ESCORT 300A

SERVICE MANUAL

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Revision B

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STANDARD WARRANTY

The ESCORT 300A Monitor is warranted against defects in materials and workmanship for a period of twelve (12) months from the date of shipment to the original purchaser. Batteries, cables, cuffs, and sensors are warranted ninety (90) days from date of shipment. Warranty is valid only to the original buyer. Defective equipment should be returned freight prepaid to Medical Data Electronics. Equipment returned with defective parts and assemblies will be either repaired or replaced. This warranty is not applicable if repair has been attempted, if the instrument has been damaged due to operation outside the environmental and power specifications for the product, or due to improper handling or use.

If any fault develops, notify MDE Technical Support giving full details of the difficulty, and include the model and serial number of the device. Upon receipt of the shipping instructions, forward the device prepaid and repairs will be made at the factory.

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SPECIFICATIONS

CHAPTER 1

ESCORT 300A SPECIFICATIONS

DISPLAY

Size: 6" diagonal
Type: LCD or Electroluminescent (EL)
Number of Traces: 3
Trace Length: 4 seconds at 25 mm/sec

FRONT PANEL KEY FUNCTIONS

Freeze, Record 1, Record 2, Record 3, Alarm Suspend, Record Stop, Page Home, Next Page, Softkeys (6)

ECG

Range: 10 to 300 BPM
Accuracy: ±2% or ±2 BPM
Sweep Speed: 12.5, 25 mm/sec selectable
High Limit Range: 50 to 250 BPM
Low Limit Range: 20 to 150 BPM
Limit Resolution: 5 BPM
Asystole Alarm: R to R interval greater than 6 seconds
Bandwidth: 0.5 to 40 Hz (monitor) 0.05 to 100 Hz (diagnostic)
R-wave indicator: Flashing heart
Leads: Full 5 lead selectable,
Fixed lead with option 11AE
Sensitivity: .25 to 3mV/cm selectable (12 levels)
Pacer Rejection: 0.2 to 2 msec; 2 to 700mV
Defib Tolerance: 400 joule with 25 ohm series lead impedance
Connector: Standard 6 pin MS
Isolation: Full electrical isolation
Overload Recovery: 2 sec excluding electrode polarization
Electrosurgical Suppression: Standard
Configuration: Neonatal/Adult softkey

MODULAR BATTERIES

Capacity: 2.5 to 3 hours depending upon configuration
Charge Time: 14 hrs to 90%; Opt. external charger: 2.7 hrs
Type: 12V, 2.3AH sealed lead acid rechargeable (2 each)

RECORDER (OPTION 02E, 03E)

Print Method: Thermal array
Channels: Single (Opt. 02E) or dual (Opt. 03E)
Resolution: 8 dots/mm vertical, 32 dots/mm horizontal
Paper: 40 mm grid; 50 mm paper width
Speed: 6.25, 12.5, 25 mm/sec
Manual Record Duration: 16 seconds
Memory: 12 seconds
Annotation: Time, date, all parameter values, scales, source, speed

TREND (OPTION 04E)

Parameters: HR, RR, IBP, NIBP, SAO_2, T
Time: 1, 8, 24 hours

RESPIRATION (OPTION 05E)

Range: 4 to 200 BPM
Accuracy: ±2% or ±2 BPM
Lead: RA to LA
Inspiration Indicator: Flashing lungs
Sensitivity: .25 to 3 ohm/cm selectable
Alarms: High and low rate,
Apnea delay selectable, 10, 15, 20, 30, 40 sec
Sweep Speed: 6.25, 12.5, 25 mm/sec selectable
CVA Rejection: Rejects most cardiovascular coincidence
Configuration: Neonatal/Adult softkey

TEMPERATURE (OPTION 06SE, 06DE)

Range: 0 to 50 degrees C
Accuracy: ±0.2 degrees C
Probe: YSI 700
Units: Degrees C or degrees F selectable
Channels: One (06SE), two (06DE)
Connector: 1/4 inch stereo phone jack
Isolation: Full electrical isolation

NIBP (OPTION 07NE)

Measurement Method: Oscillometric
Measurement Range: Systolic 30-270 mmHg
Diastolic 20-240 mmHg
Pulse Rate 20-250 BPM
Measurement Time: 30 to 40 seconds typical
Modes: Manual-initiated via START key, Automatic-STAT, 1, 2, 3, 4, 5, 10, 15, 30, 45 minutes, 1, 2, 3, 4 hours
Auto Zero: Prior to each reading
Cuff Inflation: Adult: Selectable 140-190 mmHg
Neonatal: 90 mmHg
Systolic +25 mmHg on subsequent inflations
Cuff Deflation: 8 mmHg steps
Alarms: SYS, DIAS, or MEAN selectable in 5 mmHg increments
Electronic Accuracy: ±3 mmHg or ±2% reading
System Accuracy: ±5 mmHg mean error with ±8 mmHg SD
Hose: Dual lumen
Cuff/Hose Connectors: Standard screw fittings
Cuff Sizes: Adult, Large Adult, Adult Thigh, Pediatric, Infant, Neonatal (Sizes 1, 2, 3, 4)
Tabular Trend: 100 NIBP measurements with time, PR, % SAO_2

HP CONNECTORS (OPTION 10CE, 10ME)

ECG Connector: Opt. 10CE-78534 (8 pin),
Opt. 10ME - Component Monitoring System (12 pin)
Pressure Connector: 12 pin HP (5 uV/V/mmHg)
Temperature Connector: 2 pin HP
Temperature Probe: YSI 400
Temperature Channel: One
Defib Sync Out/Defib Marker In: 1/4 inch stereo phone jack

SAO_2 (OPTION 11AE, 11BE)

Display: % SaO2, Plethysmographic Waveform, Pulse Rate, Pulse Amplitude Bar, Alarm & Status Messages
SAO_2 Range: 0-100%
SAO_2 Accuracy: Adult 70-100% $\pm$2 digits
Adult 50-69% $\pm$3 digits
Neonatal 70-94% $\pm$3 digits
Heart Rate Source: ECG or Pleth, selectable
Pulse Rate Range: 35-250 beats/minute
Pulse Rate Accuracy: $\pm$3 beats/minute
High Limit Range: High 70-100%
Low Limit Range: Low 50-100%
Operating Modes: NORM = 5-7 seconds
FAST = 2-3 seconds
SLOW = 10-15 seconds
Calibration: Automatic
Sensors: Neonatal to Adult (NELLCOR)
Pulse Tone: Pitch varies with O_2 SAT

PRESSURE (OPTIONS 13E, 14E)

Channels: One (Opt. 13E), two (Opt. 14E)
Range: -40 to 300 mmHg
Accuracy: $\pm$1% or $\pm$1 mmHg
Parameter Display: SYS, DIAS, and MEAN
Alarm Parameter: SYS, DIAS, or MEAN
Limit Range: 5 to 250 mmHg
Sweep Speed: 12.5, 25 mm/sec selectable
Display Scale: 30, 60, 120, 240 mmHg selectable
Cursor Bar: Selectable level, 1 mmHg steps
Input Connector: Standard 6 pin MS
Display: Pulse or scaled waveform, selectable
Heart Rate Source: ECG or BP1, selectable
Sensitivity: 5 uV/V/mmHg, softkey gain adjust
Zero Range: $\pm$100 mmHg, auto zero
Calibration: 100/50 mmHg squarewave
Isolation: Full electrical isolation
Auto Transducer Detect

INPUT/OUTPUT CONNECTORS

Defib Sync Out	Defib Marker In
Analog Out	HR Out
RS232 Interface	Alarm Out
	Record Out

PHYSICAL

Size: 7" (H) x 7" (W) x 8 1/2" (D) with battery and recorder
Weight: 9 lbs.
Add 1 lb. for NIBP option
Add 1 lb. for Recorder option
Add 3 lbs. for Batteries
Environment: 5 to 40 degrees C
0 to 90% humidity
AC Main: Selectable 110/220 VAC ±10%, 60/50 Hz
Power: 35 watts
Certification: UL 544 & CSA pending

PATIENT CONNECTIONS

All inputs are CF protected.

SYSTEM OVERVIEW

CHAPTER 2

2.0.0 SYSTEM OVERVIEW

The **ESCORT 300A** is a three trace patient monitor designed for transport applications. It can be configured at the factory for a variety of uses depending on the requirements of the user.
All **ESCORTs** are configured for ECG. With the addition of various processor boards and enhanced software. NIBP, temperatures, invasive BP, respiration, and SaO_2 can also be included.

The **ESCORT 300A** can be equipped with a defibrillator (option 19E), or a defibrillator/noninvasive pacer (option 20E). When the defibrillator or defibrillator\noninvasive pacer option is ordered, a mounting plate is added to the monitor. This will allow the **ESCORT 300A** to mount on to the defibrillator or defibrillator/pacer unit.

The **ESCORT** has a minimum of three PCBAs and a maximum of four. These include a CPU board, ECG board, Temp-Press board, and Switching Power Supply board.

The CPU board handles the various processing tasks for the monitor as well as interfacing between the processor boards, the display (LCD or EL), and the recorder. Keyboard decoding is located on the CPU board, as are the High Level Outputs. The HL outputs are available at the aux connector on the rear Panel .

ECG, temperature, respiration, NIBP/BP, and SaO_2 signals are input to the processor boards via the connector plate on the right side of the monitor. These inputs are isolated from line current by the use of opto-couplers. The signals that are input are filtered and then converted from analog to digital format. Further processing and calculating will be done before the data is sent to the CPU board through the edge connector. The CPU will then process the data and send it to the display and the Recorder.

The Switching Power Supply provides necessary operating voltages through one of two methods: An AC outlet, or internal battery power. Battery level indication is measured on the Switching Power Supply board.

The Switching Power Supply board also incorporates battery charging by providing charging current to the batteries. When the unit is *not* being used for monitoring, the batteries are charged at the maximum current rate; when the **ESCORT 300A** is *in use*, the batteries are charged at minimum current to reduce total power consumption.

2.1.0 ESCORT RS-232 Communication Protocol

ESCORT 300A monitors include an RS-232 interface for data acquisition by the user's clinical information system. Virtually all information displayed on the ESCORT monitor is available for serial transmission, including parameter values, alarm status, leads status, remote status and waveform information. The clinical information system used should have an unused serial port that operates under the EIA (Electronics Industry Association) RS-232C standard. This protocol is only valid for main software versions 7.66 and higher and ESCORT monitors with a main CPU board level Revision O as a minimum. The software version may be obtained by calling up the TEST page of the ESCORT monitor. Refer to the ESCORT 300A Operator's Manual for instructions.

WARNING!

Do not attempt accessing RS-232 information unless you are familiar with UART (Universal Asynchronous Receiver and Transmitter) operation and setup. Only qualified and experienced technicians or programmers should attempt using the following protocol. The user will be required to develop program code to access and display the acquired data.

UART configuration for serial communications is 9600 baud, one (1) start bit, eight (8) data bits, two (2) stop bits, and no parity. In its default condition, ESCORT monitors transmit two packets of information: a parameter packet followed by an ECG waveform packet.

A parameter packet is illustrated below. Parameter sequence and identification are outlined in Table 1. The tabular references located above some of the blocks in the figure below will point toward additional information. All checksums are modulo 256 over the indicated ranges.

	Table 2	Table 3	.....	Table 3			Table 4		
2 byte ID ESC,P	3 byte parameter #0	3 byte parameter #1	*parameters #2 thru #11*	3 byte parameter #12	1 byte HR limit HIGH	1 byte HR limit LOW	1 byte Remote Status	2 byte Spare	1 byte CHECK SUM

Parameter Packet: The two byte ID is generated by the ESCORT monitor, see Table 5 for details

The three byte parameter blocks (referenced #0 through #12 above) are broken down as follows:

2 byte Data (0-500)	1 byte ECG Status

3 Byte - Parameter #0 (ECG)

The *first two bytes* contain the value of the parameter measured (in this case, ECG) within a range of zero to five hundred (0 -500). Data is transmitted LSB, MSB.
The *third byte* contains ECG status information as described in Table 2.

2 byte Data (0-500)	1 byte Status

3 Byte - Parameters #1 through #12

The *first two bytes* contain the value of the parameter measured within a range of zero to five hundred (0 -500). Data is transmitted LSB, MSB.
The *third byte* contains parameter status information as described in Table 3.

1 byte HR limit HIGH

1 Byte - Number representing heart rate HIGH alarm limit

1 byte HR limit LOW

1 Byte - Number representing heart rate LOW alarm limit

1 byte Remote Status

1 Byte - Remote Status (See Table 4)

The ECG waveform packet immediately follows the parameter packet. It is identified by its three byte ID (ESC, W, <Waveform No.>) followed by a length byte. The length byte represents the number of bytes that include waveform data. Waveform resolution is limited to 00h - FEh (254 decimal). FFh (255d) sets a pacer flag which may be used for pacer detection (only sent when PACER ON is selected, and the ECG software version is 7.11 or later).

Transmitted waveform information varies in ESCORT monitors configured for 110V/60Hz and 220V/50Hz. Please note caption information in the following waveform packet descriptions to determine the anticipated waveform information for your ESCORT monitor.

3 byte ID ESC, W, <Waveform No.>	1 byte length (bytes)	approx. 160ms of data sent at a sample rate of 120Hz; length is specified by length byte	1 byte CHECK SUM

Waveform packet information for 110V/60Hz ESCORT monitors ONLY

3 byte ID ESC, W, <Waveform No.>	1 byte length (bytes)	approx. 200ms of data sent at a sample rate of 100Hz; length is specified by length byte	1 byte CHECK SUM

Waveform packet information for 220V/50Hz ESCORT monitors ONLY

As previously stated, the ESCORT monitor transmits two packets of information: a parameter packet and an ECG waveform packet. The user's computer may request an additional waveform by issuing the following command:

ESC, R, <Waveform No.>

The ESCORT monitor will respond by sending the additional waveform packet in the previously described format (i.e., ESC, W, <Waveform No.>). Only one additional waveform may be acquired at a time. *IMPORTANT - Remember differences in transmission information for 110V/60Hz and 220V/50Hz!*

The additional waveform packet will be sent in sequence after the ECG waveform packet. A review of the overall sequence would be:

PARAMETER - ECG WAVEFORM - ADDITIONAL WAVEFORM

It is particularly important that special attention is applied when counting the number of bytes received and to properly use the waveform length byte to locate the appropriate waveform data. To change to a different *additional* waveform or to simply stop the acquisition of the current waveform, the selection in use must be turned off. This is accomplished by issuing the following command:

ESC, R, O

Note: The ECG waveform packet always follows the Parameter packet by default and may not be turned off.

Wiring information may be found in Figure 1, located at the end of this section.

Parameter	Order	Waveform Number
ECG	0	0
RESP	1	1
BP1 systolic	2	2
BP1 diastolic	3	
BP1 mean	4	
BP2 systolic	5	5
BP2 diastolic	6	
BP2 mean	7	
NIBP systolic	8	not available
NIBP diastolic	9	not available
NIBP mean	10	not available
SaO_2	11	11
TEMP	12	not available

Table 1
Order of parameters within packet

Note: TEMP (Temperature) is transmitted as an integer value with a range between 200 and 500 (Base 10). Each integer represents one tenth degree Celsius (0.1° C). This translates to an actual temp range transmitted that is between 20 and 50 degrees Celsius (20° — 50° C).

ECG Status	Bit Position	Description
ECG Lead Loose (no connection)	0	leads not connected or loose
HR Alarm ON	1	an alarm is set for ECG
HR "IN ALARM"	2	a heart rate limit has been violated
HR Source Not ECG	3	heart rate is set for another source
Telemetry in Squelch (lead-fail)	4	send lead-fail message when telemetry is in squelch

Table 2
ECG Status (Bit Value: 1 = true, 0 = false)

Parameter Status	ASCII Value	Hex Value	Description
Connected and Alarms On	N	4Eh	Parameter is installed, connected and alarm is enabled
Connected and Alarms Off	F	46h	Parameter is installed, connected and alarm is disabled
Connected in Alarm	A	41h	Parameter is installed, connected and in alarm condition
Disconnected	D	44h	Parameter is installed but not connected
Not Available	V	56h	Parameter is not installed
Not Zeroed	Z	5Ah	BP1 or BP2 have not been zeroed

Table 3
Parameter Status (ECG, see Table 2)

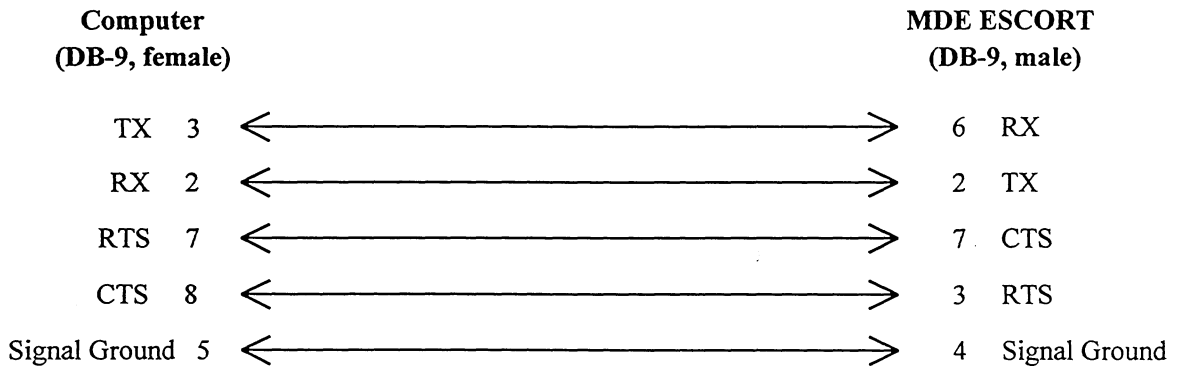
Remote ESCORT Status	Hex Value	Description
Null Status	00h	No activity
Low Battery	10h	Battery Voltage is Low
ESCORT Alarm Suspend	70h	Alarm Suspend Activated

Table 4
Remote Status

Note: In the event that a low battery condition occurs coincident with an alarm suspend, the ESCORT monitor will prioritize the event. Priority will be given to the low battery signal and ESCORT will transmit 10h.

Action	Identification Commands (ASCII)	Identification Commands (HEX)	Source
Parameter Packet Transmission	ESC , P	1B, 50	ESCORT
Waveform Packet Transmission	ESC , W , <Waveform No.> (See Table 1)	1B, 57, <Waveform No.> (See Table 1)	ESCORT
Request by User's computer for additional waveform	ESC, R , <Waveform No.> (See Table 1)	1B, 52, <Waveform No.> (See Table 1)	Clinical Information System
Turn off transmission of all waveforms except ECG	ESC, R, O	1B, 52, 4F	Clinical Information System

Table 5
Packet Identification Codes



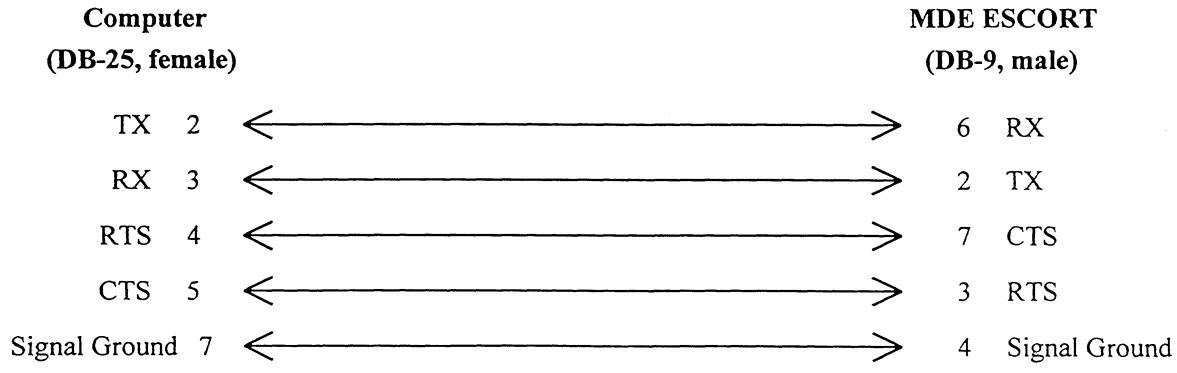
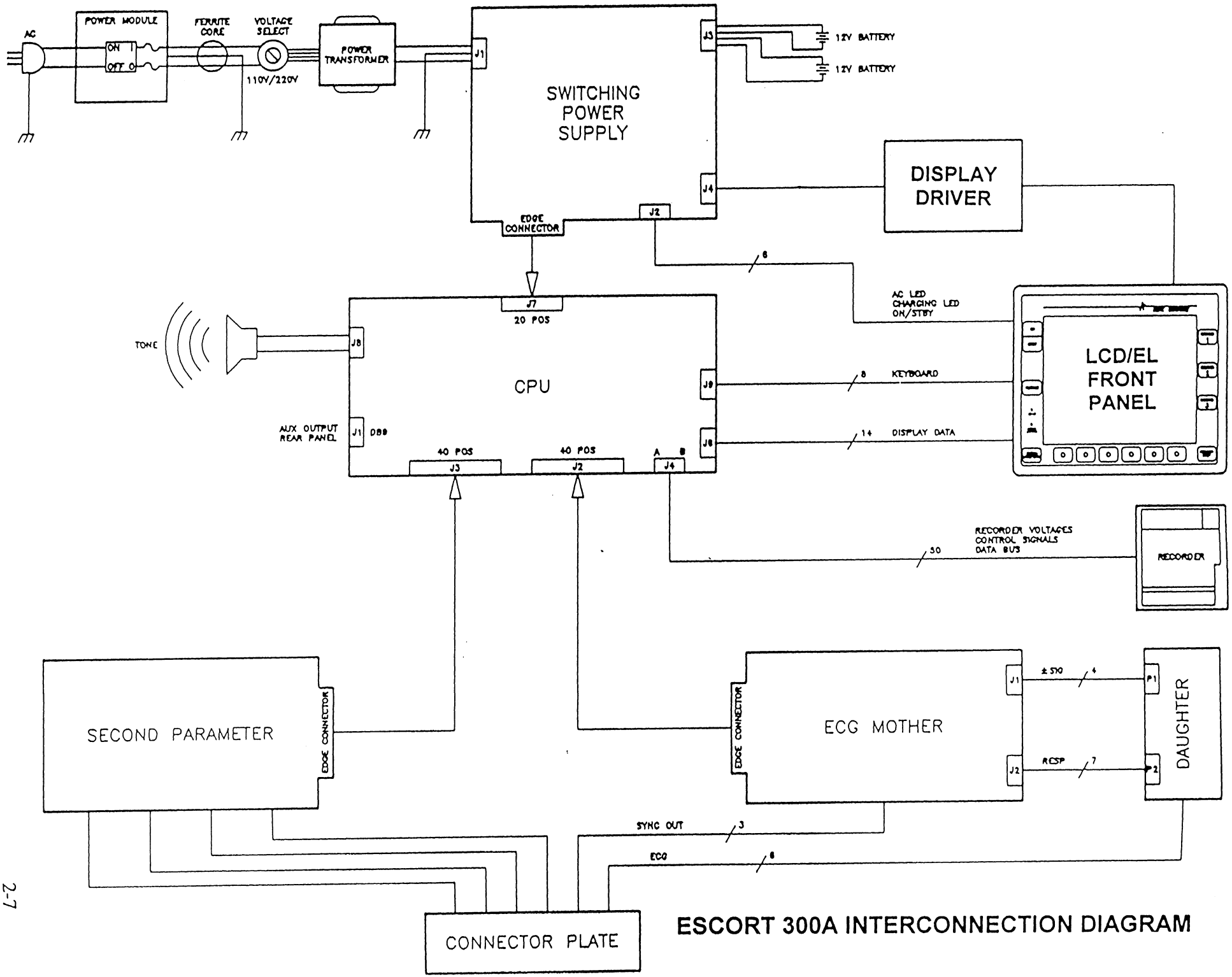
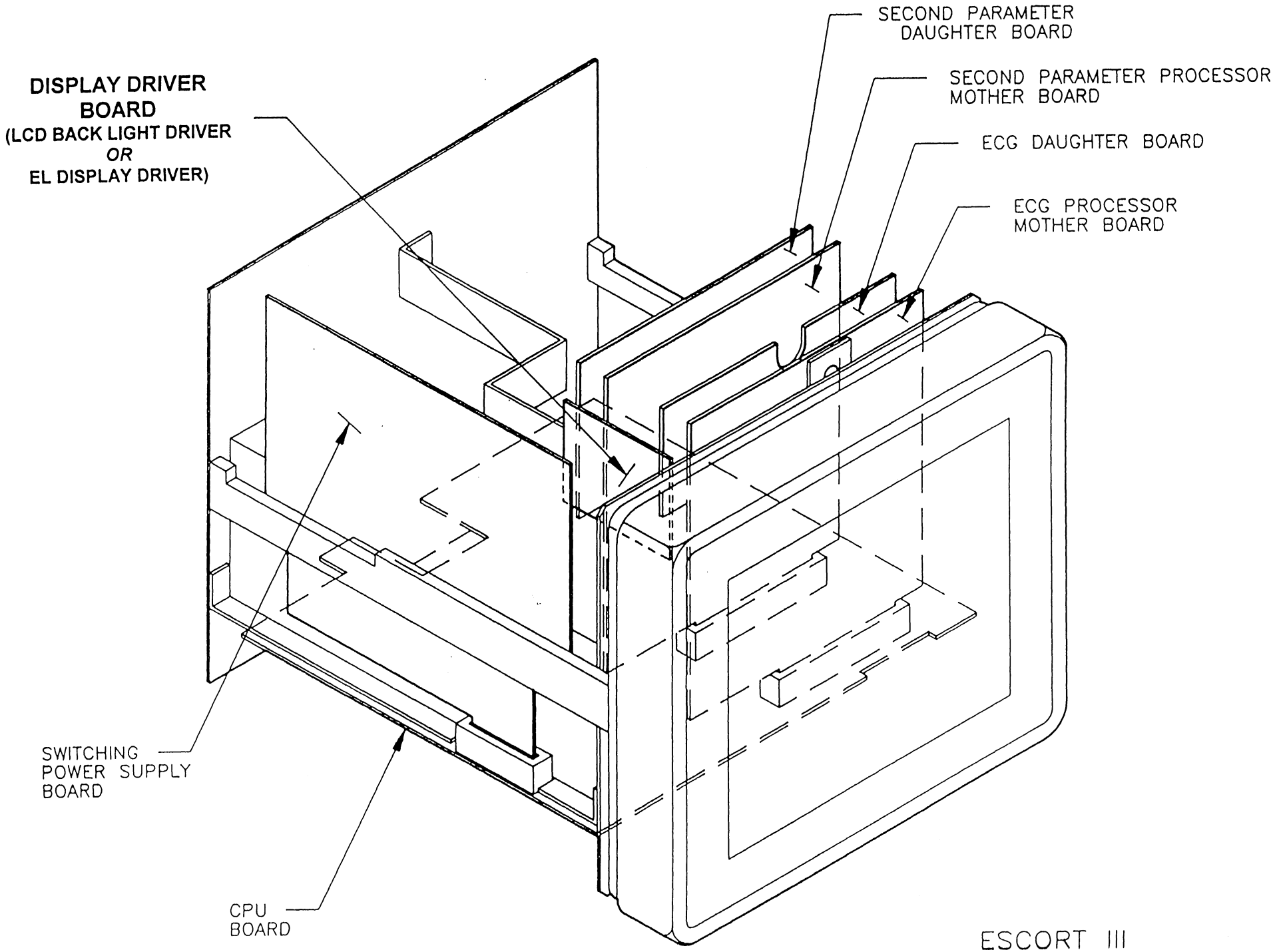


Figure 1
RS-232 Wiring Diagrams



ESCORT 300A INTERCONNECTION DIAGRAM



ESCORT III
BOARD LOCATION DIAGRAM

CPU BOARD

CHAPTER 3

3.0.0 CPU OVERVIEW

3.1.0 OVERVIEW

The CPU board controls the system functions of the ESCORT. It generates timing signals and holds the monitor configuration in the EPROM. It stores the softkey setup in the RAM, and retains it with a battery backup. A peripheral I/O chip generates and receives essential operating signals, and a keyboard decoder identifies and debounces key depressions. The microprocessor controls the display, either a backlit Liquid Crystal Display (LCD) or an Electroluminescent (EL), via a video controller chip. CPU computing, softkeys, alarms and recorder functions are also controlled by the CPU board.

3.2.0 MICROPROCESSOR

The microprocessor chip used on the CPU board is a Hitachi 64180. It is an 8-bit high integration CMOS chip with internal memory management, DMA control and a Z80 type CPU. It has 18 address lines that can access 512K memory or I/O. Pins 34-41 are on the data bus and pins 13-30 are on the address bus. Basic timing for the processor is derived from Y1, a 16 MHz crystal input to pins 2 and 3. The processor divides this signal internally by two for an 8 MHz timing output at pin 64. The WAIT* signal at pin 4 is to introduce bus cycle waits as needed by the Dual Port RAM. Pins 47 and 54 are used for DMA Requests. The RECORDER SYNC (REC. SYNC) input at pin 11 of U13 will let the CPU know if the recorder's buffer is full. This enters the CPU at pin 10 as the signal INT1*. Rec Busy (INT2*) at pin 11 is not used. Pin 8 is a non-maskable interrupt. A soft start circuit is implemented by, RESET*, pin 7, being held low by C50 slowly charging. MEMORY ENABLE* (ME*) pin 59 and READ* (RD*), WRITE* (WR*) pins 63 and 62 are gated together to produce the signals Memory Read* (M/R*) and Memory Write* (M/W*). These signals are used to write to and read from the ROM and RAM chips, U16 and U17. The same gating logic is used to derive I/O Read* (IO/R*) and I/O Write* (IO/W*) from IOE* pin 58 and WR*, RD* pins 62 and 63.

3.2.1 TIMING

The 8 MHz clock from pin 64 is further divided by the flip flop, U10. The 4 MHz clock goes to U11 pin 2. U10 clocks U11, producing the POWER SUPPLY SYNCHRONIZING signal (P.S. SYNC) at pin 15. This signal coordinates all generated voltages to switch on the same edge. The 4 MHz clock from also goes to U12 pin 2, which divides the 4 MHz clock by 13. The signal then returns to U10 at pin 11 where it is divided by two. The result is a 153.8 KHz signal called BAUD RATE at pin 12. This signal goes to the microprocessor U4 at pin 50 and controls external baud rate communications.

3.2.2 DISPLAY ENABLE

U9 controls reading and writing to and from the processor boards and the display (LCD or EL) with the signals SLOT1*, SLOT2*, and LCDEA*. The SLOT1* and SLOT2* signals go out to the connectors J2 and J3 respectively, while the LCDEA* goes to Display Driver U21 at pin 56 and enables the display.

3.2.3 CHIP ENABLE

The multiplexer U6 issues control signals to enable most of the monitor's functions. The PORTIO* signal enables the Peripheral I/O U14 at pin 6. The ADCSEL* signal enables the analog to digital converter U25 at pin 1. The DACSEL* signal enables the digital to analog converter U20 at pin 1. The CLKSEL* signal enables the clock Ul9 at pin 2. The SOUND* signal enables the sound chip U30 at pin 2.

3.2.4 PERIPHERAL I/O (P I/O)

U14 is a peripheral I/O chip that is enabled through U6 by PORTIO* and address line A9. U14 interfaces critical system information and tasks to and from the microprocessor, including BATTERY CHARGER CONTROL, AC DETECT, RECORDER RESET and KEYBOARD DATA.

3.2.5 KEYBOARD DECODER

The keyboard decoder, U18, has a four-line matrix of four rows (Y) and four columns (X). The columns are scanned at a rate set by C7 and C8. With a key depression, the appropriate X and Y input will go low, disabling the counter. Internal and external circuitry (C9) will debounce the key by locking out the other Y inputs, timing out and then latching the data. DATA AVAILABLE (KEY DA) will also go high. U18 is enabled via U7 at pin 13 and will put data on the bus through pins 14-17.

3.2.6 TIME OF DAY CLOCK

U19 is a real time clock module (RTC-72421). It has a built in quartz oscillator, time and date function and CMOS circuitry for low power consumption. The time and date are displayed on the test page and annotated on the recorder strip. U15 monitors +5 volts, which is the operating voltage for U19. If +5 volts drops below a critical level, U15 will switch to the battery backup for the operating voltage. This will retain accurate time and date.

3.2.7 MEMORIES

The memory chips are U17, a 64K X 8 bit EPROM and U16, a 32K X 8 bit static RAM. U17 is enabled by the address line A17 at pin 22 and U16 is enabled from the address decoder U9 through U8. The enable signal is received by U16 at pin 22. U15 monitors +5V at pin 1; if the voltage falls below critical level, U15 will inhibit the select line (CEO) at pin 12 and switch VCC to the battery. The 2.4V nicad battery supplies enough voltage to retain RAM information, but not for operation in the event of the loss of +VCC. The battery is trickle charged through R16 and D3.

3.2.8 LCD CONTROL

The E300A standard display is a flat screen LCD controlled by the video driver U21. The LCD is enabled by the signal LCDEA* from address decoder U9. The 8 MHz signal from pin 64 of the CPU enters at pin 54. Resetting takes place via the signal RESET*, originating at the reset timer, U15, and entering the video driver at pin 47.

U23 is the video RAM, allowing access of stored information by the video driver U21.

The signal CONTRAST is generated at U28 and sent directly to the LCD through J6. This signal is incremented up or down by the user via the keypad in order to adjust the viewing angle.

3.2.9 EL CONTROL

The E300A may be configured with an Electroluminescent (EL) display (Option 22E). The EL display is controlled by the video driver U21. The EL display is enabled by the signal LCDEA* from address decoder U9. The 8 MHz signal from pin 64 of the CPU enters at pin 54. Resetting takes place via the signal RESET*, originating at the reset timer, U15, and entering the video driver at pin 47.

U23 is the video RAM, allowing access of stored information by the video driver U21.

The EL Display recieves its power from the EL Display Driver Board. The EL Display Driver produces the voltages necessary for operation and control of the EL Display. It is sourced by the Switching Power Supply (+15V and +24V). The +15V from the Switching Power Supply is regulated to +5V and +12V. T1 on the EL Display Driver Board outputs -175V, -87V, +215V, +107V, +40V, and +20V. All voltages are then routed to the EL Display via the EL Interface Board. The EL Display Driver Board schematic and layout may be found later in this chapter.

3.2.10 ANALOG VOLTAGES

Various analog voltages for the CPU board are generated by the DAC, U20, and the sample and hold circuitry that includes U24. U20 is addressed as an I/O device. It takes data off the bus and decodes it for the appropriate voltage. U20 then outputs this voltage to U24. U24 selects an output by the signals DMUX1, DMUX2, DMUX3 and DMUX4. U24 will route the input at pin 3 to the selected output. The capacitors at the output pins will charge and hold the voltage. U27 and U28 are unity gain buffers. The exception to unity gain is the output at pin 7, which controls the LCD contrast. Its associated opt- amp has gain built into the circuitry.

3.2.11 AUXILIARY OUTPUTS

Two high level output pins are available to the user. These pins are located on the J1 connector at the rear panel. Port #1 is pin 9. Port #2 is pin 8. Pin 5 is analog ground.

Each port can be defined by the user under the CONFIG page of the ESCORT softkeys. Each key has three modes, each with a number of possibilities:

1. The WAVEFORM (WF) mode causes the port to output a waveform or parameter value. The selections are as follows:

   AUTO — The waveform that is currently displayed on the screen is output. Port 1 reflects Trace 2.

   ECG — The ECG waveform is always output. Signal level is approximately 1V/mV and rides on a 2.5V baseline level.

   BP1 or BP2 — The pressure waveform is always output. 0mmHg = 0V, and 250mmHg = 2.5V.

   RESP — The respiration waveform is always output. The signal level is approximately 1V/1 ohm and rides on a 2.5V baseline level.

   HR — The cardiotach information will be output and updated every 200ms. 1V = 50BPM, and 2V = 100 BPM.

   T1 or T2 — The temperature values are always output. 0 degrees C = 0V and 50 degrees C = 5V.

   Pleth — Pleth waveform output is centered on 2.5V level.

   SaO_2 — Percentage is SaO_2 output (4V = 100%).

2. The ALARM (ALM) mode can send different alarm conditions to the port. In all cases 0V = no alarm and 5V = alarm condition.

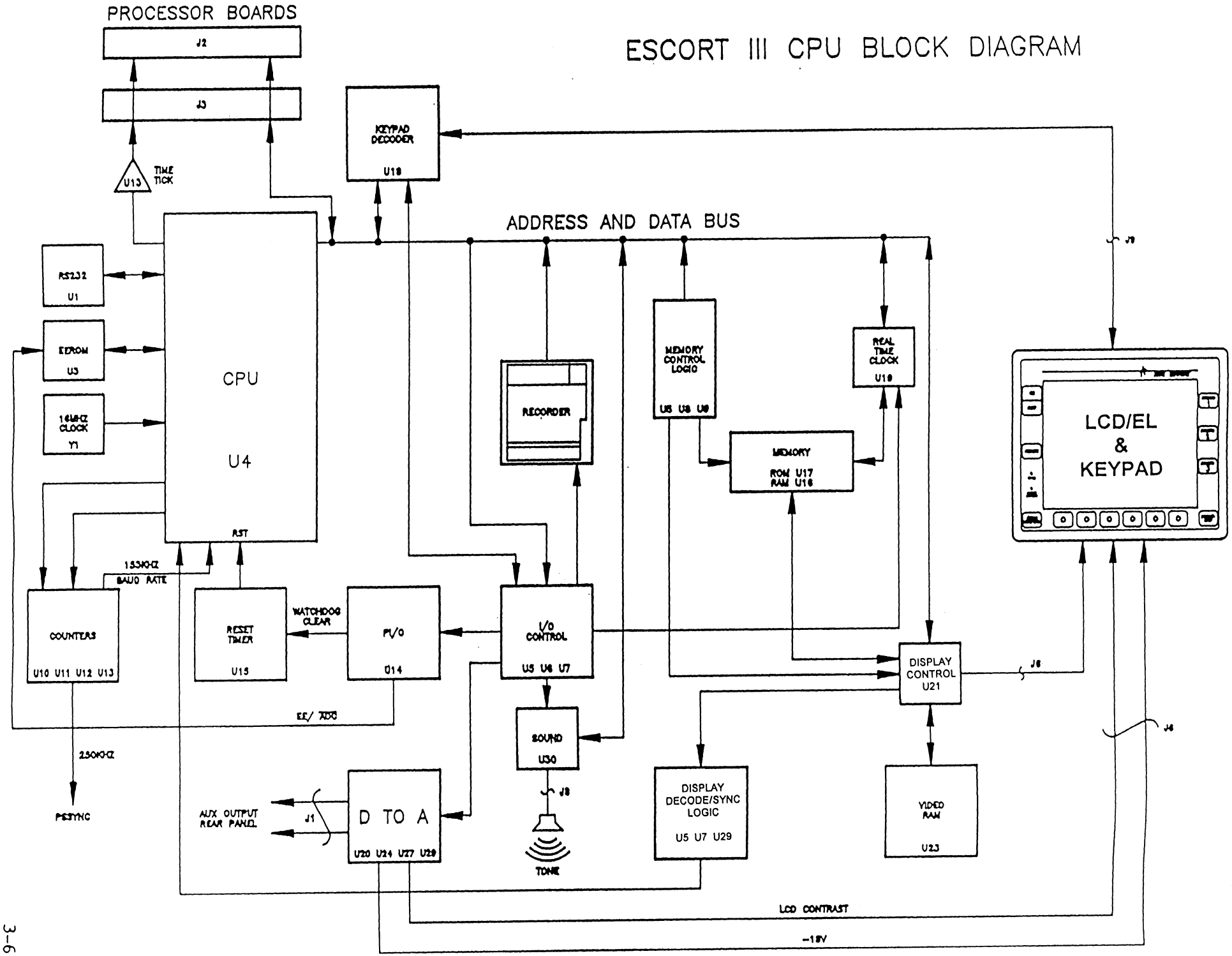
   ANY Enables on any alarm condition.
   FLASH Will toggle the port on any alarm condition.
   ECG Enables on ECG alarms only.
   BP1 Enables on BP1 alarms only.
   BP2 Enables on BP2 alarms only.
   RESP Enables on respiration alarms only.
   T1 Enables on temperature 1 alarm only.
   T2 Enables on temperature 2 alarm only.
   SaO_2 Enables on SaO_2 alarm only.

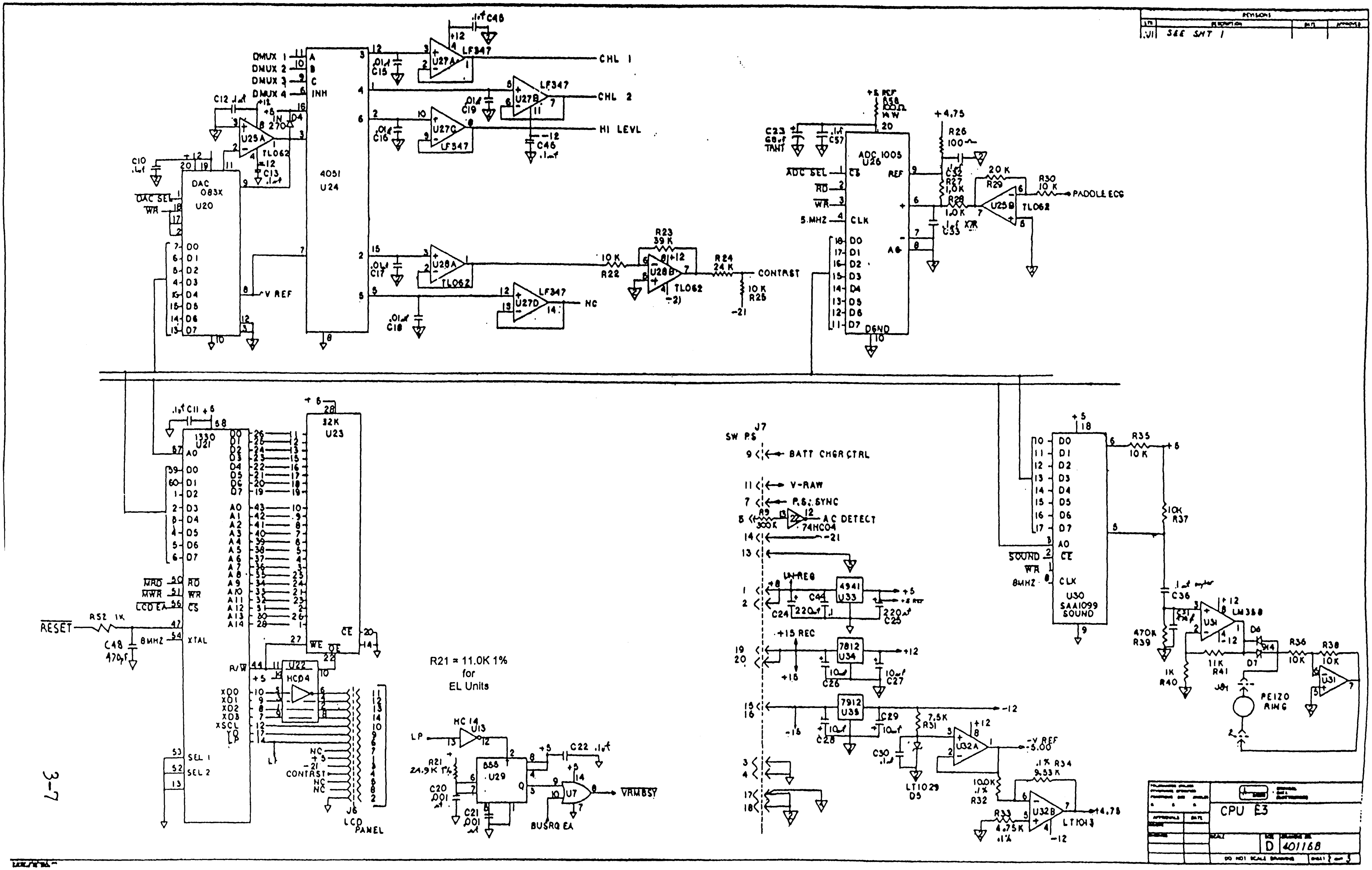
3. The KEY mode will reflect recorder condition:

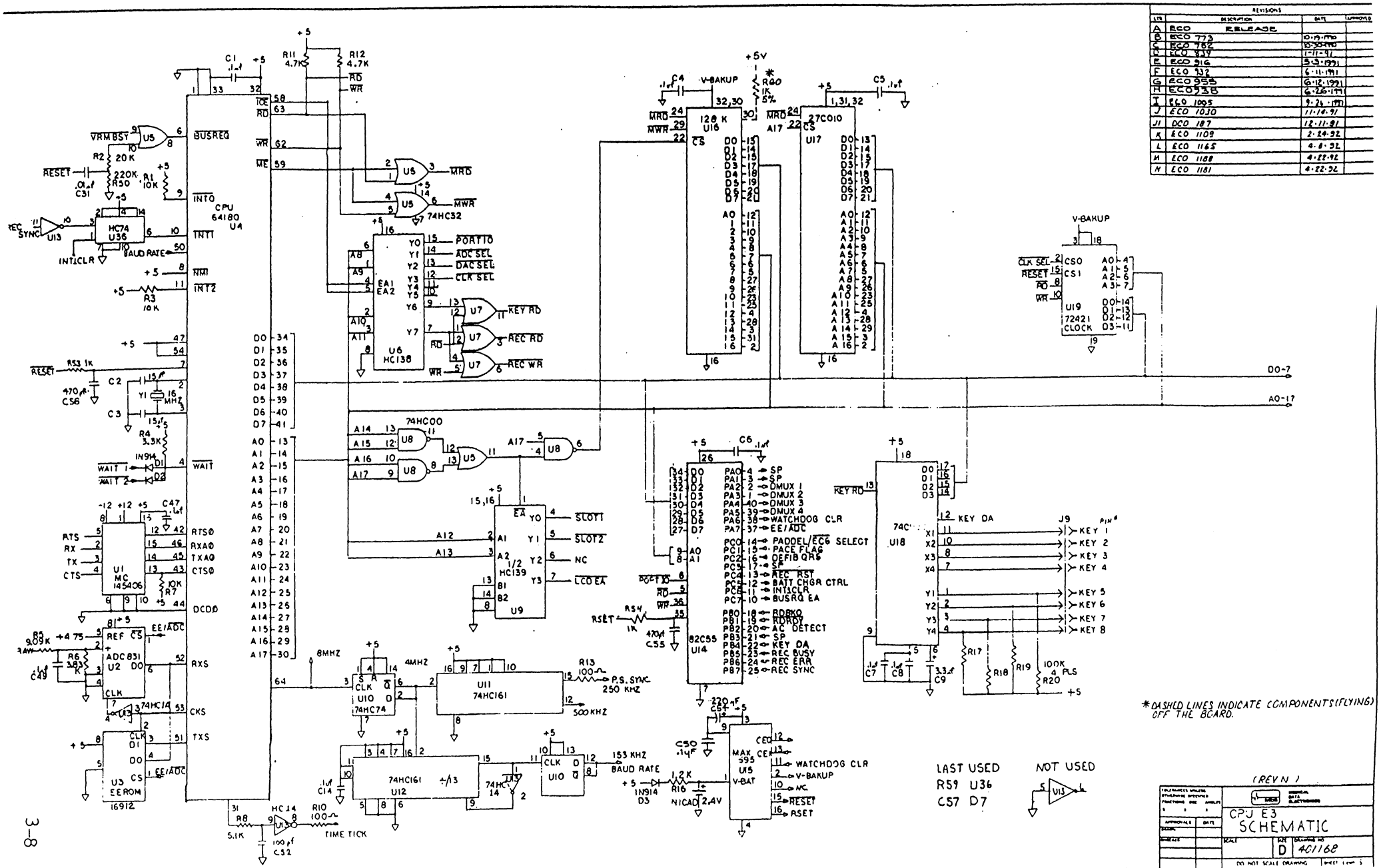
   ANY Enables when either REC1, REC2, or REC3 key has been selected.
   REC1 Enables only when REC1 key is selected.
   REC2 Enables only when REC2 key is selected.
   REC3 Enables only when REC3 key is selected.

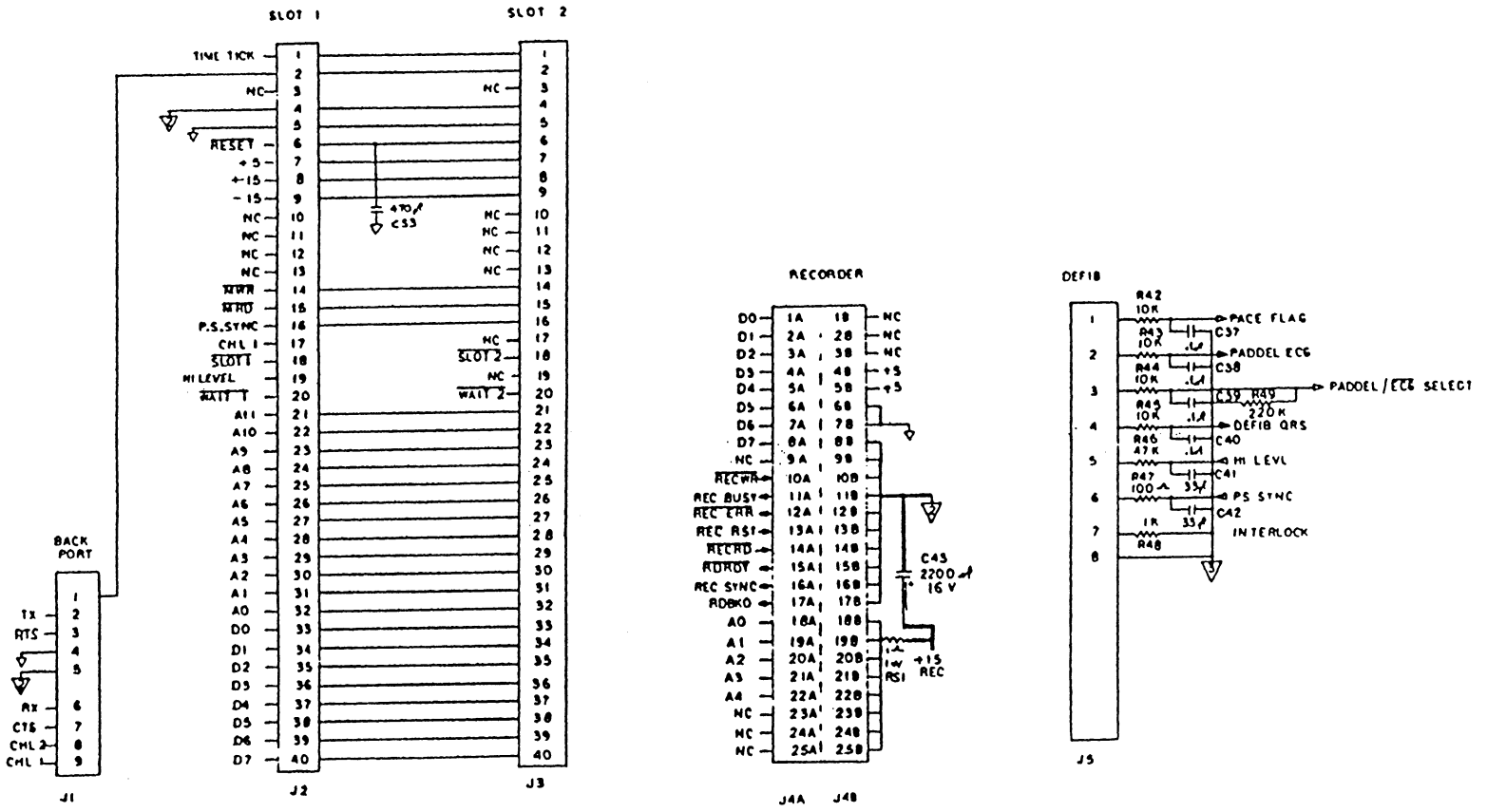
3.2.12 REGULATORS

U33 regulates +5V from the +8V input at pins 1 and 2 of J7 . U34 and U35 will regulate +12V and -12V from the +15V and -15V input. These input voltages are from the switching power supply board. VRAW comes in on J7 pin 11, to the ADC U2, to determine battery condition. LOW=10.6V or lower, MID=10.6V to 11V, and HIGH=11V and above.


