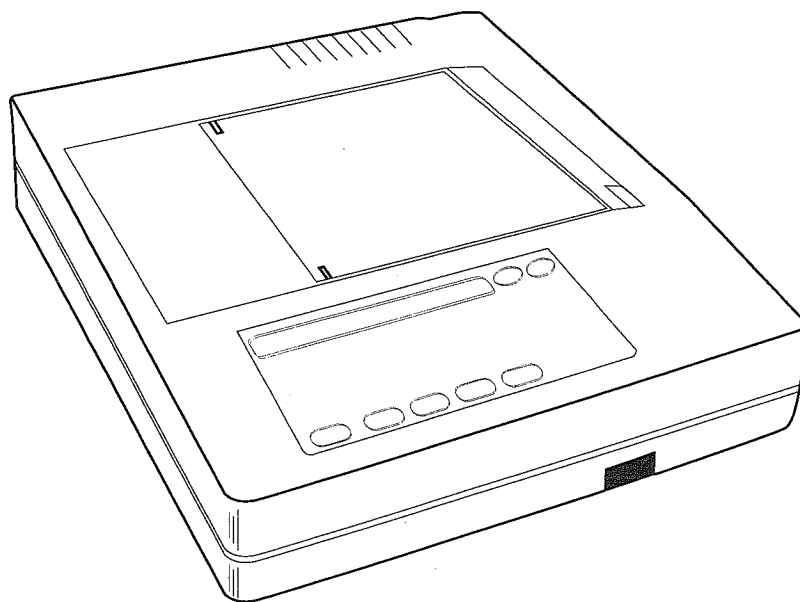


# Service manual



## **E350i** **Electrocardiograph**

Service Manual Part No. 086234  
Revised 8-93

**TO RESPONSIBLE SERVICE PERSONNEL:**

*The contents of this document are not binding. If any significant differences between the product and this document are encountered regarding service work, contact Burdick, Inc. for further information.*

*We reserve the right to modify products without amending this document or advising the user.*

*We recommend using authorized Burdick personnel for all service and repairs, and the use of Burdick exchange parts or genuine spare parts. Burdick will not otherwise assume responsibility for the materials used, the work performed, or for any possible consequences thereof.*

*This product has been carefully designed to provide a high degree of safety and dependability. However, we can not guarantee against the deterioration of components due to aging and normal wear.*

# CONTENTS

## 1 GENERAL INFORMATION

1.1 Basic System Description .....	3
1.2 Block Diagram .....	3
1.3 Specifications.....	4

## 2 SERVICE

2.1 Tools and Test Equipment.....	5
2.2 Safety and Service Cautions.....	5
2.3 Special Functions.....	5
2.4 Printhead Voltage Adjustment.....	6

## 3 PROBLEM SOLVING

3.1 Troubleshooting.....	7
3.1.1 Display .....	7
3.1.2 Printer.....	8-9
3.2 Waveforms.....	10-12
3.3 Connector Pinouts and Jumpers.....	13-16

## 4 REMOVAL AND REPLACEMENT PROCEDURES

4.1 Removal and Replacement.....	17
4.1.1 Top Enclosure .....	17
4.1.2 Keyboard & LCD Assembly .....	17
4.1.3 Printer Assembly .....	17
4.1.4 Motor .....	17
4.1.5 Printhead.....	17
4.1.6 Drive Roller.....	18
4.1.7 Que Sensor .....	18
4.1.8 Logic PCB.....	18
4.1.9 3-Volt Lithium Battery .....	18
4.1.10 Fuses.....	18
4.1.11 (Optional) Fax Modem PCB.....	18
4.2 Exploded Views .....	19-22
4.3 Parts List.....	23-24

## 5 MAINTENANCE

5.1 Preventive Maintenance.....	25
5.1.1 Visual Inspection.....	25
5.1.2 Cleaning.....	25
5.1.3 Power Cable.....	25
5.1.4 Patient Cable.....	25
5.2 Printhead.....	25
5.3 Chassis Leakage Current Check.....	25
5.4 Patient Leakage Current Check.....	26

**6 THEORY OF OPERATION**

6.1 Logic PCB .....27  
6.1.1 Power Supply .....27  
6.1.2 Amplifier - Microprocessor & Memory .....27  
6.1.3 Amplifier - Analog Front End .....28  
6.1.4 Logic - Microprocessor & Memory .....28  
6.1.5 Logic - I/O Functions.....28  
6.1.6 Printhead Loading.....29  
6.1.7 Printhead Strobe .....30  
6.1.8 Logic PCB Block Diagram .....31  
6.2 (Optional) Fax Modem PCB .....32

**7 SCHEMATICS AND COMPONENT DIAGRAM**

7.1 Logic PCB Schematic (1 of 10).....33  
7.2 Logic PCB Schematic (2 of 10).....33  
7.3 Logic PCB Schematic (3 of 10).....33  
7.4 Logic PCB Schematic (4 of 10).....33  
7.5 Logic PCB Schematic (5 of 10).....33  
7.6 Logic PCB Schematic (6 of 10).....33  
7.7 Logic PCB Schematic (7 of 10).....33  
7.8 Logic PCB Schematic (8 of 10).....33  
7.9 Logic PCB Schematic (9 of 10).....33  
7.10 Logic PCB Schematic (10 of 10).....33  
7.11 Logic PCB Component Diagram .....33  
7.12 (Optional) Fax Modem PCB Schematic .....33  
7.13 (Optional) Fax Modem PCB Component Diagram .....33

# 1 GENERAL INFORMATION

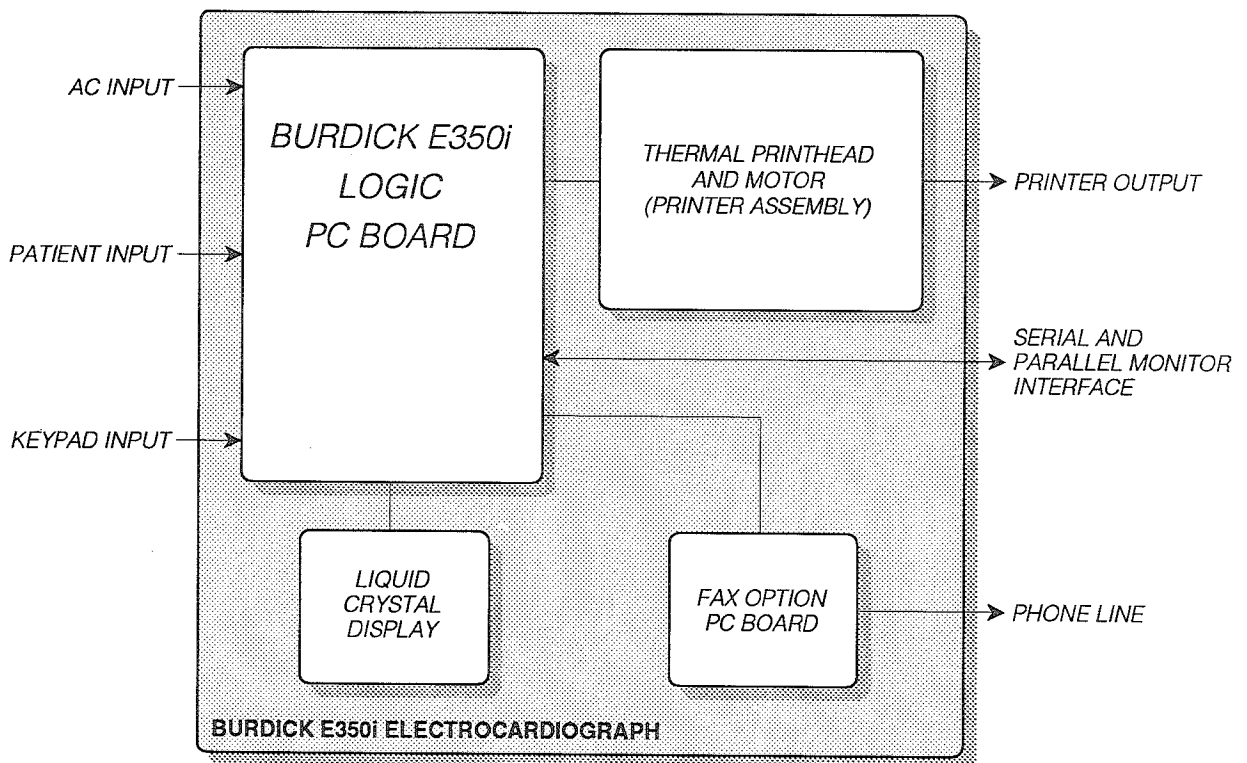
## 1.1 BASIC SYSTEM DESCRIPTION

The BURDICK E350i is a multi-channel interpretive electrocardiograph capable of acquiring data from all the ECG leads simultaneously. A thermal array printing system is used to print standard electrocardiograms and interpretive data. Also, an optional internal fax modem enables the electrocardiograph to send records via the telephone line to a remote fax machine.

The main circuitry for the BURDICK E350i is located on the Logic PCB (printed circuit board). Analog ECG input signals are sampled, buffered, and amplified before being converted to digital levels. A fiber optic link connects the signals to a pre-processor, which is connected to the logic microprocessor by a parallel interface. The logic microprocessor controls the entire system, including input/output functions.

The operator prompts and menus appear on a 2-line by 40-character liquid crystal display. User inputs are provided by means of a membrane switch keypad. ECG recordings and interpretive data are printed by the printer assembly, which consists of a 216-mm thermal array printhead and a dc motor.

## 1.2 BLOCK DIAGRAM



### 1.3 SPECIFICATIONS

Dimensions: 4.5" x 15.25" x 18"  
 114 mm x 387 mm x 457 mm

Weight: 19 lbs. (8.6 kg)

Power Requirements: 120/240 VAC, 50/60 Hz, 100 VA

Environmental:

temperature 10°C to 40°C (operating)  
 -34°C to 70°C (storage)

relative humidity 30% to 75%, non-condensing (operating)  
 25% to 95%, non-condensing (storage)

atmospheric pressure 525 mm Hg to 795 mm Hg (operating)  
 375 mm Hg to 795 mm Hg (storage)

Acquisition:

lead selection I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6

modes auto, manual

frequency response meets or exceeds AAMI standard (unfiltered)  
 0.05 to 30 Hz, -3 dB (filtered)

input impedance > 50 megohms

electrode offset tolerance ±300 mV

a/d conversion 5 µV LSB

sampling rate 500 per second

Printout:

paper type thermal

chart speeds 5, 25, 50 mm/s

printout formats 3, 4, or 6 channels

lead marking imprinted for each lead above its waveform

printout device 216-mm thermal dot array

paper dimension 8.5" by 11" Z-fold  
 or 210 mm by 300 mm Z-fold

Safety:

conforms to standards CSA C22.2 No. 125-M1984

leakage current patient < 10 µA, chassis < 100 µA

defibrillator protection to 5000 V, 400 J (floating ECG input)

## 2 SERVICE

### 2.1 TOOLS AND TEST EQUIPMENT

The BURDICK E350i requires only standard electronics tools for maintenance to the board level. The following is a list of suggested test equipment. The test equipment should be calibrated periodically and be in good repair.

Digital Multimeter

Leakage Current Meter / Safety Analyzer

Oscilloscope

Electronic Heart Simulator

Anti-static Workstation

### 2.2 SAFETY AND SERVICE CAUTIONS

**CAUTION** — Mains voltage is present on the Logic PCB. Mains voltage can be encountered at the toroid, fuses, power switch, and primary side of the power transformer. Always ensure that the unit is unplugged whenever you are disassembling it.

*The BURDICK E350i uses CMOS integrated circuits and caution must be taken during maintenance procedures to prevent damage which can be caused by static electricity. Also, the printhead is sensitive to static. An anti-static work surface is recommended.*

*Use only Burdick-approved thermal ECG recording paper. Wax-coated or blush-coated paper will damage the printhead.*

### 2.3 SPECIAL FUNCTIONS

A number of special functions are available to aid in servicing the BURDICK E350i. These functions are accessed by activating the System Self Test Menu as follows:

1. From the Main Menu, press the function key located below the word "PAT".
2. After the Patient Data menu appears, press "T" (#5) on the keyboard.
3. Next, the System Self Test Menu appears. This menu has two screens. The "<<<<" and

">>>>" keys move back and forth between these screens. The "RTN" key returns to the Main Menu.

Note: Use the function key farthest to the right to exit individual tests (even though "RTN" is not always displayed on the LCD above the key).

These special functions are available:

**PHVT** — Adjusts the printhead voltage (see section 2.4).

**QHOL** — Tests the queuing hole sensor circuits. The words "paper" or "no paper" are displayed, according to whether or not paper is detected. The sensor can be checked by manually inserting and removing a sheet of paper. To quit, press the rightmost function key.

**SYST** — Initiates an automatic test which verifies the RAM, EPROM, printhead strobe, and front end circuits. The message "Tests Complete!!" appears when the test is done. Then, the Main Menu is displayed.

**PRNT** — Produces a 4-page printer test. First, a diagonal line is printed. It should be inspected for continuity. Fading at the top or bottom of the page indicates that the printhead is misaligned. Individual dots or groups of dots which do not print indicate a problem with the printhead control circuitry or the printhead itself.

Next, paper speed accuracy is tested by measuring a horizontal line printed for 10 seconds at a speed of 25 mm/s. The line length should be 250 mm  $\pm$  5 mm.

Then, gain calibrations of 20, 10, and 5 mm/mV are printed for paper speeds of 5, 25, and 50 mm/s. The paper runs for 2 seconds at each speed.

Finally, the character set is printed. To quit, press the rightmost function key.

**ERRL** — Displays an error log on the LCD. Many different error messages are possible. Contact Burdick if you are unable to interpret a particular message. To quit, press the rightmost function key.

**NOTE** — The following special functions are for *factory use only* and should not be used in the field: HRUN, VRGN, and ERRC.

## 2.4 PRINthead VOLTAGE ADJUSTMENT

Because individual printheads vary in resistance, the printhead voltage adjustment is necessary whenever the Logic PCB or printhead has been replaced. Make the adjustment as follows:

1. Remove the top enclosure as described in section 4.1.1. Locate R4 at top right corner of the board, near two large capacitors and the printhead connector (refer to section 7.11).
2. Ensure that the ac power is ON. From the Main Menu, press the function key located below the word "PAT".
3. After the Patient Data menu appears, press "T" (#5) on the keyboard. Then, select "PHVT" from the System Self Test Menu.
4. Compare the displayed value (resistance in ohms) to the value indicated on the printhead.
5. Adjust R4 until the displayed value is as close as possible ( $\pm 7 \Omega$ ) to the value indicated on the printhead.
6. When finished, press the rightmost function key to exit.

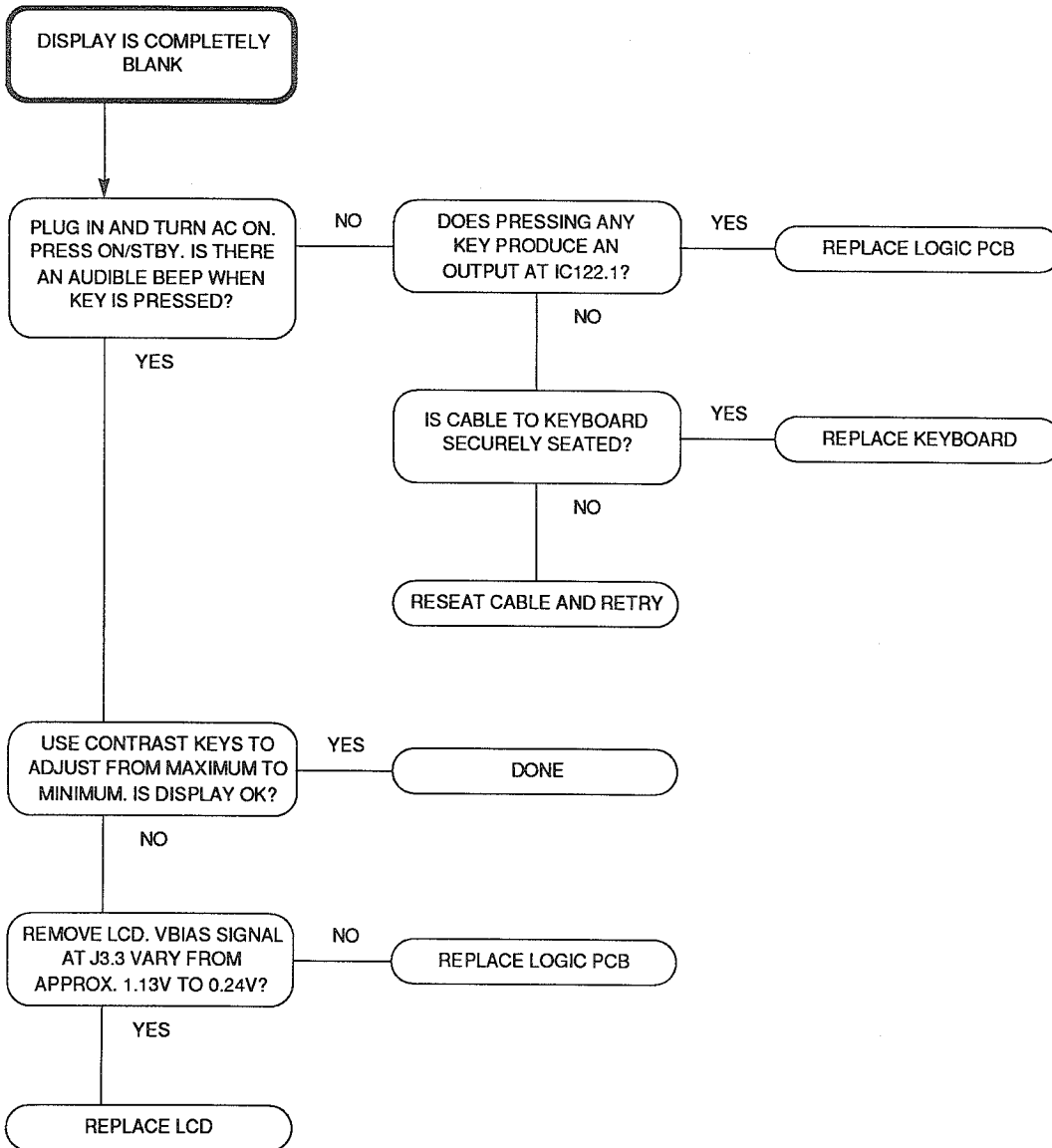


### 3 PROBLEM SOLVING

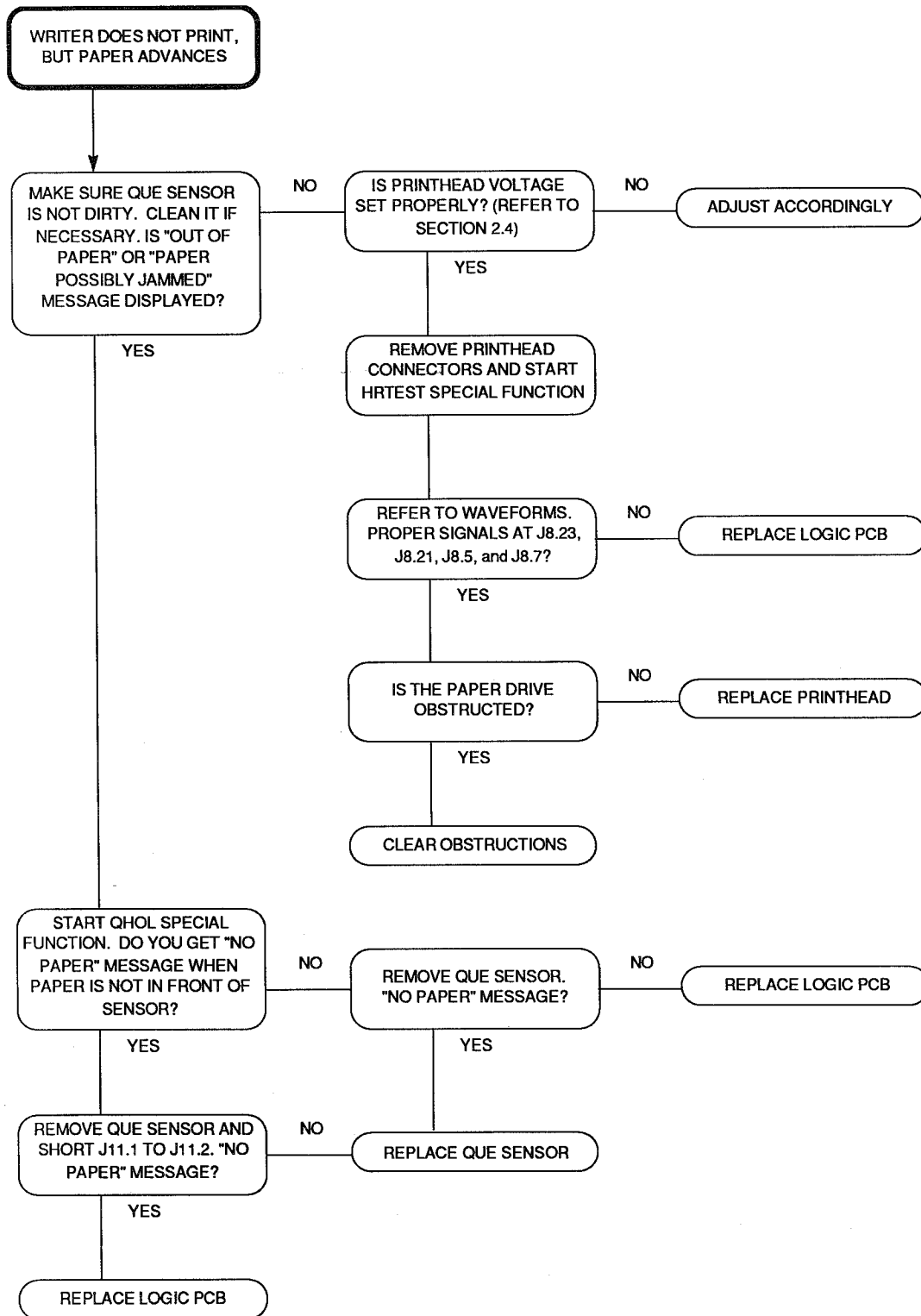
#### 3.1 TROUBLESHOOTING

Past experience has shown that a large percentage of service calls are due to poor ECG technique and broken cables. Before disassembling the electrocardiograph, ensure that technique and faulty cables are eliminated as the source of the problem. Refer to the Operator's Manual for additional information.

