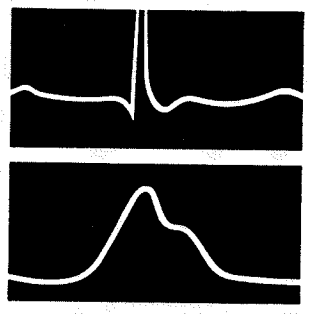
Datascope®
3000 MONITOR

Service Manual



CONTENTS

FOREWORD

This Service Manual is intended as a guide for technically qualified personnel during repair and calibration procedures. The information has been divided into the five main sections listed above. A detailed table of contents is provided on the first page of each section.

This publication may be updated to reflect product design changes and/or manual improvements. Changes to this manual are accomplished by supplying replacement pages and instructions for inserting or affixing them into the manual.

NOTE: In order to ensure the proper performance of your monitoring equipment and to prevent the voiding of the warranty, it is recommended that only parts and accessories provided by Datascope be used with your monitor.

WARNINGS

The 3000 Monitor operates on AC line voltages. Therefore, an electric shock hazard may exist when the instrument covers are removed. Repair and calibration procedures should be performed only by qualified personnel who proceed with care and follow proper servicing techniques. Warnings are given in Sections 2.2, 4.2.2, and other appropriate locations.

NOTE

Unauthorized servicing may void the remainder of the warranty. Check with the factory or with a local authorized Datascope representative to determine the warranty status of a particular instrument.

RS232 DISCLAIMER Connection of non-isolated devices to the RS232 Connector on this unit may cause chassis leakage to exceed the specification standards.

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1.1 Introduction

This section of the Service Manual provides general information about the instrument.

Sections 1.2 and 1.3 are included as a review of instrument functions and operation. The reader is encouraged to refer to the Operating Instructions, P/N 0070-00-0218, for more information.

Section 1.4 provides a description of operating principles, used for reference during repairs.

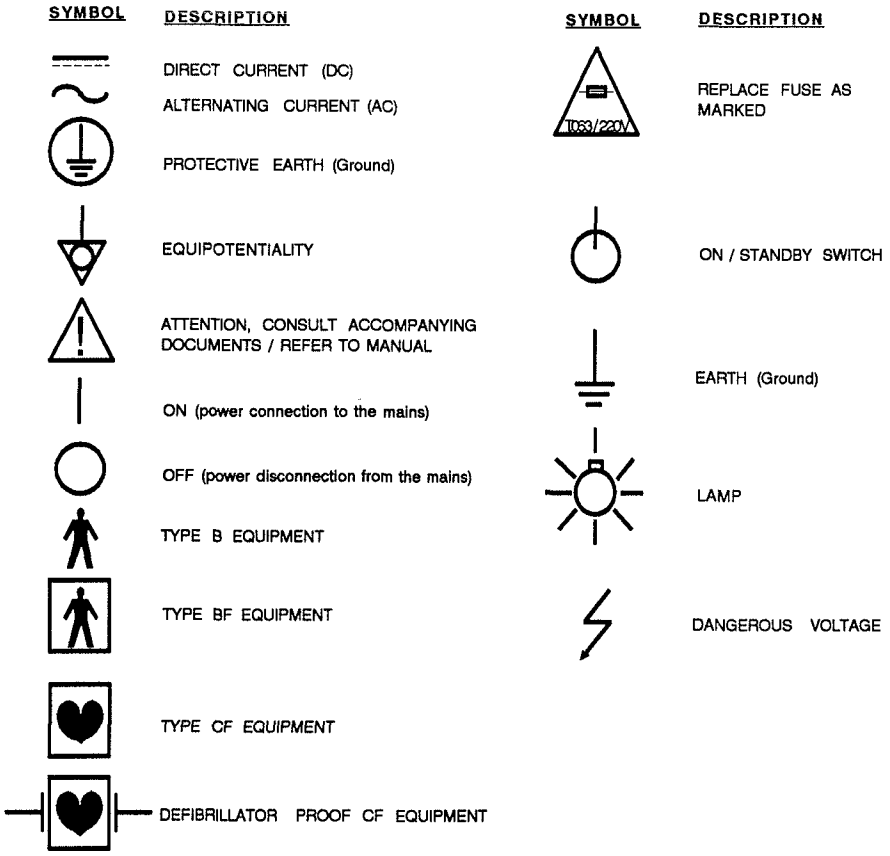
Section 1.5 provides product specifications.

1.2 CONTROLS AND INDICATORS

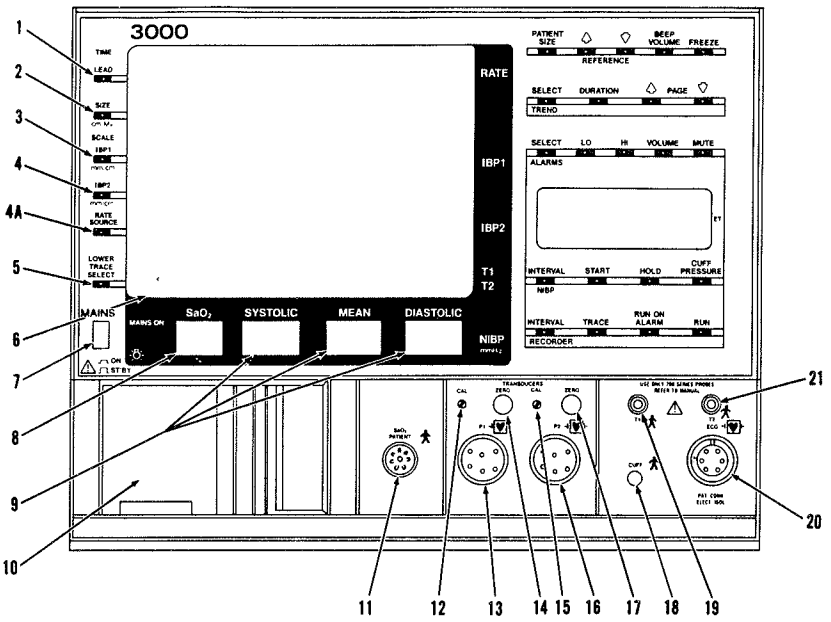
This section of the Service Manual identifies the fully configured Datascope 3000 Monitor and describes each front and rear panel control. Step-by-step instructions for operation are included in Sections 1.3, "Operation."

Refer to the paragraph numbers listed below for the location of the specific controls and displays.

NOTE: Descriptions are for a fully configured 3000. Some of the descriptions may not apply to your model.



1.2.1 Display Controls and Connectors



1. LEAD

Selects the available 3-lead or 5-lead configuration.

2. SIZE

Changes the size of the displayed ECG waveform. The four scale settings are 0.5-, 1.0-. 2.0-, and 3.0 cm/mV.

3. IBP1

Changes the scale of the displayed IBP1 waveform. The four scale settings are 5, 10, 20, and 40 mmHg/cm representing full scale values of 37, 75, 150, and 300 mmHg respectively.

With no input to the Pressure/Pulse Connector, P1 the IBP1 scale switch is inactive and the scale value is blank.

4. IBP2

Changes the scale of the displayed IBP2 waveform. The four scale settings are 5, 10, 20, and 40 mmHg/cm representing full scale values of 37, 75, 150, and 300 mmHg respectively.

With no input to the Pressure/Pulse Connector, P2 the IBP2 scale switch is inactive and the scale value is blank.

4a. RATE SOURCE

Selects the available heart rate source for systole beep and heart rate determination. The settings are A (ECG or IBP1), R (ECG), P (IBP), and S (SaO_2).

5. LOWER TRACE SELECT

Selects the available lower traces. Available selections can be cascaded ECG, invasive blood pressure, plethysmograph, or CO_2 waveform. The lower trace select key is inactive when the trend display is on or when Delayed ECG is being recorded.

6. CRT Display

The CRT display contains the following information (when the data is available).

Left border - time, selected lead configuration, ECG magnitude indicator, scale values for P1 and P2, reference trace data, and the movable reference trace.

Right border - heart rate data; heart rate source (R = ECG, P = pressure channel; S = SaO_2); systolic, mean, and diastolic pressure readings from the P1 and P2 channels; and temperature (T1 and T2) in ^{o}C.

7. ON/ST'BY

This push button switch is used to turn the monitor ON or to place it into a standby mode.

8. SaO2 Display

A 2-digit LED display indicating SaO_2 measurements made by the pulse oximeter.

9. SYSTOLIC, MEAN, and DIASTOLIC (NIBP Measurements)

Three, 3-digit LED displays indicating systolic, mean, and diastolic pressures. The mean pressure digits indicate cuff pressure during the measurement process.

10. RECORDER

A device used to produce an annotated, hard copy of monitor data.

11. SaO2 PATIENT Connector

This connector is used to attach the Datascope oximeter sensors to the Datascope 3000 Monitor.

12. CAL, P1 Transducer

A single-turn, adjustable potentiometer used to calibrate the blood pressure transducer.

13. Pressure/Pulse Connector, P1

A 6-pin male connector used for Datascope specified pressure transducers or peripheral pulse sensors.

14. ZERO, P1

This pushbutton is used for electronically zeroing the IBP channel pressure transducers.

15. CAL, P2 Transducer

A single-turn, adjustable potentiometer used to calibrate the blood pressure transducer.

16. Pressure/Pulse Connector, P2

A 6-pin male connector used for Datascope specified pressure transducers.

17. ZERO, P2

This pushbutton is used for electronically zeroing the IBP channel pressure transducers.

18. CUFF Connector

A pneumatic fitting that accepts the blood pressure cuff hose.

19. Temperature Connector, T1

A standard 3-wire phone jack used to mate the YSI series 700 temperature probes.