ESCORT III CPU BLOCK DIAGRAM
PROCESSOR BOARDS
J2
J3
U13
TIME TICK
KEYPAD DECODER
U18
ADDRESS AND DATA BUS
RS232
U1
EEPROM
U3
16MHZ CLOCK
Y1
CPU
U4
RST
RECORDER
MEMORY CONTROL LOGIC
U5 U8 U9
REAL TIME CLOCK
U19
MEMORY
ROM U17
RAM U16
LCD/EL
&
KEYPAD
J9
153KHZ
BAUD RATE
COUNTERS
U10 U11 U12 U13
RESET TIMER
U15
WATCHDOG CLEAR
P I/O
U14
I/O CONTROL
U5 U6 U7
DISPLAY CONTROL
U21
J6
EE/ ADC
SOUND
U30
J8
TONE
250KHZ
PSYNC
AUX OUTPUT REAR PANEL
J1
D TO A
U20 U24 U27 U29
DISPLAY DECODE/SYNC LOGIC
U5 U7 U29
VIDEO RAM
U23
J4
LCD CONTRAST
-18V


SEE SHT 1
DMUX 1
DMUX 2
DMUX 3
DMUX 4
4051
U24
DAC
083X
U20
DAC SEL
WR
V REF
LF347
TL062
CHL 1
CHL 2
HI LEVL
NC
CONTRAST
ADC 1005
U26
ADC SEL
RD
5.MHZ
CLK
PADDLE ECG
1330
U21
32K
U23
RESET
8MHZ
XTAL
LCD EA
MRD
MWR
U22
HC04
LCD
PANEL
J6
R21 = 11.0K 1%
for
EL Units
LP
HC14
U13
555
U29
U7
VRMBSY
BUSRQ EA
J7
SW PS
BATT CHGR CTRL
V-RAW
P.S. SYNC
AC DETECT
74HC04
+15 REC
4941
U33
7812
U34
7912
U35
LT1029
D5
U32A
U32B
LT1013
-V REF
-5.00
+4.75
SOUND
U30
SAA1099
SOUND
LM358
U31
PEIZO
RING
CPU E3
D
401168

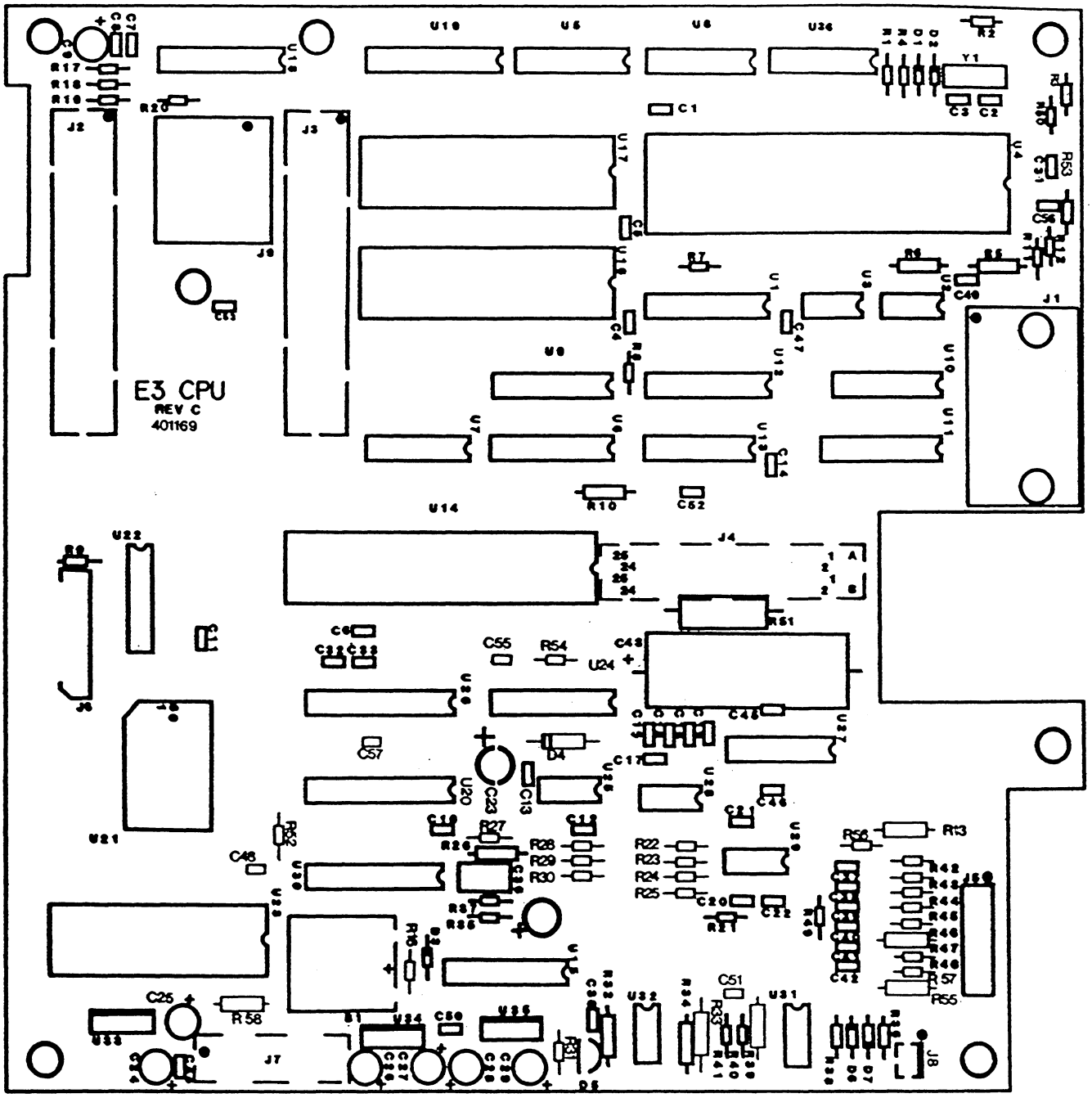

REVISIONS
LTR DESCRIPTION DATE APPROVED
A ECO RELEASE
B ECO 773 10-19-1990
C ECO 782 10-29-1990
D ECO 839 1-11-91
E ECO 916 5-3-1991
F ECO 932 6-11-1991
G ECO 955 6-12-1991
H ECO 938 6-26-1991
I ECO 1005 9-24-1991
J ECO 1030 11-14-91
J1 DCO 187 12-11-91
K ECO 1109 2-24-92
L ECO 1165 4-8-92
M ECO 1188 4-22-92
N ECO 1181 4-22-92
CPU 64180 U4
U1 MC 145406
U2 ADC 831
U3 EEROM 16912
U5 74HC32
U6 HC138
U7 KEY RD
U7 REC RD
U7 REC WR
U8 74HC00
U9 1/2 HC139
U10 74HC74
U11 74HC161
U12 74HC161 ÷13
U13 HC14
U14 82C55
U15 MAX 695
U16 128 K
U17 27C010
U18 74C
U19 72421 CLOCK
U36 HC74
PORT10
ADC SEL
DAC SEL
CLK SEL
SLOT1
SLOT2
NC
LCD EA
BUSREQ
INT0
INT1
INT2
NMI
WAIT
RTS0
RXA0
TXA0
CTS0
DCD0
CKS
RXS
TXS
EE/ADC
TIME TICK
BAUD RATE
WATCHDOG CLR
V-BAKUP
RESET
RSET
D0-7
A0-17
KEY DA
KEY 1
KEY 2
KEY 3
KEY 4
KEY 5
KEY 6
KEY 7
KEY 8
P.S. SYNC 250 KHZ
500 KHZ
153 KHZ
8MHZ
4MHZ
*DASHED LINES INDICATE COMPONENTS (FLYING) OFF THE BOARD.
LAST USED R59 U36 C57 D7
NOT USED
(REV N)
CPU E3 SCHEMATIC
SIZE D
401168
3-8



CPU E3

D 401168

DO NOT SCALE DRAWING



CPU BOARD

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing	Rev	LT
401168-0000	PCBA, E3 CPU MOTHER REV. J1 (D187)			A				J1	14

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
401169-0000	*1	1	PCB, E3 CPU MOTHER BD REV D .D (E986)		R	33	1.000	EA		Yes		
352100-0104A	*1	2	CAP, .1UF,50V,10%,RAD,X7R		R	11	8.000	EA	C1,4,5,6,10,12,14,45	Yes		
352100-0104A	*1	3	CAP, .1UF,50V,10%,RAD,X7R		R	11	7.000	EA	C11,13,22,44,57,47,49	Yes		
352100-0471A	*1	4	CAP, 470PF,25V,10%,RAD,X7 R		R	22	5.000	EA	C51,55,56,53,48	Yes		
352101-0330A	*1	5	CAP, 33PF,100V,5%,RAD,NPO		R	22	2.000	EA	C41, C42	Yes		
352201-0227A	*1	6	CAP, 220UF,10V,RAD,ELECT, .248 X .433 CS		R	66	3.000	EA	C24,25,54	Yes		
352202-0228A	*1	7	CAP, 2200uF,16V,AX,ELECT, 12x30mm		R	22	1.000	EA	C43	Yes		
352300-0010A	*1	8	CAP., .001UF,5%,MYLAR SOR T FROM 352300-0007A		R	66	1.000	EA	C20	Yes		
352300-0102A	*1	9	CAP, 1000PF,50V,20%,RAD,M YLAR		R	66	1.000	EA	C21	Yes		
352300-0103A	*1	10	CAP, .01UF,50V,20%,RAD,MY LAR		R	22	4.000	EA	C15, C16, C17, C18	Yes		
352300-0103A	*1	11	CAP, .01UF,50V,20%,RAD,MY LAR		R	22	2.000	EA	C19,31	Yes		
352300-0104A	*1	12	CAP, .1UF,50V,20%,RAD,MYL AR		R	22	3.000	EA	C7,8,30	Yes		
352300-0104A	*1	13	CAP, .1UF,50V,20%,RAD,MYL AR		R	22	4.000	EA	C37, C38, C39, C40	Yes		
352400-0686A	*1	14	CAP, 68UF,25V,20%,RAD,TAN T,.5 IN MAX.HT/.15LS		R	22	1.000	EA	C23	Yes		
352200-0476A	*1	15	CAP, 47UF,25V,RAD,ELECT		R	55	4.000	EA	C26, C27, C28, C29	Yes		
352400-0335A	*1	16	CAP, 3.3UF,20V,20%,RAD,TA NT		R	11	1.000	EA	C9	Yes		
354000-0102A	*1	17	CONN, SNAP,R/A,SGL.ROW,SG L.PINS		R	11	8.000	PIN	J9 - DO NOT ISSUE	Yes		
354000-0106A	*1	18	CONN, DBL ROW,STRT,SGL PI N,SNAP-AWAY		R	11	14.000	PIN	J5 - DO NOT ISSUE	Yes		
354000-0138A	*1	19	CONN, 2-P,M,STRT LOCK,.1 CTR,HDR		R	11	1.000	EA	J8	Yes		
354000-0145A	*1	20	CONN, 9-P,F,DB 9,PLASTIC, R/A		R	22	1.000	EA	J1	Yes		
354000-0146A	*1	21	CONN, 40-PIN,CARD EDGE,.1 CTR,.437-.460 HIGH		R	22	2.000	EA	J2, J3	Yes		
354000-0199A	*1	22	CONN, 50-PIN,HIGH DENSITY ,MALE		R	33	1.000	EA	J4	Yes		
354000-0200A	*1	23	CONN, 20-PIN,EDGE,DUAL 10		R	22	1.000	EA	J7	Yes		
354000-0201A	*1	24	CONN, 14-PIN,FLAT FLEX		R	44	1.000	EA	J6	Yes		

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing	Rev	LT
401168-0000	PCBA, E3 CPU MOTHER REV. J1 (D187)			A				J1	14

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
356000-0001A	*1	25	XTAL, 16MHZ,QUARTZ,MICROPROCESSOR		R	11	1.000	EA	Y1	Yes		
364000-0002A	*1	26	IC, DAC-083X, NOTE: X = EITHER 0, 1, OR 2.		R	22	1.000	EA	U20	Yes		
364000-0173A	*1	27	IC, LF347 SCREENED FROM -0009, -0130, -0135		A	5	1.000	EA	U27	Yes		
364000-0011A	*1	28	IC, LM358		R	11	1.000	EA	U31	Yes		
364000-0024A	*1	29	IC, 74HC00		R	11	1.000	EA	U8	Yes		
364000-0025A	*1	30	IC, 74HC04		R	11	1.000	EA	U22	Yes		
364000-0027A	*1	31	IC, 74HC32		R	11	2.000	EA	U5, U7	Yes		
364000-0028A	*1	32	IC, 74HC74		R	11	2.000	EA	U10,36	Yes		
364000-0029A	*1	33	IC, 74HC138		R	11	1.000	EA	U6	Yes		
364000-0031A	*1	34	IC, 74HC161		R	11	2.000	EA	U11, U12	Yes		
364000-0040A	*1	35	IC, 4051		R	11	1.000	EA	U24	Yes		
364000-0059A	*1	36	IC, 555, TIMER CHIP, LINEAR		R	11	1.000	EA	U29	Yes		
364000-0062A	*1	37	IC, 74C922		R	22	1.000	EA	U18	Yes		
364000-0092A	*1	38	IC, HD 64180 RP-8 (Z180-8 MHZ)		R	11	1.000	EA	U4	Yes		
364000-0100A	*1	39	IC, MC145406		R	11	1.000	EA	U1	Yes		
364000-0101A	*1	40	IC, 82C55 **MITSUBISHI ONLY**		R	22	1.000	EA	U14	Yes		
364000-0104A	*1	41	IC, 74HC139		R	11	1.000	EA	U9	Yes		
364000-0105A	*1	42	IC, TL55257 PL12 32 X 8 RAM, STATIC		R	22	1.000	EA	U23	Yes		
364000-0107A	*1	43	IC, 7812 CT		R	11	1.000	EA	U34	Yes		
364000-0108A	*1	44	IC, 7912 CT		R	11	1.000	EA	U35	Yes		
364000-0115A	*1	45	IC, L4941, 5V REG, TO-220, LOW DROP		R	11	1.000	EA	U33	Yes		
364000-0123A	*1	46	IC, RTC 72421A		R	22	1.000	EA	U19	Yes		
364000-0129A	*1	47	IC, ADC0831CCN		R	22	1.000	EA	U2	Yes		
364000-0133A	*1	48	IC, TL062ACP		R	11	2.000	EA	U25, U28	Yes		

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing	Rev	LT
401168-0000	PCBA, E3 CPU MOTHER REV. J1 (D187)			A				J1	14

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
364000-0136A	*1	49	IC, LT1013,OP AMP		R	33	1.000	EA	U32	Yes		
364000-0137A	*1	50	IC, ADC1005		R	22	1.000	EA	U26	Yes		
364000-0159A	*1	51	IC, SAA1099P		R	33	1.000	EA	U30	Yes		
364000-0139A	*1	52	IC, E-1330,SM LCD CONTROL LER		R	33	1.000	EA	U21	Yes		
364000-0140A	*1	53	IC, MAX695,SUPERVISOR		R	33	1.000	EA	U15	Yes		
364000-0141A	*1	54	IC, EPROM,27C010,1 MEG		R	33	1.000	EA	U17	Yes		
364000-0142A	*1	55	IC, 1000K RAM		R	33	1.000	EA	U16	Yes		
364000-0143A	*1	56	IC, MSM16912RS,EEPROM		R	33	1.000	EA	U3	Yes		
370100-0101A	*1	57	RES, 100,1/4W,5%,CF		R	11	4.000	EA	R10,13,26,58	Yes		
370101-0243A	*1	58	RES, 24K,1/8W,5%,CF		R	11	1.000	EA	R24	Yes		
370101-0393A	*1	59	RES, 39K,1/8W,5%,CF		R	11	1.000	EA	R23	Yes		
370101-0472A	*1	60	RES, 4.7K,1/8W,5%,CF		R	11	2.000	EA	R11,12	Yes		
370101-0752A	*1	61	RES, 7.5K,1/8W,5%,CF		R	11	1.000	EA	R31	Yes		
370101-0102A	*1	62	RES, 1K,1/8W,5%,CF		R	11	2.000	EA	R27,28	Yes		
370101-0102A	*1	63	RES, 1K,1/8W,5%,CF		R	11	5.000	EA	R40,48,52,53,54	Yes		
370101-0103A	*1	64	RES, 10K,1/8W,5%,CF		R	11	4.000	EA	R1,3,7,37	Yes		
370101-0103A	*1	65	RES, 10K,1/8W,5%,CF		R	11	6.000	EA	R22,25,30,35,36,38	Yes		
370101-0103A	*1	66	RES, 10K,1/8W,5%,CF		R	11	4.000	EA	R42, R43, R44, R45	Yes		
370101-0104A	*1	67	RES, 100K,1/8W,5%,CF		R	11	2.000	EA	R17,18	Yes		
370101-0104A	*1	68	RES, 100K,1/8W,5%,CF		R	11	2.000	EA	R19,20	Yes		
370101-0113A	*1	69	RES, 11K,1/8W,5%,CF		R	11	1.000	EA	R41	Yes		
370101-0203A	*1	70	RES, 20K,1/8W,5%,CF		R	11	2.000	EA	R2,29	Yes		
370101-0224A	*1	71	RES, 220K,1/8W,5%,CF		R	11	2.000	EA	R49,50	Yes		
370101-0332A	*1	72	RES, 3.3K,1/8W,5%,CF		R	22	2.000	EA	R4, R16	Yes		

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing	Rev	LT
401168-0000	PC8A, E3 CPU MOTHER REV. J1 (0187)			A				J1	14

Shrinkage Factor: 0.000

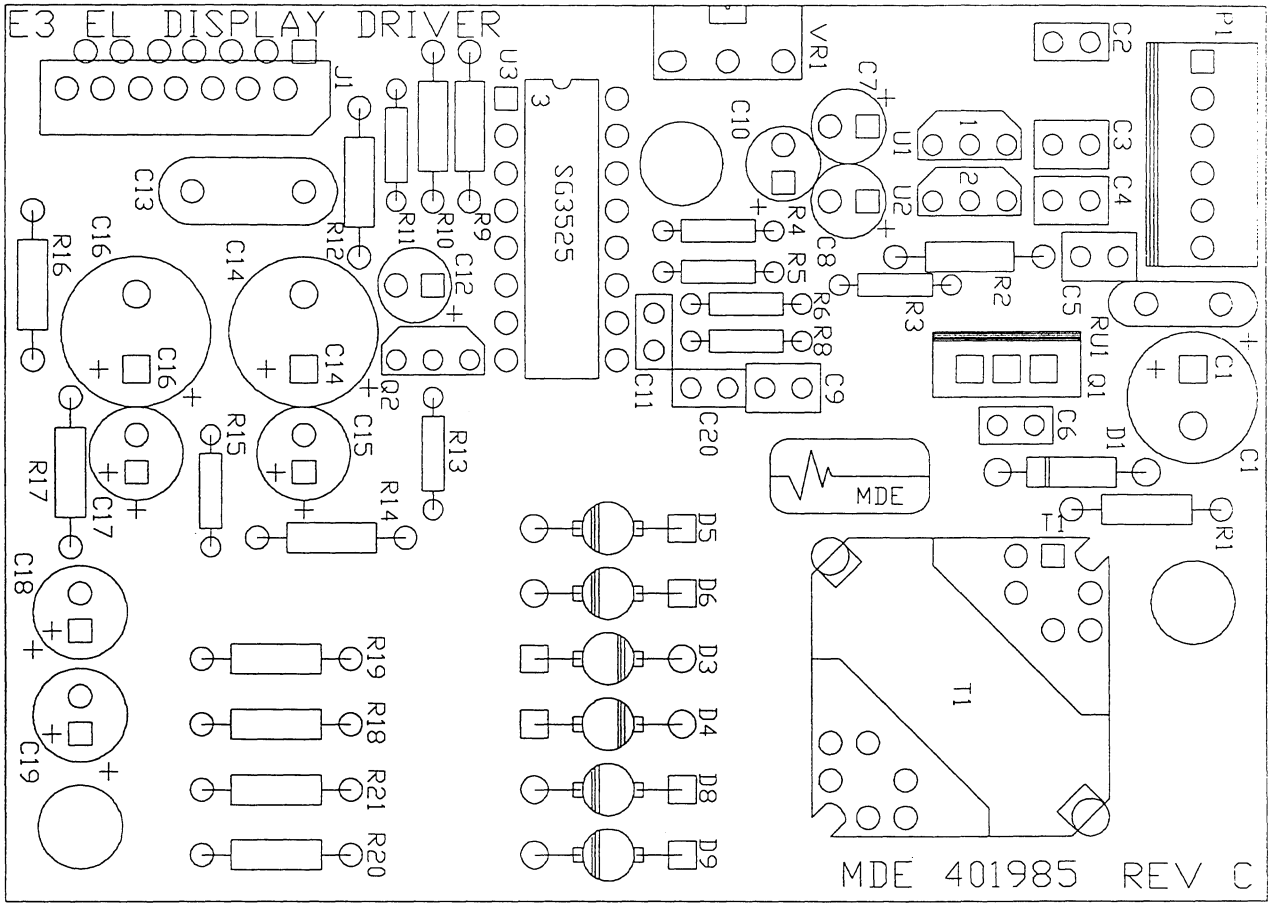
ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
370202-2492A	*1	73	RES, 24.9K,1/8W,1%		R	11	1.000	EA	R21 R21 = 11.0K, 1% for EL Units	Yes		
370101-0473A	*1	74	RES, 47K,1/8W,5%,CF		R	11	2.000	EA	R46,59	Yes		
370100-0510A	*1	75	RES, 51,1/4W,5%,CF		R	11	1.000	EA	R55	Yes		
370200-3831A	*1	76	RES, 3.83K,1/4W,1%,MF		R	22	1.000	EA	R6	Yes		
370200-9091A	*1	78	RES, 9.09K,1/4W,1%,MF		R	11	1.000	EA	R5	Yes		
370204-1002A	*1	79	RES, 10K,1/4W,0.1%,MF		R	22	1.000	EA	R32	Yes		
370204-4751A	*1	80	RES, 4.75K,1/4W,0.1%,MF		R	22	1.000	EA	R33	Yes		
370204-9531A	*1	81	RES, 9.53K,1/4W,0.1%,MF		R	66	1.000	EA	R34	Yes		
378000-0001A	*1	82	DIO, 1N270 T&R		R	11	1.000	EA	D4	Yes		
378000-0005A	*1	83	DIO, 1N914,SIGNAL T&R		R	11	5.000	EA	D1,2,3,6,7	Yes		
378000-0043A	*1	84	DIO, LT1029ACZ,5V,PRES		R	22	1.000	EA	D5	Yes		
384000-0036A	*1	85	BATT, 2.4V (1 PIN NEG; 2 PINS POS.)		R	11	1.000	EA	B1	Yes		
352100-0150A	*1	86	CAP, 15PF,50V,10%,RAD,NPO EDPT		R	22	2.000	EA	C2, C3	Yes		
352100-0101A	*1	87	CAP, 100PF,25V,10%,RAD,NP O - .1 LEAD SPACING		R	11	1.000	EA	C52	Yes		
352301-0105A	*1	88	CAP, 1UF,63V,20%,MYLAR		R	66	1.000	EA	C36	Yes		
364000-0169A	*1	89	IC, 74HC14		R	22	1.000	EA	U13	Yes		
370101-0512A	*1	90	RES, 5.1K,1/8W,5%,CF		R	11	1.000	EA	R8	Yes		
370101-0304A	*1	91	RES, 300K,1/8W,5%,CF		R	11	1.000	EA	R9	Yes		
370201-0010A	*1	92	RES, 1,1W,M.O.		R	11	1.000	EA	R51	Yes		
370100-0474A	*1	93	RES, 470K,1/4W,5%,CF		R	11	1.000	EA	R39	Yes		
352100-0104A	*1	94	CAP, .1UF,50V,10%,RAD,X7R		R	11	4.000	EA	C32,33,50,46	Yes		
370101-0204A	*1	95	RES, 200K,1/8W,5%,CF		R	11	2.000	EA	R56,57	Yes		
100000	*1	98	NOTES & SPEC. INSTRUCTION S		P	0	0.000	EA	CUT TRACE & ADD	Yes		
100000	*1	99	NOTES & SPEC. INSTRUCTION S		P	0	0.000	EA	JUMPER ON CKT SIDE	Yes		

Assembly	Description	Group	PFC	Commodity	Class	Planner	Buyer	Drawing	Rev	LT
401168-0000	PCBA, E3 CPU MOTHER REV. J1 (D187)				A				J1	14

Shrinkage Factor: 0.000

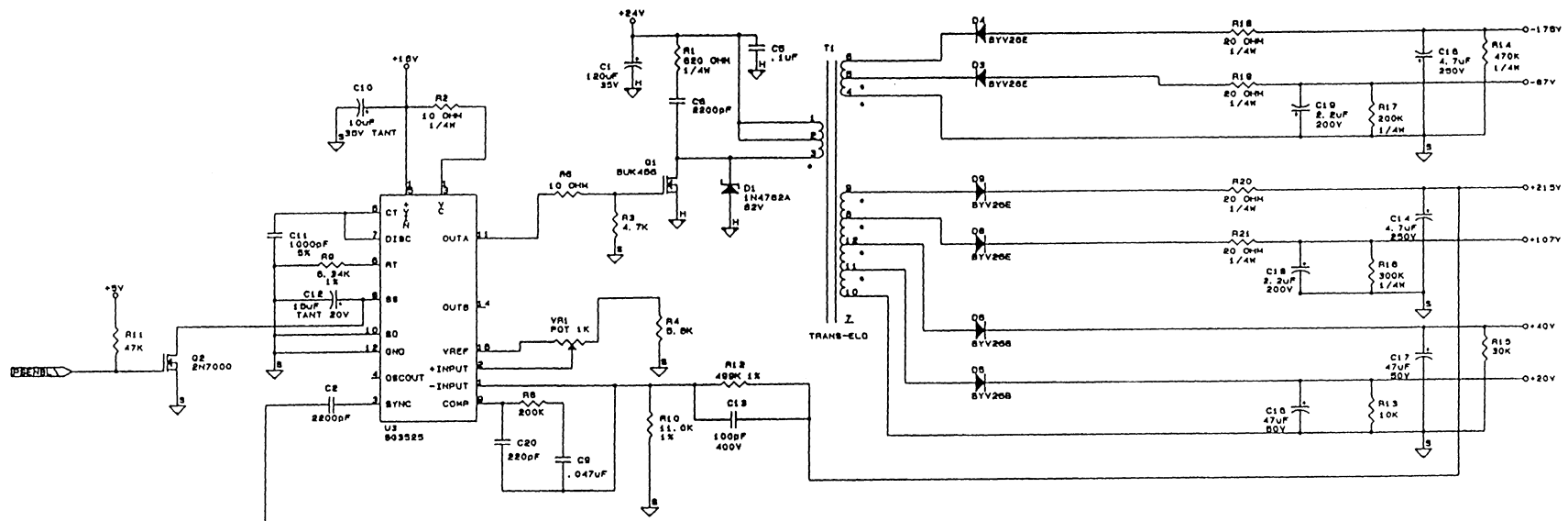
ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
100000	*1	100	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	AS PER MARKED UP DRW.	Yes		
365000-0064A	*1	101	SKT, 64-PIN,.07 LEADS		R	11	1.000	EA	U4	Yes		
365000-0032A	*1	102	SKT, 32-PIN LOW PROFILE		R	22	1.000	EA	U17	Yes		
365000-0040A	*1	103	SKT, 40-POS,DIP,TIN PLATE ,L.P.		R	11	1.000	EA	U14	Yes		
100000	*1	104	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	FOR ASSEMBLY	Yes		
100000	*1	105	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	FOR RESISTORS CHECK	Yes		
100000	*1	106	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	BIN - FILL IF REQUIRE	Yes		
370101-0242A	*1	107	RES, 2.4K,1/8W,5%,CF		R	11	1.000	EA	R47	Yes		
900000	*1	120	ASSEMBLY LABOR & BURDEN		L	0	1.555	HR		Yes		

Cumulative Lead Time for 401168-0000 = 80

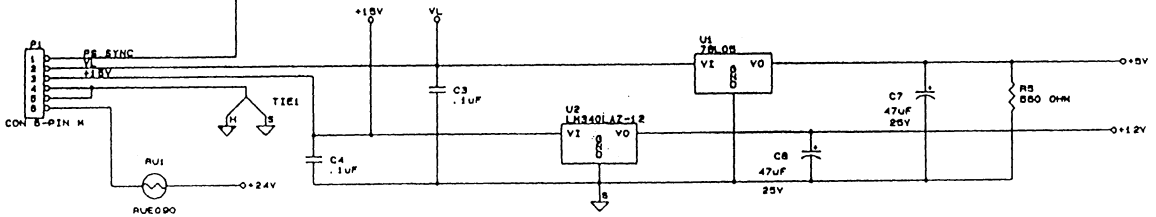


EL Display Driver - Board Layout

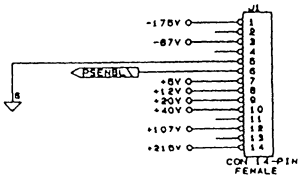
REVISIONS			
LTR	DESCRIPTION	DATE/AUTH	PCB UPDATE
A	RELEASED ECO # 1852	1-1-93 CDF	
B	ECO #1880	4-12-93 BPH	
C	ECO #1888	4-22-93 BPH	4-22 B BPH
D	ECO #1487	8-18-93 CDF	8-18 C CDF
D1	DCO 824-ADD NOTE (SHT 2)	03-02-94 RAT	



FROM E3
POWER SUPPLY



TO EL INTERFACE BD.



LAST USED

C19 AUI U3 R21
D14 Q2 J2

UNUSED LABELS

R7 L1 Q2 Q7 D10-D14

REV C PCB

TOLERANCES UNLESS OTHERWISE SPECIFIED
RESISTORS 1% 1/4W 5% 1/8W
CAPACITORS 20%

APPROVALS	DATE
DRAWN CDF	11-17-92
CHECKED SPH	
APPROVED SPH	3-3-94

MEDICAL DATA ELECTRONICS

TITLE: E3 EL DISPLAY DRIVER SCHEMATIC

SCALE	SIZE	DRAWING NO.	REV
FULL	C	401986	D1

E3ELDR1.SCH | DO NOT SCALE DRAWING | SHEET 1 OF 2

401986-0000	PCBA,E3 ELECTROLUMIN DISPLAY DRIVER		
352102-0101A	CAP,100PF,20%,400VAC,2500V CS CER DISC,INT'L APPR.	1	C13
352200-0127A	CAP, 120uF,35V,20%,LOW ESR,.15/.35,ELECT	1	C1
352200-0225A	CAP, 2.2uF,20%,200V,RAD,6.3 x 11mm,ELECT	2	C18,19
352200-0475A	CAP, 4.7uF,20%,250V,RAD,10 x 12mm,ELECT	2	C14,16
352200-0476A	CAP, 47UF,25V,RAD,ELECT 2.5mm LEAD SPACE	2	C7,8
352202-0476A	CAP, 47uF,20%,50V,RAD,6.3 x 11mm,ELECT	2	C15,17
352300-0010A	CAP., 1000pF,5%,MYLAR SORT FROM 352300-0007A	1	C11
352300-0104A	CAP, .1UF,50V,20%,RAD,MYLAR	3	C3,4,5
352300-0221A	CAP, 220PF,50V,20%,RAD,MYLAR,.1 L.S.	1	C20
352300-0473A	CAP, .047UF,50V,20%,MYLAR	1	C9
352301-0222A	CAP, 2200PF,50V,20%,MYLAR	2	C2,6
352400-0156A	CAP, 15UF,20V,20%,RAD,TANT.1 IN L.S.	1	C12
352401-0106A	CAP, 10UF,35V,20%,RAD,TANT TAPE & REEL	1	C10
354000-0201A	CONN, 14-POS,STRT,FFC,.049 CTR	1	J1
354000-0211A	CONN, 6-PIN,M,STRT,0.1~ CTR	1	P1
364000-0091A	IC, SG 3525	1	U3
364000-0109A	IC, 78LO5 +5V REG. TO-92 PKG.	1	U1
364000-0207A	IC, LM78L12ACZ,+ 12V REG TO92	1	U2
370100-0100A	RES, 10,1/4W,5%,CF TAPE & REEL	1	R2
370100-0200A	RES, 20,1/4W,5%,CF TAPE & REEL	4	R18,19,20,21
370100-0204A	RES, 200K,1/4W,5%,CF TAPE & REEL	1	R17
370100-0304A	RES, 300K,1/4W,5%,CF TAPE & REEL	1	R16
370100-0474A	RES, 470K,1/4W,5%,CF TAPE & REEL	1	R14
370100-0821A	RES, 820,1/4W,5%,CF TAPE & REEL	1	R1
370101-0100A	RES, 10,1/8W,5%,CF TAPE & REEL	1	R6
370101-0103A	RES, 10K,1/8W,5%,CF TAPE & REEL	1	R13
370101-0204A	RES, 200K,1/8W,5%,CF TAPE & REEL	1	R8
370101-0303A	RES, 30K,1/8W,5%,CF TAPE & REEL	1	R15
370101-0472A	RES, 4.7K,1/8W,5%,CF TAPE & REEL	1	R3
370101-0473A	RES, 47K,1/8W,5%,CF TAPE & REEL	1	R11
370101-0561A	RES, 560,1/8W,5%,CF TAPE & REEL	1	R5
370101-0562A	RES, 5.6K,1/8W,5%,CF TAPE & REEL	1	R4
370200-1102A	RES, 11K,1/4W,1%,MF TAPE & REEL	1	R10
370200-4993A	RES, 499K,1/4W,1%,MF TAPE & REEL	1	R12
370200-6341A	RES, 6.34K,1/4W,1%,MF TAPE & REEL	1	R9
374300-0102A	POT, 1K,TRIM,SIDE ADJ,CERMET,3/8 IN.QR,.15LS	1	VR1
376000-0017A	XSTR, BUK456-100A,(OR IRF 540) (TO-220)MOSFET ONLY	1	Q1
376000-0019A	XSTR, 2N7000,FET	1	Q2
378000-0060A	DIO, BYV26B RECT. TAPE & REEL	2	D5,6
378000-0061A	DIO, 1N4762A,82V,1W,ZENER TAPE & REEL	1	D1
378000-0069A	DIO, BYV26E,1000V,ULTRA FAST TAPE & REEL	4	D3,4,8,9
380000-0037A	SW, RUE090,POLY,RESETTABLE FUSE PTC DEV	1	RU1
401985-0000	PCB,E3 ELECTROLUMINESCENT DISPLAY DRVR REV C(E1467	1	-
402194-0000	XFMR, SWITCHING E3/E3B EL DRIVER REV B2 (D551)	1	T1

ECG BOARD

CHAPTER 4

4.0.0 ECG BOARD

4.1.0 OVERVIEW

One of the two processor boards in the **ESCORT 300A** is the ECG Board. The primary function of this board is to detect an ECG signal and reproduce it on the monitor screen. If the **ESCORT 300A** is configured for Respiration, then the ECG Board will detect and reproduce a respiration waveform. Both waveforms are received in analog, and converted to a digital format to be stored in RAM on the CPU Board. If the **ESCORT 300A** is equipped with five lead select, the ECG Daughter Board will interpret and implement the selection.

The ECG Board also provides electrical isolation for the patient from the monitor. All signals are isolated through opto-couplers creating a barrier, separating line voltages from the patient. Necessary operating voltage for the isolated section are provided by T1 and U8 completing the isolation barrier.

Circuits will be described in 2 major sections: The ISOLATED SECTION including Lead Select, Instrumentation amp and Notch filter, Pacer detect, ECG MUX, A to D Sampling, Iso DC Power Supply, and the Respiration circuit if included in configuration. In the NON ISOLATED section are the Digital portion and Defib Buffer.

4.2.0 ISOLATED SECTION

4.2.1 LEAD SELECT

For **ESCORT 300A's** equipped with Lead Select and/or Respiration, an ECG Daughter Board is installed. ECG from patient leads is input to and selected on the Daughter Board. Each lead has its own defibrillator protection circuitry comprised of a current limiting resistor and two back-to-back zener diodes (for RA: R17 and D1, D2). In addition, each lead has its own electro-surgical filtering circuits consisting of a 63 mH inductor and a 2200 pF capacitor in parallel with it.

The multiple gang waffer switch (S1) selects the lead configuration to produce the signals -SIG, +SIG and ISO GRD. These signals go to the main ECG Board via J1.

4.2.2 INSTRUMENTATION AMPLIFIER/NOTCH FILTER

U1 on the ECG Mother Board is a high impedance differential amplifier. The two signals are combined and amplified with a gain of 26 at U1 pin 8. R66 is adjusted to compensate for any phase difference in the two signals; R8 will balance and offset any common mode on top of the ECG signal.

The Notch filter will eliminate any respiration drive signal (125KHz) that might be present on the ECG signal.

4.2.3 PACER PULSE DETECT

If Pace key is ON, the **ESCORT 300A** will reject pacer artifact and insert a pacer flag into the ECG waveform. C10, C11, R12 and R13 form a bandpass filter which is used to recognize the pacer pulse. If a quick spike, ±150mV, occurs, U3 pin 13 or 14 will be forced to - 15V for 2ms. This will inhibit U2 pin 7, effectively stripping the spike from the ECG signal. The U3 output also goes to opto coupler U7, generating the signal FLAG. When FLAG goes LOW for 5 - 15mS, a pacer spike has been detected.

The pacer detection circuit can be disabled by the user with the softkey PACE ON/OFF. The signal PACE ENABLE* goes through opto coupler U6 to U2 pin 9. U2 pin 11 will force U3 pins 9 and 10 to ground, disabling the pacer detect circuit.

4.2.4 ECG/RESPIRATION MULTIPLEXER

R16, R18, R19, C14, C13, C15, D11 and D12 all comprise another band pass filter that sets the monitor frequency response at .05Hz to 100Hz. The next section will multiplex the respiration signal (RESP) and the ECG signal according to the control signals RESP SEL and ECG SEL from the digital portion. Q1 is turned on and off by ECG SEL through opto coupler U5 pin 11. If respiration is selected, (RESP SEL high) Q2 is turned on, passing the respiration signal on to the A to D sampling circuit. For **ESCORT 300A's** not configured with respiration, ECG only will be selected.

BASELINE RST will quickly drive the ECG signal back on the screen if the amplitude of the signal becomes too large, as in the case of replacing a loose lead.

4.2.5 A TO D SAMPLING CIRCUIT

This circuit provides analog to digital conversion for use by the digital portion of the ECG Board. An oscillator and ramp waveform create a window to sample the instantaneous analog voltage and calculate a digital data point. Reference voltages are used by the integrating A to D converter to initiate timing cycles. The ramp voltage has a rise rate of 1 volt per 60us: If the ECG signal voltage has not been reached by the ramp voltage by 900 microseconds,the digital circuitry will set the SAMPLE RST to start a new cycle.

The sampling circuit starts with the signal SAMPLE RST. When SAMPLE RST goes high, it turns on Q4, shorting U4 pin 1 to -10.5V. The voltage then starts to ramp up. When it reaches -10V, U3 pin 2 will go high, starting the count and signifying the beginning of the digital conversion. U3 pin 1 and U3 pin 2 outputs are wired OR'd together. The ramp will continue up until its voltage is equal to the signal at U3 pin 7, ECG or RESP. At that time, U3 pin 1 will pull the

outputs low, stopping the counter and completing the square wave. The higher the voltage, the longer the square wave. This signal will go to opto coupler U7, and then to the digital portion of the board.

4.2.6 RESPIRATION

In addition to lead select, respiration detection is on the Daughter Board. Respiration is detected by the impedance change that occurs with the inhalation and exhalation of air by the lungs. The signal RESP DRIVE is a 125 KHz square wave that is generated by pulse width modulator U8 through T1 on the Mother Board. It gets clipped and stabilized by U8, D11, D12 and L2. U1A will amplify the square wave to approximately $\pm$7.2V. C9 and R11 couple this signal to T1. T1 will limit this signal to less than 1mA at the outputs RA and LA.

The patient is seen by T1 as a resistance load on the secondary of the transformer. As the patient breathes, the primary drive signal changes amplitude according to how much resistance it sees across the two leads. This signal is rectified and filtered by D13, C10 and R12 to a DC level. C11 will strip off the DC component, leaving only the respiration component. This signal will change very slightly (mV), reflecting the patient's breathing pattern.

U1B has a gain of 2K to amplify this respiration component and create RESP SIGNAL. If for some reason the signal is too large to be seen on the screen, RESP RESET will shorten the RC time constant by adding R10 in parallel with R14 to drive the signal back onto the screen quickly.

4.2.7 LEAD FAIL

The LEAD FAIL detect circuit is standard in all monitors. Most of the circuitry is located on the ECG daughter board. A LEAD FAIL message will be displayed if the +SIG, the -SIG, or both leads, have been dislodged, or if the base line impedance for respiration is 4k ohms or more. In any of these instances, LEAD FAIL will be displayed on the parameter message line, but no recording will be generated. In addition, all alarms are inhibited at this time.

U2 pin 12 will detect an interruption of current flow on the -SIG, and U2 pin 3 will monitor +SIG. When the current loop, through ISO GROUND, is broken, as in the case of a lead off, the affected input will be pulled high through R23 or R24. U2c is looking for a differential of 160mV or more to signify the lead at -SIG is off. If both leads are off, D14 and D15 will drop approximately 3 volts, leaving 2 volts at the input of U3d.

U3d will detect if the lead is off at +SIG or if both leads are off. U3c will detect a lead off at -SIG, and U3a will detect if the respiration signal is higher than 4K ohms base line impedance. These signals are wired or'd together at this point. R33 and C15 form a 500ms RC time constant to filter ECG and artifact. U2b and U3b are

buffers for the signal LEAD FAIL. This signal goes to the ECG mother board through J2 pin 2.

At this point if LEAD FAIL is low, a lead fail condition exists. This signal will go through opto-coupler U7 where it becomes the signal FLAG. Software determines whether the FLAG is a pacer spike or a lead fail. If the signal remains low for 10 to 15ms, then it is considered a pacer spike. If FLAG remains low for more than 3 seconds, it is considered a lead fail.

4.2.8 ISOLATION POWER SUPPLY

Plus and minus voltages for the isolation section of the ECG Board are supplied by T1 and U8. PS SYNC drives the pulse width modulator U8 and synchronizes it with all other voltages in the monitor. T1 furnishes isolation to complete the isolation barrier. The 125 KHz RESP DRIVE signal is taken from pin 5 of T1. D7, D8, D9, and D10 rectify the AC, and a filtering circuit smoothes out the DC. ISO Ground, +V, and -V are obtained from this circuit.

4.3.0 NON ISOLATED SECTION

4.3.1 ECG DIGITAL

The processor chip on the ECG Board is a Z-80 type microprocessor. Y1 clocks U9 at 4MHz. I/O reads and writes (IORD, IOWR) and memory reads and writes (MRD, MWR) are decoded by U14 from the signals at pins 19-22. The ECG data address bus directs information to the EPROM, Dual Port RAM, CTC and address decoders. The microprocessor is reset by the CPU Board signal RSTOUT*. WAIT at pin 24 inserts wait cycles to the CPU from the Dual Port RAM. The interrupt on pin 16 will indicate to the microprocessor that 900 microseconds have elapsed since the start of the sampling cycle and request the processor to terminate this cycle. Pin 17 is the signal TIMETIC* which synchronizes the sampling cycle so that each TIMETIC* denotes getting and decoding one data point.

The EPROM (U10) stores software for the ECG Board and is enabled by U12 and the MRD signal.

The Dual Port RAM (U11) is a 2K x 8 bit CMOS RAM MS6132. It provides two ports with separate controls, address and I/O that permit separate access to memory reads and writes. The Dual Port RAM interfaces the CPU Board data address bus to the ECG Board.

U13 and U16 are input and output ports. U13 has two input signals, DEFIB SYNC and FLAG that, when requested, it places on the ECG data bus. U16 outputs control signals to the isolated section of the board.

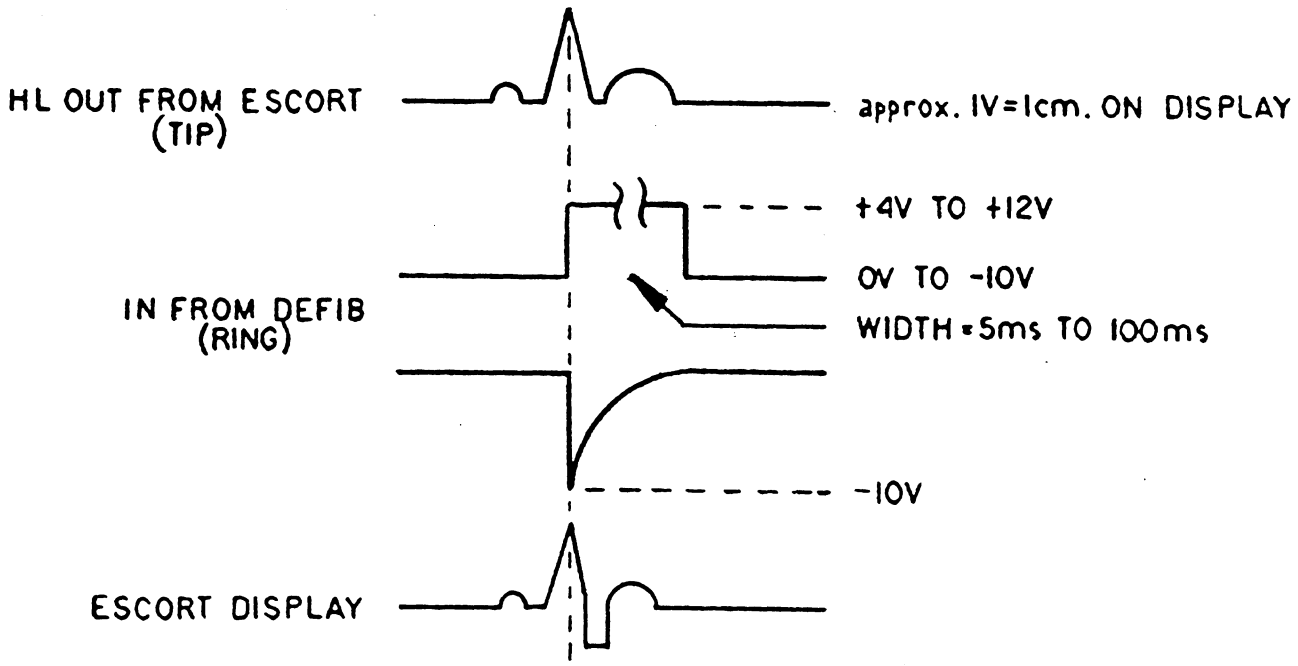
U17 is a Counter Timer Chip. It is programmable with four

independent channels for counting and timing functions. It is enabled by IOWR, IORD and A2, and it is clocked by Y1.

At SAMPLE RST the counter will start counting at the rate of 4MHz and will continue to count for 900 microseconds if it is not stopped before by the ramp voltage equaling the sample voltage in the A to D sample circuit.

4.3.2 DEFIBRILLATOR SYNC

The defibrillator sync circuit sends a high level ECG signal to the defibrillator via the stereo jack on the connector plate. The defibrillator will detect the R wave and respond with a square wave, or RC spike flag to the **ESCORT 300**. This signal will turn Q5 on sending a low to the input port U13. The microprocessor will take this information and place a flag on the ECG waveform indicating the defibrillator sync position. Defibrillator sync requirements follow:



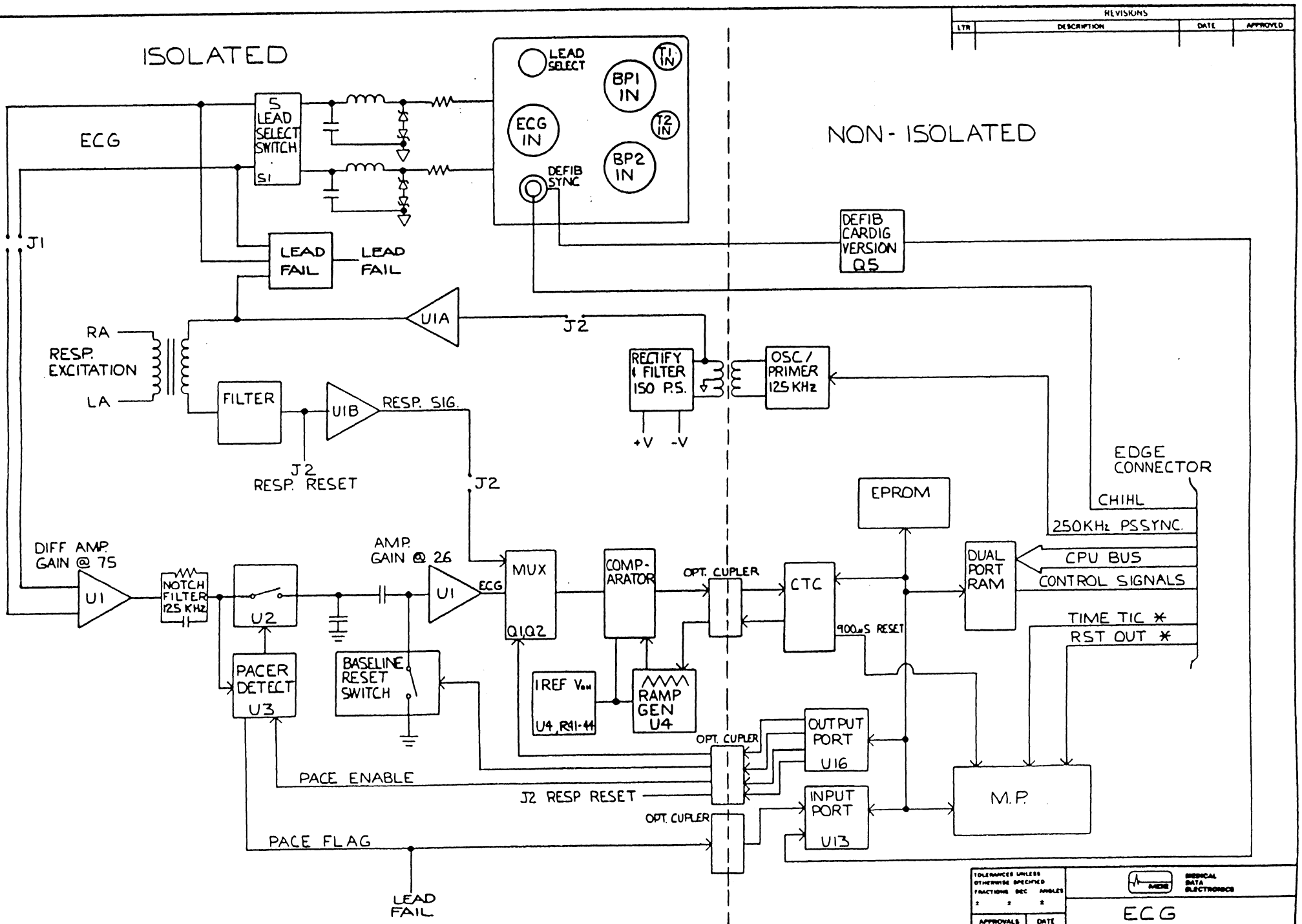
4.4.0 SOFTWARE

Software for the ECG board is stored in the EPROM, U10. Software version number can be obtained by calling up the TEST softkey page. All ESCORT 300A's will feature software for ECG functions. If your monitor is configured for respiration, then the EPROM will include software for respiration tasks.

Software tasks:

ECG Waveform sizing and gain control
High pass filtering
Low pass filtering
Line frequency notch filtering
R-wave picking
Baseline reset
Heart rate counting

RESPIRATION Waveform sizing and gain control
High pass filtering
Low pass filtering
Respiration waveform picking
Baseline reset
Pneumotach tach rate
CVA detection
Apnea delay



REVISIONS

LTR	DESCRIPTION	DATE	APPROVED

TOLERANCES UNLESS OTHERWISE SPECIFIED
FRACTIONS DEC ANGLES
± ± ±

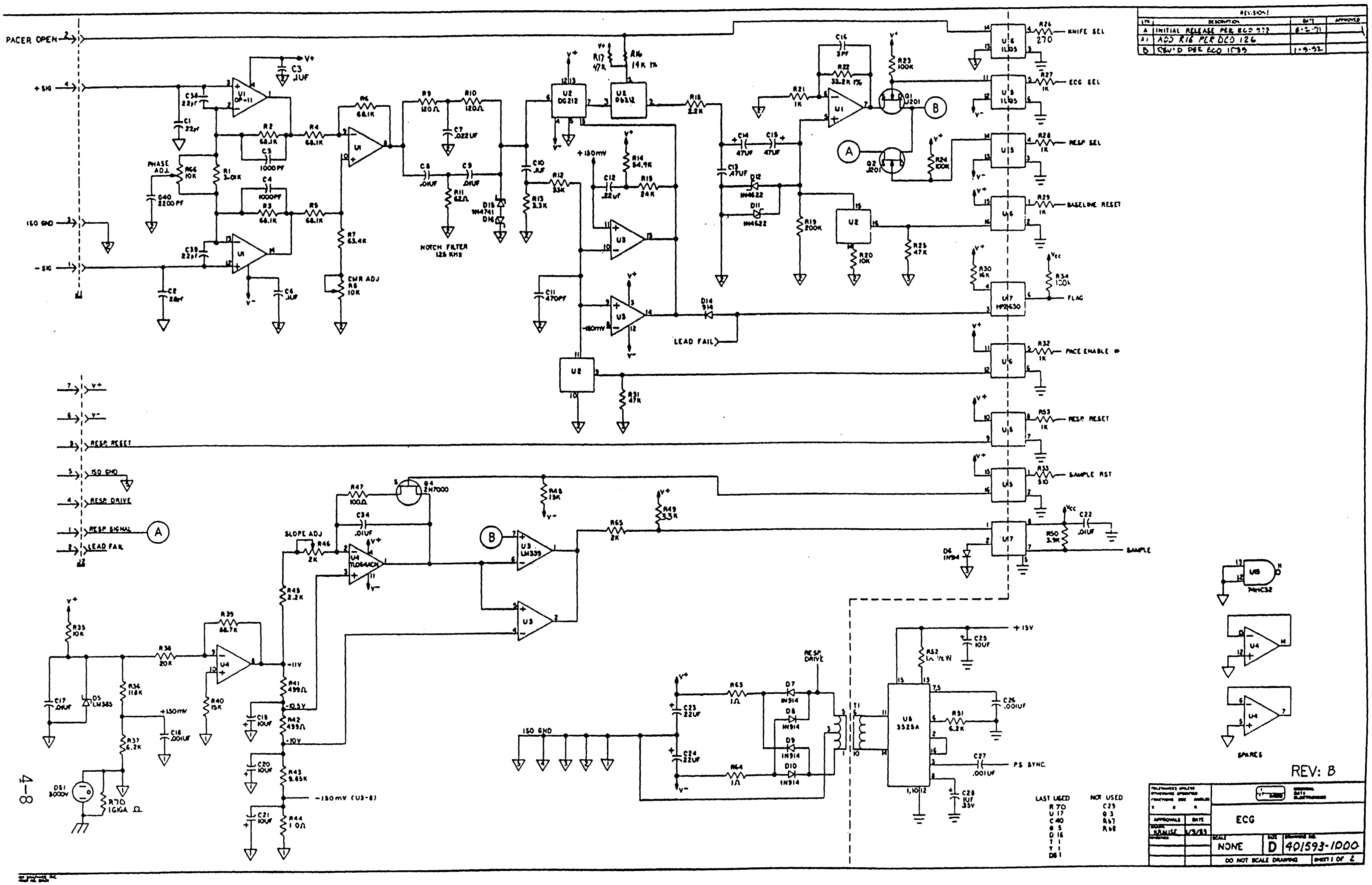
APPROVALS	DATE
DRAWN A. KRAUSE	4-25-93
CHECKED	

MEDICAL DATA ELECTRONICS

ECG BLOCK DIAG.

SCALE Ø | SIZE C | DRAWING NO.

DO NOT SCALE DRAWING | SHEET 1 of 1


REVISIONS
A INITIAL RELEASE PER ECO 972
A1 ADD R16 PER DCO 126
B REV'D PER ECO 1039
PACER OPEN
+ SIG
ISO GND
- SIG
J1
V+
V-
RESP RESET
ISO GND
RESP DRIVE
RESP SIGNAL
LEAD FAIL
J2
PHASE ADJ
CMR ADJ
NOTCH FILTER 125 KHZ
SLOPE ADJ
-150mV (U3-8)
KNIFE SEL
ECG SEL
RESP SEL
BASELINE RESET
FLAG
PACE ENABLE
RESP RESET
SAMPLE RST
SAMPLE
PS SYNC
+15V
RESP DRIVE
ISO GND
SPARES
LAST USED
R70
U17
C40
Q5
D16
T1
DS1
NOT USED
C25
Q3
R67
R68
REV: B
ECG
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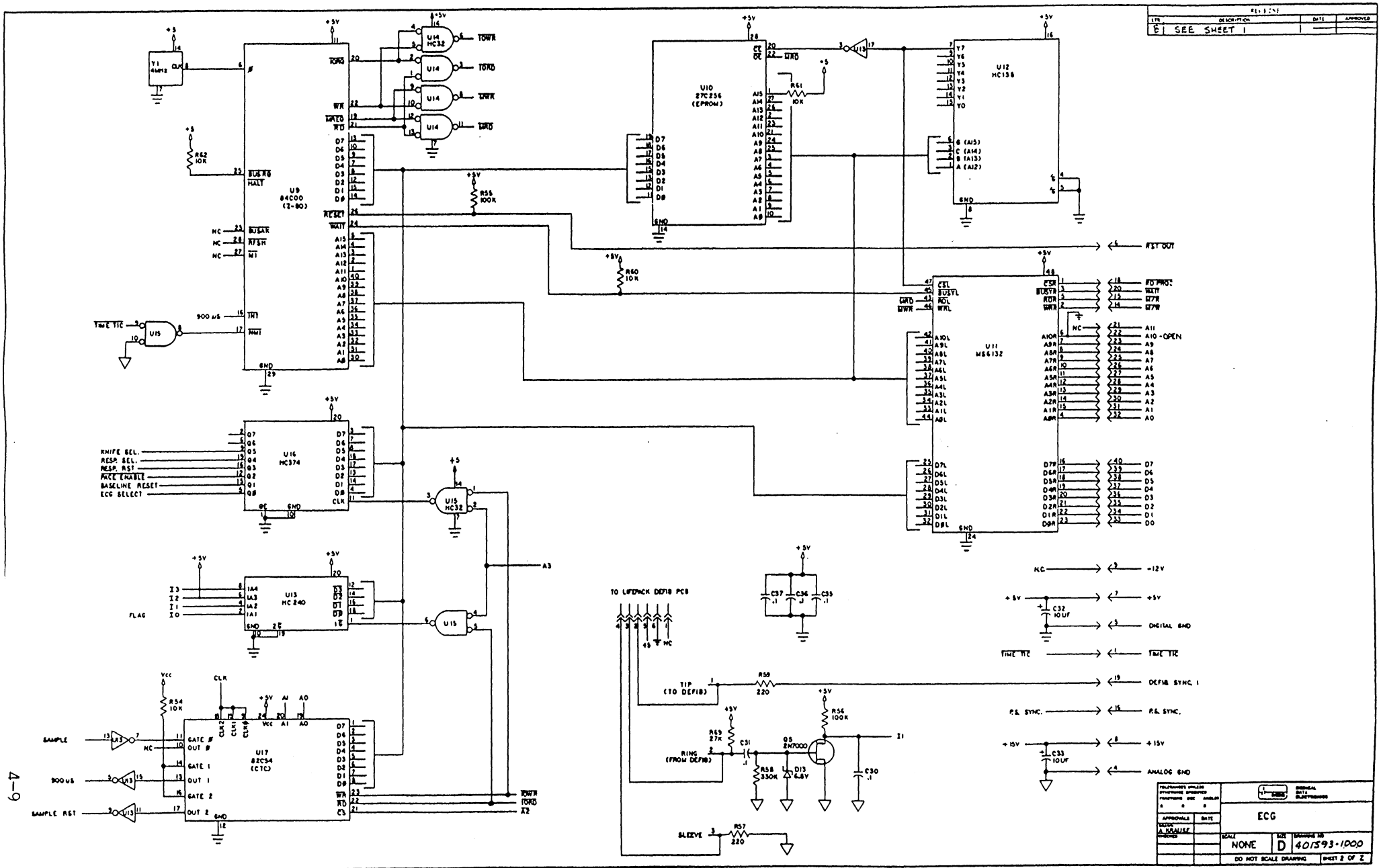
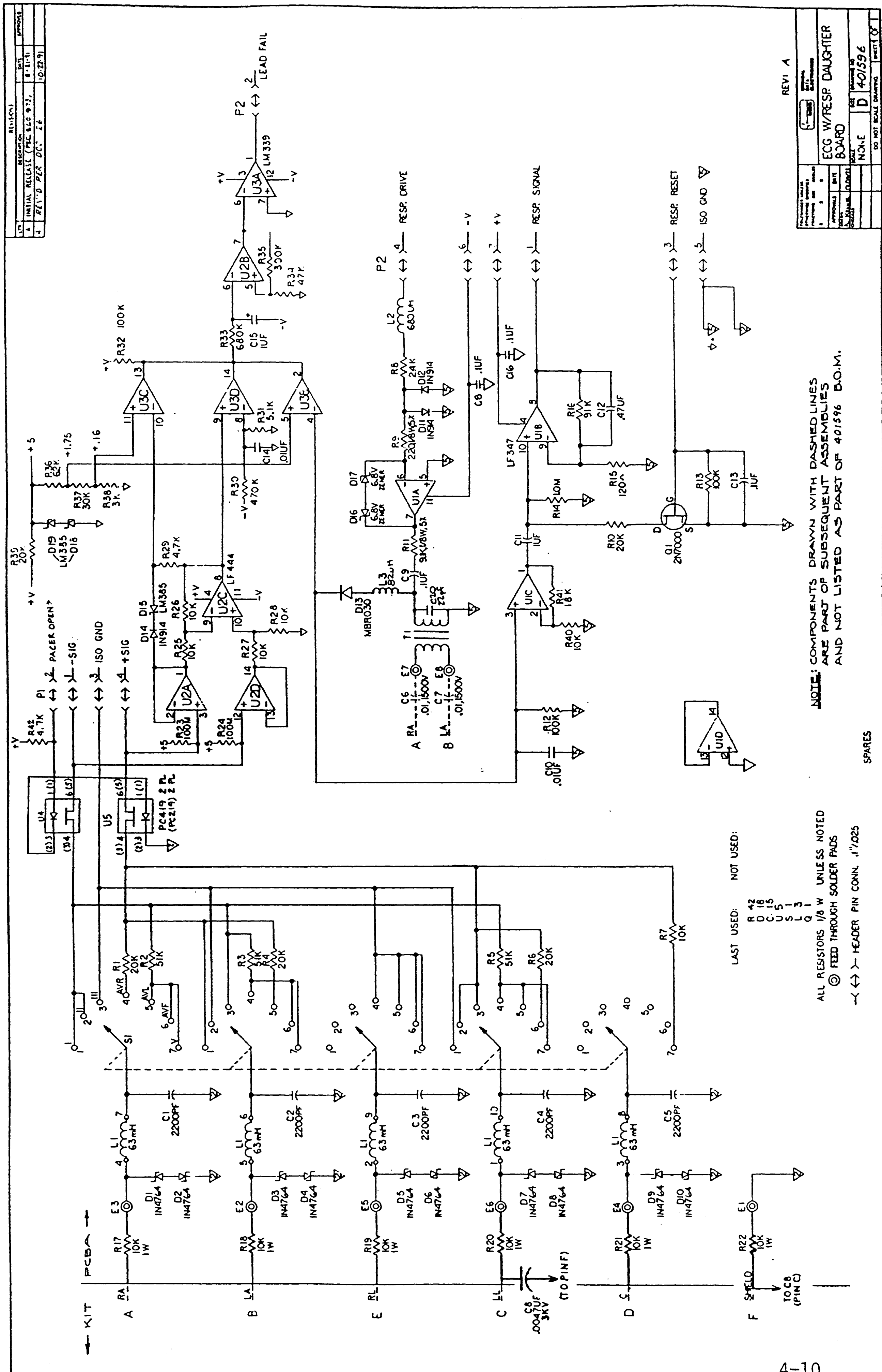
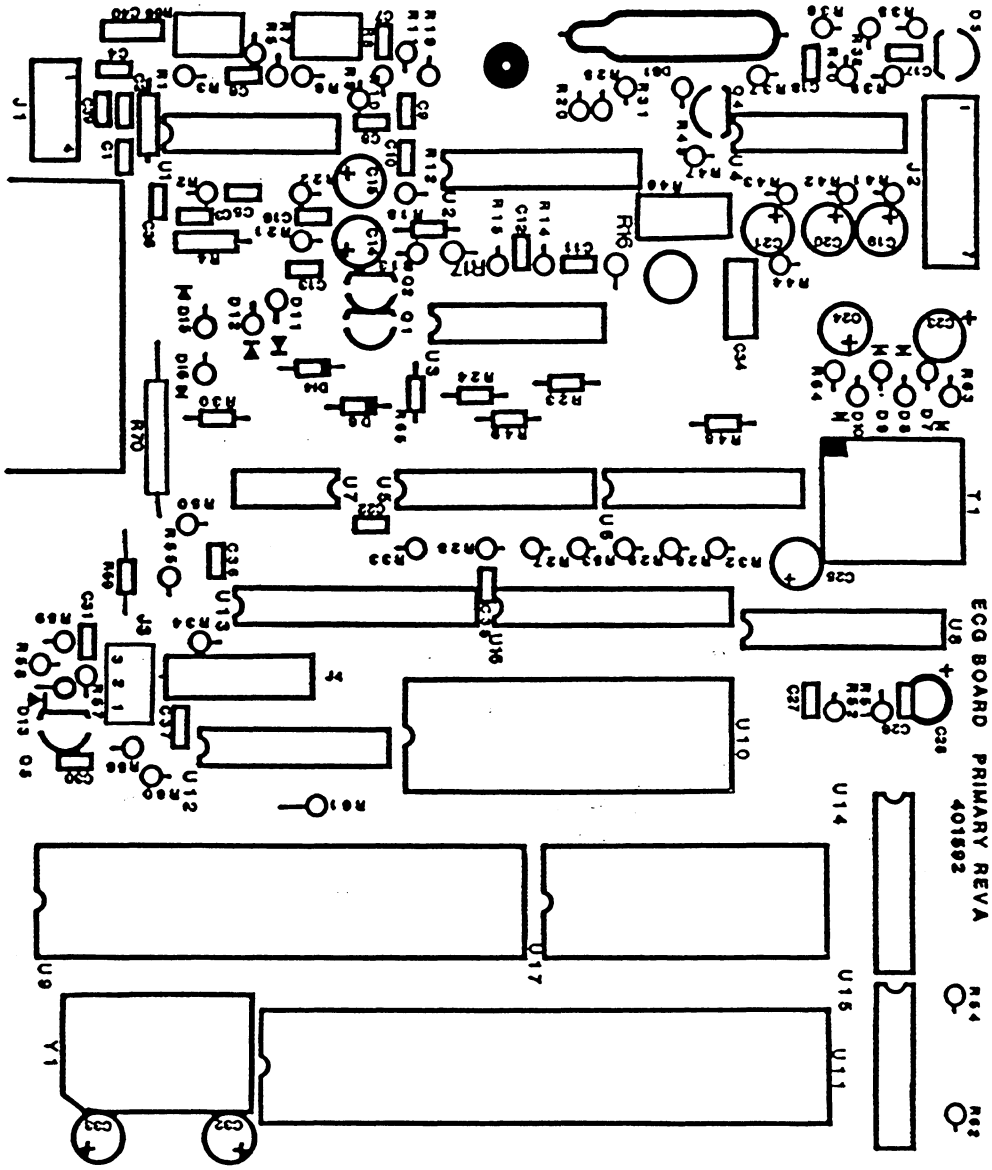
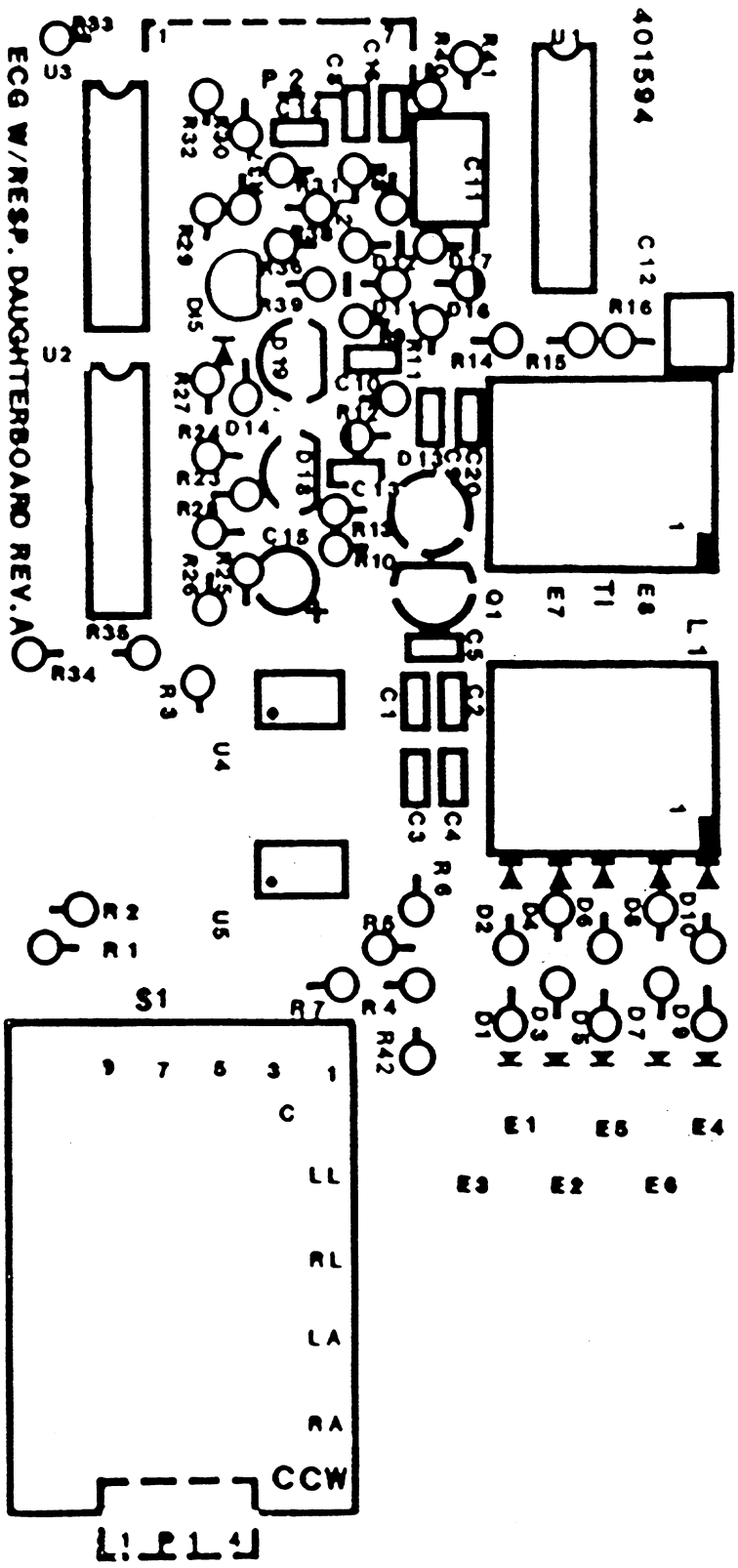
D
401593-1000
DO NOT SCALE DRAWING
SHEET 1 OF 2


