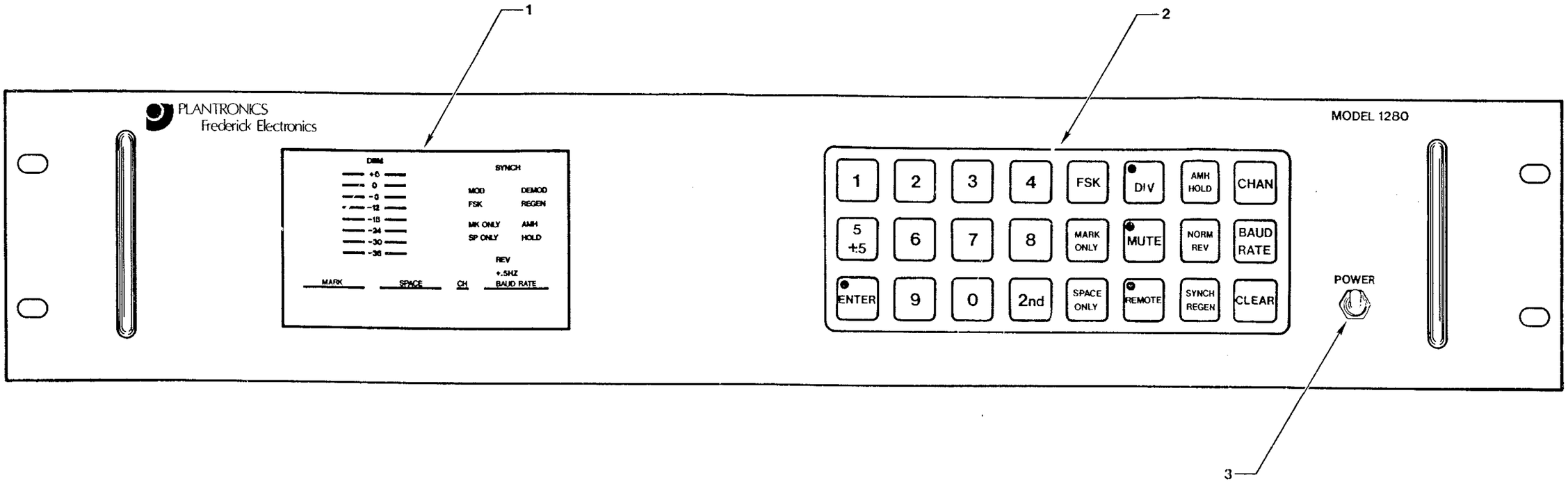


Figure 3-1. Model 1280 