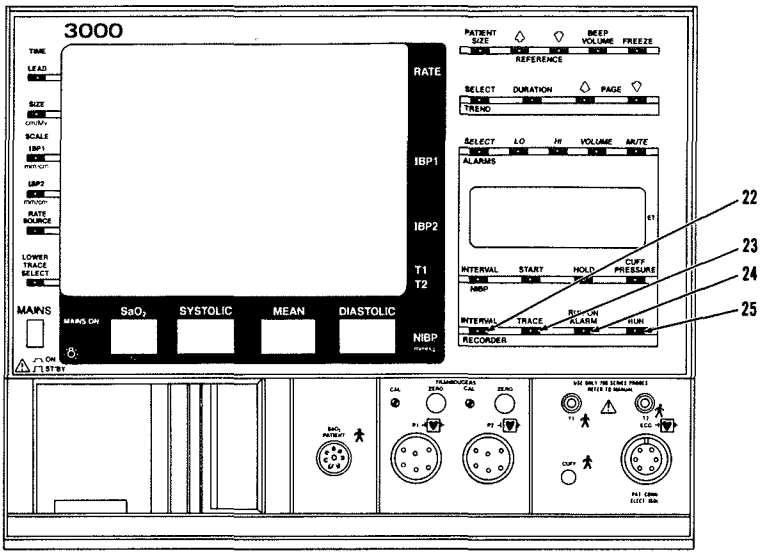
20. ECG Connector

A 6-pin AAMI (ECG-D 10/75) connector used for the ECG patient cable.

21. Temperature Connector, T2

A standard 3-wire phone jack used to mate the YSI series 700 temperature probes.

1.2.2 Recorder



22. INTERVAL

Selects automatic printing intervals of OFF, CONT, 10-, 30-, 60-, or 120-minutes. The selected setting is indicated on the LCD display. Continuous (CONT) specifies continuous run recorder.

23. TRACE

Selects the traces to be recorded. The selected trace(s) is indicated on the LCD display.

The available traces for recordings are Delayed ECG; Diagnostic ECG; ECG and IBP1; ECG and IBP2; Invasive blood pressures (IBP1 and/or IBP2); CO_2; or CO_2 Trend (1mm/s) and plethysmograph (SaO_2).

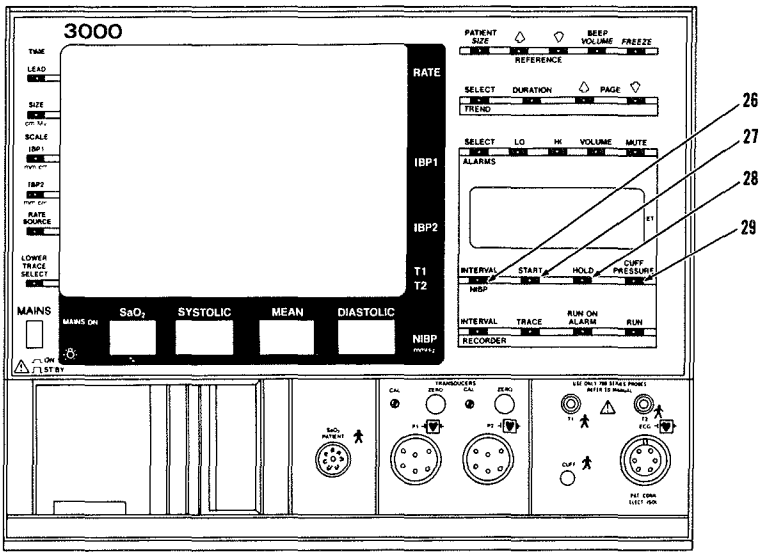
24. RUN ON ALARM

Selects the feature that automatically prints the violated alarm data. The function is off at power-up. The status is shown as AUTO or blank on the LCD display.

25. RUN

Used to begin the printing of selected data. Also used to begin the printing of selected data at designated interval times.

1.2.3 NIBP



26. INTERVAL

This key is used to select an automatic NIBP measurement cycle and to display that selected interval time in the LCD window. Choices of selection are Off, Continuous (one cycle immediately after the other), 1-, 2.5-, 5-, 10-, 15-, 20-, 30-, 45-, 60, or 120-minutes.

27. START

This key is used to begin an NIBP measurement cycle, and if applicable, the timed interval function.

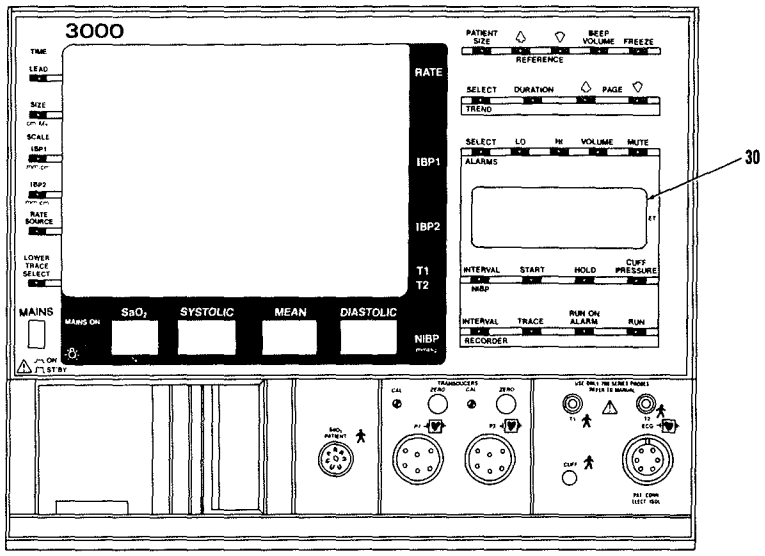
28. HOLD

This key is used, during a cuff measurement, to deflate the cuff and place the instrument into a hold mode. "HOLD" is displayed on the LCD window at these times.

29. CUFF PRESSURE

This key is used for selecting the initial cuff inflation pressure. If no choice is made the unit will automatically pump up to a default level of 180 mmHg (adult) or 120 mmHg (neonatal).

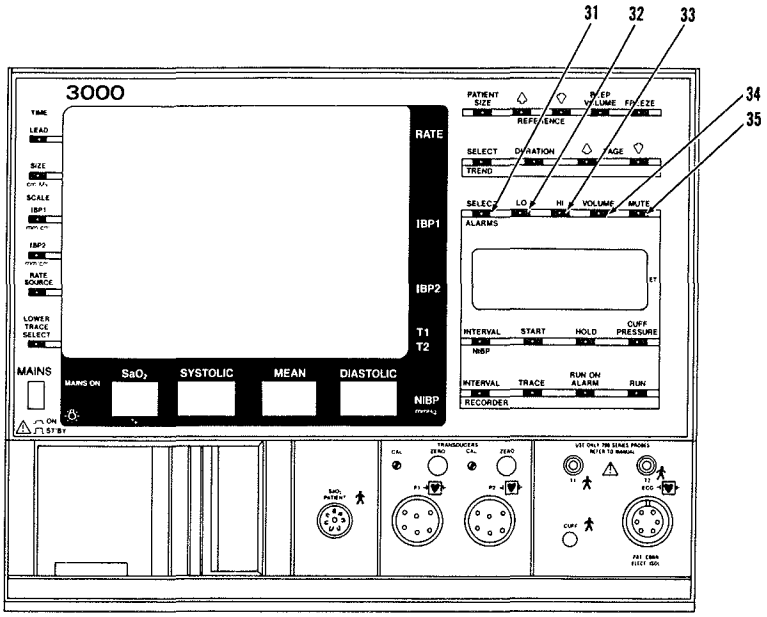
1.2.4 LCD Display



30. LCD Display

A 4-line display used to show various advisory messages relating to oximeter and NIBP status, recorder operating modes, and alarm limits.

1.2.5 Alarms



31. SELECT

Selects an alarm parameter, i.e., heart rate, systolic pressure, or SaO_2.

32. LO

Sets the low alarm limit for a selected parameter. The low alarm limit can be set only for the alarm parameter that displays in the LCD window.

33. HI

Sets the high alarm limit for a selected parameter. The high alarm limit can be set only for the alarm parameter that displays in the LCD window.

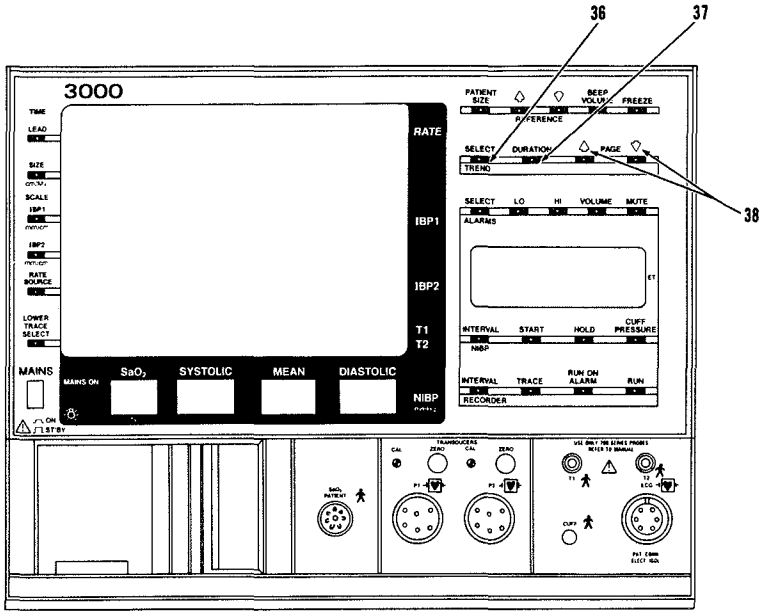
34. VOLUME

Sets the loudness of the audible alarm. There are six volume selections. The audible alarm cannot be permanently turned off once the alarm limits are set.

35. MUTE

This key is used to temporarily silence the alarm tone for 60 seconds for continuous measurement. Non-continuous measurements eg (NIBP) are muted until the next measurement.