SEE SHEET 1
U9 84C00 (Z-80)
U10 27C256 (EPROM)
U11 MS6132
U12 HC138
U13 HC 240
U14 HC32
U15 HC32
U16 HC374
U17 82C54 (CTC)
Y1 4MHz
R54 10K
R55 100K
R56 100K
R57 220
R58 330K
R59 27K
R60 10K
R61 10K
R62 10K
C30 .1
C31 .1
C32 10UF
C33 10UF
C35 .1
C36 .1
C37 .1
Q5 2N7000
D13 6.8V
TIME TIC
900 uS
SAMPLE
SAMPLE RST
FLAG
KNIFE SEL.
RESP. SEL.
RESP. RST
PACE ENABLE
BASELINE RESET
ECG SELECT
TO LIFEPACK DEFIB PCB
TIP (TO DEFIB)
RING (FROM DEFIB)
SLEEVE
RST OUT
A3
A2
A1
A0
-12V
+5V
DIGITAL GND
TIME TIC
DEFIB SYNC 1
R.S. SYNC.
+15V
ANALOG GND
ECG
NONE
D
401593-1000
DO NOT SCALE DRAWING
SHEET 2 OF 2


ECG W/RESP DAUGHTER BOARD
401596
REV A
NOTE: COMPONENTS DRAWN WITH DASHED LINES ARE PART OF SUBSEQUENT ASSEMBLIES AND NOT LISTED AS PART OF 401596 B.O.M.
ALL RESISTORS 1/8 W UNLESS NOTED
FEED THROUGH SOLDER PADS
HEADER PIN CONN. .1"/.025
LAST USED: R 42 D 18 C 15 U 5 S 1 L 3 Q 1
NOT USED:
SPARES
KIT
PCBA
LEAD FAIL
RESP. DRIVE
RESP. SIGNAL
RESP. RESET
ISO GND
PACER OPEN?
-SIG
+SIG
LF 444
LF 347
LM 339
2N7000
MBR030
LM385
PC419
TO C8 (PIN C)

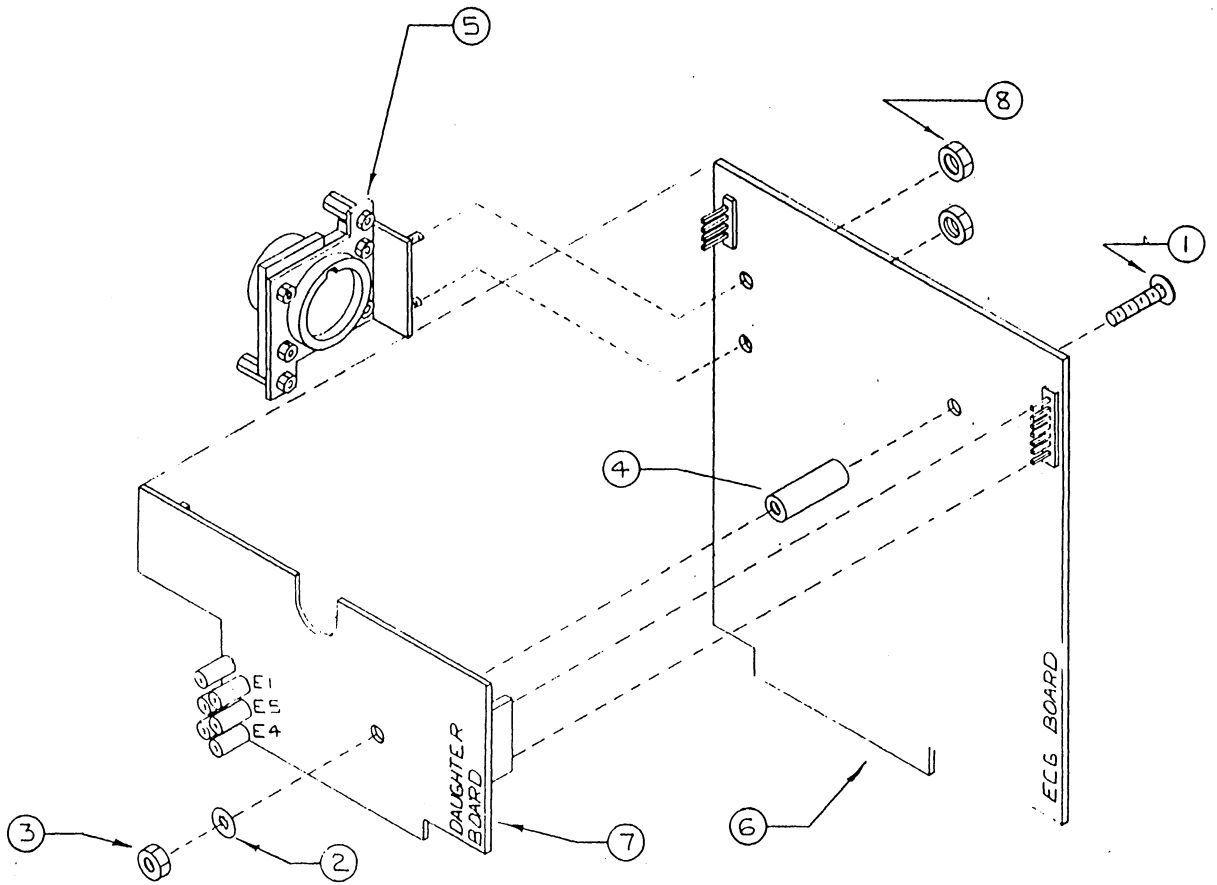


ECG BOARD

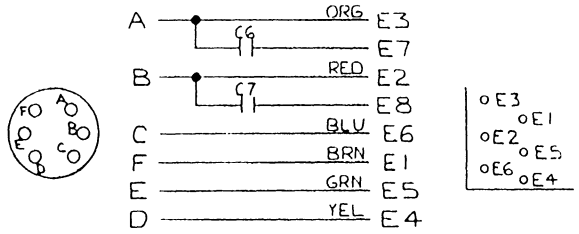


ECG W/RESP.
DAUGHTERBOARD

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	12-	



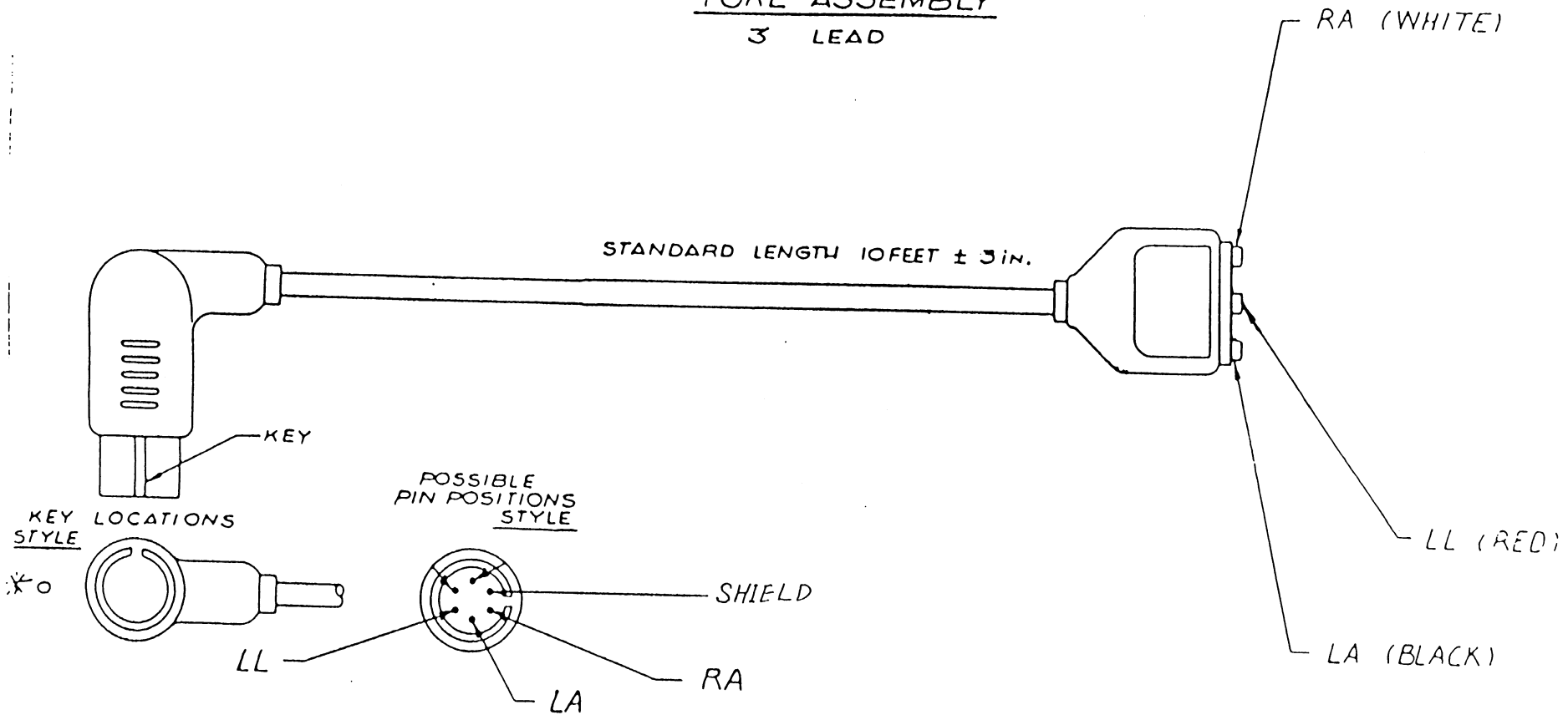
NO	QTY	DESCRIPTION	PART NO.
9			
8	2	4-40 LOCK NUTS	360500-0037
7	1	ECG 5 LD. DGHTR PCBA	SEE NOTE 1
6	1	ECG MOTHER BD ASSY # 2	400608-0000
5	1	ECG BRKT ASSY.	400650-0000
4	1	# 4 ROUND ALU SPACER	360500-0035
3	1	# HEX NUT SM. PATTERN	360500-0021
2	1	# 4 STAR WASHER	358200-0007
1	1	4-40 x 3/4 PHIL SCREW	358100-0022



NOTES:
1. FOR 5 LD ONLY (400584) USE DGHTR BD. ASSY. 400609.
2. FOR 5 LEAD WITH RESP (400585) USE DGHTR BD. 400610.
3. C6 AND C7 USED ON 400585-0000 (RESP) ONLY.

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DEC ANGLES		MDE MEDICAL DATA ELECTRONICS	
APPROVALS	DATE	ECG 5 LD. WITH OR WITH OUT RESP OPT. ASSY.	
DRAWN A. KRAUSE	12-22-87		
CHECKED		SCALE FULL	SIZE C
		DRAWING NO. 400584-0000 400585-0000	
		DO NOT SCALE DRAWING	SHEET 1 of 1

YOKE ASSEMBLY
3 LEAD



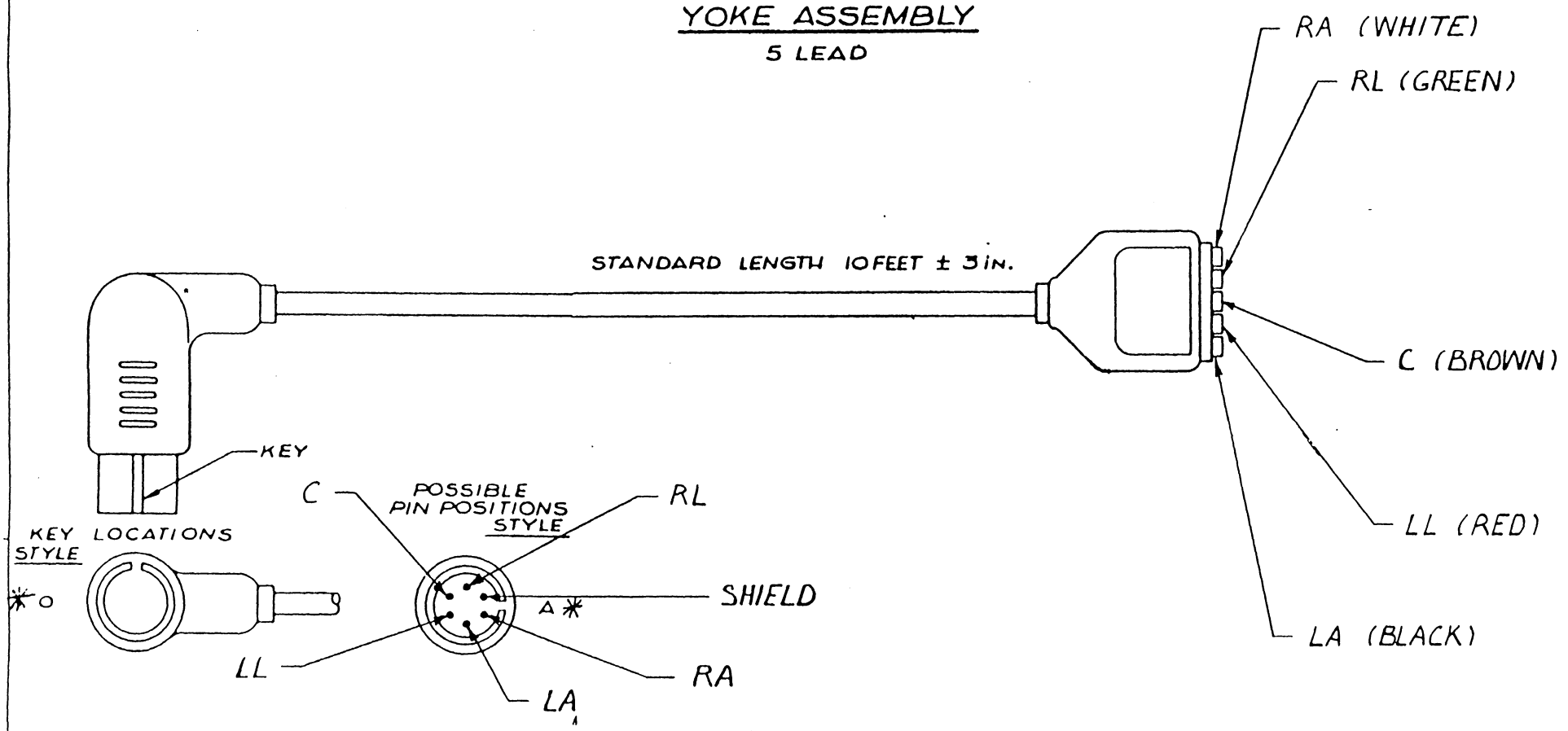
ASSEMBLY MAY BE GAS STERILIZED.
LEAD RETAINER WITH BEDSHEET CLIP
IS P/N K-2148.
UNLESS OTHERWISE NOTED, STANDARD
COLOR OF ASSEMBLY IS GRAY.

MOLD NO. T-102
SHEET 5 A
4-79-A

MOLD NO T-103-5
SHEET 2
4-79-A

YOKE ASSEMBLY

5 LEAD



ASSEMBLY MAY BE GAS STERILIZED.
LEAD RETAINER WITH BEDSHEET CLIP
IS P/N K-2148.
UNLESS OTHERWISE NOTED, STANDARD
COLOR OF ASSEMBLY IS GRAY.

MOLD NO. T-102
SHEET 5A
4-79-A

MOLD NO. T-103-5
SHEET 2
4-79-A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

RESP.CAPS	H.P.CONN.	E II DAUGHTER BD.	(REF)
	H GRN/WHT		LL
	F BROWN		C
	J BLUE		RL
X	A ORANGE		RA
X	B RED		LA
	D YELLOW		SHIELD

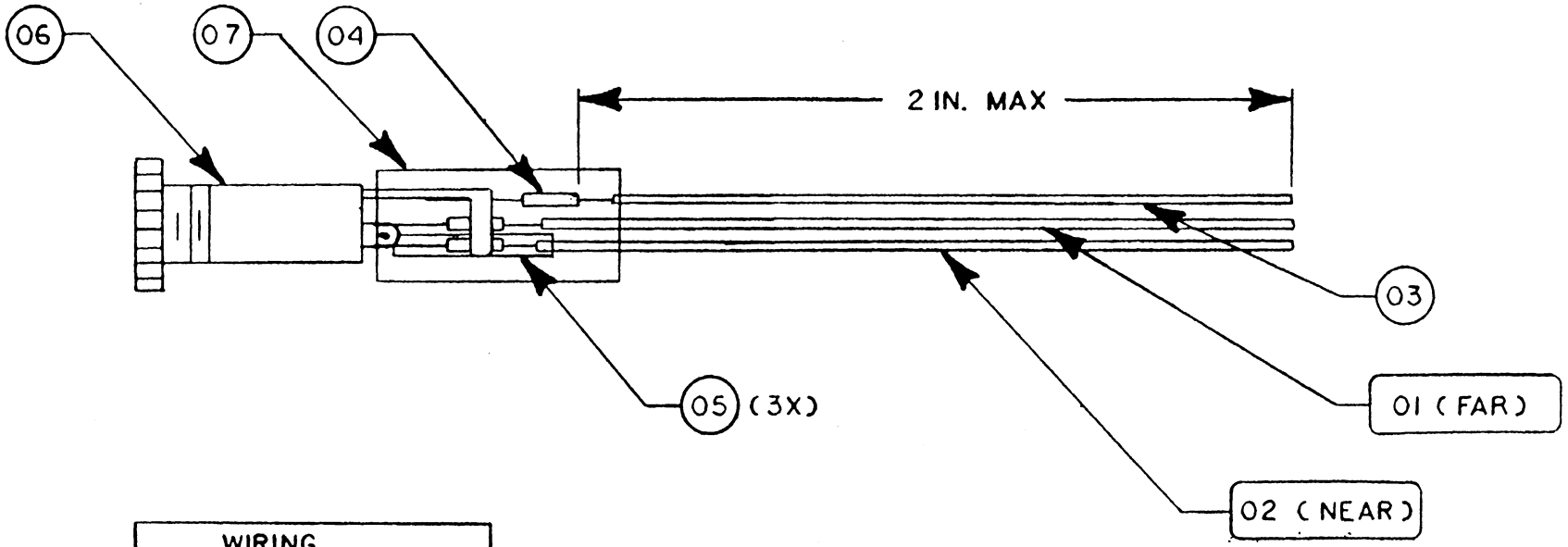
TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DEC ANGLES ± ± ±	MDE MEDICAL DATA ELECTRONICS		
	H.P. ECG WIRING CLOVER FOR ESCORT II		
APPROVALS / DATE	SCALE	SIZE	DRAWING NO.
DRAWN E DAVIS 10/26/88	NONE	A	
CHECKED	DO NOT SCALE DRAWING		SHEET 1 OF 1

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

RESPCAPS	MERLIN H.P.CONN	E II DAUGHTER BD.	(REF)
	6 GRN/WHT		LL
	5 BROWN		C
	2 BLUE		RL
X	1 ORANGE		RA
X	7 RED		LA
	C YELLOW		SHIELD

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DEC ANGLES ± ± ±	MDE MEDICAL DATA ELECTRONICS		
APPROVALS	DATE	H.P. MERLIN ECG WIRING FOR ESCORT II	
DRAWN E DAVIS	2/10/89		
CHECKED		SCALE NONE	SIZE A
		DRAWING NO.	
		DO NOT SCALE DRAWING	SHEET

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	2-10-89	
B	ECO 393 REDRAWN	2-22-89	



WIRING
PIN 1 BROWN
PIN 2 RED
PIN 3 ORANGE

4-18

REV: B

NO.	QTY.	DESCRIPTION	PART NO.
07	1	1/4" DIA. HT. SHRINK 1/2" LENGTH	385000-0005A
06	1	CONN. MINI STEREO	354000-0144A
05	3	1/16" SHRINK TUBING 1/2" LENGTH	385000-0003A
04	3	RESISTOR 1K, 1/4W, 5%	370100-0102A
03	1	WIRE ORANGE 24GA STRD. 1.5"	399100-0003A
02	1	WIRE RED 24GA STRD. 1.5"	399100-0002A
01	1	WIRE BROWN 24 GA STRD 1.5"	399100-0001A

TOLERANCES UNLESS OTHERWISE SPECIFIED
FRACTIONS DEC ANGLES
± ± ±

APPROVALS	DATE
DRAWN A. KRAUSE	2-22-89
CHECKED	

MDE MEDICAL DATA ELECTRONICS

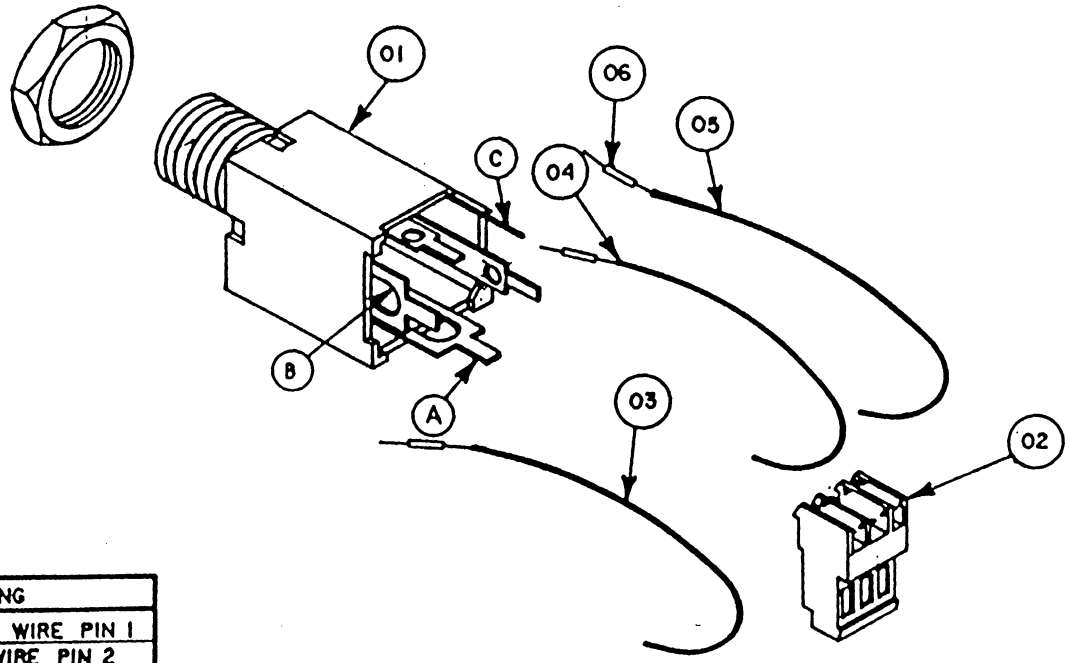
DEFIB SYNC CONNECTOR HARNESS ASSY.

SCALE	SIZE	DRAWING NO.
2X	A	400903-0000

DO NOT SCALE DRAWING

SHEET 1 OF 1

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	11/18/88	
B	ECO 377	2/10/89	
C	ECO 391	2/21/89	



WIRING
A - RING BROWN WIRE PIN 1
B - TIP RED WIRE PIN 2
C - GND ORANGE WIRE PIN 3

REV: C

NO.	QTY.	DESCRIPTION	PART NO.
06	3	RESISTOR 1K, 1/4W, 5 %	370100-0102A
05	1	WIRE ORANGE 24GA STRD. HOOKUP PVC	399100-0003A
04	1	WIRE RED 24GA STRD. HOOKUP PVC.	399100-0002A
03	1	WIRE BROWN 24GA STRD. HOOKUP PVC.	399100-0001A
02	1	CONN. 3-P.F 24GA INS. DISP. MASS TERM.	354000-0087A
01	1	CONNECTOR, 1/4 JACK, F. (DEFIB SYNC)	354000-0179A

TOLERANCES UNLESS OTHERWISE SPECIFIED
FRACTIONS DEC ANGLES
± ± °

APPROVALS	DATE
E. DAVIS	12/9/88
CHECKED	

MEDICAL DATA ELECTRONICS

H.P. SYNC CONNECTOR HARNESS ASSEMBLY

SCALE 2/1 | SIZE B | DRAWING NO. 400828-0000

DO NOT SCALE DRAWING | SHEET 1 OF 1

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing	Rev	LT
401596-0000	PCBA, ECG W/RESP 5LD DAUGHTER REV. A1 (D126)			A				A1	22

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
401594-0000	*1	1	PCB, ECG 5LD DAUGHTER REV A . A (E973)		R	22	1.000	EA		Yes		
354000-0142A	*1	2	CONN, 7 SKT STRP,.1 SKT SP,.335 HT		R	22	1.000	EA		Yes		
354000-0143A	*1	3	CONN, 4 SKT STRP,.1 SKT SP,.335 HT.		R	22	1.000	EA		Yes		
370101-0103A	*1	4	RES, 10K,1/8W,5%,CF		R	11	6.000	EA	R7,25,26,27,28,40	Yes		
370101-0203A	*1	5	RES, 20K,1/8W,5%,CF		R	11	5.000	EA	R1,4,6,10,39	Yes		
370101-0513A	*1	6	RES, 51K,1/8W,5%,CF		R	11	3.000	EA	R2,3,5	Yes		
370402-0103A	*1	7	RES, 10K,1/2W,5%,CC (ALL N BRDLY ONLY)*BULK ONLY*		R	22	6.000	EA	R17-22	Yes		
100000	*1	8	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	ABOVE ALL MATCHED 1%	Yes		
378000-0054A	*1	9	DIO, 1N4764,100V,ZENER		R	22	10.000	EA	D1-10	Yes		
352100-0104A	*1	10	CAP, .1UF,50V,10%,RAD,X7R		R	11	3.000	EA	C13,8,16	Yes		
380000-0017A	*1	11	SW, MINI,PCB MOUNT,5 POLE ,7-POS		R	44	1.000	EA	S1	Yes		
352300-0222A	*1	12	CAP, 2200PF,50V OR 100V,1%,MYLAR,.15L.S.		R	77	5.000	EA	C1-5	Yes		
400554-0000	*1	13	IDCTR, MULTI ESCORT II, REV. 'B' **(FIFO)**		R	22	1.000	EA	L1	Yes		
360600-0016A	*1	14	LUG, 1/4,INT TOOTH,13/16 INCH LENGTH		R	11	1.000	EA		Yes		
400738-0000	*1	15	5-LEAD SHIELD, REV. 'B', GOLD IRRID.FINISH		R	22	1.000	EA		Yes		
352300-0104A	*1	16	CAP, .1UF,50V,20%,RAD,MYLAR		R	22	1.000	EA	C9	Yes		
352300-0103A	*1	17	CAP, .01UF,50V,20%,RAD,MYLAR		R	22	2.000	EA	C10,14	Yes		
352301-0105A	*1	18	CAP, 1UF,63V,20%,MYLAR		R	66	1.000	EA	C11	Yes		
352600-0019A	*1	19	CAP, .01UF,1000V,20%,Z5U, CER DISC,.4 L.S.		R	11	2.000	EA	C6,7	Yes		
364000-0135A	*1	20	IC, LF347, SCREENED TO +/-1.5mV OFFSET & LOW NOISE		A	22	1.000	EA	U1	Yes		
370101-0121A	*1	21	RES, 120,1/8W,5%,CF		R	11	1.000	EA	R15	Yes		
370101-0104A	*1	22	RES, 100K,1/8W,5%,CF		R	11	3.000	EA	R12,13,32	Yes		
364000-0132A	*1	23	IC, LF444 NATIONAL ONLY		R	22	1.000	EA	U2	Yes		
370101-0242A	*1	24	RES, 2.4K,1/8W,5%,CF		R	11	1.000	EA	R8	Yes		

Assembly	Description	Group	PFC	Commodity Class	Planner Buyer	Drawing	Rev	LT
401596-0000	PCBA, ECG W/RESP 5LD DAUGHTER REV. A1 (D126)			A			A1	22

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
370101-0221A	*1	25	RES, 220,1/8W,5%,CF		R	11	1.000	EA	R9	Yes		
370101-0105A	*1	26	RES, 1M,1/8W,5%,CF		R	11	1.000	EA	R14	Yes		
370101-0912A	*1	27	RES, 9.1K,1/8W,5%,CF		R	11	1.000	EA	R11	Yes		
376000-0019A	*1	28	XSTR, 2N7000,FET		R	11	1.000	EA	Q1	Yes		
378000-0005A	*1	29	DIO, 1N914,SIGNAL T&R		R	11	3.000	EA	D11,12,14	Yes		
378000-0009A	*1	30	DIO, 1N754A,6.8V,ZENER T&R ***MOT ONLY***		R	11	2.000	EA	D16,17	Yes		
400553-0000	*1	31	XFMR, ESC. II RESP DRIVE REV. A **(FIFO)**		R	22	1.000	EA	T1	Yes		
352300-0474A	*1	32	CAP, .47UF, 50V,20%,RAD,MYLAR(METALLIZED POLYESTR)		R	22	1.000	EA	C12	Yes		
365000-0014A	*1	33	SKT, 14-POS,DIP,TIN PLATE,L.P.		R	11	1.000	EA	U1	Yes		
370101-0913A	*1	34	RES, 91K,1/8W,5%,CF		R	22	1.000	EA	R16	Yes		
378000-0037A	*1	35	DIO, MBR030,SCHOTTKY RCTFR		R	11	1.000	EA	D13	Yes		
382200-0015A	*1	36	CHOKE, 680 UH		R	11	1.000	EA	L2	Yes		
384000-0047A	*1	37	BUMPERS, .125 INCH, BLACK		R	22	1.000	EA		Yes		
352400-0105A	*1	38	CAP, 1UF,50V,20%,RAD,TANT, MAX: HT. .28; O.D. .16		R	11	1.000	EA	C15	Yes		
364000-0010A	*1	39	IC, LM339		R	11	1.000	EA	U3	Yes		
378000-0034A	*1	40	DIO, LM385,ZENER (XSTR NATIONAL ONLY)		R	11	3.000	EA	D19,18,15	Yes		
370500-0107A	*1	41	RES, 100M,1/4W,5%,M.O. (OR M.G.)		R	33	2.000	EA	R23,24	Yes		
370101-0183A	*1	42	RES, 18K,1/8W,5%,CF		R	11	1.000	EA	R41	Yes		
370101-0302A	*1	43	RES, 3K,1/8W,5%,CF		R	11	1.000	EA	R38	Yes		
370101-0303A	*1	44	RES, 30K,1/8W,5%,CF		R	11	1.000	EA	R37	Yes		
370101-0304A	*1	45	RES, 300K,1/8W,5%,CF		R	11	1.000	EA	R35	Yes		
370101-0472A	*1	46	RES, 4.7K,1/8W,5%,CF		R	11	1.000	EA	R29	Yes		
370101-0473A	*1	47	RES, 47K,1/8W,5%,CF		R	11	1.000	EA	R34	Yes		
370101-0474A	*1	48	RES, 470K,1/8W,5%,CF		R	11	1.000	EA	R30	Yes		

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing	Rev	LT
401596-0000	PCBA, ECG W/RESP 5LD DAUGHTER REV. A1 (D126)			A				A1	22

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
370101-0512A	*1	49	RES, 5.1K,1/8W,5%,CF		R	11	1.000	EA	R31	Yes		
370101-0623A	*1	50	RES, 62K,1/8W,5%,CF		R	11	1.000	EA	R36	Yes		
370101-0684A	*1	51	RES, 680K,1/8W,5%,CF		R	11	1.000	EA	R33	Yes		
382200-0027A	*1	52	IDCTR, 82uH,SHIELDED,ISOLATED		R	22	1.000	EA	L3 IN SERIES WITH D13	Yes		
352100-0220A	*1	53	CAP, 22PF,50V,10%,RAD,NPO EDPT		R	22	1.000	EA	ACROSS PRIMARY OF T1	Yes		
352100-0220A	*1	54	CAP, 22PF,50V,10%,RAD,NPO EDPT		R	22	0.000	EA	FLY ON SOLDER SIDE	Yes		
100000	*1	55	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	FOR ASSEMBLY	Yes		
100000	*1	56	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	FOR RESISTORS CHECK	Yes		
100000	*1	57	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	BIN - FILL IF REQUIRE	Yes		
352101-0472A	*1	58	CAP, 4700PF,20%,3KV, Z5U, CERAMIC DISC (5000PF OK)		R	22	1.000	EA	C17	Yes		
364000-0175A	*1	59	IC, PC219,PHOTOCOUPLER,MINI-FLAT PKG.		R	22	2.000	EA	U4-5	Yes		
370100-0472A	*1	60	RES, 4.7K,1/4W,5%,CF		R	11	1.000	EA	R42	Yes		
900000	*1	99	ASSEMBLY LABOR & BURDEN		L	0	0.910	HR		Yes		

Cumulative Lead Time for 401596-0000 = 99

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing	Rev	LT
401593-0000	PCBA, ECG 5LD MOTHER REV. D (E1074)			A				D	22

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
401592-0000	*1	1	PCB, ECG 5LD MOTHER REV. A (E973)		R	22	1.000	EA		Yes		
352300-0102A	*1	2	CAP, 1000PF,50V,20%,RAD,MYLAR		R	66	1.000	EA	C18	Yes		
352300-0103A	*1	3	CAP, .01UF,50V,20%,RAD,MYLAR		R	22	2.000	EA	C17,22	Yes		
352300-0104A	*1	4	CAP, .1UF,50V,20%,RAD,MYLAR		R	22	6.000	EA	C5,6,30,36,37,31	Yes		
352301-0104A	*1	5	CAP, .1UF,5%,MYLAR		R	66	1.000	EA	C10	Yes		
354000-0084A	*1	6	CONN, 3-P,M,STRT LCK,.1 CTR		R	11	1.000	EA	J3	Yes		
352100-0471A	*1	7	CAP, 470PF,25V,10%,RAD,X7R		R	22	1.000	EA	C11	Yes		
352300-0007A	*1	8	CAP, .001UF,10%, MYLAR		R	66	2.000	EA	C26,27	Yes		
352100-0223A	*1	9	CAP, .022UF,50V,10%,RAD,X7R		R	22	1.000	EA	C7	Yes		
352300-0018A	*1	10	CAP, .47UF,10%,MYLAR		R	66	1.000	EA	C13	Yes		
352301-0103A	*1	11	CAP, .01UF,100V,20%,POLYCARB,.2 L.S.		R	66	1.000	EA	C34	Yes		
352401-0106A	*1	12	CAP, 10UF,35V,20%,RAD,TANT		R	11	6.000	EA	C19,20,21,25,32,33	Yes		
352400-0226A	*1	13	CAP, 22UF,25V,20%,TANT		R	11	2.000	EA	C23,24	Yes		
352401-0476A	*1	14	CAP, 47UF,10V,20%,RAD,TANT (10V ONLY)		R	11	2.000	EA	C14,15	Yes		
354000-0104A	*1	15	CONN, SGL ROW,STRT,SGL PINS,SNAP-AWAY		R	11	4.000	PIN	1 PC. OF 4 PINS	Yes		
354000-0104A	*1	16	CONN, SGL ROW,STRT,SGL PINS,SNAP-AWAY		R	11	7.000	PIN	1 PC. OF 7 PINS	Yes		
356000-0008A	*1	17	REF OSCILLATOR, 4.0MHZ,CMOS HIGH SPEED		R	22	1.000	EA	Y1	Yes		
360500-0048A	*1	18	SPCR, 1/4 X 1/4,SWAGE TYPE		R	11	1.000	EA	DO NOT ISSUE	Yes		
364000-0008A	*1	19	IC, DG212CJ		R	11	1.000	EA	U2	Yes		
364000-0114A	*1	20	IC, TL064 ACN		R	11	1.000	EA	U4	Yes		
364000-0010A	*1	21	IC, LM339		R	11	1.000	EA	U3	Yes		
364000-0027A	*1	22	IC, 74HC32		R	11	2.000	EA	U14,15	Yes		
364000-0029A	*1	23	IC, 74HC138		R	11	1.000	EA	U12	Yes		
364000-0038A	*1	24	IC, 27C256,CMOS,EPROM,200NS		R	11	1.000	EA	U10	Yes		

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing	Rev	LT
401593-0000	PCBA, ECG 5LD MOTHER REV. D (E1074)			A				D	22

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
364000-0132A	*1	25	IC, LF444 NATIONAL ONLY		R	22	1.000	EA	U1	Yes		
364000-0080A	*1	26	IC, TMPZ84C00P (Z80A, CMOS VERSION)		R	11	1.000	EA	U9	Yes		
364000-0091A	*1	27	IC, SG 3525		R	44	1.000	EA	U8	Yes		
364000-0093A	*1	28	IC, ILQ5 QUAD OPTO ISOLATOR		R	22	2.000	EA	U5,6	Yes		
364000-0094A	*1	29	IC, HP2630, OPTO ISOLATOR		R	11	1.000	EA	U7	Yes		
364000-0095A	*1	30	IC, MS6132,DUAL PORT RAM, 8 X 2K,48-PIN (OR MS7132)		R	11	1.000	EA	U11	Yes		
364000-0096A	*1	31	IC, 74HC240		R	11	1.000	EA	U13	Yes		
364000-0097A	*1	32	IC, 74HC374		R	11	1.000	EA	U16	Yes		
364000-0098A	*1	33	IC, 82C54,CTC		R	11	1.000	EA	U17	Yes		
370100-0010A	*1	34	RES, 1,1/4W,5%,CF		R	11	2.000	EA	R63,64	Yes		
370100-0101A	*1	35	RES, 100,1/4W,5%,CF		R	11	1.000	EA	R47	Yes		
370100-0102A	*1	36	RES, 1K,1/4W,5%,CF		R	11	4.000	EA	R27-29,32	Yes		
370100-0102A	*1	37	RES, 1K,1/4W,5%,CF		R	11	1.000	EA	R53	Yes		
370100-0103A	*1	38	RES, 10K,1/4W,5%,CF		R	11	6.000	EA	R20,35,54,60-62	Yes		
370100-0104A	*1	39	RES, 100K,1/4W,5%,CF		R	11	2.000	EA	R55,56	Yes		
370100-0121A	*1	40	RES, 120,1/4W,5%,CF		R	11	2.000	EA	R9,10	Yes		
370100-0153A	*1	41	RES, 15K,1/4W,5%,CF		R	11	1.000	EA	R40	Yes		
370100-0204A	*1	43	RES, 200K,1/4W,5%,CF		R	11	1.000	EA	R19	Yes		
370100-0221A	*1	44	RES, 220,1/4W,5%,CF		R	11	2.000	EA	R57,59	Yes		
370100-0222A	*1	45	RES, 2.2K,1/4W,5%,CF		R	11	1.000	EA	R45	Yes		
370100-0334A	*1	46	RES, 330K,1/4W,5%,CF		R	11	1.000	EA	R58	Yes		
370100-0243A	*1	47	RES, 24K,1/4W,5%,CF		R	11	1.000	EA	R15	Yes		
370100-0333A	*1	48	RES, 33K,1/4W,5%,CF		R	11	1.000	EA	R12	Yes		
370100-0622A	*1	49	RES, 6.2K,1/4W,5%,CF		R	11	1.000	EA	R51	Yes		

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing	Rev	LT
401593-0000	PCBA, ECG 5LD MOTHER REV. D (E1074)			A				D	22

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
370100-0473A	*1	50	RES, 47K,1/4W,5%,CF		R	11	3.000	EA	R17,25,31	Yes		
370100-0620A	*1	51	RES, 62,1/4W,5%,CF		R	11	1.000	EA	R11	Yes		
370200-6342A	*1	52	RES, 63.4K,1/4W,1%,MF		R	11	1.000	EA	R7	Yes		
370101-0153A	*1	53	RES, 15K,1/8W,5%,CF		R	11	1.000	EA	R48	Yes		
370101-0104A	*1	54	RES, 100K,1/8W,5%,CF		R	11	3.000	EA	R23,24,34	Yes		
370200-3011A	*1	55	RES, 3.01K,1/4W,1%,MF		R	11	1.000	EA	R1	Yes		
370101-0222A	*1	56	RES, 2.2K,1/8W,5%,CF		R	11	1.000	EA	R18	Yes		
370101-0332A	*1	57	RES, 3.3K,1/8W,5%,CF		R	22	1.000	EA	R49	Yes		
370200-1183A	*1	58	RES, 118K,1/4W,1%,MF		R	11	1.000	EA	R36	Yes		
370200-1210A	*1	59	RES, 121,1/4W,1%,MF		R	11	1.000	EA	R44	Yes		
370200-2002A	*1	60	RES, 20K,1/4W,1%,MF		R	11	1.000	EA	R38	Yes		
370200-3322A	*1	61	RES, 33.2K,1/4W,1%,MF		R	11	1.000	EA	R22	Yes		
370200-4990A	*1	62	RES, 499,1/4W,1%,MF		R	11	2.000	EA	R41,42	Yes		
370200-5492A	*1	63	RES, 54.9K,1/4W,1%,MF		R	11	1.000	EA	R14	Yes		
370200-6812A	*1	64	RES, 68.1K,1/4W,1%,MF		R	11	5.000	EA	R2-6	Yes		
370200-8872A	*1	65	RES, 88.7K,1/4W,1%,MF		R	11	1.000	EA	R39	Yes		
370200-9761A	*1	66	RES, 9.76K,1/4W,1%,MF		R	11	1.000	EA	R43	Yes		
374300-0202A	*1	67	POT, 2K,TRIM,SIDE ADJ,CER MET,3/8 SQR,.15LS		R	11	1.000	EA	R46	Yes		
374401-0103A	*1	68	POT, 10K,TRIMM,MULTI-TURN ,CERMET FILM (860X)		R	11	2.000	EA	R8,66	Yes		
376000-0019A	*1	69	XSTR, 2N7000,FET		R	11	2.000	EA	Q4,5	Yes		
376000-0020A	*1	70	XSTR, J201,FET		R	11	2.000	EA	Q1,2	Yes		
378000-0005A	*1	71	DIO, 1N914,SIGNAL T&R		R	11	6.000	EA	D6,7,8,9,10,14	Yes		
378000-0005A	*1	72	DIO, 1N914,SIGNAL T&R		R	11	2.000	EA	D11,12	Yes		
378000-0034A	*1	73	DIO, LM385,ZENER (XSTR NA TIONAL ONLY)		R	11	1.000	EA	D5	Yes		

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing	Rev	LT
401593-0000	PCBA, ECG 5LD MOTHER REV. D (E1074)			A				D	22

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
400552-0000	*1	75	ESCORT II ISO-TRANSFORMER , REV. 'A' **(FIFO)**		R	22	1.000	EA	T1	Yes		
352100-0003A	*1	76	CAP, 3.3PF,50V,+/-.5PF,RAD,NPO EDPT		R	11	1.000	EA	C16	Yes		
370100-0332A	*1	77	RES, 3.3K,1/4W,5%,CF		R	11	1.000	EA	R13	Yes		
365000-0024A	*1	82	SKT, 24-POS,DIP,TIN PLATE ,L.P.		R	11	1.000	EA		Yes		
365000-0028A	*1	83	SKT, 28-POS,DIP,TIN PLATE ,L.P.		R	11	1.000	EA		Yes		
365000-0040A	*1	84	SKT, 40-POS,DIP,TIN PLATE ,L.P.		R	11	1.000	EA		Yes		
370200-6191A	*1	86	RES, 6.19K, 1/4W 1%, MF		R	11	1.000	EA	R37	Yes		
378000-0009A	*1	87	DIO, 1N754A,6.8V,ZENER T&R ***MOT ONLY***		R	11	1.000	EA	D13	Yes		
370200-1001A	*1	88	RES, 1K,1/4W,1%,MF		R	11	1.000	EA	R21	Yes		
352300-0222A	*1	89	CAP, 2200PF,50V OR 100V,1%,MYLAR,.15L.S.		R	77	1.000	EA	C40	Yes		
370101-0163A	*1	90	RES, 16K,1/8W,5%,CF		R	11	1.000	EA	R30	Yes		
370100-0392A	*1	91	RES, 3.9K,1/4W,5%,CF		R	11	1.000	EA	R50	Yes		
370100-0271A	*1	92	RES, 270,1/4W,5%,CF		R	11	1.000	EA	R26	Yes		
370101-0202A	*1	93	RES, 2K,1/8W,5%,CF		R	11	1.000	EA	R65	Yes		
352101-0471A	*1	95	CAP, 470pF,10%,50V,RAD,NP0		R	22	2.000	EA	C3,4	Yes		
352300-0008A	*1	96	CAP, .01UF,5%,MYLAR		R	66	2.000	EA	C8,9	Yes		
352400-0105A	*1	97	CAP, 1UF,50V,20%,RAD,TANT , MAX: HT. .28; O.D. .16		R	11	1.000	EA	C28	Yes		
370102-0010A	*1	98	RES, 1,1/2W,5%,CF		R	11	1.000	EA	R52	Yes		
900000	*1	99	ASSEMBLY LABOR & BURDEN		L	0	0.990	HR		Yes		
384000-0061A	*1	100	GAS TUBE (SURGE ARRESTER)		R	33	1.000	EA	DS1	Yes		
352100-0104A	*1	101	CAP, .1UF,50V,10%,RAD,X7R		R	11	1.000	EA	C35	Yes		
352100-0220A	*1	102	CAP, 22PF,50V,10%,RAD,NPO EDPT		R	22	4.000	EA	C38,39,1,2	Yes		
352300-0015A	*1	103	CAP, .22UF,10%,MYLAR		R	66	1.000	EA	C12	Yes		
370100-0273A	*1	104	RES, 27K,1/4W,5%,CF		R	11	1.000	EA	R69	Yes		

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing	Rev	LT
401593-0000	PCBA, ECG 5LD MOTHER REV. D (E1074)			A				D	22

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
370401-0108A	*1	105	RES, 1000M,1W,5%,2500V		R	66	1.000	EA	R70	Yes		
378000-0011A	*1	106	DIO, 1N4741A,11V,ZENER T& R ***MOTOROLA ONLY***		R	11	2.000	EA	D15,16	Yes		
365000-0148A	*1	107	SOCKET, 48 PIN DIP		R	22	1.000	EA	U11	Yes		
100000	*1	108	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	FOR ASSEMBLY	No		
100000	*1	109	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	FOR RESISTORS CHECK	No		
100000	*1	110	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	BIN - FILL IF REQUIRE	No		
370100-0511A	*1	111	RES, 510,1/4W,5%,CF		R	11	1.000	EA	R33	Yes		
370200-1402A	*1	112	RES, 14K,1/4W,1%,MF		R	11	1.000	EA	R16	No		

Cumulative Lead Time for 401593-0000 = 99

TEMPERATURE PRESSURE BOARD

CHAPTER 5

5.0.0 TEMPERATURE-PRESSURE BOARD

5.1.0 OVERVIEW

Another optional processor board in the ESCORT 300A is the TEMP-PRESS BOARD. Whether the monitor is configured for temperature or blood pressure, the circuitry to implement the configuration is on the TEMP-PRESS board.

The two main functions of the board are: (1) To detect temperature and display on the screen the value in degrees C or degrees F (selectable by user), and (2) To receive a signal from a pressure transducer, interpret, and reproduce the pressure waveform on the screen, while calculating the mean, systolic and diastolic values. All information is received in analog and converted to a digital format that is stored in RAM on the CPU Board.

The TEMP-PRESS board also provides an excitation voltage of +5VDC for use by the pressure transducer.

As on the ECG Board, an ISOLATION BARRIER is also utilized to protect the patient from line current. The barrier is created by the use of opto couplers. The isolated section has its own power supply to complete the barrier.

5.2.0 ISOLATION SECTION

5.2.1 TEMPERATURE INPUTS

The temperature input connector to the ESCORT 300A is a 1/4 inch stereo phone jack. 700 series temperature probes are used by the ESCORT 300A. There is an option that can provide 400 series temperature probe input. Temperature is detected by measuring the resistance from the probe and interpreting that resistance to a temperature value.

The temperature inputs for T1 at J5 are protected by zener diodes D10 and D11. Capacitors C40, C41 and C44 are for noise reduction. U10 pin 14 is a constant current source of 2.5uA to the temperature probes. The resistance change that occurs in the probe parallels the temperature change. This will produce a voltage across R50 and R51. The signal HALFREF (2.5V) goes to U10 pin 12. R52 is adjusted to offset and to equal U10 pin 12, so only the difference is seen at the output. This difference is equal to the temperature. R50 and R51 will divide the signal to a level that is usable by the multiplexer, creating the signals TPOS1 and TNEG1. These signals go directly to MUX, U11 and U14.

The input circuit for T2 is functionally identical to that of T1.

5.2.2 PRESSURE INPUTS

The pressure inputs are on J3 (BP1) and J2 (BP2). The inputs are protected by zener diodes D14-D18. The +5VDC excitation goes to the transducer through pin 13 on J2 and J3. The +SIG and -SIG are filtered by LC circuits to reduce noise. L1, C19 and C20 filter BP1 and L2, C21 and C22 filter BP2. The filtered signal PPOS1, PNEG1 and PPOS2, PNEG2 also go to MUX, U11 and U14.

5.2.3 MULTIPLEXERS

U11 and U14 are 8 to 1 multiplexers that are addressed by the microprocessor. The address lines E0, E1, and E2 are used by the processor to walk through the inputs one at a time and send the appropriate signal on to the A to D circuit.

Along with temperature and pressure signals, other signals that the processor walks through at the MUX are the GROUND and the REFERENCE VOLTAGE. Information from the ground signal is used by software to determine what ground will look like when it is sent through the A to D circuit, and will use that as a zero reference. The reference voltage generated by metal film resistors R47, R48, and R49 is used by software as a calibration standard, and will adjust all other readings appropriately. R47 is adjusted for a reading of 100mmHg by the monitor when a calibrated 100mmHg is input to it.

5.2.4 ANALOG TO DIGITAL

The positive and negative signals are passed on to the differential amplifier which begins the A to D conversion. As on the ECG Board, a ramp waveform is compared to the signal input; when both are equal, the sample voltage is turned into a digital data point to be used by the digital portion of the board. Here again, reference voltages are used to initiate timing cycles. A 900us time limit is set by the CTC (U5) to retrieve and calculate one data point.

U12 is a high impedance differential amplifier that subtracts and amplifies the input signals. The output at U12 pin 7 has a gain of 770. R30 adjusts to compensate for common mode offset, and to give the circuit more precision.

SAMPLE RST is used to begin a new "fetch datapoint" cycle by driving U13 pins 8 and 11 to -11.7V. As the voltage from U12 pin 8 ramps up, the counter (U5) will start and the square wave (SAMPLE) will go high. The ramp will continue up until its voltage is equal to the signal at U13 pin 9. Since pins 13 and 14 are wired OR'd together, U13 pin 14 will pull the outputs low, completing the square wave and stopping the counter. Q1 is used as a current source to drive the opto-coupler, U17.

5.2.5 EXCITATION VOLTAGE

The excitation voltage provided by the **ESCORT 300A** is +5VDC. D8 and D20 are 2.5V reference diodes that put +5V at U10 pin 5. Q2 is used to give the +5V a higher current capability. VREF becomes + excitation voltage to the transducer.

5.2.6 ISOLATION POWER SUPPLY

Plus and minus voltages for the isolated section of the board are supplied by U15 and T1. PS SYNC drives the pulse width modulator, U15, and synchronizes it with all other supply voltages in the monitor. T1 furnishes isolation to complete the barrier. D4-D7 rectify the AC to DC; L3, L4, C9 and C10 filter out the ripple. +V is equal to +15V and -V is equal to -15V.

5.3.0 NON-ISOLATED

5.3.1 TEMP-PRESS DIGITAL

The digital portion of the TEMP-PRESS board is identical to the ECG Board.

The microprocessor chip is a Z-80 type microprocessor. Y1 clocks U1 at 4MHz. I/O reads and writes (IORD, IOWR) and memory reads and writes (MRD, MWR) are decoded by U8 from the signals at pins 19-22. The TEMP-PRESS data address bus directs information to and from the EPROM, Dual Port RAM, CTC and address decoders. The microprocessor is reset by the CPU Board signal RSTOUT*. WAIT at pin 24 inserts wait cycles to the CPU from the Dual Port RAM. The interrupt on pin 16 will indicate to the microprocessor that 900 microseconds have elapsed since the start of the sampling cycle and will request the processor to terminate this cycle. Pin 17 is the signal TIMETIC* which synchronizes the sampling cycle so that each TIMETIC* denotes getting and decoding one data point.

The EPROM (U2) stores software for the TEMP-PRESS board and is enabled by U4 and the MRD signal.

The Dual Port RAM (U3) is a 2K x 8 bit CMOS RAM MS6132. It provides two ports with separate controls, address and I/O that permit separate access to memory reads and writes. The Dual Port RAM interfaces the CPU board data address bus to the TEMP-PRESS board. U3 is enabled by U4.

U6 and U7 are input and output ports. U7 outputs control signals to the isolated section of the board.

U5 is a Counter Timer Chip. It is programmable with four independent channels for counting and timing functions. It is enabled by IOWR, IORD, and A2, and it is clocked by Y1.

