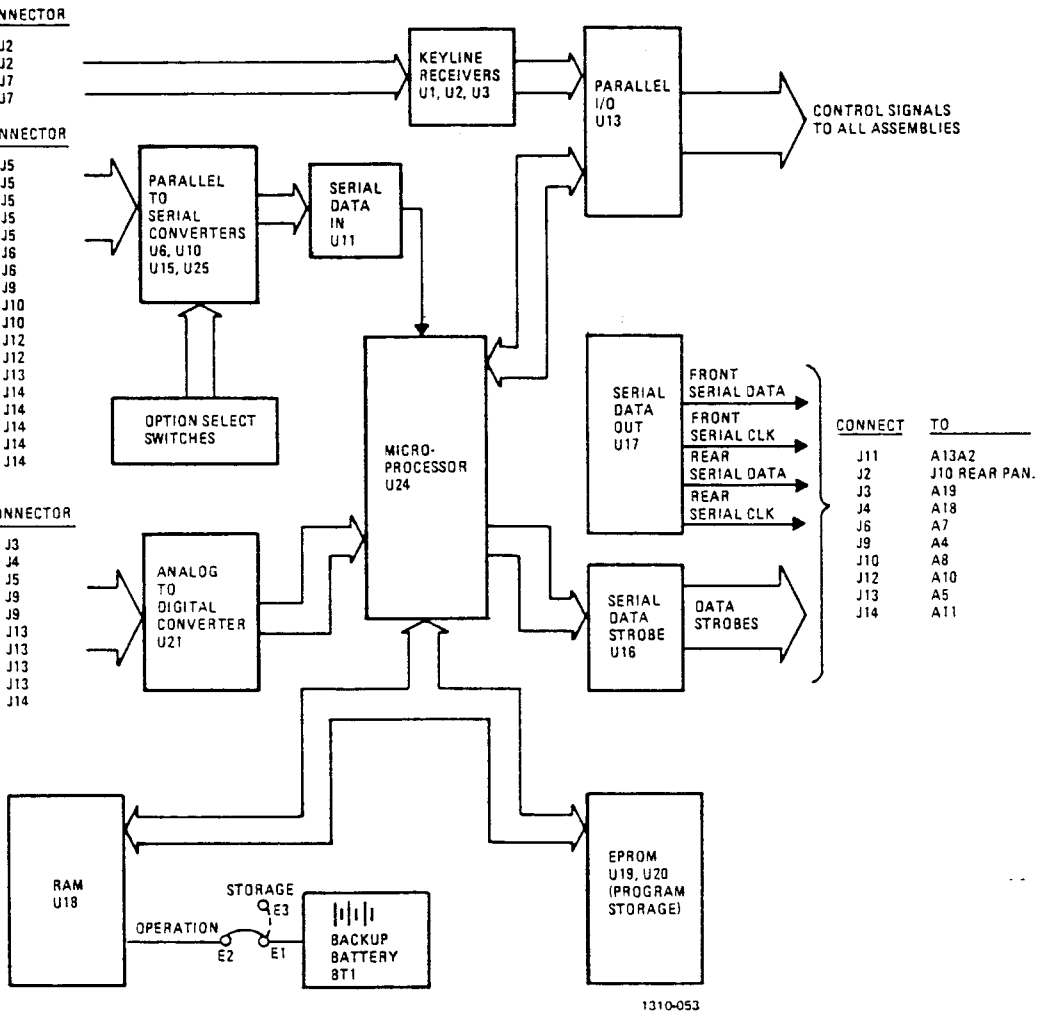
A14
CONTROL BOARD ASSEMBLY

SIG	FROM	CONNECTOR
AUX PTT	J10	J2
AUX CW	J10	J2
PTT KEY	A13A3	J7
CW KEY	A13A3	J7

SIG	FROM	CONNECTOR
PLL 1 LOCK	A6	J5
PLL 4 LOCK	A9	J5
800 KHZ DET	A12	J5
1 MHZ DET	A12	J5
40 MHZ DET	A12	J5
PLL 2 LOCK	A7	J6
PLL 2 SER CHK	A7	J6
A4 SER CHK	A4	J9
PLL 3 LOCK	A8	J10
PLL 3 SER CHK	A8	J10
PLL 5 LOCK	A10	J12
PLL 5 SER CHK	A10	J12
A5 SER CHK	A5	J13
A11 45 MHZ LOCK	A11	J14
A11 LOCK DET 1	A11	J14
A11 LOCK DET 2	A11	J14
A11 SER CHK 1	A11	J14
A11 SER CHK 2	A11	J14

SIG	FROM	CONNECTOR
FILTER I.D.	A19	J3
A1 OUTPUT DET	A1	J4
A2 BITE DET	A2	J5
IF ENVELOPE	A4	J9
COMBINER I.D.	A4	J9
USB ALC BITE	A5	J13
LSB ALC BITE	A5	J13
USB IF BITE	A5	J13
LSB IF BITE	A5	J13
A11 BITE DET	A11	J14



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CONTROL BOARD ASSEMBLY A14

1. GENERAL DESCRIPTION

Control Board Assembly A14 contains the 8085AH-2 CPU and associated peripheral circuits, serial data transmission circuits, parallel-to-serial reception circuits, parallel I/O circuits, keyline processing circuits, and analog-to-digital converter circuitry. The A14 assembly controls the RF-1310, accepts input from the front panel and exciter assemblies, and generates the digital signals necessary to control the exciter. Software contained within two, 8K byte EPROMs is executed to supervise, control, and in the BITE process, test the display, control, and signal generating circuitry. Random access read/write memory (RAM) is used to temporarily store the software program and store battery-backed exciter setups and programmed channels. Figure 1 shows the location of this assembly.

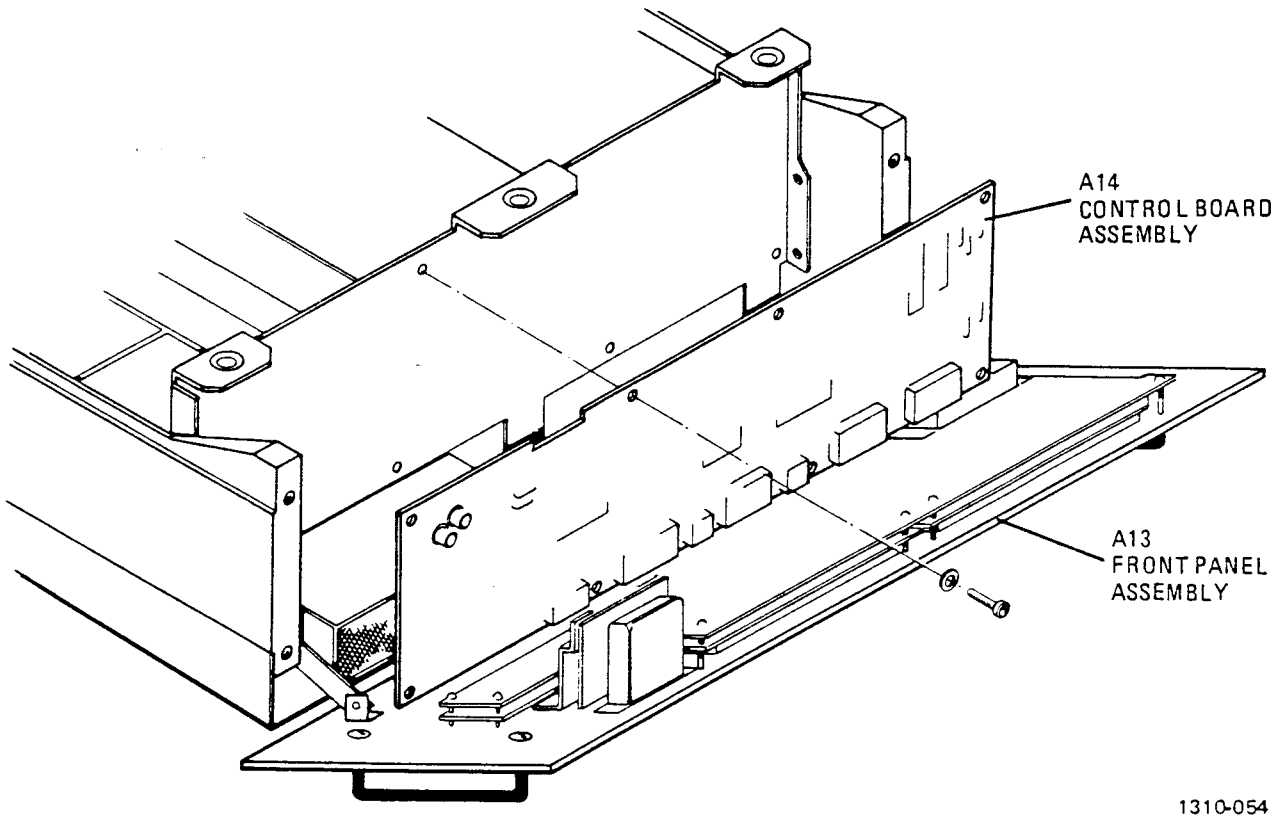


Figure 1. Control Board Assembly Exploded View

2. INTERFACE CONNECTIONS

All Control Board Assembly A14 interface connections are shown in table 1 and on the schematic diagram.

Table 1. RF-1310 Control Board Interface Lines

Connector	Function	To	From
A14J1	NC	----	----
A14J1-2	INDEX	----	----
A14J1-3	CONTROL +5 V	----	A15J3-21
A14J1-4	DISPLAY +5 V	----	A15J3-9
A14J2-1	AUXILIARY PTT KEY	----	J10-7
A14J2-2	AUXILIARY CW KEY	----	J10-9
A14J2-3	SPARE	----	----
A14J2-4	REMOTE IN 0	----	J10-20
A14J2-5	PRI FAIL	J10-9	----
A14J2-6	REMOTE OUT 0	J10-16	----
A14J2-7	REMOTE OUT 1	J10-31	----
A14J2-8	REMOTE IN 1	----	J10-5
A14J2-9	FAULT	J10-4	----
A14J2-10	NC	----	----
A14J2-11	REAR SERIAL CLOCK	J10-3	----
A14J2-12	REAR SERIAL DATA	J10-1	----
A14J2-13	BUFFERED SERIAL ENABLE 1	J10-18	----
A14J2-14	BUFFERED SERIAL ENABLE 2	J10-32	----
A14J3-1	SPARE	----	----
A14J3-2	FILTER, ID	----	A19J1-2
A14J3-3	SPARE	----	----
A14J3-4	SPARE	----	----
A14J3-5	SPARE	----	----
A14J3-6	INDEX	----	----
A14J3-7	EXTERNAL MUTE	----	A19J1-7
A14J3-8	SERIAL ENABLE	A19J1-8	----
A14J3-9	REAR SERIAL DATA	A19J1-9	----
A14J3-10	REAR SERIAL CLOCK	A19J1-10	----
A14J4-1	CW KEY	A18J2-1	----
A14J4-2	PTT KEY	A18J2-2	----
A14J4-3	RESET	A18J2-3	----
A14J4-4	GROUND	A18J2-4	----
A14J4-5	FSK SHIFT	----	A18J2-5
A14J4-6	PRI FAIL	----	A18J2-6
A14J4-7	IF ENVELOPE	A18J2-7	----
A14J4-8	REAR SERIAL CLOCK	A18J2-8	----
A14J4-9	REAR SERIAL DATA	A18J2-9	----
A14J4-10	SPARE	----	----

Table 1. RF-1310 Control Board Interface Lines (Cont.)

Connector	Function	To	From
A14J4-11	SERIAL ENABLE	A18J2-11	----
A14J4-12	SERIAL DATA IN	----	A18J2-12
A14J4-13	SPARE	----	----
A14J4-14	INTERNAL KEY	A18J2-14	----
A14J4-15	BUSY	----	A18J2-15
A14J4-16	A1 OUTPUT DETECT	----	A18J2-16
A14J4-17	READ SELECT	A18J2-17	----
A14J4-18	ATTNC	----	A18J2-18
A14J4-19	PPC CONTROL	----	A18J2-19
A14J4-20	BUFFERED APC	----	A18J2-20
A14J5-1	A2 BITE DET	----	A2J6-1
A14J5-2	NC	----	----
A14J5-3	A6 PLL 1 LOCK	----	A16A3J1-1
A14J5-4	INDEX	----	----
A14J5-5	A9 PLL 4 LOCK	----	A16A3J1-3
A14J5-6	A12 800 KHZ BITE DET	----	A16A3J1-4
A14J5-7	A12 1 MHZ BITE DET	----	A16A3J1-5
A14J5-8	A12 40 MHZ BITE DET	----	A16A3J1-6
A14J6-1	REAR SERIAL DATA	A7J1-10	----
A14J6-2	REAR SERIAL CLOCK	A7J1-9	----
A14J6-3	INDEX	----	----
A14J6-4	PLL 2 SERIAL CHECK	----	A7J1-7
A14J6-5	SERIAL ENABLE	A7J1-6	----
A14J6-6	PLL 2 LOCK	----	A7J1-5
A14J6-7	GROUND	A7J1-4	A7J1-5
A14J6-8	SPARE	----	----
A14J7-1	CW KEY	----	A13A3J1-1
A14J7-2	INDEX	----	----
A14J7-3	PTT KEY	----	A13A3J1-3
A14J7-4	SPARE	----	----
A14J7-5	BUFFERED APC	A13A3J1-5	----
A14J7-6	GROUND	A13A3J1-6	----
A14J7-7	A1 OUTPUT DET	A13A3J1-7	----
A14J7-8	SPARE	----	----
A14J8-1	POWER SUPPLY BITE	----	A15J3-22
A14J8-2	SPARE	----	----
A14J8-3	+ 15 V REGULATED	----	A15J3-23
A14J8-4	-15 V REGULATED	----	A15J3-11
A14J8-5	INDEX	----	----
A14J8-6	+ 5 V UNREGULATED	----	A15J3-12
A14J8-7	GROUND	----	A15J3-25
A14J8-8	GROUND	----	A15J3-13

Table 1. RF-1310 Control Board Interface Lines (Cont.)