1.2.6 Trend



36. SELECT

Selects a trend presentation, either tabular or graphic. Trend presentations, in tabular form, are made for trended NIBP data on the first page and trended heart rate, SaO_2 and Temperature 1 on the second page. Trend presentations, in graphic form, are made for heart rate, temperatures, pressures, CO_2, or SaO_2, or Agent.

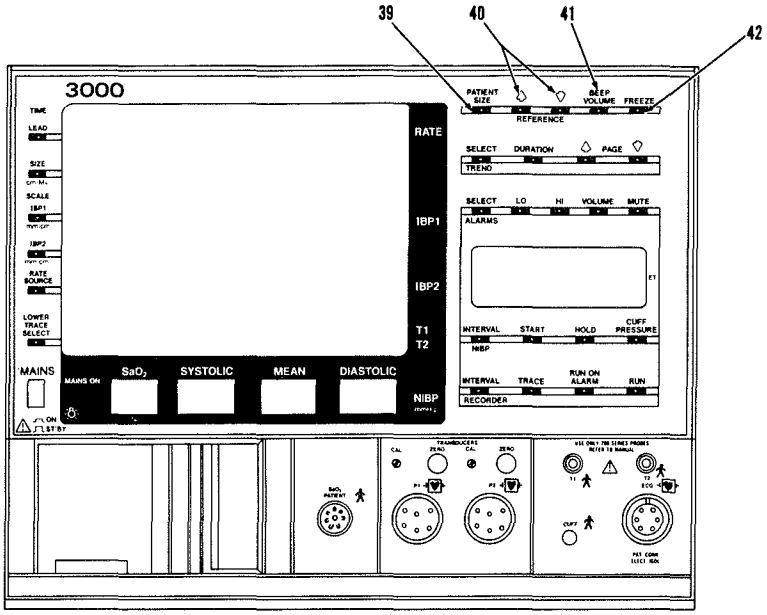
37. DURATION

Selects the time scales for the trend presentations. Available time scales are 1-, 2-, 4-, 8-, or 24-hours.

38. PAGE

Scrolls the list of trended Tabular Data. The measurements, along with the time of each measurement, are presented in tabular form. The page keys only operate when Tabular Data is displayed.

1.2.7 Monitor Operation



39. PATIENT SIZE

This key is used for selecting the desired operating mode, Neonate or Adult/Ped.

40. REFERENCE

These keys are used to move the CRT reference trace.

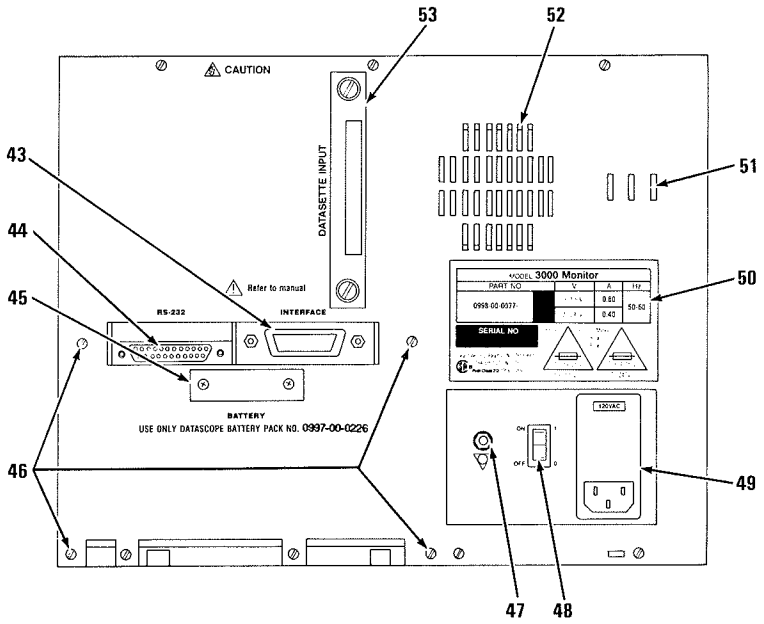
41. BEEP VOLUME

This key is used to select the setting of the QRS detect beeper.

42. FREEZE

This key is used to stop and start the trace movement across the CRT screen. The function is disabled when a recording is in process.

1.2.8 Rear Panel



43. INTERFACE CONNECTOR (for Datascope equipment)
44. RS232 CONNECTOR**
45. BATTERY CONNECTOR* ***
46. BATTERY PACK MOUNTING POINTS***
47. EQUIPOTENTIAL POST
48. MAINS POWER SWITCH
49. LINE CORD RECEPTACLE/FUSE HOLDER/ VOLTAGE SELECTOR
50. SERIAL NUMBER LABEL
51. LOUDSPEAKER LOCATION
52. FAN EXHAUST (DO NOT BLOCK)
53. SOFTWARE MODULE PORT

43. INTERFACE CONNECTOR (for Datascope equipment)

A 24-pin IEEE #488-1978 type receptacle (AMP Champ P/N 55 291-2) used to interface with the Datascope ACCUCAP, ACCUSAT, ACCUTORR, and DATATRAC.

44. RS232 CONNECTOR** (For future optional use only.)

A 25-pin D-type connector used to provide additional high speed channels for peripheral communications.

45. BATTERY CONNECTOR***

A connector used to attach the battery to the unit.

* Protective cover is removed for clarity.
** Connection of non-isolated devices to the RS232 Connector on this unit may cause leakage to exceed the specification standards.
*** Battery option is not available in countries that require IEC.601-1 Standards compliance of this instrument. Please contact the Datascope Service Department for further details.

46. BATTERY* PACK MOUNTING POINTS

Four mounting points used to attach the optional sealed, lead-acid battery.

47. EQUIPOTENTIAL POST

A connector used to equalize the potential between other hospital equipment.

48. MAINS POWER SWITCH

A switch used to act as the line (mains) disconnect.

49. LINE CORD RECEPTACLE/FUSE HOLDER/VOLTAGE SELECTOR

A line cord receptacle, fuse holder, and voltage selector for mating with an 8 ft. detachable line cord.

50. SERIAL NUMBER LABEL

Identifies model number, serial number, fuse type, and ac rating of the unit.

51. LOUDSPEAKER LOCATION

52. FAN EXHAUST

An opening through which heat escapes from the unit. DO NOT BLOCK.

53. SOFTWARE MODULE PORT

An input used to connect a high density programmable memory module (Datascope 3000 Datasette).

* Battery option is not available in countries that require IEC.601-1 Standards compliance of this instrument. Please contact the Datascope Service Department for further details.

1.3.0 OPERATION

This section of the Operating Instructions provides general guidelines and step-by-step instructions for the proper use of the monitor. Numbers in parenthesis ( ) identify the displays and controls described in Section 2.0, Controls and Indicators.

1.3.1 SET UP

1. Set the rear panel MAINS POWER SWITCH (51) OFF.

2. Check the serial number label (48) and voltage indicator on the line cord module window. Confirm proper voltage configuration. If the instrument is not appropriately wired, contact a Datascope Service representative or qualified hospital personnel.

3. If interfacing with other compatible Datascope instruments, attach the interface cables (P/N 0012-00-0271) between the rear panel INTERFACE connector (43) and the corresponding interface connectors on the peripheral instruments.

4. If additional communications capabilities are required, attach the RS232 interface cable to the rear panel RS232 connector (44).

5. Attach the AC power cord into the Datascope 3000's rear panel POWER CORD RECEPTACLE (47) and into a grounded (3-prong) Hospital Grade AC receptacle. Do not use an adaptor to defeat the U-ground.

WARNING: Insure that the total chassis leakage currents do not exceed 100 ua.

1.3.2 TURNING POWER ON

1. Place the rear panel MAINS POWER SWITCH (51) ON. The front panel ON/ST'BY LED should illuminate. This LED is located by the ON/ST'BY switch (7).

2. Set the front panel ON/ST'BY switch (7) ON. The 3000 will perform an internal self test as indicated on the LCD.

3. Self Test Messages:

MESSAGE	REASON/Operator OPERATOR/RESPONSE	Message Displayed In LCD Window:	ALARM TONE
Trend Failure	Trend self test unsuccessful. Power cycle the monitor.	Displayed on fourth line of LCD.	No
System Failure	System self test unsuccessful. Power cycle the monitor.	Displayed on second line of LCD.	No
Recorder Failure	System self test unsuccessful. Power cycle the monitor.	Displayed on second line of LCD.	No

4. Monitor is in the ADULT/PED mode. If NEONATE mode is desired, press PATIENT SIZE (39) and hold for 1 second. CRT displays NEONATE.

WARNING: The following equipment is approved for use with the 3000 Monitor in order to maintain IEC.601-1 Standard compliance.
1) MULTINEX (P/N 0998-00-0071)
2) ACCUSAT (P/N 0998-00-0057)

1.3.3 CONTROL SETTINGS

The first time default settings are as follows:

Parameter	First Time Default	Parameter	First Time Default
Alarm Parameters	OFF	Heart Rate Source	Auto
Alarm Volume	Lowest Setting	Lower Trace Select	Cascaded ECG
Beep Volume	OFF	NIBP Interval	OFF
IBP 1 Scale	20 mm/cm	Patient Size	Adult
IBP 2 Scale	20 mm/cm	Recorder Trace	Delay ECG
ECG Lead	II	Run On Alarm	OFF
ECG Size	1. cm/Mv		

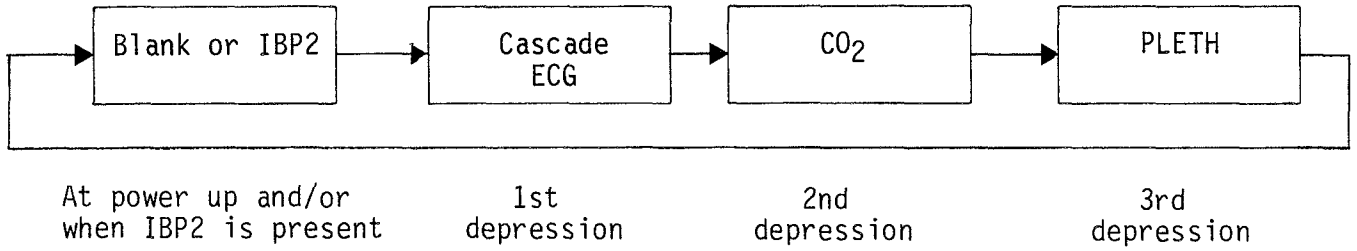
Every 30 seconds the 3000 stores these control settings. Therefore, any changes made to these settings will be stored as long as power has not been turned off before the 30 second period has elapsed.