At SAMPLE RST the counter will start counting at the rate of 4MHz and will continue to count for 900 microseconds if it is not stopped before by the ramp voltage equaling the sample voltage in the A to D sample circuit.

5.4.0 SOFTWARE

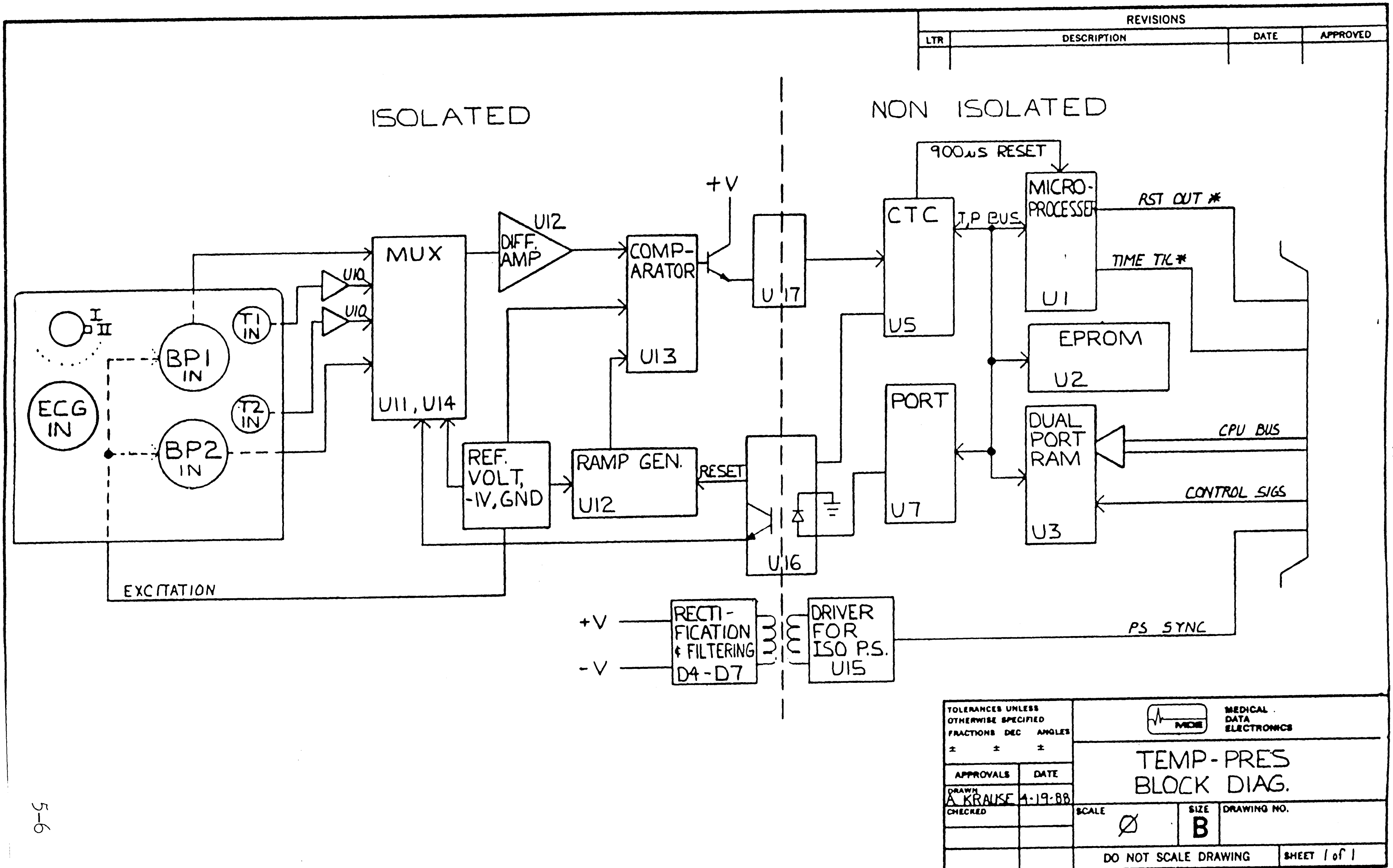
Software for the TEMP-PRESS board is stored in the EPROM, U2.

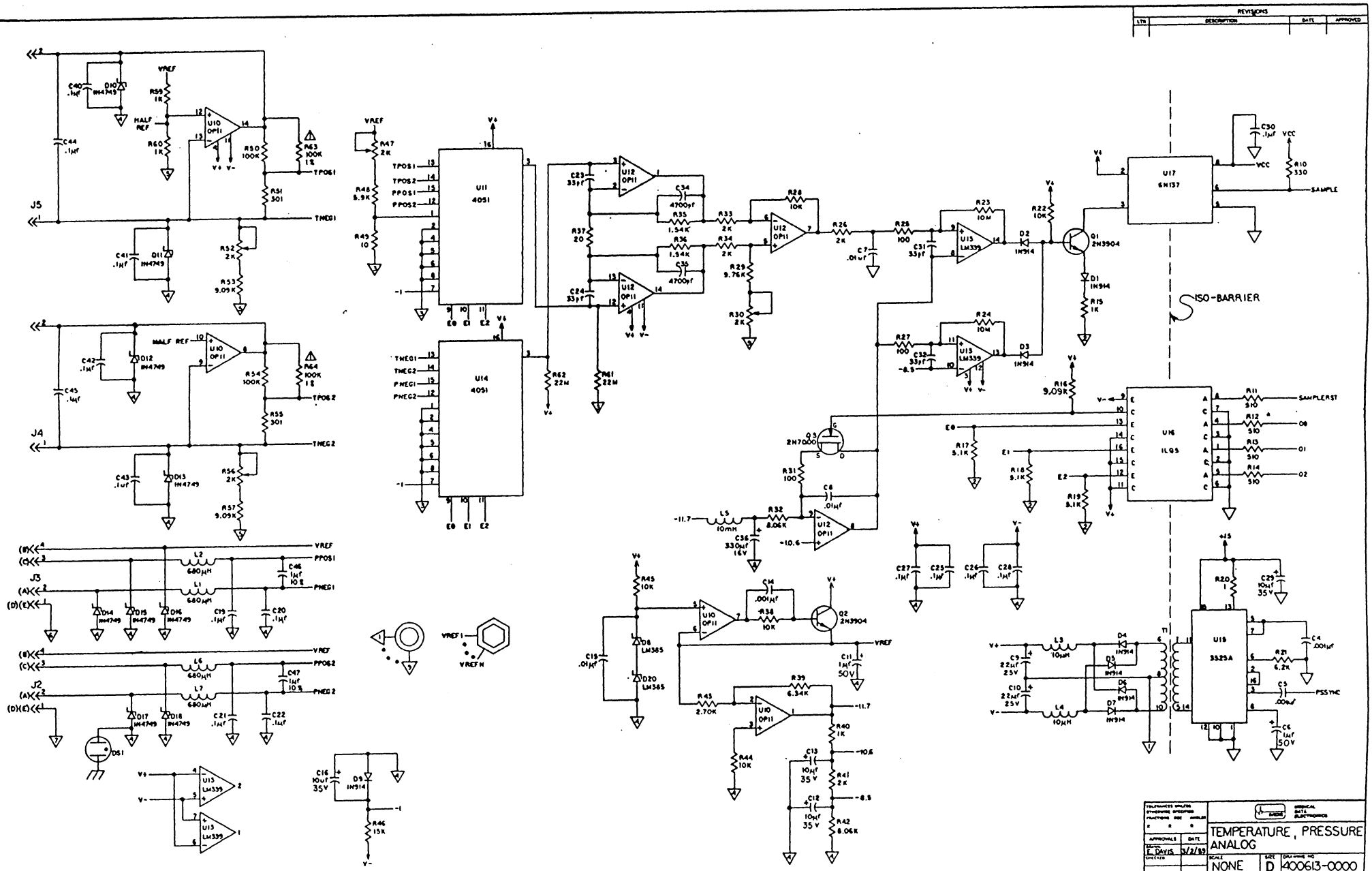
Software tasks:

PRESSURE WAVEFORM	Correction for gain drift and amplification offset Low Pass filter, 15Hz cutoff Correction for transducer offset Final scaling for screen
PRESSURE CALCULATIONS	Mean calculation Heart rate picking Systolic calculation Diastolic calculation
TEMPERATURE CALCULATIONS	Correction for amplification and gain drift Low pass filter Linearization Conversion to degrees F
AUTO CALIBRATION	Compute gain and offset drift correction factors

Partial list of disposable type pressure transducer adapter cables for use with **ESCORT 300A**.

COMPANY NAME	PART NUMBER
Cobe	CDX3 - 041709-012
Baxter Edwards	Super Cable 892019-001
Baxter Edwards (HP)	UNIFLO893208-001
SpectraMed (Gould)	TCVTK 072393-000-013
Sorenson (Abbott Critical Care)	47987-01 or 42655-04-14
Deseret	38-8505-1
Utah Medical	650-208
MEDEX	MX900-03
MECWX (Reusable Disposable)	MX800-03


REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
ISOLATED
NON ISOLATED
900µS RESET
MICRO-PROCESSER
U1
RST OUT *
TIME TIC *
CTC
U5
T,P BUS
EPROM
U2
PORT
U7
DUAL PORT RAM
U3
CPU BUS
CONTROL SIGS
PS SYNC
MUX
U11, U14
U10
U10
DIFF. AMP
U12
COMP-ARATOR
U13
+V
U17
REF. VOLT, -1V, GND
RAMP GEN.
U12
RESET
U16
ECG IN
BP1 IN
BP2 IN
T1 IN
T2 IN
I
II
EXCITATION
+V
-V
RECTI-FICATION & FILTERING
D4-D7
DRIVER FOR ISO P.S.
U15
TOLERANCES UNLESS OTHERWISE SPECIFIED
FRACTIONS DEC ANGLES
± ± ±
APPROVALS
DATE
DRAWN A. KRAUSE
4-19-88
CHECKED
MEDICAL DATA ELECTRONICS
TEMP-PRES BLOCK DIAG.
SCALE
Ø
SIZE
B
DRAWING NO.
DO NOT SCALE DRAWING
SHEET 1 of 1


REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
ISO-BARRIER
TEMPERATURE, PRESSURE ANALOG
NONE
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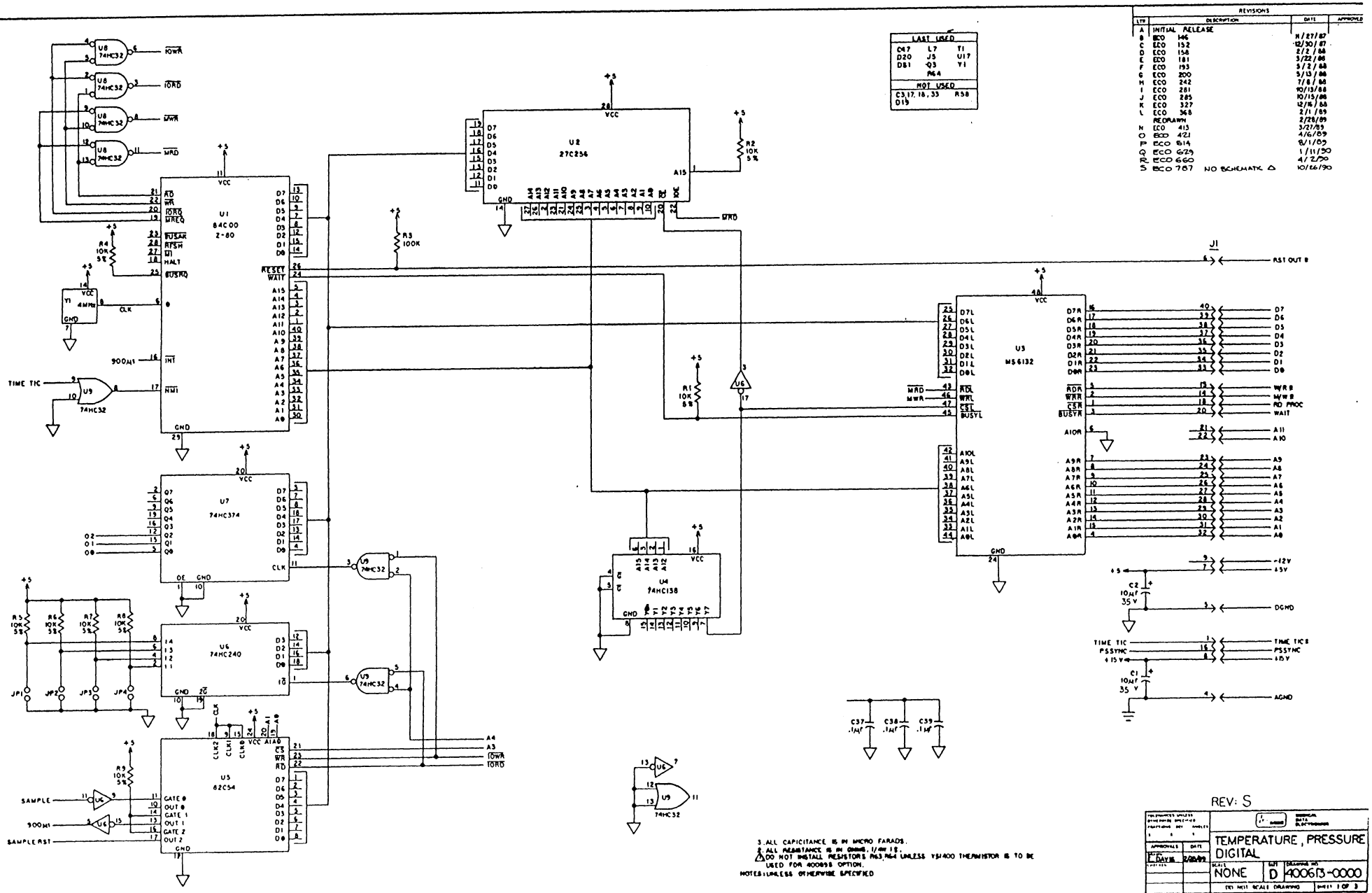
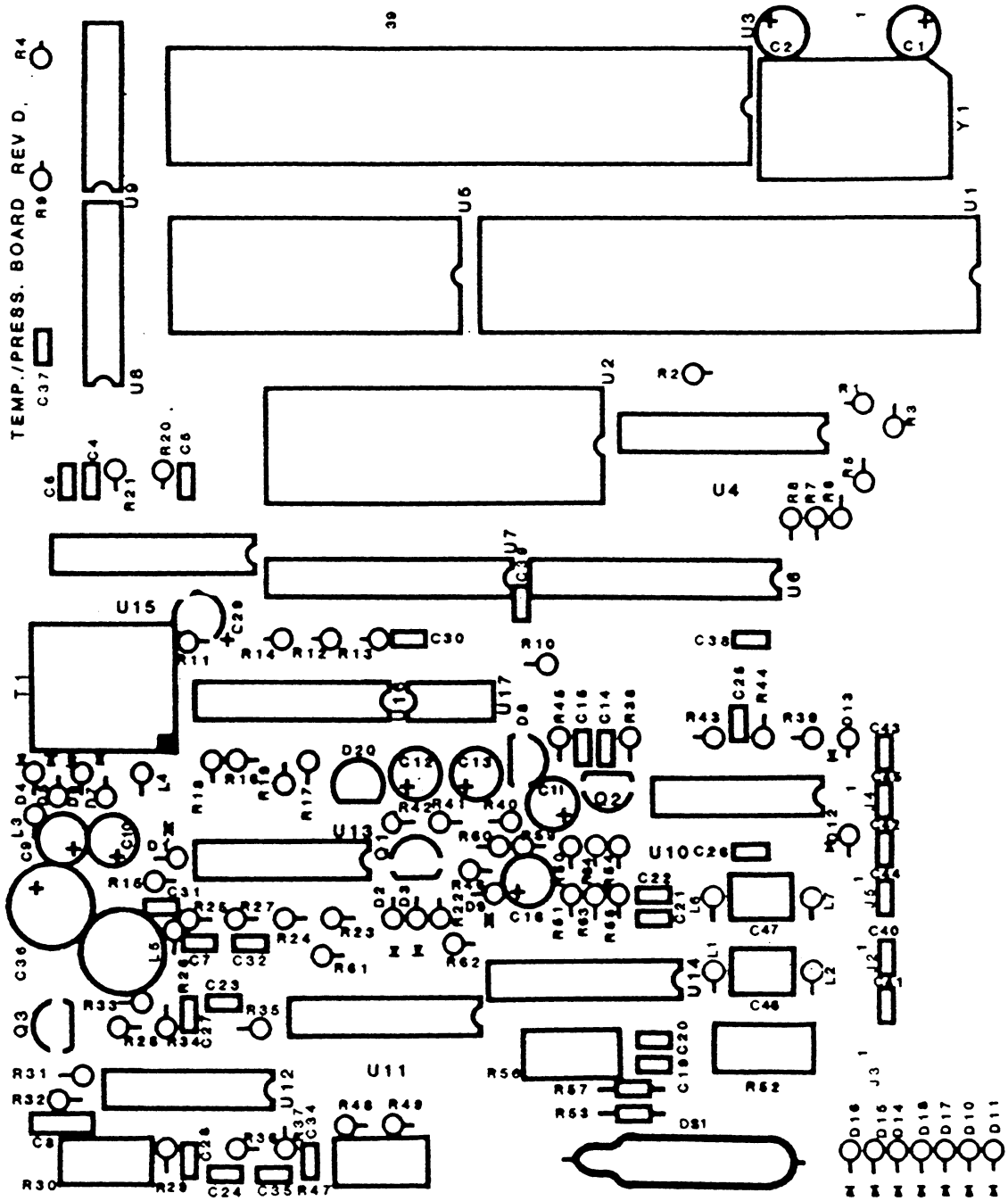
400613-0000
DO NOT SCALE DRAWING
SHEET 2 OF 3
E. DAVIS
3/2/89


REVISIONS
LTR DESCRIPTION DATE APPROVED
A INITIAL RELEASE H/27/87
B ECO 146 12/30/87
C ECO 152 2/2/88
D ECO 156 3/22/88
E ECO 181 5/2/88
F ECO 193 5/13/88
G ECO 200 7/8/88
H ECO 242 10/13/88
I ECO 281 10/15/88
J ECO 285 12/16/88
K ECO 327 2/1/89
L ECO 368 2/28/89
REDRAWN
M ECO 413 3/27/89
O ECO 421 4/6/89
P ECO 614 8/1/89
Q ECO 629 1/11/90
R ECO 660 4/2/90
S ECO 787 NO SCHEMATIC Δ 10/26/90
LAST USED
D47 L7 T1
D20 J5 U17
D81 Q3 Y1
R64
NOT USED
C3,17,18,33 R58
D19
U1 84C00 Z-80
U2 27C256
U3 MS6132
U4 74HC138
U5 82C54
U6 74HC240
U7 74HC374
U8 74HC32
U9 74HC32
Y1 4MHz
J1
RST OUT B
WR B
RD B
RD PROC
WAIT
-12V
+5V
DGND
TIME TIC B
PSSYNC
+15V
AGND
SAMPLE
900Hz
SAMPLE RST
3. ALL CAPACITANCE IS IN MICRO FARADS.
2. ALL RESISTANCE IS IN OHMS, 1/4W 1%.
Δ DO NOT INSTALL RESISTORS R63,R64 UNLESS YSI400 THERMISTOR IS TO BE USED FOR 400898 OPTION.
NOTES: UNLESS OTHERWISE SPECIFIED
REV: S
TEMPERATURE, PRESSURE DIGITAL
SCALE NONE
SIZE D
DRAWING NO. 400613-0000
DO NOT SCALE DRAWING
SHEET 1 OF 3



TEMP/PRESS. BOARD

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
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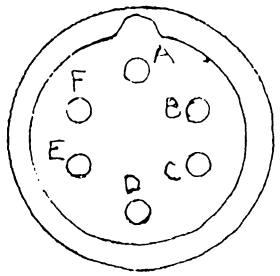
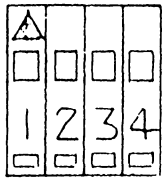
MS 97-3102A14S-6S(639)



REAR VIEW

WIRING



VREF	B	YEL	4	VREF
+	C	ORG	3	+
−	A	RED	2	−
GND	D, E	BRN	1	GND

2.0"

TOLERANCES UNLESS OTHERWISE SPECIFIED		
FRACTIONS	DEC	ANGLES
±	±	±

APPROVALS	DATE
DRAWN A. KRAUSE	12-21-87
CHECKED	

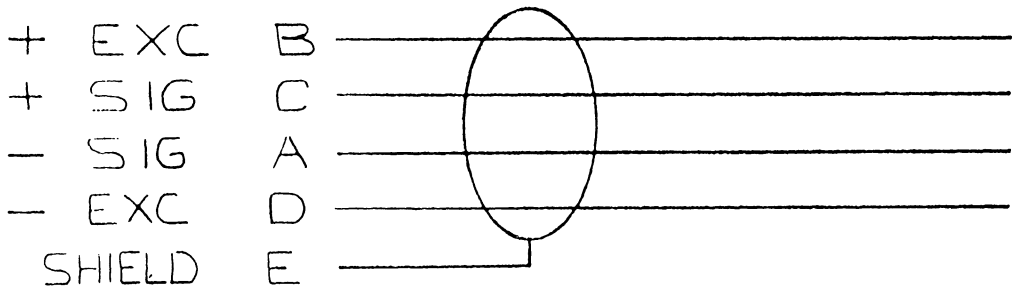
MDE MEDICAL DATA ELECTRONICS

PRESSURE CONN. HARNESS
ESCORT 100/200 SERIES

SCALE	SIZE	DRAWING NO.
∅	A	400698-0000

DO NOT SCALE DRAWING | SHEET 1 of 1

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	1-29-87	

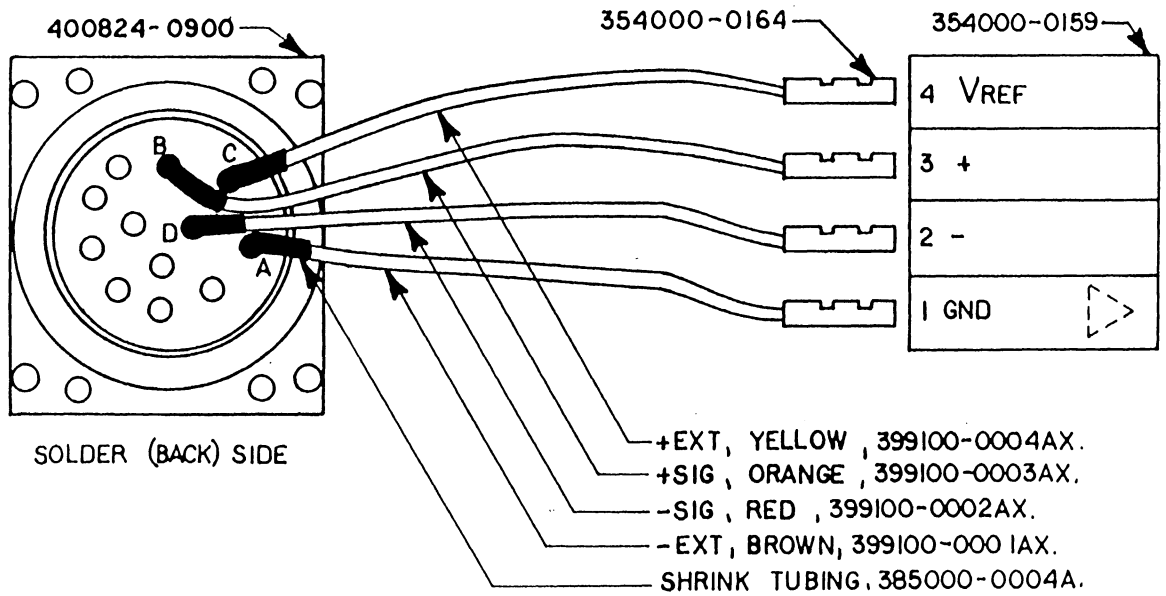


5 uV
TRANSDUCER

CABLE CONNECTOR
IS MS3106E 14S-6P

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DEC ANGLES ± ± ±	MDE MEDICAL DATA ELECTRONICS
APPROVALS / DATE	PRESSURE XDUCER CABLE ESCORT 100 SERIES
DRAWN A. KRAUSE / 1-29-88	
CHECKED	SCALE Ø / SIZE A / DRAWING NO. REFERENCE ONLY
	DO NOT SCALE DRAWING / SHEET 1 of 1

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	11/18/88	



REV:A

NOTES:

2: TRIM OFF NARROW END OF PINS ON NO. 354000-0176.
1: ALL WIRE LENGTHS ARE 2.0 INCHES.

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS ± DEC ± ANGLES ±	MDE MEDICAL DATA ELECTRONICS	
APPROVALS / DATE	H.P. PRESSURE CONN. HARNESS ASSEMBLY	
DRAWN E. DAVIS 10/25/88		
CHECKED	SCALE NONE / SIZE B / DRAWING NO. 400819	
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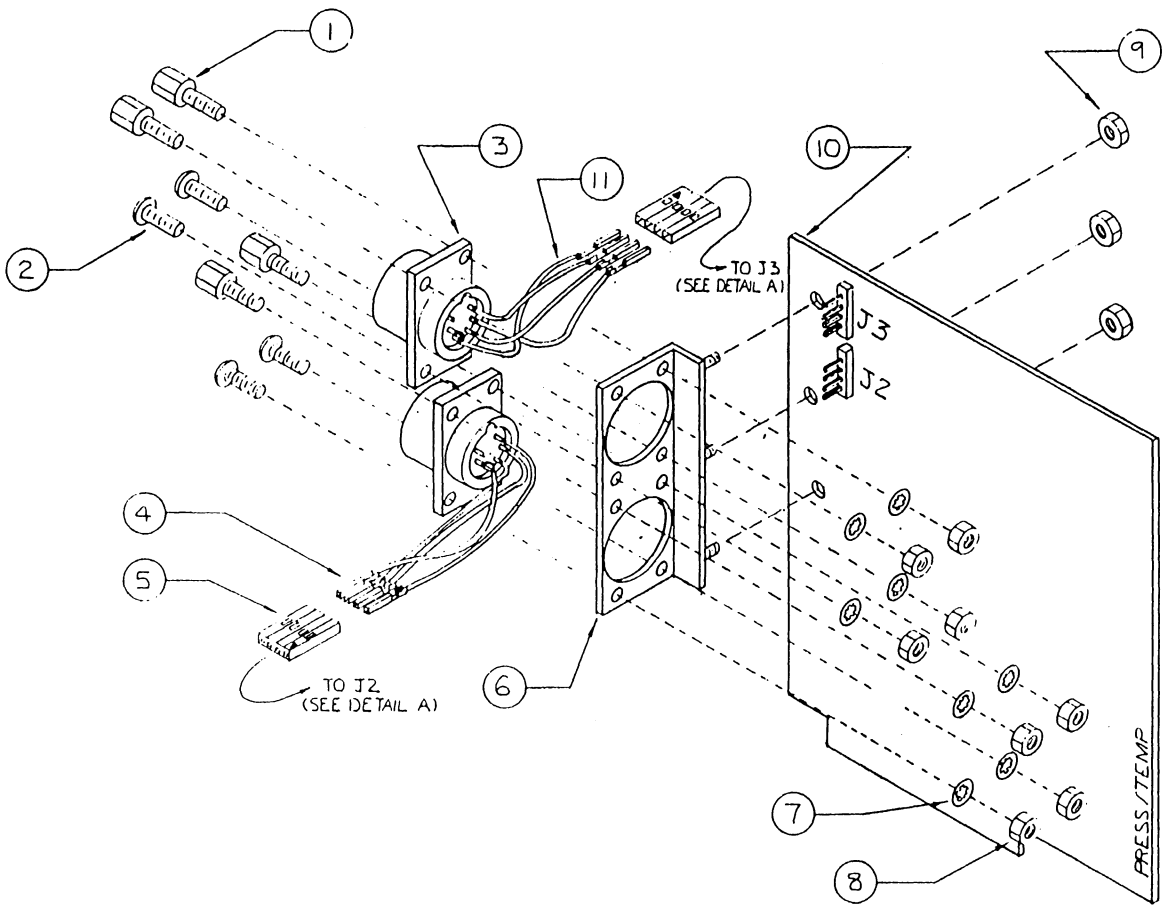
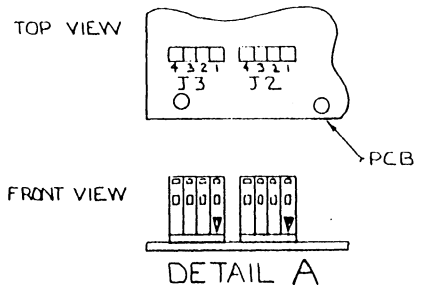
REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	12-14-87	



11	2	WHITE WIRE 24 GA STRANDED	399100-0009
10	1	PRESSURE/TEMP PCBA	400613-0000
9	3	#4 LOCK NUT THIN PATTERN	360500-0043
8	8	HEX NUT 2-56	360500-0020
7	8	#2 STAR WASHER	358200-0020.
6	1	PRESSURE TEMP BRKT.	400578-0000
5	2	CONN. HOUSING 4F	359000-0159
4	8	CRIMP PINS	354000-0160
3	2	PRESSURE CONNECTOR FAB.	400665-0000
2	4	SCREW 2-56 x 3/8 PHILLIP	358100-0044
1	4	STANDOFF. 2-56 X .187	360500-0020
NO.	QTY.	DESCRIPTION	PART NO.



NOTES: 1.

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DEC ANGLES ± ± ±		MEDICAL DATA ELECTRONICS
APPROVALS	DATE	PRESS &/OR TEMP. OPTION ASSY.
DRAWN KRAUSE	12-14-87	
CHECKED		SCALE FULL / SIZE C / DRAWING NO. 400587-0000
		DO NOT SCALE DRAWING / SHEET 1 of 1

Medical Data Electronics
MANUFACTURING BOM WITH LABOR AND PROCESS

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
400613-0000	PCBA, PRESS/TEMP, REV.'S' (E787)			A			

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
400612-0000	*1	1	PCB, PRESSURE/TEMP., REVISION 'F'		R	33	1.0	EA		Yes	
352300-0012A	*1	2	CAP, .01UF,10%,MYLAR		R	77	2.0	EA	C7,15	Yes	
352301-0105A	*1	4	CAP, 1UF,63V,20%,MYLAR		R	22	2.0	EA	C46,47	Yes	
352301-0104A	*1	5	CAP, .1UF,5%,MYLAR		R	66	4.0	EA	C19-22	Yes	
352300-0017A	*1	6	CAP, .0047UF,10%,MYLAR		R	77	2.0	EA	C34,35	Yes	
352101-0330A	*1	7	CAP, 33PF,100V,5%,RAD,NPO		R	22	4.0	EA	C23,24,31,32	Yes	
352201-0337A	*1	8	CAP, 330UF,16V,ELEC,RAD		R	22	1.0	EA	C36	Yes	
352301-0103A	*1	9	CAP, .01UF,100V,20%,POLYCARB,.2 L.S.		R	66	1.0	EA	C8	Yes	
352400-0105A	*1	10	CAP, 1UF,50V,20%,RAD,TANT, MAX: HT. .28; O.D. .16		R	11	2.0	EA	C11,6	Yes	
352401-0106A	*1	11	CAP, 10UF,35V,20%,RAD,TANT		R	11	6.0	EA	C1,2,12,13,16,29	Yes	
352400-0226A	*1	12	CAP, 22UF,25V,20%,TANT		R	11	2.0	EA	C9,10	Yes	
356000-0008A	*1	14	REF OSCILLATOR, CMOS 4.0MHZ,HIGH SPEED		R	22	1.0	EA	Y1	Yes	
364000-0010A	*1	15	IC, LM339		R	11	1.0	EA	U13	Yes	
364000-0027A	*1	16	IC, 74HC32		R	11	2.0	EA	U8,9	Yes	
364000-0029A	*1	17	IC, 74HC138		R	11	1.0	EA	U4	Yes	
364000-0038A	*1	18	IC, 27C256,CMOS,EPROM,200NS		R	11	1.0	EA	U2	Yes	
364000-0040A	*1	19	IC, 4051		R	11	2.0	EA	U11,14	Yes	
364000-0065A	*1	20	IC, OP11FP,OP AMP		R	11	2.0	EA	U10,12	Yes	
364000-0080A	*1	21	IC, TMPZ84C00P (Z80A, CMOS VERSION)		R	11	1.0	EA	U1	Yes	
364000-0091A	*1	22	IC, SG 3525		R	44	1.0	EA	U15	Yes	
364000-0093A	*1	23	IC, ILQ5 QUAD OPTO ISOLATOR		R	11	1.0	EA	U16	Yes	
364000-0095A	*1	24	IC, MS6132,DUAL PORT RAM, 8 X 2K,48-PIN (OR MS7132)		R	11	1.0	EA	U3	Yes	
364000-0096A	*1	25	IC, 74HC240		R	11	1.0	EA	U6	Yes	
364000-0097A	*1	26	IC, 74HC374		R	11	1.0	EA	U7	Yes	
364000-0098A	*1	27	IC, 82C54,CFC		R	11	1.0	EA	U5	Yes	

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
400613-0000	PCBA, PRESS/TEMP, REV.'S' (E787)			A			

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
364000-0099A	*1	28	IC, 6N137		R	11	1.0	EA	U17	Yes	
370100-0010A	*1	29	RES, 1,1/4W,5%,CF		R	11	1.0	EA	R20	Yes	
370100-0101A	*1	30	RES, 100,1/4W,5%,CF		R	11	3.0	EA	R25,27,31	Yes	
370100-0102A	*1	31	RES, 1K,1/4W,5%,CF		R	11	1.0	EA	R15	Yes	
370100-0103A	*1	32	RES, 10K,1/4W,5%,CF		R	11	8.0	EA	R1,2,4-9	Yes	
370100-0103A	*1	33	RES, 10K,1/4W,5%,CF		R	11	3.0	EA	R22,38,45	Yes	
370100-0104A	*1	34	RES, 100K,1/4W,5%,CF		R	11	1.0	EA	R3	Yes	
370100-0106A	*1	35	RES, 10M,1/4W,5%,CF		R	11	2.0	EA	R23,24	Yes	
370100-0153A	*1	36	RES, 15K,1/4W,5%,CF		R	11	1.0	EA	R46	Yes	
370100-0202A	*1	37	RES, 2K,1/4W,5%,CF		R	11	1.0	EA	R26	Yes	
370100-0226A	*1	38	RES, 22M,1/4W,5%,CF		R	11	2.0	EA	R61,62	Yes	
370100-0622A	*1	39	RES, 6.2K,1/4W,5%,CF		R	11	1.0	EA	R21	Yes	
370100-0511A	*1	40	RES, 510,1/4W,5%,CF		R	11	4.0	EA	R11-14	Yes	
370100-0512A	*1	41	RES, 5.1K,1/4W,5%,CF		R	11	3.0	EA	R17-19	Yes	
370100-0331A	*1	42	RES, 330,1/4W,5%,CF		R	11	1.0	EA	R10	Yes	
370200-0200A	*1	43	RES, 20,1/4W,1%,MF		R	11	1.0	EA	R37	Yes	
370200-0100A	*1	44	RES, 10,1/4W,1%,MF		R	11	1.0	EA	R49	Yes	
370200-1001A	*1	45	RES, 1K,1/4W,1%,MF		R	11	3.0	EA	R40,59,60	Yes	
370200-1002A	*1	46	RES, 10K,1/4W,1%,MF		R	11	2.0	EA	R28,44	Yes	
370200-1003A	*1	47	RES, 100K,1/4W,1%,MF		R	11	2.0	EA	R50,54	Yes	
370200-1541A	*1	48	RES, 1.54K,1/4W,1%,MF		R	11	2.0	EA	R35,36	Yes	
370200-3010A	*1	49	RES, 301,1/4W,1%,MF		R	11	2.0	EA	R51,55	Yes	
370200-2001A	*1	50	RES, 2K,1/4W,1%,MF		R	11	3.0	EA	R33,34,41	Yes	
370200-2701A	*1	51	RES, 2.7K,1/4W,1%,MF		R	11	1.0	EA	R43	Yes	
370200-5901A	*1	52	RES, 5.9K,1/4W,1%,MF		R	11	1.0	EA	R48	Yes	

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
400613-0000	PCBA, PRESS/TEMP, REV.'S' (E787)			A			

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
370200-6341A	*1	53	RES, 6.34K,1/4W,1%,MF		R	11	1.0	EA	R39	Yes	
370200-8061A	*1	54	RES, 8.06K,1/4W,1%,MF (8 .05K N/A :OK PER ER)		R	11	2.0	EA	R32,42	Yes	
370200-9091A	*1	55	RES, 9.09K,1/4W,1%,MF		R	11	3.0	EA	R16,53,57	Yes	
370200-9761A	*1	56	RES, 9.76K,1/4W,1%,MF		R	11	1.0	EA	R29	Yes	
374300-0202A	*1	57	POT, 2K,TRIM,SIDE ADJ,CER MET,3/8 SQR,.15LS		R	11	4.0	EA	R30,47,52,56	Yes	
376000-0003A	*1	58	XSTR, 2N3904		R	11	2.0	EA	Q1,2	Yes	
376000-0019A	*1	59	XSTR, 2N7000,FET		R	11	1.0	EA	Q3	Yes	
378000-0005A	*1	60	DIO, 1N914,SIGNAL		R	11	8.0	EA	D1-7,9	Yes	
378000-0012A	*1	61	DIO, 1N4749A,24V,ZENER ** *MOT ONLY***		R	11	5.0	EA	D10-14	Yes	
378000-0012A	*1	62	DIO, 1N4749A,24V,ZENER ** *MOT ONLY***		R	11	4.0	EA	D15-18	Yes	
378000-0034A	*1	63	DIO, LM385,ZENER (XSTR NA TIONAL ONLY)		R	11	2.0	EA	D8,20	Yes	
382200-0005A	*1	64	CHOKE, 10UH,MOLDED		R	11	2.0	EA	L3,4	Yes	
382200-0018A	*1	65	CHOKE, 10,000UH MS75089-35		R	11	1.0	EA	L5	Yes	
382200-0015A	*1	66	CHOKE, 680 UH		R	11	4.0	EA	L1,2,6,7	Yes	
352300-0007A	*1	67	CAP, .001UF,10%, MYLAR		R	66	3.0	EA	C4,5,14	Yes	
365000-0016A	*1	70	SKT, 16-POS,DIP,TIN PLATE ,L.P.		R	11	2.0	EA	U11,14	Yes	
365000-0028A	*1	73	SKT, 28-POS,DIP,TIN PLATE ,L.P.		R	11	1.0	EA	U2	Yes	
360500-0045A	*1	76	SPCR, #6 X 1.437 X 1/4,RO UND		R	22	1.0	EA		Yes	
400552-0000	*1	77	ESCORT II ISO-TRANSFORMER , REV. 'A' **(FIFO)**		R	22	1.0	EA	T1	Yes	
354000-0103A	*1	78	CONN, SGL ROW,STRT,SGL PI NS,SNAP-AWAY		R	11	8.0	PIN	2 PCS. OF 4 PINS EACH	Yes	
354000-0103A	*1	79	CONN, SGL ROW,STRT,SGL PI NS,SNAP-AWAY		R	11	4.0	PIN	2 PCS. OF 2 PINS EACH	Yes	
352300-0104A	*1	80	CAP, .1UF,50V,20%,RAD,MYL AR		R	22	4.0	EA	C30,25,26,27	Yes	
352300-0104A	*1	81	CAP, .1UF,50V,20%,RAD,MYL AR		R	22	5.0	EA	C28,37,38,44,45	Yes	
352300-0104A	*1	82	CAP, .1UF,50V,20%,RAD,MYL AR		R	22	4.0	EA	C40,41,42,43	Yes	
352100-0104A	*1	83	CAP, .1UF,50V,10%,RAD,X7R		R	11	1.0	EA	C39	Yes	

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
400613-0000	PCBA, PRESS/TEMP, REV.'S' (E787)			A			

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
365000-0040A	*1	84	SKT, 40-POS,DIP,TIN PLATE ,L.P.		R	11	1.0	EA	U1	Yes	
365000-0024A	*1	85	SKT, 24-POS,DIP,TIN PLATE ,L.P.		R	11	1.0	EA	U5	Yes	
384000-0061A	*1	86	GAS TUBE (SURGE ARRESTER)		R	33	1.0	EA	DS1	Yes	
365000-0148A	*1	87	SOCKET, 48 PIN DIP		R	22	1.0	EA	U3	Yes	

Cumulative Lead Time for 400613-0000 = 77

NIBP BOARD

CHAPTER 6

6.0.0 NIBP

6.1.0 OVERVIEW

The NIBP option is separated into three major sections: Pneumatic, digital and analog. Included in the pneumatic section are: The pump itself, manifold, valve, check valve, and the interconnecting plumbing. The digital portion includes: EPROM, Dual Port RAM, and other circuitry for processing digital data. The analog section includes: The transducer, fail detect, AC and DC channels, reference voltage generation, A to D conversion, and pump and valve ON/OFF control.

6.1.1 AC/DC CHANNELS

The **ESCORT 300A** uses a two lumen hose to inflate and deflate the cuff. Cuff pressure is sensed through this hose. The DC channel represents actual cuff pressure. The AC element is used to calculate the systolic, mean, and diastolic values.

6.1.2 OVERPRESSURE PROTECTION AND DETECTION

There are three methods of overpressure detection to protect the patient from sustained or excessive cuff inflation. They are: 1) software, 2) hardware and 3) mechanical. The first method is software controlled. The algorithm checks cuff pressure every 4mS looking for a reading of over 240mmHg. If it reads a pressure higher than 240mmHg, the pump and valve will be turned off by the signals PUMP ON and VALVE ON. The cuff is deflated until pressure is below 240mmHg. The monitor will also display the message NIBP ERROR MAX LIMIT on the channel message line. The second method relies on analog hardware. A comparator detects cuff pressure over 275mmHg and turns the pump and valve off by the signal FAIL-INT, deflating the cuff completely. The channel message line will display NIBP FAIL MAX LIMIT. The third method is mechanical. A pressure switch, located in the pneumatics section, senses any pressure over 320mmHg. This switch will interrupt +V to the pump and valve, turning them off and deflating the cuff. No message is associated with this overpressure condition.

6.1.3 BLOOD PRESSURE OR TEMPERATURE OPTIONS

A Daughter Board is installed onto the NIBP option if invasive pressure or temperature options have been selected. The invasive pressure and temperature circuits are functionally identical to the circuits on the Pressure Temperature Board, P/N 400613. Please refer to section 5.0.0 for the Theory of Operation.

6.2.0 INPUT CIRCUIT

The transducer used in the NIBP option uses a +5VDC excitation and has internal amplification for an approximate output of 1V = 100mmHg at pin 2. R11 and R58 are to adjust gain and offset errors for a true reading of 1V = 100mmHg at U2 pin 8. This signal becomes the DC channel and is the input to the AC channel, the low pressure comparator and the high pressure comparator.

6.2.1 AC CHANNEL

The AC channel strips off the DC component with C9 and C18. U4 provides amplification for the AC signal.

BASELINE RESET resets the AC channel quickly in the event the signal is saturated: U7A discharges C9 by bringing U4 pin 8 to ground; U7B discharges C18.

The AC channel then goes into a gain stage that is software controlled. The signals 200N and 400N place R44 and R45 in parallel with R43, selecting one of 4 possible levels for U43.

The next stage biases the signal to half of the A to D converter's full scale. U4A uses a 1.25V reference to scale up the AC channel so the A to D converter can read both negative and positive signals. U10 selects either the AC or DC channel and converts it to a digital format. The A to D converter uses the 2.5 REF signal to set the scale. ADC DONE is a data available signal signifying that the conversion is complete.

6.2.2 VALVE AND PUMP CONTROL

The signal PUMP-ON is gated together with the signals FAIL-INT and RESET to drive Q2. Q2 turns the pump on by grounding its negative lead. The normally open valve is controlled by the signal VALVE ON which is also gated with FAIL-INT and RESET to drive Q1. When VALVE ON is low, the valve is open, releasing air out of the cuff. FAIL-INT or RESET inhibit the valve and pump. FAIL-INT occurs during any failure, and RESET is active during power up.

When cuff pressure exceeds 320mmHg $\pm$15mmHg, the overpressure switch interrupts +Vin, disabling the pump and valve.

6.2.3 FAIL DETECT

U6 and U2 comprise the Fail Detect circuit. U2A compares the DC pressure signal to a 31mmHg reference. The timer, U6, will time out after 5 minutes if not reset by the cuff pressure going below 31mmHg. If the timer does time out, the signal FAIL 5 - MINUTES will

be active. U2 compares 275mmHg with the DC pressure signal for overpressure. If cuff pressure exceeds 275mmHg, the signal FAIL OVER-PRESS will be active. Either signal will produce the FAIL-INT signal, turning off the pump and valve, and will go on to the Digital Section.

6.2.4 REFERENCE VOLTAGE

Reference Voltages are generated from +15V. The 2.5V zener reference diode, U20, generates the signal 2.5 REF. U2 pin 14 generates 5.0 REF. R6 and R7 form a voltage divider for the 1.25 REF signal.

6.3.0 DIGITAL

The digital section processes data and interfaces signals to and from the NIBP analog section, Blood Pressure or Temperature Daughter Boards, and the CPU Board. A Z-80 type microprocessor is clocked by a 4MHz crystal. RST OUT* from the CPU Board resets U11. TIME TIC* coordinates the fetching of data points. The ROM, U15, holds the microprocessor's program. U17 is an address decoder that decodes address BUS data to enable U15 or U18. U18, a dual Port RAM, passes data to and from the CPU Board. U12 and U13 are input and output ports. U12 outputs signals to the NIBP analog and invasive pressure or temperature sections. U13 receives signals from the NIBP analog section. U19 interfaces with the Invasive Pressure or Temperature Daughter Boards. J2 goes to the Daughter Board (Invasive Pressure or Temperature).

6.4.0 CALIBRATION CHECK PROCEDURE

Calibration of the monitor should be checked at least once a month or where there is doubt about the validity of the pressure readings. The test procedure is designed to confirm accuracy of the monitor as well as to diagnose pneumatic leaks.

CAUTION: Calibration tubing should always be kept dry and free of particulate matter. Moisture or foreign substances introduced into the pneumatic system can cause damage to the unit.

To perform a calibration check, follow these steps:

1. Obtain the calibration kit supplied with the unit.

2. Connect a mercury manometer to the monitor using the parts supplied with the calibration kit.

3. Press the NIBP TEST key and select CAL. Press PAGE HOME. The following is displayed in trace 2 message field:

CAL NIBP
CUFF=XXX

4. Open manometer to air and verify the offset CUFF-XXX is between -3 and +10mmHg.

5. Using the inflation bulb, manually pump up the pressure to 100mmHg; monitor should read CUFF-XXX 100mmHg plus offset, ±4mmHg.

6. Using the inflation bulb, manually pump up the pressure to 200mmHg; monitor should read CUFF-XXX 200mmHg plus offset, ±5mmHg.
7. If indicated pressures are not within tolerance, the monitor must be calibrated. Refer to qualified service personnel.

NOTE

The **ESCORT 300A** also includes a backup automatic safety valve which, in the event of system failure, will automatically deflate the cuff if pressure exceeds 320mmHg.

6.4.1 LEAK TEST PROCEDURE

If a leak is suspected, use the cuff and hose in question.

1. Cuff should be wrapped tightly on itself.

2. Select the LEAK position of the NIBP TEST key.

3. Press NIBP key followed by the START key.

4. **ESCORT 300A** will inflate cuff and automatically check for a leak. If no leak is detected, a NO LEAK message is displayed. If a leak is detected, a LEAK message is displayed. If a leak is detected, replace or repair leak in cuff/hose before using to monitor a patient.

5. To exit the LEAK test mode, press STOP key.

6.4.2 OSCILLATION WAVEFORM RECORDING

If the **ESCORT** is configured with a recorder, the oscillation waveform can be recorded. The oscillation waveform can be recorded in the TEST mode. To record the waveform:

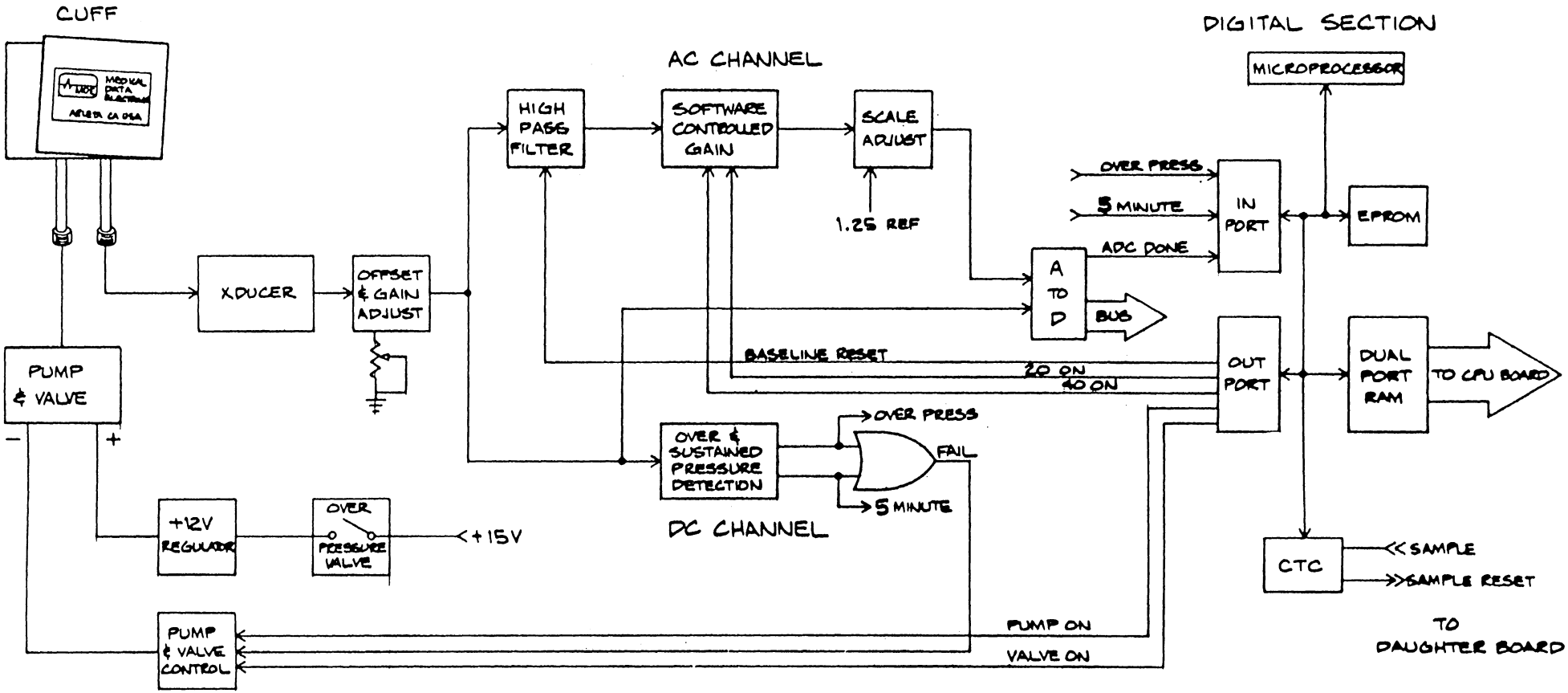
1. Select the WAVE position of the NIBP TEST key.

2. Press PAGE HOME followed by the NIBP setup key.

3. The oscillation waveform will automatically record for each determination.

4. To exit the waveform test mode, select the OFF position of the NIBP TEST key.

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

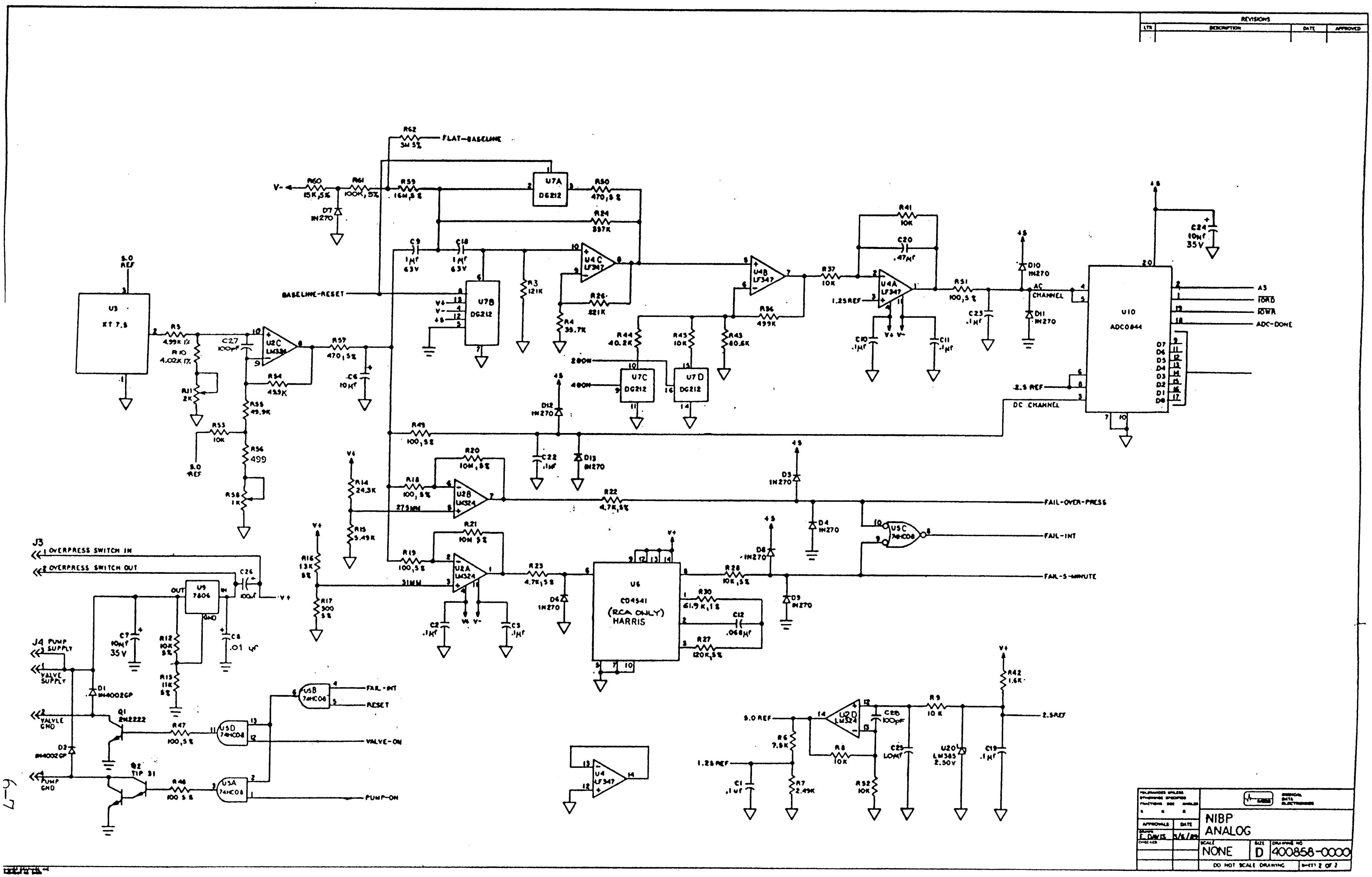


APPROVALS	DATE		
DRAWN AJM	8-28-97		
CHECKED			

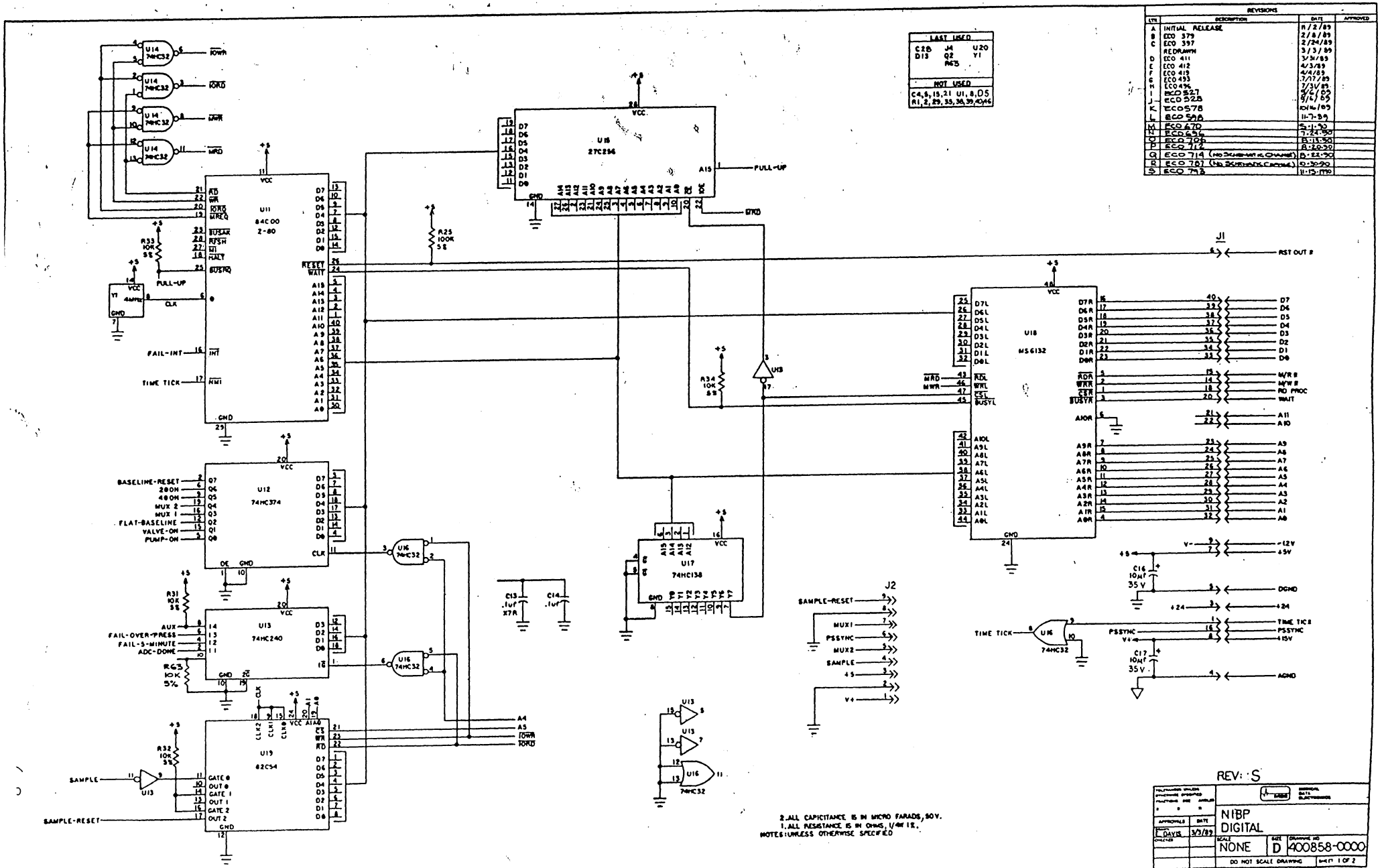
NIBP BLOCK DIAGRAM

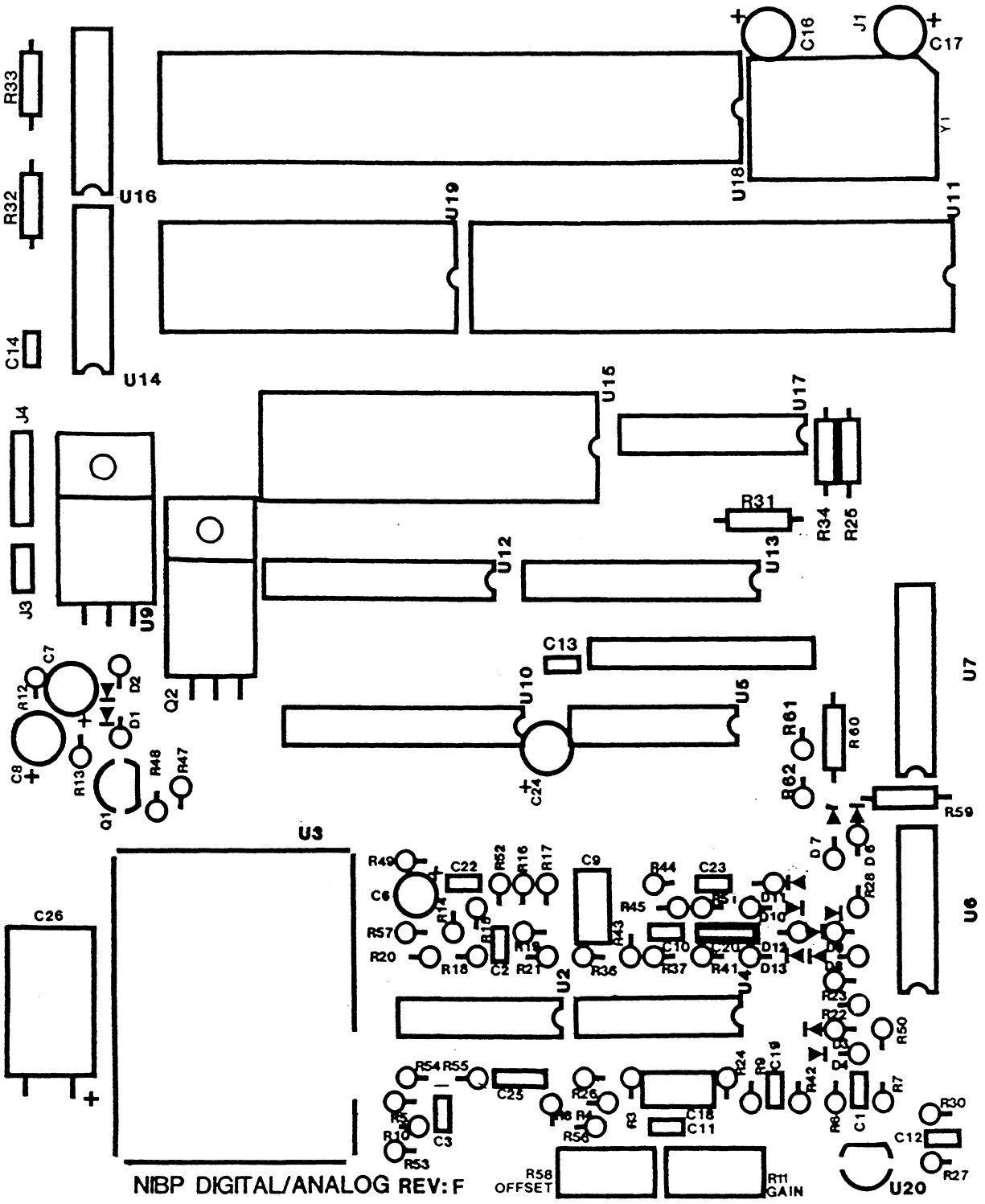
SCALE	SIZE	DRAWING NO.
NONE	C	

DO NOT SCALE DRAWING — SHEET 1 OF 1



NIBP
ANALOG
NONE
D
400858-0000
DO NOT SCALE DRAWING
SHEET 2 OF 2
E. DAVIS
REVISIONS
FLAT-BASELINE
BASELINE-RESET
FAIL-OVER-PRESS
FAIL-INT
FAIL-5-MINUTE
AC CHANNEL
DC CHANNEL
2.5 REF
ADC-DONE
U10 ADC0844
U6 CD4541 (RCA ONLY) HARRIS
U3 XT 7.5
U9 7806
J3
1 OVERPRESS SWITCH IN
2 OVERPRESS SWITCH OUT
J4 PUMP 3 SUPPLY
1 VALVE SUPPLY
2 VALVE GND
4 PUMP GND
VALVE-ON
PUMP-ON
RESET


REVISIONS
LTR DESCRIPTION DATE APPROVED
A INITIAL RELEASE 11/2/89
B ECO 379 2/8/89
C ECO 397 2/24/89
REDRAWN 3/3/89
D ECO 411 3/31/89
E ECO 412 4/3/89
F ECO 415 4/4/89
G ECO 433 7/17/89
H ECO 494 7/31/89
I ECO 527 9/2/89
J ECO 528 9/6/89
K ECO 578 10/16/89
L ECO 596 11-7-89
M ECO 670 5-1-90
N ECO 686 7/24-90
O ECO 709 8-15-90
P ECO 712 8-20-90
Q ECO 714 (NO SCHEMATIC CHANGE) 8-22-90
R ECO 767 (NO SCHEMATIC CHANGE) 10-30-90
S ECO 798 11-15-990
LAST USED
C28 J4 U20
D13 Q2 Y1
R63
NOT USED
C4,5,15,21 U1,8,05
R1,2,29,35,36,39,40,46
U11 64C00 2-80
U12 74HC374
U13 74HC240
U15 82C54
U16 74HC32
U17 74HC138
U18 MS6132
U19 27C256
J1
J2
R25 100K 5%
R31 10K 5%
R32 10K 5%
R33 10K 5%
R34 10K 5%
R63 10K 5%
C13 .1uF X7R
C14 .1uF
C16 10uF 35V
C17 10uF 35V
FULL-UP
FAIL-INT
TIME TICK
BASELINE-RESET
200N
400N
MUX 2
MUX 1
FLAT-BASELINE
VALVE-ON
PUMP-ON
AUX
FAIL-OVER-PRESS
FAIL-5-MINUTE
ADC-DONE
SAMPLE
SAMPLE-RESET
RST OUT #
M/R #
M/W #
RD PROC
WAIT
-12V
+5V
DGND
+24
AGND
TIME TICK
PSSYNC
+15V
REV: S
NIBP
DIGITAL
NONE
D
400858-0000
DO NOT SCALE DRAWING
SHEET 1 OF 2
NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTANCE IS IN OHMS, 1/4W 1%.
2. ALL CAPICITANCE IS IN MICRO FARADS, 50V.