Connector	Function	To	From
A14J9-1	REAR SERIAL DATA	A4J6-1	----
A14J9-2	REAR SERIAL CLOCK	A4J6-2	----
A14J9-3	A4 SERIAL CHECK	----	A4J6-3
A14J9-4	SERIAL ENABLE	A4J6-4	----
A14J9-5	IF ENVELOPE	----	A4J6-5
A14J9-6	PPC CONTROL	A4J6-6	----
A14J9-7	INTERNAL KEY	A4J6-7	----
A14J9-8	GROUND	A4J6-8	----
A14J9-9	INDEX	----	----
A14J9-10	COMBINER ID	A4J6-12	----
A14J9-11	SPARE	----	----
A14J9-12	NC	----	----
A14J10-1	REAR SERIAL DATA	A8J4-10	----
A14J10-2	REAR SERIAL CLOCK	A8J4-9	----
A14J10-3	INDEX	----	----
A14J10-4	PLL 3 SERIAL CHECK	----	A8J4-7
A14J10-5	SERIAL ENABLE	A8J4-6	----
A14J10-6	PLL 3 LOCK	----	A8J4-5
A14J10-7	GROUND	A8J4-4	----
A14J10-8	SPARE	----	----
A14J11-1	NC	----	----
A14J11-2	FRONT SERIAL DATA	A13A2J1-2	----
A14J11-3	NC	----	----
A14J11-4	FRONT SERIAL CLOCK	A13A2J1-4	----
A14J11-5	NC	----	----
A14J11-6	-15 V	A13A2J1-6	----
A14J11-7	DISPLAY +5 V	A13A2J1-7	----
A14J11-8	POWER SUPPLY BITE	A13A2J1-8	----
A14J11-9	PB3	A13A2J1-9	----
A14J11-10	KEYBOARD STROBE	A13A2J1-10	----
A14J11-11	PB2	A13A2J1-11	----
A14J11-12	FAULT	----	A13A2J1-12
A14J11-13	PB1	A13A2J1-13	----
A14J11-14	DISPLAY STROBE	A13A2J1-14	----
A14J11-15	PB0	A13A2J1-15	----
A14J11-16	RESET	A13A2J1-16	----
A14J11-17	NC	----	---
A14J11-18	GROUND	A13A2J1-18	----
A14J11-19	+5 V UNREGULATED	A13A2J1-19	----
A14J11-20	GROUND	A13A2J1-20	----
A14J12-1	REAR SERIAL DATA	A10J1-10	----
A14J12-2	REAR SERIAL CLOCK	A10J1-9	
A14J12-3	INDEX	----	----
A14J12-4	PLL 5 SERIAL CHECK	----	A10J1-7
A14J12-5	SERIAL ENABLE	A10J1-6	----

Table 1. RF-1310 Control Board Interface Lines (Cont.)

Connector	Function	To	From
A14J12-6	PLL 5 LOCK	----	A10J1-5
A14J12-7	GROUND	A10J1-4	----
A14J12-8	SPARE	----	----
A14J13-1	REAR SERIAL DATA	A15A1J3-24	----
A14J13-2	REAR SERIAL CLOCK	A15A1J3-23	----
A14J13-3	A5 SERIAL CHECK	----	A5A1J3-22
A14J13-4	SERIAL ENABLE	A5A1J3-21	----
A14J13-5	SPARE	----	----
A14J13-6	USB ALC BITE DET	----	A5A1J3-19
A14J13-7	USB IF BITE DET	----	A5A1J3-18
A14J13-8	LSB ALC BITE DET	----	A5A1J3-17
A14J13-9	LSB IF BITE DET	----	A5A1J3-16
A14J13-10	REM LINE AUDIO GRD	A5A1J3-15	----
A14J13-11	SPARE	----	----
A14J13-12	REMOTE LINE AUDIO	A5A1J3-13	----
A14J13-13	SPARE	----	----
A14J13-14	VOX KEYLINE	A5A1J3-11	----
A14J13-15	GROUND	A5A1J3-10	----
A14J13-16	FM AUDIO	A5A1J3-9	----
A14J13-17	SPARE	----	----
A14J13-18	-15 V	A5A1J3-7	----
A14J13-19	INTERNAL KEY	A5A1J3-6	----
A14J13-20	+ 15 V	A5A1J3-5	----
A14J13-21	SPARE	----	----
A14J13-22	CLIP ENABLE	A5A1J3-3	----
A14J13-23	SPARE	----	----
A14J13-24	SPARE	----	----
A14J14-1	GROUND	A11J3-1	----
A14J14-2	SPARE	----	----
A14J14-3	A11 BITE DET	----	A11J3-3
A14J14-4	REAR SERIAL DATA	A11J3-4	----
A14J14-5	SERIAL ENABLE 1	A11J3-5	----
A14J14-6	REAR SERIAL CLOCK	A11J3-6	----
A14J14-7	A11 45 MHZ LOCK	----	A11J3-7
A14J14-8	FSK SHIFT	A11J3-8	----
A14J14-9	INTERNAL KEY	A11J3-9	----
A14J14-10	FM AUDIO	A11J3-10	----
A14J14-11	A11 LOCK DET 1	----	A11J3-11
A14J14-12	SPARE	----	----
A14J14-13	SERIAL ENABLE 2	A11J3-13	----
A14J14-14	A11 SERIAL CHECK 1	----	A11J3-14
A14J14-15	A11 LOCK DET 2	----	A11J3-15
A14J14-16	A11 SERIAL CHECK 2	----	A11J3-16
A14J15-1	+ 5 V UNREGULATED	A17J1-1	----

Table 1. RF-1310 Control Board Interface Lines (Cont.)

Connector	Function	To	From
A14J15-2	+5 V UNREGULATED	A17J1-2	----
A14J15-3	RESET OUT	A17J1-3	----
A14J15-4	HOLD	----	A17J1-4
A14J15-5	REMOTE LINE AUDIO	A17J1-5	----
A14J15-6	HLDA	A17J1-6	----
A14J15-7	REMOTE LINE AUDIO GROUND	A17J1-7	----
A14J15-8	CLOCK OUT	A17J1-8	----
A14J15-9	+15 V	A17J1-9	----
A14J15-10	GROUND	A17J1-10	----
A14J15-11	READY	----	A17J1-11
A14J15-12	-15 V	A17J1-12	----
A14J15-13	RST 5.5	----	A17J1-13
A14J15-14	IO/M	A17J1-14	----
A14J15-15	INTR	----	A17J1-15
A14J15-16	S1	A17J1-16	----
A14J15-17	WR	A17J1-17	----
A14J15-18	RD	A17J1-18	----
A14J15-19	INTA	A17J1-19	----
A14J15-20	ALE	A17J1-20	----
A14J15-21	NC	----	----
A14J15-22	NC	----	----
A14J15-23	AD0	A17J2-3	BIDIRECTIONAL
A14J15-24	NC	----	BIDIRECTIONAL
A14J15-25	AD1	A17J2-5	BIDIRECTIONAL
A14J15-26	A15	A17J2-6	----
A14J15-27	AD2	A17J2-7	BIDIRECTIONAL
A14J15-28	A14	A17J2-8	----
A14J15-29	AD3	A17J2-9	BIDIRECTIONAL
A14J15-30	A13	A17J2-10	----
A14J15-31	AD4	A17J2-11	BIDIRECTIONAL
A14J15-32	A12	A17J2-12	----
A14J15-33	AD5	A17J2-13	BIDIRECTIONAL
A14J15-34	A11	A17J2-14	----
A14J15-35	AD6	A17J2-15	BIDIRECTIONAL
A14J15-36	A10	A17J2-16	----
A14J15-37	AD7	A17J2-17	BIDIRECTIONAL
A14J15-38	A9	A17J2-18	----
A14J15-39	GROUND	A17J2-19	----
A14J15-40	A8	A17J2-20	----

3. FUNCTIONAL DESCRIPTION

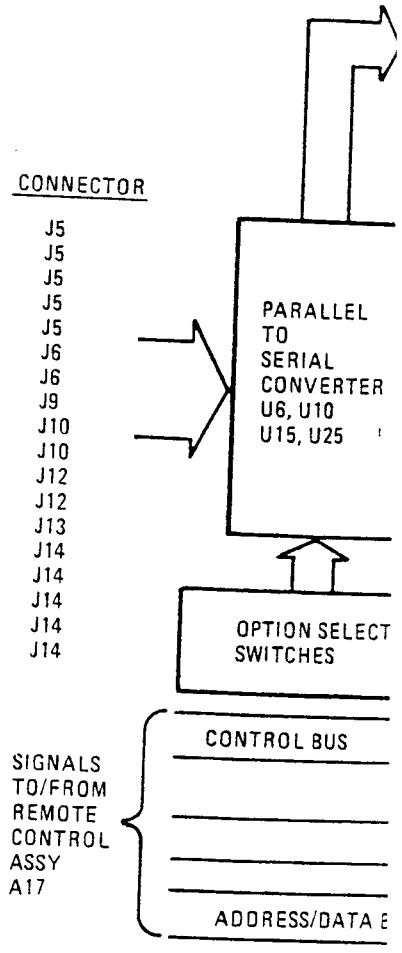
3.1 CPU and Interface

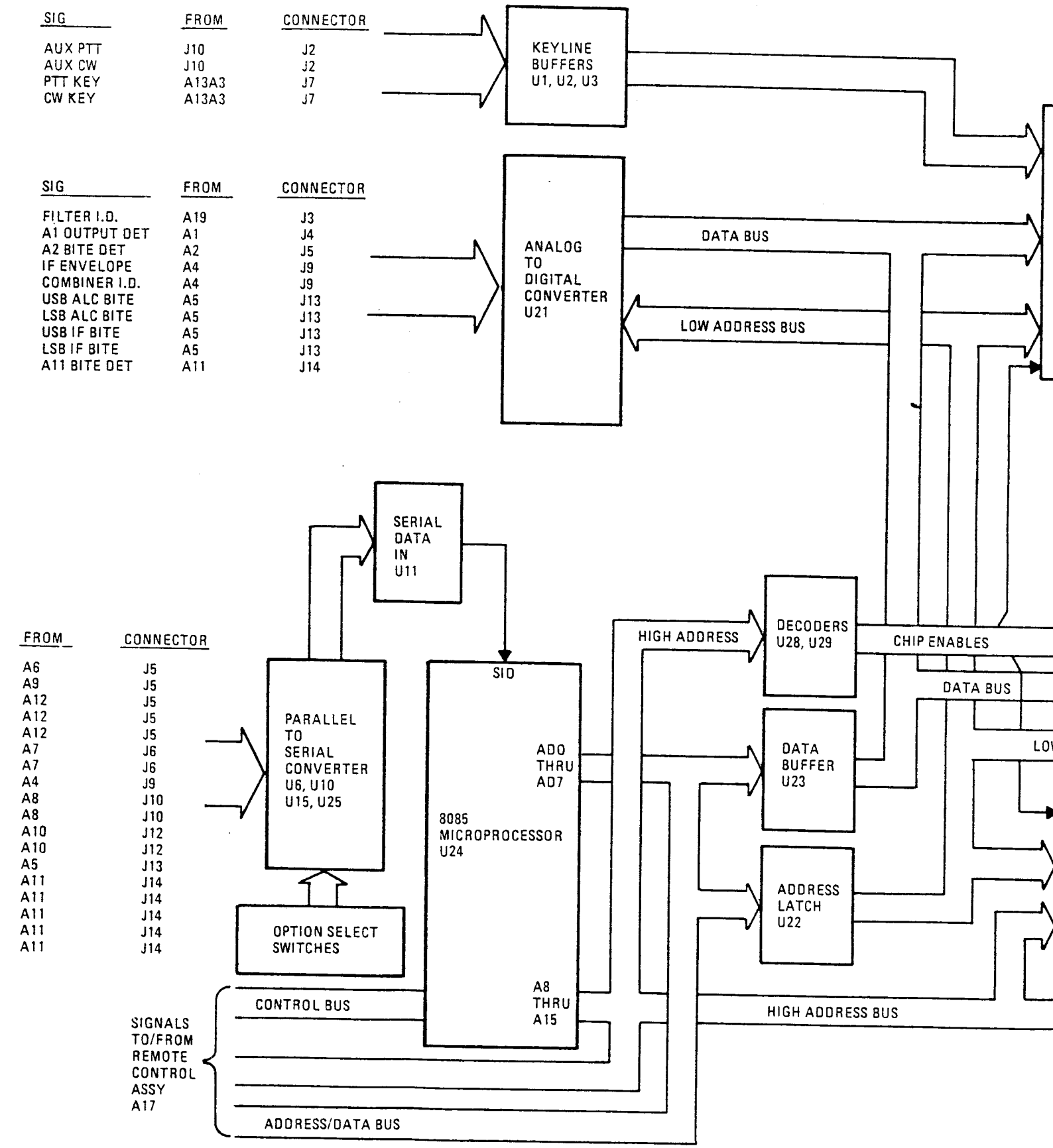
Figure 2 is a functional block diagram of the Control Board Assembly A14. The U24 8085AH-2 microprocessor executes the application program. The 6.0 MHz frequency of crystal Y1 is divided-by-two within U24 to yield

SIG	FROM	CONNECTOR
AUX PTT	J10	J2
AUX CW	J10	J2
PTT KEY	A13A3	J7
CW KEY	A13A3	J7

SIG	FROM	CONNECTOR
FILTER I.D.	A19	J3
A1 OUTPUT DET	A1	J4
A2 BITE DET	A2	J5
IF ENVELOPE	A4	J9
COMBINER I.D.	A4	J9
USB ALC BITE	A5	J13
LSB ALC BITE	A5	J13
USB IF BITE	A5	J13
LSB IF BITE	A5	J13
A11 BITE DET	A11	J14

SIG	FROM	CONNECTOR
PLL 1 LOCK	A6	J5
PLL 4 LOCK	A9	J5
800 KHZ DET	A12	J5
1 MHZ DET	A12	J5
40 MHZ DET	A12	J5
PLL 2 LOCK	A7	J6
PLL 2 SER CHK	A7	J6
A4 SER CHK	A4	J9
PLL 3 LOCK	A8	J10
PLL 3 SER CHK	A8	J10
PLL 5 LOCK	A10	J12
PLL 5 SER CHK	A10	J12
A5 SER CHK	A5	J13
A11 45 MHZ CHK	A11	J14
A11 LOCK DET 1	A11	J14
A11 LOCK DET 2	A11	J14
A11 SER CHK 1	A11	J14
A11 SER CHK 2	A11	J14




SIG
FROM
CONNECTOR
AUX PTT
J10
J2
AUX CW
J10
J2
PTT KEY
A13A3
J7
CW KEY
A13A3
J7
KEYLINE BUFFERS U1, U2, U3
SIG
FROM
CONNECTOR
FILTER I.D.
A19
J3
A1 OUTPUT DET
A1
J4
A2 BITE DET
A2
J5
IF ENVELOPE
A4
J9
COMBINER I.D.
A4
J9
USB ALC BITE
A5
J13
LSB ALC BITE
A5
J13
USB IF BITE
A5
J13
LSB IF BITE
A5
J13
A11 BITE DET
A11
J14
ANALOG TO DIGITAL CONVERTER U21
DATA BUS
LOW ADDRESS BUS
SERIAL DATA IN U11
FROM
CONNECTOR
A6
J5
A9
J5
A12
J5
A12
J5
A12
J5
A7
J6
A7
J6
A4
J9
A8
J10
A8
J10
A10
J12
A10
J12
A5
J13
A11
J14
A11
J14
A11
J14
A11
J14
A11
J14
PARALLEL TO SERIAL CONVERTER U6, U10 U15, U25
OPTION SELECT SWITCHES
SID
AD0 THRU AD7
8085 MICROPROCESSOR U24
A8 THRU A15
HIGH ADDRESS
DECODERS U28, U29
CHIP ENABLES
DATA BUS
DATA BUFFER U23
ADDRESS LATCH U22
CONTROL BUS
HIGH ADDRESS BUS
SIGNALS TO/FROM REMOTE CONTROL ASSY A17
ADDRESS/DATA BUS