NOTE: The first time default settings will be used if an internal error occus.

1.3.4 OPERATION

The Datascope 3000 can monitor one or any combination of the following: ECG, invasive blood pressure, non-invasive blood pressure, SaO2, and temperature.

The data relating to these parameters is displayed on the monitor's CRT, in traces and alphanumerics. Three non-fade traces are provided. The top trace always displays ECG, the middle trace is used to display the first invasive blood pressure (IBP1), and the lower trace is used to sequence through cascaded ECG, CO_2, plethsymograph, and, if applicable, the second invasive blood pressure (IBP2). If data is not present, the appropriate trace will display as a flat line or be blank.

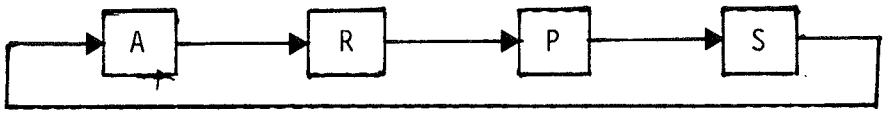


LOWER TRACE SEQUENCE
Figure 3-1

NOTE: The CO_2 trace is only availabel when data is received from an external source.
The speed of all traces is 12.5 mm/s, not the normal 25 mm/s when CO_2 is selected.

Alphanumerics are provided on both sides of the CRT screen. The left border contains time; patient size; user-selected lead configurations; ECG magnitude indicator; scale values for P1 and P2; and reference trace data.

The right border contains heart rate data; heart rate data source; systolic, mean, and diastolic pressure readings from both the P1 and P2 channels; and temperature (^{o}C).



RATE SOURCE SEQUENCE

When rate source select is pressed, the respective heart rate source for systole beep and heart rate determination is identified. Depressing this switch indicates the heart rate source with a letter next to the heart rate display. Subsequent depressions sequence through the selections as follows:

(A) Automatic selection of ECG or IBP1 for heart rate measurement, depending on which signal is stronger. Once the 3000 determines the stronger signal, the letter "A" will disappear. If ECG is selected, a flashing "R" will be displayed, synchronous with systole. If IBP1 is selected, a flashing "P" will result, synchronous with systole.

(R) Only ECG will be selected for heart rate measurement. The letter "R" will flash with systole.

(P) Only IBP1 will be selected for heart rate measurement. The letter "P" will flash with systole.

(S) SaO_2 will be selected for heart rate measurement. An internal speaker provides an audio beep tone for systole pitched to the SaO_2 value. In the event that the sensor becomes disconnected from either the patient or the monitor the rate source will default back to A.

A movable reference trace is provided for the positive display area of the non-ECG traces. The line moves 1 mmHg for pressure displays or 1 mmHg, TORR, BPM, and ^{o}C for trend displays.

If the keys associated with the reference trace (40) are held despressed for more than half a second, the trace moves at a rate that allows it to travel the 7.5 cm vertical distance in approximately 10 seconds.

1.3.4.1 Sequence for Establishing ECG

NOTE: ECG can be used as a heart rate source. See section 1.3.4 for details.

The patient ECG signal is preferably acquired using the five lead patient cable and skin electrodes.

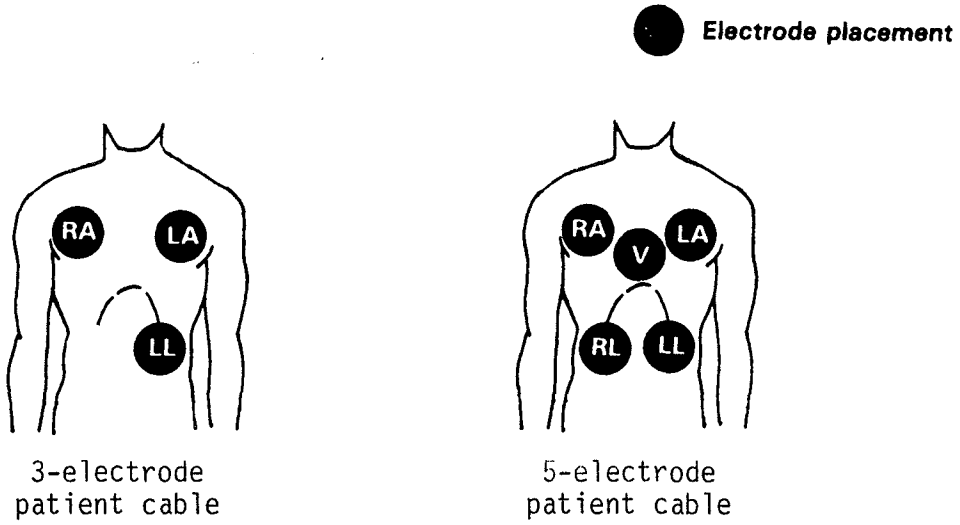
The five electrode patient cable permits monitoring of Leads I, II, III, aVR, aVL, aVF, and V. The optional three electrode cable permits monitoring of Leads I, II, and III.

When a three electrode patient cable is used, the monitor sequences through the seven available lead configurations (I, II, III, aRV, aVL, aVF, and V) and displays XXX's for all non-valid configurations. (A five electrode patient cable used with three electrodes operates the same as a three lead cable configuraton.)

The type of skin electrode and the technique of applying the electrodes are major factors in determining the quality of the signal. Limb electrodes commonly used with electrocardiographs are typically unstable and, therefore, unsuitable for monitoring purposes. They are not recommended.

Use the electrodes supplied with the monitor or use equivalent high-quality, silver-silver chloride electrodes. Both are designed to acquire ECG with the optimum baseline stability, recovery from defibrillation, and minimum artifact from patient movement.

1. Attach the electrodes to the patient as shown in Figure 3-2.



ELECTRODE PLACEMENT
Figure 3-2

2. Attach the electrodes to the patient cable using an ESIS filter block when in an electrosurgical environment. See Section 1.3.4.2, Use in an Electrosurgical Environment.

3. Plug the patient cable into the ECG CONNECTOR (20) on the front panel. The CRT displays the ECG trace in the top trace position. Once ECG is acquired, an audible beep is provided with the arrival of each R-wave. Adjust the volume of this beep by pressing BEEP VOLUME (41).

   Heart rate is displayed as RATE on the CRT. A flashing "R", in the upper right corner, next to the displayed rate value, occurs with each QRS event. "R" indicates that ECG is determining the heart rate.

4. Press LEAD (1) to select a desired lead configuration. Indication of the selected lead is displayed in the upper left corner of the monitor screen.

   NOTE: Lead II usually produces the largest R-wave and is automatically selected when the monitor is turned on.

5. Press the SIZE (2) key to sequentially select an ECG scale factor (0.5-, 1.0-, 2.0-, or 3.0 cm/mV). The selected scale factor is displayed in the upper left portion of the CRT.

   NOTE: 1.0 cm/mV is automatically selected when the monitor is initially turned on.

6. Lead Fault Detection

   Visual lead fault detection is provided when Leads I, II, or III are selected and when any of the LL, LA, RA leads are open. The lead configuration window alternately displays XXX's and the selected lead.

If a pressure signal is not present at the Pressure/Pulse Connector, P1 (13) when an EKG lead fault occurs, an audio tone sounds if a LO heart rate alarm has been set. (Once the alarm limits are set the alarm volume cannot be turned off without resetting the alarm limits.)

When electrode connections required for a given lead are not present, or connected but resistive because of a dried-out electrode or bad lead wire, a visual lead fault indication (XXX) is given.

7. Alarm limits should be set once the signal is established as a stable trace. See Section 1.3.4.8, Alarms and Indicators.

8. Trended Heart Rate data can be obtained. See Section 1.3.4.9, Trend.

9. A permanent, hard copy of ECG data is also available. See Section 1.3.4.10, Recorder.

1.3.4.2 Use in an Electrosurgical Environment

The Datascope 3000 has a built in Electrosurgical Interference Suppressor (ESIS) which keeps electrosurgical unit (ESU) noise from disturbing the system's performance. While the ESIS suppresses ESU noise, it cannot eliminate it altogether. This is because sparking to tissue may occur with ESU operation. ESU operation may generate noise that extends into the ECG frequency range. Since the Datascope 3000's ECG amplifier must pass through these frequencies, some ESU noise may be picked up. Interference may occur with an ECG signal.

Limiting the power of this noise energy is therefore very important. Its magnitude is directly related to the power setting of the ESU, which should be as low as possible for the intended effect.

Successful ECG triggering in the presence of ESU noise depends to a large extent on insightful patient preparation and ESU use.

Proceed with the following techniques when the monitor is used in an electrosurgical environment. These techniques are recommended to minimize the presence of electrical interference from electrosurgical devices.

1. Attach the electrodes the furthest possible distance from the surgical site. Place the ESU return electrode directly opposite the active elecrode site. Select the lead configuration that yields the largest amplitued of ECG display.

2. Attach the leads to the patient cable using the optional ESIS filter block (0002-00-0180/0181) when in an electrosurgical environment.

3. Plug the patient cable into the ECG CONNECTOR (20) on the front panel. The CRT displays the ECG trace in the top trace position. Once ECG is acquired, an audible beep is provided with the arrival of each R-wave. Adjust the volume of this beep by pressing BEEP VOLUME (41).

   Heart rate is displayed as RATE on the monitor screen. A flashing "R", in the upper right corner of the CRT, next to the displayed rate value will occur with each QRS event. "R" indicates use of ECG to determine rate.