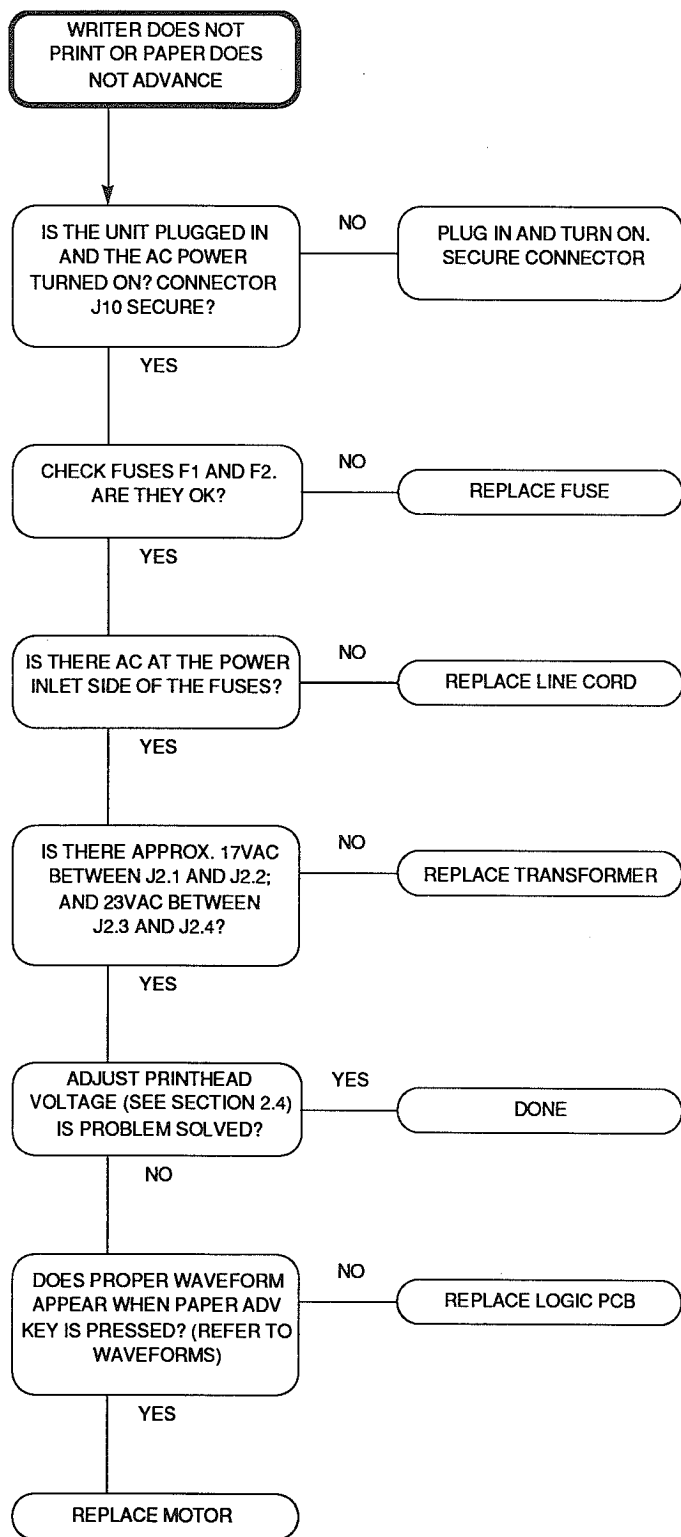
##### 3.1.1 Display



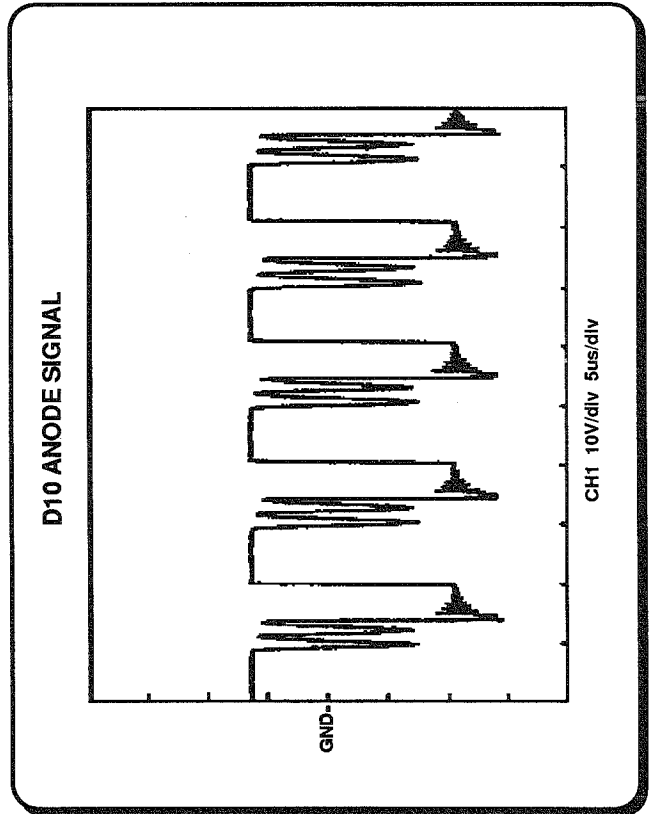
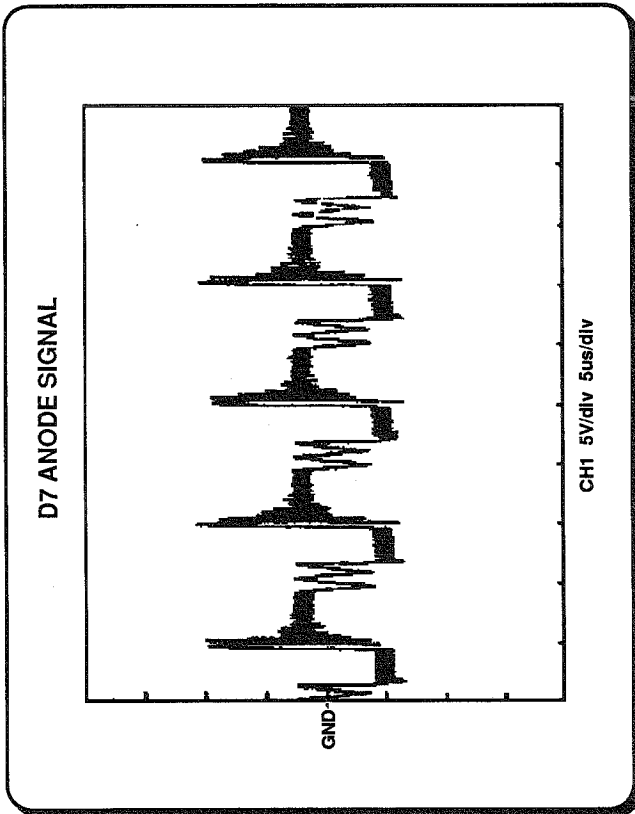
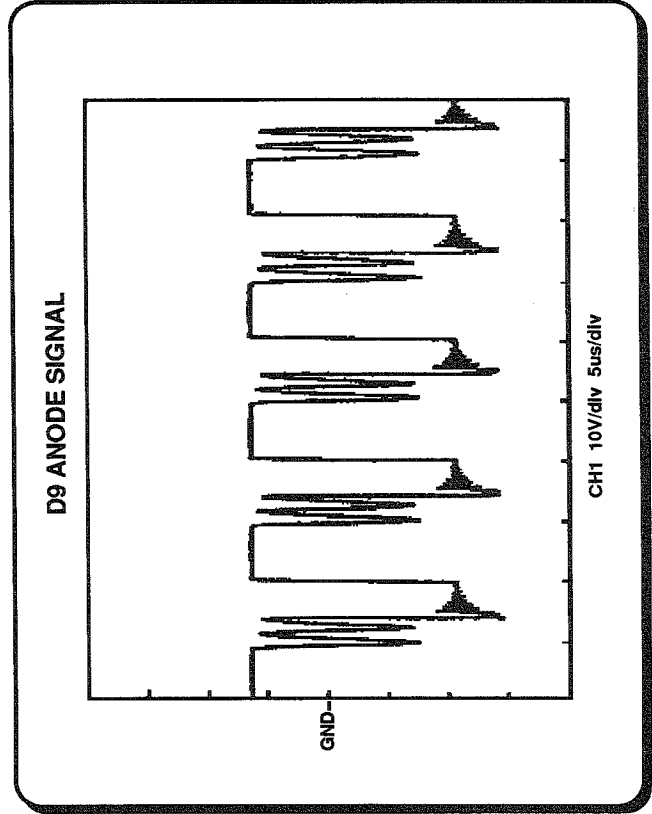
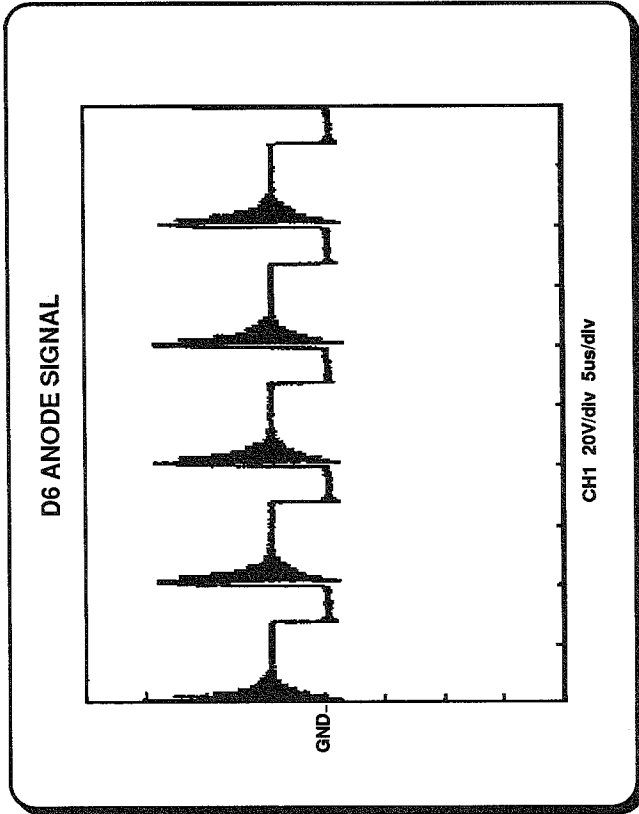
### 3.1.2 Printer



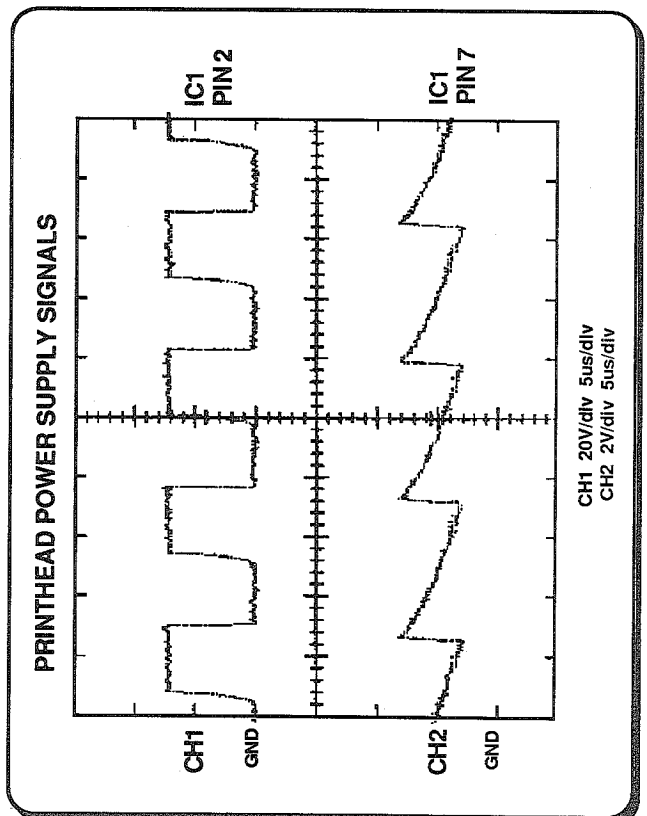
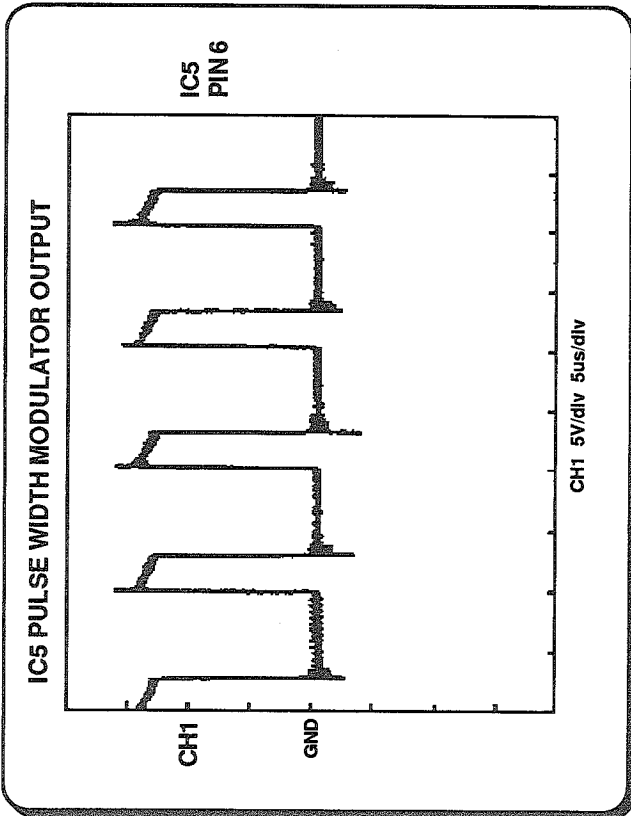
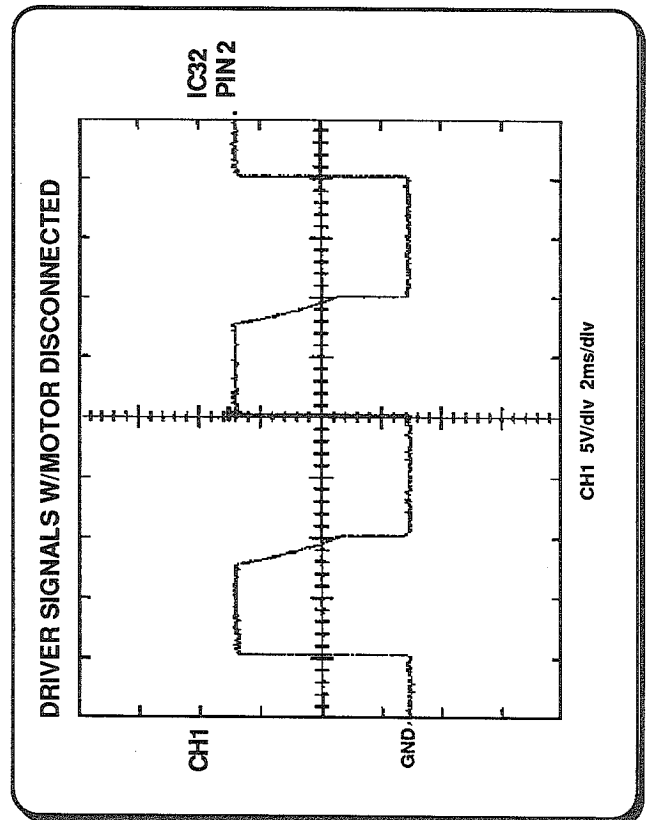
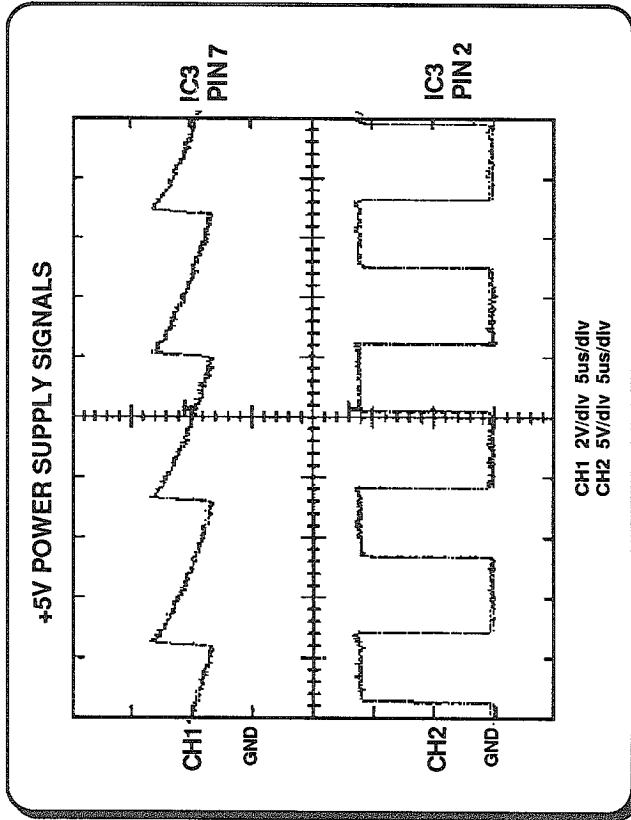
### 3.1.2 Printer (continued)