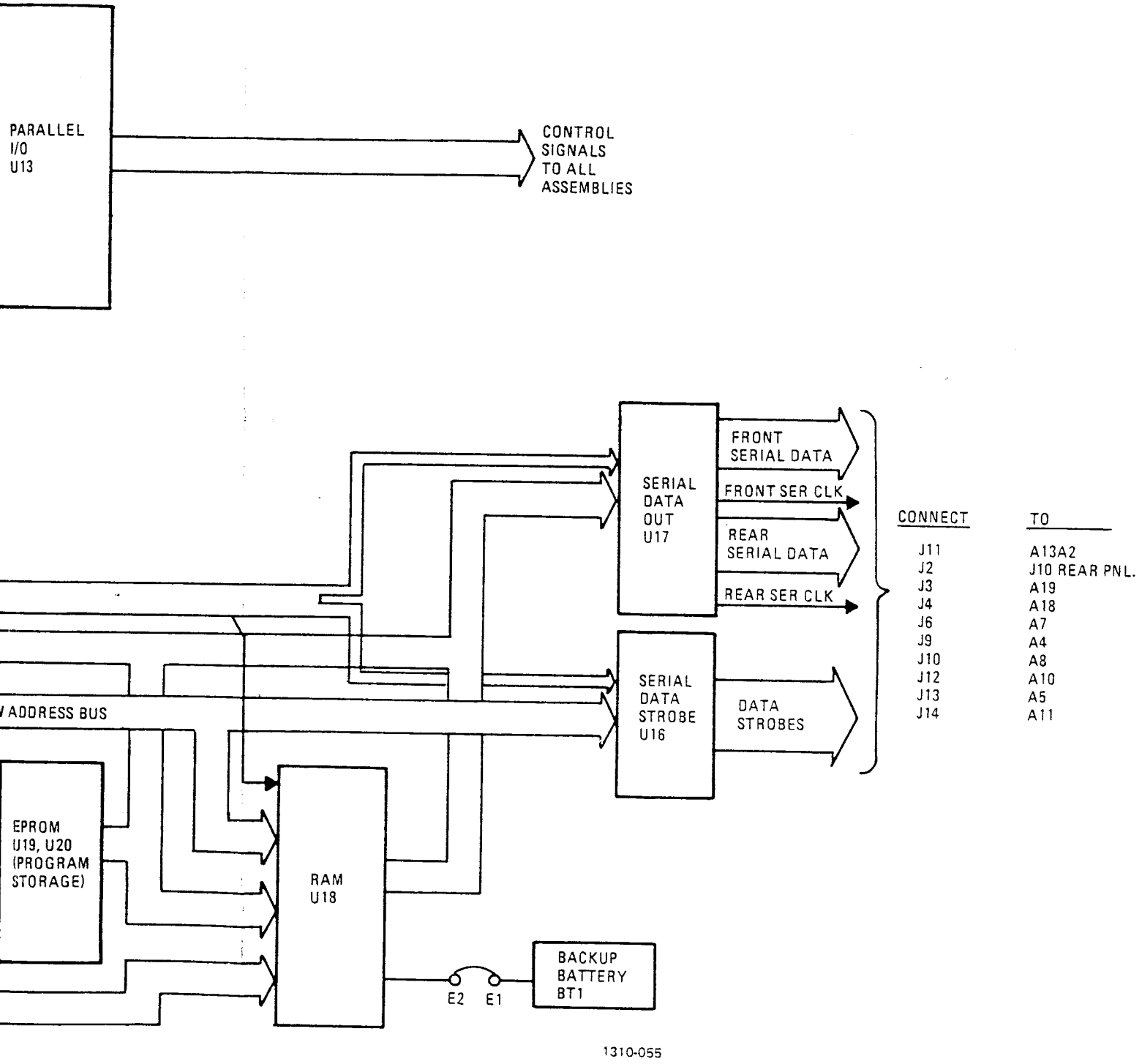


Figure 2. Control Board Assembly A14
Functional Block Diagram

the 3.0 MHz processor timing (333 nanosecond cycle time). This 3.0 MHz signal is further divided by binary counter U8 and divide-by-12 counter U9 to produce the real time clock frequency of 977 Hz and the A-to-D clock frequency of 750 kHz. The high order address bits of the CPU are inputs to address decoder U28, producing one of four active low chip selects to peripheral circuits, as well as two additional selects. These two additional selects are in turn fed into a dual one-to-four decoder U30 to produce four additional selects that are related to the RD and WR pulses. The multiplexed low address/data (AD) bus from U24 is input to low address latch U22 and to the data bus transceiver U23.

The control lines RD and WR are buffered by two gates of U26, with highest address line A15 and interrupt lines gated through U29 to control the enabling of U23. As mentioned earlier, the RD and WR signal are combined with several of the enable outputs of U30 as well as U26 to produce chip selects for various chips and control serial data operations. The major outputs of the microprocessor are also run to connector J15 for access to the installed remote, with R31, R32, R36, and R37 holding the lines at their proper logic levels. Lines of address and data busses are pulled up through resistor pack R25 and R26, respectively. The active high interrupt line of the CPU are dedicated as follows:

- RST 7.5 uses the real-time clock
- RST 6.5 is used by the system interface assembly
- RST 5.5 is used by the remote control option

3.2 Reset and Trap

When the power is turned on, the RC network (formed by R38 and C31) holds the processor RESET IN input low for about 100 milliseconds. This allows the power supplies time to stabilize before the CPU starts running. Diode CR9 and Q4 detect a falling + 5 V supply and pull the RESET IN input low to avoid spurious operation on exciter power down or loss. At such times, the chip select to the CMOS RAM U18 is disabled (FET Q2), before the RAM enters its battery-backed condition.

The reset can be initiated manually by pressing pushbutton S3. Pressing S3 grounds the RESET IN input.

During normal program execution, the microprocessor SOD output sends a low active pulse to the retriggerable one-shot U27 every millisecond. If the CPU is affected by noise on the busses or some other failure, the one-shot will time out and restart the microprocessor through the 8085AH-2 TRAP input. Components C34 and R43 set this one-shot timeout to 50 milliseconds. The one-shot is also reset on powerup.

3.3 Memory

The firmware program is stored in two, 2764 8K byte EPROMs, U19 and U20. The program steps and data contained in these devices are accessed by the chip selects from U28 to each EPROM, gated onto the data bus with an output enable from the RD signal.

The information stored in the EPROMs is part of the RF-1310 software and cannot be altered by the customer.

CAUTION

EPROMs are ultraviolet erasable over extended periods of exposure to fluorescent light or sunlight which can erase the memory information. Do not remove the opaque protective shield on these devices.

The 6116 2K byte static CMOS RAM (U18) contains the channel storage. A fully charged battery, BT1, in the backup power supply should maintain channel storage for one month. In normal exciter operation, the trickle charge circuit will recharge a dead battery in 24 hours. Terminals E1-E2, left unjumpered, isolate the battery from the board circuitry for prolonged storage without maintaining channel memory to prevent battery discharge. However, E1 and E2, must be connected prior to operating the exciter to provide the battery backup provision, and to avoid damage to U18.

3.4 Parallel Input/Output

The 8255A U13 provides 22 lines of interface through two output ports and one input port which handle a variety of exciter controls and functions. The functions and modules associated with each port are shown in table 2.

Table 2. 8255A Port to Module Correlation

Port	Associated Module
PA OUTPUT	Post Selector, Rear Panel, System Interface, Carrier Generator, Combiner, Audio Assembly, and A14 Serial Data Generation Circuitry.
PB INPUT	Rear Panel, System Interface, A14 Keyline Circuitry, and A14 A-to-D Converter (U21).
PC OUTPUT	Rear Panel and A14 Parallel/Serial Conversion Circuitry.

3.5 Parallel/Serial Conversions

Four, 4021 type parallel-to-serial converters, U6, U10, U15, and U25 handle the parallel-to-serial conversions that take place on Control Board Assembly A14. When one group of eight parallel inputs needs to be read in, the appropriate converter is selected by multiplexer U11. A pulse is then generated through U17 to that converter to latch the parallel information into its buffers. The front serial clock is then used to clock the eight bits of information from that 4021 into the processor through the CPU SID line. Converters U6, U15, and U25 are used to read in BITE status lines and U10 reads in the options select switch S2. (See paragraph 4.) Table 3 lists the modules affected by each parallel-to-serial converter.

3.6 Serial Output

Most of the control signals within the RF-1310 Exciter are sent serially from the A14 assembly. The serial data transmission circuitry consists of U12, U13, and U17. The data to be written out is loaded into U17 and clocked out as either front data or rear data by a clock generated through an output port on U13. Front serial data and clock signals control the front panel and display assembly functions. All other assemblies are controlled by the rear serial data and clock. All assemblies controlled by each serial control line receive the same data simultaneously. Address signals and strobe pulses generated by U16 are used to gate the data into the individual assemblies.

3.7 Analog Inputs

Analog-to-digital (A/D) converter U21 handles all the analog inputs to the A14 assembly. With a few exceptions, the majority of these inputs are used for BITE testing. Most are generated on the assemblies involved with audio and RF signal processing and reflect the signal level at the output of the individual

Table 3. Parallel/Serial Converter Modules

Converter	Module Affected
U10	Options Switch S2
U15	Front Panel Signals, PB0 through PB4 Combiner, Serial Check, and PLL 3 - Serial Check/Lock
U6	PLL 1 Lock, PLL 4 Lock Reference Generator 800 kHz, 1 MHz, 40 MHz Locks PLL 2 Serial Check/Lock
U25	Carrier Generator - 45 MHz Lock/Lock 1 Lock 2 Serial Check 1/Serial Check 2 Audio Assembly/Serial Check PLL 5 Serial Check/Lock

assemblies. Two other lines are used as a postselector indicator line and a line which indicates the combiner assembly option as installed. In order to maintain a high degree of accuracy, the A/D converter is powered off its own + 5 volt reference VR1. The EOC line of the A/D converter is read back through an input port of the 8255A U13 and is used during BITE to verify the conversion time of the A/D converter.

4. PROGRAMMABLE OPTIONS SELECTIONS

Automatic Level Control (ALC), Voice Activated Keying (VOX), and the desired FSK shift are selected at the options selection switch S2. S2 is located near the top edge of the A14 assembly. The desired selections are then programmed into the exciter via pushbutton switch S1. S1 is located near the bottom edge of the A14 PWB between J8 and J9. ALC operation is enabled or disabled individually at S2 for each of the six audio inputs. ALC Hangtime is programmed for VOICE (one second) or DATA (fifty milliseconds) on AUX 1 and AUX 2. VOX operation is available for USB, AM, AFSK, and 2ISB. The FSK shift can be set for 85 Hz, 170 Hz, 425 Hz, or 850 Hz.

The options are selected by setting the individual switches of S2 to the desired positions as described in the following tables and example procedure. The selected parameters are retained in the exciter's CMOS RAM. Memory protection is provided by a back up battery.

Switch S2, positions 1 and 2 are used to select the ALC, ALC Hangtime/VOX or FSK frequency shift option group as summarized in table 4. When programming the ALC option group, positions 3 through 8 of S2 are used to select ALC on or off for each of the audio inputs as listed in table 5. For ALC Hangtime/VOX option, positions 4 and 5 select VOICE or DATA operation for AUX 1 and/or AUX 2 inputs. VOX operation for all USB audio inputs is turned on or off at S2 position 8, as shown in table 6. To select the desired FSK frequency shift, S2 positions 3 and 4 should be set as shown in table 7. (NOTE: For all frequency shift options, S2 positions 5 through 8 are in the closed position.)

Table 4. General Options Available

Options Group	S2 Positions		Description
	S2-1	S2-2	
ALC	C	C	When the ALC option group is selected, switches S2-3 through S2-8 control whether the ALC operation for a particular audio input is on or off.
ALC HANGTIME/VOX	C	O	Switches S2-4 and S2-5 select an ALC HANGTIME for VOICE or DATA operation on inputs AUX 1 and AUX 2 (Closed = DATA; Open = VOICE). S2-8 enables or disables the VOX option for all USB audio inputs. (S2-8; Closed = VOX OFF; Open = VOX ON)
FSK FREQUENCY SHIFT	O	C	S2 positions -3, and -4 select FSK Freq. Shift option per Table 7.

O = Switch section in open position
C = Switch section in closed position

Table 5. ALC Options

Note: S2-1 and S2-2 closed

Switch Position	S2-3	S2-4	S2-5	S2-6	S2-7	S2-8
O = ALC OFF C = ALC ON	AUX 3	AUX 2	AUX 1	LSB	USB	MIC

O = Switch section in open position
C = Switch section in closed position

Table 6. ALC Hangtime (Aux 1 and Aux 2)/VOX Options (All USB Inputs)

Note: S2-1 Closed, S2-2 Open

Switch Position	S2-3	S2-4	S2-5	S2-6	S2-7	S2-8
O = VOICE C = DATA	----	AUX 2	AUX 1	----	----	VOX available for all Audio Inputs: On = Open Off = Closed

O = Switch section in open position
C = Switch section in closed position

Table 7. FSK Frequency Shift

Note: S2-1 Open, S2-2 Closed

Switch Position	S2-3	S2-4	S2-5	S2-6	S2-7	S2-8
Shift Frequency						
85 Hz (± 42 Hz)	C	C	C	C	C	C
170 Hz (± 85 Hz)	O	C	C	C	C	C
425 Hz (± 212 Hz)	C	O	C	C	C	C
850 Hz (± 425 Hz)	O	O	C	C	C	C

O = Switch section in open position
C = Switch section in closed position

4.1 Programming Options

4.1.1 Programming for ALC Operation:

a. Close S2-1 and S2-2. This will place you in the ALC mode.

b. Select desired audio inputs. Close or open the applicable switch(es) per table 5.

S2-3 = AUX 3
S2-4 = AUX 2
S2-5 = AUX 1
S2-6 = LSB
S2-7 = USB
S2-8 = MIC

c. Depress S1 to enter the selection into memory.