4. Press LEAD (1) to select a desired lead configuration. The selected lead is displayed in the upper left corner of the monitor screen.

   NOTE: Lead II usually produces the largest R-wave and is automatically selected when the monitor is turned on.

5. Touch SIZE (2) to sequentially select ECG scale factors (0.5-, 1.0-, 2.0, or 3.0 cm/mV). The scale factor selected is displayed in the upper left portion of the monitor screen.

   NOTE: 1.0 cm/mV is automatically selected when the monitor is initialy turned on.

1.3.4.3 Operation with Pacemaker

When monitoring a patient with a pacemaker, a simulated pacing signal is displayed as a full scale, positive spike having a time relationship with the ECG QRS complex, regardless of actual pacer polarity.

However, the heart rate meter circuitry within the monitor rejects the pacer spikes and responds only to a valid ECG QRS complex when computing and displaying the heart rate. (See Specifications for circuit limitations.)

1.3.4.4 Sequence for Establishing IBP

The Datascope 3000 can simultaneously display two sets of invasive blood presssure measurements, each with independently scaled pressure ranges, reference traces, and auto zeros.

NOTE: IBP1 can be used as a heart rate source. See section 1.3.4 for details.

NOTE: Use the pressure transducers recommended by Datascope. See Section 5, Optional Accessories. Periodically calibrate the transducer. Follow standard practice, time interval recommendations. See Section 1.3.4.5 to calibrate transducers.

1. Connect the transducers to the front panel transducer connectors P1 (12) and/or P2 (15).

2. Confirm that the monitor is ON and the display is not in the FREEZE mode. Flashing XXX's are displayed on the right side of the CRT.

3. Vent the pressure transducers to atmosphere.

4. Press ZERO, P1 (14) and hold for a minimum of one second.

   After one second, one audible click sounds and the automatic zero process begins. All of the numerical sets of pressure values for P1 should indicate zero.

5. Press ZERO, P2 (17) and hold for a minimum of one second.

   After one second, two audible clicks sound and the automatic zero process begins. All of the numerical sets of pressure values for P2 should indicate zero.

   NOTE: It is not possible to automatically zero the transducers if the transducer offset exceeds 120 mm/Hg or if a non-compatible transducer is used.

   If the numerical systolic pressure value remains as flashing XXX's, the transducer should be considered defective and should be replaced.

   Diastolic and mean readings are blank during a fault condition.

6. Close the pressure transducer(s) vent to atmosphere. Verify the presence of pressure waveform(s) and digital display(s) for P1 and/or P2.

7. Press IBP1 (3) and IBP2 (4) until achieving the desired scale ranges.

   See Section 1.3.4.6 for a more detailed description of the IBP1 and IBP2 keys.

8. Press REF LINE (40) to begin reference trace movements.

   When the monitor is initially turned on the reference trace is at 0 mmHg. The numerical value of the pressure corresponding to the reference trace position is shown at the extreme left side of the reference trace.

9. Press REF LINE (40) to reverse the direction of the trace.

   NOTE: If changing the SCALE (3,4) causes the reference trace to disappear, touch the REF LINE (40) to reset the reference trace to zero.

10. Press IBP1 (3) or IBP2 (4) if a measurement is required when the numerical value for the reference trace is not present.

    Press IBP1 (3) and IBP2 (4) until they equal and then make the measurement.

    Press IBP1 (3) and IBP2 (4) until previous pressure values display.

1.3.4.5 Transducer Calibration

A ±15% gain calculation adjustment is provided in the event the transducer gain factor is other than 50uV/V/cmHg.

1. Connect the pressure transducer to the front panel connector(s) for P1 and/or P2.

2. Vent the pressure transducer(s) to atmosphere and zero the monitor.

3. Close the pressure transducer(s) vent to atmosphere.

4. Connect a mercury manometer to the pressure transducer(s).

5. Pump the manometer to the desired pressure.

6. Using a screwdriver, rotate CAL 1 and/or Cal 2 until the digital information on the monitor screen for P1 and/or P2 agrees with the manometer.

7. Disconnect the manometer. The transducer can now be used.

NOTE: If a calibration cannot be achieved, the transducer is either defective or outside the ±15% limits. If IBP1 or IBP2 gain adjustment has been affected on the monitor, this will have matched the monitor's characteristics to the particular non-standard transducer only. The monitor will have to be readjusted whenever a transducer is substituted.

1.3.4.6 IBP1 and IBP2

These keys are used to change the scale of their respectively displayed waveforms. The scales are changed as a result of the input signals at the Pressure/Pulse Connectors. The scales change to a more sensitive setting with each successive depression of its respective switch. When either scale is set to the most sensitive setting, the next change is to the least sensitive input.

The P1 and P2 scale values are used to display the selected sensitivity. At power-on, the least sensitive setting is selected for both.

The scale P1 switch is inactive and the P1 scale value is blank with no connection to the Pressure/Pulse Connector, P1.

The scale P2 switch is inactive and the P2 scale value is blank with no connection to the Pressure/Pulse Connector, P2.

The four P1 pressure scales are:

P1 Display Scale (mmHg/cm)	P1 Input Range (mmHg)	Reference Trace Limit (mmHg)
5	-2.5 to 37.5	33
10	- 5 to 75	75
20	-10 to 150	100
40	-20 to 300	300

The four P2 pressure scales are:

P2 Display Scale (mmHg/cm)	P2 Input Range (mmHg)	Reference Trace Limit (mmHg)
5	-2.5 to 37.5	33
10	- 5 to 75	75
20	-10 to 150	100
40	-20 to 300	300

CAUTION: The Reference Trace can be used to measure the two IBP waveforms provided, the two scales are identical as shown next to the scale keys (3,4). When the scales of the two IBP's are not matched, the value next to the Reference Trace is blank. When the Lower Trace is displaying ECG, CO_2, or Pleth waveform and IBP1 is also present, the value of the Ref Line only applies to IBP1. It should not be used to measure the lower trace whatever that may be.

1.3.4.7 Sequence for Establishing NIBP (Optional)

The Datascope 3000 provides an automatic and manual NIBP capability for a wide range of patients, from neonates and small children to large adults.

NOTE: This instrument will give erroneous NIBP values on those patients that are undergoing intra-aortic balloon pump treatment.

NOTE: To obtain the best accuracy, make sure that the cuff is either disconnected or completely deflated when power is applied.

A. Selection of the NIBP Cuff

The correct size of the pressure cuff for a given patient has, among other considerations, a direct bearing on the accuracy of the obtained NIBP measurements. Base your selection of the cuff size on the limb circumference of the patient.

The following table indicates the available Datascope cuffs for use with the Datascope 3000 and the range of limb circumferences for which they are intended. The design dimensions of the cuffs and the intended uses are based on recommendations of the American Heart Association in their publication, "Recommendations for Human Blood Pressure Determination by Sphygmomanometer."

Approx. Limb Size	Description (cuff name)	DATASCOPE Part Number	
Size 0: 6.0-8.0 cm	neonate	0683-03-0004-02	(Box of 50)
Size 1: 7.0-10.0 cm	neonate	0683-03-0001-02	(Box of 50)
Size 2: 9.0-13.0 cm	neonate	0683-03-0002-02	(Box of 50)
Size 3: 11.0-17.0 cm	neonate	0683-03-0003-02	(Box of 50)
8 cm diameter	pediatric	0998-00-0003-04	
9 cm diameter	pediatric	0998-00-0003-03	
12 cm diameter	adult	0998-00-0003-01	
15 cm diameter	large adult	0998-00-0003-02	

B. Placement of Cuff on Patient

The cuff should be placed at the patient's heart level or an error, due to the hydrostatic effect, is introduced into the measurements. To reduce additional errors, the cuff should be fitted snugly, with little or no air present within the cuff.

NOTE: The distal edge of the cuff should be placed higher on the patient's arm (away from the elbow) to avoid differential pressure damage to the radial nerve. Refer to Section 6.3, in the Operating Instructions, Precautions with Using Automatically Cycled Blood Pressure Cuffs, for more information.

C. Initiation of NIBP Measurements

NIBP measurements may be initiated either manually or automatically.

1. Manual Initiation of NIBP Measurements

CUFF PRESSURE (29) is used to select the initial cuff inflation pressure.

a. Press CUFF PRESSURE (29) to change the cuff pressure. The selected pressure is displayed in the LCD window (30).

Cuff Pressure mmHg

Adult/Ped: 120, 140, 160, 180, 200, 220, 240, 260, or AUTO*

Neonate: 40, 60, 80, 100, 120, 140, or AUTO*

*Auto selection (Adult/Pediatric) inflates cuff to 180mmHg for first selection. Subsequent inflation pressures = last systolic reading + 50mmHg.

*Auto selection (Neonate) inflates cuff to 120mmHg for the first selection. Subsequent inflation pressure = last systolic reading + 30mmHg.

b. Press START (27) to begin an NIBP measurement.

The cuff begins to inflate. Inflation stops when the cuff pressure reaches the pressure selected in step 1.

At this time, the cuff begins to slowly deflate and the Datascope 3000 begins to collect oscillometric pulsations from the cuff.

Have the patient remain still to avoid the introduction of unnecessary motion artifact.

After the cuff pressure drops below the diastolic pressure, the results of the measurement are displayed on three sets of discrete LED readouts (9).

During or after an NIBP measurement, one of several advisory messages may display on the LCD window (30). Refer to NIBP Advisory Messages page 1-26.

One minute after the NIBP data has been presented the LCD window (30) indicates the elapsed time. Elapsed time is updated each minute since last successful measurement.

2. Automatic Initiation of NIBP Measurements - Interval Timer

The INTERVAL key (26) is used to establish an automatic time sequence for taking NIBP measurements.

a. Press INTERVAL (26). The LCD advisory (30) displays one of the following:

Cont., 1-, 2.5-, 5-, 10-, 15-, 20-, 30-, 45-, 60-, or 120-minutes.