NIBP DIGITAL/ANALOG BOARD

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
400858-0000	PCBA, NIBP, REV. "S" (E793)			A			

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
400857-0000	*1	1	PCB, NIBP, REVISION "G"		R	33	1.0	EA		Yes	
352100-0474A	*1	2	CAP, .47UF,50V,10%,RAD,X7R		R	22	1.0	EA	C20	Yes	
352100-0104A	*1	3	CAP, .1UF,50V,10%,RAD,X7R		R	11	1.0	EA	C13	Yes	
352300-0020A	*1	4	CAP., 1UF,63V,5%,MYLAR		R	77	2.0	EA	C9,18	Yes	
352300-0021A	*1	5	CAP., .068UF,50V,10%,MYLAR		R	66	1.0	EA	C12	Yes	
352300-0104A	*1	6	CAP, .1UF,50V,20%,RAD,MYLAR		R	22	7.0	EA	C1,2,3,10,11,14,19	Yes	
352300-0104A	*1	7	CAP, .1UF,50V,20%,RAD,MYLAR		R	22	2.0	EA	C22,23	Yes	
352300-0008A	*1	8	CAP, .01UF,5%,MYLAR		R	66	1.0	EA	C8	Yes	
352401-0106A	*1	9	CAP, 10UF,35V,20%,RAD,TANT		R	11	5.0	EA	C6,7,16,17,24	Yes	
356000-0008A	*1	10	REF OSCILLATOR, CMOS 4.0MHZ,HIGH SPEED		R	22	1.0	EA	Y1	Yes	
354000-0188A	*1	11	CONN, FEMALE, SNAP-AWAY, 20 PIN STRIP,INTERCONNECT		R	11	9.0	EA	J2 (CUT TO 9 PINS)	Yes	
364000-0008A	*1	12	IC, DG212CJ		R	11	1.0	EA	U7	Yes	
364000-0026A	*1	13	IC, 74HC08		R	11	1.0	EA	U5	Yes	
364000-0027A	*1	14	IC, 74HC32		R	11	2.0	EA	U14,16	Yes	
364000-0029A	*1	15	IC, 74HC138		R	11	1.0	EA	U17	Yes	
364000-0036A	*1	16	IC, 7806		R	11	1.0	EA	U9	Yes	
364000-0038A	*1	17	IC, 27C256,CMOS,EPROM,200NS		R	11	1.0	EA	U15	Yes	
364000-0057A	*1	18	IC, LM324, LINEAR		R	11	1.0	EA	U2	Yes	
364000-0080A	*1	19	IC, TMPZ84C00P (Z80A, CMOS VERSION)		R	11	1.0	EA	U11	Yes	
364000-0095A	*1	20	IC, MS6132,DUAL PORT RAM, 8 X 2K,48-PIN (OR MS7132)		R	11	1.0	EA	U18	Yes	
364000-0096A	*1	21	IC, 74HC240		R	11	1.0	EA	U13	Yes	
364000-0097A	*1	22	IC, 74HC374		R	11	1.0	EA	U12	Yes	
364000-0130A	*1	23	IC, LF347 (SCREENED TO +/- 1.5mV), NATIONAL ONLY		R	22	1.0	EA	U4	Yes	
384000-0067A	*1	24	PRESSURE TRANSDUCER XT7.5		R	22	1.0	EA	U3	Yes	
364000-0127A	*1	25	IC, CD4541 **RCA (HARRIS) ONLY**		R	22	1.0	EA	U6	Yes	

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
400858-0000	PCBA, NIBP, REV. "S" (E793)			A			

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
364000-0128A	*1	26	IC, ADC844		R	22	1.0	EA	U10	Yes	
370100-0101A	*1	27	RES, 100,1/4W,5%,CF		R	11	6.0	EA	R47,48,49,51,18,19	Yes	
370100-0103A	*1	28	RES, 10K,1/4W,5%,CF		R	11	7.0	EA	R12,28,31,32,33,34,63	Yes	
370100-0104A	*1	29	RES, 100K,1/4W,5%,CF		R	11	2.0	EA	R25,61	Yes	
370100-0106A	*1	30	RES, 10M,1/4W,5%,CF		R	11	2.0	EA	R20,21	Yes	
370100-0113A	*1	31	RES, 11K,1/4W,5%,CF		R	11	1.0	EA	R13	Yes	
370100-0124A	*1	32	RES, 120K,1/4W,5%,CF		R	11	1.0	EA	R27	Yes	
370100-0133A	*1	33	RES, 13K,1/4W,5%,CF		R	11	1.0	EA	R16	Yes	
370100-0162A	*1	34	RES, 1.6K,1/4W,5%,CF		R	11	1.0	EA	R42	Yes	
370100-0301A	*1	36	RES, 300,1/4W,5%,CF		R	11	1.0	EA	R17	Yes	
370100-0471A	*1	37	RES, 470,1/4W,5%,CF		R	11	2.0	EA	R50,57	Yes	
370100-0472A	*1	38	RES, 4.7K,1/4W,5%,CF		R	11	2.0	EA	R22,23	Yes	
370200-6192A	*1	39	RES, 61.9K,1/4W,1%,MF		R	11	1.0	EA	R30	Yes	
370200-1002A	*1	40	RES, 10K,1/4W,1%,MF		R	11	7.0	EA	R8,9,37,41,45,52,53	Yes	
370200-1213A	*1	41	RES, 121K,1/4W,1%,MF		R	11	2.0	EA	R3,26	Yes	
370200-2432A	*1	42	RES, 24.3K,1/4W,1%,MF		R	11	1.0	EA	R14	Yes	
370200-2491A	*1	43	RES, 2.49K,1/4W,1%,MF		R	11	1.0	EA	R7	Yes	
370200-3572A	*1	44	RES, 35.7K,1/4W,1%,MF		R	11	1.0	EA	R4	Yes	
370200-3573A	*1	45	RES, 357K,1/4W,1%,MF		R	11	1.0	EA	R24	Yes	
370200-4022A	*1	46	RES, 40.2K,1/4W,1%,MF		R	11	1.0	EA	R44	Yes	
370200-4990A	*1	47	RES, 499,1/4W,1%,MF		R	11	1.0	EA	R56	Yes	
370200-4992A	*1	48	RES, 49.9K,1/4W,1%,MF		R	11	2.0	EA	R54,55	Yes	
370200-4993A	*1	49	RES, 499K,1/4W,1%,MF		R	11	1.0	EA	R36	Yes	
370200-5491A	*1	50	RES, 5.49K,1/4W,1%,MF		R	11	1.0	EA	R15	Yes	
370200-7501A	*1	51	RES, 7.5K,1/4W,1%,MF		R	11	1.0	EA	R6	Yes	

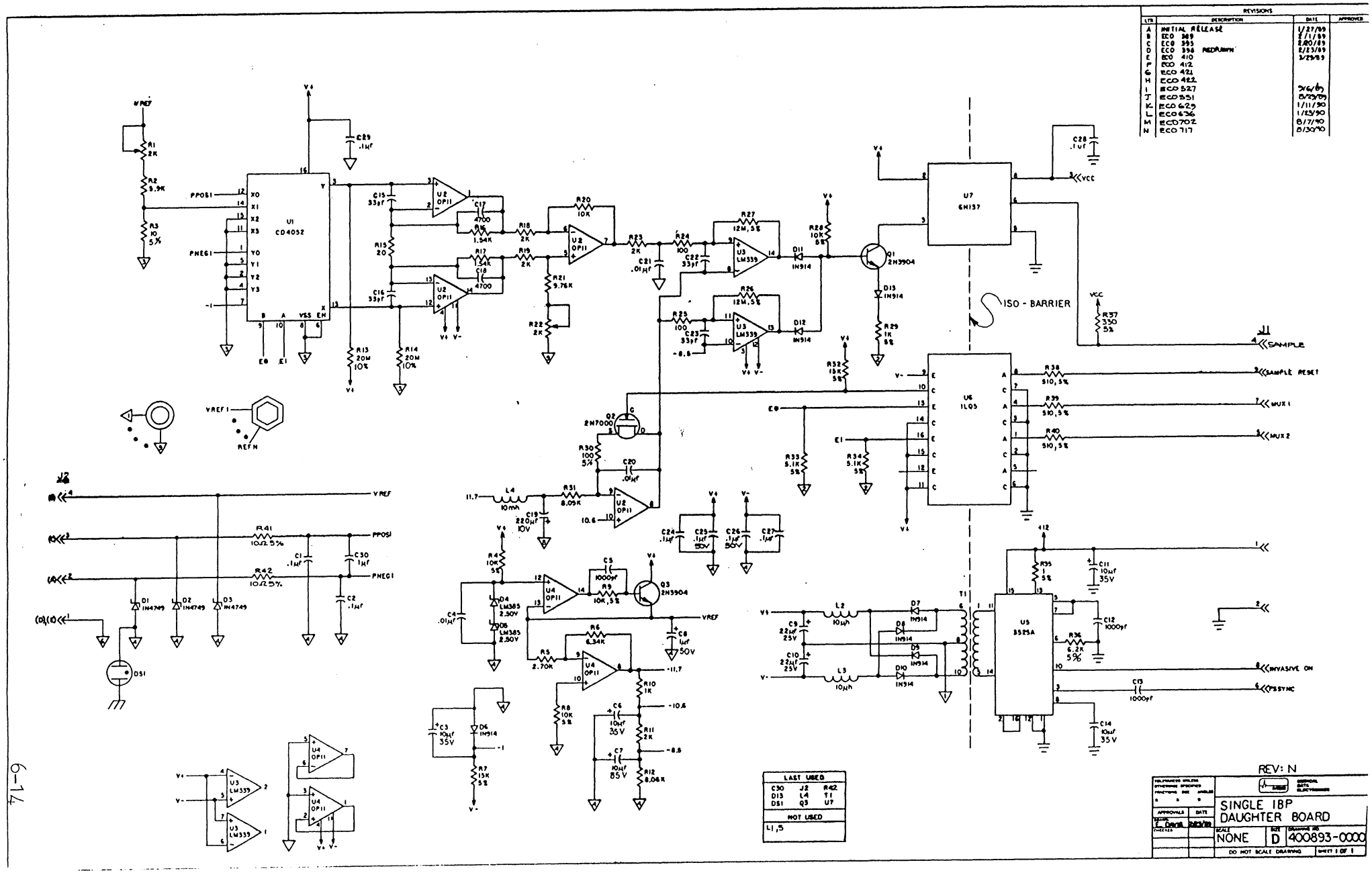
Assembly	Description	Group	PFC	Commodity Class	Planner Buyer	Drawing
400858-0000	PCBA, NIBP, REV. "S" (E793)			A		

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
370200-8062A	*1	52	RES, 80.6K,1/4W,1%,MF		R	11	1.0	EA	R43		Yes
370200-4021A	*1	53	RES, 4.02K,1/4W,1%,MF		R	11	1.0	EA	R10		Yes
374300-0102A	*1	54	POT, 1K,TRIM,SIDE ADJ,CER MET,3/8 IN.QR,.15LS		R	11	1.0	EA	R58		Yes
374300-0202A	*1	55	POT, 2K,TRIM,SIDE ADJ,CER MET,3/8 SQR,.15LS		R	11	1.0	EA	R11		Yes
376000-0007A	*1	56	XSTR, TIP31		R	11	1.0	EA	Q2		Yes
376000-0013A	*1	57	XSTR, PN2222,PLASTIC		R	11	1.0	EA	Q1		Yes
378000-0001A	*1	58	DIO, 1N270		R	11	6.0	EA	D3,4,8,9,10,11,		Yes
378000-0001A	*1	59	DIO, 1N270		R	11	4.0	EA	D12,13,6,7		Yes
378000-0002A	*1	60	DIO, 1N4002GP,RCTFR, (MOT ONLY)		R	11	2.0	EA	D1,2		Yes
378000-0034A	*1	61	DIO, LM385,ZENER (XSTR NATIONAL ONLY)		R	11	1.0	EA	U20		Yes
354000-0138A	*1	62	CONN, 2-P,M,STRT LOCK,.1 CTR,HDR		R	11	1.0	EA	J3		Yes
354000-0148A	*1	63	CONN, 4-P,M,STRT,.1 CTR,LOCKING RAMP		R	11	1.0	EA	J4		Yes
358100-0064A	*1	64	SCR, 4-24 X 3/8 ,PH.PNHD. ,SELF-TAP		R	11	2.0	EA	USED ON TRANSDUCER		Yes
370100-0166A	*1	66	RES, 16M,1/4W,5%,CF		R	11	1.0	EA	R59		Yes
370100-0153A	*1	67	RES, 15K,1/4W,5%,CF		R	11	1.0	EA	R60		Yes
352400-0105A	*1	68	CAP, 1UF,50V,20%,RAD,TANT , MAX: HT. .28; O.D. .16		R	11	1.0	EA	C25		Yes
365000-0014A	*1	69	SKT, 14-POS,DIP,TIN PLATE ,L.P.		R	11	3.0	EA	U2,4,6		Yes
365000-0024A	*1	72	SKT, 24-POS,DIP,TIN PLATE ,L.P.		R	11	1.0	EA	U19		Yes
365000-0228A	*1	73	SKT, 28-POS,LOW PROFILE,GOLD CNTCT W/TIN SHELL		R	22	1.0	EA	U15		Yes
365000-0040A	*1	74	SKT, 40-POS,DIP,TIN PLATE ,L.P.		R	11	1.0	EA	U11		Yes
360500-0062A	*1	75	STDOFF, #6,ALUM,1/4 RND X 1.375 LNGTH		R	11	1.0	EA			Yes
400712-0000	*1	76	FISH PAPER FAB, 23.26SQ"/ PC.(4.125" X 5.125")REV B		A	0	1.0	EA			Yes
352200-0107A	*1	77	CAP, 100UF,50V,RAD,ELECT, LS TYPE		R	22	1.0	EA	C26		Yes
370200-4991A	*1	78	RES, 4.99K,1/4W,1%,MF		R	11	1.0	EA	R5		Yes
370100-0305A	*1	79	RES, 3M,1/4W,5%,CF		R	11	1.0	EA	R62		Yes

Assembly	Description	Group	PFC	Commodity Class	Planner Buyer	Drawing
400858-0000	PCBA, NIBP, REV. "S" (E793)				A	

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
352100-0101A	*1	80	CAP, 100PF,25V,10%,RAD,NP0		R	11	2.0	EA	C27,28	Yes	
100000	*1	84	NOTES & SPEC. INSTRUCTIONS		P	0	0.0	EA	APPLY FOIL TAPE TO	Yes	
100000	*1	85	NOTES & SPEC. INSTRUCTIONS		P	0	0.0	EA	BACK OF 384000-0067A	Yes	
100000	*1	86	NOTES & SPEC. INSTRUCTIONS		P	0	0.0	EA	NIBP TRANSDUCER	Yes	
365000-0148A	*1	87	SOCKET, 48 PIN DIP		R	22	1.0	EA	U18	Yes	

Cumulative Lead Time for 400858-0000 = 77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E ECO 410 3/29/89
F ECO 412
G ECO 421
H ECO 422
I ECO 527 9/6/89
J ECO 551 11/29/89
K ECO 629 1/11/90
L ECO 636 1/23/90
M ECO 702 8/17/90
N ECO 717 8/30/90
U1 CD4052
U2 OP11
U3 LM339
U4 OP11
U5 3525A
U6 ILQ5
U7 6N137
Q1 2N3904
Q2 2N7000
Q3 2N3904
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D2 IN4749
D3 IN4749
D4 LM385 2.50V
D5 LM385 2.50V
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D11 IN914
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D13 IN914
T1
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VREF
PPOS1
PNEG1
REFN
SAMPLE
SAMPLE RESET
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MUX 2
INVASIVE ON
PSYNC
VCC
LAST USED
C30 J2 R42
D13 L4 T1
DS1 Q3 U7
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SIZE D
Drawing No. 400893-0000
DO NOT SCALE DRAWING
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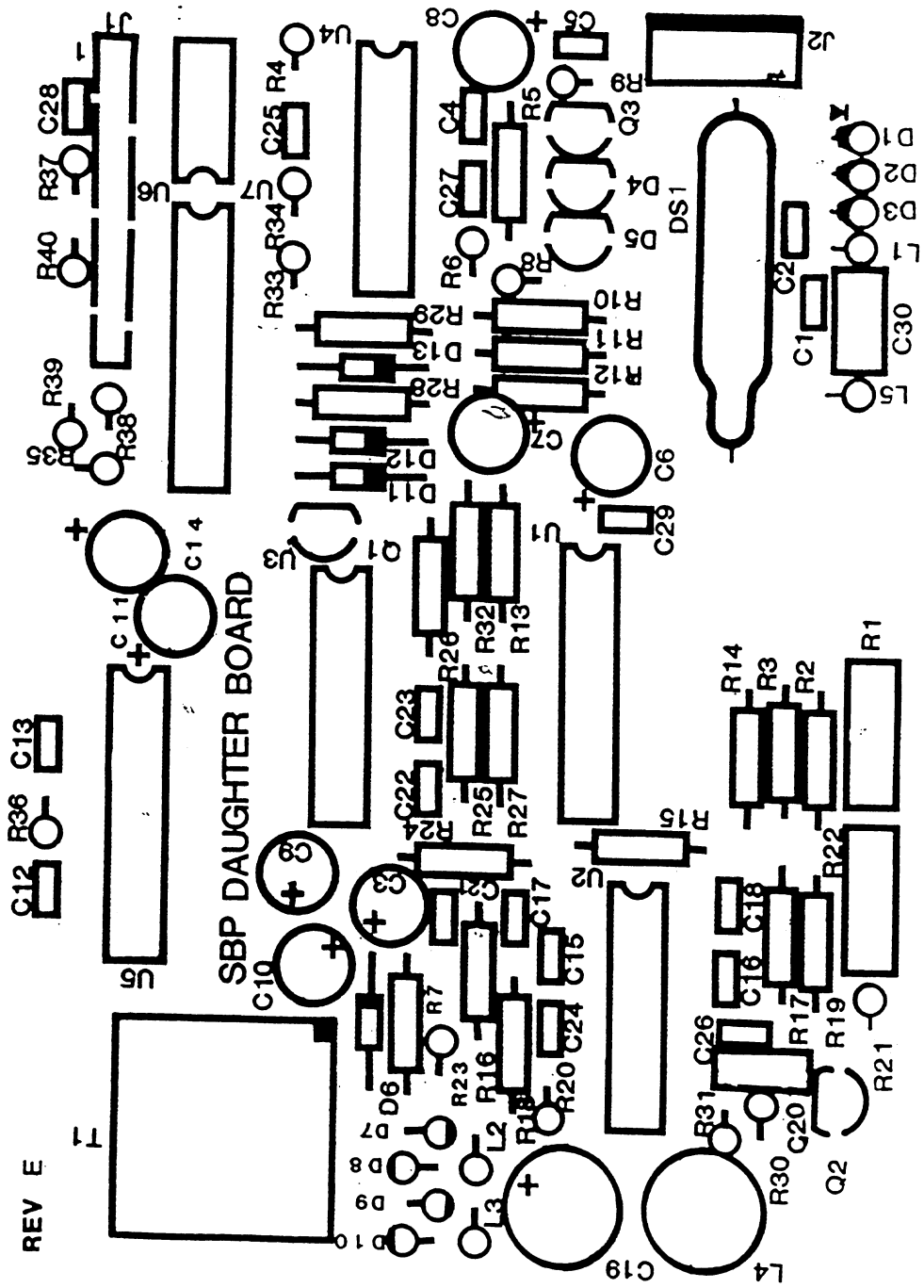


SBP DAUGHTER BOARD

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
400893-0000	PCBA, SINGLE IBP DAUGHTER BOARD, REVISION "N"			A			

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
400894-0000	*1	1	PCB, SINGLE IBP DAUGHTER BD., REVISION 'G'		R	33	1.0	EA	USE UP REV F PCB'S	Yes	
352100-0102A	*1	2	CAP, 1000PF,50V,10%,RAD,X7R		R	11	2.0	EA	C5,13	Yes	
352100-0103A	*1	3	CAP, .01UF,50V,10%,RAD,X7R		R	11	2.0	EA	C4,21	Yes	
352100-0472A	*1	4	CAP, .0047UF,25V,10%,RAD, X7R		R	22	2.0	EA	C17,18	Yes	
352101-0330A	*1	5	CAP, 33PF,100V,5%,RAD,NPO		R	22	4.0	EA	C15,16,22,23	Yes	
352201-0227A	*1	6	CAP, 220UF,10V,RAD,ELECT, .248 X .433 CS		R	66	1.0	EA	C19	Yes	
352301-0103A	*1	7	CAP, .01UF,100V,20%,POLYCARB,.2 L.S.		R	66	1.0	EA	C20	Yes	
352301-0104A	*1	8	CAP, .1UF,5%,MYLAR		R	66	5.0	EA	C1,2,24,27,28	Yes	
352301-0104A	*1	9	CAP, .1UF,5%,MYLAR		R	66	1.0	EA	C29	Yes	
352301-0105A	*1	10	CAP, 1UF,63V,20%,MYLAR		R	22	1.0	EA	C30	Yes	
352400-0105A	*1	11	CAP, 1UF,50V,20%,RAD,TANT, MAX: HT. .28; O.D. .16		R	11	1.0	EA	C8	Yes	
352401-0106A	*1	12	CAP, 10UF,35V,20%,RAD,TANT		R	11	5.0	EA	C3,6,7,11,14	Yes	
352400-0226A	*1	13	CAP, 22UF,25V,20%,TANT		R	11	2.0	EA	C9,10	Yes	
364000-0010A	*1	14	IC, LM339		R	11	1.0	EA	U3	Yes	
364000-0055A	*1	15	IC, CD4052		R	11	1.0	EA	U1	Yes	
364000-0065A	*1	16	IC, OP11FP,OP AMP		R	11	2.0	EA	U2,4	Yes	
378000-0034A	*1	17	DIO, LM385,ZENER (XSTR NATIONAL ONLY)		R	11	2.0	EA	D4,5	Yes	
364000-0091A	*1	18	IC, SG 3525		R	44	1.0	EA	U5	Yes	
364000-0093A	*1	19	IC, ILQ5 QUAD OPTO ISOLATOR		R	11	1.0	EA	U6	Yes	
364000-0099A	*1	21	IC, 6N137		R	11	1.0	EA	U7	Yes	
354000-0103A	*1	22	CONN, SGL ROW,STRT,SGL PINS,SNAP-AWAY		R	11	1.0	PIN	J2	Yes	
354000-0187A	*1	23	CONN, MALE, SNAP-AWAY, 20 PIN STRIP, INTERCONNECT		R	11	9.0	EA	J1-MALE; 9 PIN = 1 PC	Yes	
370100-0010A	*1	24	RES, 1,1/4W,5%,CF		R	11	1.0	EA	R35	Yes	
370100-0101A	*1	26	RES, 100,1/4W,5%,CF		R	11	3.0	EA	R24,25,30	Yes	
370100-0102A	*1	27	RES, 1K,1/4W,5%,CF		R	11	1.0	EA	R29	Yes	

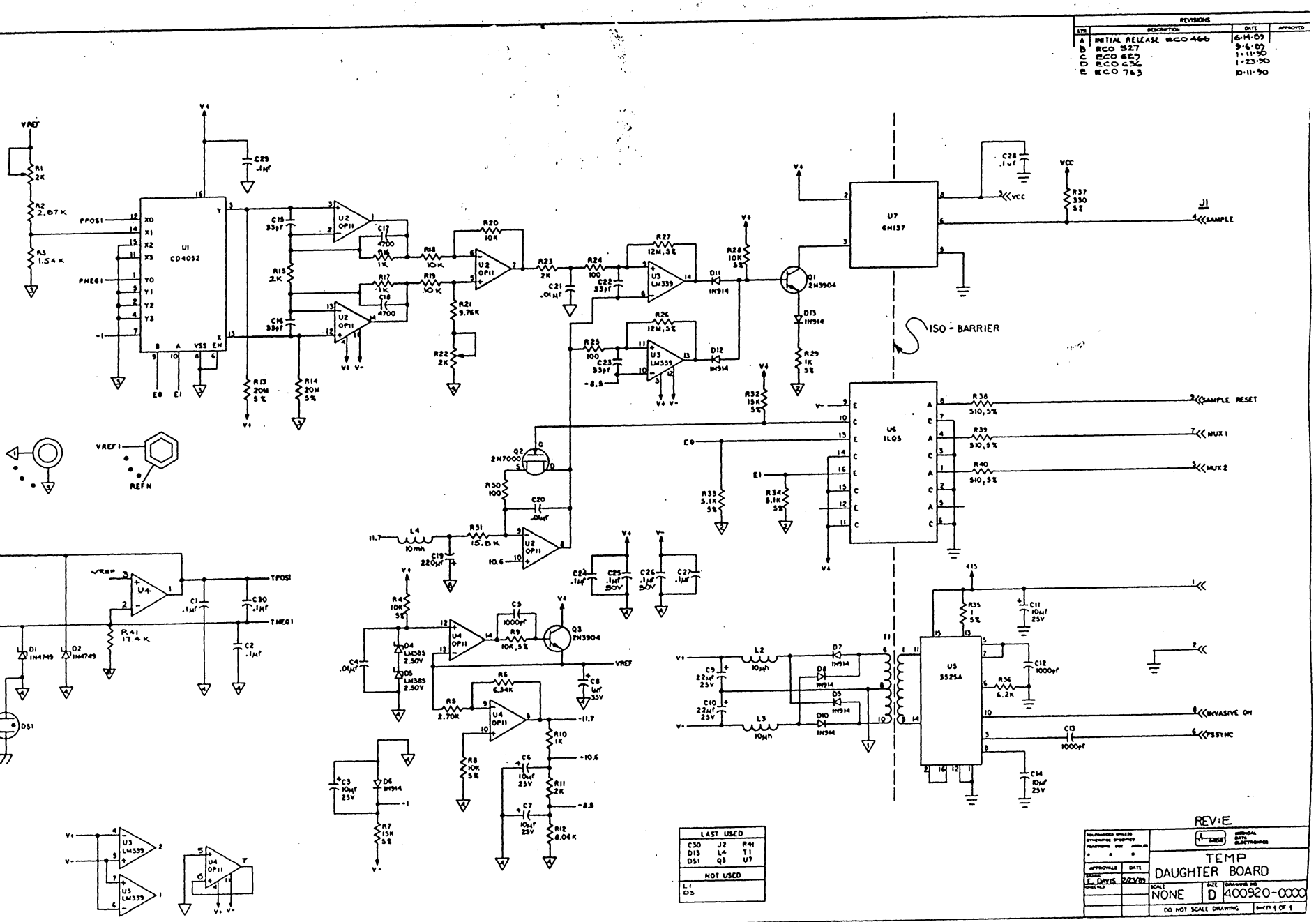
Assembly	Description	Group	PFC	Commodity Class	Planner Buyer	Drawing
400893-0000	PCBA, SINGLE IBP DAUGHTER BOARD, REVISION "N"			A		

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
370100-0103A	*1	28	RES, 10K,1/4W,5%,CF		R	11	4.0	EA	R4,8,9,28	Yes	
370100-0126A	*1	29	RES, 12M,1/4W,5%,CF		R	11	2.0	EA	R26,27	Yes	
370100-0153A	*1	30	RES, 15K,1/4W,5%,CF		R	11	2.0	EA	R7,32	Yes	
370100-0206A	*1	31	RES, 20M,1/4W,10%,CF		R	11	2.0	EA	R13,14	Yes	
370100-0331A	*1	32	RES, 330,1/4W,5%,CF		R	11	1.0	EA	R37	Yes	
370100-0511A	*1	33	RES, 510,1/4W,5%,CF		R	11	3.0	EA	R38,39,40	Yes	
370100-0512A	*1	34	RES, 5.1K,1/4W,5%,CF		R	11	2.0	EA	R33,34	Yes	
370100-0622A	*1	35	RES, 6.2K,1/4W,5%,CF		R	11	1.0	EA	R36	Yes	
370200-0200A	*1	36	RES, 20,1/4W,1%,MF		R	11	1.0	EA	R15	Yes	
370200-1001A	*1	37	RES, 1K,1/4W,1%,MF		R	11	1.0	EA	R10	Yes	
370200-1002A	*1	38	RES, 10K,1/4W,1%,MF		R	11	1.0	EA	R20	Yes	
370200-1541A	*1	39	RES, 1.54K,1/4W,1%,MF		R	11	2.0	EA	R16,17	Yes	
370200-2001A	*1	40	RES, 2K,1/4W,1%,MF		R	11	4.0	EA	R11,18,19,23	Yes	
370200-2701A	*1	41	RES, 2.7K,1/4W,1%,MF		R	11	1.0	EA	R5	Yes	
370200-5901A	*1	42	RES, 5.9K,1/4W,1%,MF		R	11	1.0	EA	R2	Yes	
370200-6341A	*1	43	RES, 6.34K,1/4W,1%,MF		R	11	1.0	EA	R6	Yes	
370200-8061A	*1	44	RES, 8.06K,1/4W,1%,MF (8 .05K N/A :OK PER KR)		R	11	2.0	EA	R31,12	Yes	
370200-9761A	*1	45	RES, 9.76K,1/4W,1%,MF		R	11	1.0	EA	R21	Yes	
374300-0202A	*1	46	POT, 2K,TRIM,SIDE ADJ,CER MET,3/8 SQR,.15LS		R	11	2.0	EA	R1,22	Yes	
376000-0003A	*1	47	XSTR, 2N3904		R	11	2.0	EA	Q1,3	Yes	
376000-0019A	*1	48	XSTR, 2N7000,FET		R	11	1.0	EA	Q2	Yes	
378000-0005A	*1	49	DIO, 1N914,SIGNAL		R	11	8.0	EA	D6,7,8,9,10,11,12,13	Yes	
378000-0012A	*1	50	DIO, 1N4749A,24V,ZENER ** *MOT ONLY***		R	11	3.0	EA	D1,2,3	Yes	
382200-0005A	*1	51	CHOKE, 10UH,MOLDED		R	11	2.0	EA	L2,3	Yes	
382200-0018A	*1	52	CHOKE, 10,000UH MS75089-35		R	11	1.0	EA	L4	Yes	

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
400893-0000	PCBA, SINGLE IBP DAUGHTER BOARD, REVISION "N"			A			

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
384000-0061A	*1	54	GAS TUBE (SURGE ARRESTER)		R	33	1.0	EA	DS1	Yes	
400552-0000	*1	55	ESCORT II ISO-TRANSFORMER , REV. 'A' **(FIFO)**		R	22	1.0	EA	T1	Yes	
360500-0060A	*1	57	STNDOFF, NYLON,#4 THREADED		R	11	2.0	EA		Yes	
358100-0021A	*1	58	SCR, 4-40 X 1/4,PH FLTHD, 100 DEG,ZN		R	11	4.0	EA		Yes	
365000-0016A	*1	61	SKT, 16-POS,DIP,TIN PLATE ,L.P.		R	11	1.0	EA	U1	Yes	
352100-0104A	*1	62	CAP, .1UF,50V,10%,RAD,X7R		R	11	2.0	EA	C25,26	Yes	
358100-0066A	*1	64	SCR, 6-32 X 2.75,LONG-LAG		R	11	1.0	EA		Yes	
360500-0022A	*1	66	NUT, #4 HEX,LRG PTTRN		R	11	3.0	EA		Yes	
352300-0007A	*1	67	CAP, .001UF,10%, MYLAR		R	66	1.0	EA	C12	Yes	
370100-0100A	*1	68	RES, 10,1/4W,5%,CF		R	11	3.0	EA	R3,41,42	Yes	
100000	*1	69	NOTES & SPEC. INSTRUCTIONS		P	0	0.0	EA	ON REV E PCB & BEFORE	Yes	
100000	*1	70	NOTES & SPEC. INSTRUCTIONS		P	0	0.0	EA	R41&R42 ARE L1&L5	Yes	

Cumulative Lead Time for 400893-0000 = 66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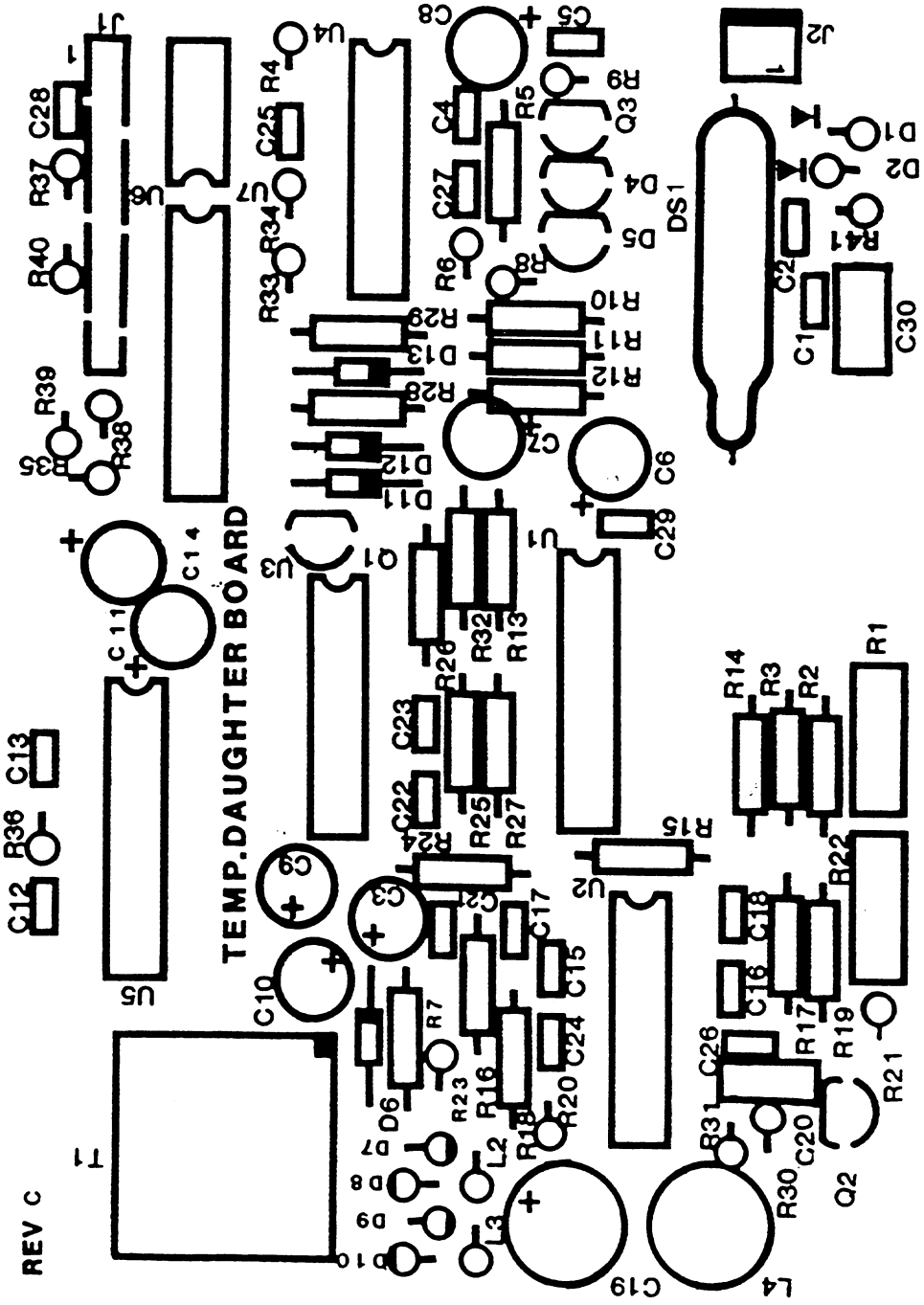


TEMP DAUGHTER BOARD

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
400920-0000	PCBA, SINGLE TEMP. DGHTR. BOARD, REVISION "E"			A			

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
400959-0000	*1	1	PCB, SGL.TEMP DGHTR. BD., RAW BOARD, REVISION 'D'		R	33	1.0	EA	USE UP REV. C PCB'S	Yes	
352100-0102A	*1	2	CAP, 1000PF,50V,10%,RAD,X7R		R	11	2.0	EA	C5,13	Yes	
352100-0103A	*1	3	CAP, .01UF,50V,10%,RAD,X7R		R	11	2.0	EA	C4,21	Yes	
352100-0472A	*1	4	CAP, .0047UF,25V,10%,RAD, X7R		R	22	2.0	EA	C17,18	Yes	
352101-0330A	*1	5	CAP, 33PF,100V,5%,RAD,NPO		R	22	4.0	EA	C15,16,22,23	Yes	
352201-0227A	*1	6	CAP, 220UF,10V,RAD,ELECT, .248 X .433 CS		R	66	1.0	EA	C19	Yes	
352301-0103A	*1	7	CAP, .01UF,100V,20%,POLYCARB,.2 L.S.		R	66	1.0	EA	C20	Yes	
352301-0104A	*1	8	CAP, .1UF,5%,MYLAR		R	66	5.0	EA	C1,2,24,27,28	Yes	
352301-0104A	*1	9	CAP, .1UF,5%,MYLAR		R	66	2.0	EA	C29,30	Yes	
352400-0105A	*1	11	CAP, 1UF,50V,20%,RAD,TANT, MAX: HT. .28; O.D. .16		R	11	1.0	EA	C8	Yes	
352401-0106A	*1	12	CAP, 10UF,35V,20%,RAD,TANT		R	11	5.0	EA	C3,6,7,11,14	Yes	
352400-0226A	*1	13	CAP, 22UF,25V,20%,TANT		R	11	2.0	EA	C9,10	Yes	
364000-0010A	*1	14	IC, LM339		R	11	1.0	EA	U3	Yes	
364000-0055A	*1	15	IC, CD4052		R	11	1.0	EA	U1	Yes	
364000-0065A	*1	16	IC, OP11FP,OP AMP		R	11	2.0	EA	U2,4	Yes	
378000-0034A	*1	17	DIO, LM385,ZENER (XSTR NATIONAL ONLY)		R	11	2.0	EA	D4,5	Yes	
364000-0091A	*1	18	IC, SG 3525		R	44	1.0	EA	U5	Yes	
364000-0093A	*1	19	IC, ILQ5 QUAD OPTO ISOLATOR		R	11	1.0	EA	U6	Yes	
364000-0099A	*1	21	IC, 6N137		R	11	1.0	EA	U7	Yes	
354000-0103A	*1	22	CONN, SGL ROW,STRT,SGL PINS,SNAP-AWAY		R	11	1.0	PIN	J2	Yes	
354000-0187A	*1	23	CONN, MALE, SNAP-AWAY, 20 PIN STRIP, INTERCONNECT		R	11	9.0	EA	J1-MALE; 9 PIN = 1 PC	Yes	
370100-0010A	*1	24	RES, 1,1/4W,5%,CF		R	11	1.0	EA	R35	Yes	
370100-0101A	*1	26	RES, 100,1/4W,5%,CF		R	11	3.0	EA	R24,25,30	Yes	
370100-0102A	*1	27	RES, 1K,1/4W,5%,CF		R	11	1.0	EA	R29	Yes	
370100-0103A	*1	28	RES, 10K,1/4W,5%,CF		R	11	4.0	EA	R4,8,9,28	Yes	

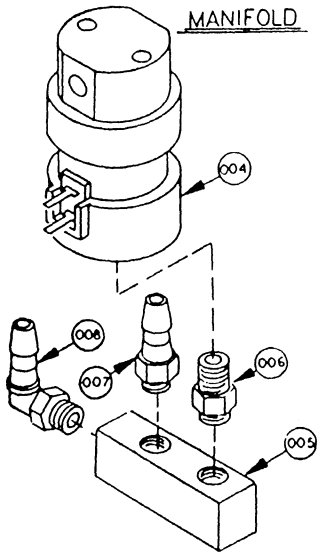
Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
400920-0000	PCBA, SINGLE TEMP. DGHTR. BOARD, REVISION "E"			A			

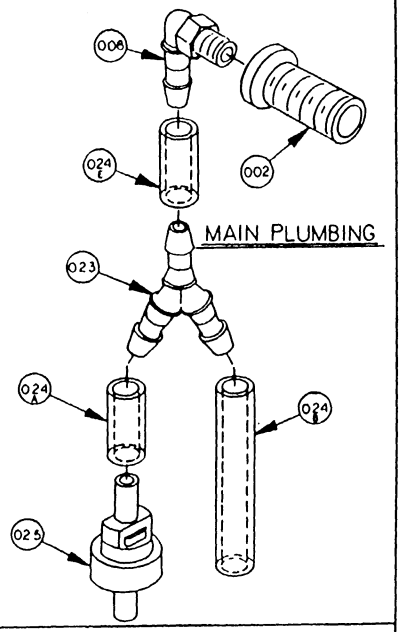
ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
370100-0126A	*1	29	RES, 12M,1/4W,5%,CF		R	11	2.0	EA	R26,27	Yes	
370100-0153A	*1	30	RES, 15K,1/4W,5%,CF		R	11	2.0	EA	R7,32	Yes	
370100-0206A	*1	31	RES, 20M,1/4W,10%,CF		R	11	2.0	EA	R13,14	Yes	
370100-0331A	*1	32	RES, 330,1/4W,5%,CF		R	11	1.0	EA	R37	Yes	
370100-0511A	*1	33	RES, 510,1/4W,5%,CF		R	11	3.0	EA	R38,39,40	Yes	
370100-0512A	*1	34	RES, 5.1K,1/4W,5%,CF		R	11	2.0	EA	R33,34	Yes	
370100-0622A	*1	35	RES, 6.2K,1/4W,5%,CF		R	11	1.0	EA	R36	Yes	
370200-1582A	*1	36	RES, 15.8K,1/4W,1%,MF		R	11	1.0	EA	R31	Yes	
370200-1001A	*1	37	RES, 1K,1/4W,1%,MF		R	11	3.0	EA	R10,16,17	Yes	
370200-1002A	*1	38	RES, 10K,1/4W,1%,MF		R	11	3.0	EA	R20,18,19	Yes	
370200-1541A	*1	39	RES, 1.54K,1/4W,1%,MF		R	11	1.0	EA	R3	Yes	
370200-2001A	*1	40	RES, 2K,1/4W,1%,MF		R	11	3.0	EA	R11,23,15	Yes	
370200-2701A	*1	41	RES, 2.7K,1/4W,1%,MF		R	11	1.0	EA	R5	Yes	
370200-2871A	*1	42	RES, 2.87K,1/4W,1%,MF		R	11	1.0	EA	R2	Yes	
370200-6341A	*1	43	RES, 6.34K,1/4W,1%,MF		R	11	1.0	EA	R6	Yes	
370200-8061A	*1	44	RES, 8.06K,1/4W,1%,MF (8 .05K N/A :OK PER KR)		R	11	1.0	EA	R12	Yes	
370200-9761A	*1	45	RES, 9.76K,1/4W,1%,MF		R	11	1.0	EA	R21	Yes	
374300-0202A	*1	46	POT, 2K,TRIM,SIDE ADJ,CER MET,3/8 SQR,.15LS		R	11	2.0	EA	R1,22	Yes	
376000-0003A	*1	47	XSTR, 2N3904		R	11	2.0	EA	Q1,3	Yes	
376000-0019A	*1	48	XSTR, 2N7000,FET		R	11	1.0	EA	Q2	Yes	
378000-0005A	*1	49	DIO, 1N914,SIGNAL		R	11	8.0	EA	D6,7,8,9,10,11,12,13	Yes	
378000-0012A	*1	50	DIO, 1N4749A,24V,ZENER ** *NOT ONLY***		R	11	2.0	EA	D1,2	Yes	
382200-0005A	*1	51	CHOKE, 10UH,MOLDED		R	11	2.0	EA	L2,3	Yes	
382200-0018A	*1	52	CHOKE, 10,000UH MS75089-35		R	11	1.0	EA	L4	Yes	
100000	*1	53	NOTES & SPEC. INSTRUCTIONS		P	0	0.0	EA	L1,5 - NOT USED	Yes	

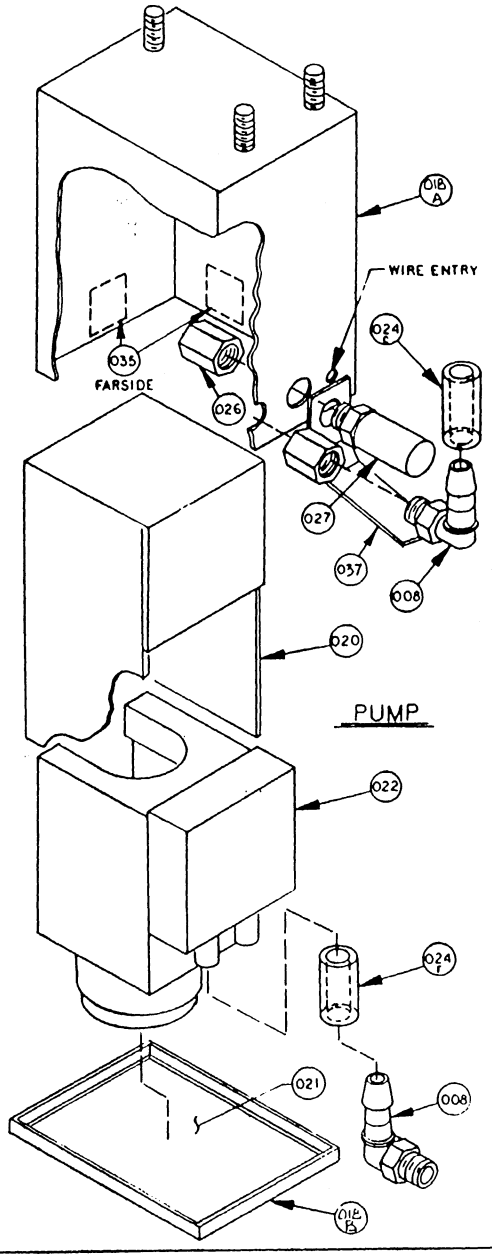
Assembly	Description	Group	PFC	Commodity Class	Planner Buyer	Drawing
400920-0000	PCBA, SINGLE TEMP. DGHTR. BOARD, REVISION "E"			A		

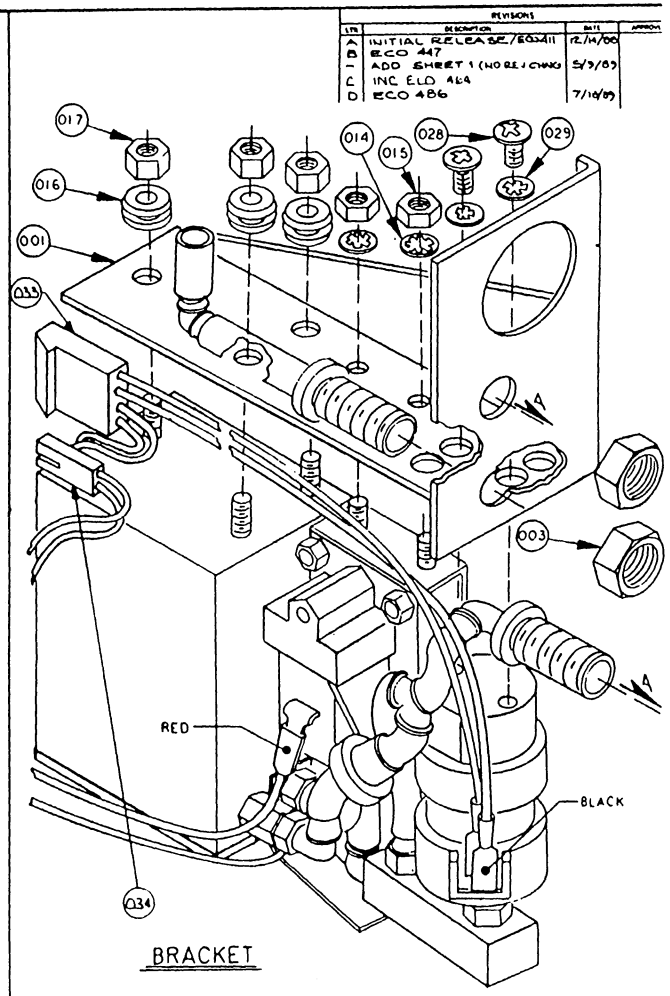
ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
384000-0061A	*1	54	GAS TUBE (SURGE ARRESTER)		R	33	1.0	EA	DS1	Yes	
400552-0000	*1	55	ESCORT II ISO-TRANSFORMER , REV. 'A' **(FIFO)**		R	22	1.0	EA	T1	Yes	
360500-0060A	*1	57	STNDOFF, NYLON,#4 THREADED		R	11	2.0	EA		Yes	
358100-0021A	*1	58	SCR, 4-40 X 1/4,PH FLTHD, 100 DEG,ZN		R	11	4.0	EA		Yes	
365000-0016A	*1	61	SKT, 16-POS,DIP,TIN PLATE ,L.P.		R	11	1.0	EA	U1	Yes	
352100-0104A	*1	62	CAP, .1UF,50V,10%,RAD,X7R		R	11	2.0	EA	C25,26	Yes	
360500-0063A	*1	63	STDOFF, #6, 1/4 RND X .75		R	11	1.0	EA		Yes	
358100-0066A	*1	64	SCR, 6-32 X 2.75,LONG-LAG		R	11	1.0	EA		Yes	
352300-0007A	*1	67	CAP, .001UF,10%, MYLAR		R	66	1.0	EA	C12	Yes	
370200-1742A	*1	68	RES, 17.4K,1/4W,1%,MF		R	11	1.0	EA	R41	Yes	

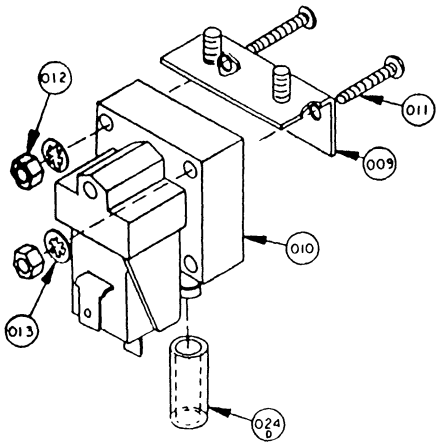
Cumulative Lead Time for 400920-0000 = 66

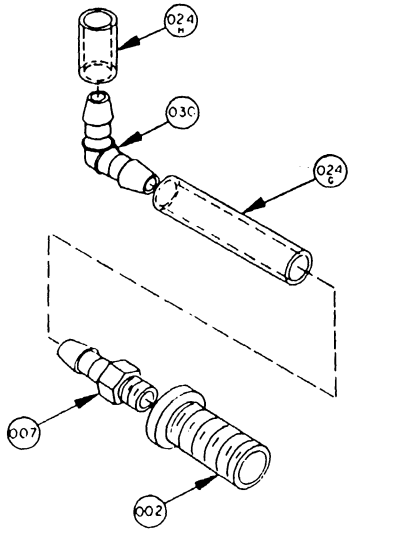












REV: D

APPROVALS	DATE	NIBP PNEUMATIC ASSEMBLY	
DRAWN JS		SCALE 2/1	SIZE D
CHECKED		DRAWING NO 400859-0000	
		DO NOT SCALE DRAWING	SHEET 1 OF 2

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
400859-0000	NIBP PNEUMATIC ASSEMBLY, REVISION 'I'			A			

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
400849-0000	*1	1	NIBP PNEUMATICS BRACKET, REVISION 'B'		R	22	1.0	EA	1		Yes
400850-0000	*1	2	NIBP BULKHEAD CONNECTOR, REVISION 'D'		R	22	2.0	EA	2		Yes
360500-0057A	*1	3	NUT, 5/16 - 24		R	11	2.0	EA	3		Yes
360700-0001A	*1	4	VALVE, 12 VOLT		R	22	1.0	EA	4		Yes
400851-0000	*1	5	NIBP PNEUMATICS MANIFOLD REV. 'B'		R	22	1.0	EA	5		Yes
360700-0002A	*1	6	FITTING, HOSE NIPPLE 10-32,10-32		R	22	1.0	EA	6		Yes
360700-0003A	*1	7	FITTING, HOSE,10-32,1/8 INCH		R	22	3.0	EA	7		Yes
360700-0004A	*1	8	FITTING, L HOSE,10-32,1/8 INCH		R	22	3.0	EA	8		Yes
400852-0000	*1	9	NIBP PRESS.SWITCH BRACKET, ZINC FINISH, REV. 'B'		R	22	1.0	EA	9		Yes
380000-0018A	*1	10	SWITCH, NIBP PRESSURE		R	22	1.0	EA	10		Yes
358100-0063A	*1	11	SCR, 2-56 X 5/8 PH PNHD		R	11	2.0	EA	11		Yes
360500-0020A	*1	12	NUT, 2-56 HEX		R	11	2.0	EA	12		Yes
358200-0020A	*1	13	WSHR, #2 INT TOOTH,CAD1 OR NICKEL PLATING		R	11	2.0	EA	13		Yes
358200-0007A	*1	14	WSHR, #4 INT TOOTH		R	11	2.0	EA	14		Yes
360500-0022A	*1	15	NUT, #4 HEX,LRG PTTRN		R	11	2.0	EA	15		Yes
360500-0059A	*1	16	GROMMET, RUBBER #2185		R	11	3.0	EA	16		Yes
360500-0043A	*1	17	NUT, #4 LOCK,THIN PTTRN,W/ NYLON INSERT		R	11	3.0	EA	17		Yes
400853-0000	*1	18	NIBP PUMP CAN AND LID (2 PCS. PER SET)		R	22	1.0	SET	18		Yes
400854-0000	*1	19	NIBP PUMP FOAM PACKING, REVISION 'B'		R	22	1.0	EA	20		Yes
400855-0000	*1	20	NIBP PUMP CAN FISH PAPER (1.7 SQ.IN. PER PC)		A	0	1.0	EA	21		Yes
360700-0009A	*1	21	PUMP, 12 VOLT NIBP, GILIAN		R	22	1.0	EA	22		Yes
360700-0005A	*1	22	FITTING, Y HOSE,1/8INCH		R	22	1.0	EA	23		Yes
385000-0020A	*1	23	TUBING, 1/8 INCH I.D.		R	11	16.1	IN	24		Yes
360700-0006A	*1	24	VALVE, PNEUMATIC CHECK		R	22	1.0	EA	25		Yes
360500-0058A	*1	25	STDOFF, #10 HEX,5/16 INCH		R	11	2.0	EA	26		Yes

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
400859-0000	NIBP PNEUMATIC ASSEMBLY, REVISION 'I'			A			

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
385000-0006A	*1	26	SHRINK TUBING, 3/8in BLACK		R	11	0.3	IN.	19 (1PC = 1/4"	Yes	
360700-0008A	*1	27	MUFFLER, SINTERED METAL,10-32		R	22	1.0	EA	27	Yes	
358100-0041A	*1	28	SCR, 6-32 X 1/4 PHL PNHD		R	11	2.0	EA	28	Yes	
358200-0018A	*1	29	WSHR, #6 INT TOOTH STEEL		R	11	2.0	EA	29	Yes	
360700-0007A	*1	30	FITTING, L HOSE,1/8 INCH		R	22	1.0	EA	30	Yes	
400890-0000	*1	33	NIBP VALVE/PUMP HARNESS, REVISION "D"		A	0	1.0	EA	33	Yes	
400891-0000	*1	34	NIBP PRESSURE SWITCH HARNESS, REVISION "G"	G	A	0	1.0	EA	34	Yes	
385000-0017A	*1	35	CABLE TIE MOUNT, ADHESIVE BACKED		R	11	2.0	EA	32,35	Yes	
385000-0000A	*1	36	TY-WRAPS, 3IN LENGTH (1000/BAG)		R	11	1.0	EA	36	Yes	
400958-0000	*1	37	CLIP, GROUND, REV. A		R	22	1.0	EA	37	Yes	
401005-0000	*1	38	WIRE ASSEMBLY, GROUND, REVISION 'B'		A	0	1.0	EA	38	Yes	

Cumulative Lead Time for 400859-0000 = 22

SAO_2 BOARD

CHAPTER 7

7.0.0 SAO_2 OPTION

7.1.0 OVERVIEW

The **ESCORT 300A** SAO_2 option provides an automatically calibrated measurement of blood oxygen content as well as deriving a pulse rate. The pulse oximeter employs spectrophotometric oximetry and plethysmography principles to obtain these readings.