4.1.2 Programming ALC Hangtime/VOX Operation:

a. To set the ALC Hangtime on Aux 1 and Aux 2, position S2-1 to the closed position and open S2-2.

b. Select ALC Hangtimes required for programming:

VOICE (1 second = switch position open)
DATA (50 milliseconds = switch position closed)
Close or open the applicable switch positions per table 6.

AUX 1 = S2-5
AUX 2 = S2-4

Note: VOX operation is available for USB, AM, AFSK, and 2ISB.

c. Select VOX operation on the above selected audio inputs;

S2-8 open = VOX on
S2-8 closed = VOX off

d. Depress S1 to enter the selection into memory.

4.1.3 Setting the FSK Frequency Shift Options:

a. Position S2-1 open and S2-2 closed.

b. Using table 7, determine the desired shift frequency and position S2-3 and S2-4 to the proper settings.

Note: S2-5, -6, -7, and -8 should be in the closed position when setting frequency options.

c. Depress S1 to enter the selection into memory.

NOTE

If data in the CMOS RAM is lost or corrupted, all options should be reprogrammed to ensure desired selections are used.

5. MAINTENANCE

CAUTION

Battery BT1 is in the circuit. Shorting this battery could result in severe circuit damage.

5.1 Alignment

Control Board Assembly A14 requires no adjustment to properly operate.

5.2 Troubleshooting

Although most of the circuitry on this assembly is controlled directly or indirectly by the microprocessor, a practice of standard digital troubleshooting methods alone will isolate most faults to the component level. A logic high is the level between 3 and 5 volts, and a proper logic low is typically between 0 and 1 volt. The circuit area involved in minor faults can be determined by BITE fault codes or by using paragraph 3 of this subsection. More general or major failures are best handled by following the instructions outlined in the following paragraphs.

5.2.1 CPU

If the microprocessor is running, it is capable of debugging several circuits on the A14 assembly by itself. However, first determine if the 8085AH-2 is operating.

These CPU input signals must be present in order for the device to run:

- U24-1, 2 Crystal inputs - 6 MHz

- U24-36 Reset input - High
- U24-6 Trap input - Low
- U24-35 Ready - High
- U24-39 Hold - Low

The A14 assembly + 5 volt supply should be between + 4.75 and + 5.1 volts. The following CPU outputs should be present:

- U24-37 Clock Out 3 MHz square wave
- U24-3 Reset out low
- U24-31 Write active-low pulses
- U24-32 Read active-low pulses
- U24-30 Address latch enable active-high pulses
- U24-4 SOD active-low pulses at 1 millisecond intervals

When the CPU is running and executing the application software, its outputs will only be active a portion of each millisecond. The rest of the time it will stop, waiting for a real-time clock interrupt from U9.

5.2.2 Trap and Reset Circuits

The trap circuit is provided to restart the CPU in the software if the device loses synchronization due to high noise levels on its busses. One-shot U27 is retriggered before timeout from U24, pin 4, the SOD output. The software will generate a low-active pulse every millisecond if it is working properly and if it gets the real-time clock interrupt. Low voltage on the + 5 supply to this board will cause the processor to reset due to the reset circuit Q2-Q5.

5.2.3 Device Selection

Address decoders U28 and U30 aid the access of devices through the data bus by outputting low-active chip enable signals corresponding to the address on the high-order bits of the CPU. During normal operation, the enables from U28 and U29 should be seen on pin 20 of U19, U20, U18, and U13-6.

5.2.4 Memory Circuits

It can be very difficult to troubleshoot memory problems if the 8085AH-2 is not operating. If the CPU is running, it can find some problems itself. If the BITE routine indicates a PROM checksum fault, the fact that it is running indicates that the data bus buffers are operating and the PROMs are accessed. However, invalid data in these devices would require replacement of PROMs U19 and U20.

If the BITE routine indicates a CMOS RAM fault, check that the enable pulse is getting to RAM U18, and check the voltage on U18-24. FET Q2 is driven by an enable from U30 as a switch to select U18. The chip enable should put the U2 gate at + 5 V unregulated to turn on the switch. The CMOS RAM is not connected directly to the + 5 V supply, and E1-E2 must be jumpered to avoid damaging the RAM when the power is turned on.

5.2.5 Real-Time Clock

The real time clock circuitry originates from the 3 MHz clock output of CPU U24-37. This is first divided down to 11.72 kHz by counter U8, then fed into U9 to reach the final frequency of 977 Hz. This 977 Hz has become the real time clock and is fed back to the processor as an interrupt through U24-7. Any problems with the real time clock operation can be isolated to a check of this circuitry.

5.2.6 Serial Out

The A14 assembly communicates with the display control board through its serial output circuit (U12, U13, and U17). If this circuit fails, the display will light up but will never change from its power up lamp test.

When the A14 assembly is operating normally, it will attempt to update the complete display once every second. Every second there will be a burst of 64 bytes to the display control board. (2 bytes of serial data sent every millisecond for a 32 millisecond total duration). Following every 2 bytes will be a strobe pulse to the display control board from U16-13.

The BITE routine tests the serial output circuit by sending a test pattern to the four PLLs and the two carrier generator PLLs, and then reading back a test bit from each. If it can set (high) and reset (low) all these test bits, it assumes that the serial output circuit on the A14 assembly is operating. If any one test bit cannot be set and reset, it assumes a problem with that PLL. Table 8 lists the serial data transmission circuit signals.

Table 8. Serial Data Transmission Circuit Signals

Signal	Description
U12-6	Rear serial clock
U12-11	Front serial clock
U13-17	Clock Frequency (software generated)
U13-38	Serial clock select: • High when sending rear serial data • Low when sending front serial data
U17-7, U12-8	Rear serial data
U17-9	Front serial data
U16-4 through 19	Assembly serial strobes, narrow active high pulses clock data on to the assembly being controlled

5.2.7 Serial In

All parallel/serial conversions take place through U6, U10, U16, U25, U11, U13, and U24. Converter U10 is used to read the options select switch, and the remaining converters are used to read in the BITE lines. If any of the logic lines that are read on the parallel sides of these converters end up showing as an error in BITE and are correct as inputs, then this parallel/serial conversion circuitry can be suspected. Signals involved in this circuitry are listed in table 9.

Table 9. Serial In Signals

Signal	Description
U11-9, 10, 11	MUX select - Active high determines which converter will be read in
U6-10, U15-10, U25-10, U10-10	Front serial clock - Clocks data out of converters and into MUX
U6-9, U15-9, U25-9, U10-9	Read line - Active high latches parallel information into 4021 buffers
U6-3, U15-3, U25-3, U11-2, U11-12, U11-14	Serial data in - 8 bits of serial data corresponding to parallel information

5.3 Keylines

All exciter keylines are handled through optoisolators U1 and U3, gate U2, and U13. No signals in the circuitry will be observed unless one of the keylines external to the exciter is activated. If a specific keyline has failed, its corresponding diode CR1 through CR4 should be checked. From there, a low on the opto output should be observed, and then the proper level on the corresponding output gate of U2, followed all the way into U13. If none of the keylines are functioning, there may be a problem with the internal keyline, making U13 suspect.

5.4 Parallel I/O

Parallel I/O is centralized through the ports on U13. If there is a BITE or operation problem concerning the modules controlled by the lines from these parallel circuits, but the module in question is not at fault, there may be a failure in the ports. Failure of proper A/D conversions or lack of any Internal Key signals are just a few signs that could indicate a defective U13.

5.5 Analog Conversions

A/D converter U21 is used primarily during BITE to read in and test the analog output levels of individual signal path assemblies. Starting any conversion consists of two writes to U21, narrow high-active pulses on U21-16. Ten microseconds (or less) later, the end-of-conversion (EOC) line will go low. It will stay low for 100 microseconds and after it goes high again there will be one narrow high-active pulse on U21-21. At that point, the digital version of the input signal read will be transferred on the data bus to the CPU. The above is true for all the other analog inputs sampled during the execution of BITE. Table 10 lists signals of the analog input circuit.

5.6 BITE Detected Faults

The faulting areas on the A14 assembly detectable through BITE are listed in table 11.

6. PARTS LIST, COMPONENT LOCATIONS, AND SCHEMATIC DIAGRAM

All replaceable components of Control Board Assembly A14 are listed in table 12. Component locations are shown in figure 3. Figure 4 is a schematic of the control board circuit.

Table 10. Analog Input Circuit Signals

Signal	Description
U8-1	Clock in - 3 MHz TTL square wave
U8-4	Clock Out - 750 kHz TTL square wave
U21-22	Clock in - 750 kHz TTL square wave
U21-16, 32	Start conversion - Two narrow high going pulses, every time a conversion is initiated
U21-13	End of Conversion - 85 microseconds low, at the completion of a conversion
U21-21	Output enable - narrow high going pulse.
U21-15, 18	Multiplexer out, comparator in

Table 11. BITE Detected Faults

Fault	Description
Fault 01	PROM failure: The binary checksum calculated from the contents of programmed U19 and U20 do not match the value programmed by the factory. Validity of firmware is doubtful, and after some initial checks, consideration should be given to replacing both devices.
Fault 02	Parallel/Serial conversion error: Error was detected in the reading in and shift of the test level (0 Vdc) at pin 8 of U6, U10, U15, and U25. Check these and U11 and U13.
Fault 03	CMOS RAM failure: Errors are found in the ability to store and retrieve data in U18. Check U18, check E1-E2 jumpering, BT1, Q2, and associated circuits.
Fault 04	Serial data input failure: Faulty serial input is detected. Check U12, U13, and U17.
Fault 05	Keyline logic failure: Error reading in the proper keyline closure. Check U1, U2, U12, and U13.
Fault 06	I/O Failure: Error detected in controlling U13. Replace U13.
Faults 07, 08, and 09	A/D failure: Failure in correctly making A-to-D conversions. Check U21, VR1, and U13. Check that all analog inputs to U21 are between 0 volts and 5 volts.

Table 12. Control Board Assembly A14 Parts List

Ref. Desig.	Part Number	Description
A14	10121-2800	CONTROL BOARD ASSEMBLY
	10121-8502	SOFTWARE KIT
	J65-0008-103	PLUG SHORTING 2-PIN FEM
	J46-0042-103	JUMPER HEADER
BT1	B41-0009-004	BATTERY
C1	C26-0010-221	CAP 220UF 20% 10V TANT
C2	M39014/02-1310	CAP .1UF 10% 100V CER-R
C3	C26-0010-221	CAP 220UF 20% 10V TANT
C4	C26-0010-221	CAP 220UF 20% 10V TANT
C5	C26-0010-221	CAP 220UF 20% 10V TANT
C6	M39014/02-1310	CAP .1UF 10% 100V CER-R
C7	M39014/02-1310	CAP .1UF 10% 100V CER-R
C8	M39014/02-1310	CAP .1UF 10% 100V CER-R
C9	M39014/02-1310	CAP .1UF 10% 100V CER-R
C10	M39014/02-1310	CAP .1UF 10% 100V CER-R
C11	M39014/02-1310	CAP .1UF 10% 100V CER-R
C12	M39014/02-1310	CAP .1UF 10% 100V CER-R
C13	M39014/02-1310	CAP .1UF 10% 100V CER-R
C14	M39014/02-1310	CAP .1UF 10% 100V CER-R
C15	M39014/02-1310	CAP .1UF 10% 100V CER-R
C16	M39014/02-1310	CAP .1UF 10% 100V CER-R
C17	M39014/02-1310	CAP .1UF 10% 100V CER-R
C18	C26-0010-680	CAP 68UF 20% 10V TANT
C19	C26-0010-680	CAP 68UF 20% 10V TANT
C20	C26-0010-680	CAP 68UF 20% 10V TANT
C21	M39014/02-1310	CAP .1UF 10% 100V CER-R
C22	M39014/02-1310	CAP .1UF 10% 100V CER-R
C23	M39014/02-1310	CAP .1UF 10% 100V CER-R
C24	M39014/02-1310	CAP .1UF 10% 100V CER-R
C25	M39014/02-1310	CAP .1UF 10% 100V CER-R
C26	M39014/02-1310	CAP .1UF 10% 100V CER-R
C27	M39014/02-1310	CAP .1UF 10% 100V CER-R
C28	M39014/02-1310	CAP .1UF 10% 100V CER-R
C29	C25-0001-313	CAP 100UF 20% 20V TANT
C30	C26-0035-159	CAP 1.5UF 20% 35V TANT
C31	C26-0016-150	CAP 15UF 20% 16V TANT
C32	C26-0050-479	CAP 4.7UF 20% 50V TANT
C33	C26-0050-479	CAP 4.7UF 20% 50V TANT
C34	C26-0050-109	CAP 1.0UF 20% 50V TANT
CR1	1N4454	DIODE 200mA 75V SW
CR2	1N4454	DIODE 200mA 75V SW
CR3	1N4454	DIODE 200mA 75V SW
CR4	1N4454	DIODE 200mA 75V SW
CR5	1N4454	DIODE 200mA 75V SW
CR6	1N4454	DIODE 200mA 75V SW

Table 12. Control Board Assembly A14 Parts List (Cont.)

Ref. Desig.	Part Number	Description
CR7	1N4454	DIODE 200mA 75V SW
CR8	1N4454	DIODE 200mA 75V SW
CR9	1N4454	DIODE 200mA 75V SW
CR10	1N4454	DIODE 200mA 75V SW
J1	J46-0032-004	CONN, 4 PIN
J2	J46-0013-014	CONN, 14 PIN
J3	J46-0032-010	HEADER, 10 PIN DISCRETE
J4	J46-0013-020	HEADER, PROTECTED, 20 PIN
J5	J46-0032-008	CONN,8 PIN
J6	J46-0034-008	CONN, 8 PIN
J7	J46-0032-008	CONN,8 PIN
J8	J46-0034-008	CONN, 8 PIN
J9	J46-0034-012	CONN, 12 PIN
J10	J46-0034-008	CONN, 8 PIN
J11	J46-0031-020	CONN 20 PIN
J12	J46-0034-008	CONN, 8 PIN
J13	J46-0031-024	CONN,24 PIN
J14	J46-0031-016	CONN, 16 PIN
J15	J46-0013-040	HDR PROTECTED 40 PIN
JMP1	MP-1142	CIRCUIT JUMPER
L1	10073-7034	INDUCTOR, 440UH
L2	10073-7034	INDUCTOR, 440UH
L3	10073-7029	INDUCTOR, FILTER CHOKE
L4	L-0644	COIL 220UH 10% FXD RF
L6	10073-7034	INDUCTOR, 440UH
Q1	2N2222A	XSTR SS/GP NPN TO-18
Q2	3N170	XSTR MOSFET
Q3	2N2907A	XSTR SS/GP PNP TO-18
Q4	2N2907A	XSTR SS/GP PNP TO-18
Q5	2N2222A	XSTR SS/GP NPN TO-18
R1	R65-0004-561	RES,560 5% 1/2W CAR FILM
R2	R65-0004-331	RES,330 5% 1/2W CAR FILM
R3	R65-0004-331	RES,330 5% 1/2W CAR FILM
R4	R65-0003-472	RES,4.7K 5% 1/4W CAR FILM
R5	R65-0004-331	RES,330 5% 1/2W CAR FILM
R6	R65-0003-472	RES,4.7K 5% 1/4W CAR FILM
R7	R65-0003-472	RES,4.7K 5% 1/4W CAR FILM
R8	R65-0003-472	RES,4.7K 5% 1/4W CAR FILM
R9	R65-0003-103	RES,10K 5% 1/4W CAR FILM
R10	R65-0003-102	RES,1.0K 5% 1/4W CAR FILM
R11	R65-0003-472	RES,4.7K 5% 1/4W CAR FILM
R12	R50-0010-104	RES,10SIP,100K,2.0%, 9RES
R13	R65-0003-103	RES,10K 5% 1/4W CAR FILM
R14	R65-0003-512	RES,5.1K 5% 1/4W CAR FILM
R15	R65-0003-154	RES,150K 5% 1/4W CAR FILM
R16	R65-0003-512	RES,5.1K 5% 1/4W CAR FILM

Table 12. Control Board Assembly A14 Parts List (Cont.)