Continuous mode takes measurements for five consecutive minutes and then switches into five minute mode. Measurements can be re-started manually or a different time interval can be selected.

b. Press START (27) to begin the timed measurement sequence.

The START (27) and HOLD (28) function affects the taking of timed measurements. Example:

TIME	DATASCOPE 3000 OPERATION
10:00	Press INTERVAL (26) to the 5-minute setting. Press START (27) once. First measurement is taken.
10:05	A scheduled measurement is taken.
10:06	Press HOLD (28).
10:10	A scheduled measurement is skipped.
10:12	Press START (27) again. This releases the HOLD mode and a measurement is taken.
10:15	A scheduled measurement is taken.

CAUTION: Observe extreme care when NIBP is set in the continuous mode on neonatal and pediatric patients.

NOTE: If the unit is in the continuous, 1 minute, or 2.5 minute timer mode and is UNABLE TO MEASURE (cannot successfully complete a measurement after four attempts), then the next timed measurement cycle starts immediately and another measurement is taken.

3. NIBP Advisory Messages

MESSAGE	REASON	MESSAGE DISPLAYS IN LCD WINDOW FOR:	Alarm TONE
RETRY-MOTION ARTF	Too much motion artifact was present to complete the measurement. The unit begins a retry measurement process.	10 seconds	NO
UNABLE TO MEASURE	The measurement cycle terminates, if for any reason, the unit cannot successfully complete a measurement after four attempts.	Alternates with normal display	Generated for 5 seconds

MESSAGE	REASON	MESSAGE DISPLAYS IN LCD WINDOW FOR:	ALARM TONE
RETRY	A) The cuff pressure failed to reach the preset pressure in 60 seconds. The unit begins a retry measurement after a five second pause.	10 seconds	NO
	B) The measurement takes longer than two minutes. The unit begins a retry measurement after a five second pause.	10 seconds	NO
	C) No pulse is detected in the cuff. The unit attempts a retry measurement after a five second pause.	10 seconds	NO
RTRY= PUMP HIGHER	The cuff was not sufficiently inflated to measure the patient's pressure. The monitor automatically begins a retry measurement at a higher pressure.	10 seconds	NO
NIBP FAILURE	NIBP Module fails self diagnostic test at power-up.	Until power is manually turned off and on and problem is corrected.	NO
CUFF OVERPRESSURE	The cuff pressure exceeds the preset value. The cuff vents and remains vented until the system power is cycled.	Alternates with normal display	NO

1.3.4.8 Alarms

The Datascope 3000 Monitor provides high and low alarm limits for Heart Rate (adult and neonate), IBP1, IBP2, NIBP, and SaO_2.

A. Selection of Alarm Parameter

The alarm limits are continuously scrolled on the first line of the LCD display (30). Each parameter displays for two seconds.

Select an alarm parameter by pressing Alarms SELECT (31) when the desired parameter is displayed. The selected parameter is indicated by flashing arrows next to the limit values. If desired, change the limit values by using the HI (33) and LO (32) keys. The selection remains for 15 seconds after the last HI or LO key has been pressed.

If the limit values do not need to be changed, press Alarms SELECT (31) to continue through the list of parameters. The last selection in the list allows for the clearing of all alarm limits except for SaO_2 which remains set at 85%.

B. Changing Alarm Limits

The HI (33) and LO (32) keys are used to change the settings of the alarm limits.

Once a parameter has been selected, pressing either the HI or LO key increments the high or low limit. Each successive depression of the key increments the high or low value up to the maximum value then to OFF, and then wraps around to the minimum value. If either key is held depressed, the limit increments at a rate of three steps per second, it remains at OFF for two seconds before wrapping around to minimum value.

C. Alarm Limits

PARAMETER		LO LIMIT RANGE	HI LIMIT RANGE	INCREMENTS IN STEPS OF
Heart Rate:	NEO	20 - 100	100 - 250	5 bpm
	ADULT/ PED	20 - 100	100 - 220	5 bpm
IBP1:	SYS	20 - 130	130 - 240	5 mmHg
	DIA	20 - 90	40 - 130	5 mmHg
IBP2:	SYS	20 - 130	130 - 240	5 mmHg
	DIA	20 - 90	40 - 130	5 mmHg
NIBP:	SYS	20 - 130	130 - 240	5 mmHg
	DIA	20 - 90	40 - 130	5 mmHg
SaO_2		50 - 95	80 - 99	1% or 5%

NOTES:

1. IBP alarms can only be set after a pressure tranducer has been installed.

2. NIBP alarms can only be set if the option has been installed.

3. The SaO_2 HI alarm limit increments in steps of 1%. The SaO_2 LO alarm limit increments in steps of 5% from 50 to 85% and in steps of 1% from 85 to 95%.

D. Alarm Volume

The VOLUME key (34) is used to set the loudness of the audible alarm. There are eight available settings from minimum to maximum. The LCD Display (30) provides a visual indication of the selected alarm volume in the form of a bar graph.

The MUTE key (35) is used to temporarily silence the alarm tone. For NIBP the alarm tone remains muted until the next measurement that violates the alarm. For all other parameters the alarm tone will resume automatically after 60 seconds if the alarm condition still exists.

E. Alarm Limit Violations

A HI alarm limit violation occurs when the parameter value equals or exceeds the set HI alarm limit value.

A LO alarm limit violation occurs when the parameter value is less than or equals the set LO alarm limit value.

Upon an alarm the following will occur:

1. The alarmed parameter will display on the first line of the LCD (30). The violated limit will flash. If more than one parameter is violated, the LCD rotates through each of the violated parameters. After the alarm conditions have been cleared, all of the alarm parameters will be displayed and then the LCD reverts to the scrolling state.

2. The current measurement of the violated parameter will flash in unison with violated limit. If SaO_2 is the violated parameter, the SaO_2 LEDs will flash "HL" or "LL" alternately with the current SaO_2 measurement. "HL" for a high limit violation and "LL" for a low limit violation.

3. The NIBP trend list will display a "*" next to the measurement that caused the alarm. The "*" is also printed with the trend list data.

4. The record cycle will activate if the "RUN ON ALARM" function is set to "AUTO". If the record cycle is activated when the ECG display is frozen and "delayed ECG" is the selected record trace then the "FREEZE" mode will be disabled.

Other Alarm Conditions

1. A low limit invasive pressure alarm will occur if the pressure tranducer is disconnected or not zeroed when a low limit is set.

2. A low limit rate alarm will occur if the selected rate source sensor is disconnected.

3. A four second alarm tone occurs when the SaO_2 "SENSOR OFF" message is displayed in the LCD advisory.

1.3.4.9 Trend

The Datascope 3000 can display and provide a permanent record for heart rate (BPM), invasive blood pressures, temperatures, SaO_2, CO_2, and up to 120 noninvasive blood pressure measurements.

With power on, available data from each parameter (heart rate, IBP, NIBP, etc.,) automatically accumulate. (Data is taken once every 10 seconds.) An average of the data taken for each parameter is updated on the screen every 1.5 minutes.

Over a period of time, this accumulation of data provides a trend for each parameter.

Trend information can be presented on a 1-, 2-, 4-, 8-, or 24-hour scale.

The trend memory is saved for one hour when power to the monitor is interrupted. If power is restored within one hour all trended data previously accumulated is still available. An area of the trend display will be blank indicating the time that power was interrupted.

Operation of the trend feature is as follows:

1. Press SELECT (36) until the desired trend parameter displays on the CRT (6).

   The trend selection and time duration are shown on the left side of the CRT, replacing the IBP scale information.

   Successive depressions of the SELECT switch provide tabular data and the following scale-adjusted graphic displays:

   Heart Rate (BPM); IBP1 and IBP2 (mmHg); T1 and T2 (temperatures) in ^{o}C; SaO_2%; CO_2 (TORR); Agent (AGT) in %; NIBP (mmHg).

   As each parameter is displayed the numbers next to the movable reference trace change to reflect the units and scale associated with that particular parameter. The units and scale for each parameter are fixed, but the reference trace is not. The moveable reference trace can be used to measure various points of the parameter by observing the digital displays on the left side of the reference trace.

   NOTE: Displaying a trend waveform overrides the SCALE (3,4) and LOWER TRACE SELECT (5) switches. Displaying a trend list also overrides the LEAD (1) and SIZE (2) switches.

2. Repeatedly press DURATION (37) until the desired trend time scale displays.

   Trended data can be displayed on a 1-, 2-, 4-, 8-, or 24-hour time scale.

   The DURATION (37) switch can be used to erase the trended data. Press and hold DURATION for three seconds to erase all previously recorded trended data.

An explanation of the trend displays is as follows:

Pressure P1,P2, and CUff - Displayed as a square wave with a step in the falling edge. The peak of the square wave represents systolic pressure, the valley represents diastolic pressure, and the step in each falling edge represents mean pressure.

Temperature - TEMP 1 - displayed as a solid line in ^{o}C.
TEMP 2 - displayed as a dashed line in ^{o}C.

NOTE: Avoid trending both T1 and T2 together when they are overlapping or when the values are too close to be distinguished by observing the CRT display. When in doubt, always use the printer copies to verify.

Heart Rate - Displayed as a continuous line in beats per minute.

CO2 and AGT - Displayed as a square wave showing Inspired and Expired CO_2. Partial pressures (represented in TORR) are represented by the low and high part of the waveform.

SaO2 - Displayed as a continuous line in percent.

3. Page

The PAGE UP and DOWN keys (38) operate only with the Tabular Data displays.

The NIBP Trend List can retain up to 120 NIBP measurements. NIBP measurements are presented in tabular form with the time of each NIBP measurement included.

1. Press PAGE UP or DOWN (38) to scroll through the available NIBP measurements.

2. To obtain a permanent record of the NIBP Trend List, see Secton 1.3.4.10, Recorder.

4. Clear

Press and hold DURATION (37) for three consecutive seconds to clear trend memory.