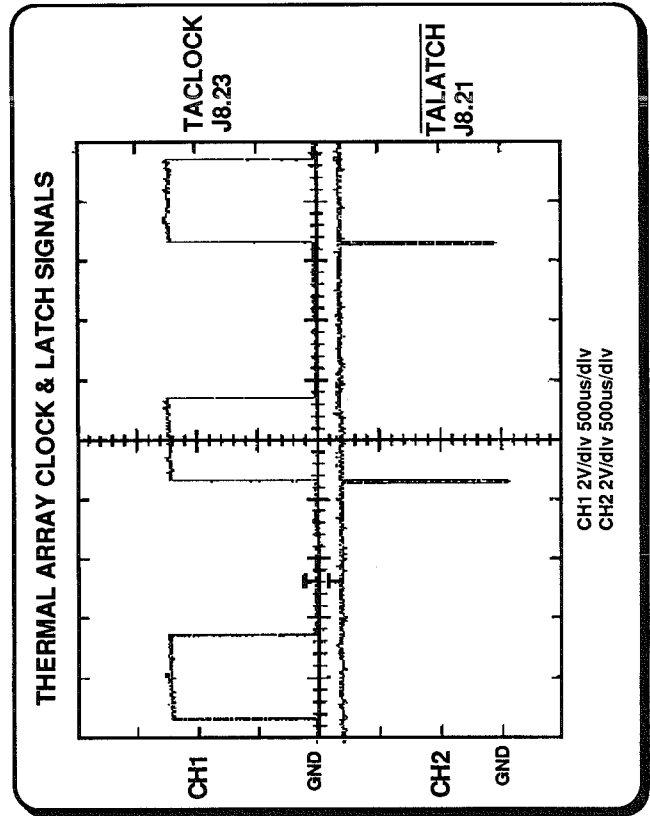
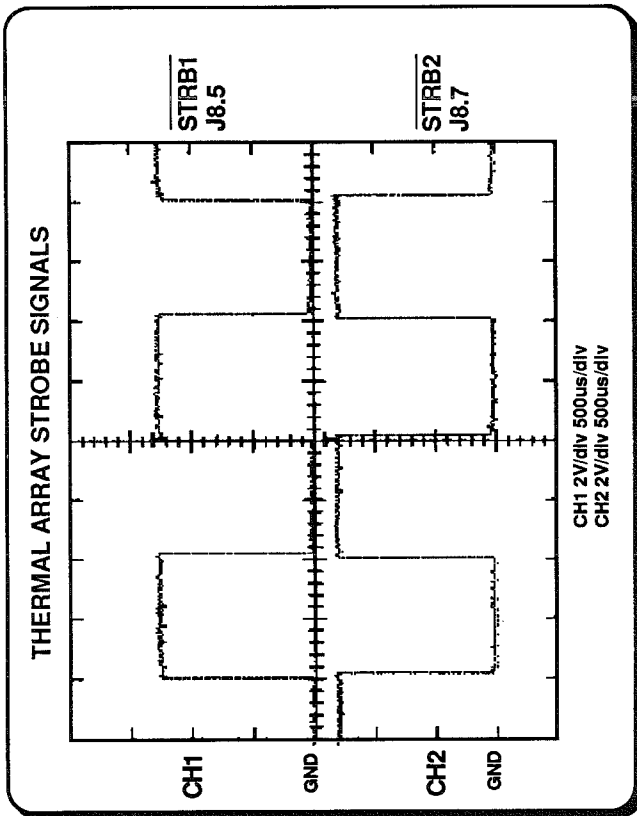
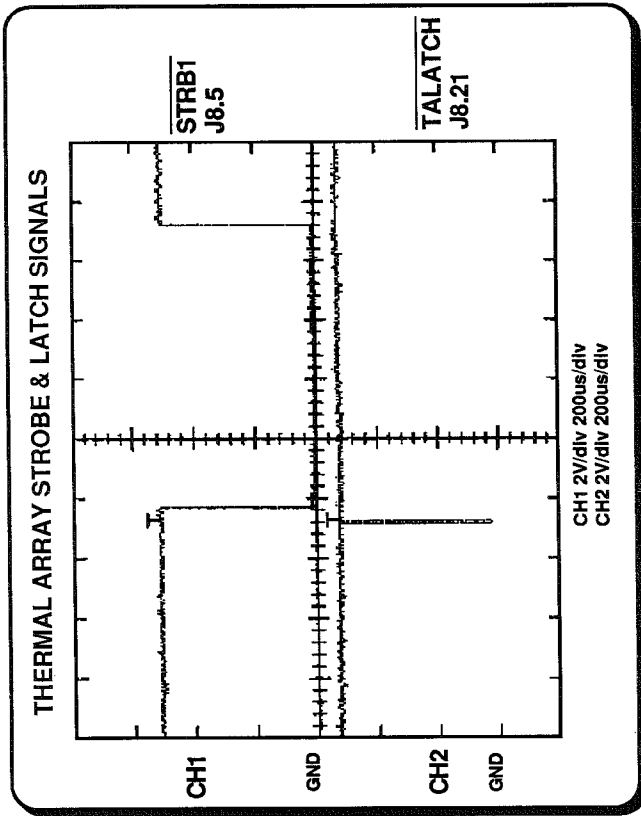
3.2 WAVEFORMS



### 3.2 WAVEFORMS (CONTINUED)



3.2 WAVEFORMS (CONTINUED)



### 3.3 CONNECTOR PINOUTS AND JUMPERS

<u>Connector</u>	<u>Pin#</u>	<u>Name</u>	<u>Description</u>	
<u>EXTERNAL</u>				
J6 [MONITOR]	1	ACKIN	Parallel data enable	
	2-9	PD0-PD7	Parallel data to M300d	
	10	—	Unused	
	11-13	CH1-CH3	Analog outputs to M300	
	14-15	—	Unused	
	16	12-LEAD	12-Lead signal from M300	
	17	RHYTHM	Rhythm signal from M300	
	18	+5 V	Supply	
	19	—	Unused	
	20	TXD3	Transmit data to M300d	
	21	RXD3	Receive data from M300d	
	22-25	GND	Ground	
	J7 [PATIENT]	1	RL	Right leg ECG input signal
		2	V3	Chest lead ECG input signal
3		V2	Chest lead ECG input signal	
4		V1	Chest lead ECG input signal	
5		V4	Chest lead ECG input signal	
6		RA	Right arm ECG input signal	
7		LA	Left arm ECG input signal	
8		LL	Left leg ECG input signal	
9-13		—	Unused	
14		V6	Chest lead ECG input signal	
15		V5	Chest lead ECG input signal	
J13 [MODEM]	1	—	Unused	
	2	TXD2	Transmit data signal	
	3	RXD2	Receive data signal	
	4-6	—	Unused	
	7	GND	Ground	
	8	DTR	Data terminal ready signal	
	9	CTS	Clear to send signal	
J18 [PHONE]	1	—	From J19, pin 1	
	2	—	Unused	
	3	—	From J19, pin 2	
	4	—	Unused	

<u>Connector</u>	<u>Pin#</u>	<u>Name</u>	<u>Description</u>
<u>INTERNAL</u>			
J1 [AC SWITCH]	1	BLUE	To power switch
	2	BRN	To power switch
	3	BLUE	From power switch
	4	BRN	From power switch
J2 [TRANS.]	1-4	—	From transformer secondary
J3 [LCD]	1	GND	Ground
	2	+5 V	Supply
	3	VBIAS	LCD bias voltage
	4-5	—	Control
	6	LCDE	LCD enable
	7-14	D0-D7	LCD data
J4 [KEYBOARD]	1	ON/STBY	Power on/standby
	2	ROW3	Keyboard row 3
	3	ROW4	Keyboard row 4
	4	ROW2	Keyboard row 2
	5	ROW5	Keyboard row 5
	6	ROW1	Keyboard row 1
	7	ROW6	Keyboard row 6
	8	ROW0	Keyboard row 0
	9	ROW7	Keyboard row 7
	10	COL4	Keyboard column 4
	11	COL3	Keyboard column 3
	12	COL5	Keyboard column 5
	13	COL2	Keyboard column 2
	14	COL6	Keyboard column 6
	15	COL1	Keyboard column 1
	16	COL7	Keyboard column 7
	17	COL0	Keyboard column 0
	18	GND	Ground
J8 [PRINTHEAD]	1	+5 V	Supply
	2	BEO	Thermal array strobe enable
	3	TADATA	Thermal array data
	4	GND	Ground
	5	STRB1	Thermal array strobe 1
	6	GND	Ground
	7	STRB2	Thermal array strobe 2
	9	STRB1	Thermal array strobe 1

(continued...)



<u>Connector</u>	<u>Pin#</u>	<u>Name</u>	<u>Description</u>
		(...continued)	
	10	—	Unused
	11	STRB2	Thermal array strobe 2
	12	GND	Ground
	13	STRB1	Thermal array strobe 1
	14	THERMISTOR	Printhead thermistor signal to A/D converter
	15	STRB2	Thermal array strobe 2
	16	—	Unused
	17	STRB1	Thermal array strobe 1
	18	—	Unused
	19	STRB2	Thermal array strobe 2
	20	GND	Ground
	21	TALATCH	Thermal array latch
	22	GND	Ground
	23	TACLOCK	Thermal array clock
	24	GND	Ground
	25	TADTST	Thermal array data out
	26	GND	Ground
J9 [PRINTHEAD]	1-7	PHGND	Printhead ground
	8-14	VPRINT	Printhead voltage
J10 [MOTOR]	1	MDRV4	Motor driver 4
	2	MDRV1	Motor driver 1
	3	MDRV2	Motor driver 2
	4	MDRV3	Motor driver 3
J11 [SENSOR]	1	QTRNS	Que sensor transistor
	2	GND	Ground
	3	QD	Que sensor LED
J12 [TRANS.]	1-4	—	To transformer primary
J15 [FAX BOARD]	1	+5 V	Supply to fax board
	2	NC	Unused
	3	GND	Ground
	4	IP5	Control
	5	IPO	Control
	6	FAX CONT	Control
	7	RXDA	Recieve data signal
	8	TXDA	Transmit data signal
	9	DCD	Data carrier detect signal
	10	DTR	Data terminal ready signal

<u>Connector</u>	<u>Pin#</u>	<u>Name</u>	<u>Description</u>
J19 [PHONE]	1-2	—	From fax option board
J20 [UNUSED]	1-26	—	Future expansion

<u>Jumper</u>	<u>Description</u>
JP1-2	Voltage selection
JMP1, JMP9-10	Fax option Enable = JMP1 to +5 V, JMP9 installed, JMP10 not installed Disable = JMP1 to ground, JMP9 not installed, JMP10 installed
JMP2-8	Factory use only
JMPR1	Factory use only

## 4 REMOVAL AND REPLACEMENT PROCEDURES

### 4.1 REMOVAL AND REPLACEMENT

**WARNING** — Always ensure that unit is unplugged prior to performing any disassembly.

**CAUTION** — The BURDICK E350i uses CMOS integrated circuits and caution must be taken during maintenance procedures to prevent damage which can be caused by static electricity. Also, the printhead is sensitive to static. An anti-static work surface is recommended.

**NOTE:** When removing connectors or wires from PC boards, observe and mark their position. Careful observation will prevent wire or connector reversal during re-assembly.

#### 4.1.1 Top Enclosure

1. Turn power off and unplug the BURDICK E350i. Remove paper from paper compartment.
2. Remove paper compartment lid by releasing the spring-loaded hinge pin at the rounded end. This is the end positioned nearest to the display.
3. Remove top of paper well by snapping it out of place.
4. Remove two (2) screws from the bottom of the BURDICK E350i, located in the front corners of each side.
5. Remove four (4) screws from the top of the BURDICK E350i, located in each corner of paper compartment. For convenience, leave screws in the holes.
6. Carefully lift top enclosure up and off.
7. Replace in reverse order.

**NOTE:** Always ensure that internal wires are properly routed before replacing top enclosure. Failure to do so may damage wires.

#### 4.1.2 Keyboard & LCD Assembly

1. Remove top enclosure as described previously.
2. Unplug keyboard connector at PC board and LCD connector at LCD. Remove keyboard & LCD assembly.
3. Replace in reverse order.

#### 4.1.3 Printer Assembly

**CAUTION** — The printhead is susceptible to damage from static electricity. An anti-static work surface is recommended.

1. Remove top enclosure as described previously.
2. Remove que sensor from printer assembly.
3. Disconnect the remaining two (2) connectors at the printer assembly.
4. Lift printer assembly up and remove ground wire clip. Remove printer assembly.
5. Replace in reverse order. Ensure that metal shim is properly placed under near side of printer assembly.

**NOTE:** After replacing the printer assembly, an adjustment will be necessary. Refer to printhead voltage adjustment in section 2.4.

#### 4.1.4 Motor

1. Remove printer assembly as described previously. Remove brush assembly.
2. Remove three (3) clips securing motor to roller chassis. Remove motor.
3. Unscrew and remove three (3) motor mount spacers. Remove gear.
4. Replace in reverse order.

#### 4.1.5 Printhead

**CAUTION** — The printhead is susceptible to damage from static electricity. An anti-static work surface is recommended.

1. Remove printer assembly as described previously. Remove brush assembly.

2. Remove motor as described previously.
3. Carefully squeeze printhead and chassis together to release spring tension on roller and printhead.
4. Slide printhead out of slot. Remove two (2) fiber washers from ends of printhead.
5. Replace in reverse order.

NOTE: After replacing the printhead, an adjustment will be necessary. Refer to printhead voltage adjustment in section 2.4.

#### 4.1.6 Drive Roller

1. Remove printer assembly as described previously. Remove brush assembly.
2. Remove motor as described previously.
3. Carefully squeeze printhead and chassis together to release spring tension on roller and printhead. Remove drive roller shaft grounding clip.
4. Slide drive roller out of slot. Remove gear.
5. Remove two (2) bearings from ends of drive roller.
6. Replace in reverse order.

#### 4.1.7 Que Sensor

1. Remove top enclosure as described previously.
2. Unplug connector at Logic PCB.
3. Slide que sensor up and out of slot.
4. Replace in reverse order.

#### 4.1.8 Logic PCB

1. Remove top enclosure as described previously.
2. Remove all internal connectors and ground wires.
3. Remove keyboard & LCD assembly as previously described in section 4.1.2.
4. Remove nine (9) screws securing external connectors and board to bottom enclosure.

5. Remove Logic PCB.
6. Replace in reverse order.

NOTE: To avoid damage, ensure that all wires are properly routed.

#### 4.1.9 3-Volt Lithium Battery

**WARNING** — *The correct polarity must be observed when replacing the battery. Ensure that the positive (+) side of the battery is aligned with the positive (+) side of the battery holder.*

1. Have the replacement battery within reach.  
NOTE — The configuration items stored in memory may be lost if this battery is removed for more than one or two minutes!
2. Remove top enclosure as described previously.
3. Remove old battery and install new one, taking care to *observe the proper polarity*.
4. Replace top enclosure.
5. Plug in power cord and turn the unit's mains power switch on. Press the ON/STBY key.
6. Reset the time and date (refer to Operating Instructions). Also, verify that the proper configuration items have been maintained.

#### 4.1.10 Fuses

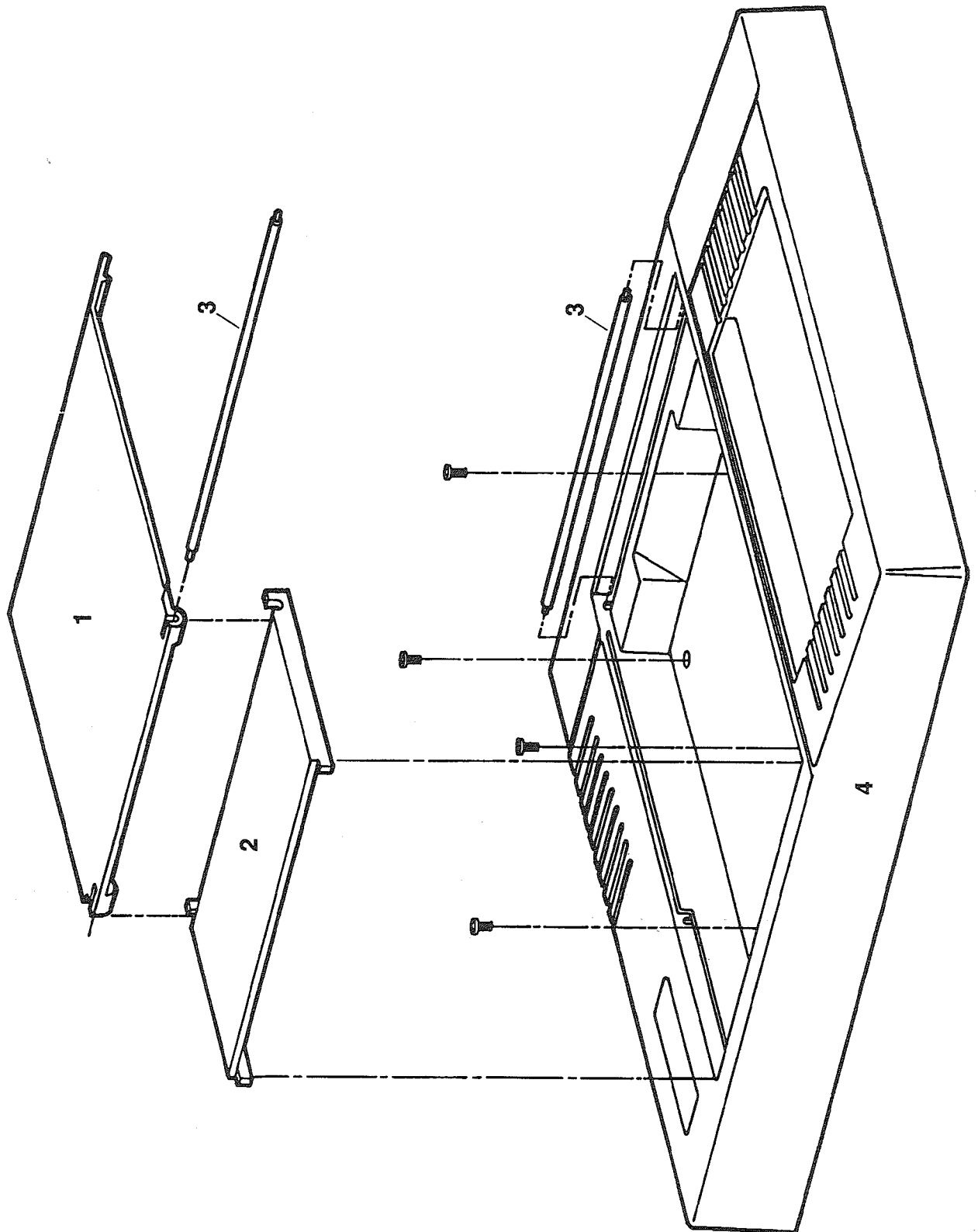
**WARNING** — *Mains voltage is present on fuses! Ensure that unit is unplugged prior to replacing any fuses.*

Two (2) fuses are located on the Logic PCB. Access to the fuses is gained by removing the top enclosure. If replacement is necessary, use only a fuse of the same type and rating as the original.