Front Panel

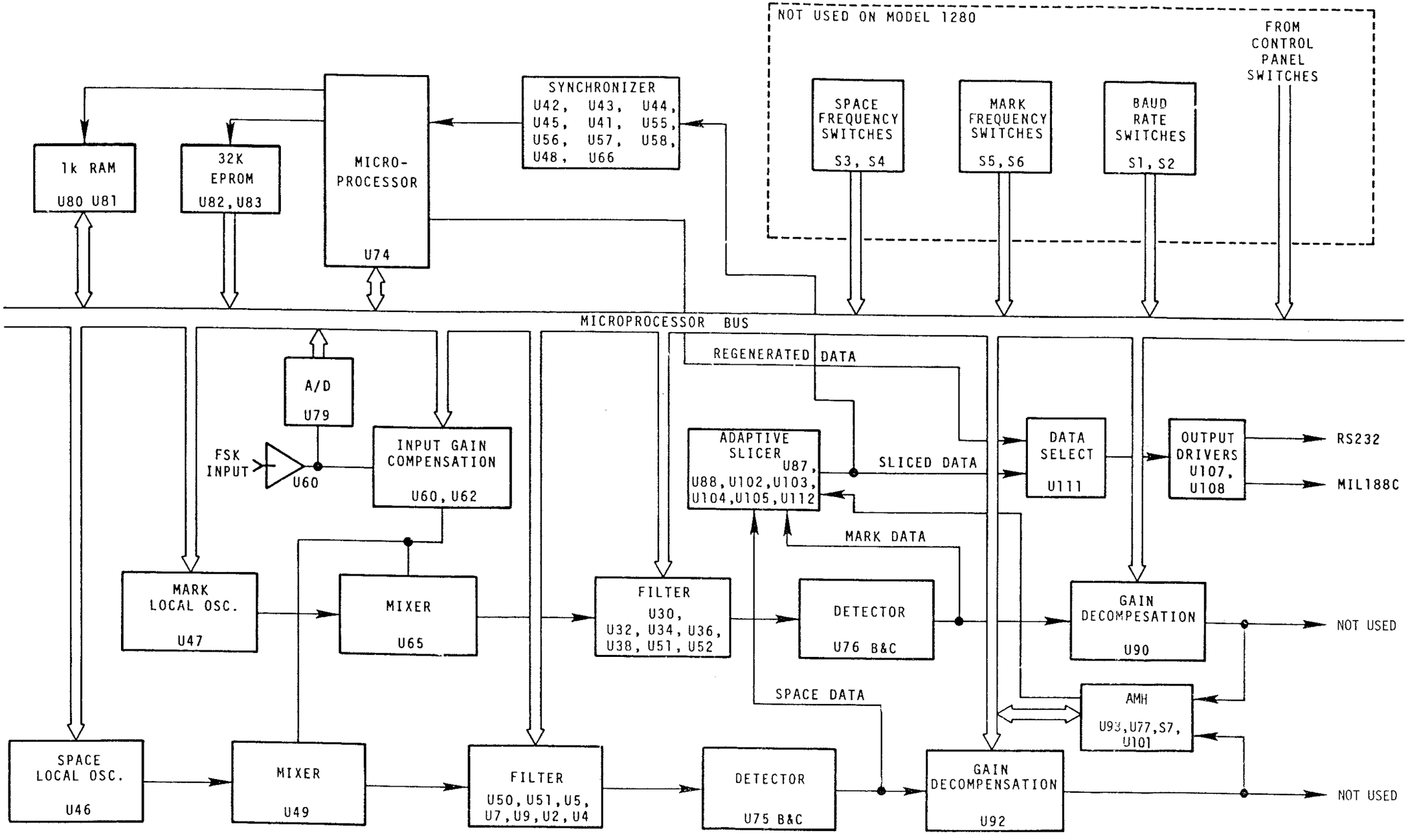