1.3.4.10 Recorder

The Datascope 3000 can provide a permanent record of delayed ECG; diagnostic ECG; two invasive blood pressures (diagnostic IBP1 or diagnostic IBP2); CO_2; Plethysmograph (SaO_2); Trend Parameters (Heart Rate and IBP); two temperatures; lead configuration, trended data and error messages, time of measurment, and scale factors.

A. Trace Recordings

To obtain a permanent record of a trace:

1. Press TRACE (23) until the desired selection is displayed on the LCD window (30).

2. Press INTERVAL (22) to select a printing time interval of OFF, CONT, 10-, 30-, 60-, or 120-minutes.

3. Press RUN (25) to begin a 20-second timed recording of the selected trace.

4. If desired, set RUN-ON-ALARM (24) to AUTO so a permanent record of violated parameters can be printed automatically upon alarm violations. The recorder will print the waveform selected, using the TRACE key, indicated on the recorder advisory.

5. Use the "Delayed ECG" recording selection to engage the pacer enhancement circuit for recording purposes.

B. Trended Recordings

To obtain a permanent record of trended data:

1. Press SELECT (36) until the desired trended trace selection is displayed on the CRT (6).

2. Press RUN (25) to print the selected trended trace.

NOTE: Activation of the RUN key (25) overrides the LEAD (1), SIZE (2), and SCALE (3) keys, EXCEPT when the display is in trend mode.

Pressing the RUN button while printing is in process will: 1) immediately stop the printing of CO_2 and pleth waveforms, 2) will stop printing ECG and pressure waveforms after printing cal pulses, 3) will have no effect on trend printout, and 4) will stop continuous running recorder.

All pages of the NIPB Trend List are printed.

Heart rate with source, pressure, temperature, time, date, lead configuration, and scale information are included on the edge of the strip chart paper for each analog waveform. CO_2, SaO_2, NIBP or MULTINEX information is also printed when available.

At least two calibration pulses are injected into the ECG channel representing 1mV RTI at the end of the record run.

At least two calibration pulses are injected into the P1 and P2 channel representing 40mmHg at the end of the record run.

When ECG is selected for recording, a 3 second ECG marker will be printed on the top and bottom of the printout.

1.3.4.11 Options

A. SaO_2 Measurements

The Datascope 3000 can be equipped to measure SaO_2. The alarm, record, and trend features can also be applied to SaO_2.

NOTE: SaO_2 can be used as a heart rate source. See section 1.3.4 for details.

1. SaO2 Signal Acquisition

a. Plug an SaO_2 sensor into the SaO_2 PATIENT CONNECTOR (11).
b. Attach the sensor to the patient.
c. After 20 seconds the SaO_2 percentage is displayed on front panel digital readouts (8).

NOTE: Poor or diminished light levels passing through the finger may result if the patient wears nail polish or artificial nails. Diminished light levels may be determined from the ACCUSAT's light level indicator on the right side of the Advisory Display. If less than one, or only one box illuminates, insufficient light is passing through the finger. If more than six boxes illuminate, too much light is passing through the finger. On some patients, it may be necessary to remove the polish to obtain an adequate signal. If an adequate pulse level cannot be achieved on patients with polished, long or artificial nails, position the finger probe on a toe or use an alternate site probe.

Strong ambient light or sunlight may result in poor or diminished signal levels.

If a blood pressure cuff is being used, the DIGISENSOR should be attached to the limb opposite the site of the blood pressure cuff.

d. Alarm limits can be set for SaO_2. See Section 1.3.4.8, Alarms and Indicators.

NOTES: This instrument is calibrated to read percentage oxygen saturation of functional hemoglobin (SaO_2). Significant levels of dysfunctional hemoglobin, such as carboxyhemoglobin or methemoglobin, affect the accuracy of the SaO_2 measurement. See the appendix for a bibliography of related articles.

This instrument may have trouble obtaining SaO_2 readings on patients undergoing intra-aortic balloon pump treatment.

Administration of certain vasoconstrictive drugs, i.e., norepinephrine, may reduce peripheral perfusion to a level that prevents the Datascope 3000 from taking SaO_2 and pulse rate measurements.

Arterial compression, tricuspid regurgitation, or other conditions may reduce perfusion of the plethysmograph waveform to a level that prevents the 3000 from taking SaO_2 and pulse rate measurements.

Intravascular dyes, depending on concentration, may affect the accuracy of the SaO_2 measurement.

2. SaO2 Advisory Messages

MESSAGE	REASON/Operator OPERATOR/RESPONSE	Message Displayed In LCD Window:	ALARM TONE
No Sensor	Sensor not connected to 3000	Alternates between advisory message and light level message every two seconds	No
Sensor Off	Sensor not connected to patient	Same as above	Yes - 4 second alarm tone
Pulse Search	3000 establishing patient pulse level	Same as above	No
No Pulse	Patient's pulse not detected	Same as above	No
Pulse Level Weak	Low patient pulse amplitude	Same as above	No
Check Sensor	Inspection of probe site required	Same as above	No
Interference	Patient motion; wait for ESU noise to end	Same as above	No
SaO_2 Uncalibrated	SaO_2 value below specified accuracy	Same as above	No
Pulse Rate <30	Pulse Rate below operating limits	Same as above	No
Pulse Rate >250	Pulse Rate above operating limits	Same as above	No
SaO_2 Failure	SaO_2 self test unsuccessful, power cycle the monitor.	Displayed on second line of display.	No

B. Pulse Signal

The Datascope 3000 can be equipped to measure pulse.

1. Pulse Signal Acquisition

a. Plug the pulse sensor connection into the front panel PRESSURE/PULSE CONNECTOR, P1 (13).

b. Attach the pulse sensor to the patient.

NOTE: "PUL" replaces the pressure scale data at the SCALE display zone.*

c. Press IBP1 (3) to change the pulse size of IBP1. The pulse size is gradually increased by keeping a finger on the IBP1 key.

d. Pulse data is displayed on the front panel digital readouts (8).

C. Battery Operation**

1. General Guidelines for Battery Operation

a. Batteries are intentionally shipped in a discharged state. Charge the batteries for 16 hours before use. This insures a full charge.

b. Avoid operating the Datascope 3000 when "Battery Low" shows on the CRT.

c. Frequently check the display when the 3000 operates on battery power.

d. Charge the battery pack when the 3000 is not in use. This insures a full charge for portable operation.

* Pulse input is not available on IBP2

** Battery option is not available in countries that require IEC.601-1 Standards compliance of this instrument. Please contact the Datascope Service Department for further details.

2. Battery Installation and Operation*

NOTE: The procedure below must be followed, in the order given, to ensure a battery with a full charge. If the procedure is not followed as given below, damage to the battery does not result, BUT there can be no asssurance of obtaining a battery with a full charge.

a. Switch the AC Mains Power Switch (48) OFF.

The green ON/ST'BY light should not be illuminated.

b. Switch the ON/ST'BY switch (7) OFF.

c. Remove the cover of the battery connector on the rear panel.

d. Place the battery pack on the rear panel and tighten the four thumb screws (46) to secure the battery pack.

e. Switch the AC Mains Power Switch (48) ON. The battery begins to charge.

f. The battery pack is fully charged after 16 hours.

3.4.12 Setting 3000 Real Time Clock

a. Simultaneoulsy press any key (i.e., Recorder - Trace) as you turn the 3000 ON.

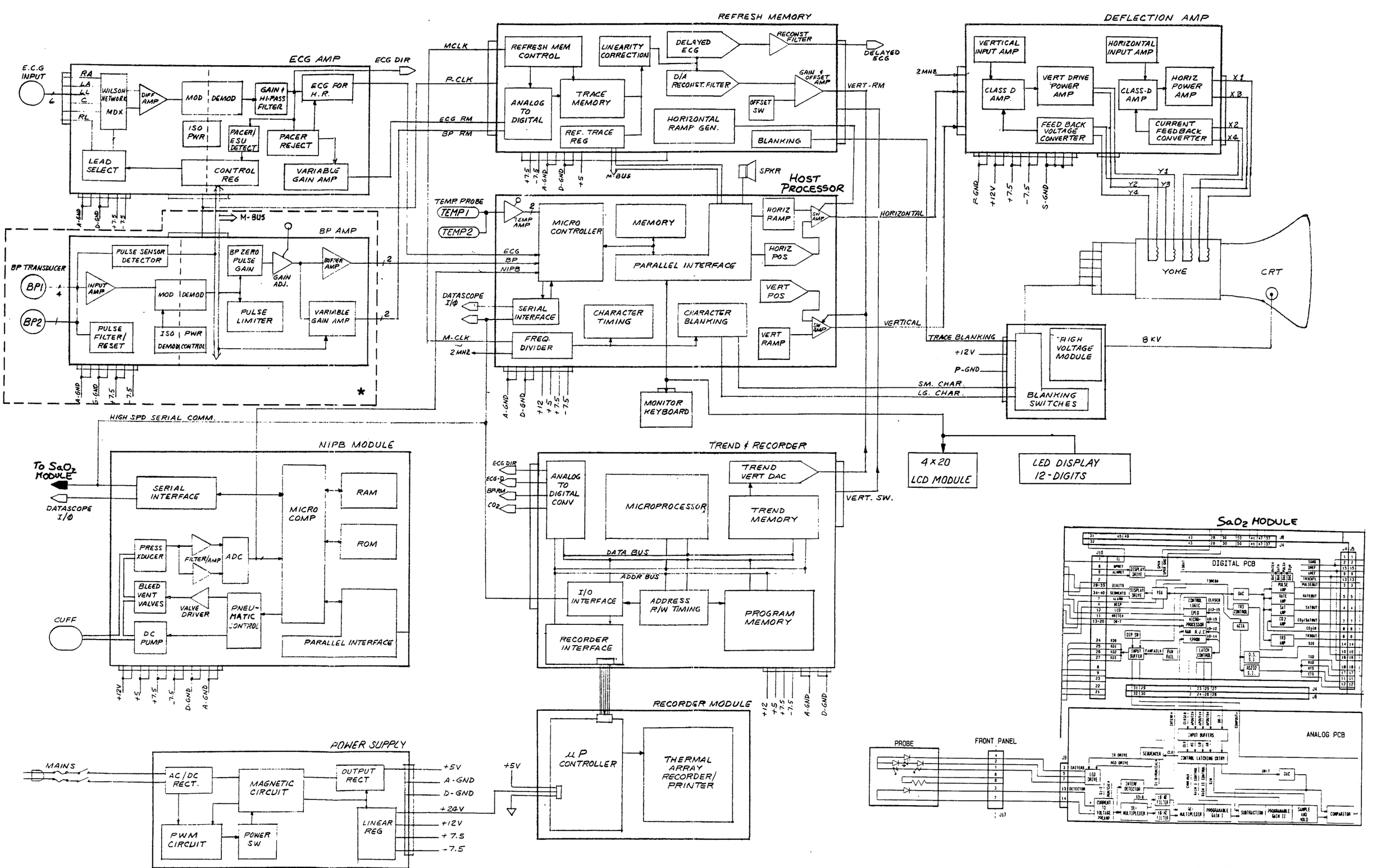
The LCD window will display a "SET TIME" message.