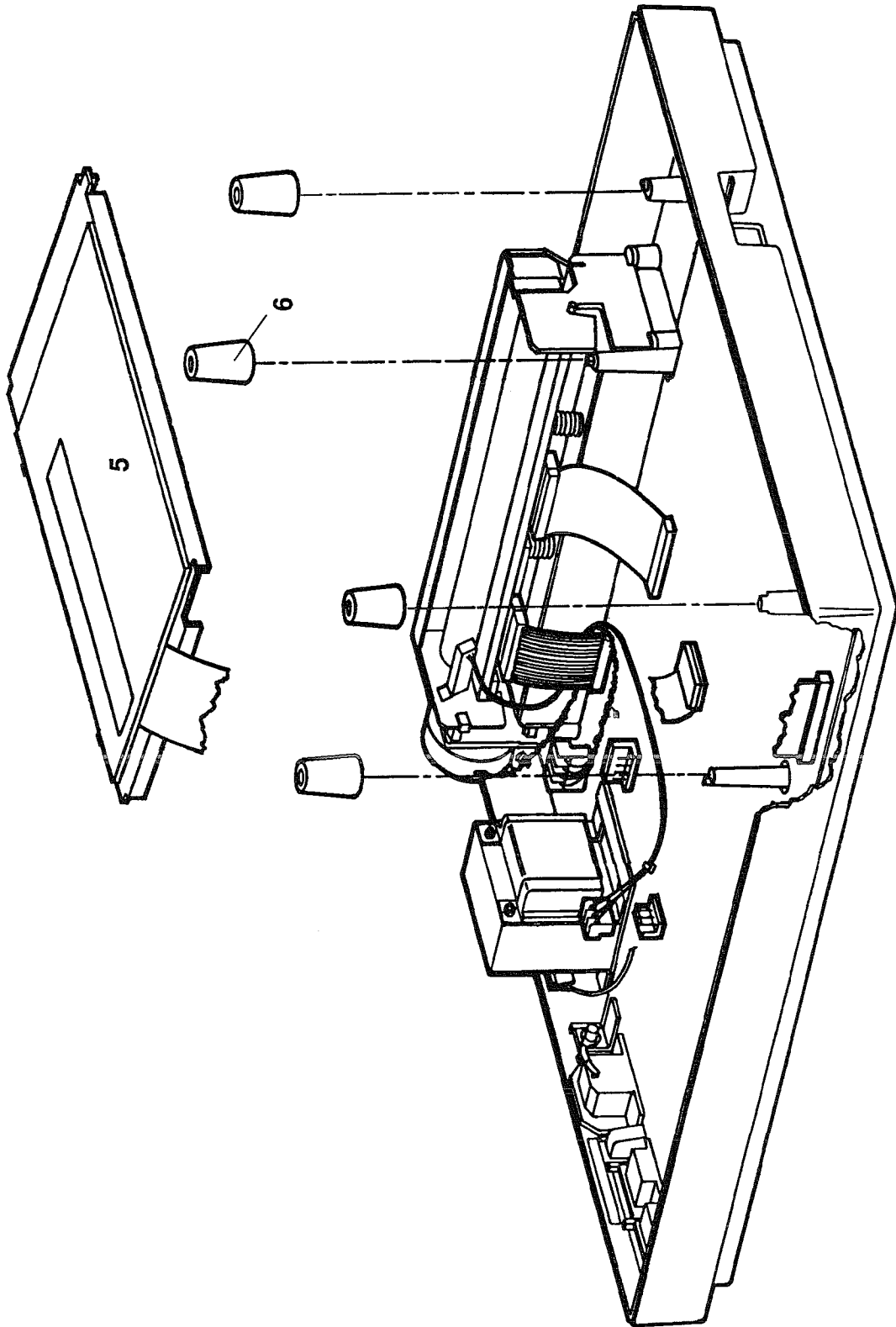
#### 4.1.11 (Optional) Fax Modem PCB

1. Remove top enclosure as described previously.
2. Unplug 10-pin flex-cable connector at J15 and 2-pin connector at J19 on Logic PCB.
3. Carefully unsnap the Fax Modem PCB from five (5) nylon stand-offs and remove board.
4. Replace in reverse order.

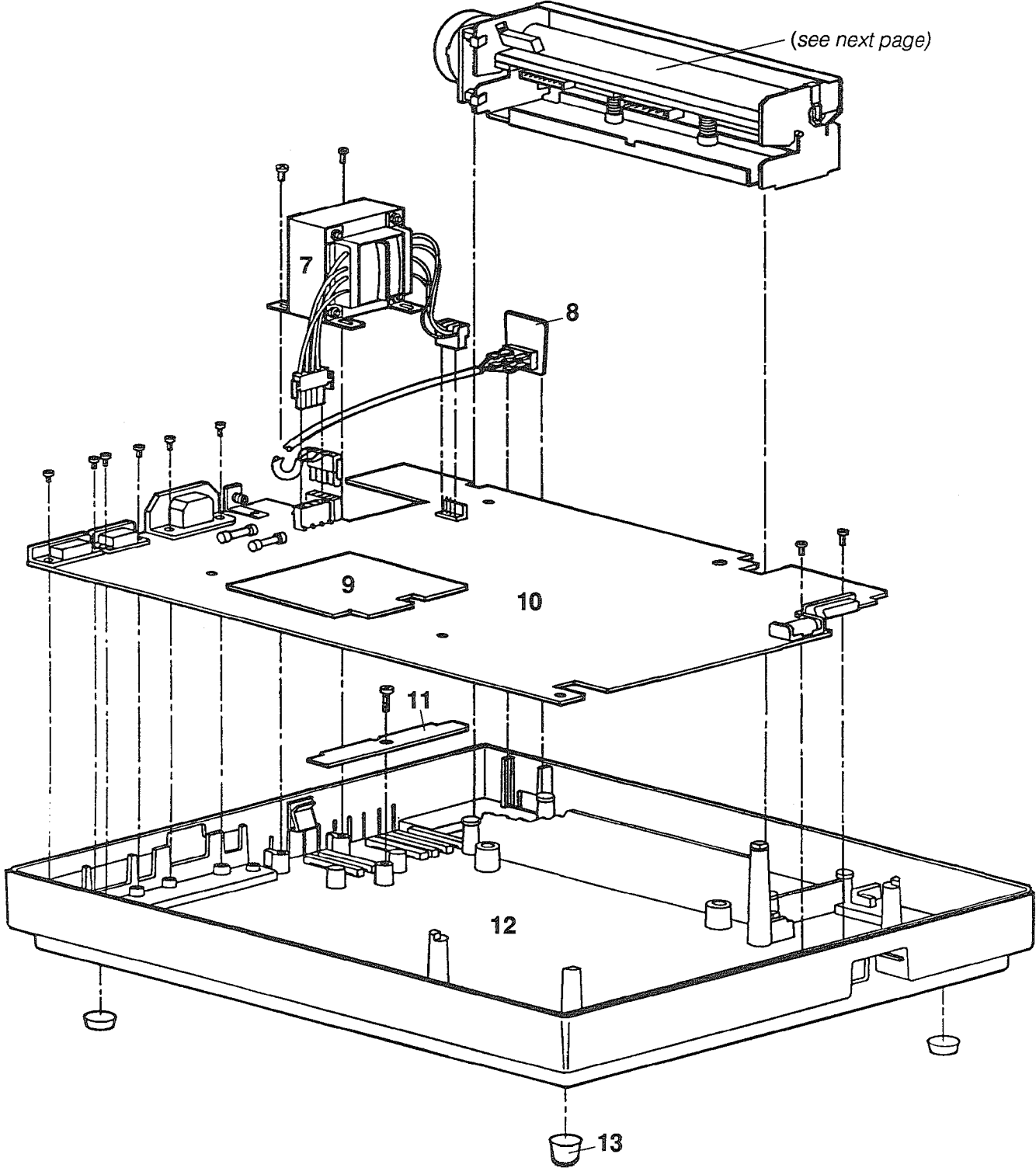
4.2 EXPLODED VIEWS



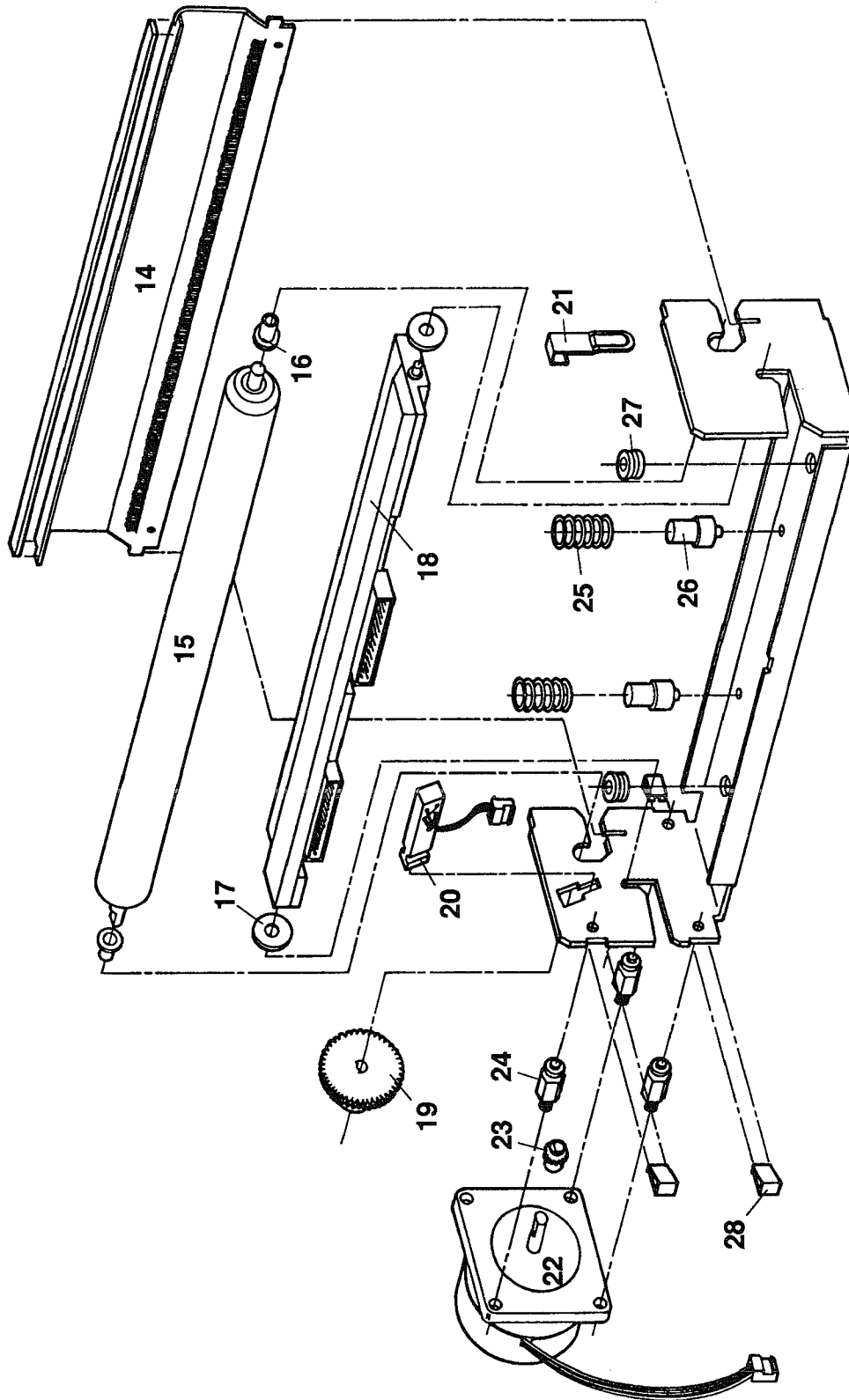
4.2 EXPLODED VIEWS (CONTINUED)



4.2 EXPLODED VIEWS (CONTINUED)



4.2 EXPLODED VIEWS (CONTINUED)





**4.3 PARTS LIST**

	<b>Part #</b>	<b>Description</b>
<b>1</b>	862775	Paper Compartment Lid*
<b>2</b>	862776	Paper Well Top*
<b>3</b>	862923	Pin Assembly*
<b>4</b>	862912	Enclosure, Top*
	700729	Screw, 8-32 x 1/2, (4 required)
<b>5</b>	862682	Keyboard & LCD Assembly
<b>6</b>	862537	Rubber Mounting Pad for Keyboard, (4 required)
<b>7</b>	834518	Transformer Assembly
	700773	Screw, 8-32 x 3/8, (2 required)
<b>8</b>	862661	Cable, Main Power Switch
<b>9</b>	862801	(Optional) Fax Modem PC Board
<b>10</b>	862793	Logic PC Board Assembly (includes EPROMS)
	811585	EPROM, Odd (IC84)
	811584	EPROM, Even (IC49)
	850662	Battery, 3-Volt Lithium (BT1)
	833011	Fuse, 1 Amp, 250V
	825142	Cable, LCD (J3)
	825112	Cable, Printhead (J8)
	862399	Cable, Printhead (J9)
	700228	Screw, 4-40 x 5/16, (8 required)
<b>11</b>	862386	Bracket, Transformer
	700773	Screw, 8-32 x 3/8
<b>12</b>	862913	Enclosure, Bottom*
	700729	Screw, 8-32 x 1/2, (2 required)
<b>13</b>	850419	Rubber Foot, (4 required)
<b>14</b>	862881	Paper Guide*
<b>15</b>	862376	Drive Roller
<b>16</b>	862495	Bearing, Drive Roller, (2 required)
<b>17</b>	705017	Washer, Fiber, (2 required)
<b>18</b>	811317	Thermal Printhead
<b>19</b>	862372	Gear, 60T
<b>20</b>	862835	Que Sensor Assembly
<b>21</b>	850660	Clip, Drive Roller
<b>22</b>	862633	Motor Assembly
<b>23</b>	862640	Gear, 20T
<b>24</b>	844247	Motor Mount Spacer, (3 required)
<b>25</b>	862055	Spring, Printhead Compression, (2 required)
<b>26</b>	862374	Spring Retainer, (2 required)
<b>27</b>	845868	Grommet, (2 required)
<b>28</b>	850462	Clip, Motor Retainer, (3 required)

(continued...)

\* Units below serial no. 42408 require the #862922 Enclosure Kit.

**Accessories**

862922	Enclosure Kit for Units Below Serial No. 42408
007514	10-Lead ECG Patient Cable
007868	Paper, Thermal Z-Fold, 200 sheets
047262	Power Cord
086215	BURDICK E350i Operator's Manual

## 5 MAINTENANCE

### 5.1 PREVENTIVE MAINTENANCE

The purpose of preventive maintenance is to eliminate future problems as much as possible and to keep the equipment in good operating condition. This ensures safe and satisfactory ECG recordings.

THE FOLLOWING PREVENTIVE MAINTENANCE CHECKS SHOULD BE CARRIED OUT AT LEAST ONCE A YEAR:

- Visual inspection
- Cleaning
- Check power cord
- Check patient cable
- Check leakage currents

Simple maintenance routines, normally performed daily or weekly by the user, are described in the Operating Instructions. In the event of a malfunction, refer the repair to an authorized Burdick Service Representative.

#### 5.1.1 Visual Inspection

Check to see if the BURDICK E350i has been subjected to extreme mechanical stress, such as a heavy fall, or damage from liquid spills. Check cabinet for cracks and missing parts. Check thermal printhead and clean if necessary. Inspect connectors and cords for signs of deterioration. Check for any signs of abnormal operation.

If problems are apparent, remove the power cable and check the following:

- Are mechanical items firmly attached?
- Are all internal electrical connections firmly attached?
- Is there any sign of burning or other damage?

#### 5.1.2 Cleaning

The need for cleaning greatly depends on the environment and frequency of use. The following items are required:

- Soft, lint-free cloth
- Polishing cloth
- Distilled water

- Mild detergent solution
- Soft brush

Disconnect the AC power cord before attempting any cleaning. Clean the housing with a damp cloth. Do not use abrasive cleaners or polishes. Wipe dry with a soft, clean cloth. Also, wipe the paper compartment.

*CAUTION: Do not pour liquids (such as alcohol or other cleaners) directly on the unit. Contamination from liquids may result in severe electrical damage.*

#### 5.1.3 Power Cable

Check the power cord and appliance inlet for any visible signs of deterioration, loose connections, or burn damage.

#### 5.1.4 Patient Cable

Check the patient cable and input connector for any visible signs of damage or loose connections. Disconnect the patient cable from the unit and inspect it for short circuits, broken wires, or poor contacts by measuring the resistance for individual electrode leads.

### 5.2 PRINTHEAD

The thermal array printhead should be kept clean and free of dirt or other foreign materials which can adversely affect its performance. Individual dots or groups of dots which do not print (particularly at the baseline) are an indication that the printhead is dirty. Residue can be removed effectively by using a small amount of rubbing alcohol and a lint-free swab. Do not use abrasives or cleaners which may damage the printhead.

### 5.3 CHASSIS LEAKAGE CURRENT CHECK

*NOTE — Leakage tests should be conducted with a high quality meter or safety analyzer capable of testing to AAMI specifications. Inappropriate meters can produce erroneous leakage readings. Leakage tests should be performed at a non-conductive work station.*

**WARNING** — Use caution when conducting these tests. The meter must be suitably insulated and capable of withstanding the power line voltage.

1. Turn the BURDICK E350i side panel power switch ON.
2. Connect a leakage meter between the rear panel chassis ground jack and power line ground. Ensure that leakage current is less than 100  $\mu\text{A}$ .
3. Open ground line and ensure leakage current is less than 100  $\mu\text{A}$ .
4. Reverse line polarity and ensure that leakage current is less than 100  $\mu\text{A}$  with ground closed.
5. With reversed polarity, open ground line and ensure leakage is less than 100  $\mu\text{A}$ .

#### 5.4 PATIENT LEAKAGE CURRENT CHECK

**NOTE** — Leakage tests should be conducted with a high quality meter or safety analyzer capable of testing to AAMI specifications. Inappropriate meters can produce erroneous leakage read-

ings. Leakage tests should be performed at a non-conductive work station.

**WARNING** — Use caution when conducting these tests. The meter must be suitably insulated and capable of withstanding the power line voltage.

**NOTE:** Leakage should be less than 20  $\mu\text{A}$  with the patient cable attached and less than 10  $\mu\text{A}$  with it disconnected.

1. Connect the patient cable to the BURDICK E350i. Turn the side panel power switch ON.
2. Connect all patient cable leads together.
3. Connect a leakage meter between patient cable leads and power line ground. Ensure leakage is less than 20  $\mu\text{A}$ .
4. Open ground line and ensure that leakage current is less than 20  $\mu\text{A}$ .
5. Reverse line polarity and ensure that leakage current is less than 20  $\mu\text{A}$  with ground closed.
6. With reversed polarity, open ground line and ensure leakage current is less than 20  $\mu\text{A}$ .

## 6 THEORY OF OPERATION

### 6.1 LOGIC PCB

All of the circuitry for the BURDICK E350i Electrocardiograph is contained on a single printed circuit board assembly, the Logic PCB. For the purpose of discussion, the circuitry is grouped as follows: power supply, amplifier, logic, and printhead loading.

#### 6.1.1 Power Supply

The line voltage is applied to the main transformer through toroid L7, fuses F1–F2, and the side panel power switch (refer to schematic 7.1). The transformer secondary at J2, pins 3 and 4, is rectified by D1 and filtered by C1 and C2 to produce an unregulated +30 VDC for IC1. The transformer secondary at J2, pins 1 and 2, is rectified by D2 and filtered by C3 and C10 to produce an unregulated +19 VDC for the other supplies.