The SAO_2 finger sensor has two low voltage LED light sources. One emits a red light (approximately 660nm) and the other emits an infrared light (approximately 920nm). The photo diode across from these two LED's senses the light that has passed through the sensor point. These values are then used by the pulse oximeter to calculate how much red and infrared light has been absorbed. With this information the percent of functional hemoglobin that is saturated with oxygen can be determined.

The **ESCORT 300A** SAO_2 option is packaged in two ways: 3 lead ECG SaO2, slot 1 (SLOT1 SAO_2); and 5 lead SAO_2, slot 2 (SLOT2 SAO_2). When configured with SLOT1 SAO_2, 3 lead ECG and SAO_2 interface circuitry are both implemented on the same PCBA. When configured with SLOT2 SAO_2, blood pressure or temperature as well as SAO_2 interface circuitry are all implemented on the same PCBA. These circuits are functionally identical to their original circuits with the exception of the interface circuitry for SAO_2, isolated power supply, and the Nellcor OEM module. Please refer to Chapter 4 for the ECG and respiration theory of operation and to Chapter 5 for the blood pressure and temperature theory of operation.

7.1.1 NELLCOR OEM MODULE

A Nellcor OEM factory replaceable module is installed in all SAO_2 options. This module performs the SAO_2 functions of determining blood oxygen content, computing heart rate through pulse picking, and providing a pulse waveform. This information is transmitted from the module to the interface board by RS232 communications. In addition to the RS232 TX AND RX signals, an ECG SYNC signal goes to the Nellcor module for C-LOCK (tm) information. This ECG SYNC signal synchronizes the saturation measurements for the best time to perform an SAO_2 reading. If ECG SYNC is not present, C-LOCK (tm) will not be operational.

7.2.0 INTERFACE CIRCUITRY

Whether configured with SLOT1 or SLOT2 SAO_2, the interface circuitry will be the same. J3 goes to the Nellcor module. The RS232 communications, RX, TX AND CTS* (clear to send), go to the opto-

couplers U13 and U14, as do RESET* and ECG SYNC. U13 and U14 provide isolation from line current for the patient. The signal RESET* comes from the CPU board and is active on power up and during hard resets. ECG SYNC signal information is pulled off the bus by U16 and outputted to U14 pin 8 for SLOT1 SAO_2. For SLOT2 SAO_2, the ECG SYNC signal information comes from the ECG board through the CPU board. The information is similarly pulled off the bus by U4 and fed to U14 pin 8. U4 and U16 are Z-80 compatible, 84 pin, serial/parallel/ counter/timer. U4 and U16 act as an I/O port between the digital and the isolated sections. This IC replaces the three I/O ports on the original ECG/RESP and BP/TEMP PCBA's.

The signal QRS OUT, at J1 pin 2, is a SAO_2 module generated ECG synchronizing signal that is routed to the AUX port, J8 pin 1, for the optional SAO_2 alarm.

7.3.0 ISOLATED SUPPLY

The isolation power supply circuits for SLOT1 and SLOT2 SAO_2 are functionally identical with the exception of the respiration drive that is exclusive to the SLOT1 SAO_2. For convenience we shall refer to SLOT1 SAO_2 reference designators only. The pulse width modulator, U11, uses +15V as its Vin. PS SYNC keeps the supply voltages all switching on the same edge. The pulse width modulator uses the +5V as the sense line for voltage regulation. Q4 and Q5 drive T1. D19 and D14 are for spike protection. D8, D9, D10, and D13 form a bridge rectifier to turn the AC voltage to a DC voltage. L1 and C33-C34 filter the DC voltage.

The voltage regulation circuit uses D7 for a 2.5V reference input to the op-amp, U15. R58 and R59 divide the +5V in half and input it to U6. The difference is reflected at the output. It then goes to the opto-coupler U8, and on to the pulse width modulator.

3 LEAD - SAO2 (SLOT 1)

REVISIONS			
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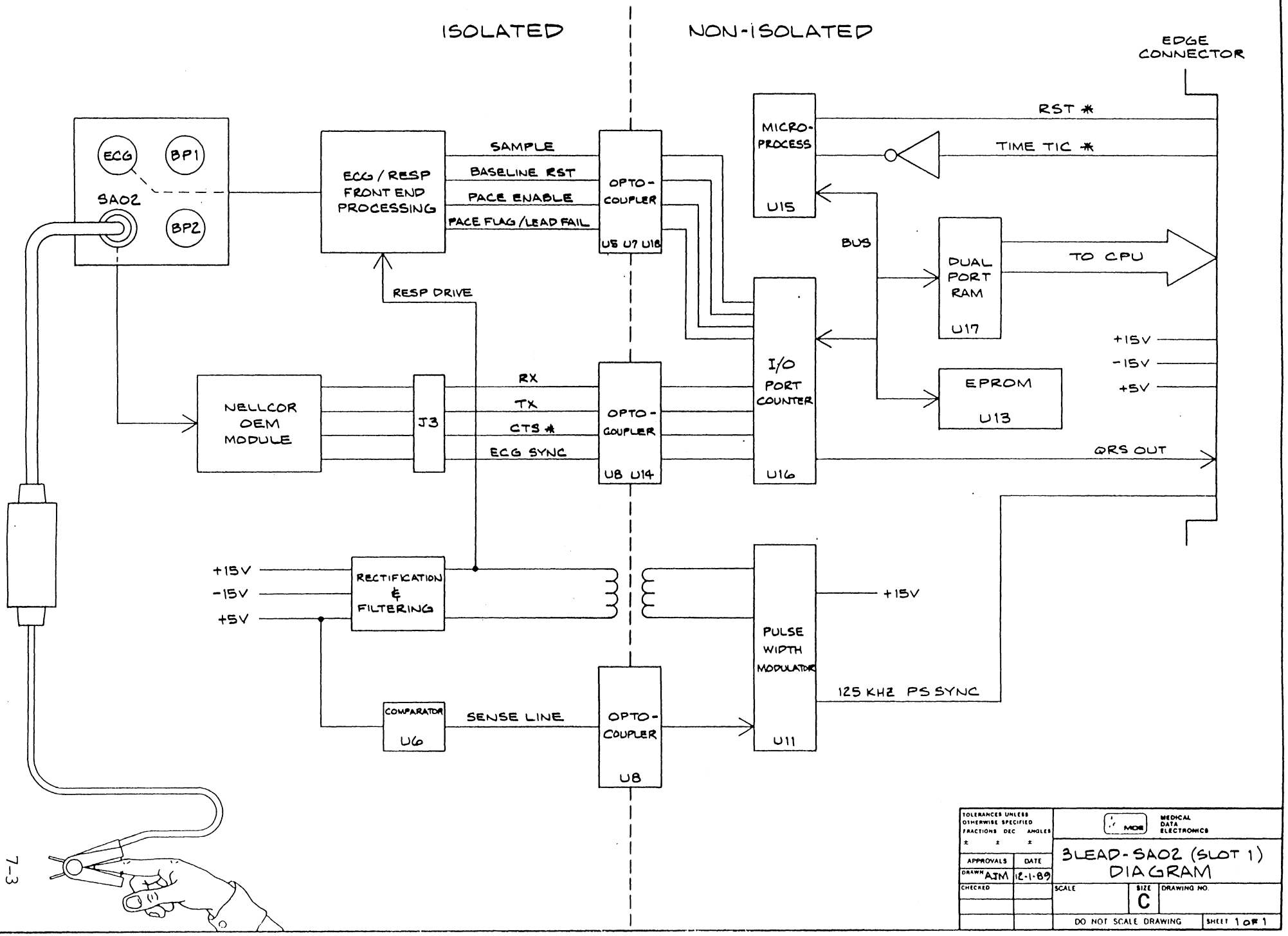


TOLERANCES UNLESS OTHERWISE SPECIFIED		
FRACTIONS	DEC	ANGLES
±	±	±

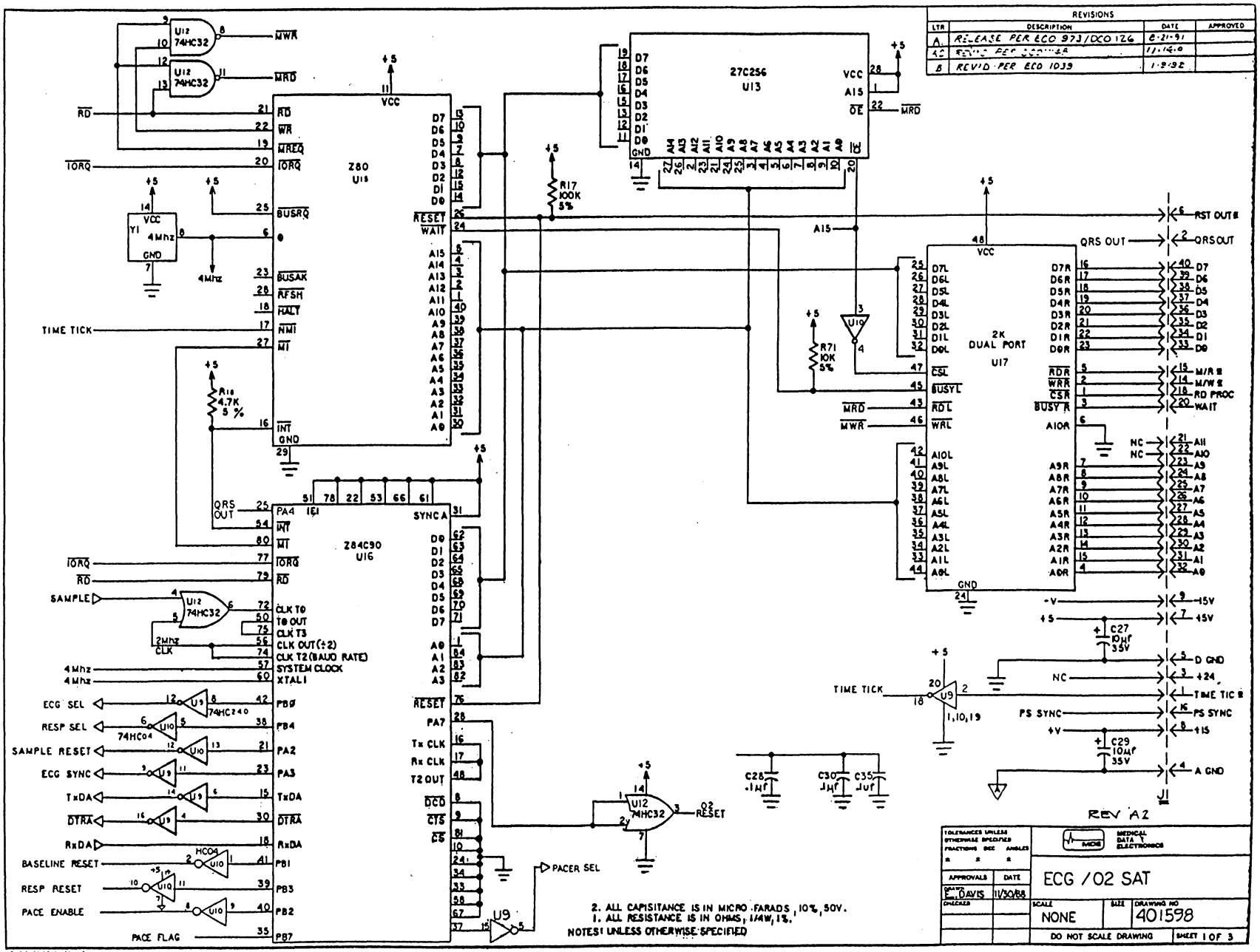
MEDICAL DATA ELECTRONICS

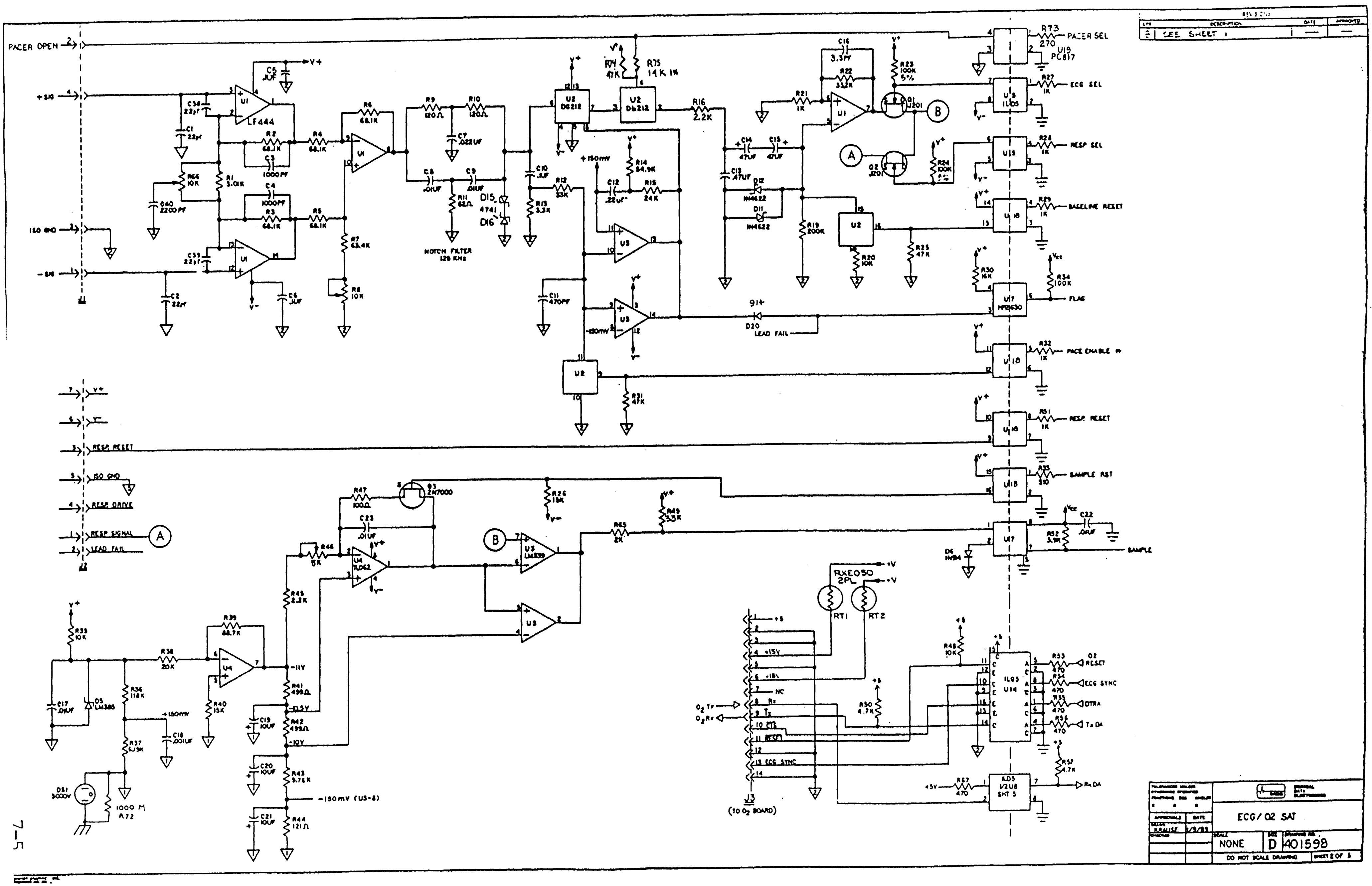
APPROVALS	DATE
DRAWN AJM	12-1-89
CHECKED	

3LEAD - SAO2 (SLOT 1) DIAGRAM

SCALE | SIZE C | DRAWING NO.

DO NOT SCALE DRAWING | SHEET 1 OF 1


REVISIONS
LTR DESCRIPTION DATE APPROVED
A RELEASE PER ECO 973/DCO 126 6-21-91
A1 REVID PER ECO 1039 1-9-92
Z80 U15
Z84C90 U16
27C256 U13
2K DUAL PORT U17
74HC32
74HC240
74HC04
4Mhz
2Mhz CLK
R17 100K 5%
R71 10K 5%
R18 4.7K 5%
C27 10uf 35V
C28 .1uf
C30 .1uf
C35 .1uf
C29 10uf 35V
RST OUT
QRS OUT
M/R
M/W
RD PROC
WAIT
-15V
+15V
D GND
+24
TIME TIC
PS SYNC
+5
A GND
PACER SEL
RESET
BASELINE RESET
RESP RESET
PACE ENABLE
PACE FLAG
ECG SEL
RESP SEL
SAMPLE RESET
ECG SYNC
TxDA
RxDA
SAMPLE
TIME TICK
2. ALL CAPISITANCE IS IN MICRO-FARADS, 10%, 50V.
1. ALL RESISTANCE IS IN OHMS, 1/4W, 1%.
NOTES: UNLESS OTHERWISE SPECIFIED
ECG /02 SAT
SCALE NONE
SIZE
DRAWING NO 401598
DO NOT SCALE DRAWING
SHEET 1 OF 3
REV A2


PACER OPEN
+ SIG
150 GND
- SIG
J1
V+
V-
RESP RESET
ISO GND
RESP DRIVE
RESP SIGNAL
LEAD FAIL
J2
LF444
NOTCH FILTER 120 KHz
DG212
+150mV
-150mV
D20 LEAD FAIL
PACER SEL
U19 PC817
ECG SEL
RESP SEL
BASELINE RESET
FLAG
PACE ENABLE
RESP RESET
SAMPLE RST
SAMPLE
2N7000
LM339
TL062
-11V
-10.5V
-10V
-150mV (U3-8)
RXE050 2PL
RT1
RT2
O2 Tx
O2 Rx
J3 (TO O2 BOARD)
O2 RESET
ECG SYNC
DTRA
Tx DA
Rx DA
IL05 U14
ECG/O2 SAT
NONE
D
401598
DO NOT SCALE DRAWING
SHEET 2 OF 3
SEE SHEET 1

REVISIONS			
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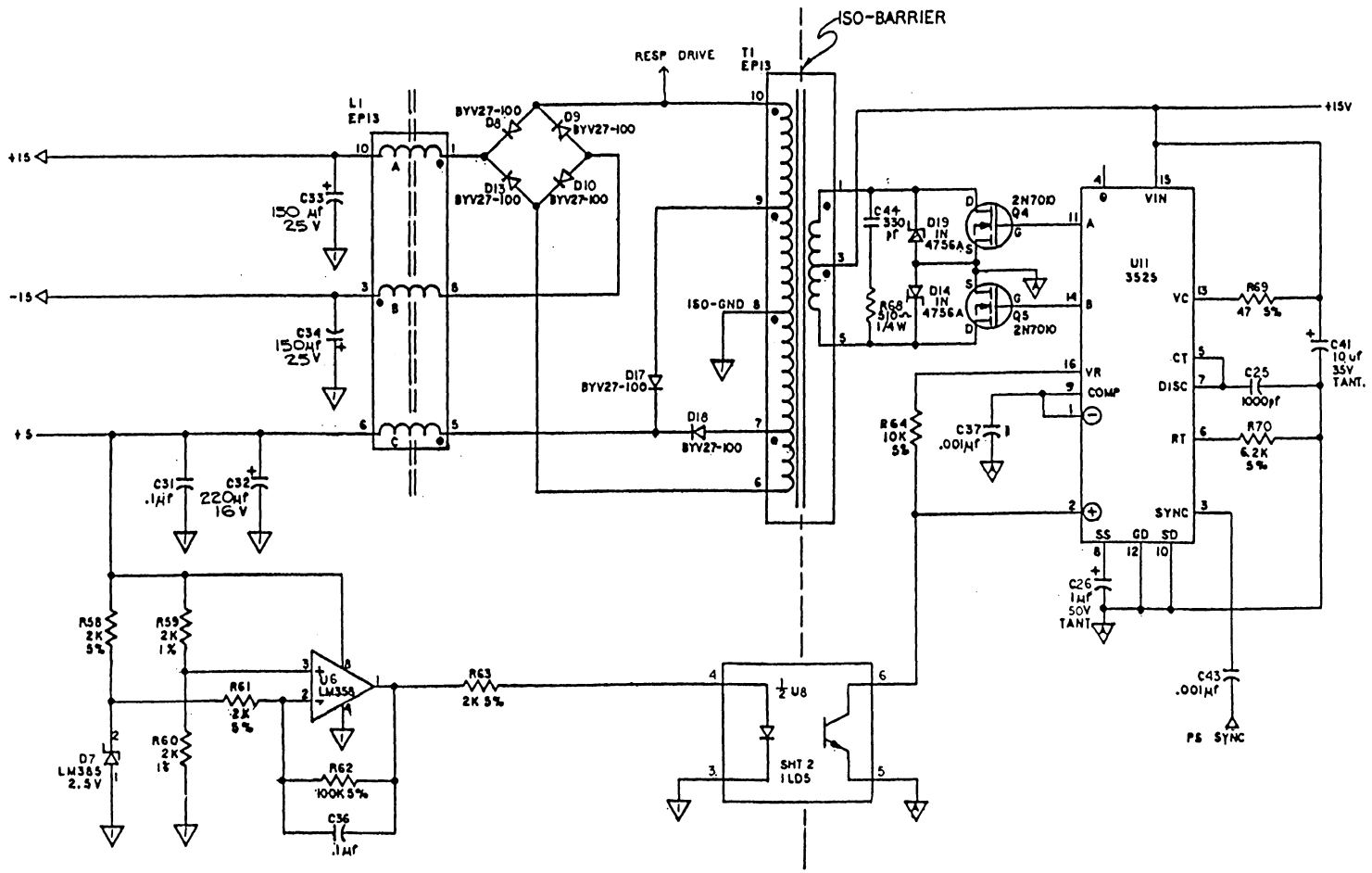

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DEC ANGLES		MEDICAL DATA ELECTRONICS	
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CHECKED		SCALE NONE	SIZE DRAWING NO. 401598
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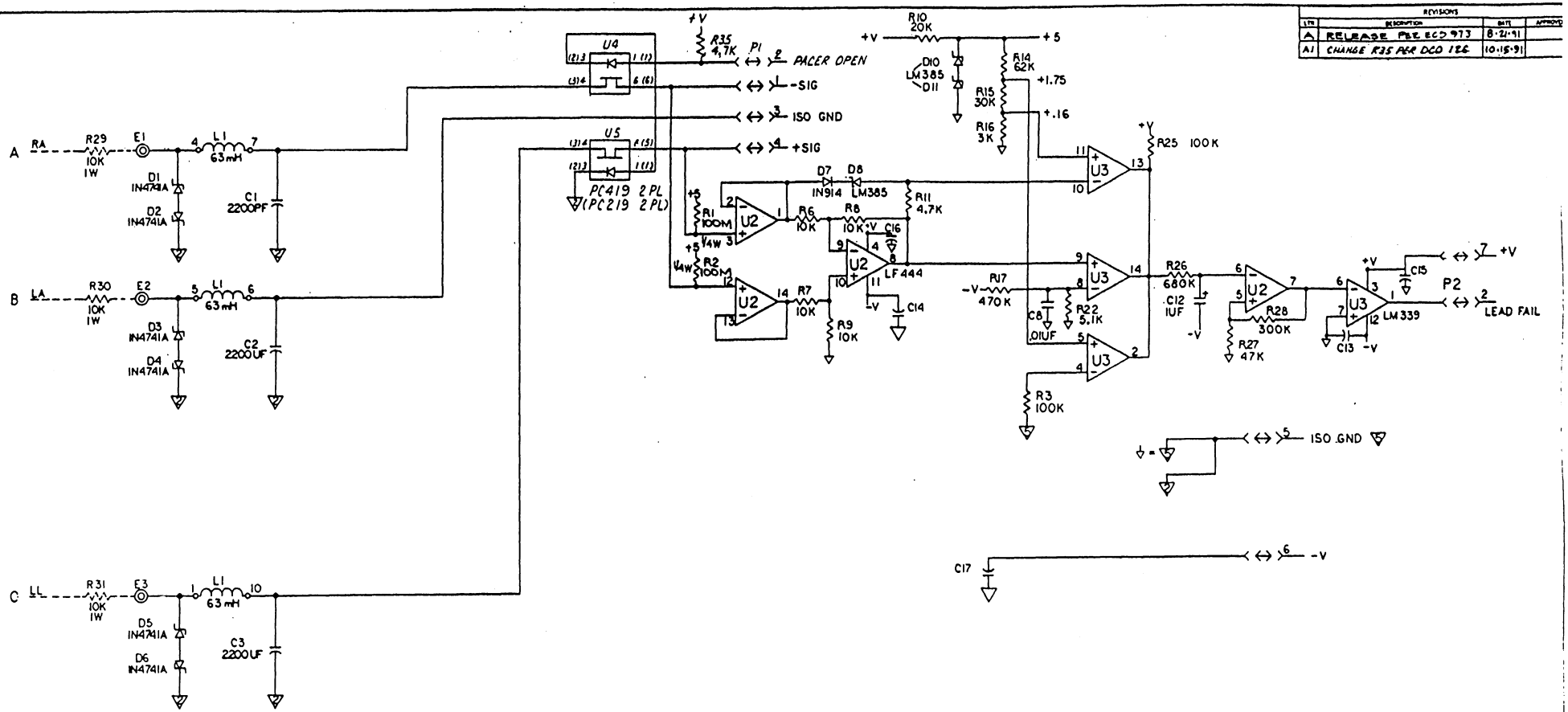


LAST USED: NOT USED:

R 35
D 15
C 20
U 3
T 1
L 2
Q 1

ALL RESISTORS 1/8 W UNLESS NOTED

◎ FEED THROUGH SOLDER PADS

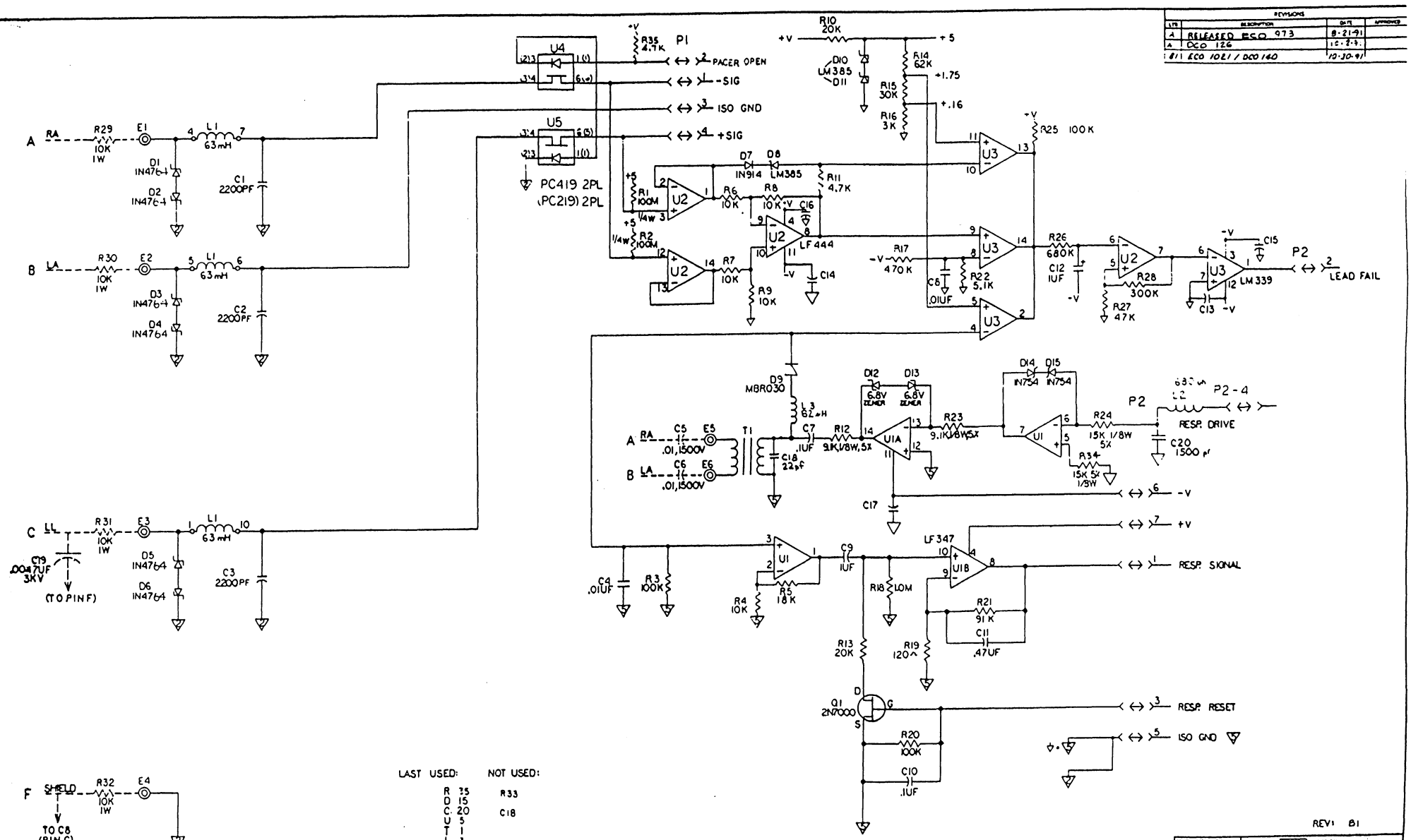
⊣↔⊢ HEADER PIN CONN. .1"/.025

SPARES

REV: A1

ECG SAO2 DAUGHTER BD

SCALE NONE | SIZE D | DRAWING NO. 401601


REVISIONS
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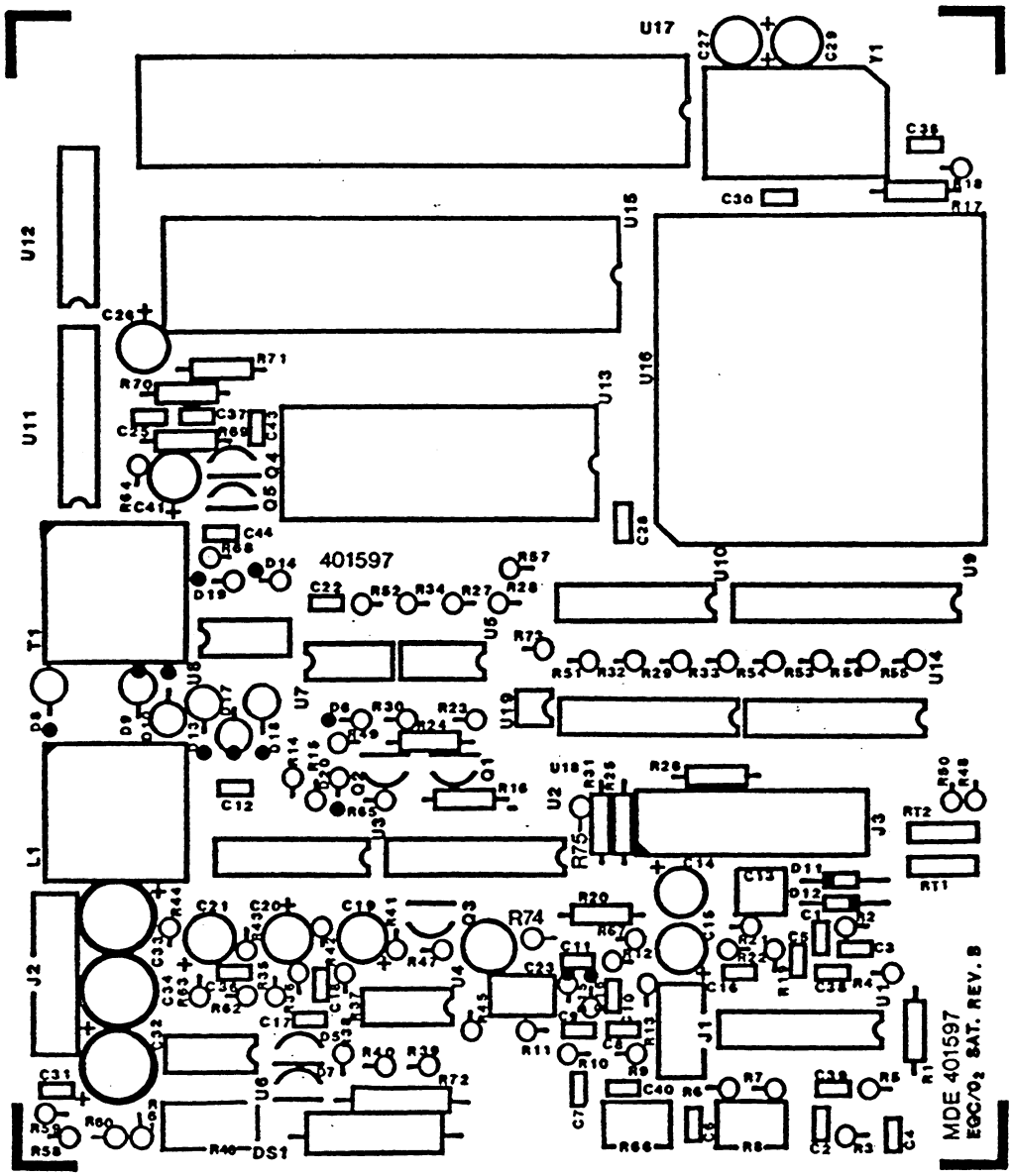
A DCO 126 12-2-9.
B1 ECO 1021 / DCO 140 10-30-91
A RA R29 10K 1W E1 L1 63 mH D1 IN4764 D2 IN4764 C1 2200PF
B LA R30 10K 1W E2 L1 63 mH D3 IN4764 D4 IN4764 C2 2200PF
C LL R31 10K 1W E3 L1 63 mH C19 .0047UF 3KV (TO PIN F) D5 IN4764 D6 IN4764 C3 2200PF
F SHIELD R32 10K 1W E4 TO C8 (PIN C)
U4 U5 PC419 2PL (PC219) 2PL
+V R35 4.7K P1
PACER OPEN
-SIG
ISO GND
+SIG
R10 20K +5 +1.75 +.16
D10 LM385 D11
R14 62K R15 30K R16 3K
R25 100K
D7 IN914 D8 LM385 R11 4.7K
R1 100M R6 10K R8 10K C16
R2 100M R7 10K R9 10K C14
LF 444
R17 470K C6 .01UF R22 5.1K
R26 680K C12 1UF R28 300K R27 47K C15
U3 LM 339 C13
P2 LEAD FAIL
D9 MBR030 L3 62 μH
D12 D13 6.8V ZENER
D14 D15 IN754 IN754
P2-4 RESP. DRIVE
C5 .01, 1500V C6 .01, 1500V T1 C18 22pF C7 .1UF R12 9.1K 1/8W 5%
U1A R23 9.1K 1/8W 5% U1 R24 15K 1/8W 5% R34 15K 5% 1/8W C20 1500 pF
C17
-V
+V
RESP. SIGNAL
C4 .01UF R3 100K R4 10K R5 18K C9 1UF
LF 347 U1B R18 10M R21 91K C11 .47UF
R13 20K R19 120Ω
Q1 2N7000
RESP. RESET
ISO GND
R20 100K C10 .1UF
LAST USED: R 35 D 15 C 20 U 5 T 1 L 3 Q 1
NOT USED: R33 C18
ALL RESISTORS 1/8 W UNLESS NOTED
FEED THROUGH SOLDER PADS
HEADER PIN CONN. .1" / .025
SPARES
REV1 B1
ECG W/RESP. & O2 SAT DAUGHTER BD.
NONE D 401600



SLOT1 $Sa0_2$

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing	Rev	LT
401598-0000	PCBA, ECG 3LD SaO2 MOTHER REV. D (E1074)			A				D	22

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
401597-0000	*1	1	PCB, ECG 3LD SaO2 MOTHER REV. B (E1044)	B	R	22	1.000	EA		Yes		
352100-0003A	*1	2	CAP, 3.3PF,50V,+/-.5PF,RAD,NPO EDPT		R	11	1.000	EA	C16	Yes		
100000	*1	3	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	FOR ASSEMBLY	Yes		
352100-0220A	*1	5	CAP, 22PF,50V,10%,RAD,NPO EDPT		R	22	4.000	EA	C1,2,38,39	Yes		
352100-0223A	*1	6	CAP, .022UF,50V,10%,RAD,X7R		R	22	1.000	EA	C7	Yes		
352100-0331A	*1	7	CAP, 330PF,25V,10%,RAD,X7R		R	22	1.000	EA	C44	Yes		
352100-0471A	*1	8	CAP, 470PF,25V,10%,RAD,X7R		R	22	1.000	EA	C11	Yes		
352300-0007A	*1	9	CAP, .001UF,10%, MYLAR		R	66	3.000	EA	C25,37,43	Yes		
352300-0008A	*1	10	CAP, .01UF,5%,MYLAR		R	66	2.000	EA	C8,9	Yes		
352300-0015A	*1	11	CAP, .22UF,10%,MYLAR		R	66	1.000	EA	C12	Yes		
352300-0018A	*1	12	CAP, .47UF,10%,MYLAR		R	66	1.000	EA	C13	Yes		
352300-0102A	*1	13	CAP, 1000PF,50V,20%,RAD,MYLAR		R	66	1.000	EA	C18	Yes		
352300-0103A	*1	14	CAP, .01UF,50V,20%,RAD,MYLAR		R	22	2.000	EA	C17,22	Yes		
352300-0104A	*1	15	CAP, .1UF,50V,20%,RAD,MYLAR		R	22	5.000	EA	C5,6,28,30,31	Yes		
352300-0104A	*1	16	CAP, .1UF,50V,20%,RAD,MYLAR		R	22	2.000	EA	C35,36	Yes		
352300-0222A	*1	17	CAP, 2200PF,50V OR 100V,1%,MYLAR,.15L.S.		R	77	1.000	EA	C40	Yes		
352301-0103A	*1	18	CAP, .01UF,100V,20%,POLYCARB,.2 L.S.		R	66	1.000	EA	C23	Yes		
352301-0104A	*1	19	CAP, .1UF,5%,MYLAR		R	66	1.000	EA	C10	Yes		
352400-0105A	*1	20	CAP, 1UF,50V,20%,RAD,TANT, MAX: HT. .28; O.D. .16		R	11	1.000	EA	C26	Yes		
352203-0227A	*1	21	CAP, 220uF,16V,20%.RAD,ELECT,8mm x 12mm		R	77	1.000	EA	C32	Yes		
352200-0157A	*1	22	CAP, 150uF,25V,20%,RAD,ELECT,8mm x 12mm		R	22	2.000	EA	C33,34	Yes		
352401-0106A	*1	23	CAP, 10UF,35V,20%,RAD,TANT		R	11	6.000	EA	C19,20,21,27,29,41	Yes		
352401-0476A	*1	24	CAP, 47UF,10V,20%,RAD,TANT (10V ONLY)		R	11	2.000	EA	C14,15	Yes		
354000-0196A	*1	25	CONN, SGL ROW,STRT PIN,SNAP-AWAY (ENTER PER PIN)		R	22	4.000	PIN	1 PC. OF 4 PINS	Yes		

Assembly	Description	Group	PFC	Commodity Class	Planner Buyer	Drawing	Rev	LT
401598-0000	PCBA, ECG 3LD SaO2 MOTHER REV. D (E1074)			A			D	22

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
354000-0196A	*1	26	CONN, SGL ROW,STRT PIN,SNAP-AWAY (ENTER PER PIN)		R	22	7.000	PIN	1 PC. OF 7 PINS	Yes		
354000-0106A	*1	27	CONN, DBL ROW,STRT,SGL PIN,SNAP-AWAY		R	11	14.000	PIN	J3 (14-PIN)	Yes		
356000-0008A	*1	28	REF OSCILLATOR, 4.0MHZ,CMOS HIGH SPEED		R	22	1.000	EA	Y1	Yes		
360500-0048A	*1	29	SPCR, 1/4 X 1/4,SWAGE TYPE		R	11	1.000	EA	DO NOT ISSUE	Yes		
364000-0008A	*1	30	IC, DG212CJ		R	11	1.000	EA	U2	Yes		
364000-0010A	*1	31	IC, LM339		R	11	1.000	EA	U3	Yes		
364000-0011A	*1	32	IC, LM358		R	11	1.000	EA	U6	Yes		
364000-0025A	*1	33	IC, 74HC04		R	11	1.000	EA	U10	Yes		
364000-0027A	*1	34	IC, 74HC32		R	11	1.000	EA	U12	Yes		
364000-0038A	*1	35	IC, 27C256,CMOS,EPROM,200NS		R	11	1.000	EA	U13	Yes		
364000-0080A	*1	36	IC, TMPZ84C00P (Z80A, CMOS VERSION)		R	11	1.000	EA	U15	Yes		
364000-0091A	*1	37	IC, SG 3525		R	44	1.000	EA	U11	Yes		
364000-0093A	*1	38	IC, ILQ5 QUAD OPTO ISOLATOR		R	22	2.000	EA	U14,18	Yes		
364000-0094A	*1	39	IC, HP2630, OPTO ISOLATOR		R	11	1.000	EA	U7	Yes		
364000-0095A	*1	40	IC, MS6132,DUAL PORT RAM, 8 X 2K,48-PIN (OR MS7132)		R	11	1.000	EA	U17	Yes		
364000-0096A	*1	41	IC, 74HC240		R	11	1.000	EA	U9	Yes		
364000-0131A	*1	42	IC, Z84C9008VSC ZILOG		R	11	1.000	EA	U16 - ISSUE TO TEST	Yes		
364000-0132A	*1	43	IC, LF444 NATIONAL ONLY		R	22	1.000	EA	U1	Yes		
364000-0133A	*1	44	IC, TL062ACP		R	11	1.000	EA	U4	Yes		
364000-0134A	*1	45	IC, ILD5 DUAL OPTO		R	11	2.000	EA	U5,8	Yes		
365000-0148A	*1	46	SOCKET, 48 PIN DIP		R	22	1.000	EA	U17	Yes		
365000-0028A	*1	47	SKT, 28-POS,DIP,TIN PLATE,L.P.		R	11	1.000	EA	U13X	Yes		
365000-0040A	*1	48	SKT, 40-POS,DIP,TIN PLATE,L.P.		R	11	1.000	EA	U15X	Yes		
365000-0084A	*1	49	SKT, 84-PIN,PLCC		R	22	1.000	EA	U4X,16X	Yes		

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing	Rev	LT
401598-0000	PCBA, ECG 3LD SaO2 MOTHER REV. D (E1074)			A				D	22

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
370100-0101A	*1	50	RES, 100,1/4W,5%,CF		R	11	1.000	EA	R47	Yes		
370100-0102A	*1	51	RES, 1K,1/4W,5%,CF		R	11	5.000	EA	R27,28,29,32,51	Yes		
370100-0103A	*1	52	RES, 10K,1/4W,5%,CF		R	11	5.000	EA	R20,35,48,64,71	Yes		
370100-0104A	*1	53	RES, 100K,1/4W,5%,CF		R	11	5.000	EA	R34,17,23,24,62	Yes		
370100-0121A	*1	54	RES, 120,1/4W,5%,CF		R	11	2.000	EA	R9,10	Yes		
370100-0204A	*1	57	RES, 200K,1/4W,5%,CF		R	11	1.000	EA	R19	Yes		
370100-0222A	*1	58	RES, 2.2K,1/4W,5%,CF		R	11	2.000	EA	R45,16	Yes		
370100-0243A	*1	60	RES, 24K,1/4W,5%,CF		R	11	1.000	EA	R15	Yes		
370100-0332A	*1	61	RES, 3.3K,1/4W,5%,CF		R	11	2.000	EA	R13,49	Yes		
370100-0333A	*1	62	RES, 33K,1/4W,5%,CF		R	11	1.000	EA	R12	Yes		
370100-0392A	*1	63	RES, 3.9K,1/4W,5%,CF		R	11	1.000	EA	R52	Yes		
370100-0470A	*1	64	RES, 47,1/4W,5%,CF		R	11	1.000	EA	R69	Yes		
370100-0471A	*1	65	RES, 470,1/4W,5%,CF		R	11	5.000	EA	R53,54,55,56,67	Yes		
370100-0472A	*1	66	RES, 4.7K,1/4W,5%,CF		R	11	3.000	EA	R18,50,57	Yes		
370100-0473A	*1	67	RES, 47K,1/4W,5%,CF		R	11	3.000	EA	R25,31,74	Yes		
370100-0511A	*1	68	RES, 510,1/4W,5%,CF		R	11	2.000	EA	R33,68	Yes		
370100-0620A	*1	69	RES, 62,1/4W,5%,CF		R	11	1.000	EA	R11	Yes		
370100-0622A	*1	70	RES, 6.2K,1/4W,5%,CF		R	11	1.000	EA	R70	Yes		
370100-0153A	*1	72	RES, 15K,1/4W,5%,CF		R	11	2.000	EA	R26,40	Yes		
370100-0163A	*1	73	RES, 16K,1/4W,5%,CF		R	11	1.000	EA	R30	Yes		
370100-0202A	*1	74	RES, 2K,1/4W,5%,CF		R	11	4.000	EA	R58,61,63,65	Yes		
370200-1001A	*1	76	RES, 1K,1/4W,1%,MF		R	11	1.000	EA	R21	Yes		
370200-1183A	*1	77	RES, 118K,1/4W,1%,MF		R	11	1.000	EA	R36	Yes		
370200-1210A	*1	78	RES, 121,1/4W,1%,MF		R	11	1.000	EA	R44	Yes		

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing	Rev	LT
401598-0000	PCBA, ECG 3LD SaO2 MOTHER REV. D (E1074)			A				D	22

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
370200-2001A	*1	79	RES, 2K,1/4W,1%,MF		R	11	2.000	EA	R59,60	Yes		
370200-2002A	*1	80	RES, 20K,1/4W,1%,MF		R	11	1.000	EA	R38	Yes		
370200-3011A	*1	81	RES, 3.01K,1/4W,1%,MF		R	11	1.000	EA	R1	Yes		
370200-3322A	*1	82	RES, 33.2K,1/4W,1%,MF		R	11	1.000	EA	R22	Yes		
370200-4990A	*1	83	RES, 499,1/4W,1%,MF		R	11	2.000	EA	R41,42	Yes		
370200-5492A	*1	84	RES, 54.9K,1/4W,1%,MF		R	11	1.000	EA	R14	Yes		
370200-6191A	*1	85	RES, 6.19K, 1/4W 1%, MF		R	11	1.000	EA	R37	Yes		
370200-6342A	*1	86	RES, 63.4K,1/4W,1%,MF		R	11	1.000	EA	R7	Yes		
370200-6812A	*1	87	RES, 68.1K,1/4W,1%,MF		R	11	5.000	EA	R2,3,4,5,6	Yes		
370200-8872A	*1	88	RES, 88.7K,1/4W,1%,MF		R	11	1.000	EA	R39	Yes		
370200-9761A	*1	89	RES, 9.76K,1/4W,1%,MF		R	11	1.000	EA	R43	Yes		
374300-0502A	*1	90	POT, 5K,TRIM,SIDE ADJ,CERMET,3/8 SQR,.15LS		R	11	1.000	EA	R46	Yes		
374401-0103A	*1	91	POT, 10K,TRIMM,MULTI-TURN,CERMET FILM (860X)		R	11	2.000	EA	R8,66	Yes		
376000-0019A	*1	92	XSTR, 2N7000,FET		R	11	1.000	EA	Q3	Yes		
376000-0020A	*1	93	XSTR, J201,FET		R	11	2.000	EA	Q1,2	Yes		
376000-0021A	*1	94	XSTR, 2N7010		R	44	2.000	EA	Q4,5	Yes		
378000-0005A	*1	95	DIO, 1N914,SIGNAL T&R		R	11	2.000	EA	D6,20	Yes		
378000-0011A	*1	96	DIO, 1N4741A,11V,ZENER T&R ***MOTOROLA ONLY***		R	11	2.000	EA	D15,16	Yes		
378000-0005A	*1	97	DIO, 1N914,SIGNAL T&R		R	11	2.000	EA	D11,12	Yes		
378000-0034A	*1	98	DIO, LM385,ZENER (XSTR NATIONAL ONLY)		R	11	2.000	EA	D5,7	Yes		
900000	*1	99	ASSEMBLY LABOR & BURDEN		L	0	0.960	HR		Yes		
378000-0041A	*1	100	DIO, BYV27-150 (OR -200) T&R		R	22	6.000	EA	D8,9,10,13,17,18	Yes		
400988-0000	*1	101	ISO-TRANSFORMER, EP13 SWITCHING SUPPLY		R	33	1.000	EA	T1	Yes		
400989-0000	*1	102	IDCTR, MULTI, EP13		R	22	1.000	EA	L1	Yes		

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing	Rev	LT
401598-0000	PC8A, ECG 3LD SaO2 MOTHER REV. D (E1074)			A				D	22

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
384000-0061A	*1	103	GAS TUBE (SURGE ARRESTER)		R	33	1.000	EA	DS1	Yes		
370401-0108A	*1	104	RES, 1000M,1W,5%,2500V		R	66	1.000	EA	R72	Yes		
370200-1402A	*1	105	RES, 14K,1/4W,1%,MF		R	11	1.000	EA	R75	Yes		
100000	*1	106	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	FOR RESISTORS CHECK	Yes		
100000	*1	107	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	BIN - FILL IF REQUIRE	Yes		
100000	*1	108	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	CUT & JUMP PER	Yes		
100000	*1	109	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	ECO 950 & DCO 089	Yes		
364000-0176A	*1	110	IC, PC817,PHOTOCOUPLER,HIGH DENSITY MNTNG TYPE		R	22	1.000	EA	U19	Yes		
384000-0156A	*1	111	THERMISTOR, PTC RES DEV FOR CIRCUIT PROTECT		R	22	2.000	EA	RT1-2	Yes		
370100-0271A	*1	112	RES, 270,1/4W,5%,CF		R	11	1.000	EA	R73	Yes		
352101-0471A	*1	113	CAP, 470pF,10%,50V,RAD,NP0		R	22	2.000	EA	C3,4	Yes		
378000-0040A	*1	120	DIO, 1N4756A,47V T&R		R	11	2.000	EA	D14,19	Yes		

Cumulative Lead Time for 401598-0000 = 99

Assembly	Description	Group	PFC	Commodity	Class	Planner	Buyer	Drawing	Rev	LT
401600-0000	PCBA, ECG W/RESP 3LD SaO2 DAUGHTER REV. B1 (D140)				A				B1	22

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
401599-0000	*1	1	PCB, ECG 3LD SaO2 DAUGHTER REV. A (E973)		R	22	1.000	EA	-	Yes		
352100-0104A	*1	2	CAP, .1UF,50V,10%,RAD,X7R		R	11	5.000	EA	C13,14,15,16,17	Yes		
352100-0152A	*1	3	CAP, 1500PF,100V,20%,MONO CER,X7R		R	22	1.000	EA	C20	Yes		
352300-0103A	*1	4	CAP, .01UF,50V,20%,RAD,MYLAR		R	22	2.000	EA	C4,8	Yes		
352300-0104A	*1	5	CAP, .1UF,50V,20%,RAD,MYLAR		R	22	2.000	EA	C7,10	Yes		
352300-0222A	*1	6	CAP, 2200PF,50V OR 100V,1%,MYLAR,.15L.S.		R	77	2.000	EA	C1,3	Yes		
352300-0474A	*1	7	CAP, .47UF, 50V,20%,RAD,MYLAR(METALLIZED POLYESTR)		R	22	1.000	EA	C11	Yes		
352301-0105A	*1	8	CAP, 1UF,63V,20%,MYLAR		R	66	1.000	EA	C9	Yes		
352100-0220A	*1	9	CAP, 22PF,50V,10%,RAD,NPO EDPT		R	22	1.000	EA	C18	Yes		
352400-0105A	*1	10	CAP, 1UF,50V,20%,RAD,TANT, MAX: HT. .28; O.D. .16		R	11	1.000	EA	C12	Yes		
354000-0142A	*1	12	CONN, 7 SKT STRP,.1 SKT SP,.335 HT		R	22	1.000	EA		Yes		
354000-0143A	*1	13	CONN, 4 SKT STRP,.1 SKT SP,.335 HT.		R	22	1.000	EA		Yes		
364000-0010A	*1	14	IC, LM339		R	11	1.000	EA	U3	Yes		
352101-0472A	*1	15	CAP, 4700PF,20%,3KV, Z5U, CERAMIC DISC (5000PF OK)		R	22	1.000	EA	C19	Yes		
364000-0132A	*1	16	IC, LF444 NATIONAL ONLY		R	22	1.000	EA	U2	Yes		
365000-0014A	*1	17	SKT, 14-POS,DIP,TIN PLATE,L.P.		R	11	1.000	EA	U1	Yes		
370101-0103A	*1	18	RES, 10K,1/8W,5%,CF		R	11	5.000	EA	R4,6,7,8,9	Yes		
370101-0203A	*1	19	RES, 20K,1/8W,5%,CF		R	11	2.000	EA	R10,13	Yes		
370402-0103A	*1	20	RES, 10K,1/2W,5%,CC (ALLN BRDLY ONLY)*BULK ONLY*		R	22	4.000	EA	R32,29,30,31	Yes		
370101-0153A	*1	22	RES, 15K,1/8W,5%,CF		R	11	2.000	EA	R24,34	Yes		
370101-0104A	*1	23	RES, 100K,1/8W,5%,CF		R	11	3.000	EA	R3,20,25	Yes		
370101-0105A	*1	24	RES, 1M,1/8W,5%,CF		R	11	1.000	EA	R18	Yes		
370101-0121A	*1	25	RES, 120,1/8W,5%,CF		R	11	1.000	EA	R19	Yes		
370101-0183A	*1	26	RES, 18K,1/8W,5%,CF		R	11	1.000	EA	R5	Yes		

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing	Rev	LT
401600-0000	PCBA, ECG W/RESP 3LD SaO2 DAUGHTER REV. B1 (D140)			A				B1	22

Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
370101-0302A	*1	27	RES, 3K,1/8W,5%,CF		R	11	1.000	EA	R16	Yes		
370101-0303A	*1	28	RES, 30K,1/8W,5%,CF		R	11	1.000	EA	R15	Yes		
370101-0304A	*1	29	RES, 300K,1/8W,5%,CF		R	11	1.000	EA	R28	Yes		
370101-0472A	*1	30	RES, 4.7K,1/8W,5%,CF		R	11	1.000	EA	R11	Yes		
370101-0473A	*1	31	RES, 47K,1/8W,5%,CF		R	11	1.000	EA	R27	Yes		
370101-0474A	*1	32	RES, 470K,1/8W,5%,CF		R	11	1.000	EA	R17	Yes		
370101-0512A	*1	33	RES, 5.1K,1/8W,5%,CF		R	11	1.000	EA	R22	Yes		
370101-0623A	*1	34	RES, 62K,1/8W,5%,CF		R	11	1.000	EA	R14	Yes		
370101-0684A	*1	35	RES, 680K,1/8W,5%,CF		R	11	1.000	EA	R26	Yes		
370101-0912A	*1	36	RES, 9.1K,1/8W,5%,CF		R	11	2.000	EA	R12,23	Yes		
370101-0913A	*1	37	RES, 91K,1/8W,5%,CF		R	22	1.000	EA	R21	Yes		
370500-0107A	*1	38	RES, 100M,1/4W,5%,M.O. (O R M.G.)		R	33	2.000	EA	R1,2	Yes		
376000-0019A	*1	39	XSTR, 2N7000,FET		R	11	1.000	EA	Q1	Yes		
378000-0005A	*1	40	DIO, 1N914,SIGNAL T&R		R	11	1.000	EA	D7	Yes		
378000-0009A	*1	41	DIO, 1N754A,6.8V,ZENER T& R ***MOT ONLY***		R	11	4.000	EA	D12,13,14,15	Yes		
378000-0054A	*1	42	DIO, 1N4764,100V,ZENER		R	22	6.000	EA	D1,2,3,4,5,6	Yes		
378000-0034A	*1	43	DIO, LM385,ZENER (XSTR NA TIONAL ONLY)		R	11	3.000	EA	D8,10,11	Yes		
378000-0037A	*1	44	DIO, MBR030,SCHOTTKY RCTF R		R	11	1.000	EA	D9	Yes		
382200-0030A	*1	45	INDCTR, 680uH SHIELDED		R	22	1.000	EA	L2	Yes		
352600-0019A	*1	46	CAP, .01UF,1000V,20%,Z5U, CER DISC,.4 L.S.		R	11	2.000	EA	C5,6	Yes		
400554-0000	*1	47	IDCTR, MULTI ESCORT II, R EV. 'B' **(FIFO)**		R	22	1.000	EA	L1	Yes		
364000-0135A	*1	48	IC, LF347, SCREENED TO +/ -1.5mV OFFSET & LOW NOISE		A	22	1.000	EA	U1	Yes		
382200-0027A	*1	49	IDCTR, 82uH,SHIELDED,ISOL ATED		R	22	1.000	EA	L3 IN SERIES WITH D9	Yes		
400553-0000	*1	50	XFMR, ESC. II RESP DRIVE REV. A **(FIFO)**		R	22	1.000	EA	T1	Yes		

Assembly	Description	Group	PFC	Commodity	Class	Planner	Buyer	Drawing	Rev	LT
401600-0000	PCBA, ECG W/RESP 3LD SaO2 DAUGHTER REV. B1 (D140)				A				B1	22

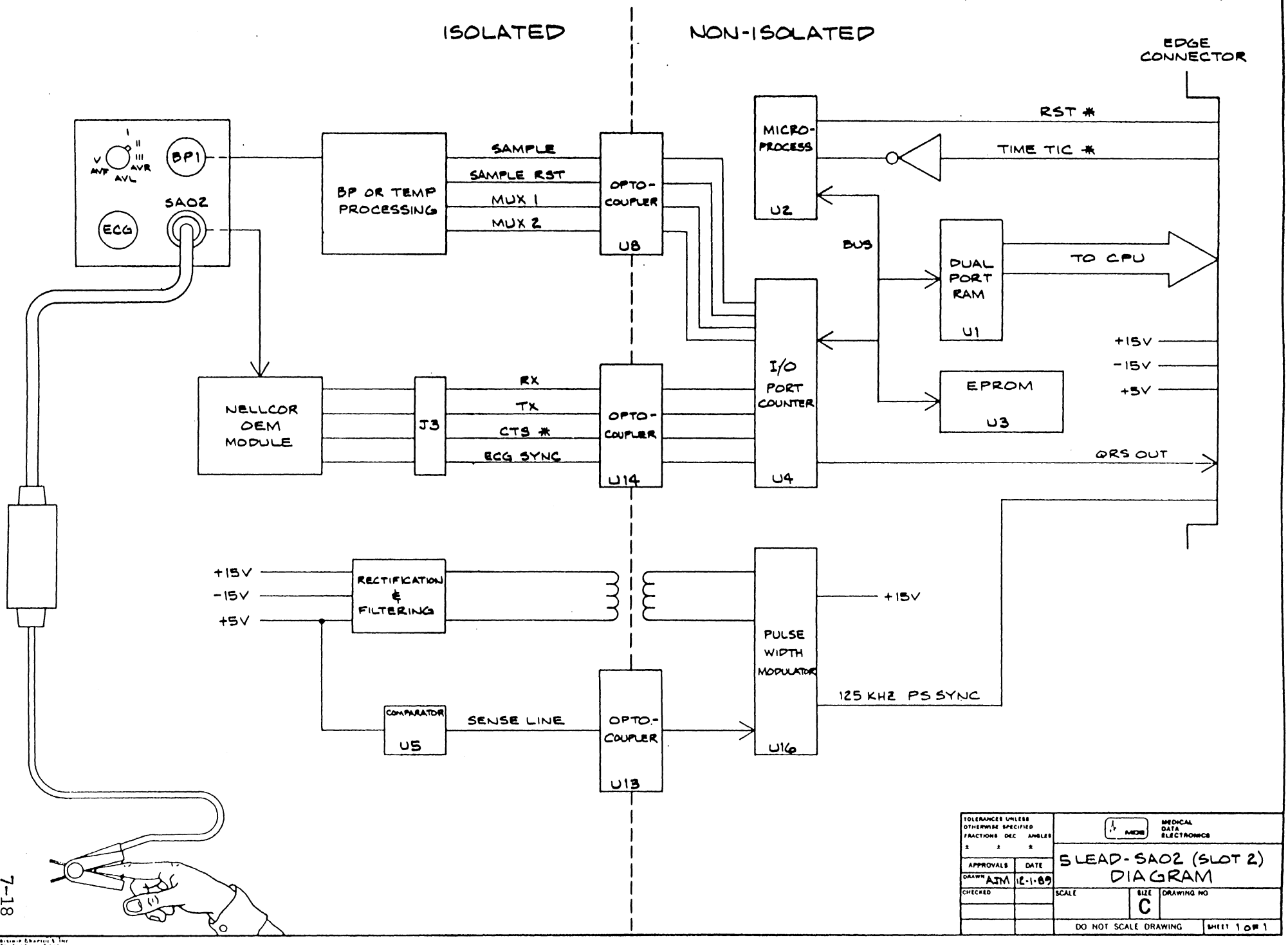
Shrinkage Factor: 0.000

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN	END
100000	*1	51	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	FOR ASSEMBLY	Yes		
100000	*1	52	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	FOR RESISTORS CHECK	Yes		
100000	*1	53	NOTES & SPEC. INSTRUCTIONS		P	0	0.000	EA	BIN - FILL IF REQUIRE	Yes		
364000-0175A	*1	54	IC, PC219,PHOTOCOUPLER,MINI-FLAT PKG.		R	22	2.000	EA	U4-5	Yes		
370100-0472A	*1	55	RES, 4.7K,1/4W,5%,CF		R	11	1.000	EA	R35	Yes		
399200-0001A	*1	56	24 GA BUSS WIRE, 1000 FT/ROLL		R	11	0.100	FT.	C2 - 1 PC = 1/2 IN.	Yes		
900000	*1	99	ASSEMBLY LABOR & BURDEN		L	0	0.190	HR	-	Yes		

Cumulative Lead Time for 401600-0000 = 99

5 LEAD - SAO2 (SLOT 2)

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



TOLERANCES UNLESS OTHERWISE SPECIFIED		
FRACTIONS	DEC	ANGLES
±	±	±

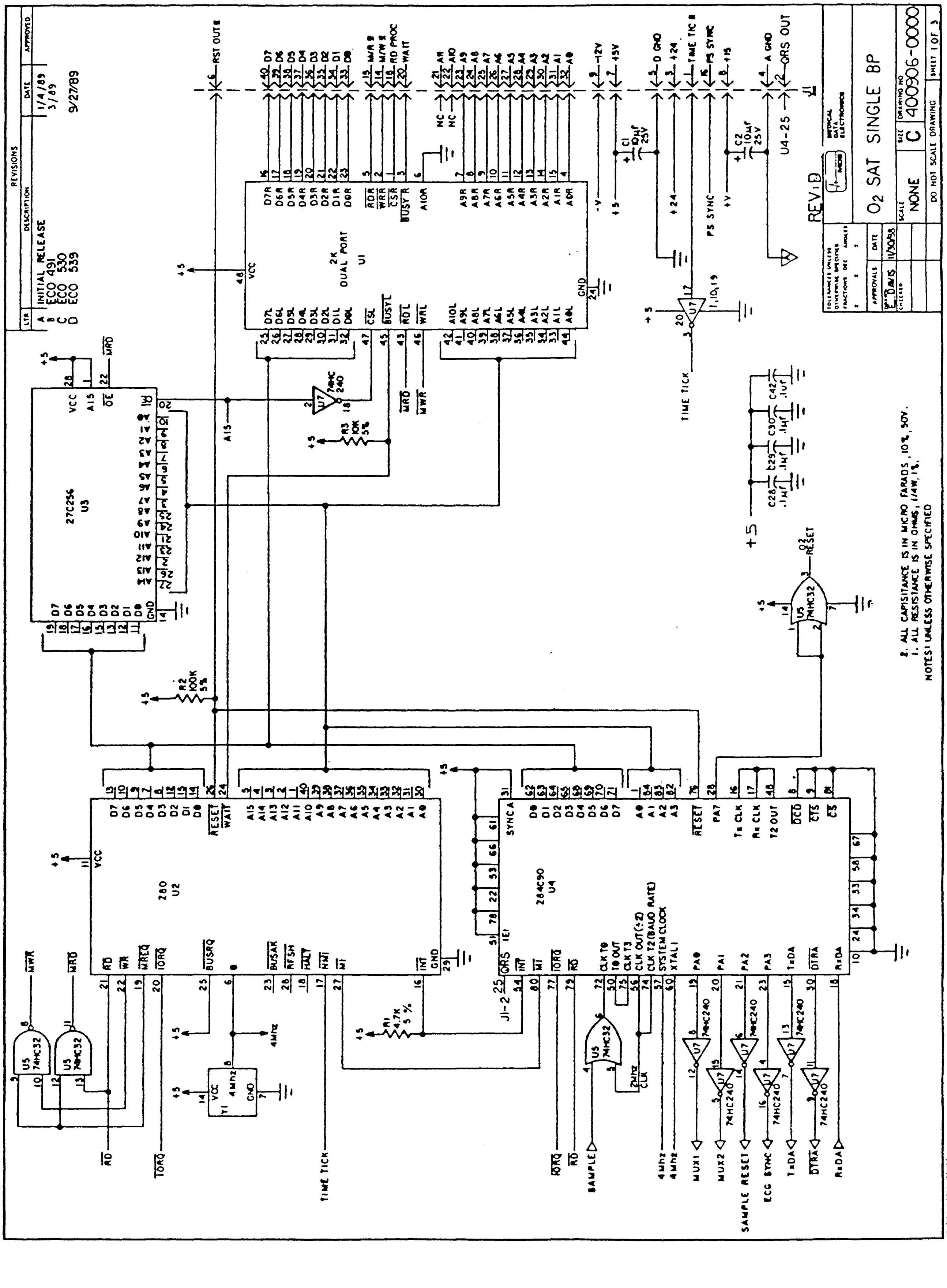
APPROVALS	DATE
DRAWN AJM	12-1-89
CHECKED	

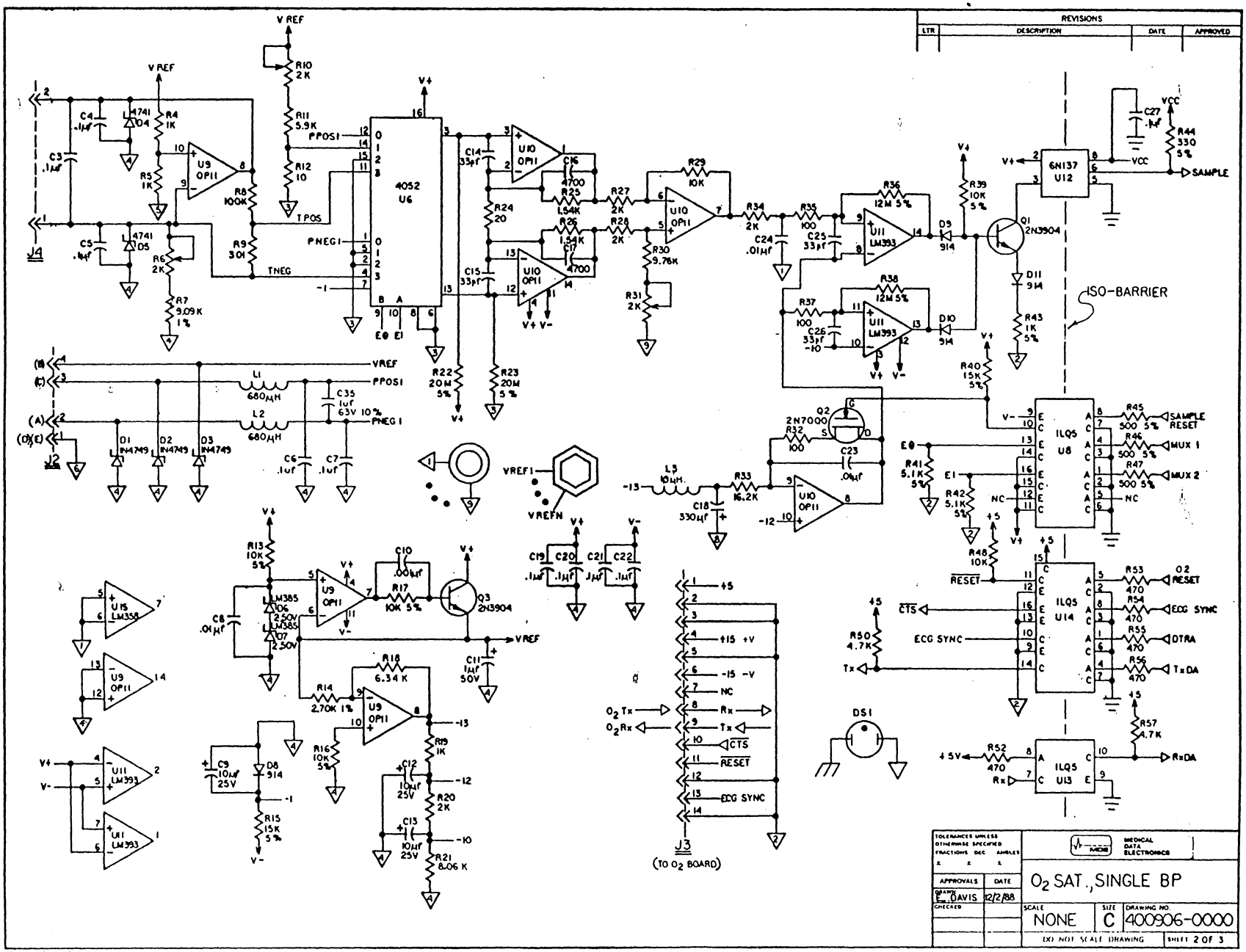
MDE MEDICAL DATA ELECTRONICS

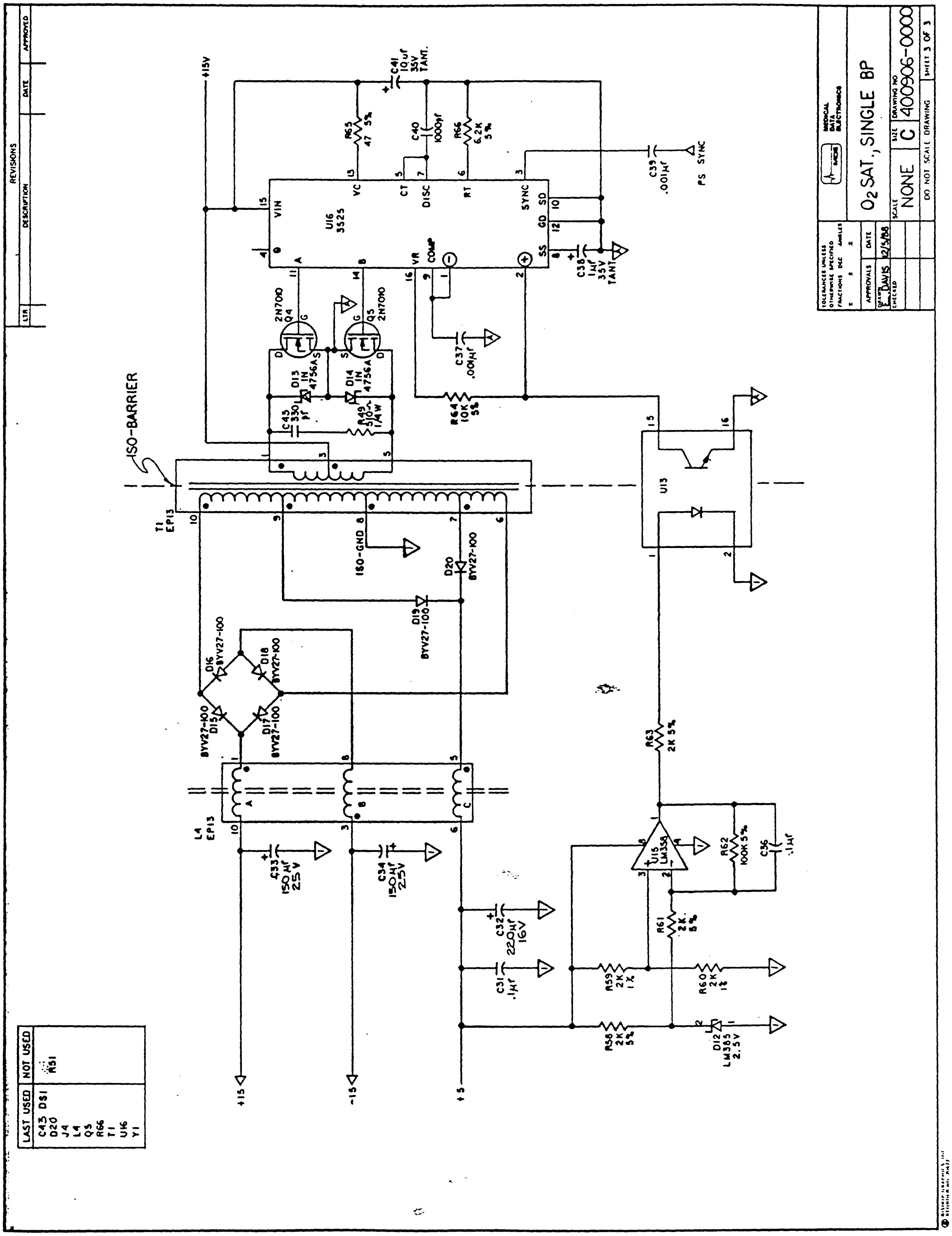
5 LEAD - SAO2 (SLOT 2) DIAGRAM

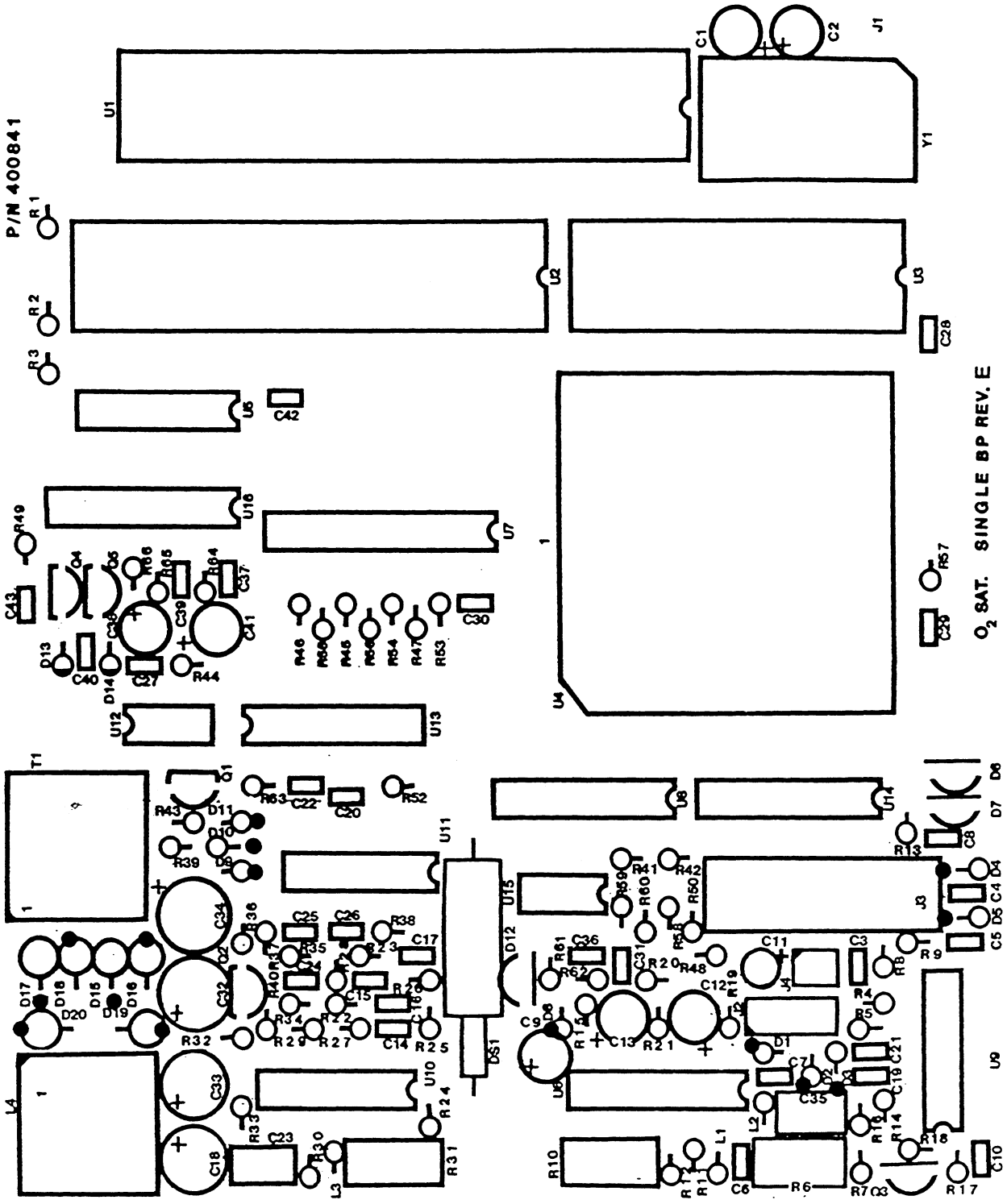
SCALE | SIZE C | DRAWING NO

DO NOT SCALE DRAWING | SHEET 1 OF 1


REVISIONS
A INITIAL RELEASE 1/4/89
B ECO 491 3/89
C ECO 530
D ECO 539 9/27/89
27C256 U3
Z80 U2
Z84C90 U4
2K DUAL PORT U1
NOTES: 1. ALL RESISTANCE IS IN OHMS, 1/4W, 1%.
2. ALL CAPISITANCE IS IN MICRO FARADS, 10%, 50V.
UNLESS OTHERWISE SPECIFIED
REV. D
O2 SAT SINGLE BP
SCALE NONE
SIZE C
400306-0000
DO NOT SCALE DRAWING
SHEET 1 OF 3


REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
ISO-BARRIER
(TO O2 BOARD)
O2 SAT., SINGLE BP
MEDICAL DATA ELECTRONICS
E. DAVIS
12/2/88
NONE
C
400906-0000
DO NOT SCALE DRAWING
SHEET 2 OF 3


O2 SAT, SINGLE BP
400906-0000
C
NONE
DO NOT SCALE DRAWING
SHEET 3 OF 3
E. DAVIS
12/5/88
MEDICAL DATA ELECTRONICS
REVISIONS
ISO-BARRIER
U16 3525
U13
U15 LM358
T1 EP13
L4 EP13
ISO-GND
PS SYNC
+15
-15
+5
LAST USED
NOT USED



SLOT2 SaO^2

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
400906-0000	PCBA, 02 SAT. SINGLE BP, REVISION "G" (E787)			A			

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
400841-0000	*1	1	PCB, 02 SAT,SNGL. BP,RAW BD, REVISION 'E'	R	33		1.0	EA	-	Yes	
352100-0102A	*1	2	CAP, 1000PF,50V,10%,RAD,X7R	R	11		1.0	EA	C37	Yes	
352300-0104A	*1	3	CAP, .1UF,50V,20%,RAD,MYLAR	R	22		7.0	EA	C19,20,21,22,27,28,29	Yes	
352300-0104A	*1	4	CAP, .1UF,50V,20%,RAD,MYLAR	R	22		4.0	EA	C30,31,36,42	Yes	
352101-0330A	*1	6	CAP, 33PF,100V,5%,RAD,NPO	R	22		4.0	EA	C14,15,25,26	Yes	
352201-0337A	*1	7	CAP, 330UF,16V,ELEC,RAD	R	22		1.0	EA	C18	Yes	
352300-0007A	*1	8	CAP, .001UF,10%, MYLAR	R	66		3.0	EA	C10,39,40	Yes	
352300-0012A	*1	9	CAP, .01UF,10%,MYLAR	R	77		2.0	EA	C8,24	Yes	
352300-0017A	*1	10	CAP, .0047UF,10%,MYLAR	R	77		2.0	EA	C16,17	Yes	
352301-0103A	*1	11	CAP, .01UF,100V,20%,POLYCARB,.2 L.S.	R	66		1.0	EA	C23	Yes	
352301-0104A	*1	12	CAP, .1UF,5%,MYLAR	R	66		4.0	EA	C3,4,5,7	Yes	
352400-0105A	*1	13	CAP, 1UF,50V,20%,RAD,TANT, MAX: HT. .28; O.D. .16	R	11		2.0	EA	C11,38	Yes	
352401-0106A	*1	14	CAP, 10UF,35V,20%,RAD,TANT	R	11		6.0	EA	C1,2,9,12,13,41	Yes	
352203-0227A	*1	15	CAP, 220uF,16V,20%.RAD,ELECT,8mm x 12mm	R	22		1.0	EA	C32	Yes	
352200-0157A	*1	16	CAP, 150uF,25V,20%,RAD,ELECT,8mm x 12mm	R	22		2.0	EA	C33,34	Yes	
354000-0103A	*1	17	CONN, SGL ROW,STRT,SGL PINS,SNAP-AWAY	R	11		4.0	PIN	J2 (4-PIN)	Yes	
354000-0103A	*1	18	CONN, SGL ROW,STRT,SGL PINS,SNAP-AWAY	R	11		2.0	PIN	J4 (2-PIN)	Yes	
354000-0106A	*1	19	CONN, DBL ROW,STRT,SGL PIN,SNAP-AWAY	R	11		14.0	PIN	J3 (14-PIN)	Yes	
356000-0008A	*1	20	REF OSCILLATOR, CMOS 4.0MHZ,HIGH SPEED	R	22		1.0	EA	Y1	Yes	
364000-0010A	*1	21	IC, LM339	R	11		1.0	EA	U11	Yes	
364000-0011A	*1	22	IC, LM358	R	11		1.0	EA	U15	Yes	
364000-0027A	*1	23	IC, 74HC32	R	11		1.0	EA	U5	Yes	
364000-0038A	*1	24	IC, 27C256,CMOS,EPROM,200NS	R	11		1.0	EA	U3	Yes	
364000-0055A	*1	25	IC, CD4052	R	11		1.0	EA	U6	Yes	
364000-0065A	*1	26	IC, OP11FP,OP AMP	R	11		2.0	EA	U9,10	Yes	

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
400906-0000	PCBA, 02 SAT. SINGLE BP, REVISION "G" (E787)					A	

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
364000-0080A	*1	27	IC, TMPZ84C00P (Z80A, CMOS VERSION)		R	11	1.0	EA	U2		Yes
364000-0091A	*1	28	IC, SG 3525		R	44	1.0	EA	U16		Yes
364000-0093A	*1	29	IC, ILQ5 QUAD OPTO ISOLAT OR		R	11	3.0	EA	U8,13,14		Yes
364000-0095A	*1	30	IC, MS6132,DUAL PORT RAM, 8 X 2K,48-PIN (OR MS7132)		R	11	1.0	EA	U1		Yes
364000-0096A	*1	31	IC, 74HC240		R	11	1.0	EA	U7		Yes
364000-0099A	*1	32	IC, 6N137		R	11	1.0	EA	U12		Yes
364000-0131A	*1	33	IC, Z84C9008VSC ZILOG		R	11	1.0	EA	U4 - ISSUE TO TEST		Yes
365000-0084A	*1	34	SKT, 84-PIN,PLCC		R	22	1.0	EA	U4X		Yes
370100-0101A	*1	35	RES, 100,1/4W,5%,CF		R	11	3.0	EA	R32,35,37		Yes
370100-0102A	*1	36	RES, 1K,1/4W,5%,CF		R	11	1.0	EA	R43		Yes
370100-0103A	*1	37	RES, 10K,1/4W,5%,CF		R	11	7.0	EA	R3,13,16,17,39,48,64		Yes
370100-0104A	*1	38	RES, 100K,1/4W,5%,CF		R	11	2.0	EA	R2,62		Yes
370100-0126A	*1	39	RES, 12M,1/4W,5%,CF		R	11	2.0	EA	R36,38		Yes
370100-0153A	*1	40	RES, 15K,1/4W,5%,CF		R	11	2.0	EA	R15,40		Yes
370100-0202A	*1	41	RES, 2K,1/4W,5%,CF		R	11	3.0	EA	R58,61,63		Yes
370100-0206A	*1	42	RES, 20M,1/4W,10%,CF		R	11	2.0	EA	R22,23		Yes
370100-0331A	*1	44	RES, 330,1/4W,5%,CF		R	11	1.0	EA	R44		Yes
370100-0470A	*1	45	RES, 47,1/4W,5%,CF		R	11	1.0	EA	R65		Yes
370100-0471A	*1	46	RES, 470,1/4W,5%,CF		R	11	5.0	EA	R52,53,54,55,56		Yes
370100-0472A	*1	47	RES, 4.7K,1/4W,5%,CF		R	11	3.0	EA	R1,50,57		Yes
370100-0511A	*1	48	RES, 510,1/4W,5%,CF		R	11	4.0	EA	R45,46,47,49		Yes
370100-0512A	*1	49	RES, 5.1K,1/4W,5%,CF		R	11	2.0	EA	R41,42		Yes
370100-0622A	*1	50	RES, 6.2K,1/4W,5%,CF		R	11	1.0	EA	R66		Yes
370200-0100A	*1	51	RES, 10,1/4W,1%,MF		R	11	1.0	EA	R12		Yes
370200-0200A	*1	52	RES, 20,1/4W,1%,MF		R	11	1.0	EA	R24		Yes

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
400906-0000	PCBA, 02 SAT. SINGLE BP, REVISION "G" (E787)						A

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
370200-1001A	*1	53	RES, 1K,1/4W,1%,MF		R	11	3.0	EA	R4,5,19	Yes	
370200-1002A	*1	54	RES, 10K,1/4W,1%,MF		R	11	1.0	EA	R29	Yes	
370200-1003A	*1	55	RES, 100K,1/4W,1%,MF		R	11	1.0	EA	R8	Yes	
370200-1541A	*1	56	RES, 1.54K,1/4W,1%,MF		R	11	2.0	EA	R25,26	Yes	
370200-1622A	*1	57	RES, 16.2K,1/4W,1%,MF		R	11	1.0	EA	R33	Yes	
370200-2001A	*1	58	RES, 2K,1/4W,1%,MF		R	11	6.0	EA	R20,27,28,34,59,60	Yes	
370200-2701A	*1	59	RES, 2.7K,1/4W,1%,MF		R	11	1.0	EA	R14	Yes	
370200-3010A	*1	60	RES, 301,1/4W,1%,MF		R	11	1.0	EA	R9	Yes	
370200-5901A	*1	61	RES, 5.9K,1/4W,1%,MF		R	11	1.0	EA	R11	Yes	
370200-6341A	*1	62	RES, 6.34K,1/4W,1%,MF		R	11	1.0	EA	R18	Yes	
370200-8061A	*1	63	RES, 8.06K,1/4W,1%,MF (8 .05K N/A ;OK PER KR)		R	11	1.0	EA	R21	Yes	
370200-9091A	*1	64	RES, 9.09K,1/4W,1%,MF		R	11	1.0	EA	R7	Yes	
370200-9761A	*1	65	RES, 9.76K,1/4W,1%,MF		R	11	1.0	EA	R30	Yes	
374300-0202A	*1	66	POT, 2K,TRIM,SIDE ADJ,CER MET,3/8 SQR,.15LS		R	11	3.0	EA	R6,10,31	Yes	
376000-0003A	*1	67	XSTR, 2N3904		R	11	2.0	EA	Q1,3	Yes	
376000-0019A	*1	68	XSTR, 2N7000,FET		R	11	1.0	EA	Q2	Yes	
376000-0021A	*1	69	XSTR, 2N7010		R	11	2.0	EA	Q4,5	Yes	
378000-0005A	*1	70	DIO, 1N914,SIGNAL		R	11	4.0	EA	D8,9,10,11	Yes	
378000-0011A	*1	71	DIO, 1N4741A,11V,ZENER ** *MOTOROLA ONLY***		R	11	2.0	EA	D4,5	Yes	
378000-0012A	*1	72	DIO, 1N4749A,24V,ZENER ** *MOT ONLY***		R	11	3.0	EA	D1,2,3	Yes	
378000-0034A	*1	73	DIO, LM385,ZENER (XSTR NA TIONAL ONLY)		R	11	3.0	EA	D6,7,12	Yes	
378000-0040A	*1	74	DIO, 1N4756A,47V		R	11	2.0	EA	D13,14	Yes	
378000-0041A	*1	75	DIO, BYV27-150 (OR -100)		R	22	6.0	EA	D15,16,17,18,19,20	Yes	
400988-0000	*1	76	ISO-TRANSFORMER, EP13 SWI TCHING SUPPLY		R	33	1.0	EA	T1	Yes	
382200-0005A	*1	77	CHOKE, 10UH,MOLDED		R	11	1.0	EA	L3	Yes	

Assembly	Description	Group	PFC	Commodity Class	Planner Buyer	Drawing
400906-0000	PCBA, 02 SAT. SINGLE BP, REVISION "G" (E787)			A		

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
382200-0015A	*1	78	CHOKE, 680 UH	R	11		2.0	EA	L1,2	Yes	
400989-0000	*1	79	MULTI-INDCTR, EP13	R	22		1.0	EA	L4	Yes	
384000-0061A	*1	80	GAS TUBE (SURGE ARRESTER)	R	33		1.0	EA	DS1	Yes	
365000-0040A	*1	81	SKT, 40-POS,DIP,TIN PLATE ,L.P.	R	11		1.0	EA	U2	Yes	
365000-0148A	*1	82	SOCKET, 48 PIN DIP	R	22		1.0	EA	U1	Yes	
365000-0028A	*1	83	SKT, 28-POS,DIP,TIN PLATE ,L.P.	R	11		1.0	EA	U3	Yes	
352100-0331A	*1	84	CAP, 330PF,25V,10%,RAD,X7 R	R	22		1.0	EA	C43	Yes	
352301-0105A	*1	85	CAP, 1UF,63V,20%,MYLAR	R	22		1.0	EA	C35	Yes	
352100-0104A	*1	86	CAP, .1UF,50V,10%,RAD,X7R	R	11		1.0	EA	C6	Yes	

Cumulative Lead Time for 400906-0000 = 77

SWITCHING POWER SUPPLY BOARD

CHAPTER 8

8.0.0 SWITCHING POWER SUPPLY BOARD WITH BATTERY CHARGER

8.1.0 OVERVIEW

The Switching Power Supply Board provides the flexibility to operate the ESCORT via two separate input circuits, along with producing DC operating voltages used throughout the monitor. The DC voltages are regulated by a sense line on the +15V output. Battery level indication originates on this board and the battery charging circuitry is incorporated into the design.

8.2.0 INPUT CIRCUITS

The ESCORT monitor can be powered by two different input modes. The monitor can be:

1. Plugged into an AC outlet, or
2. Powered by internal battery packs

When the ESCORT is plugged into an AC outlet, AC power passes through the power transformer. This steps down the line voltage to approximately 17 VAC and provides line power isolation. Full wave rectification is completed by the Bridge Rectifier CR1. The capacitors C13, C14, C15, C17, C30, and C31 filter the DC voltage.

The ON/STBY switch interrupts Vin to the pulse width modulator, U2. Local oscillation comes from R14, R15, and C7, which provide a free running frequency to the regulator. Pin 3 of U2 is a 250 KHz synchronizing input signal from the CPU, which will preempt the local oscillation. This signal assists in reducing beat frequency noise on ECG and other circuits. It also keeps all output voltages in phase with each other. C11 and R13 compensate for and stabilize the frequency. A soft start occurs when C8 slowly charges to capacity. The switching outputs of U2 pins 11 and 14 go to the high power MOSFET transistors Q3 and Q4. They, in turn, drive the transformer T1. Clamping diodes, D2 and D3, provide spike protection for Q3 and Q4. The voltages derived from T1 are +24V, +15V, +7.5V, -15V, and
-17V.

8.2.1 VOLTAGE SENSE

Because the +15V output has the largest demand for power consumption, it is used by U2 for voltage regulation. A voltage feedback signal for a closed loop operation provides a sense line to U2 pin 1. U2 will vary the duty cycle of its switching output pins 11 and 14 to maintain the regulated output of +15V. Mutual inductance from windings in T1 keep all of the other voltages at a constant. Each of the voltages have their own rectifying and L.C. circuits to provide AC ripple filtering.

8.2.2 INDICATORS AND SIGNALS

Also contained on the Power Supply Board are battery level and AC detect signals (BATT LEVEL and AC DETECT). BATT LEVEL, found at J5 pin 11, is sent to the CPU for evaluation to determine the charge level of the batteries. If AC is supplying the **ESCORT** with power then AC DETECT at J5 pin 5 will be high. The AC LED will be enabled at J2 pin 2 and controlled by the AC LIGHT signal. When being powered by the battery packs, the signal will be pulled low by circuitry on the Battery Charger Section.

8.3.0 BATTERY CHARGING CIRCUITRY

8.3.1 OVERVIEW

After AC voltage enters the charging circuit, it is full wave rectified and filtered. A current sensing circuit checks battery level for fully charged or not-fully charged condition.

If the batteries are not fully charged, voltage regulators will charge them at 150 mA. Current limiting is internal to the regulators. To prevent excessive power consumption, the signal BATT CHG CTRL from the CPU will not allow charging when the recorder is in use. When charging current is active, it passes through blocking diodes and on to the batteries. The two diodes provide discharge protection for the PCBA.

8.3.2 CURRENT SENSING

Current sensing (for charging status) is done by U3, a comparator that measures the difference at pin 2 and 3. If pin 3 is higher than pin 2, the output at pin 1 is low. This provides a path for the voltage regulators. By redirecting in this way, the batteries cease to be charged.

If 85 mA or more is sensed, the batteries are in the charging mode and the charging voltage is +15V. The CHG LED will be "ON". If less than 85 mA is sensed, the batteries are fully charged and the voltage drops to approximately 13.8V. The CHG LED will be "OFF".

8.3.3 TEMPERATURE COMPENSATION

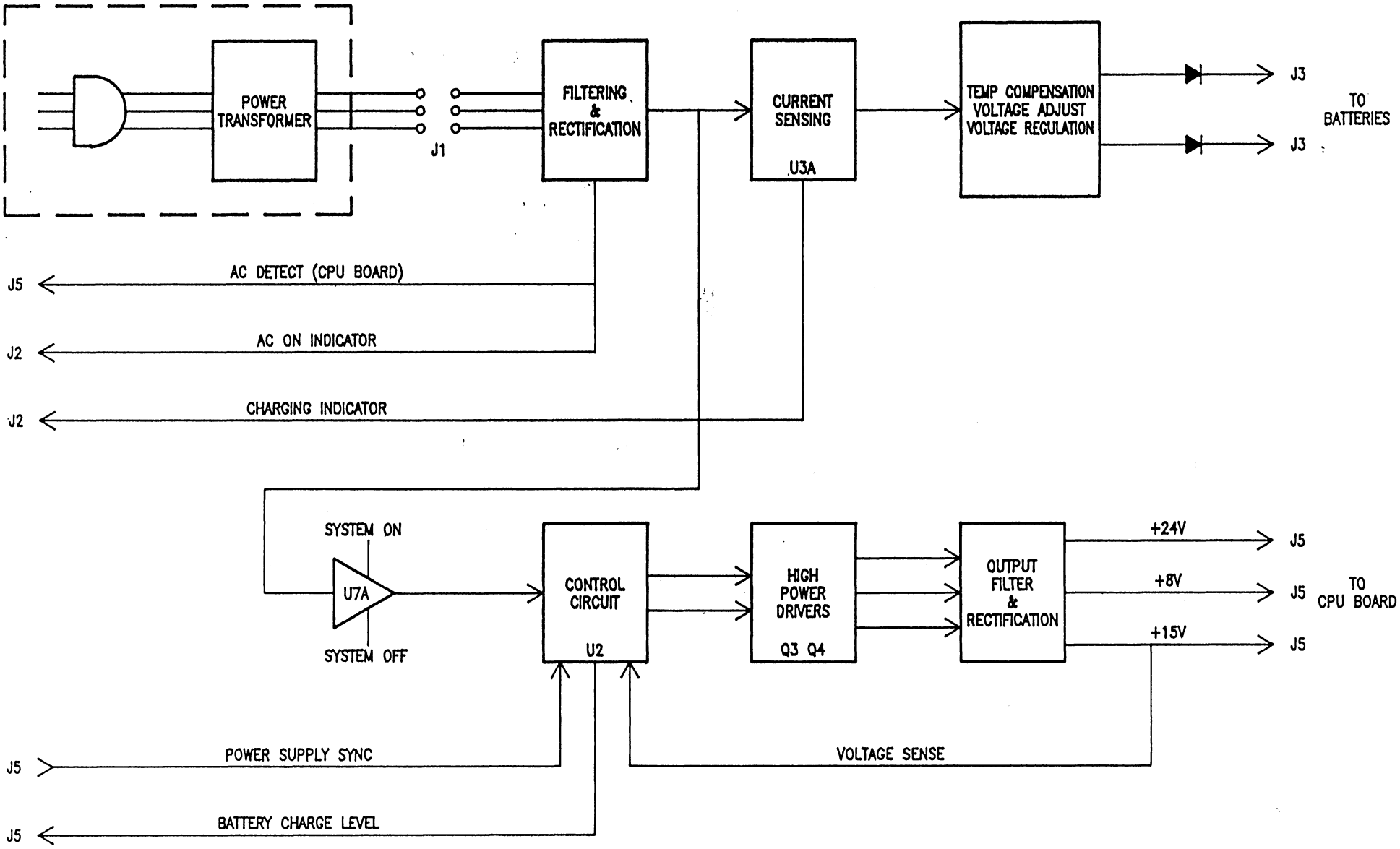
A temperature compensating circuit composed of D11 and D13 adjusts charging voltage by increasing or decreasing load as temperature rises or falls within the unit.

8.3.4 VOLTAGE REGULATING

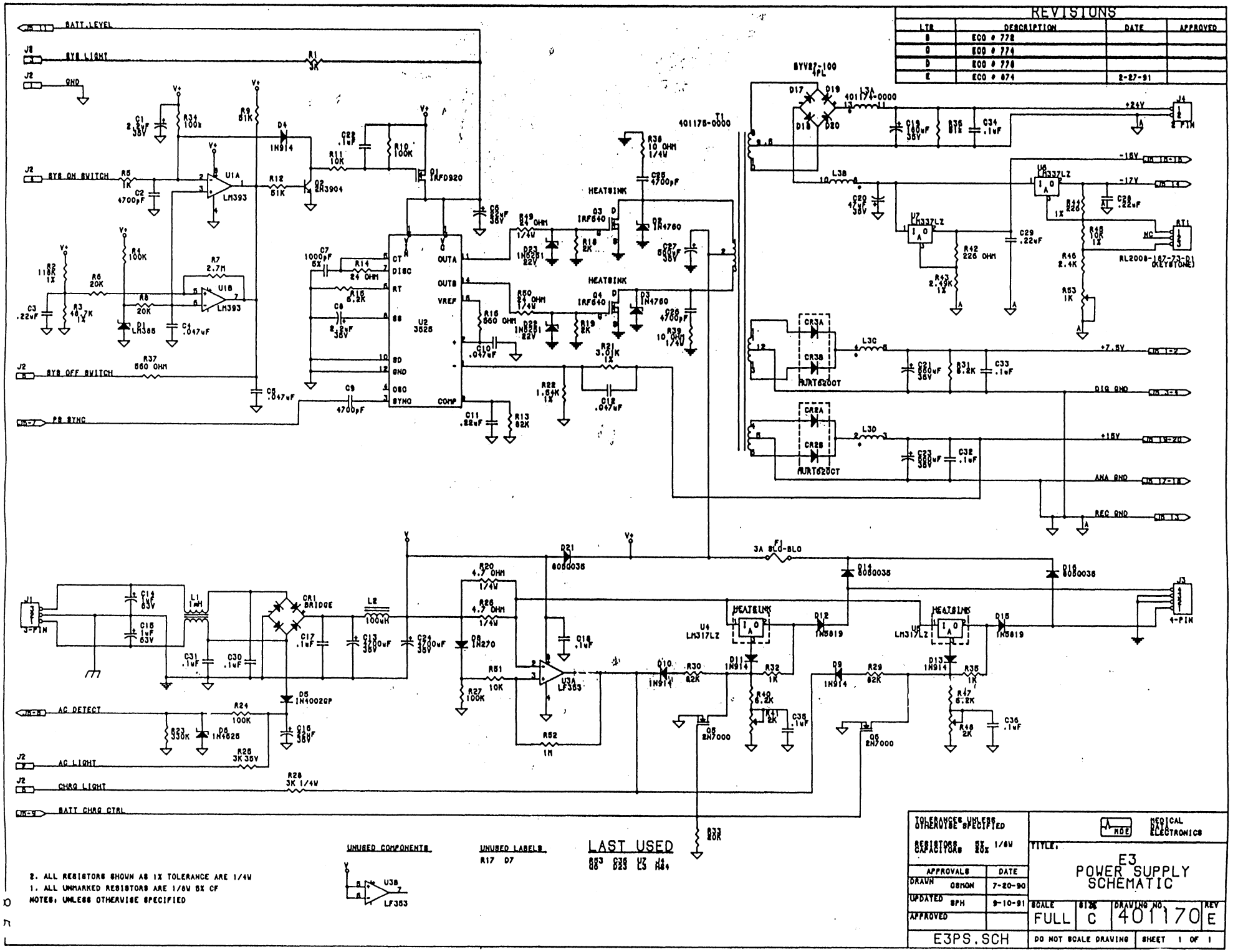
Voltage regulation for the charge circuitry is done by U4 and U5. These regulators offer internal current limiting (constant with temperature), thermal overload protection and safe area protection. This will prevent damage to the batteries by providing proper voltage levels. Optimal charging voltages are achieved at the factory by adjusting R41 and R48.

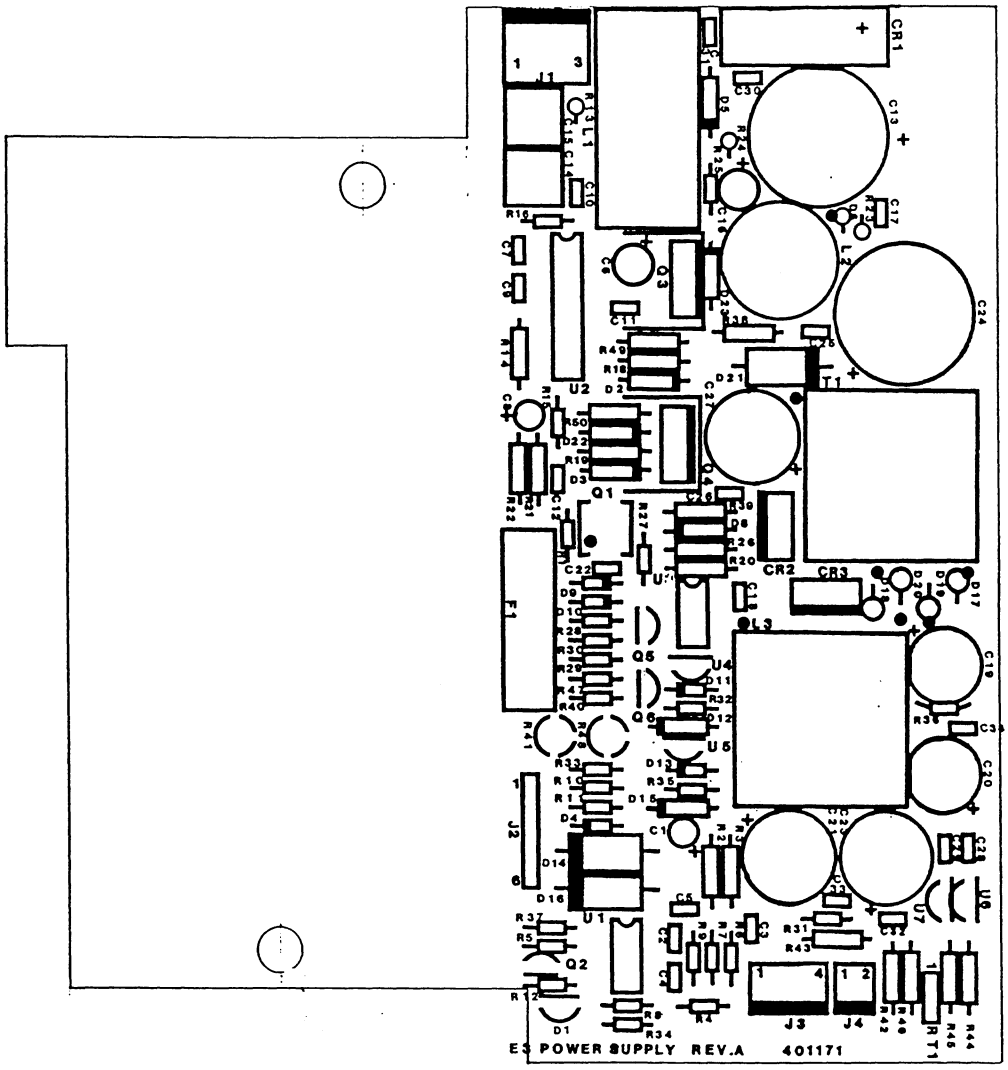
8.3.5 DISCHARGE PROTECTION

The diodes D12 and D15 provide discharge protection to the circuit by blocking the path from the batteries.



ESCORT III SWITCHING POWER SUPPLY BOARD
BLOCK DIAGRAM


REVISIONS
LTR | DESCRIPTION | DATE | APPROVED
B | ECO # 772 |
C | ECO # 774 |
D | ECO # 778 |
E | ECO # 874 | 8-27-91
BATT.LEVEL
BYR LIGHT
GND
BYR ON SWITCH
BYR OFF SWITCH
PB SYNC
AC DETECT
AC LIGHT
CHRG LIGHT
BATT CHRG CTRL
401174-0000
401175-0000
BYV27-100
+24V
-15V
-17V
+7.5V
D19 GND
+15V
ANA GND
REG GND
3A SLO-BLO
HEATSINK
RL2008-107-73-01
3-PIN
4-PIN
UNUSED COMPONENTS
U3B LF353
UNUSED LABELS
R17 D7
LAST USED
R33 20K
2. ALL RESISTORS SHOWN AS 1% TOLERANCE ARE 1/4W
1. ALL UNMARKED RESISTORS ARE 1/8W 5% CF
NOTES: UNLESS OTHERWISE SPECIFIED
TOLERANCES UNLESS OTHERWISE SPECIFIED
RESISTORS ±5%
CAPACITORS ±20% 1/8W
APPROVALS | DATE
DRAWN OSMON | 7-20-90
UPDATED SPH | 9-10-91
APPROVED
E3PS.SCH
MEDICAL DATA ELECTRONICS
TITLE:
E3
POWER SUPPLY
SCHEMATIC
SCALE FULL
SIZE C
DRAWING NO. 401170
REV E
DO NOT SCALE DRAWING
SHEET 1 OF 1



POWER SUPPLY

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
401170-0000	PCBA, E3 POWER SUPPLY REV. D1 (D007)			A			

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
401171-0000	*1	1	PCB, E3 POWER SUPPLY REV. B	B	R	33	1.0	EA	-	Yes	
352300-0104A	*1	2	CAP, .1UF,50V,20%,RAD,MYLAR		R	22	5.0	EA	C17,18,30,31,32	Yes	
352300-0104A	*1	3	CAP, .1UF,50V,20%,RAD,MYLAR		R	22	3.0	EA	C33,34,22	Yes	
352201-0476A	*1	4	CAP, 47UF,35V,RAD,ELECT,SWTCH SP TYPE,10X16MM		R	22	1.0	EA	C20	Yes	
352300-0010A	*1	5	CAP., .001UF,5%,MYLAR SORT FROM 352300-0007A		R	66	1.0	EA	C7	Yes	
352300-0224A	*1	6	CAP, .22UF,50V,20%,MYLAR		R	22	2.0	EA	C3,11	Yes	
352200-0226A	*1	7	CAP, 22UF,35V,RAD,ELECT		R	22	2.0	EA	C6,16	Yes	
352301-0105A	*1	8	CAP, 1UF,63V,20%,MYLAR		R	22	2.0	EA	C14, C15	Yes	
352300-0472A	*1	9	CAP, .0047UF,50V,20%,MYLAR		R	22	5.0	EA	C2,9,12,25,26	Yes	
352300-0473A	*1	10	CAP, .047UF,50V,20%,MYLAR		R	22	3.0	EA	C4,5,10	Yes	
352200-0567A	*1	11	CAP, 560uF,35V,LOW ESR,ELECT (12.5 x 20mm)		R	33	3.0	EA	C21,23,27	Yes	
352401-0225A	*1	12	CAP, 2.2UF,35V,20%,TANT		R	11	4.0	EA	C1,8,28,29	Yes	
354000-0148A	*1	13	CONN, 4-P,M,STRT,.1 CTR,LOCKING RAMP		R	11	1.0	EA	J3	Yes	
354000-0085A	*1	14	CONN, 3-PIN,M,STRT LCK,.156 CTR		R	11	1.0	EA	J1	Yes	
354000-0103A	*1	15	CONN, SGL ROW,STRT,SGL PINS,SNAP-AWAY		R	11	1.0	PIN	J2	Yes	
354000-0222A	*1	16	CONN, 2-PIN,LOCKING		R	22	1.0	EA	J4	Yes	
360300-0007A	*1	17	FUSE, HLDR		R	11	2.0	EA	F1	Yes	
360300-0023A	*1	18	FUSE, 3A SLOW-BLOW (5X20MM)		R	22	1.0	EA	F1	Yes	
364000-0064A	*1	19	IC, LM317LZ,VOLT. REGULATOR		R	11	2.0	EA	U4, U5	Yes	
364000-0091A	*1	20	IC, SG 3525		R	44	1.0	EA	U2	Yes	
364000-0144A	*1	21	IC, LM393N,DUAL COMP		R	33	1.0	EA	U1	Yes	
364000-0145A	*1	22	IC, LF353N,DUAL OPAMP		R	33	1.0	EA	U3	Yes	
370200-1183A	*1	23	RES, 118K,1/4W,1%,MF		R	11	1.0	EA	R2	Yes	
370100-0103A	*1	24	RES, 10K,1/4W,5%,CF		R	11	1.0	EA	R45	Yes	
370100-0302A	*1	25	RES, 3K,1/4W,5%,CF		R	11	3.0	EA	R1, R25, R28	Yes	

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
401170-0000	PCBA, E3 POWER SUPPLY REV. D1 (D007)				A		

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
370200-4872A	*1	26	RES, 48.7K,1/4W,1%,MF		R	11	1.0	EA	R3	Yes	
370101-0102A	*1	27	RES, 1K,1/8W,5%,CF		R	11	3.0	EA	R5,32,35	Yes	
370101-0103A	*1	28	RES, 10K,1/8W,5%,CF		R	11	1.0	EA	R11	Yes	
370101-0104A	*1	29	RES, 100K,1/8W,5%,CF		R	11	4.0	EA	R4,10,24,34	Yes	
370200-2260A	*1	30	RES, 226 OHM, 1/4W, 1%		R	22	2.0	EA	R42,44	Yes	
370101-0275A	*1	31	RES, 2.7M,1/8W,5%,CF		R	11	1.0	EA	R7	Yes	
370100-0100A	*1	32	RES, 10,1/4W,5%,CF		R	11	2.0	EA	R38,39	Yes	
370101-0202A	*1	33	RES, 2K,1/8W,5%,CF		R	11	2.0	EA	R18,19	Yes	
370101-0203A	*1	34	RES, 20K,1/8W,5%,CF		R	11	3.0	EA	R6,8,33	Yes	
370100-0240A	*1	35	RES, 24,1/4W,5%,CF		R	11	3.0	EA	R14,49,50	Yes	
370101-0513A	*1	36	RES, 51K,1/8W,5%,CF		R	11	2.0	EA	R12,36	Yes	
370101-0334A	*1	37	RES, 330K,1/8W,5%,CF		R	11	1.0	EA	R23	Yes	
370101-0561A	*1	38	RES, 560,1/8W,5%,CF		R	11	2.0	EA	R16,37	Yes	
370101-0622A	*1	39	RES, 6.2K,1/8W,5%,CF		R	11	4.0	EA	R15,31,40,47	Yes	
370101-0823A	*1	40	RES, 82K,1/8W,5%,CF		R	11	1.0	EA	R13	Yes	
370100-0047A	*1	41	RES, 4.7,1/4W,5%,CF		R	11	2.0	EA	R20,26	Yes	
370200-2491A	*1	42	RES, 2.49K,1/4W,1%,MF		R	11	1.0	EA	R43	Yes	
370200-1541A	*1	43	RES, 1.54K,1/4W,1%,MF		R	11	1.0	EA	R22	Yes	
370200-3011A	*1	44	RES,3.01K, 1/4W 1%, MF		R	11	1.0	EA	R21	Yes	
374100-0202A	*1	45	POT, 2K,TRIM,TOP ADJ,CTRD LEADS,CERMET		R	11	2.0	EA	R41,48	Yes	
376000-0003A	*1	46	XSTR, 2N3904		R	11	1.0	EA	Q2	Yes	
376000-0017A	*1	47	XSTR,BUK456-100A,100V,24A ,PWR (TO-220)MOSFET ONLY		R	11	2.0	EA	Q3, Q4	Yes	
376000-0019A	*1	48	XSTR, 2N7000,FET		R	11	2.0	EA	Q5, Q6	Yes	
376000-0022A	*1	49	XSTR, IRFD9020,PWR MOSFET		R	33	1.0	EA	Q1	Yes	
378000-0001A	*1	50	DIO, 1N270		R	11	1.0	EA	D8	Yes	

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
401170-0000	PCBA, E3 POWER SUPPLY REV. D1 (D007)			A			

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
378000-0002A	*1	51	DIO, 1N4002GP,RCTFR, (MOT ONLY)		R	11	1.0	EA	D5	Yes	
378000-0005A	*1	52	DIO, 1N914,SIGNAL		R	11	5.0	EA	D4,9,10,11,13	Yes	
378000-0021A	*1	53	DIO, 1N4760,68V,10%,ZENER ***MOT ONLY***		R	11	2.0	EA	D2, D3	Yes	
378000-0023A	*1	54	DIO, 80SQ035 8A RECTIFIER (OR 040 OR 045)		R	44	3.0	EA	D14,16,21	Yes	
378000-0026A	*1	55	DIO, 1N4625 (OR 1N4628)		R	11	1.0	EA	D6	Yes	
378000-0033A	*1	57	DIO, MUR1620CT,200V,16A,RCTFR,ULTRAFAST,COM ANOD		R	11	2.0	EA	CR2,3	Yes	
378000-0034A	*1	58	DIO, LM385,ZENER (XSTR NATIONAL ONLY)		R	11	1.0	EA	D1	Yes	
378000-0036A	*1	59	DIO, 1N5819,1AMP,SCHOTTKY		R	11	2.0	EA	D12, D15	Yes	
378000-0041A	*1	60	DIO, BYV27-150 (OR -100)		R	22	4.0	EA	D17,18,19,20	Yes	
378000-0051A	*1	62	DIODE, IN5251,12V,ZENER		R	33	2.0	EA	D22,23	Yes	
360600-0046A	*1	63	HEATSINK, TO-202 & TO-220		R	22	2.0	EA	HS1,2	Yes	
360600-0024A	*1	64	HTSNK, IERC RUR671B		R	22	2.0	EA	HS3,4	Yes	
382200-0025A	*1	65	CHOKE, 1mH,6 AMP,COMMON MODE		R	33	1.0	EA	L1	Yes	
401174-0000	*1	66	INDUCTOR,MULTI,E3 PWR SUPPLY, 4 ELEMENT REV. "A"		R	33	1.0	EA	L3	Yes	
401175-0000	*1	67	XFMR, SWITCHING,E3 PWR SUPPLY REV. "A"		R	33	1.0	EA	T1	Yes	
384000-0118A	*1	68	THERMISTOR, NTC R=300 OHM		R	22	1.0	EA	RT1	Yes	
352201-0478A	*1	69	CAP, 4700 UF, 35V, ELECT. (18X40MM)		R	22	2.0	EA	C13,24	Yes	
352200-0187A	*1	70	CAP., 180 UF, 35V, ELECT. LOW ESR		R	22	1.0	EA	C19	Yes	
378000-0052A	*1	71	RECTIFIER, 8AMP BRIDGE 200V		R	22	1.0	EA	CR1	Yes	
364000-0116A	*1	72	IC, LM337LZ,VOLT. REGULATOR,TO-92 CASE		R	22	2.0	EA	U6,7	Yes	
382200-0026A	*1	73	CHOKE, 100uH,6 AMP,POWER		R	33	1.0	EA	L2	Yes	
358100-0013A	*1	74	SCR, 4-40 X 3/8,PH PNHD,CAD1		R	11	2.0	EA	FOR MOUNTING HS	Yes	
358200-0001A	*1	75	WSHR, SHLDR		R	11	2.0	EA	FOR MOUNTING HS	Yes	
360500-0022A	*1	76	NUT, #4 HEX,LRG PTTRN		R	11	2.0	EA	FOR MOUNTING HS	Yes	
358200-0009A	*1	77	WSHR, #4 SPLIT LOCK		R	11	2.0	EA	FOR MOUNTING HS	Yes	

Assembly	Description	Group	PFC	Commodity Class	Planner	Buyer	Drawing
401170-0000	PCBA, E3 POWER SUPPLY REV. D1 (D007)			A			

ITEM	LEVEL	SEQ.	DESCRIPTION	REV	CL	LT	QUANTITY	U/M	REFERENCE	MLT	BEGIN
358200-0004A	*1	78	WSHR, #4 FLAT STL CAD1,(.125ID,9/320D,.025THK)		R	11	2.0	EA	FOR MOUNTING HS	Yes	
360500-0040A	*1	79	HARDWARE, ISO-THERM PAD, TO-220		R	11	2.0	EA	FOR TO-220	Yes	
365000-0008A	*1	80	SKT, 8-POS,DIP,TIN PLATE, L.P.		R	11	2.0	EA	XU1,XU3	Yes	
365000-0016A	*1	81	SKT, 16-POS,DIP,TIN PLATE ,L.P.		R	11	1.0	EA	XU2	Yes	
370101-0913A	*1	82	RES, 91K,1/8W,5%,CF		R	11	2.0	EA	R29,30	Yes	
370101-0203A	*1	83	RES, 20K,1/8W,5%,CF		R	11	1.0	EA	R27	Yes	
370101-0103A	*1	84	RES, 10K,1/8W,5%,CF		R	11	1.0	EA	R51	Yes	
370101-0105A	*1	85	RES, 1M,1/8W,5%,CF		R	11	1.0	EA	R52	Yes	
370101-0683A	*1	86	RES, 68K,1/8W,5%,CF		R	22	1.0	EA	R9	Yes	
370200-2701A	*1	87	RES, 2.7K,1/4W,1%,MF		R	11	1.0	EA	R46	Yes	
352100-0104A	*1	88	CAP, .1UF,50V,10%,RAD,X7R		R	11	2.0	EA	C35,36	Yes	
360500-0085A	*1	89	STANDOFF SWAGE 4-40X1/8" LG		R	22	2.0	EA		Yes	

PERFORMANCE CHECK

CHAPTER 9

9.0.0 PERFORMANCE CHECK

9.1.0 OVERVIEW

MDE recommends a yearly performance check to verify all functions on the ESCORT 300A. A calibrated patient simulator, such as the MDE DATASIM Model 2000 or 6000, will be necessary to complete the performance check.