Ref. Desig.	Part Number	Description
R18	R50-0010-103	RES,10SIP, 10K,2.0%, 9RES
R19	R65-0003-103	RES,10K 5% 1/4W CAR FILM
R20	R65-0003-184	RES,180K 5% 1/4W CAR FILM
R21	R65-0003-184	RES,180K 5% 1/4W CAR FILM
R22	R65-0003-512	RES,5.1K 5% 1/4W CAR FILM
R23	R50-0010-104	RES,10SIP,100K,2.0%, 9RES
R24	R65-0003-103	RES,10K 5% 1/4W CAR FILM
R25	R50-0010-103	RES,10SIP, 10K,2.0%, 9RES
R26	R50-0010-103	RES,10SIP, 10K,2.0%, 9RES
R27	R65-0003-223	RES,22K 5% 1/4W CAR FILM
R28	R65-0003-223	RES,22K 5% 1/4W CAR FILM
R29	R65-0003-223	RES,22K 5% 1/4W CAR FILM
R30	R50-0010-104	RES,10SIP,100K,2.0%, 9RES
R31	R50-0010-103	RES,10SIP, 10K,2.0%, 9RES
R32	R65-0003-472	RES,4.7K 5% 1/4W CAR FILM
R33	R65-0003-473	RES,47K 5% 1/4W CAR FILM
R34	R65-0003-333	RES,33K 5% 1/4W CAR FILM
R35	R65-0003-103	RES,10K 5% 1/4W CAR FILM
R36	R65-0003-272	RES,2.7K 5% 1/4W CAR FILM
R37	R65-0003-103	RES,10K 5% 1/4W CAR FILM
R38	R65-0003-103	RES,10K 5% 1/4W CAR FILM
R39	R65-0003-473	RES,47K 5% 1/4W CAR FILM
R40	R65-0003-122	RES,1.2K 5% 1/4W CAR FILM
R41	R65-0003-204	RES,200K 5% 1/4W CAR FILM
R42	R65-0003-243	RES,24K 5% 1/4W CAR FILM
R43	R65-0003-114	RES,110K 5% 1/4W CAR FILM
S1	S06-0002-100	SW PB SPST NO MOM BLK PCT
S2	S50-0001-008	SW SPST 8SEC .1A SLD DIP
S3	S06-0002-100	SW PB SPST NO MOM BLK PCT
U1	I75-0007-000	IC MCT6 OPTOCOUPLER 8P
U2	I01-0000-012	IC 4023B PLASTIC CMOS
U3	I75-0007-000	IC MCT6 OPTOCOUPLER 8P
U6	I01-0000-153	IC 4021B PLASTIC CMOS
U7	I05-0000-004	IC 74LS04 PLASTIC TTL
U8	I05-0000-393	IC 74LS393 PLASTIC TTL
U9	I05-0000-092	IC 74LS92 PLASTIC TTL
U10	I01-0000-153	IC 4021B PLASTIC CMOS
U11	I05-0000-151	IC 74LS151 PLASTIC TTL
U12	I05-0000-000	IC 74LS00 PLASTIC TTL
U13	I59-0008-001	IC 8255 PLASTIC
U14	I05-0000-004	IC 74LS04 PLASTIC TTL
U15	I01-0000-153	IC 4021B PLASTIC CMOS
U16	I01-0000-202	IC 4514B PLASTIC CMOS
U17	I05-0000-165	IC 74LS165 PLASTIC TTL
U18	I26-0010-001	IC STATIC RAM CMOS 2048X8

Table 12. Control Board Assembly A14 Parts List (Cont.)

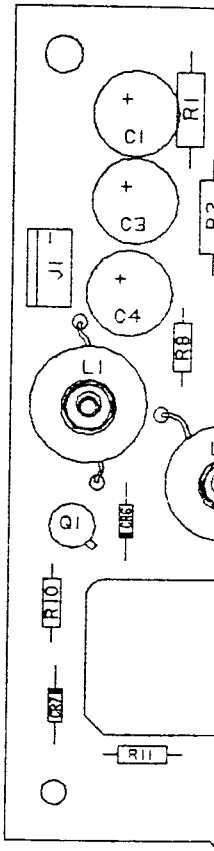
Ref. Desig.	Part Number	Description
U19	SEE NOTE	PROM, PROGRAMMED
U20	SEE NOTE	PROM, PROGRAMMED
U21	I40-0010-001	IC ADC0817 PLASTIC CMOS
U22	I05-0000-373	IC 74LS373 PLASTIC TTL
U23	I05-0000-245	IC 74LS245 PLASTIC TTL
U24	I27-0006-001	IC 8085A MICRO 8-BIT PLA
U25	I01-0000-153	IC 4021B PLASTIC CMOS
U26	I01-0017-000	IC 7432 PLASTIC TTL
U27	I05-0000-122	IC 74LS122 PLASTIC TTL
U28	I05-0000-138	IC 74LS138 PLASTIC TTL
U29	I05-0000-000	IC 74LS00 PLASTIC TTL
U30	I05-0000-139	IC 74LS139 PLASTIC TTL
VR1	I12-0006-005	IC VR 78L05A +5V .10A 4%
VR2	1N5223B	DIODE, 2.7V 1/2W
XU19	J77-0008-006	SKT IC MACH 28 PIN
XU20	J77-0008-006	SKT IC MACH 28 PIN
XU24	J77-0008-007	SKT IC MACH 40 PIN
Y1	Y15-0004-060	CRYSTAL, 6MHZ

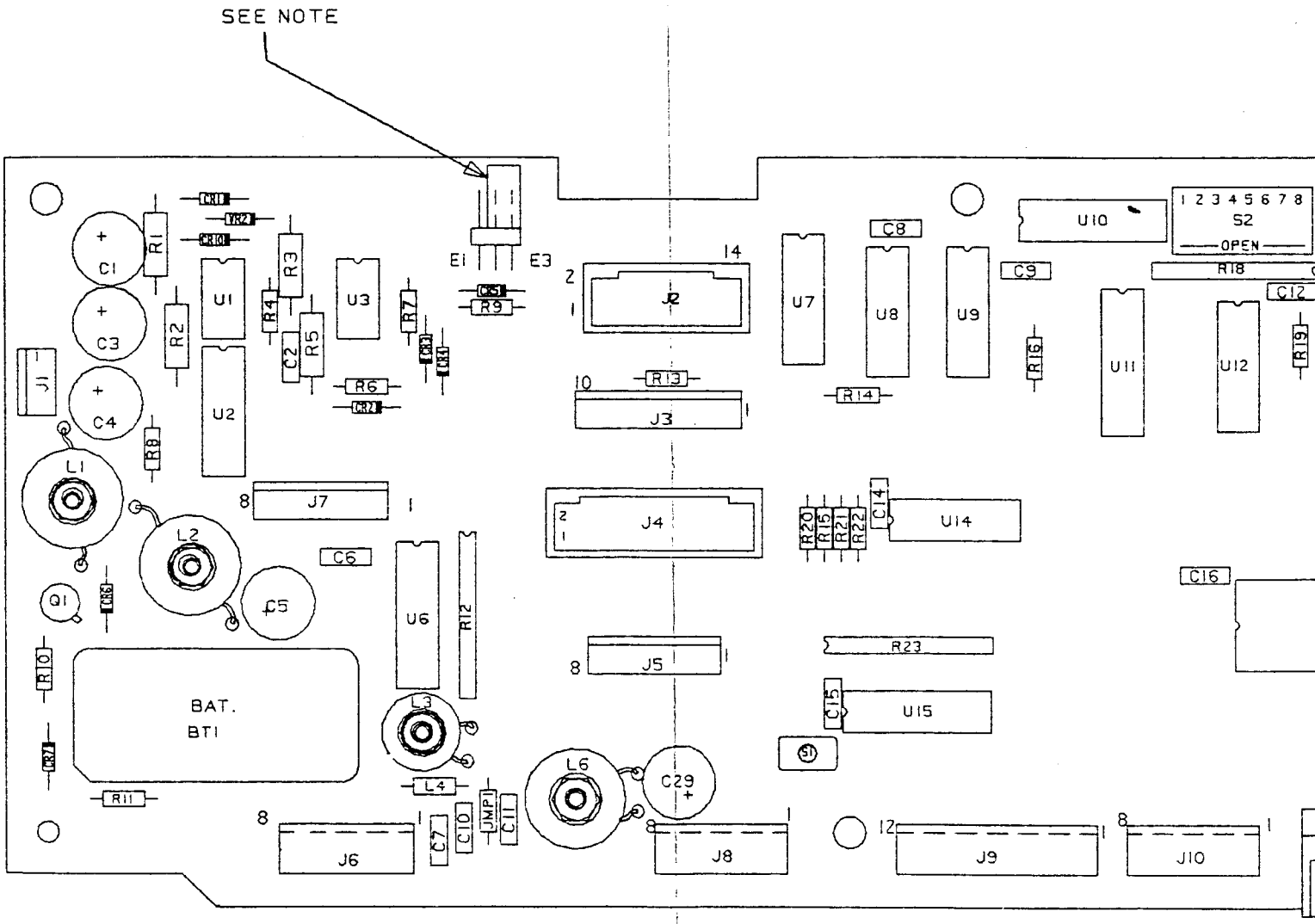
NOTE

Part numbers for U19 and U20 are 10121-8XXX-X where XXX-X is the four character software kit code found on the PROM label. For example, if the code is 501C, the part number for the programmed PROM is 10121-8501C. The kit includes both PROMS.

BATTERY BACKUP JUMPER:
CONNECT E1-E2 BEFORE NORMAL OPERATION TO PRESERVE MEMORY

CONNECT E2-E3 TO ISOLATE BATTERY FOR EXTENDED STORAGE.




SEE NOTE
E1
E3
J2
J3
J4
J5
J6
J7
J8
J9
J10
U1
U2
U3
U6
U7
U8
U9
U10
U11
U12
U14
U15
S2
OPEN
BAT.
BT1
L1
L2
L3
L4
L6
Q1
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C16
C29
R1
R2
R3
R4
R5
R6
R7
R9
R10
R11
R12
R13
R14
R15
R16
R18
R19
R20
R21
R22
R23
J1
CR1
CR2
CR3
CR4
CR5
CR6
CR7
CR8
CR9
CR10
YR2
JMP1

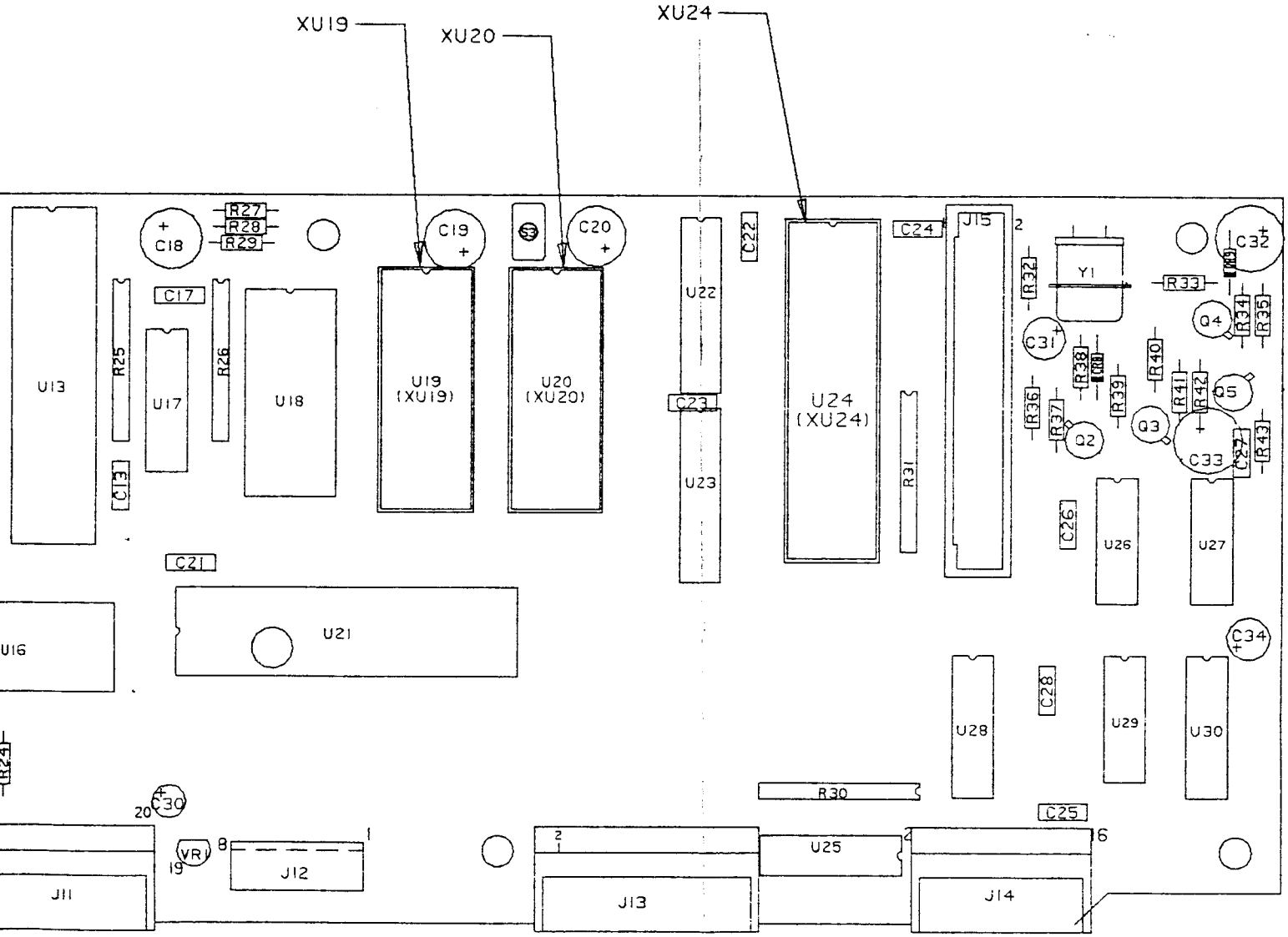


Figure 3. Control Board Assembly A14 Component Location Diagram (10121-2800)