Figure 4-2. Demodulator Block Diagram

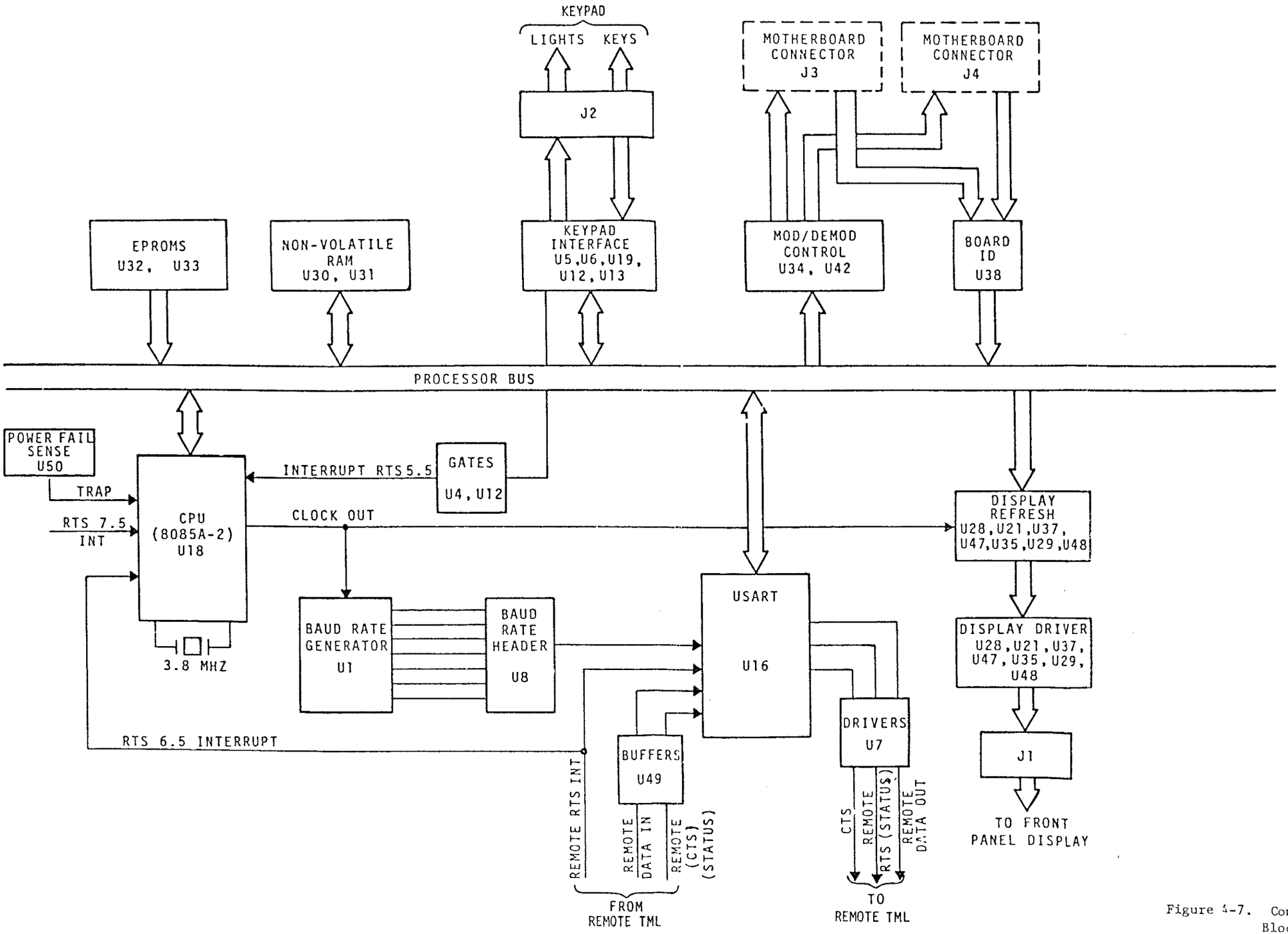