Begin with a thorough visual inspection of the unit, paying particular attention to the power cord.

9.2.0 BATTERIES

Note: Medical Data Electronics suggests battery replacement every two (2) years regardless of test results. Batteries used beyond life expectancy may fail without notice and could disrupt power to the ESCORT monitor.

All lead-acid battery packs should be fully charged prior to performance check; refer to Chapter 6 for charging procedures. If in doubt, charge the batteries.

Connect the ESCORT monitor to a 120 VAC, 60Hz power source. Set the AC switch located on the rear panel of the ESCORT to the "I" position. The yellow *battery charging* LED located on the front of the ESCORT should be off and the green *AC ON* LED should be on. If the yellow charging LED is on, allow the batteries to fully charge until the time when the LED turns off.

Turn the AC switch to the "0" position; observe if the monitor operates under battery power. Access the soft key TEST page to view battery status (i.e., HIGH, MID, LOW). Battery status should read: **MONTR BAT HI 12.8V** (voltage will vary)

Turn the ON/STBY switch to STBY, turn the AC switch on the rear panel to the "0" position. Remove the two lead-acid battery packs and measure the voltage with an open load, the voltage should measure approximately 13.0 to 13.5 volts.

Next, cycle the lead-acid battery packs individually as follows:

i. Insure that ON/STBY switch is in STBY position
ii. Insure that AC switch is in "0" position
iii. Insert one battery pack into one of the battery slots
iv. Turn the ON/STBY switch to the ON position
v. Confirm that the ESCORT monitor operates and Battery Level indicates HIGH
vi. Turn the ON/STBY switch to STBY position
vii. Remove battery pack and install into adjacent slot
viii. Repeat steps "iii" through "vii" for both battery slots

Reinstall both batteries upon successful completion of individual tests.

9.3.0 LEAKAGE TESTING

Note: All leakage tests are usually done with a meter specifically designed for making this measurement on medical equipment. For safety reasons, do not attempt these measurements unless this type of instrument is available.

9.3.1 CHASSIS LEAKAGE

To test the chassis to ground leakage, use a safety leakage tester. There should be less than 100uA read on the meter between chassis and earth ground, with the ground of the monitor open. Reverse the polarity on the AC input and check again.

9.3.2 PATIENT INPUT LEAKAGE

Using the patient lead cable, short all of the leads together. With a meter between the leads and earth ground, less than 20uA should be read. If you do not use a cable, short lead inputs at connector. Meter should read less than 10uA when at the connector.

As described above, with the leads shorted, put a meter between leads and 120V AC. The leakage current should be less than 20uA when using leads, or 10uA when at the connector.

9.4.0 GROUND CHECK

Test for ground continuity between AC plug ground and chassis ground at unpainted metal screw head on the rear panel. Power cord ground should be less than .15 ohms.

9.5.0 RAM, ROM SELF TEST

Using soft keys, call up the TEST page. Do a RAM self test by pressing soft key TEST RAM. The screen will say RAM TEST IN PROGRESS. Some screen glitches may be observed at this time. When test is completed screen will note PASSED RAM TEST or RAM BAD CALL SERVICE. Repeat the above procedure for ROM testing.

9.6.0 KEYPAD

Test hard key function by pressing all the hard keys, verifying that the key initiates function. Verify audio key click. softkeys require testing only one function.

FUNCTIONAL TESTS

Note: When using patient simulator, the tolerance factor of the simulator must be factored in determining if the monitor is within tolerance.

9.7.0 ECG

Using a calibrated patient simulator, confirm heart rate count at low, mid and high ranges, such as 20 BPM, 100 BPM, and 250 BPM. Input signal should be 1mV R-wave. Heart rate should be ± 2%, not including simulator accuracy. Check asytole, 00 count.

Verify a normal heart rate count at a low amplitude such as .2mV and a high amplitude such as 3mV. Adjust soft key sizing as necessary.

Verify alarms by turning alarm function on using soft keys. Factory default setting is 140 BPM high and 50 BPM low for adult mode, 200 BPM high and 100 BPM low for neonatal mode. Using patient simulator violate alarm limits, both high and low, returning to NSR in between to reset alarm.

Check pacer flag operation by inserting a pacer spike at 4mV to 200mV typical amplitude, for 200uS to 2mS typical in width. Be sure to have the soft key PACE in the ON mode. Cardiotach should not be affected by pacer spike.

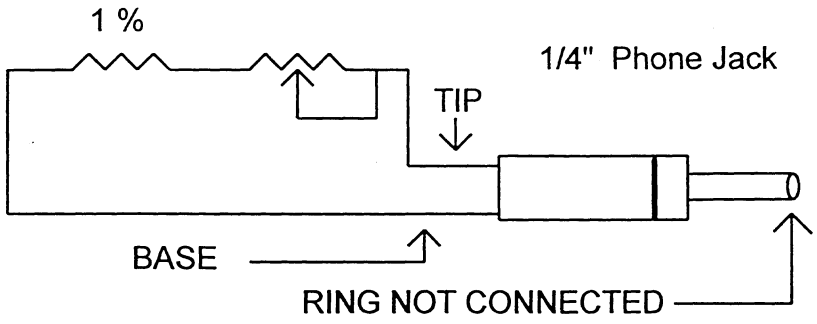
9.8.0 PRESSURE

Zero simulator using manufacturers directions. Confirm pressure readings at a low, mid and high ranges such as 10mmHg, 100mmHg and 250mmHg. Pressure reading accuracy should be ± 1% or 1mm (whichever is greater) not including simulator tolerance.

If ESCORT is configured for 2 Blood Pressures, repeat the above procedure on BP2.

9.9.0 TEMPERATURE

For temperature testing a small resistor circuit with a high degree of accuracy is necessary. For best results, use 1% resistors along with a potentiometer to adjust the resistance to the exact value required for testing.



A 1/4" stereo phone jack is used to input the resistance that is simulating the temperature. Wire this jack and circuit as in the diagram above with the resistor circuit placed between the tip and the base of the jack. The ring is not connected.

Start with the 1 degree testing circuit. A resistor circuit equaling 18,597 ohms ± 40 ohms should be assembled and placed between the tip and the base of the temperature jack. The monitor should read 1 degree C ± .2 degrees C. Using a circuit equaling 5,998 ohms ± 13 ohms, the temperature should read 25 degrees C ± .2 degrees C, and for a reading of 40 degrees C ± .2 degrees C, use a 3,203 ohm ± 6 ohm reference. Testing low, mid and high ranges is recommended.

9.10.0 RESPIRATION

Using a patient simulator with an output of 1 ohm impedance change, check respiration at a low, mid and high level, such as 10 BPM, 40 BPM and 80 BPM. Accuracy should be ± 2% or 2 BPM not including simulator tolerance. Verify a normal respiration count at a low impedance change such as .25 ohm and a high impedance change such as 3 ohms. Adjust soft key sizing as necessary. Verify 00 count by simulator apnea function. Also check apnea alarm function.

9.11.0 RECORDER

Verify recorder operation by using hard keys RECORD 1 and RECORD 2. Terminate recording with the RECORD STOP key.

9.12.0 NIBP

Connect manometer to bottom lumen. Go to test page and put the monitor in *TEST CHK* mode. Return to NIBP page, and pump up manometer to 100mmHg ± 2%. Next, vent or disconnect manometer. Monitor should read 0mmHg. Go to test page and toggle test key to *TEST LEAK*. Connect cuff and hose assembly and wrap cuff on itself. Return to NIBP page and push start. Do not touch cuff while test is in progress.

9.13.0 SAO_2

Check patient cable input pins. Verify they are straight and not bent. Connect patient module cable to monitor. Verify sensor LED is lit. Put sensor on valid sensor sight. Look for normal waveform and reading. Remove any ECG input from the monitor. Assure a NO C-LOCK message appears. If you have a Nellcor Simulator or Pocket Tester you can check SAO_2 accuracy. Use simulator according to manufacturers instructions. Tolerance should be: Adult 70 - 100% ± 2 digits, Adult 50 - 69% ± 3 digits. Neonatal 70 - 94% ± 3 digits. If using the Nellcor Pocket Tester it is important not to have any ECG signal input to the monitor. Readout should be 81% SAO_2.

9.14.0 PERFORMANCE CHECK LIST

NEO	_____	**ADULT**	_____	**MODEL**	_____
PORT 1	_____	**PORT 2**	_____	**SERIAL NUMBER**	_____
DEG C	_____	**DEG F**	_____	**DATE**	_____
				TECHNICIAN	_____

BATTERY OPERATION

Batteries charged	OK	_____
Battery #1 operation	OK	_____
Battery #2 operation	OK	_____

LEAKAGE

Chassis leakage	100uA or less	_____
Patient input leakage at ground	20uA or less	_____
without cable	10uA or less	_____
at 120V AC	20uA or less	_____
without cable	10uA or less	_____
Ground check	.15 ohms or less	_____
RAM Self Test	RAM OK	_____
ROM Self Test	ROM OK	_____
Keypad	OK	_____
audio click	OK	_____

ECG TESTS

Heart rate at 1mV low	OK	_____
mid	OK	_____
high	OK	_____
asytole	OK	_____
Normal heart rate at low amplitude	OK	_____
Normal heart rate at high amplitude	OK	_____
Alarm violation high	OK	_____
Alarm violation low	OK	_____
Pacer rejection operation	OK	_____

BLOOD PRESSURE

BP1 reading low	OK	_____
mid	OK	_____
high	OK	_____
BP2 reading low	OK	_____
mid	OK	_____
high	OK	_____

TEMPERATURE

T1 -	1 degree reading	OK _____
	25 degrees reading	OK _____
	40 degrees reading	OK _____
T2 -	1 degree reading	OK _____
	25 degree reading	OK _____
	40 degrees reading	OK _____

RESPIRATION

Resp rate at 1 ohm: low	OK _____
mid	OK _____
high	OK _____
Normal resp rate at low impedance change	OK _____
Normal resp rate at high impedance change	OK _____
Apnea alarm violation	OK _____

RECORDER OPERATION ..... OK _____

NIBP

Static 100mmHg input reads within ± 2%	OK _____
Static 0mmHg input reads 0	OK _____
Leak test	OK _____

SAO_2

Patient module cable operation check	OK _____
NO C-LOCK check	OK _____

MECHANICAL DISASSEMBLY

CHAPTER 10

10.0.0 MECHANICAL DISASSEMBLY

CAUTION!!!

Only qualified technicians should attempt to perform repairs or removal of any parts in the **ESCORT 300A**. Opening the **ESCORT 300A** could violate warranty.

READ **ALL** DISASSEMBLY INSTRUCTIONS **PRIOR** TO PERFORMING ANY REMOVAL OF PARTS!!!

REFER TO THE CONNECTOR PLACEMENT DRAWING WHEN REPLACING CONNECTORS.

10.1.0 SAFETY

High voltage is exposed when the covers are removed from the monitor. Disconnect the AC power cord **AND** remove the batteries to insure that current is removed from the unit. Always observe safe working techniques when troubleshooting or removing components. Work surface's should be free of any stray metal parts.

THE COMPONENTS IN THE ESCORT MONITOR ARE STATIC SENSITIVE. USE AN ELECTRO-STATIC DISCHARGE KIT WHENEVER HANDLING PRINTED CIRCUIT BOARDS.

10.2.0 FUSE REPLACEMENT

There are two .5 AMP Slow Blow fuses located in the power module at the rear panel. The module can be removed by prying the tab at the low-center area of the module with a flat-bladed screwdriver. Pull out the fuse holder and replace any damaged fuses. To replace the module, push it back into place until a click is heard and the module is secure. For 220V, use .25 amp slow blow.

10.3.0 DISASSEMBLY

This chapter includes removal instructions only; the reinstallation of assemblies is the opposite of removal.

10.3.1 TOP COVER

Remove the three screws on each side of the monitor. Lift the top cover straight up.

10.3.2 BOTTOM COVER

Remove the three screws on each side of the monitor. Lift the chassis out of the bottom cover.

CAUTION: When re-assembling the unit, make sure all top and bottom screws are replaced. Failure to do so could cause the unit to come apart in transport!

10.3.3 RECORDER REMOVAL

* Remove Top and Bottom covers.

Disconnect the gray ribbon cable at the rear of the recorder. Open the paper door and remove the roll of paper. Inside the paper housing, at the rear of the recorder, there are two screws that must be detached from the recorder mounting bracket. Use a flat bladed screwdriver to do this. After loosening these two screws, lift the recorder out of the chassis. The screws are part of the recorder assembly and will not fall out.

10.3.4 PROCESSOR UNIT (This consists of all Main Parameter PCBA's and their Daughter Boards.)

* Remove Top and Bottom covers.

Back off the long screw at the center of the processor unit until it is disengaged from the nut. Lift ECG and Temp/Pressure Boards (along with the connector plate) up and out of the sockets as a unit.

A. Temperature/Pressure Board removal:

Remove the four allen screws using a 5/64 allen wrench. Pull away from the connector plate slightly. Remove J5 (T1), J4 (T2), J3 (BP1), and J2 (BP2). Pull the PCBA away from the connector plate.

B. ECG Board removal:

Pull gray cap off the lead select knob (applies only to units with 5 lead select). Using "special tool", loosen screw and pull off the knob. Remove the two allen screws on the connector plate using a 5/64 allen wrench. Disconnect the "sync out" and pull the ECG Board away from the connector plate.

CAUTION!!!

Take great care in replacing the processor unit. Be sure that both boards are securely in the connector slots.

10.3.5 SWITCHING POWER SUPPLY/BATTERY CHARGER PCBA

* Remove Top and Bottom covers.

Unplug J1 and J2 on the Switching Power Supply Board. Unscrew the two Phillips-head screws located nearest the center of the chassis side bar. Remove the insulator (FISH) paper. Gently lift out the PCBA about half-way, then remove J3 and J4. Then, lift the PCBA completely out of the chassis.

10.3.6 CPU REMOVAL

* Remove Top and Bottom covers, Processor Unit and Switching Power Supply Board.

Remove J4, J6, and J8 on the CPU. Remove the seven Phillips-head screws securing the CPU Board to the chassis then gently lift the CPU out.

10.3.7 LCD REMOVAL

* Remove Top and Bottom covers, Switching Power Supply Board, and Processor Unit.

Remove J9 and J6 on the CPU Board, noting which direction they must be replaced. Remove J4 from the Power Supply Board. Remove the four corner nuts (securing the LCD to the chassis) using a 5/16" nut driver. Remove the ground strap.

Remove the Backlight Driver PCBA by removing the screws that hold it in place and lift it off the securing bar. The Backlight Driver PCBA is part of the LCD and should be removed with it. The wires connecting the Backlight Driver board to the display are secured to the LCD brass backplate with two tie-wraps. These tie-wraps must be cut and removed in order to take the LCD out of the chassis.

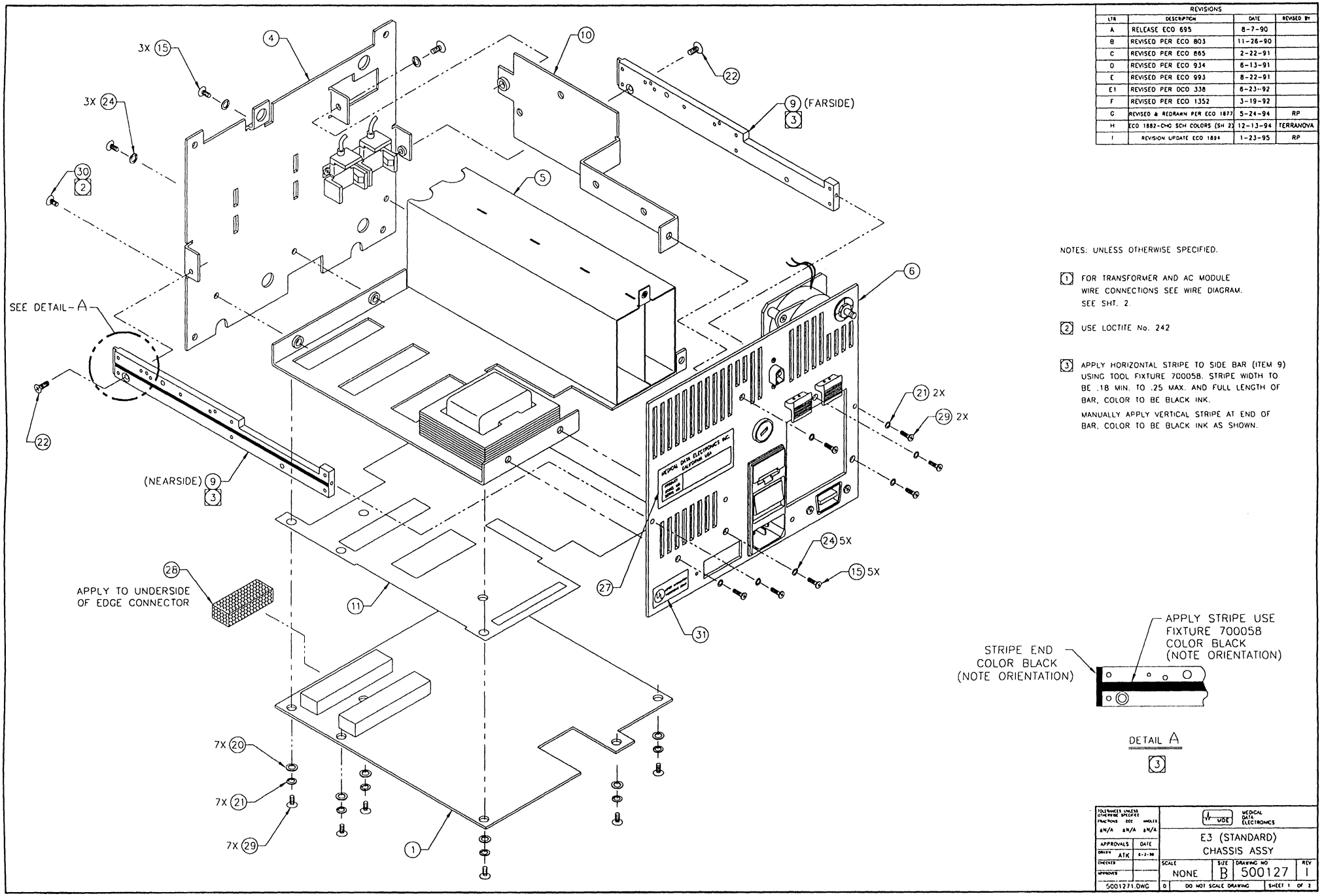
NOTE: When replacing the PCBAs remember to reinstall the fish paper for each board.

10.3.8 EL DISPLAY REMOVAL

* Remove Top and Bottom covers, Switching Power Supply Board, and Processor Unit.

Remove J9 and J6 on the CPU Board, noting which direction they must be replaced. Remove J2 from the Power Supply Board. Remove J1 from the EL Display Driver Board. Remove the four corner nuts (securing the EL Display to the chassis) using a 5/16" nut driver.

NOTE: When replacing the PCBAs remember to reinstall the fish paper for each board.



REVISIONS			
LTR	DESCRIPTION	DATE	REVISED BY
A	RELEASE ECO 695	8-7-90	
B	REVISED PER ECO 803	11-26-90	
C	REVISED PER ECO 865	2-22-91	
D	REVISED PER ECO 934	6-13-91	
E	REVISED PER ECO 993	8-22-91	
E1	REVISED PER DCO 338	6-23-92	
F	REVISED PER ECO 1352	3-19-92	
G	REVISED & REDRAWN PER ECO 1877	5-24-94	RP
H	ECO 1882-CHG SCH COLORS (SH 2)	12-13-94	TERRANOVA
I	REVISION UPDATE ECO 1894	1-23-95	RP

NOTES: UNLESS OTHERWISE SPECIFIED.

[1] FOR TRANSFORMER AND AC MODULE WIRE CONNECTIONS SEE WIRE DIAGRAM. SEE SHT. 2

[2] USE LOCTITE No. 242

[3] APPLY HORIZONTAL STRIPE TO SIDE BAR (ITEM 9) USING TOOL FIXTURE 700058. STRIPE WIDTH TO BE .18 MIN. TO .25 MAX. AND FULL LENGTH OF BAR. COLOR TO BE BLACK INK.

MANUALLY APPLY VERTICAL STRIPE AT END OF BAR. COLOR TO BE BLACK INK AS SHOWN.

DETAIL A

[3]

TOLERANCES UNLESS OTHERWISE SPECIFIED: FRACTIONS ±1/64 DEC ±.01 ANGLES ±1°		MDE MEDICAL DATA ELECTRONICS	
APPROVALS	DATE	E3 (STANDARD) CHASSIS ASSY	
DRAWN ATK	6-3-90		
CHECKED		SCALE NONE	SIZE B
APPROVED		DRAWING NO 500127	REV I
5001271.DWG		0 DO NOT SCALE DRAWING	SHEET 1 OF 2

Figure 10-1

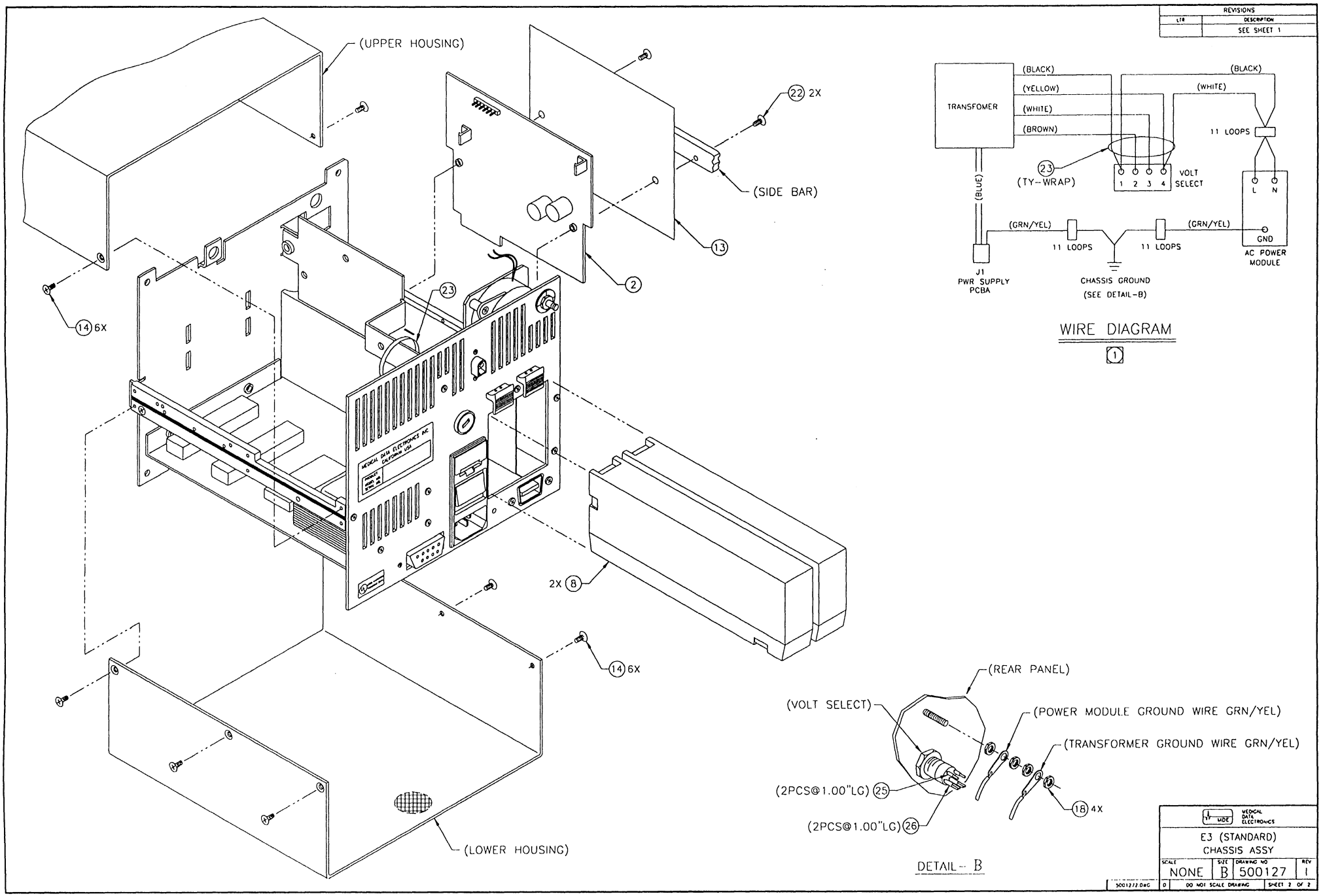
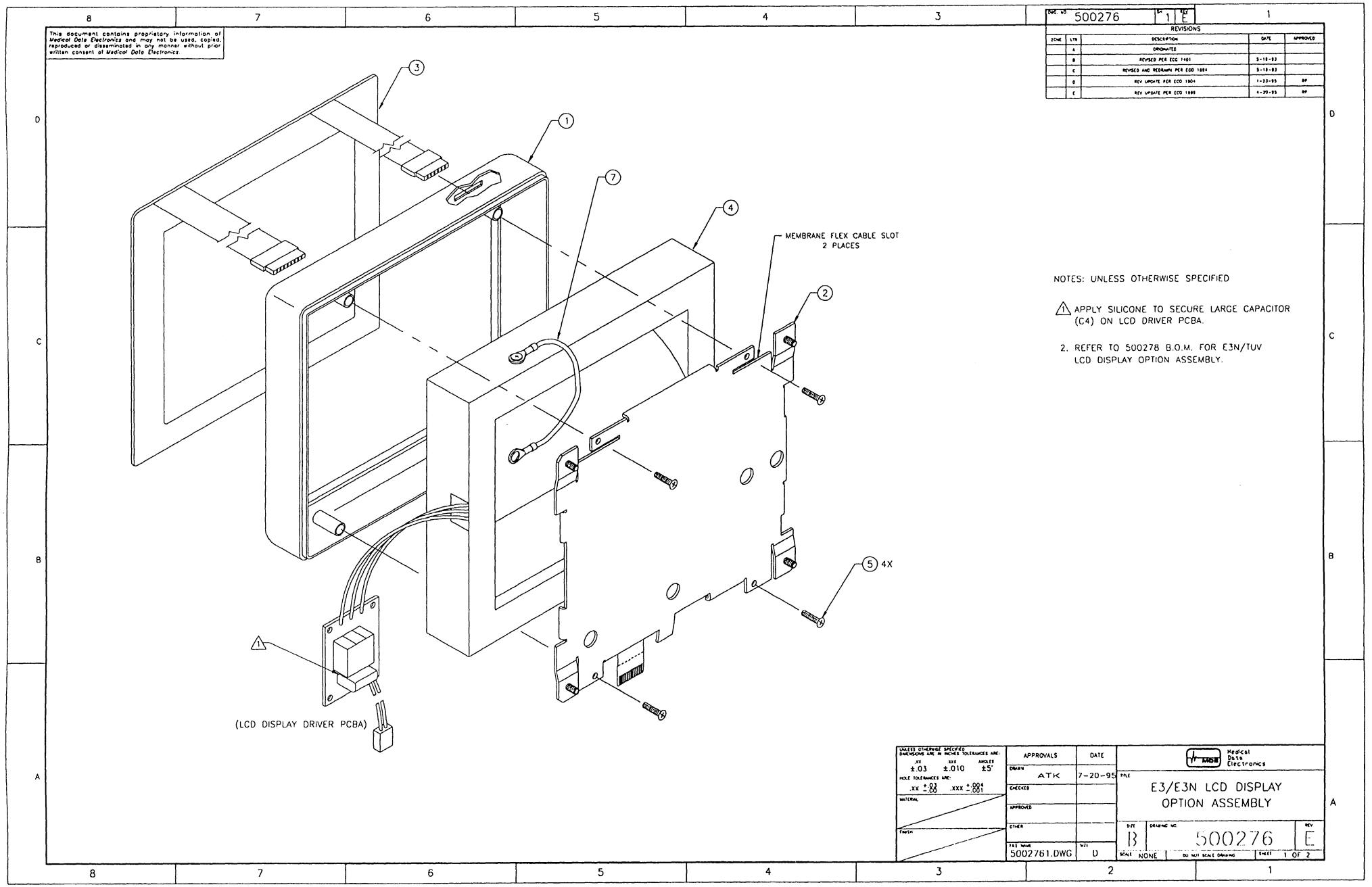


Figure 10-1 (continued)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DOC. NO 500276
SH 1
REV E
REVISIONS
ZONE LTR DESCRIPTION DATE APPROVED
A ORIGINATED
B REVISED PER ECO 1401 5-18-93
C REVISED AND REDRAWN PER ECO 1484 5-18-93
D REV UPDATE PER ECO 1804 1-23-95 RP
E REV UPDATE PER ECO 1888 4-20-95 RP
MEMBRANE FLEX CABLE SLOT 2 PLACES
(LCD DISPLAY DRIVER PCBA)
5 4X
NOTES: UNLESS OTHERWISE SPECIFIED
1 APPLY SILICONE TO SECURE LARGE CAPACITOR (C4) ON LCD DRIVER PCBA.
2. REFER TO 500278 B.O.M. FOR E3N/TUV LCD DISPLAY OPTION ASSEMBLY.
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: .XX ±.03 .XXX ±.010 ANGLES ±5° HOLE TOLERANCES ARE: .XX +.03 -.00 .XXX +.004 -.001
MATERIAL
FINISH
APPROVALS DATE
DRAWN ATK 7-20-95
CHECKED
APPROVED
OTHER
FILE NAME 5002761.DWG WT D
Medical Data Electronics
TITLE E3/E3N LCD DISPLAY OPTION ASSEMBLY
SIZE B DRAWING NO. 500276 REV E
SCALE NONE DO NOT SCALE DRAWING SHEET 1 OF 2

Figure 10-2

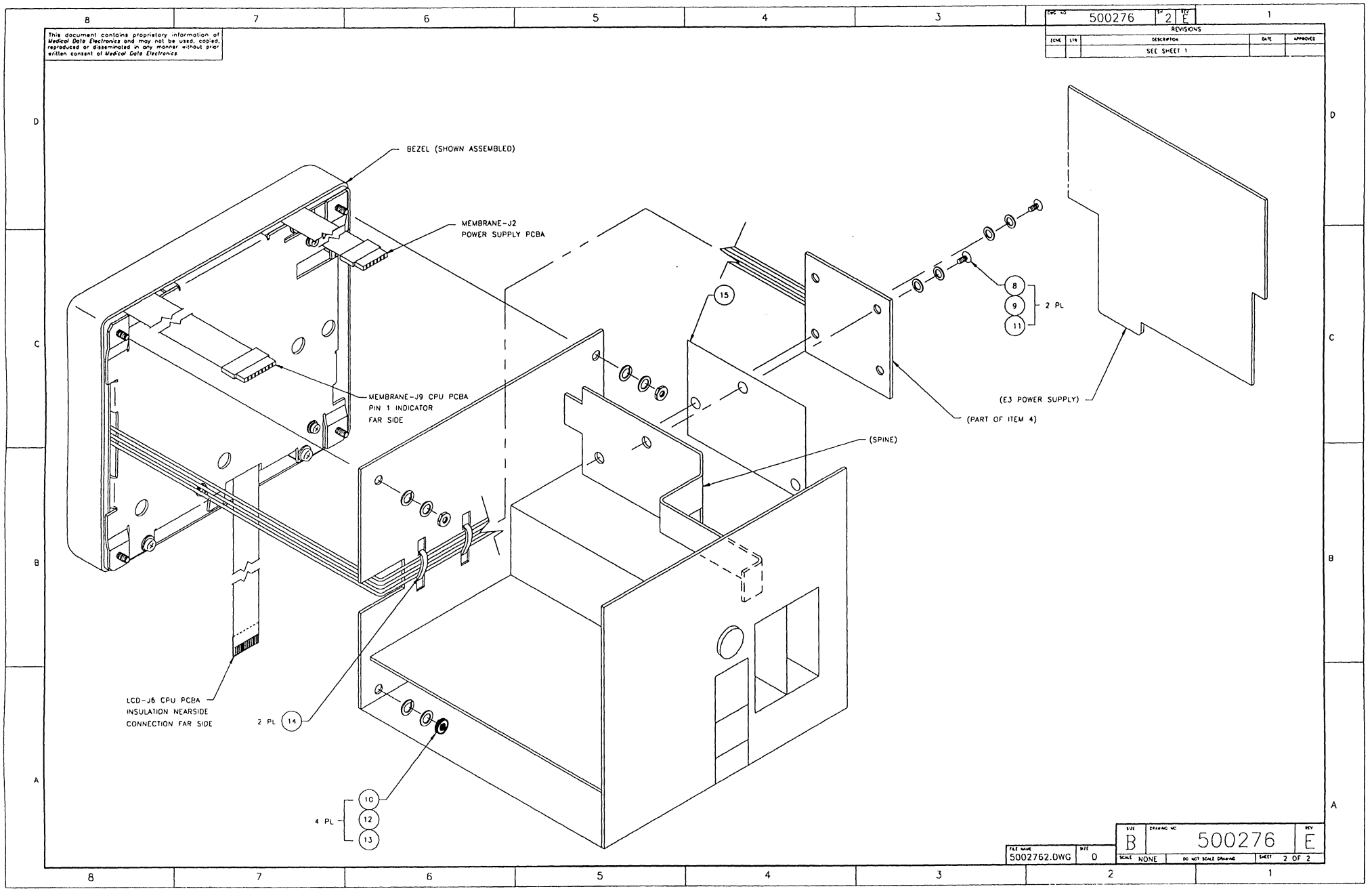


Figure 10-2 (continued)

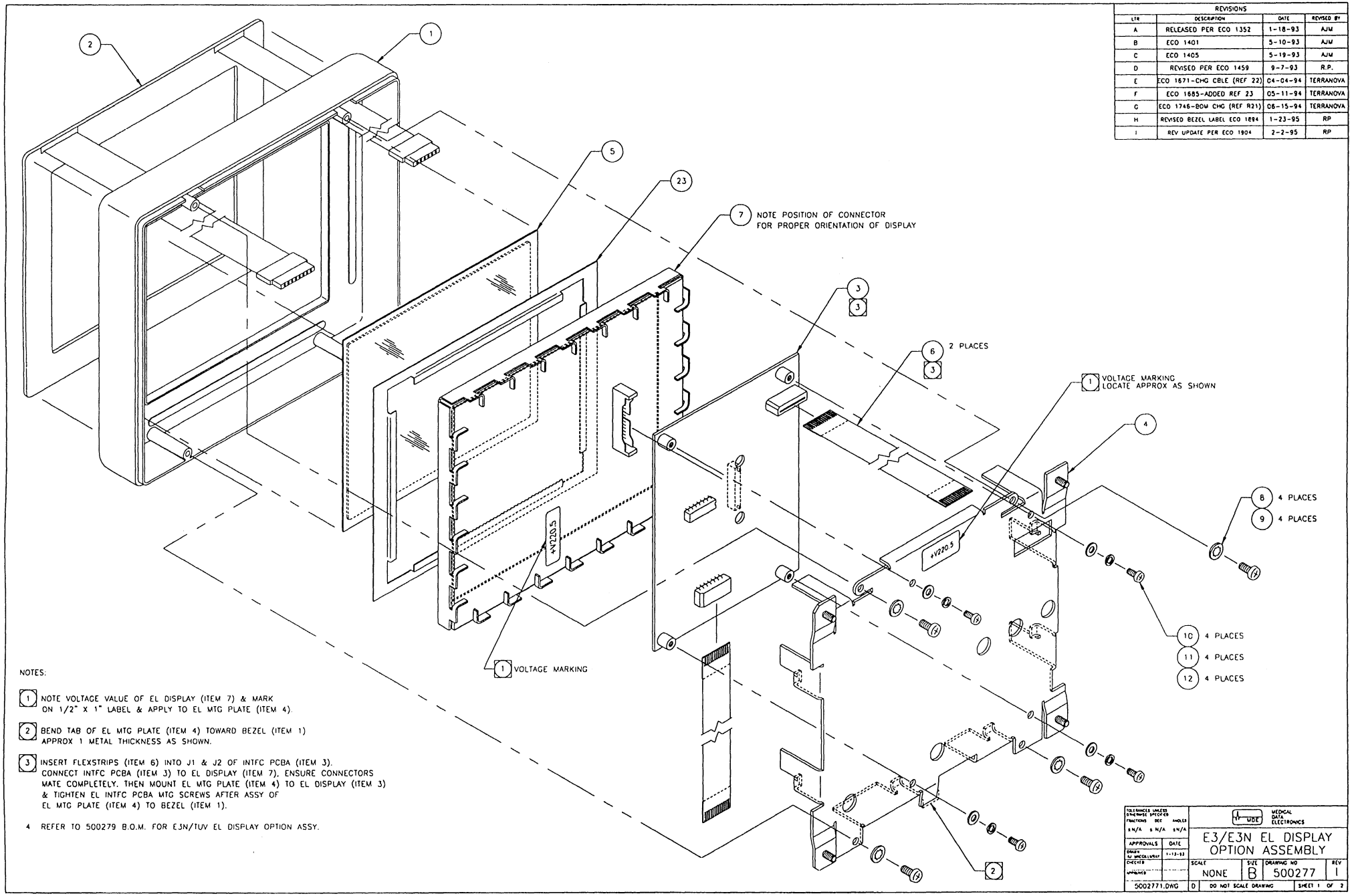

REVISIONS
LTR | DESCRIPTION | DATE | REVISED BY
A | RELEASED PER ECO 1352 | 1-18-93 | AJM
B | ECO 1401 | 5-10-93 | AJM
C | ECO 1405 | 5-19-93 | AJM
D | REVISED PER ECO 1459 | 9-7-93 | R.P.
E | ECO 1671-CHG CBLE (REF 22) | 04-04-94 | TERRANOVA
F | ECO 1685-ADDED REF 23 | 05-11-94 | TERRANOVA
G | ECO 1746-BOM CHG (REF R21) | 08-15-94 | TERRANOVA
H | REVISED BEZEL LABEL ECO 1894 | 1-23-95 | RP
I | REV UPDATE PER ECO 1904 | 2-2-95 | RP
7 NOTE POSITION OF CONNECTOR FOR PROPER ORIENTATION OF DISPLAY
6 2 PLACES
1 VOLTAGE MARKING LOCATE APPROX AS SHOWN
8 4 PLACES
9 4 PLACES
10 4 PLACES
11 4 PLACES
12 4 PLACES
1 VOLTAGE MARKING
+V220.5
+V220.5
NOTES:
1 NOTE VOLTAGE VALUE OF EL DISPLAY (ITEM 7) & MARK ON 1/2" X 1" LABEL & APPLY TO EL MTG PLATE (ITEM 4).
2 BEND TAB OF EL MTG PLATE (ITEM 4) TOWARD BEZEL (ITEM 1) APPROX 1 METAL THICKNESS AS SHOWN.
3 INSERT FLEXSTRIPS (ITEM 6) INTO J1 & J2 OF INTFC PCBA (ITEM 3). CONNECT INTFC PCBA (ITEM 3) TO EL DISPLAY (ITEM 7), ENSURE CONNECTORS MATE COMPLETELY. THEN MOUNT EL MTG PLATE (ITEM 4) TO EL DISPLAY (ITEM 3) & TIGHTEN EL INTFC PCBA MTG SCREWS AFTER ASSY OF EL MTG PLATE (ITEM 4) TO BEZEL (ITEM 1).
4 REFER TO 500279 B.O.M. FOR EJN/TUV EL DISPLAY OPTION ASSY.
MEDICAL DATA ELECTRONICS
E3/E3N EL DISPLAY OPTION ASSEMBLY
SCALE NONE
SIZE B
DRAWING NO 500277
REV I
5002771.DWG
DO NOT SCALE DRAWING
SHEET 1 OF 2

Figure 10-3

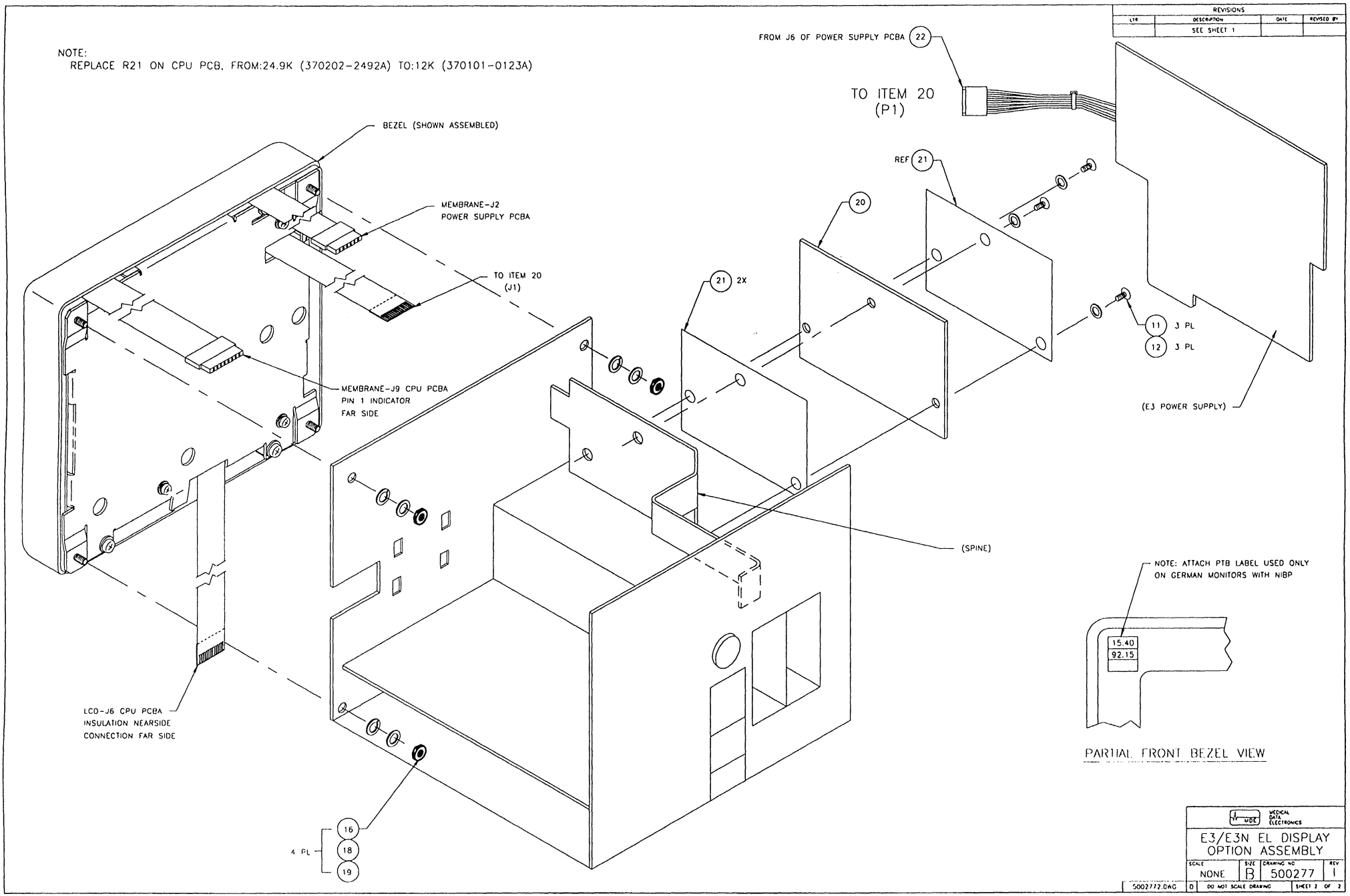
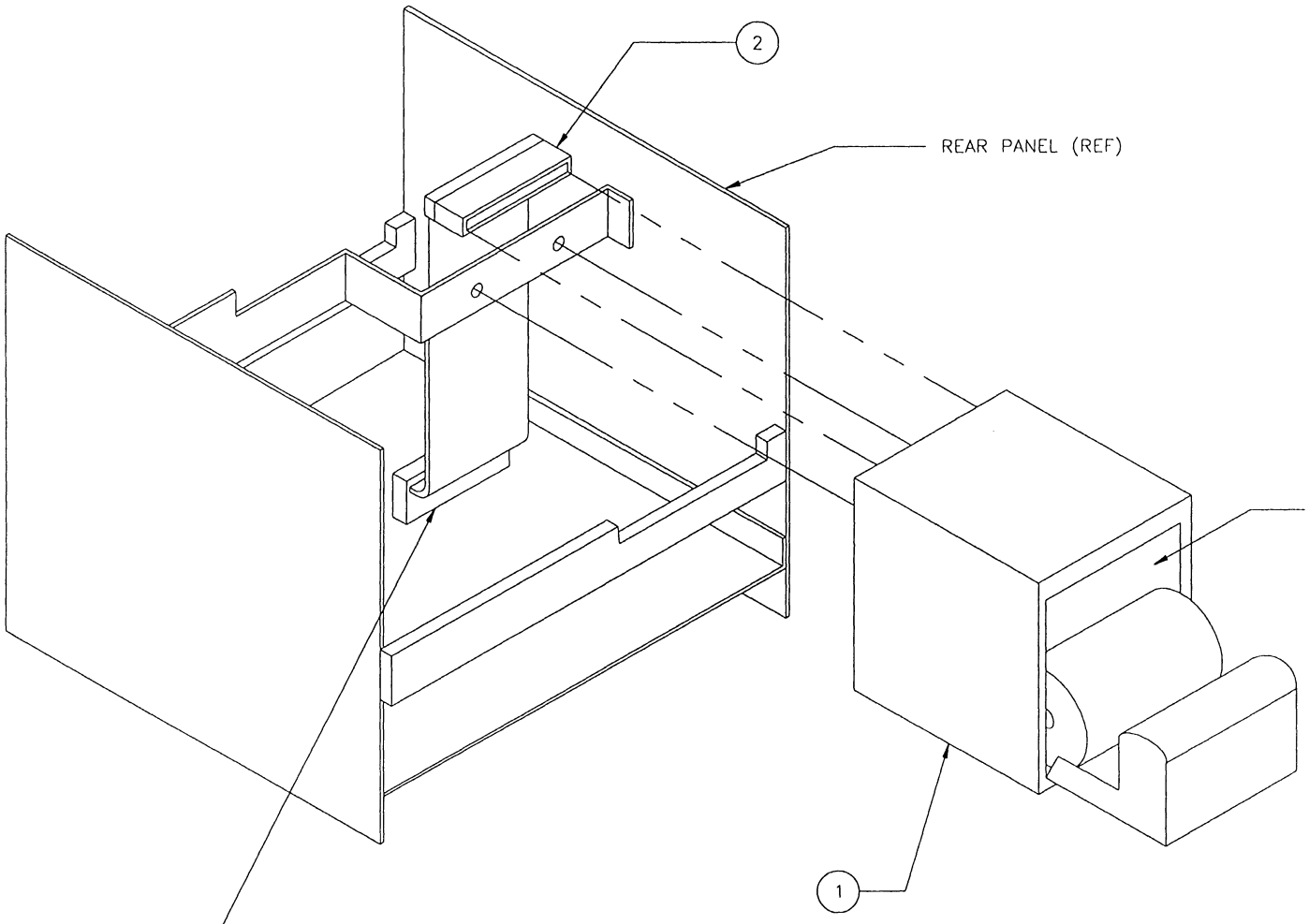


Figure 10-3 (continued)

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	RELEASED ECO 695	8-22-90	
A1	REVISED PER DCO 270	4-10-92	



TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DEC ANGLES ± ± .XX .01 ± .XXX .005 ±1/2°		MDE MEDICAL DATA ELECTRONICS	
APPROVALS	DATE	AR42 RECORDER ASSY	
DRAWN ATK	8-22-90		
CHECKED		SCALE FULL / SIZE C / DRAWING NO 500124 / REV A1	
5001241A.DWG		DO NOT SCALE DRAWING	SHEET 1 OF 1

Figure 10-4

358100-0004A	SCR, 4-40 X 3/8,PH FLTHD,SS,100 DEG.	4	22
358100-0036A	SCR, 4-40 X 1/4,PH PNHD,ZINC OR ANY	9	29
358100-0041A	SCR, 6-32 X 1/4 PHL PNHD	8	15
358100-0102A	SCR, 6-32 x 1/8 IN LG PHPNHD,STL ANY PLT	1	30
358200-0004A	WSHR, #4 FLAT STL ZINC,(.125ID,9/32OD,.025THK)	7	20
358200-0009A	WSHR, #4 SPLIT LOCK	11	21
358200-0018A	WSHR, #6 INT TOOTH STEEL	8	24
360500-0023A	NUT, #6 HEX,LRG PTRN	4	18
385000-0000A	TY-WRAPS, 3IN LENGTH (1000/BAG)	1	23
385000-0004A	SHRINK TUBING, 1/8in BLACK VW-1	2	25
385000-0005A	SHRINK TUBING, 1/4in BLACK VW-1	2	26
400404-0000	LABEL, ~UL LISTED MEDICAL EQUIP.~ 26T1 -E3/E4	1	31
400746-0000	DGHTR BD. 1/8 FOAM INSULLATION, REV B (E1521)	1	28
401073-0000	SIDE BAR E3 MONITOR REV. D (E1677)	2	9
401093-0000	FISHPAPER E3 CPU REV. B (E827)	1	11
401168-0000	PCBA, E3 CPU MOTHER REV. S(E2003)	1	1
401170-0000	PCBA, E3 POWER SUPPLY REV. T (E1879)	1	2
401234-0000	FISH PAPER PWR SPLY PCBA E3 REV. B	1	13
401237-0000	FRONT PLATE ASSY E3 REV. D1(D584)	1	4
401238-0000	SUB-CHASSIS ASSY E3 REV. C (E1732)	1	5
401244-0000	REAR PNL ASSY E3 REV. F (E1360)	1	6
401247-0000	E3/E2B/E2B BATTERY PACK W/ LABEL ASSY REV. A	2	8
401347-0000	LBL, SERIAL NUMBER E3/E4/LINK/DEFIB	1	27
402016-0000	SPINE - E3 REV. A (E1352)	1	10
402584-0000	FAB PAINT SCREW #4-40 x 3/16 REV. A (E1932)	12	14

358100-0036A	SCR, 4-40 X 1/4,PH PNHD,ZINC OR ANY	3	8
358100-0140A	SCR, PLASTITE,6 x 1/4~LG,PNH PHL STL ZN PLATE	4	5
358200-0004A	WSHR, #4 FLAT STL ZINC,(.125ID,9/32OD,.025THK)	3	9
358200-0006A	WSHR, #6 FLT STL ZINC	4	10
358200-0009A	WSHR, #4 SPLIT LOCK	3	11
358200-0010A	WSHR, #6 SPLT LCK	4	12
360500-0023A	NUT, #6 HEX,LRG PTRN	4	13
362000-0015A	LCD, 6 IN 320x200 DBL SUPERTWST FOR E3 **FIFO**	1	4
385000-0000A	TY-WRAPS, 3IN LENGTH (1000/BAG)	2	14
401071-0000	LCD PLATE E3 MONITOR REV. D (E1071)	1	2
401081-0000	MEMBRANE E3 MONITOR REV. F (E1982)	1	3
401315-0000	ROM, SINGLE CHANNEL E3 60HZ V7.66 (S035)	0	REFERENCE ONLY
401394-0000	LCD GROUNDING WIRE ASSEMBLY E3 REV. A (E780)	1	7
402019-0000	FISH PAPER EL/LCD PWR SUPPLY - E3 REV A (E1352)	1	15
402537-0000	BEZEL - E3A REV. A (E1894)	1	1

358100-0036A	SCR, 4-40 X 1/4,PH PNHD,ZINC OR ANY	7	12
358100-0140A	SCR, PLASTITE,6 x 1/4~LG,PNH PHL STL ZN PLATE	4	8
358200-0004A	WSHR, #4 FLAT STL ZINC,(.125ID,9/32OD,.025THK)	4	10
358200-0006A	WSHR, #6 FLT STL ZINC	4	16
358200-0009A	WSHR, #4 SPLIT LOCK	7	11
358200-0010A	WSHR, #6 SPLT LCK	4	18
360500-0023A	NUT, #6 HEX,LRG PTRN	4	19
362000-0032A	ELECTROLUMINESCENT DISPLAY	1	7
370101-0113A	RES, 11K,1/8W,5%,CF TAPE & REEL	1	R21
401081-0000	MEMBRANE E3 MONITOR REV. F (E1982)	1	2
401986-0000	PCBA,E3 ELECTROLUMIN DISPLAY DRVR REV D1 (D524)	1	20
401988-0000	PCBA, E3 ELECTROLUMINESCENT INTERFACE REV C(E1837)	1	3
402014-0000	MTG PLATE EL DISPLAY - E3 REV. A (E1352)	1	4
402017-0000	FILTER, POLARIZED EL DISPLAY - E3 REV D (E2094)	1	5
402018-0000	FLEXSTRIP,14-POS,1.25mmPITCH,6.5IN LG REV C(E1947)	2	6
402019-0000	FISH PAPER EL/LCD PWR SUPPLY - E3 REV A (E1352)	2	21
402067-0000	ROM, E3EL CPU 60HZ 110V SINGLE CHANNEL 7.66(S035)	0	REF ONLY
402336-0000	E3/E3N EL POWER SUPPLY ASSY REV A (E1671)	1	22
402360-0000	E3/E3B EL FLTR MTG FRAME REV C (E2032)	1	23
402537-0000	BEZEL - E3A REV. A (E1894)	1	1

366000-0008A	THERM.RCDR.PAPER,50MM WIDE, NO GRID, KANZAKI C692	1	-
366000-0015A	RECORDER, MODEL AR42 **(FIFO)**	1	1
401314-0000	CBL, AR42 RECORDER REV. C (E1344)	1	2

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