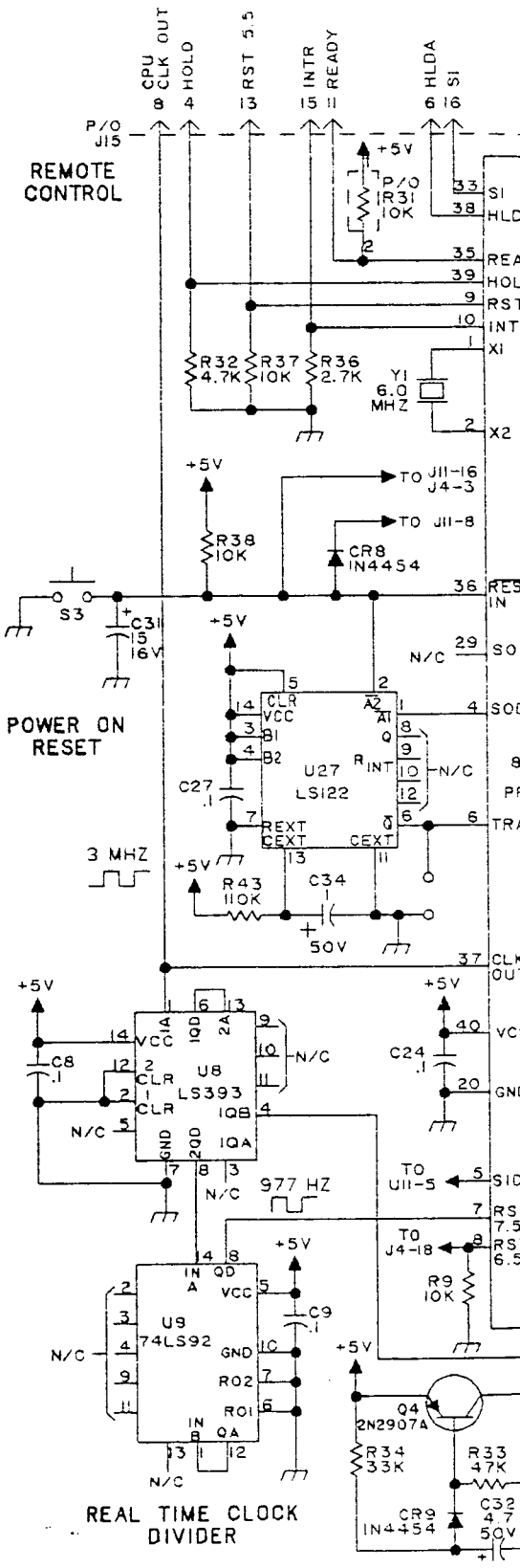
NOTE: UNLESS OTHERWISE SPECIFIED:

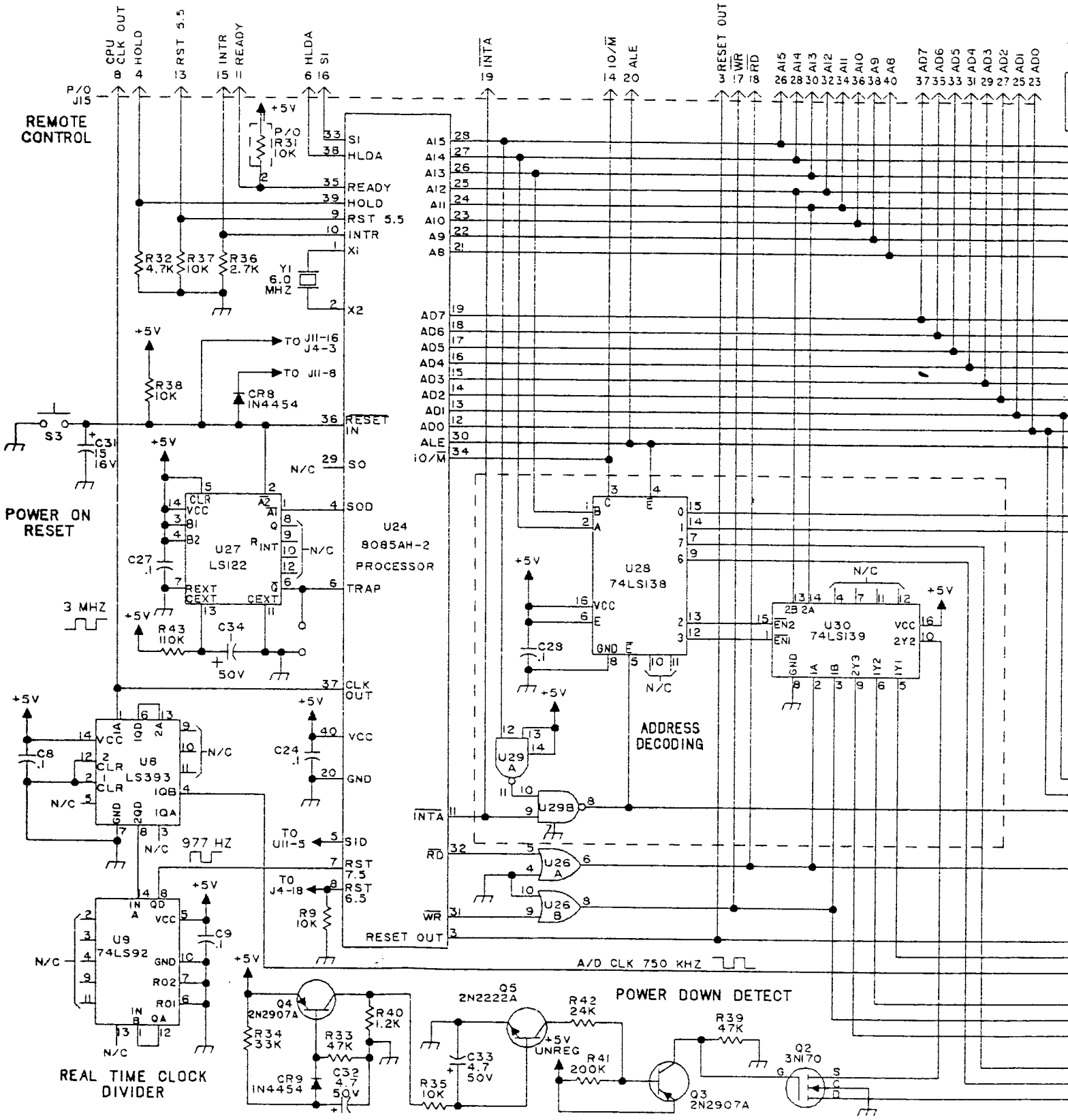
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4W, ±5%.
3. ALL CAPACITOR VALUES ARE IN MICROFARADS.
4. VENDOR PART NO. CALLOUTS ARE FOR REFERENCE ONLY. COMPONENTS ARE SUPPLIED PER PART NO. IN PARTS LIST.

U26	7432
U29	74LS00
U12	74LS00
U7	74LS04
U14	74LS04

UNUSED GATES

U14




REMOTE CONTROL
POWER ON RESET
3 MHZ
REAL TIME CLOCK DIVIDER
977 HZ
U24 8085AH-2 PROCESSOR
U27 LS122
U8 LS393
U9 74LS92
U28 74LS138
U30 74LS139
ADDRESS DECODING
POWER DOWN DETECT
A/D CLK 750 KHZ
RESET OUT
+5V UNREG
TO J11-16 J4-3
TO J11-8
TO J11-5
TO J4-18
CPU CLK OUT
HOLD
RST 5.5
INTR
READY
HLDA
SI
INTA
IO/M
ALE
RESET OUT
WR
RD
AI5 AI4 AI3 AI2 AI1 AI0 A9 A8
AD7 AD6 AD5 AD4 AD3 AD2 AD1 AD0
P/O J15
R31 10K
R32 4.7K
R37 10K
R36 2.7K
Y1 6.0 MHZ
R38 10K
CR8 IN4454
S3
C31 15 16V
R43 110K
C34 50V
C27 .1
C28 .1
C8 .1
C24 .1
C9 .1
R9 10K
Q4 2N2907A
R34 33K
R33 47K
R40 1.2K
CR9 IN4454
C32 4.7 50V
Q5 2N2222A
R42 24K
C33 4.7 50V
R35 10K
R41 200K
Q3 2N2907A
R39 47K
Q2 3N170

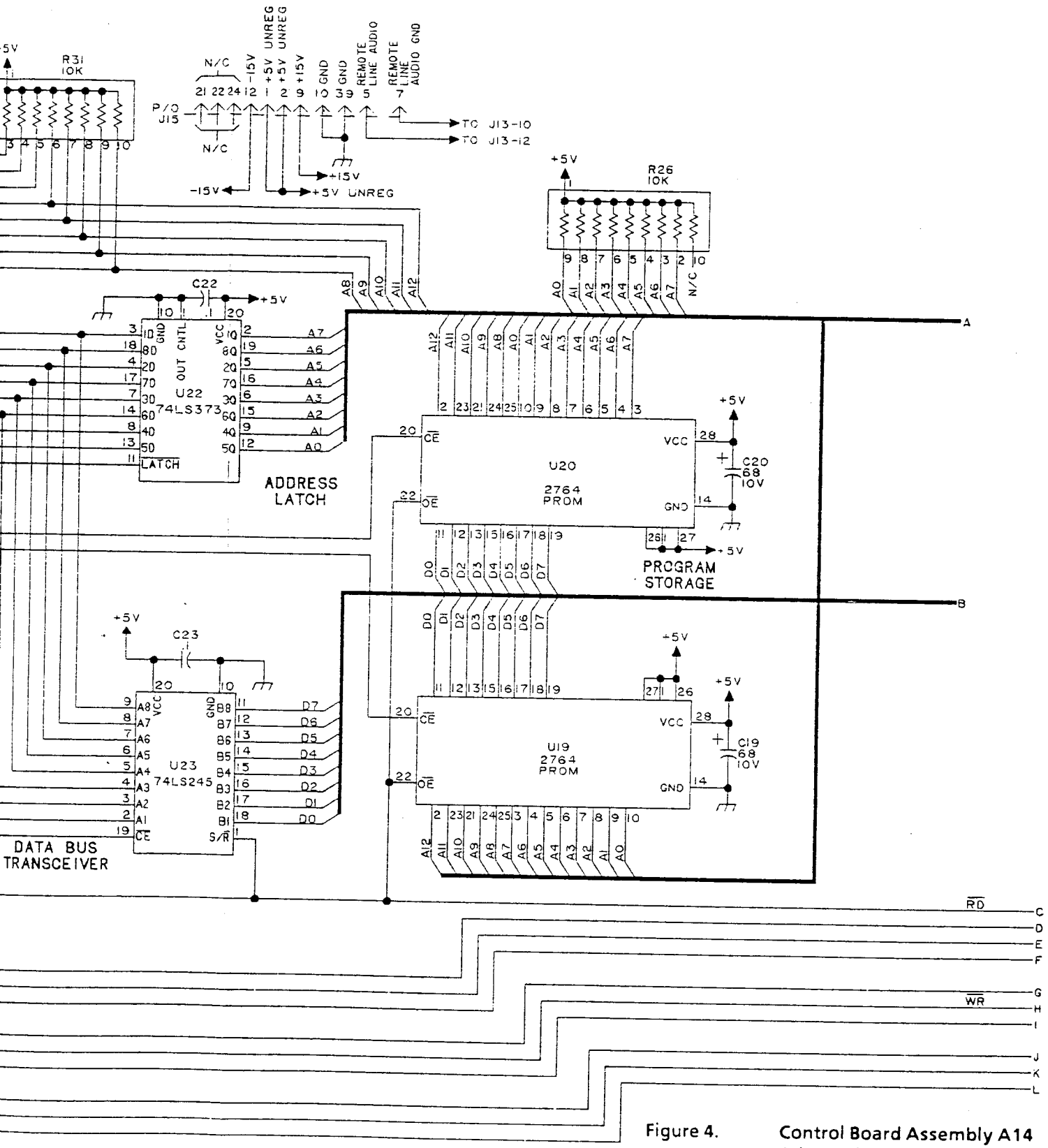
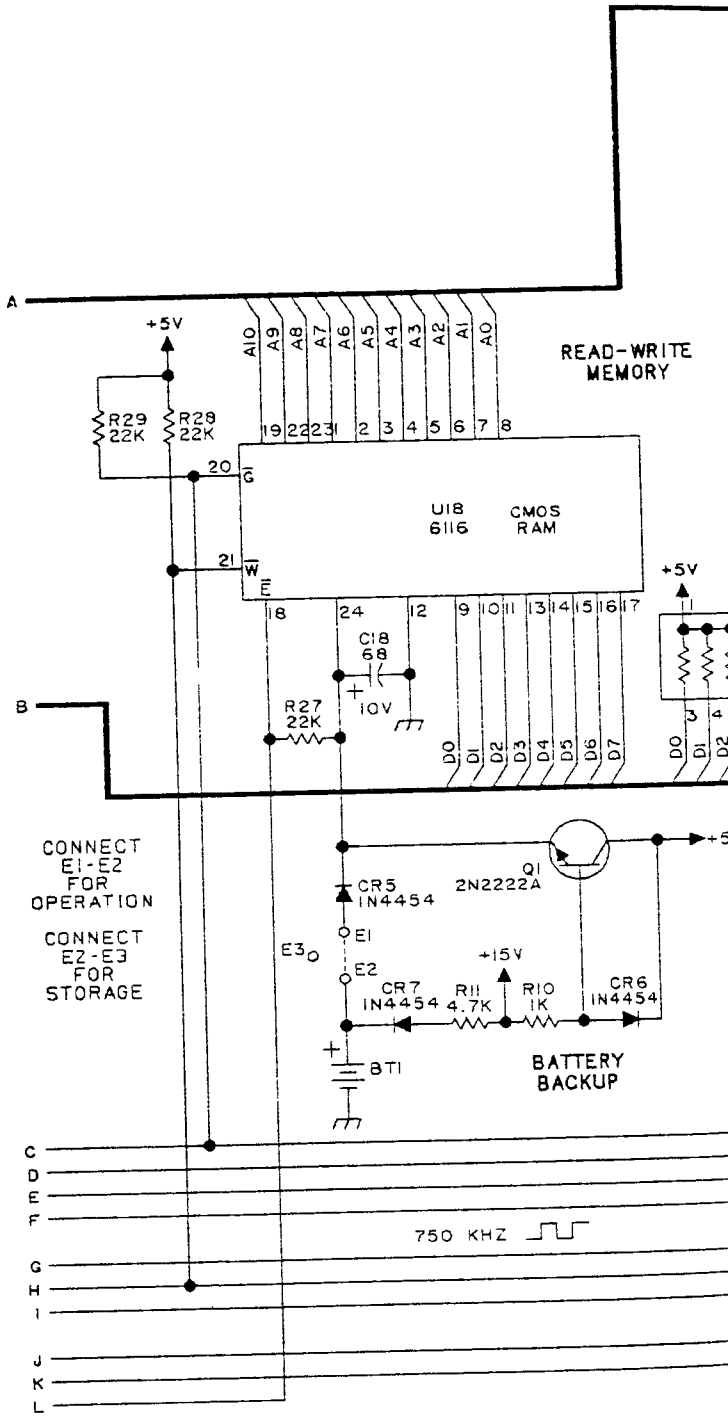
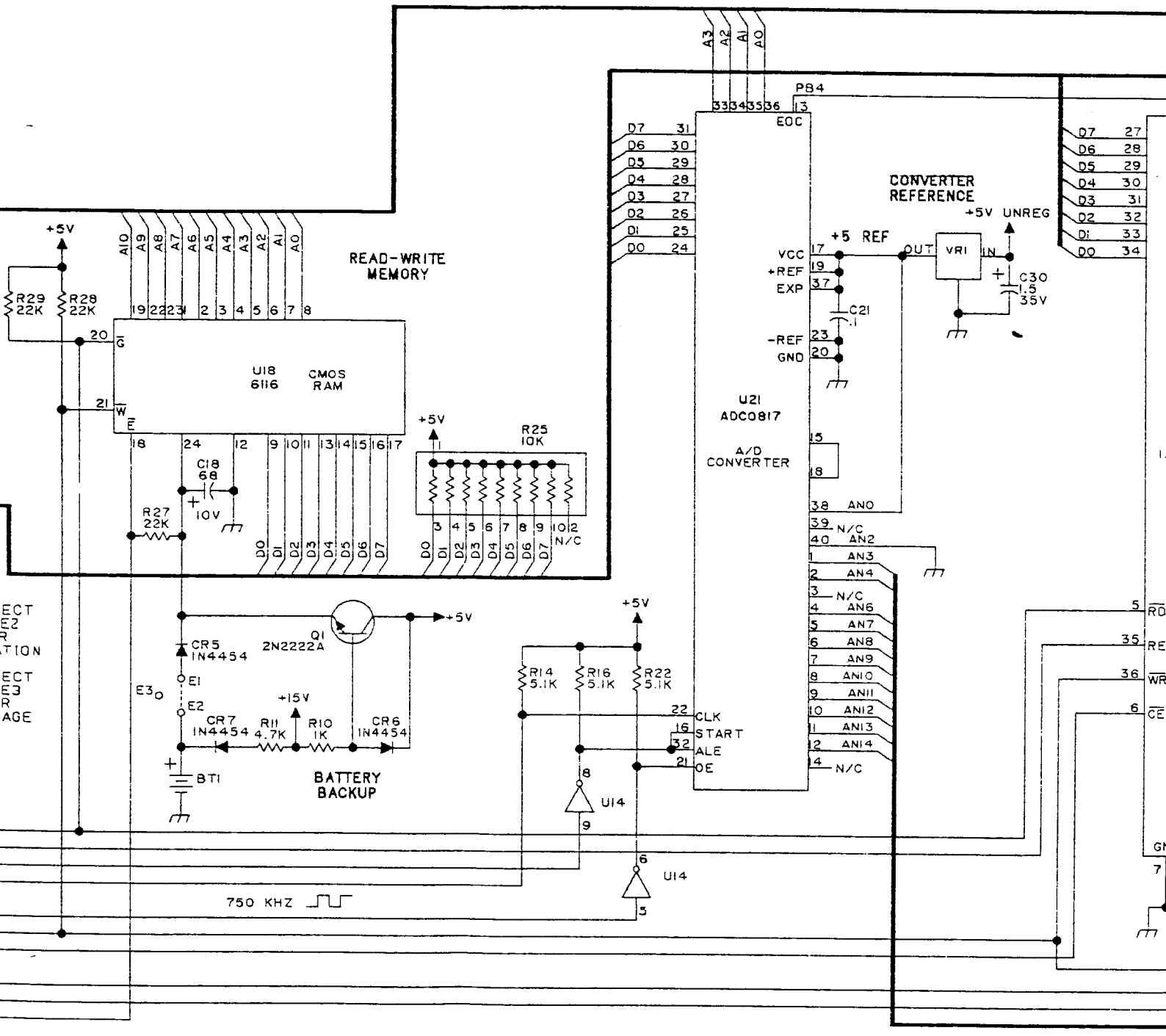