When power is first applied to the BURDICK E350i, C22 and R16 provide a power up reset. Q1 and IC4 control the logic switch, Q2. When the on/standby switch is pressed, Q1 turns off. This causes the output of IC4 at pin 13 to go low, turning on logic switch Q2.

Once the logic switch is on, power is available to all the circuits at the drain of Q2. The logic switch can be turned off by pressing the on/standby switch again, or by the PWRDWN signal from the microprocessor. In either case, Q1 is turned off again. This causes the output of IC4 at pin 13 to return to a high condition, turning off the logic switch Q2.

Rectified 30-VDC output from D1 goes to IC1, which regulates the printhead voltage supply. R3–R5 allow the output of IC1, a pulse width modulator, to be adjusted in the range of 13.5 V to 16.5 V. The VPENBL control signal is inverted through IC115-C and applied to pin 6 of IC1. This signal inhibits the output of IC1 under control of the microprocessor. C5 and R1 set the frequency to 85 kHz. R2, C6, and C7 provide stability for the circuit. The output of IC1 is controlled by D3, L1, and C9. During high density printing, C9 provides current to the printhead. IC1 recharges C9 during the off time.

The +5-volt power supply uses a pulse width modulator, IC3, to step down 19 VDC from rectifier D2. The oscillator is set to 85 kHz by C13 and R8. C15,

C16, and R10 provide stability, while D4, L2, and C17 provide output current drive and filtering. R9 limits current at 1 A peak maximum.

The isolated power supplies are generated from IC5 a pulse width modulator. Its output voltage varies with the input and load to produce unregulated voltages for three isolated regulators: IC6, IC7 and IC8. The logic supply voltage is applied to IC5 at pin 7 and to the isolation transformer T1 at pin 5. R19 and C27 determine the frequency of the internal oscillators. Pin 6 of IC5 drives the power transistor Q4, which in turn drives the transformer. R20 and R23 provide base current limiting and ground reference for Q4. R22 is the current sense resistor. R21 and C29 form a low pass filter for the over current shut down input at pin 3 of IC5.

The output regulation is controlled by feedback from pins 1 and 4 of T1. D7 and C30 rectify and filter the signal, and provide a dc value to the load resistor, R27. A divider network is formed by R25 and R26 for the feedback voltage applied to pin 2 of IC5. R24 and C28 filter out high frequency transients on the feedback signal. C23 and C24 filter the switching supply. C25 and R18 form a resonant discharge path for the primary of T1 via D6.

Pins 7 and 10 of T1 furnish a pulsating voltage to D9 and C32, which rectify and filter the input for IC6. IC6 is a voltage regulator which provides +5 V for the isolated logic circuitry. The +6-volt isolated supply is generated by IC8. D10 and C34 rectify and filter the secondary to provide an unregulated +12 V at pin 8 of IC8. R31 and R32 determine the output voltage. C36 and C227 provide filtering for the +6-volt isolated supply. The –6-volt isolated supply is the same as the +6-volt supply except that the ground and output pins are reversed to yield a negative voltage. Also,  $\pm 12$  V are furnished for the op amp supplies. The +12-volt supply is taken from the primary of T1 at pin 5. The –12-volt supply is derived from IC66 and associated components.

#### 6.1.2 Amplifier - Microprocessor & Memory

IC113 is a V25 microprocessor which receives data from the front end by means of a fiber optic link, OPT1 (refer to schematic 7.9). The V25 is supported by an 8k x 8 EPROM, IC109, and a 32k x 8 static RAM, IC110. Data from the amplifier is preprocessed by the V25 before being sent to the logic microprocessor, IC35.

Preprocessing includes the following tasks: detecting pacemakers and lead-off conditions, applying a 50/60-Hz filter to the data if requested by the logic microprocessor, and formatting the data into blocks with interleaved synchronization bytes.

The transfer of data between IC113 and IC35 is controlled by DMA channel DRQ1, IC105, IC106, IC108, IC34, IC63, IC129, and associated components. IC107 latches the data. IC63-A provides a power-up reset for the V25.

### 6.1.3 Amplifier - Analog Front End

The analog front end obtains the patient ECG signals and digitizes them. Data from all the ECG sensors is acquired simultaneously. Multiplexers determine which lead is digitized.

Signals from the ten-lead patient cable are introduced at connector J7 (refer to schematic 7.2). Diodes D71–90 protect against excessive voltage, such as from a defibrillator pulse. D93 and D94 provide a current path to the isolated ground. D91 and D92 provide lead-off detection. Capacitors C160–162 and C164–169 filter out high frequencies on the input signal. The RA patient input is low-pass filtered by IC86-B, R176, and C160 and provides a "common" reference voltage for the other 9 inputs. R183 is a current limiting resistor for the RL driver, IC87-A.

The first stage provides a dc gain of 9.45. C223 and C251 filter out high frequency noise to help prevent false pacemaker signals. The lead weighting resistors R212–214 and amplifier IC119-B develop a Wilson central terminal signal.

The second stage of each channel consists of a dc component and an ac component. The dc component helps to detect pacemaker spikes and adjusts the offset for the ECG traces. The ac component allows for waveform measurement.

Using the V1 input as an example, C176 functions as a dc blocking capacitor. The dc component is applied across R282 to IC97 at pin 15. The ac component is amplified by IC93-B for a gain of approximately 302. This is applied to IC98 at pin 15. The three multiplexers, IC96, IC97, and IC98 are cycled by a programmable logic device, IC102 (refer to schematic 7.3). The reference values from IC96 and the measured values from IC97 and IC98 are presented to a differential amplifier formed by IC99 and associated components. The result from IC99-D, pin 14, is filtered by R266 and C224 and applied to

pin 26 of IC101, a 12-bit analog to digital converter. The digital result is passed back to IC102 and serially output at the rate of 24 bytes / 2 milliseconds on pin 32. Q14 drives the fiber optic link to the V25 processor, IC113. The link itself consists of OPTO2, R253, L3, and C205–206. The V25 pre-processes the data, then passes it through a parallel interface to the 80C186 microprocessor, IC35.

IC121 furnishes 2.5 V to IC100-A. The output at pin 1 of IC100-A is scaled to 3 V by R245 and R246. This is used as a reference for the analog to digital converter, IC101. IC127, IC128, and associated components provide a regulated, isolated  $\pm 5$ -volt supply for IC101. Y2, IC104-B, and associated components form a 2.048-MHz clock to drive IC101 and IC102. D96, IC104-D, -E, -F, and associated components perform a power-on reset for IC101.

### 6.1.4 Logic - Microprocessor & Memory

IC35 is a 16-bit CMOS microprocessor which has 2 high-speed DMA channels, 3 programmable timers, programmable interrupt controllers, and peripheral chip select logic (refer to schematic 7.8).

IC46–48 are address latches for AD0–AD19. IC49 and IC84 are EPROMs used for permanent data storage (refer to schematic 7.5). IC130 and IC131 provide 64k bytes of non-volatile RAM for system variables and user-defined defaults which are saved when power is turned off. IC52–55 are dynamic RAMs which provide for variable data and the program operating stack. DRAM control is handled by the microprocessor. IC50 and IC51 multiplex lines LA1–16 to the DRAM. IC56 generates address select signals RAS, CAS0, CAS1 and MUX. IC125 generates read and write signals for the data bus. These signals are used throughout the memory and I/O bus.

IC37 operates as a software watchdog. If the microprocessor does not access IC37 on schedule, a reset is generated (refer to schematic 7.6). JMPR1 allows the watchdog function to be disabled for testing purposes.

### 6.1.5 Logic - I/O Functions

IC60 has three programmable I/O ports (refer to schematic 7.4). Its main function is to scan the interactive keyboard. Port A is programmed for outputs and is connected to column lines COL 0–7. Port B is programmed for inputs and is attached to the

ROW 0–7 lines. On initial power-up, all COL lines are set to high and the ROW lines are held low with pull-down resistors. When a key is pressed, an INT1 is generated. When this happens, the software sets all COL lines high, one by one, polling until it has determined which COL line generated the interrupt. Also, the ROW lines are polled to determine the absolute location of the key press. Port C, bit 2, determines the source of a non-maskable interrupt generated either by a strobe error from the thermal printhead or a power failure. Port C, bits 5–7, provides serial control for the 8-bit A/D converter described below. Port C, bit 4, goes to the V25 processor at PO2. Port C, bit 1, is the RHYTHM signal to J6.17.

IC64 is an 8-bit, 4-channel, multiplexed-input A/D converter (refer to schematic 7.4). IC64, along with other discrete devices, monitors system operating conditions. Input at CH0 is connected to the printhead thermistor so that the temperature can be monitored. Input at CH1 is the printhead voltage,  $V_p$ , and is used to adjust for individual printhead resistances. Input at CH3 verifies the reference to the CPU. IC111 is an 8-bit port for use with an external monitor. The parallel enable is generated by IC60.

IC38 is a DUART used for the system serial communications (refer to schematic 7.7). Serial channels A and B, along with handshaking control signals, communicate to an external monitor. IC40 contains all of the required RS-232 drivers and receivers. All internal timing is derived from a 3.684-MHz crystal, Y4. The microprocessor is notified of serial communications status through the use of INT3.

IC41 is a 12-bit DAC which converts the digital ECG signal to analog form for use by the monitor (refer to schematic 7.7). IC43 provides a reference voltage for the DAC. The analog output at pin1 of IC114-A is scaled by R98 and R99, and multiplexed by IC44. IC45, IC42, and associated components buffer and filter the three channels before they are made available to the monitor at J6, pins 11–13.

IC39 has three peripheral I/O interface ports and two programmable timers (refer to schematic 7.6). Port A, bits 4–6, are outputs used for control of a digital pot, IC67, that sets display contrast levels. Port A, bit 7, is configured for input and receives the power fail signal. Port B, bits 0–3, are outputs that determine the operation of the stepper motor. Port B, bit 4, is an input and receives the queuing sensor signal. Port B, bits 5–7, are outputs used for reset lines. Strobe errors detected in the thermal outputs

are used for controls to shut down the power supply or enable the printhead voltages. Port C, bit 3, is an output which sends the watchdog signal. Port C, bit 4, is an input used to receive serial data from the A/D converter. Port C, bit 5, is an output that controls audible feedback for the keyboard. Timer 0 is used for the printhead loading circuitry.

IC31, a stepper controller, and IC32, a stepper motor driver, are used for operation of the motor. The circuit is configured by the microprocessor for the required speed and direction. The thermal printhead loading circuit steps through the proper sequence after the second strobe goes to its inactive state.

IC29-B, IC30, and associated components function as the queuing sensor to detect holes in the ECG paper. When the sensor detects a hole, reflected light from the LED is greatly reduced. Thus, the conduction of the phototransistor is also reduced. This causes IC30 to output a high on pin 7, which signals the microprocessor that a paper hole has been detected.

If the fax option is installed, IC132 selects between fax or bike outputs at J13, pins 2 and 3.

### 6.1.6 Printhead Loading

The printhead loading circuitry takes parallel data from the microprocessor, converts it to serial form, and then sends it to the printhead.

When the TALDRST signal is low, DMA request flip-flop, IC71-B, and strobe control flip-flops, IC73-A and B, are initialized (refer to schematic 7.10). Also, the load pulse shift register, IC70-B, is initialized through IC69-B, and the bit shift counter, IC79, is reset.

When the DRQ0 signal is high, the microprocessor sends the first word to serial shift registers, IC80 and IC81. First, the data is clocked into the shift registers through IC72-D using signals PCS6 and WR. Then, it is shifted into the printhead.

After IC79 has counted up to 16, the load pulse flip-flop, IC70-B, clocks IC71-B, which in turn causes the DRQ0 signal to go high again. This causes the microprocessor to send another word to the registers. The cycle is executed 109 times for a total of 108 words (plus 1 initiating cycle) to load 1728 bits into the printhead. On the 110th cycle, IC68-B triggers one-shot IC77-A to latch the data into the printhead and complete the loading process.

### 6.1.7 Printhead Strobe

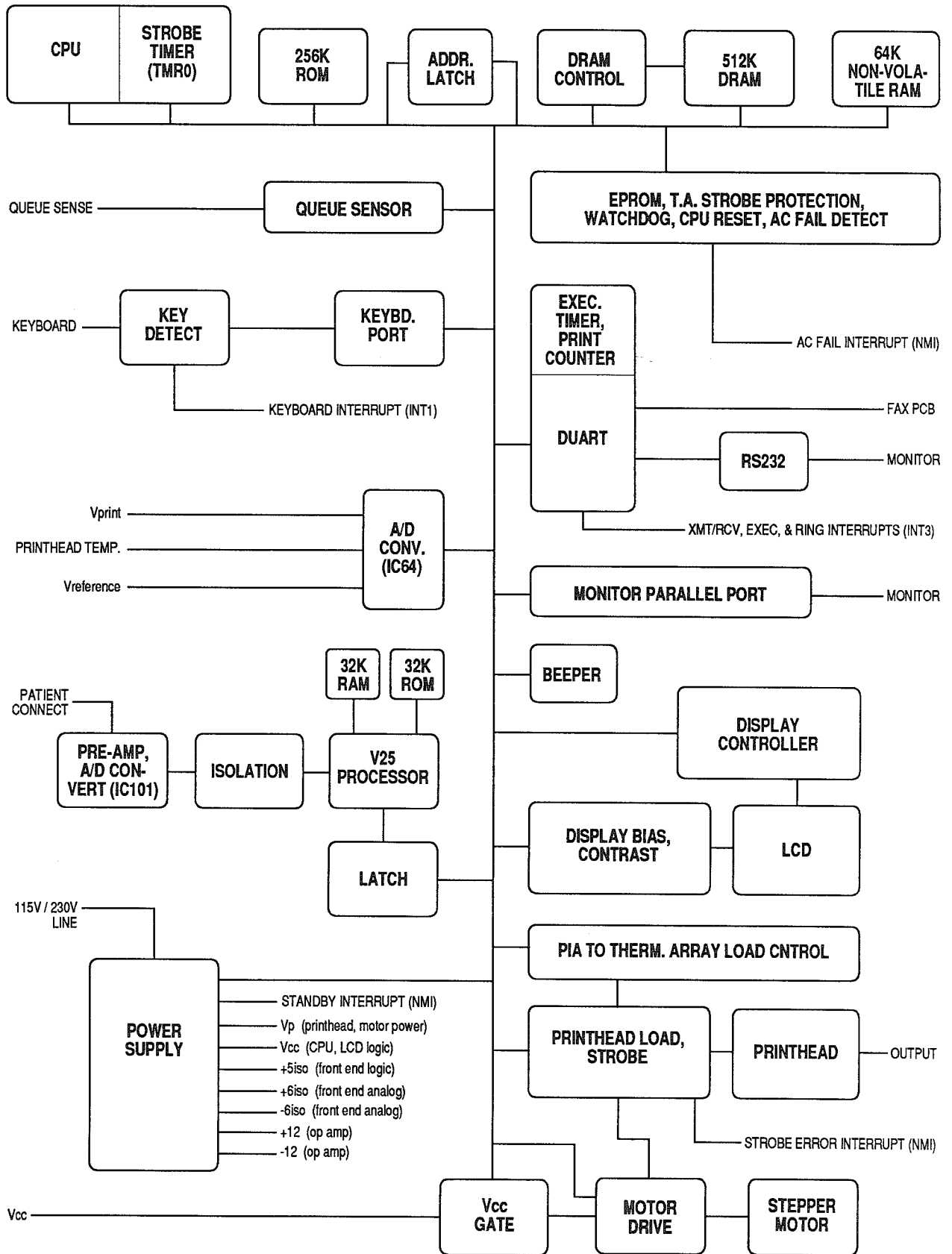
A strobe pulse for each half of the printhead is gated to the printhead in succession from TMR0, a free-running timer. Each strobe is approximately 950 microseconds long. At the end of the second strobe, the paper drive motor is stepped through IC76-C (refer to schematic 7.10). Also, the motor may be stepped with the PCS4 signal under control of the microprocessor.

Printhead temperature is monitored by a thermistor in the printhead and an analog to digital converter

circuit, which is formed by IC64 and associated components. Depending upon the temperature, the duty cycle of TMR0 is adjusted to increase or decrease the length of the strobe pulses applied to the printhead. If a failure occurs and a strobe remains on for more than approximately 1.5 milliseconds, the strobe error one-shot, IC77-B, clocks IC74-A. This produces a non-maskable interrupt signal, TSTRBRR, through IC34 to the microprocessor, which in turn protects the printhead by disabling it.



### 6.1.8 Logic PCB Block Diagram



## 6.2 (OPTIONAL) FAX MODEM PCB

The Fax Modem PCB is an option board which consists of an internal fax modem (refer to schematic 7.12). This enables the electrocardiograph to send records to a remote fax machine or data management system. The option board is attached horizontally over the Logic PCB. Output from the fax modem is via an external RJ11 phone jack located on the rear of the electrocardiograph. The option board connects at J15 on the Logic PCB.

The +5-volt power supply for the option board is provided by the Logic PCB. When fax or modem functions are activated from the keyboard, the OPTCTRL signal (at J1, pin 6 on the option board) goes high to enable U8, which functions as a bi-

directional switch. The signal also turns on Q3, passing the +5VE signal to the collector of Q2 and supplying +5 V to the option board.

Communications between the two boards is accomplished by an asynchronous serial link. U5, U8, and associated components form the serial multiplexer circuit.

The internal modem itself is comprised of U9 (modem controller), U1 (modem IC), and U3 (EPROM). It functions as a 2400-bps modem, using the standard "Hayes AT" command set. Faxes are sent at 9600, 7200, 4800, or 2400 bps.

DAA1 and associated components form the data access arrangement circuit (phone line interface).