Figure 4-7. Control Board Block Diagram

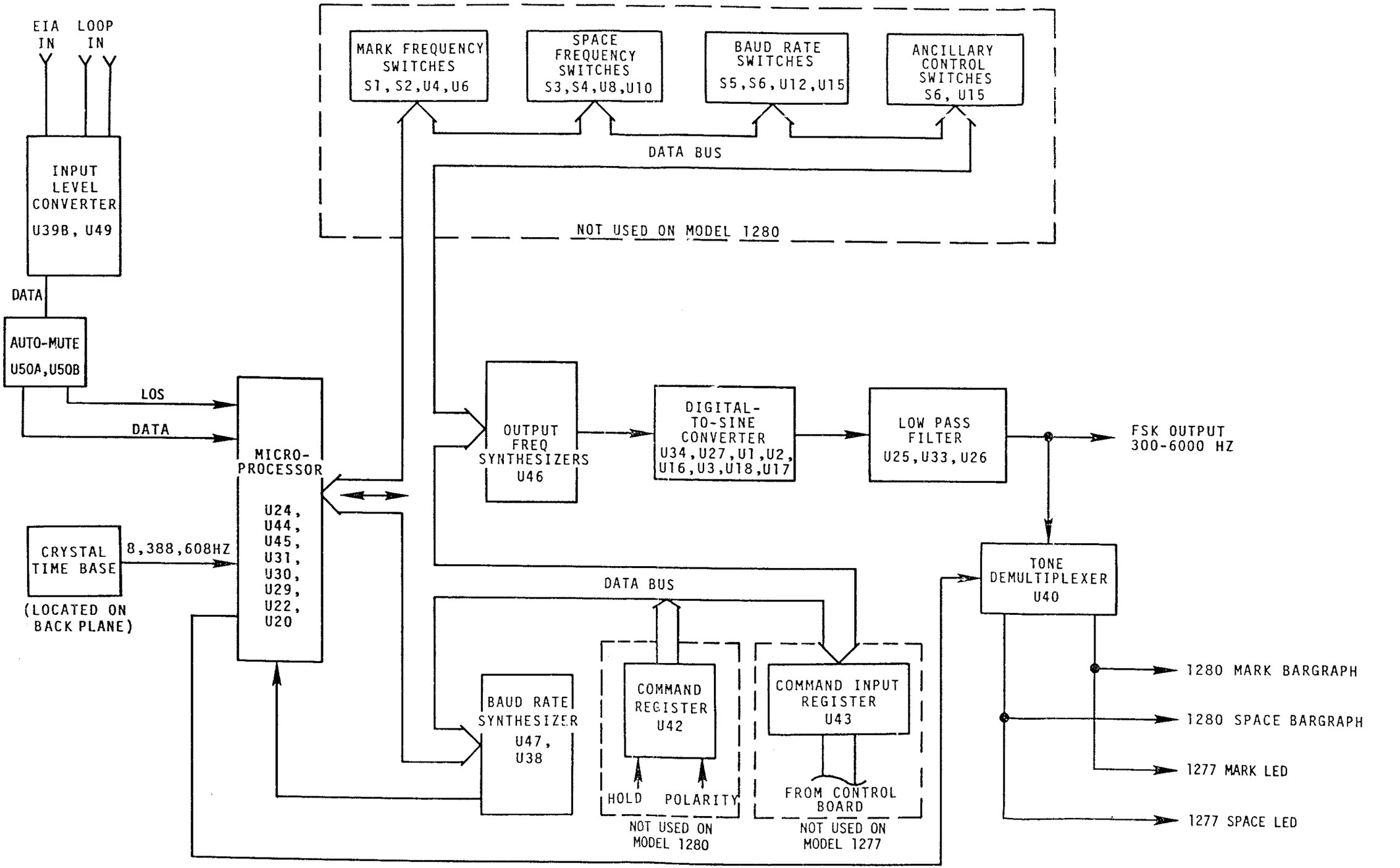
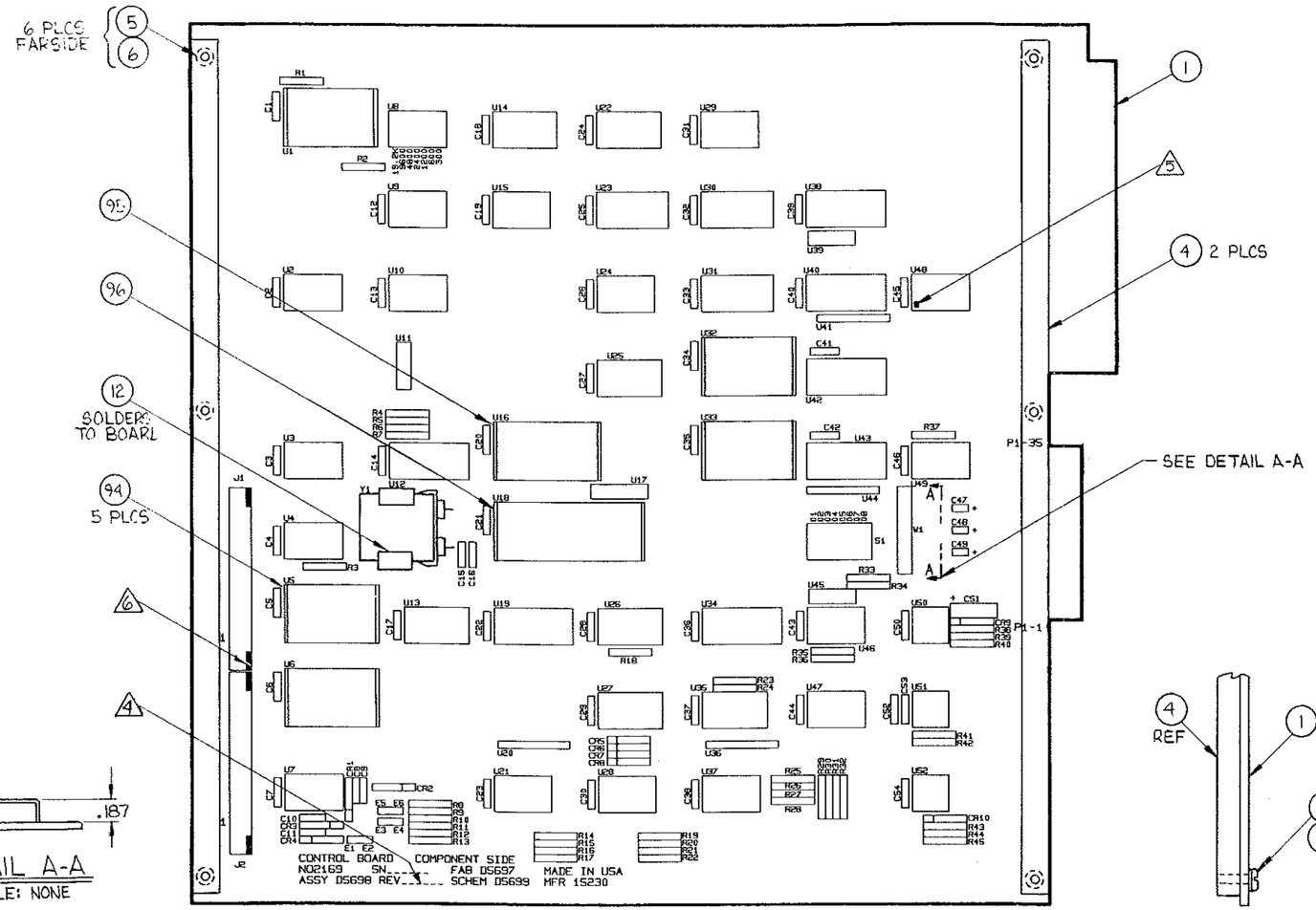