Figure 4. Control Board Assembly A14 Schematic Diagram (10121-2801 Rev.H) (Sheet 1 of 4)


A
B
+5V
A10 A9 A8 A7 A6 A5 A4 A3 A2 A1 A0
READ-WRITE MEMORY
R29 22K
R28 22K
19 22 23 1 2 3 4 5 6 7 8
20
G
21
W
E
U18 6116 CMOS RAM
18 24 12 9 10 11 13 14 15 16 17
C18 68
10V
R27 22K
D0 D1 D2 D3 D4 D5 D6 D7
+5V
CONNECT E1-E2 FOR OPERATION
CONNECT E2-E3 FOR STORAGE
Q1 2N2222A
CR5 IN4454
E1
E2
E3
+15V
CR7 IN4454
R11 4.7K
R10 1K
CR6 IN4454
BT1
BATTERY BACKUP
C
D
E
F
750 KHZ
G
H
I
J
K
L


READ-WRITE MEMORY
U18 6116 CMOS RAM
R29 22K
R28 22K
R27 22K
C18 68
10V
R25 10K
CONVERTER REFERENCE
+5V UNREG
+5 REF
VR1
C30 1.5 35V
C21 .1
U21 ADC0817
A/D CONVERTER
VCC
+REF
EXP
-REF
GND
EOC
PB4
ANO
AN2
AN3
AN4
N/C
AN6
AN7
AN8
AN9
AN10
AN11
AN12
AN13
AN14
CLK
START
ALE
OE
Q1 2N2222A
CR5 IN4454
CR7 IN4454
CR6 IN4454
R11 4.7K
R10 1K
+15V
BT1
BATTERY BACKUP
R14 5.1K
R16 5.1K
R22 5.1K
U14
750 KHZ

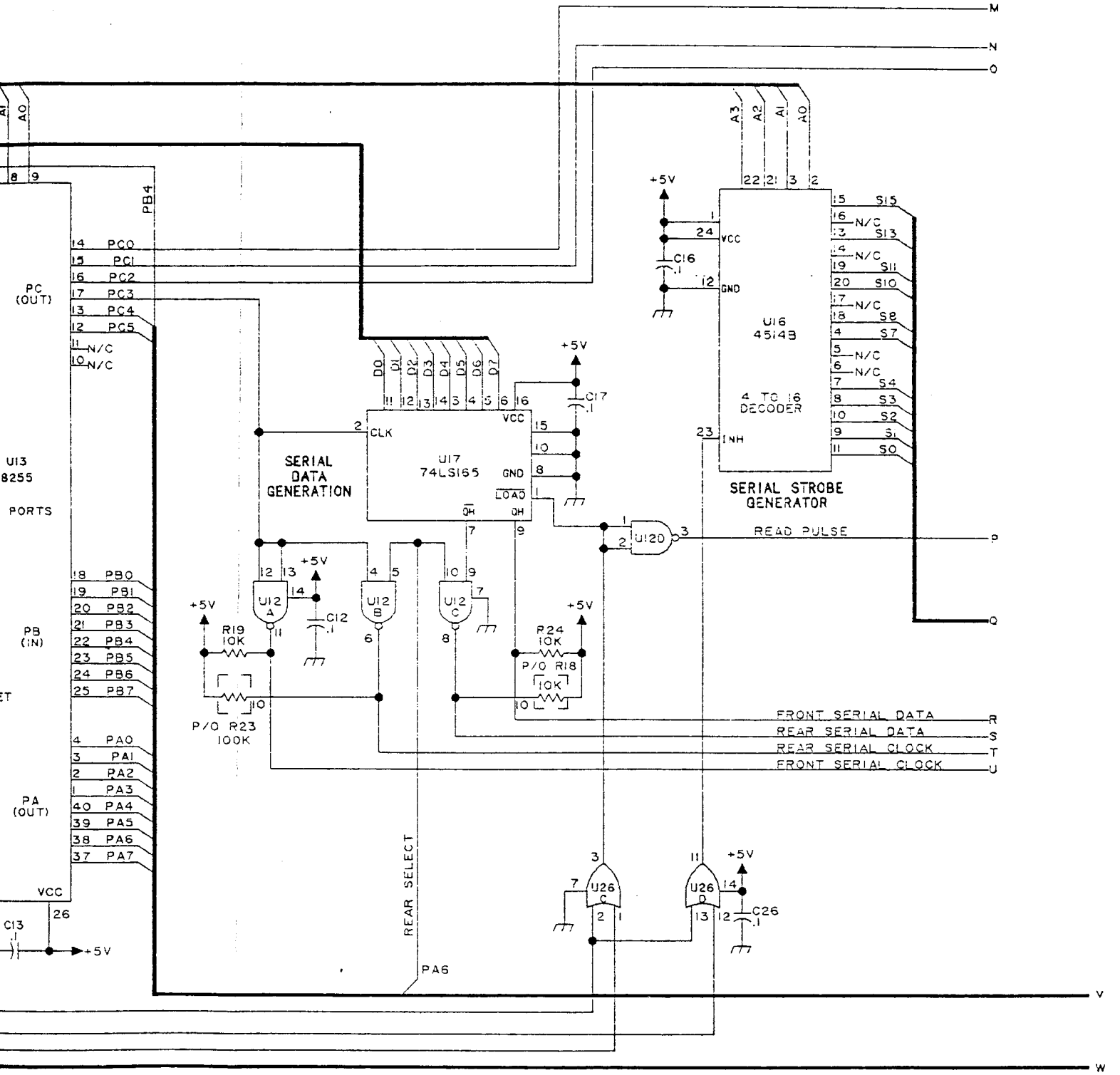
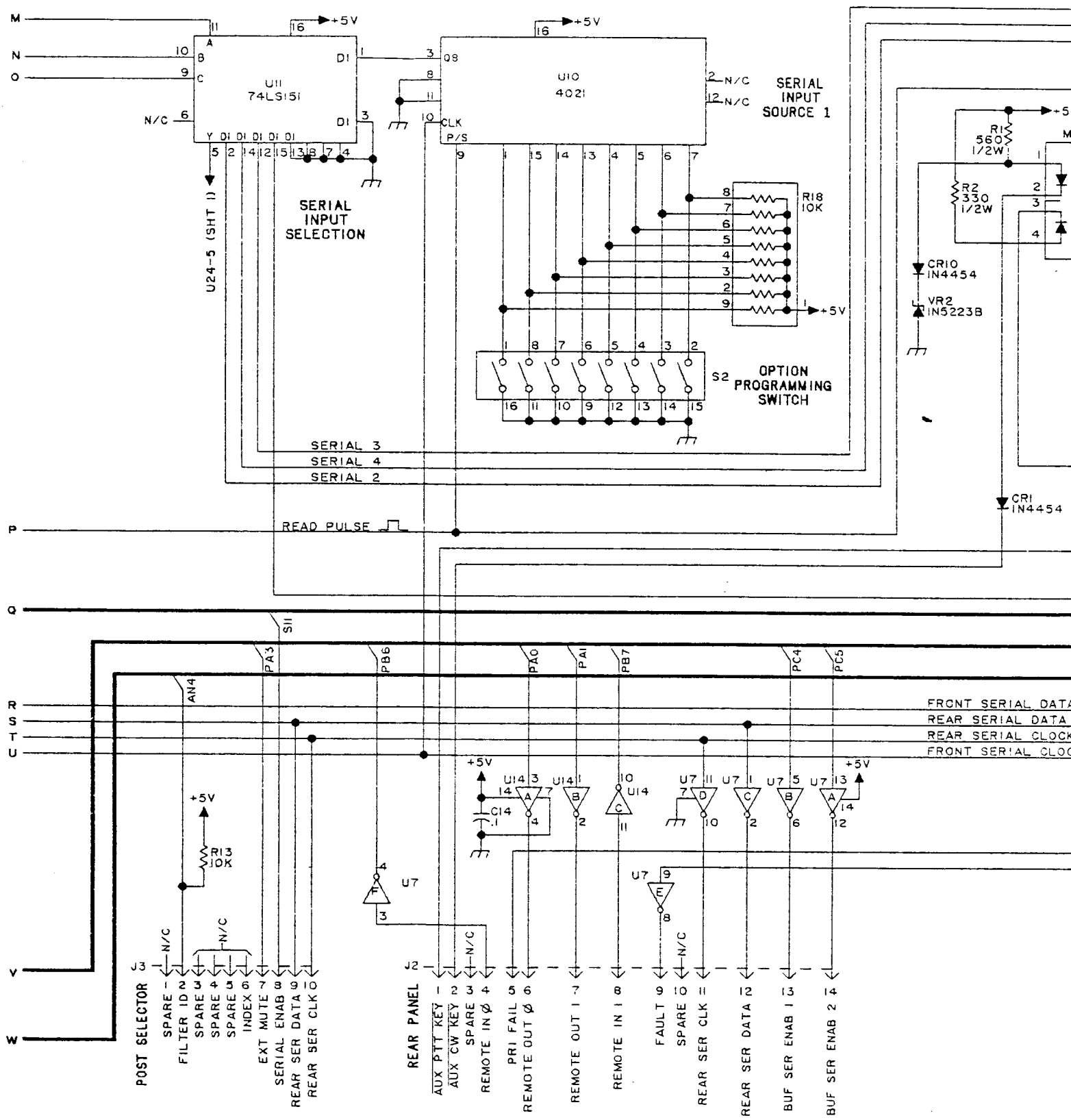