## **7 SCHEMATICS AND COMPONENT DIAGRAM**

**7.1 LOGIC PCB SCHEMATIC (1 OF 10)**

**7.2 LOGIC PCB SCHEMATIC (2 OF 10)**

**7.3 LOGIC PCB SCHEMATIC (3 OF 10)**

**7.4 LOGIC PCB SCHEMATIC (4 OF 10)**

**7.5 LOGIC PCB SCHEMATIC (5 OF 10)**

**7.6 LOGIC PCB SCHEMATIC (6 OF 10)**

**7.7 LOGIC PCB SCHEMATIC (7 OF 10)**

**7.8 LOGIC PCB SCHEMATIC (8 OF 10)**

**7.9 LOGIC PCB SCHEMATIC (9 OF 10)**

**7.10 LOGIC PCB SCHEMATIC (10 OF 10)**

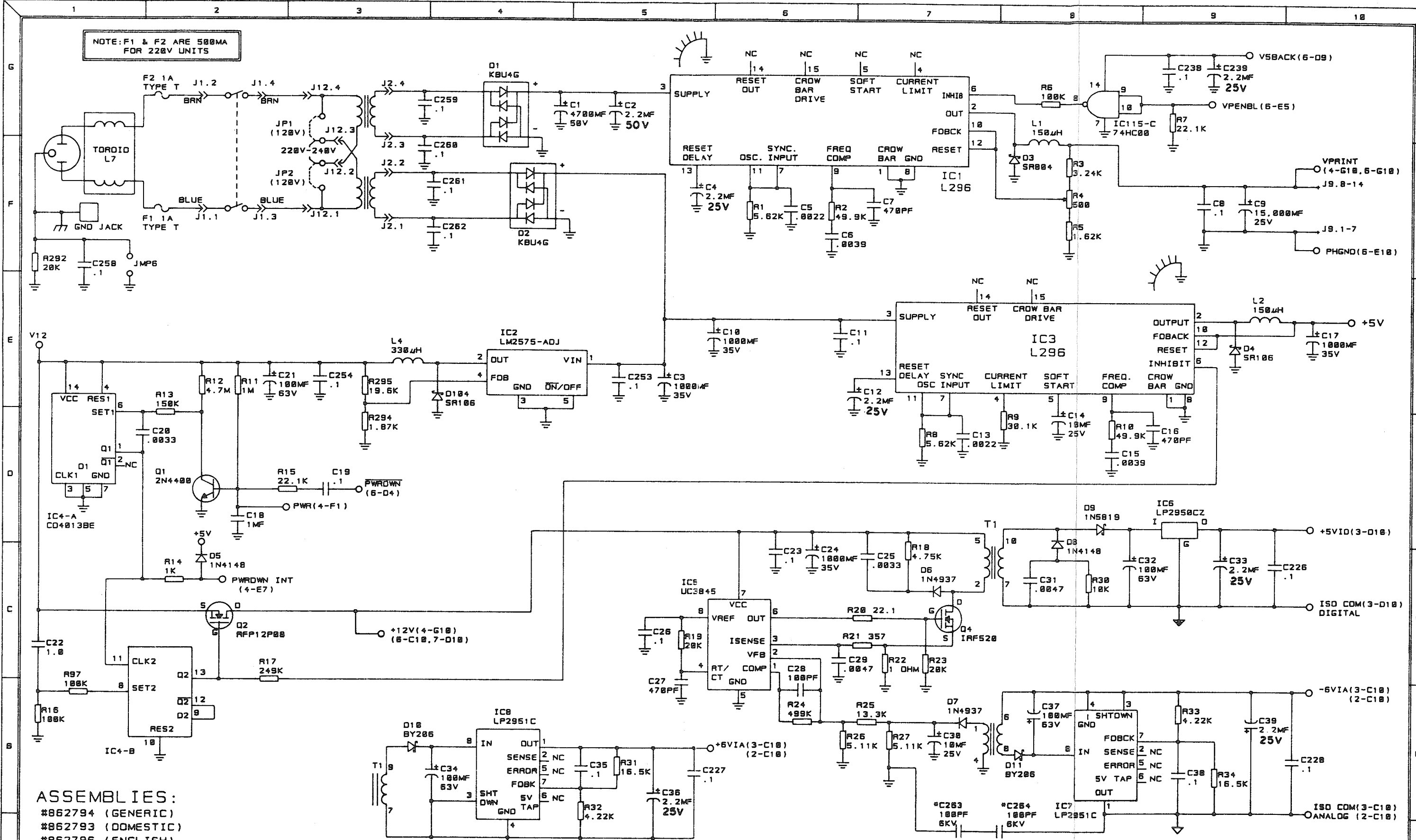
**7.11 LOGIC PCB COMPONENT DIAGRAM**

**7.12 (OPTIONAL) FAX MODEM PCB SCHEMATIC**

**7.13 (OPTIONAL) FAX MODEM PCB COMPONENT DIAGRAM**

**Notes:**

NOTE: F1 & F2 ARE 500MA FOR 220V UNITS



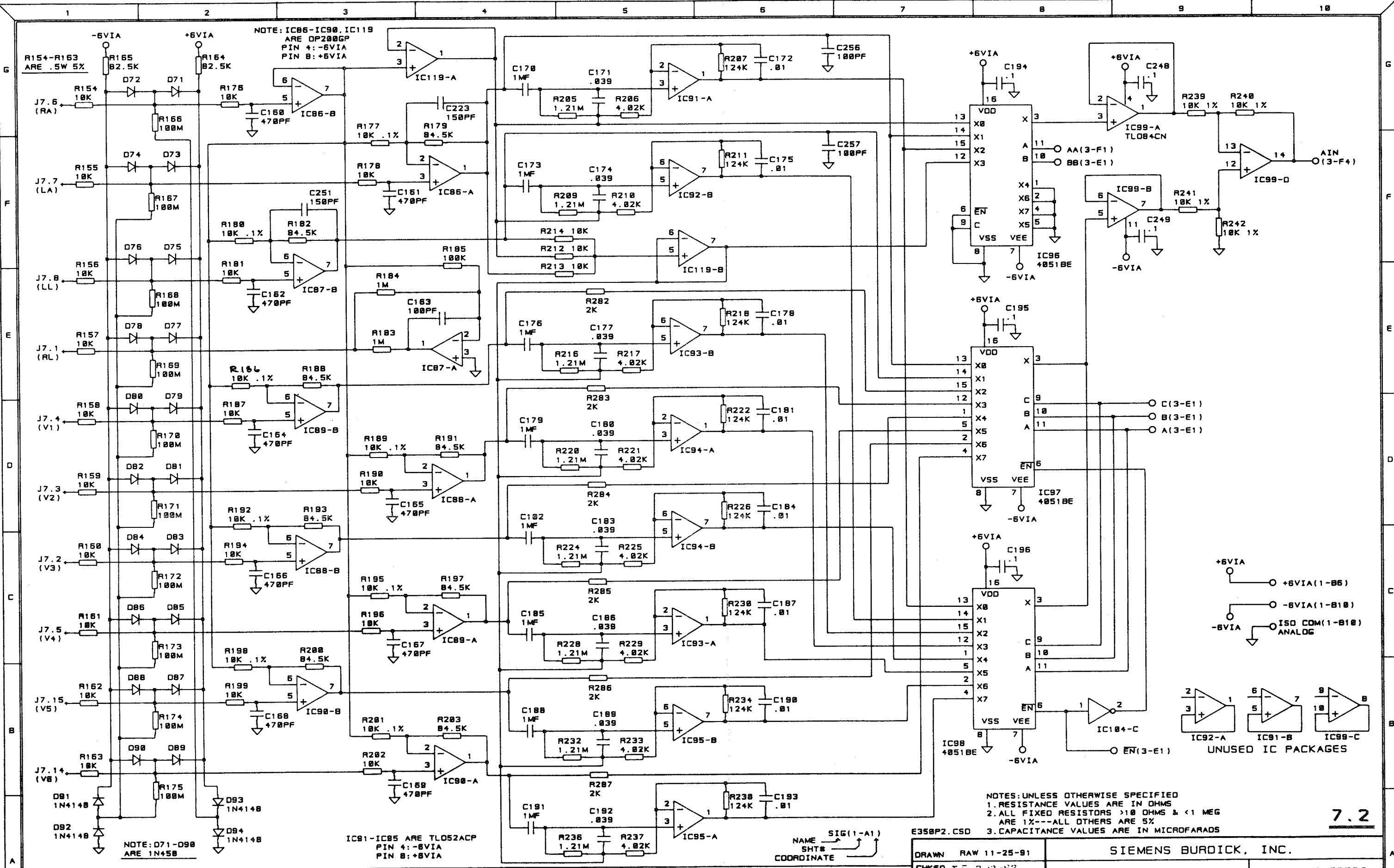
- ASSEMBLIES:**
- #862794 (GENERIC)
  - #862793 (DOMESTIC)
  - #862796 (ENGLISH)
  - #862797 (GERMAN)
  - #862798 (FRENCH)
  - #862799 (SPANISH)

NOTES: UNLESS OTHERWISE SPECIFIED  
 1. RESISTANCE VALUES ARE IN OHMS  
 2. ALL FIXED RESISTORS > 10 OHMS & < 1 MEG ARE 1% --- ALL OTHERS ARE 5%  
 3. CAPACITANCE VALUES ARE IN MICROFARADS

E350P1.CSD  
 DRAWN RAW 11-25-91  
 CHECKED J.F. 2-12-92  
 APP'D J.F. 2-12-92  
 DWG NO. 560047

SIEMENS BURDICK, INC.  
 TITLE: POWER SUPPLY CKT.  
 UNIT: E350I  
 SHT 1 OF 10

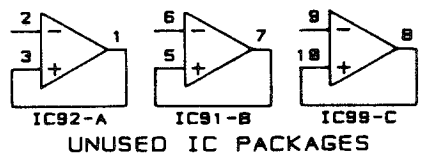
REV	DATE	ECO NO.	DESCRIPTION	REV	DATE	ECO NO.	DESCRIPTION
1	7-10-92	329	CAP. CL WAS 35V. NOW 50V, AND CAP. 24, 12, 33, 36, 39 239 WAS 35V NOW 25V				



NOTE: IC86-IC98, IC119 ARE OP280GP  
PIN 4: -6VIA  
PIN 8: +6VIA

NOTE: D71-D98 ARE 1N458

IC91-IC95 ARE TLO52ACP  
PIN 4: -6VIA  
PIN 8: +6VIA



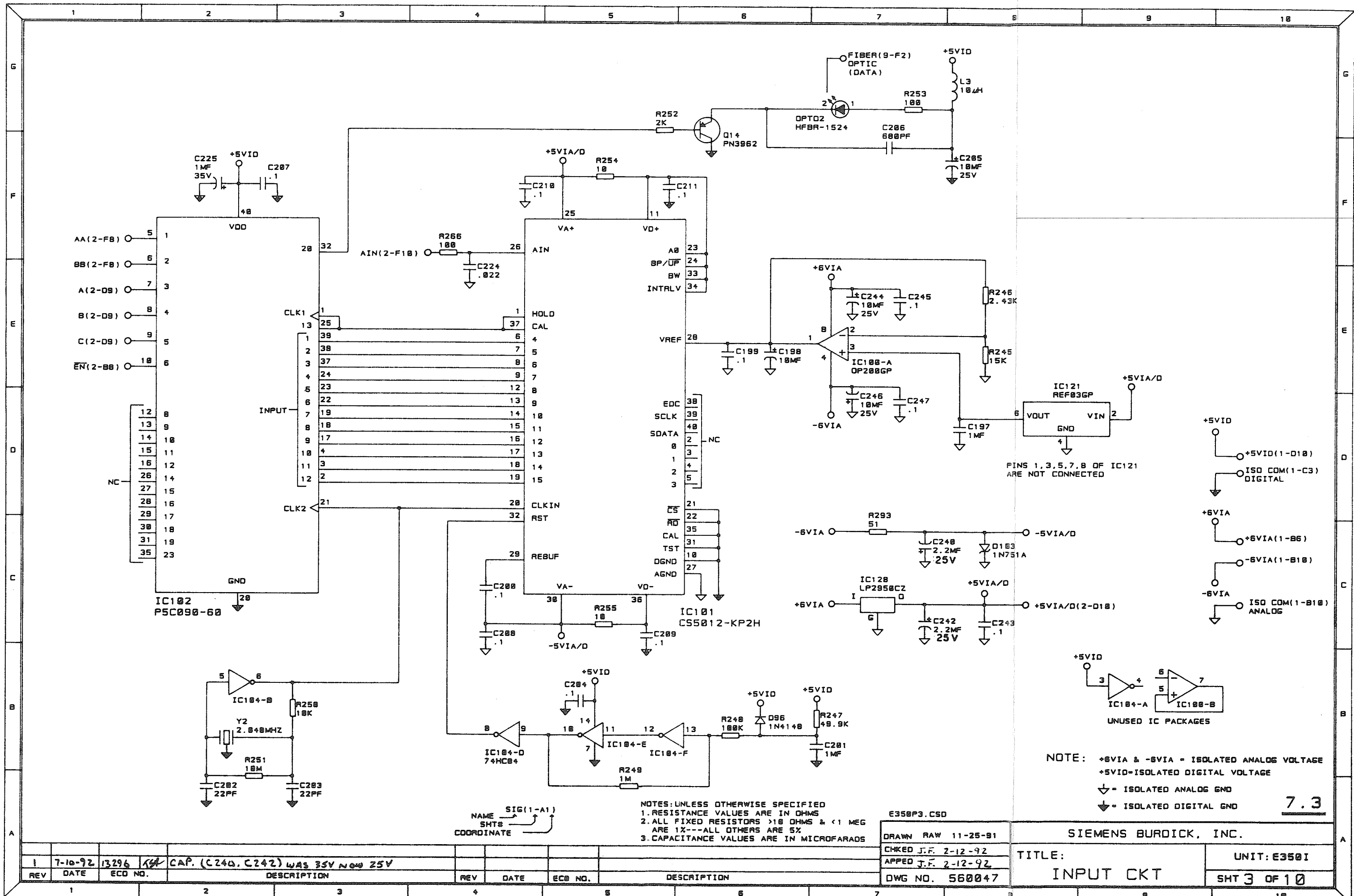
- NOTES: UNLESS OTHERWISE SPECIFIED  
1. RESISTANCE VALUES ARE IN OHMS  
2. ALL FIXED RESISTORS > 10 OHMS & < 1 MEG ARE 1%---ALL OTHERS ARE 5%  
3. CAPACITANCE VALUES ARE IN MICROFARADS

7.2

NAME SIG(1-A1)  
SHT#  
COORDINATE

E350P2.CSD		SIEMENS BURDICK, INC.	
DRAWN RAW 11-25-81	CHKED J.F. 2-12-92	TITLE: INPUT CKT.	UNIT: E350I
APPED J.F. 2-12-92	DWG NO. 560047	SHT 2 OF 10	

REV	DATE	ECO NO.	DESCRIPTION	REV	DATE	ECO NO.	DESCRIPTION
1				2			
3				4			
5				6			
7				8			
9				10			



IC121 REF03GP  
 VOUT GND VIN  
 PINS 1,3,5,7,8 OF IC121 ARE NOT CONNECTED

+5VID  
 +5VID(1-D10)  
 ISO COM(1-C3) DIGITAL  
 +6VIA  
 +6VIA(1-B6)  
 -6VIA(1-B10)  
 -6VIA  
 ISO COM(1-B10) ANALOG

IC104-A  
 IC108-B  
 UNUSED IC PACKAGES

NOTE: +6VIA & -6VIA = ISOLATED ANALOG VOLTAGE  
 +5VID=ISOLATED DIGITAL VOLTAGE  
 ↓ = ISOLATED ANALOG GND  
 ↓ = ISOLATED DIGITAL GND

7.3

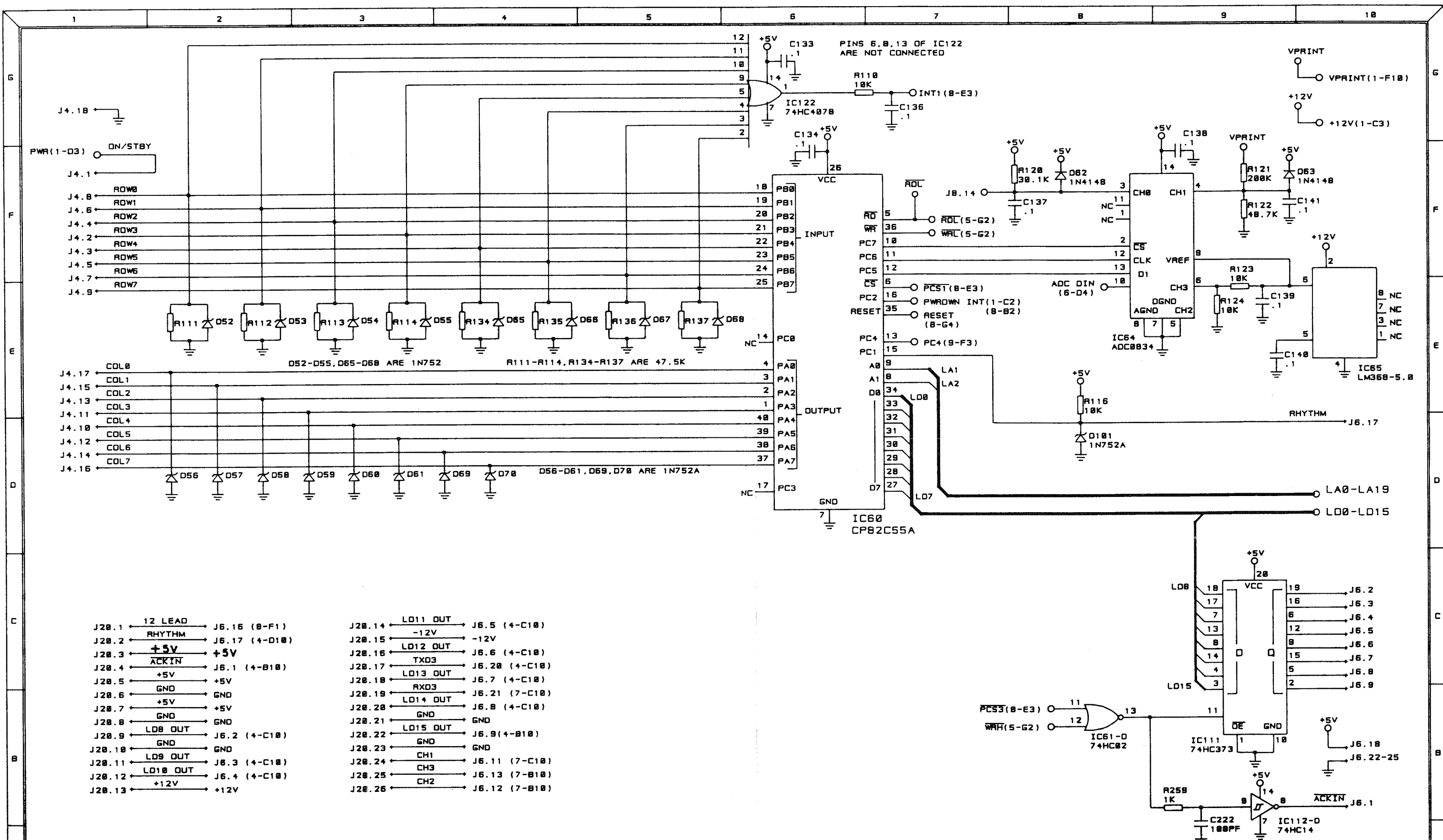
NOTES: UNLESS OTHERWISE SPECIFIED  
 1. RESISTANCE VALUES ARE IN OHMS  
 2. ALL FIXED RESISTORS >10 OHMS & <1 MEG ARE 1%--ALL OTHERS ARE 5%  
 3. CAPACITANCE VALUES ARE IN MICROFARADS

E350P3.CSD  
 DRAWN RAW 11-25-91  
 CHECKED J.F. 2-12-92  
 APP'D J.F. 2-12-92  
 DWG NO. 560047

SIEMENS BURDICK, INC.  
 TITLE: INPUT CKT  
 UNIT: E350I  
 SHT 3 OF 10

REV	DATE	ECO NO.	DESCRIPTION
1	7-10-92	13296	CAP. (C240, C242) WAS 35V NOW 25V

SIG(1-A1)  
 NAME  
 SHTS  
 COORDINATE



- J20.1 ← 12 LEAD → J6.16 (8-F1)
- J20.2 ← RHYTHM → J6.17 (4-D10)
- J20.3 ← +5V → +5V
- J20.4 ← ACKIN → J6.1 (4-B10)
- J20.5 ← +5V → +5V
- J20.6 ← GND → GND
- J20.7 ← +5V → +5V
- J20.8 ← GND → GND
- J20.9 ← LD8 OUT → J6.2 (4-C10)
- J20.10 ← GND → GND
- J20.11 ← LD9 OUT → J6.3 (4-C10)
- J20.12 ← LD10 OUT → J6.4 (4-C10)
- J20.13 ← +12V → +12V

- J20.14 ← LD11 OUT → J6.5 (4-C10)
- J20.15 ← -12V → -12V
- J20.16 ← LD12 OUT → J6.6 (4-C10)
- J20.17 ← TXD3 → J6.20 (4-C10)
- J20.18 ← LD13 OUT → J6.7 (4-C10)
- J20.19 ← RXD3 → J6.21 (7-C10)
- J20.20 ← LD14 OUT → J6.8 (4-C10)
- J20.21 ← GND → GND
- J20.22 ← LD15 OUT → J6.9 (4-B10)
- J20.23 ← GND → GND
- J20.24 ← CH1 → J6.11 (7-C10)
- J20.25 ← CH3 → J6.13 (7-B10)
- J20.26 ← CH2 → J6.12 (7-B10)