Figure 4-5. Modulator Block Diagram



NOTES: UNLESS OTHERWISE SPECIFIED

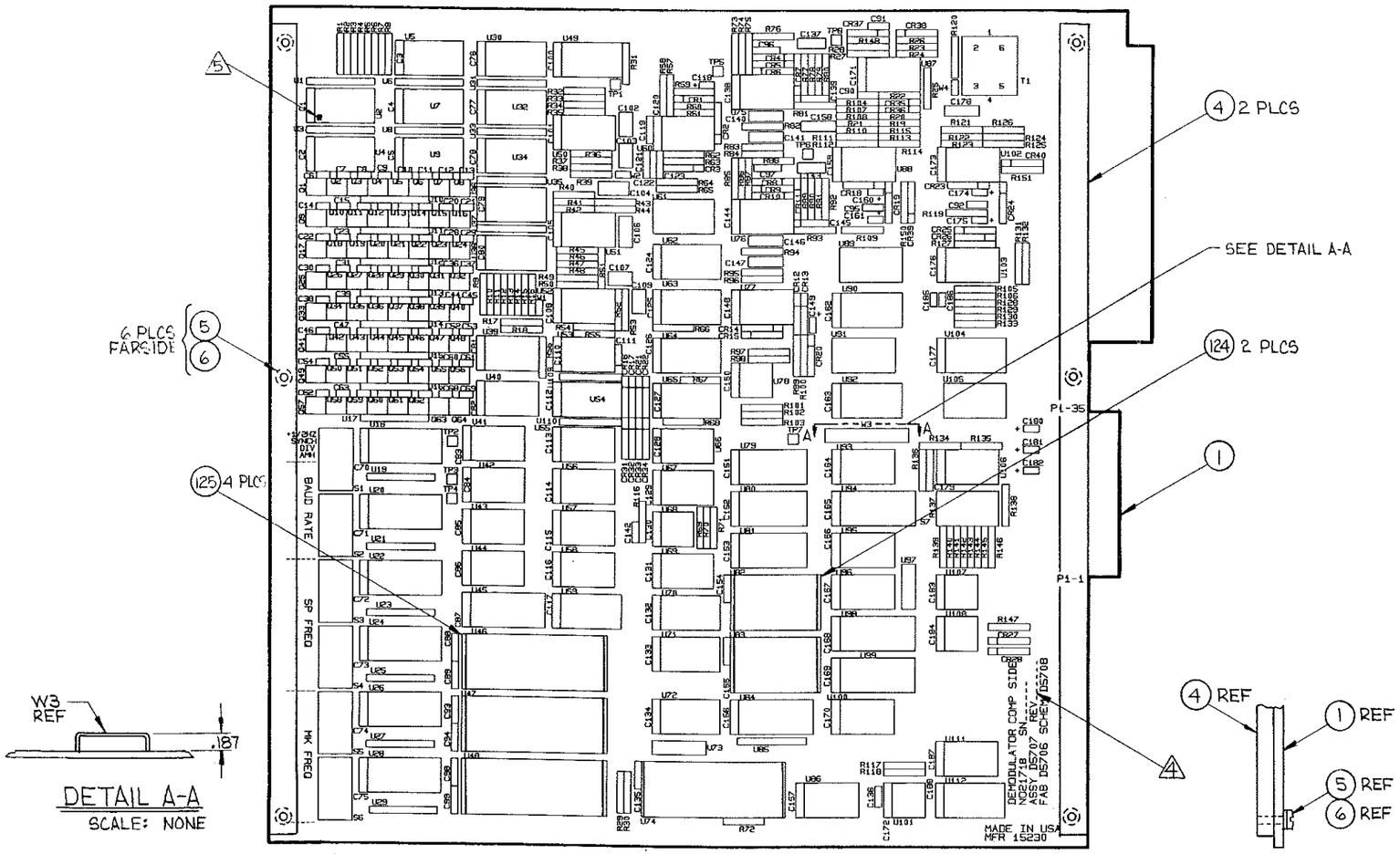
1. REFERENCE DOCUMENTS:
   P.C. BOARD-Nº2169
   FABRICATION DWG-D5697
   SCHEMATIC DWG-D5699
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.

△4 MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING WHITE EPOXY INK, APPROXIMATELY WHERE SHOWN.

△5 PIN 1 ORIENTATION TYPICAL, DENOTED BY SQUARE PAD ON PWB.

△6 INSTALL J1 AND J2 WITH KEYING TABS IN TOWARD BOARD.