Figure 4. Control Board Assembly A14 Schematic Diagram (10121-2801 Rev.H) (Sheet 2 of 4)


M
N
O
N/C
U11
74LS151
U10
4021
+5V
SERIAL INPUT SOURCE 1
SERIAL INPUT SELECTION
U24-5 (SHT 1)
R18
10K
S2
OPTION PROGRAMMING SWITCH
R1
560
1/2W
R2
330
1/2W
CR10
IN4454
VR2
IN5223B
CR1
IN4454
SERIAL 3
SERIAL 4
SERIAL 2
P
READ PULSE
Q
R
S
T
U
V
W
FRONT SERIAL DATA
REAR SERIAL DATA
REAR SERIAL CLOCK
FRONT SERIAL CLOC
R13
10K
C14
.1
POST SELECTOR
J3
SPARE
FILTER ID
SPARE
SPARE
SPARE
INDEX
EXT MUTE
SERIAL ENAB
REAR SER DATA
REAR SER CLK
REAR PANEL
J2
AUX PTT KEY
AUX CW KEY
SPARE
REMOTE IN
PRI FAIL
REMOTE OUT
REMOTE OUT
REMOTE IN
FAULT
SPARE
REAR SER CLK
REAR SER DATA
BUF SER ENAB 1
BUF SER ENAB 2

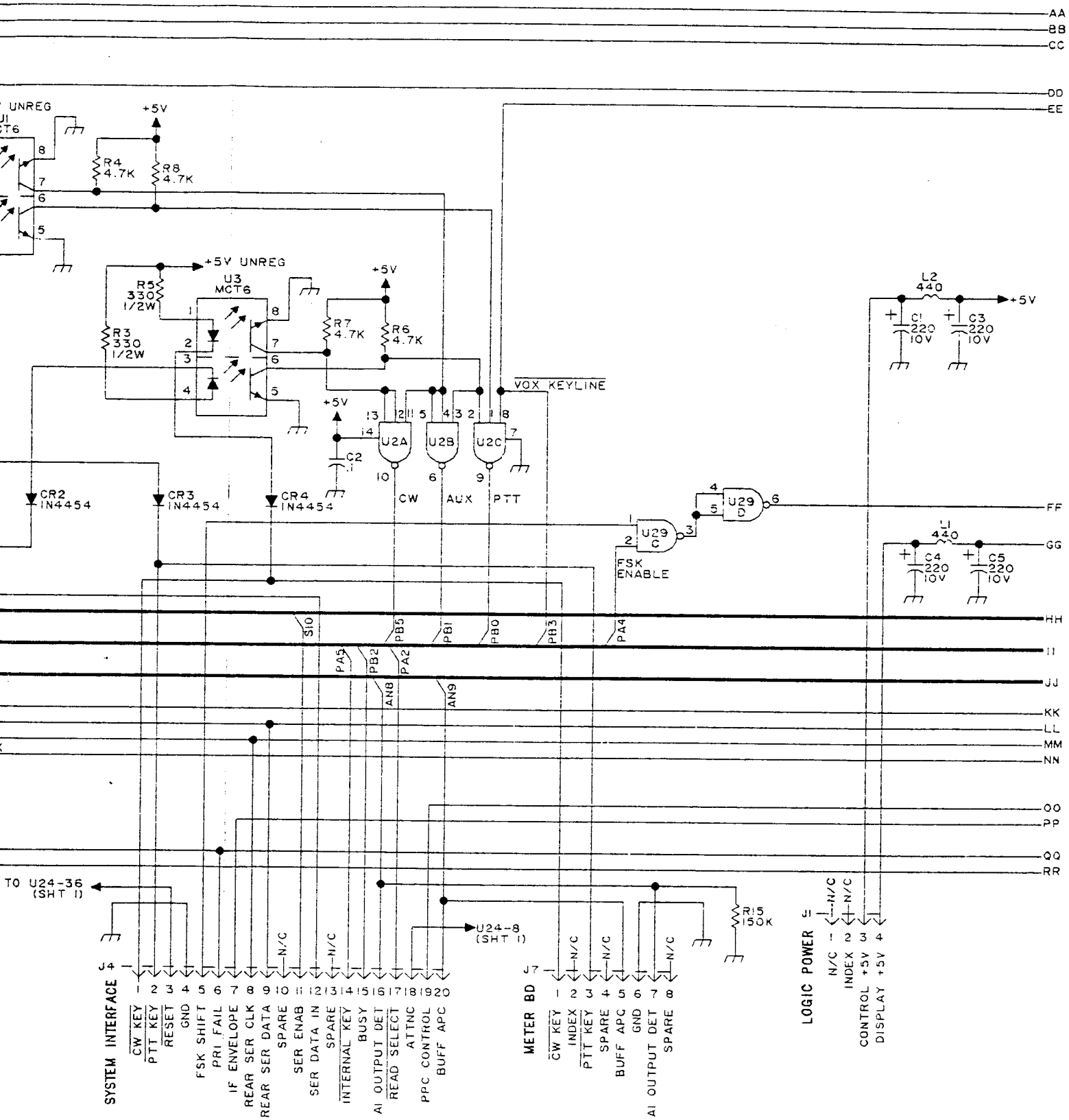
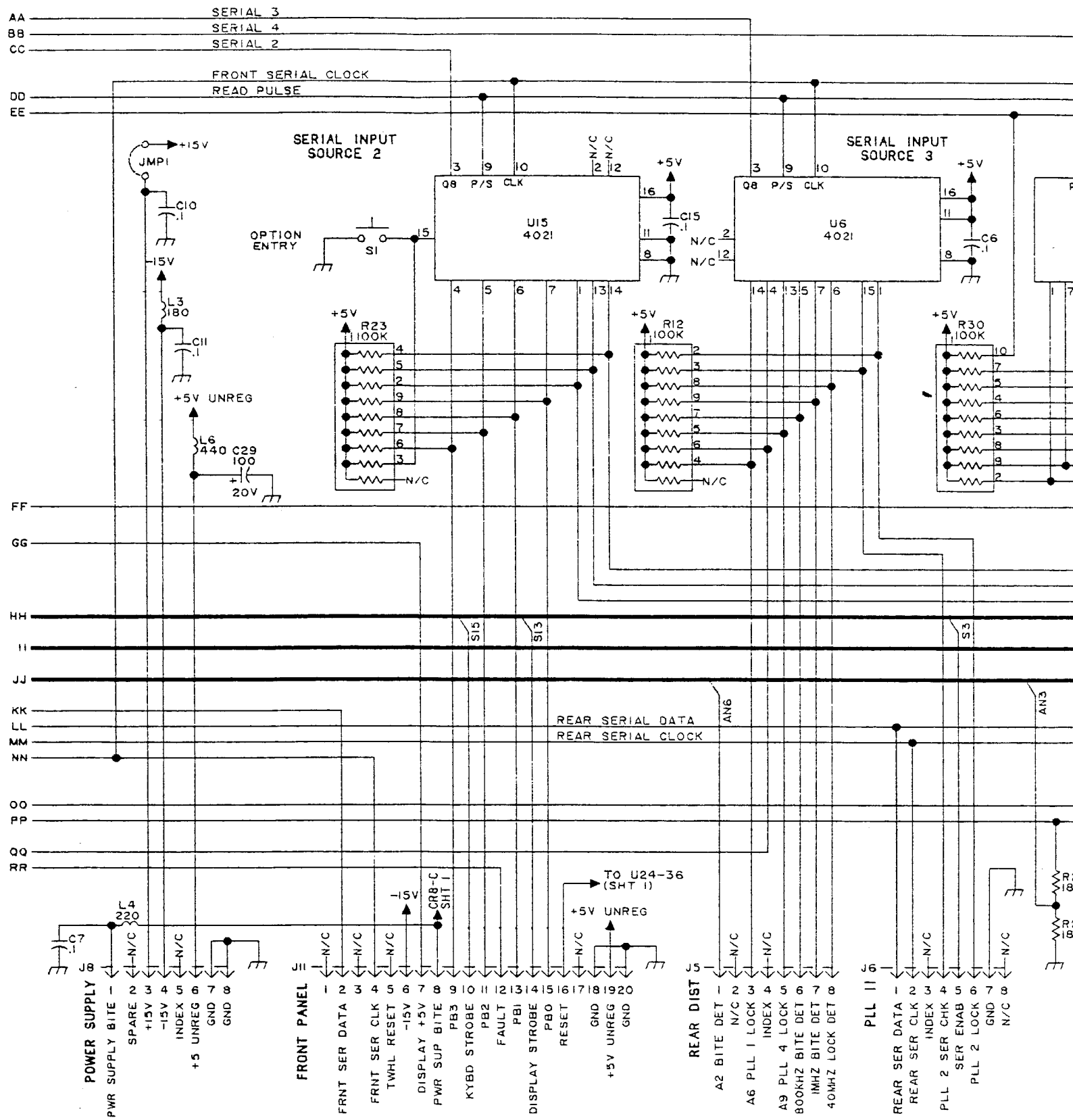


Figure 4. Control Board Assembly A14 Schematic Diagram (10121-2801 Rev.H) (Sheet 3 of 4)


AA
BB
CC
DD
EE
FF
GG
HH
II
JJ
KK
LL
MM
NN
OO
PP
QQ
RR
SERIAL 3
SERIAL 4
SERIAL 2
FRONT SERIAL CLOCK
READ PULSE
SERIAL INPUT SOURCE 2
SERIAL INPUT SOURCE 3
+15V
JMP1
C10 .1
-15V
L3 180
C11 .1
+5V UNREG
L6 440
C29 100 20V
OPTION ENTRY
S1
U15 4021
U6 4021
Q8 P/S CLK
N/C
+5V
R23 1100K
R12 100K
R30 100K
S15
S13
S3
REAR SERIAL DATA
REAR SERIAL CLOCK
AN6
AN3
L4 220
C7 .1
-15V
CR8-C SHT 1
TO U24-36 (SHT 1)
+5V UNREG
J8 POWER SUPPLY
PWR SUPPLY BITE
SPARE
+15V
-15V
INDEX
+5 UNREG
GND
GND
J11 FRONT PANEL
FRNT SER DATA
FRNT SER CLK
TWHL RESET
-15V
DISPLAY +5V
PWR SUP BITE
PB3
KYBD STROBE
PB2
FAULT
PB1
DISPLAY STROBE
PB0
RESET
GND
+5V UNREG
GND
J5 REAR DIST
A2 BITE DET
A6 PLL 1 LOCK
INDEX
A9 PLL 4 LOCK
800KHZ BITE DET
1MHZ BITE DET
40MHZ LOCK DET
J6 PLL II
REAR SER DATA
REAR SER CLK
INDEX
PLL 2 SER CHK
SER ENAB
PLL 2 LOCK
GND
N/C

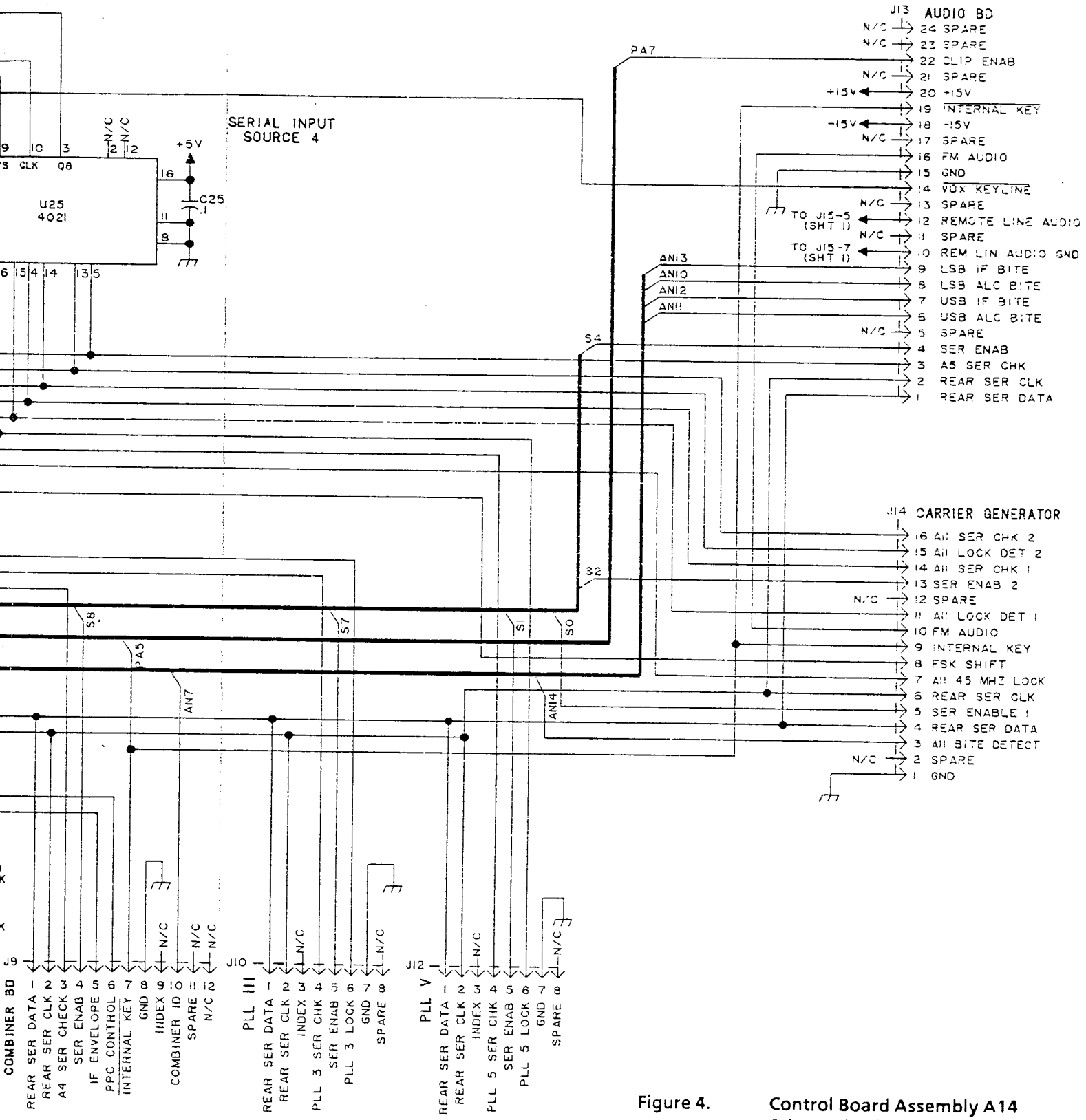


Figure 4. Control Board Assembly A14 Schematic Diagram (10121-2801 Rev.H) (Sheet 4 of 4)