NAME SIG(1-A1)  
SHT#  
COORDINATE

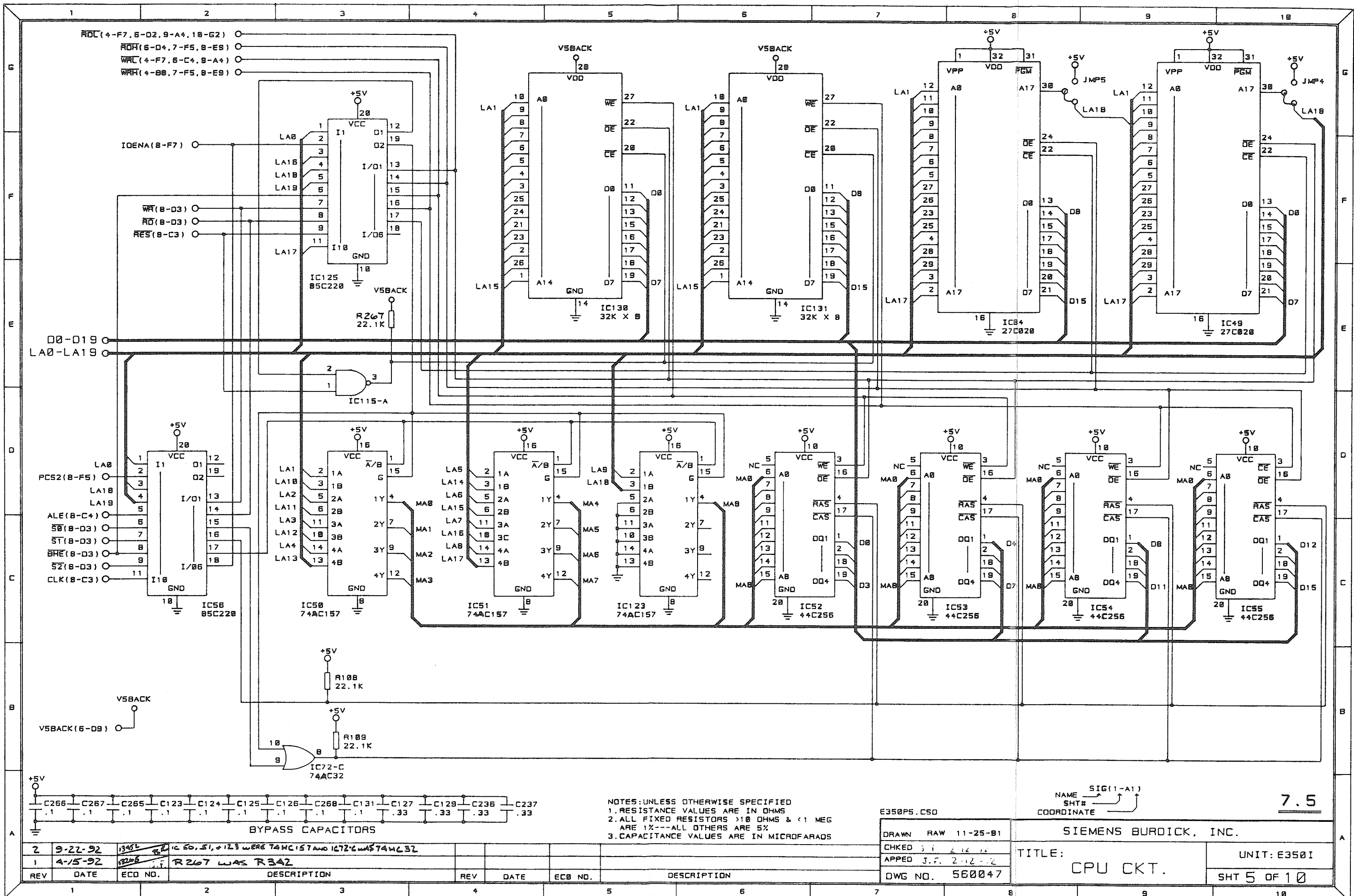
NOTES: UNLESS OTHERWISE SPECIFIED  
 1. RESISTANCE VALUES ARE IN OHMS  
 2. ALL FIXED RESISTORS > 10 OHMS & < 1 MEG ARE 1%---ALL OTHERS ARE 5%  
 3. CAPACITANCE VALUES ARE IN MICROFARADS

E350P4.CSD

DRAWN RAW 11-25-91  
 CHKED J.F. 2-12-92  
 APPED J.F. 2-12-92  
 DWG NO. 560047

SIEMENS BURDICK, INC.  
 TITLE: CPU CKT.  
 UNIT: E350I  
 SHT 4 OF 10





NOTES: UNLESS OTHERWISE SPECIFIED  
 1. RESISTANCE VALUES ARE IN OHMS  
 2. ALL FIXED RESISTORS >10 OHMS & <1 MEG ARE 1%--ALL OTHERS ARE 5%  
 3. CAPACITANCE VALUES ARE IN MICROFARADS

E350P5.CSD

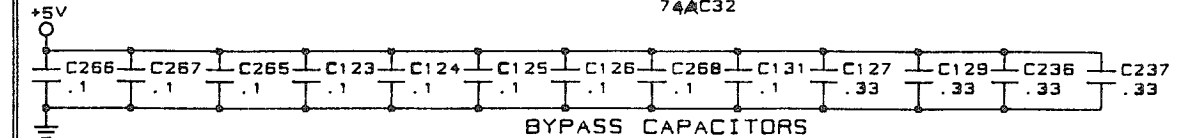
DRAWN RAW 11-25-91  
 CHKD J.F. 2-12-92  
 APPEO J.F. 2-12-92  
 DWG NO. 560047

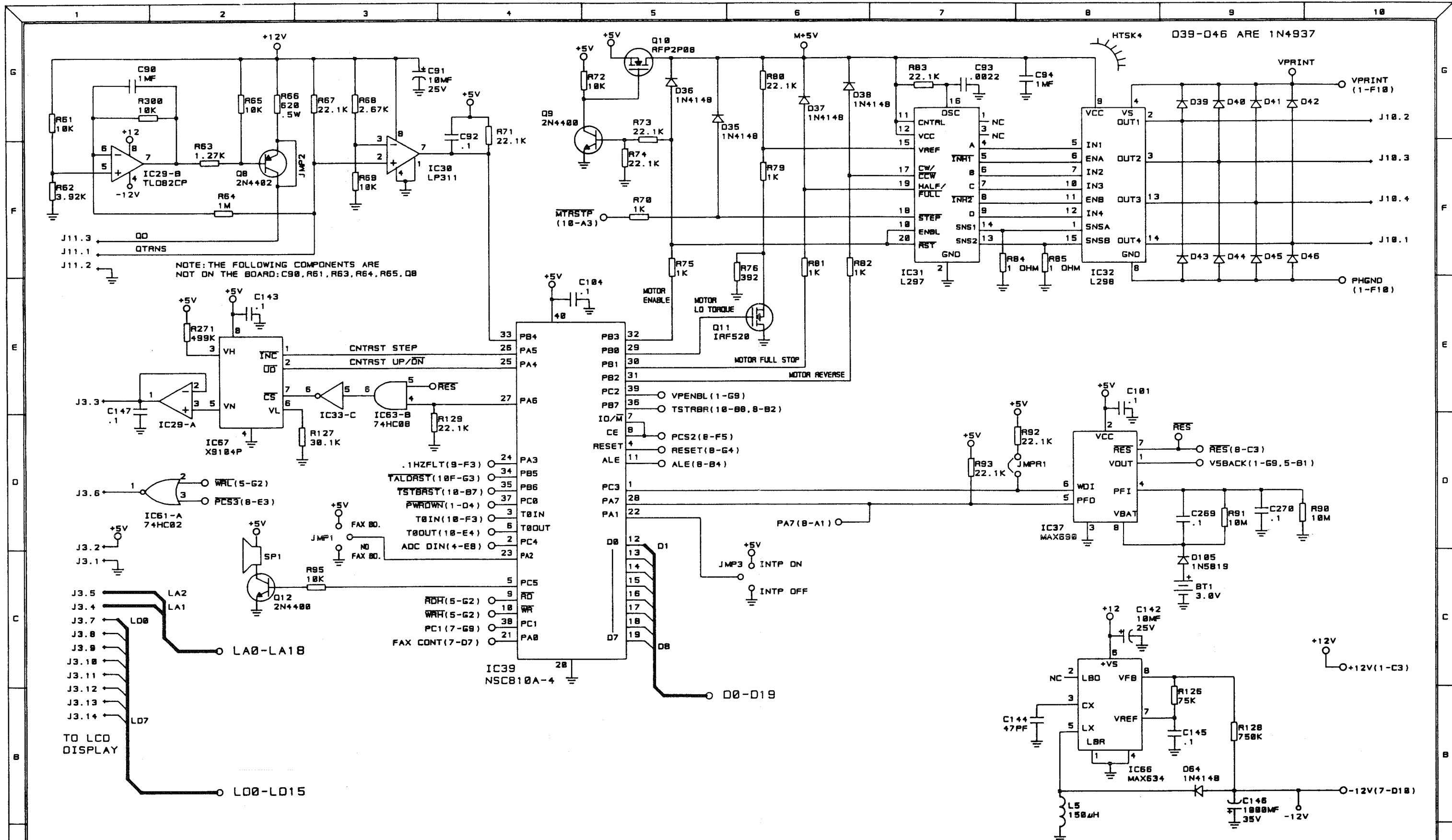
NAME SIG(1-A1)  
 SHT#  
 COORDINATE

7.5

SIEMENS BURDICK, INC.  
 TITLE: CPU CKT.  
 UNIT: E3501  
 SHT 5 OF 10

REV	DATE	ECO NO.	DESCRIPTION	REV	DATE	ECO NO.	DESCRIPTION
2	9-22-92	1345	IC 50, 51, & 123 WERE 74HC157 AND IC72C WAS 74HC32				
1	4-15-92	1320	R267 WAS R342				





NOTE: THE FOLLOWING COMPONENTS ARE NOT ON THE BOARD: C98, R61, R63, R64, R65, Q8

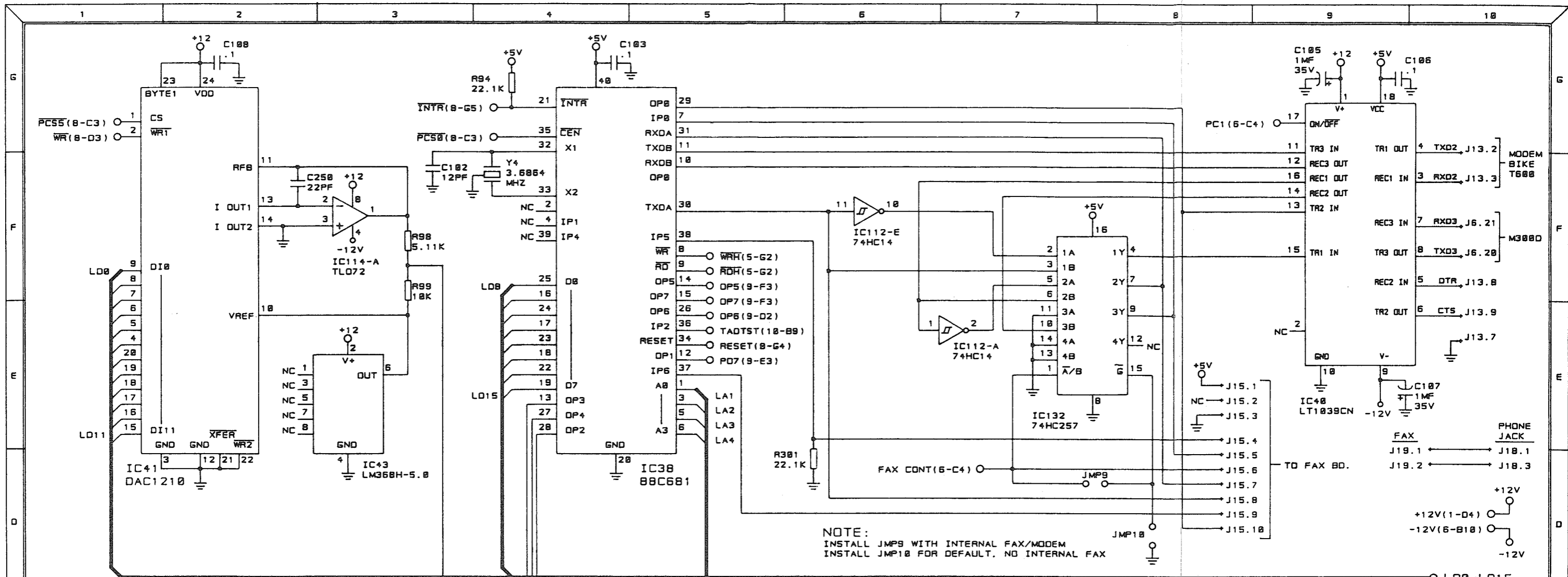
NOTES: UNLESS OTHERWISE SPECIFIED  
 1. RESISTANCE VALUES ARE IN OHMS  
 2. ALL FIXED RESISTORS >10 OHMS & <1 MEG ARE 1%--ALL OTHERS ARE 5%  
 3. CAPACITANCE VALUES ARE IN MICROFARADS

E350P6.CSD

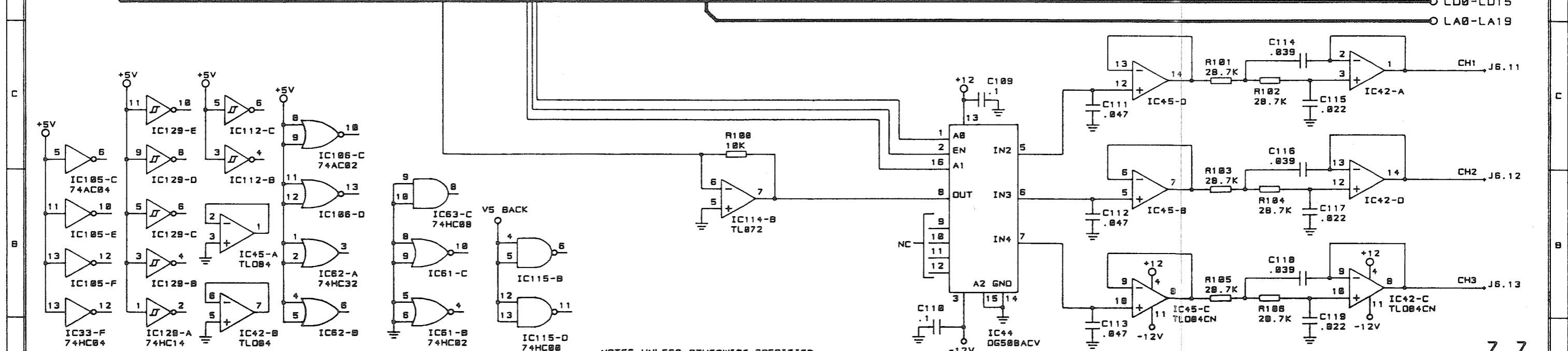
DRAWN RAW 11-25-91  
 CHKD TSK 7-23-92  
 APPED RAW 7-23-92  
 DWG NO. 560047

SIEMENS BURDICK, INC.  
 TITLE: CPU CKT.  
 UNIT: E3501  
 SHT 6 OF 10

REV	DATE	ECO NO.	DESCRIPTION	REV	DATE	ECO NO.	DESCRIPTION
1	7-14-92	13357	ADDED D185				



NOTE:  
 INSTALL JMP9 WITH INTERNAL FAX/MODEM  
 INSTALL JMP18 FOR DEFAULT, NO INTERNAL FAX



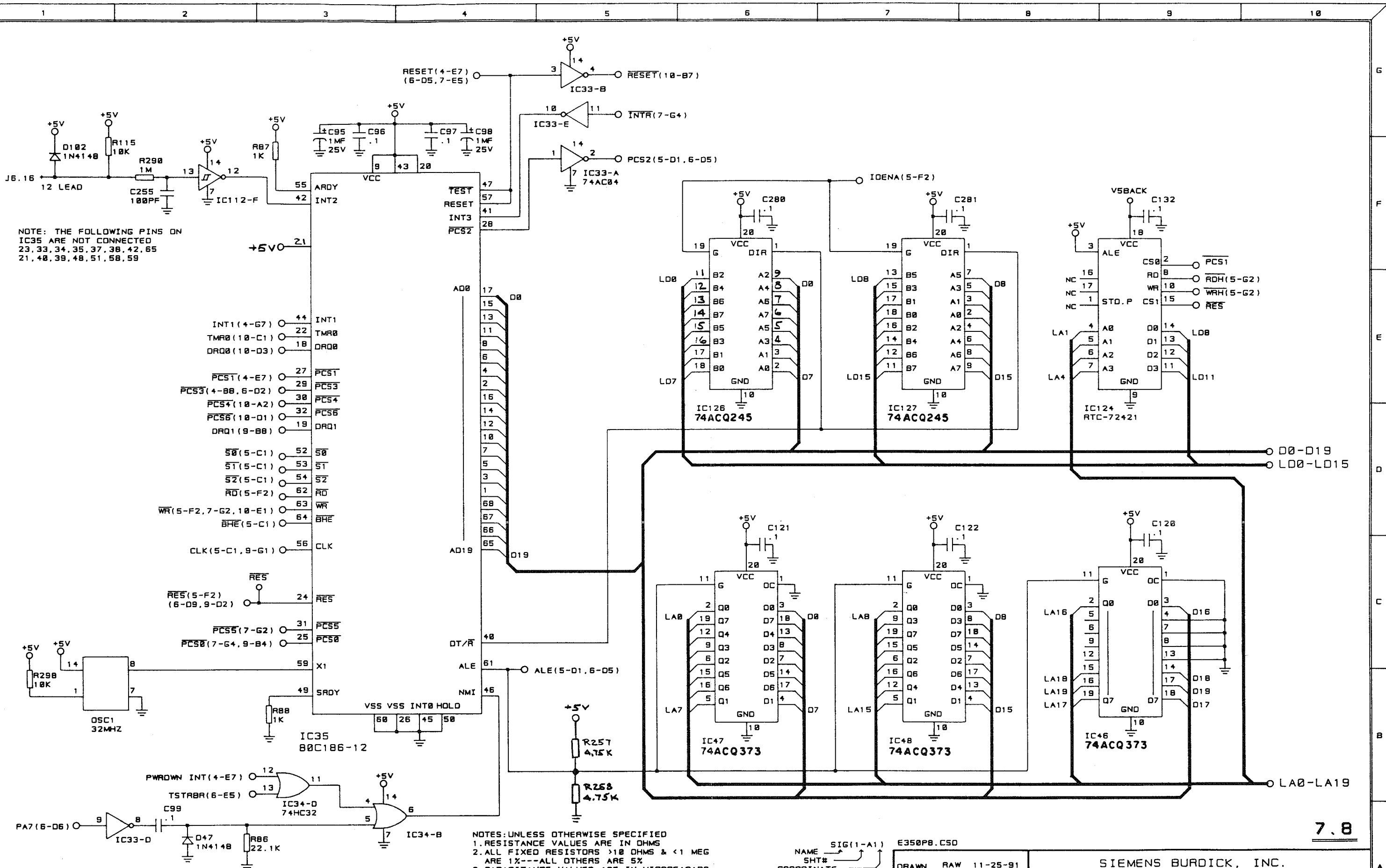
NOTES: UNLESS OTHERWISE SPECIFIED  
 1. RESISTANCE VALUES ARE IN OHMS  
 2. ALL FIXED RESISTORS >10 OHMS & <1 MEG ARE 1%---ALL OTHERS ARE 5%  
 3. CAPACITANCE VALUES ARE IN MICROFARADS