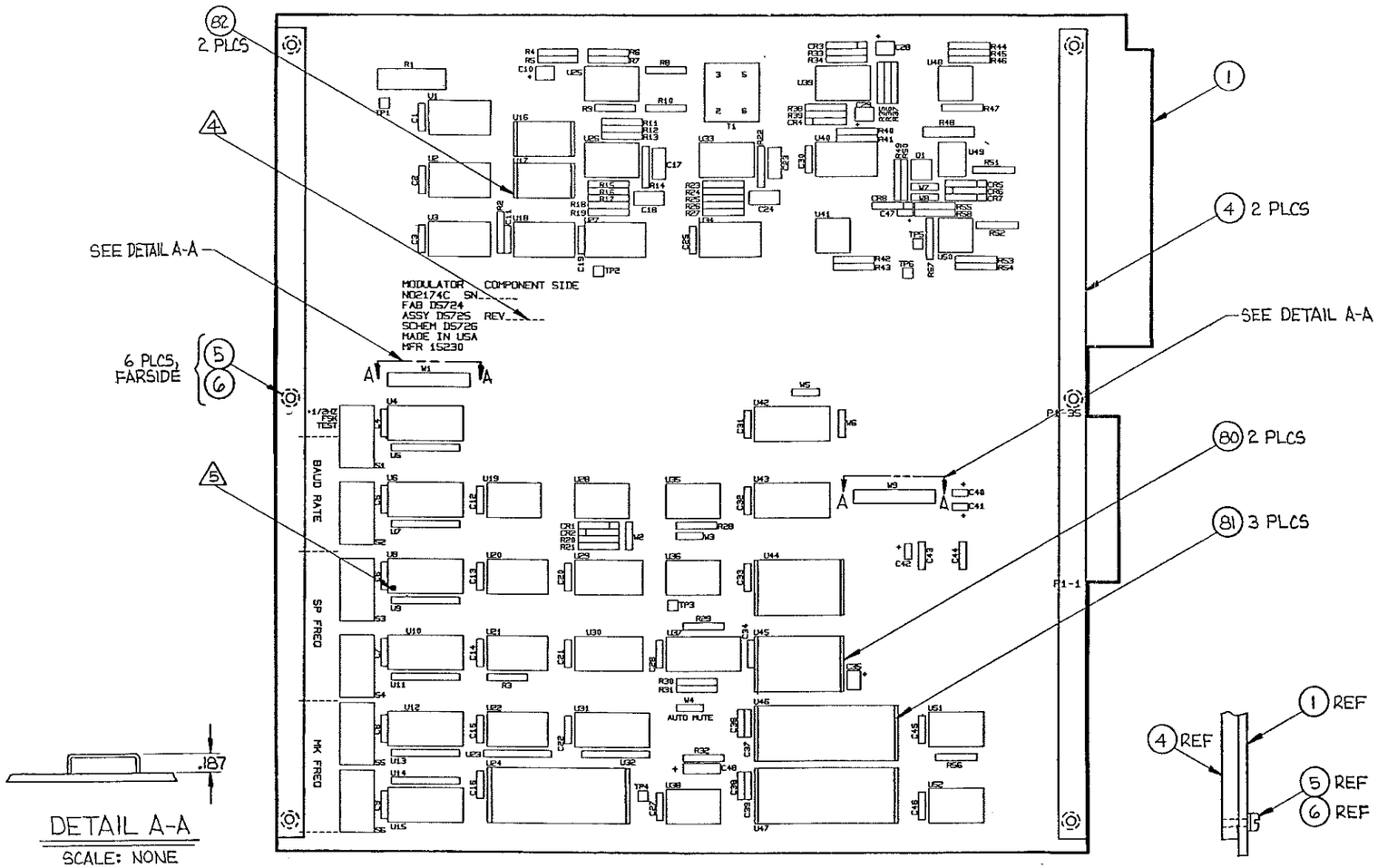
Figure 6-8. Control PWB Assembly (D5698D)



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   P.C. BOARD-№2171
   FABRICATION DWG-D5706
   SCHEMATIC DWG-D5708
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING WHITE EPOXY INK, APPROXIMATELY WHERE SHOWN.
5. PIN 1 ORIENTATION TYPICAL, DENOTED BY SQUARE PAD ON PWB.
6. DO NOT INSTALL U82, MAINTAIN POSITION FOR FUTURE USE.

Figure 6-9. Demodulator PWB Assembly (D5707D)



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   P.C. BOARD-Nº 2174
   FABRICATION DWG-D5724
   SCHEMATIC DWG-D5726
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING WHITE EPOXY INK, APPROXIMATELY WHERE SHOWN.
5. PIN 1 ORIENTATION DENOTED BY SQUARE PAD ON PWB.
6. DO NOT INSTALL U45; MAINTAIN POSITION FOR FUTURE USE.

Figure 6-10. Modulator PWB Assembly (D5725D)