E350P7.CSD

DRAWN RAW 11-25-91  
 CHECKED J.F. 2-12-92  
 APPED J.F. 2-12-92  
 DWG NO. 560047

SIEMENS BURDICK, INC.  
 TITLE: CPU CKT.  
 UNIT: E350I  
 SHT 7 OF 10

REV	DATE	ECO NO.	DESCRIPTION	REV	DATE	ECO NO.	DESCRIPTION
1				1			
2				2			
3				3			
4				4			
5				5			
6				6			
7				7			
8				8			
9				9			
10				10			



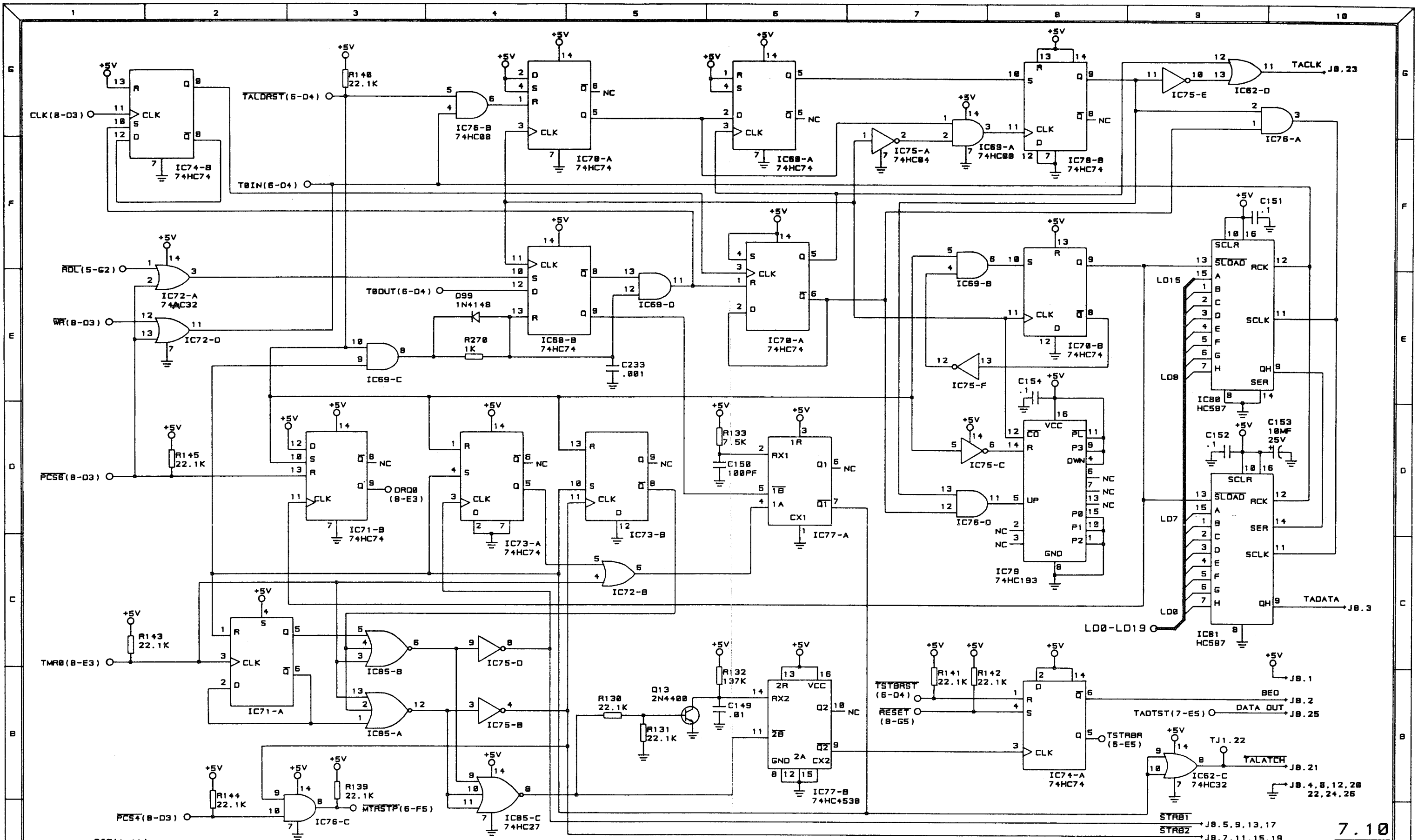
NOTE: THE FOLLOWING PINS ON IC35 ARE NOT CONNECTED  
 23, 33, 34, 35, 37, 38, 42, 65, 21, 40, 39, 48, 51, 58, 59

NOTES: UNLESS OTHERWISE SPECIFIED  
 1. RESISTANCE VALUES ARE IN OHMS  
 2. ALL FIXED RESISTORS >10 OHMS & <1 MEG ARE 1%--ALL OTHERS ARE 5%  
 3. CAPACITANCE VALUES ARE IN MICROFARADS

7.8

2	9-22-92	13932	TE	ADDED R257, R258, AND PIN 21 +5V TO IC35	3	9-23-92	13457	RP	IC 126, AND 127 WAS *74AC245 NOW *74ACQ245	E350PB.CSD	RAW 11-25-91	SIEMENS BURDICK, INC.	
1	5-1-92	13482	RW	CHANGED PIN DESIGNATION ON IC126	3	9-23-92	13457	RP	IC 46, 47 AND 48 WAS 74AC373 NOW *74ACQ373	SIG(1-A1)	CHKD J.F. 2-12-92	TITLE: CPU CKT.	UNIT: E350I
REV	DATE	ECO NO.		DESCRIPTION	REV	DATE	ECO NO.		DESCRIPTION	COORDINATE	APPD J.F. 2-12-92	DWG NO. 560047	SHT 8 OF 10





NAME SIG(1-A1)  
SHT#  
COORDINATE

E350PB.CSD

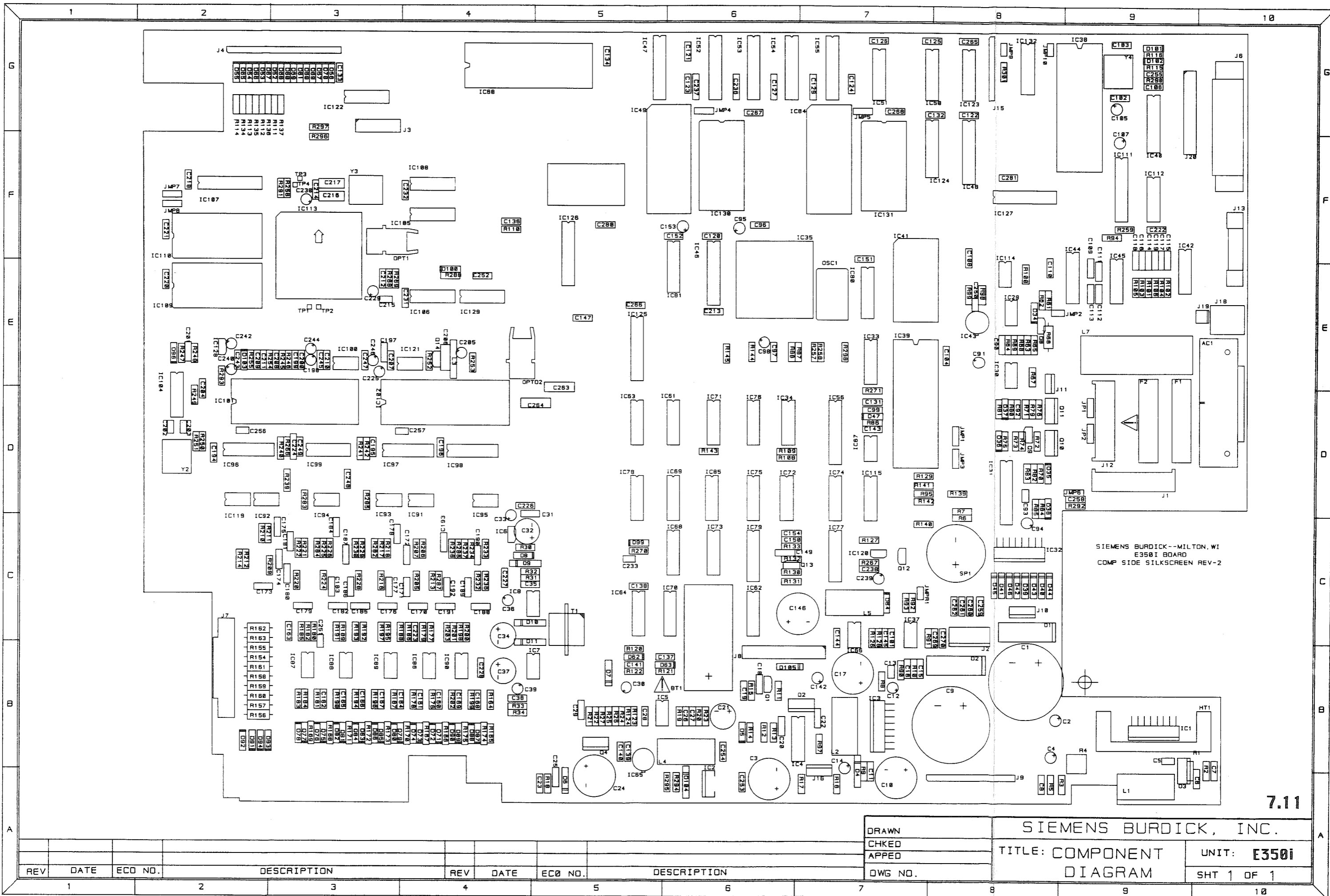
DRAWN RAW 11-25-91  
CHKED J.F. 2-12-92  
APPED J.F. 2-12-92  
DWG NO. 560047

SIEMENS BURDICK, INC.

TITLE:  
THERMAL ARRAY CKT.

UNIT: E350I  
SHT 10 OF 10

REV	DATE	ECO NO.	DESCRIPTION	REV	DATE	ECO NO.	DESCRIPTION
1	9-22-92	1345	SR IC72-A WAS 74HC32				



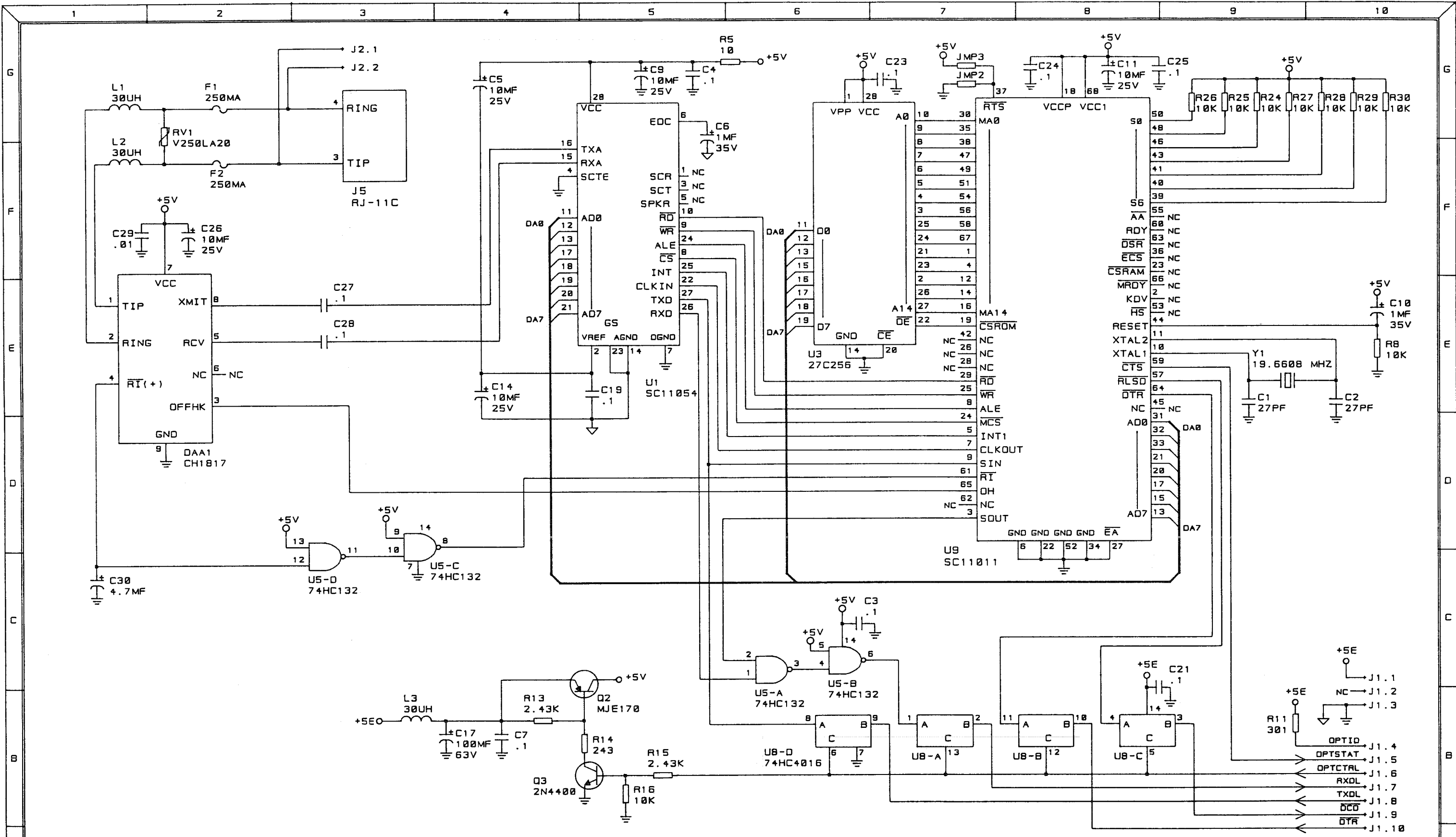
SIEMENS BURDICK--MILTON, WI  
E350I BOARD  
COMP SIDE SILKSCREEN REV-2

7.11

DRAWN
CHKD
APPD
DWG NO.

SIEMENS BURDICK, INC.	
TITLE: COMPONENT	UNIT: E350i
DIAGRAM	SHT 1 OF 1

REV	DATE	ECO NO.	DESCRIPTION	REV	DATE	ECO NO.	DESCRIPTION
1				4			
2				5			
3				6			
				7			
				8			
				9			
				10			



BOARD ASSEMBLY  
#862801

NOTES: UNLESS OTHERWISE SPECIFIED  
 1. RESISTANCE VALUES ARE IN OHMS  
 2. ALL FIXED RESISTORS >10 OHMS & <1 MEG ARE 1%---ALL OTHERS ARE 5%  
 3. CAPACITANCE VALUES ARE IN MICROFARADS

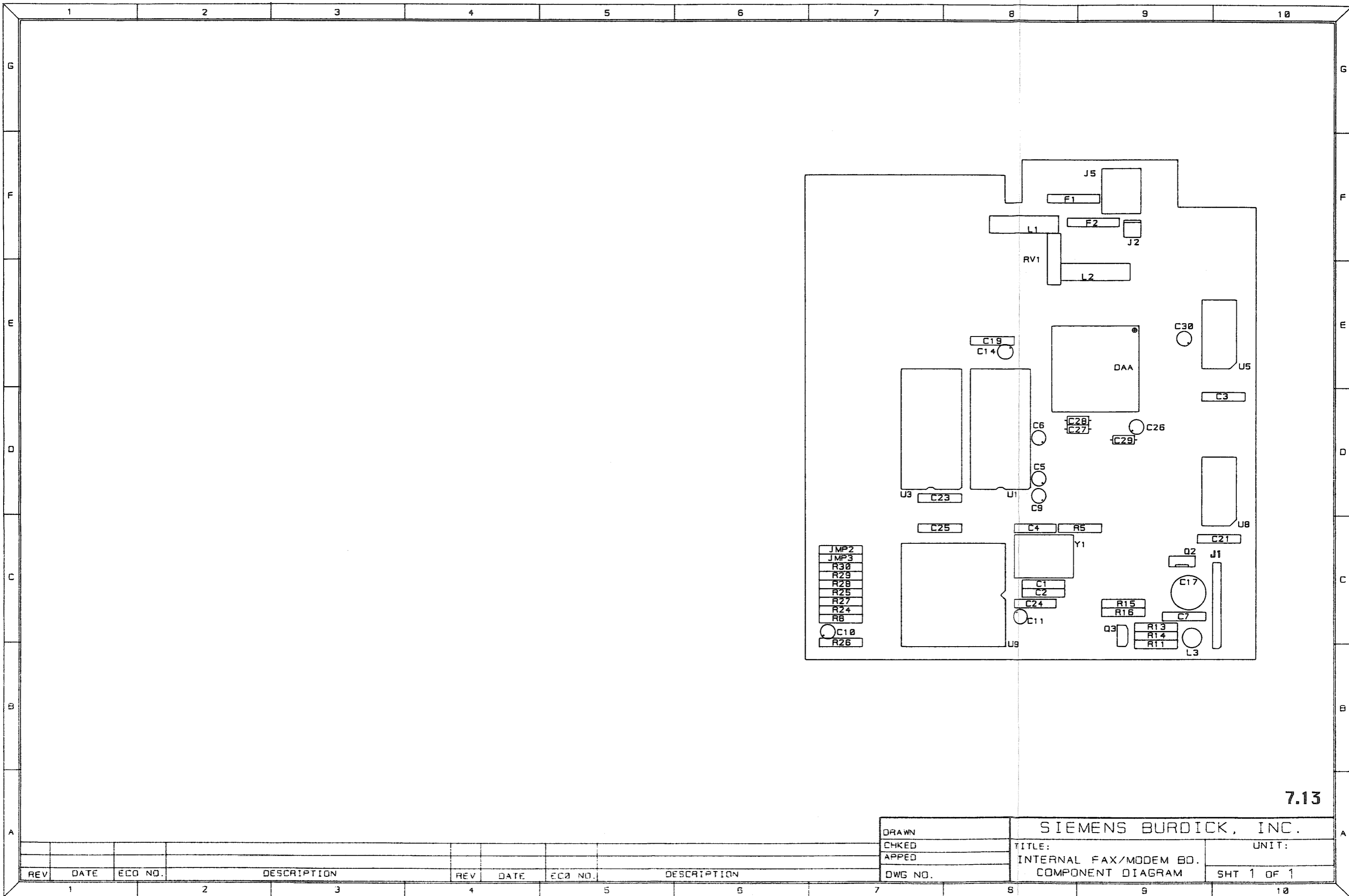
FAX1.CSD

DRAWN RAW 11-13-91	SIEMENS BURDICK, INC MILTON, WI
CHKED ME 1-28-92	TITLE:
APPED	INTERNAL FAX/MODEM
DWG NO. 560046	OPTION BOARD
	UNIT:
	SHT 1 OF 1

REV	DATE	ECO NO.	DESCRIPTION	REV	DATE	ECO NO.	DESCRIPTION
1				2			
3				4			
5				6			
7				8			
9				10			

7.12





7.13

DRAWN	SIEMENS BURDICK, INC.	
CHKED	TITLE:	UNIT:
APPED	INTERNAL FAX/MODEM BD.	
DWG NO.	COMPONENT DIAGRAM	SHT 1 OF 1

REV	DATE	ECO NO.	DESCRIPTION	REV	DATE	ECO NO.	DESCRIPTION
1				4			
2				5			
3				6			
				7			
				8			
				9			
				10			



**Notes:**

Service: (800) 333-7770 • Orders: (800) 777-1777