b. Press PATIENT SIZE (39) to move the cursor to the desired positon, hour, minute, month or day.

c. Press Reference UP or DOWN (40) to change the setting of the time.

d. Press BEEP VOLUME (41) for one second to set the time. The Datascope 3000 then goes through its normal sequence.

* Battery option is not available in countries that require IEC.601-1 Standards compliance of this instrument. Please contact the Datascope Service Department for further details.



* 0670-00-0406 is used if invasive blood pressure option is not installed in the monitor.

SYSTEM BLOCK DIAGRAM

Revised 11/15/89

1.4 Theory of Operation

The "Detailed Circuit Descriptions", Section 1.4.2, provides information regarding circuit operation. This text is included to assist service personnel while repairing printed circuit boards to a component level. Refer to the schematic diagrams, in Chapter 2, when reading the "Detailed Circuit Descriptions".

1.4.1 Block Diagram

The Block Diagram indicates the internal organization of the instrument. It depicts several circuit boards, numerous connectors, and the cathode ray tube. The Block Diagram is used to gain familiarity with the instrument and to locate malfunctioning PC Boards. To avoid clutter, the number of PC board interconnects is minimized. The interconnects shown represent major or essential signal flow and clock connections. Power Supply connections for each board are also shown.

1.4.3 Detailed Circuit Descriptions

This section of the manual describes the operation of each circuit board assembly. Refer to the schematic diagrams in Chapter 2.

Included are descriptions for the following Circuit Board Assemblies:

ECG AMPLIFIER BOARD - 0670-00-0224

ECG Amplifier (sheet 1)

Input signals are derived from the patient cable which is plugged into P25. R1, R2, R3, R4, and R5 are current limiting resistors for spark gaps DG1 thru DG5. Resistors R11, R12, R13, and R14 act as pull-up resistors which pull the input to approximately 1.5V when no lead is connected. A bank of RC filters is placed in series with each leg to suppress interference from an electrosurgical unit. U3A, U3B, U4A, and U4B are buffers which drive the Wilson network. This is an arrangement of resistors which provide the correct summation of various leads to obtain the augmented leads. U5 and U6 are multiplexers connected to the Wilson network. These multiplexers are controlled by inputs A, B, and C and select a differential signal from the preceeding Wilson network to provide a positive and negative differential ECG signal.

Lead Select Drive (sheet 1)

As multiplexers U5 and U6 are controlled, U1, a multiplexer, is also controlled. The patient drive signal, derived from sheet 2, is routed thru R24 to U1. U1 then routes that signal to the reference lead on the patient.

Differential Amplifier (sheet 2)

A differrential amplifier is formed by U7A and U7B. The input to this circuit is obtained from U5 and U6 and is a differential ECG signal. This stage provides a gain of 10. U8A is an amplifier which amplifies only signals which are common to both pin 1 of U7A and pin 7 of U7B. The ECG signal which is differential is not amplified. Pin 1 of U8A provides a common mode signal which is used to drive the patient to eliminate 60Hz interference.

Lead Fault (sheet 2)

In the event an electrode is faulty or not attached to the patient the output at pin 1 of U8A is routed thru R24 and R119 on sheet 1, and arrives at CR24 and CR25. U8B is a window comparator which determines the fact that U8A is saturated. In this event, pin 7 switches high, forward biasing CR13 and turning on Q1. This action results in a large differential voltage to the input of U9, a modulator.

ECG AMPLIFIER BOARD - 0670-00-0224 (continued)

Modulator/Demodulator (sheet 2)

U9 is a multiplexer which is driven by signals thru R53 and R52, which are derived from the isolated power supply section. This results in the ECG signal being chopped at approximately 76kHz. The 76kHz signal is applied to the primary of T1, an isolation transformer. The signal at the secondary of T1 is applied to the inputs of U10, a second multiplxer which is also driven by signals thru R139 and R61, derived from the non-isolated portion of the isolated power supply. This, in effect, unchops the signal (demodulates) and a resulting single-ended signal is available at pin 1 of U10, referenced for the first time to chassis ground.

Isolated Power Supply (sheet 2)

A 76kHz 0 to 5 volt signal is applied to the circuit board thru pin 5 of J17. Q6 changes the level to +5 to -7.5V. U24B and U24A convert the signal to complimentary signals which are applied to U10 for demodulating the ECG. Q2 and Q3 are complimentary transistors which drive the primary of T2, the isolation transformer. The signal at the secondary of T2 is used to generate two isolated power supplies (+7.5 I, -7.5I) and to drive U9, which modulates the ECG, lead select and CAL enable. The monitor control microprocessor provides digital data to U14, a latch, regarding lead selection and enabling of the CAL function. The arrival of an address on pin 17 of J17 latches this data into the output stages of U14, which controls the variable gain amplifier, and provides a reset function on sheet 3. Optoisolators U11, U12, and U13 control the lead select drive multiplexer, U1, for proper reference lead selection.

CAL Chop (sheet 1)

In order to provide a means for a calibration signal a dc voltage is provided by U2 and is chopped by U23 on sheet 2. R36 provides a means for adjusting the amplitude of the resulting square wave which replaces the positive ECG referenced to isolated ground when in the CAL mode.

ECG AMPLIFIER BOARD - 0670-00-0224 (continued)

Gain and High Pass Filter (sheet 3)

U15B and U25 act to provide gain and high-pass filtering for the demodulated ECG signal. R58 provides a means of setting the ECG gain.

The output at pin 1 of U15B is normally routed through U18D for subsequent display on the CRT. However, during a lead fault condition, U18D acts as an open circuit which causes the ECG on the screen to become a flat line. The output at pin 4 of U18D is routed thru R71 and applied to an R86 and applied to pin 6 of U21A, which provides a gain of 2 and provides a diagnostic quality ECG at the rear panel 1V ECG output jack. For a variable gain monitor frequency response the signal is routed thru C76, C77, and R93 and applied to pin 2 of U21B, which together with U22 forms a variable gain amplifier which can be digitally controlled at input A and B of U22. The digital control signals are derived on sheet 2 from U14, which latches the instructions from the monitor control system microprocessor.

CRT Window Comparator (sheet 3)

In the event the ECG signal at pin 1 of U21B exceeds predetermined limits (+ 4.5V) window detector U20B will change states and activate U18B which discharges capacitors C76 and C77, which will return the trace to its normal operating position. This will in turn cause U20B to return to its normal condition and U18B to deactivate.

Pacer Detect (sheet 3)

The ECG signal at pin 4 of U18D is routed thru C62 and thru R127 and arrives at pin 3 of U19A. U19A, in conjunction with diodes CR16 thru CR19, form a slew rate limiter circuit. When a specified slew rate is exceeded, the output of U19A at pin 1 will saturate. This will cause the output at pin 7 of U19B to change states for a specified period of time. This indicates that excessive slew rate has occurred at U19A.

CAL Pacer Detect Inhibit (sheet 3)

Upon violation of an alarm or depression of the record button, the unit switches into a CAL mode whereby calibration pulses are provided for approximately 600ms and are supplied again after 15 seconds. In the CAL mode pin 26 of J17 is brought to a logic one level which turns on Q8 and inhibits operation of the pacer spikes from being generated on the edges of the calibrate signal.

ECG AMPLIFIER BOARD - 0670-00-0224 (continued)

Pacer Reject (sheet 3)

When the output of U19B at pin 7 changes states (slew rate at U19A pin 1 exceeded limits) a one-shot U17A is activated. The output of this one-shot at pin 6 causes multiplexer U18A to momentarily close. This causes identical signals to be applied to both pins 3 and pin 2 of U20A; therefore, there is no output at pin 1 during the on-time of U17A. Under normal conditions multiplexer U18A is open; therefore, the signal at pin 1 of U20A is not inhibited.

ESU Pacer Detect Inhibit (sheet 3)

As mentioned previously, the output at pin 7 of U19B will switch states when the slew rate at pin 1 of U19A exceeds a specified limit. The presence of interference from an electrosurgical unit would cause this to happen to an excessive degree. During ESU operation U16B integrates the pulses from U19B and pin 1 of U16B will trigger one-shot U17B when an excessive number of pulses arrive within a given period of time. U17B forms a four second one-shot to inhibit the operation of U17A for that period. Therefore, interference from an electrosurgical unit will not produce a number of pseudo pacer spikes (provided ESU operation is limited to less than four seconds).

U17B also turns on Q9, which provides additional filtering of the ECG during ESU operation.

ISOLATED PULSE PRESSURE BOARD - 0670-00-0225*

P1 Input Amp (sheet 1)

The pressure transducer is essentially a balanced bridge; application of pressure to the pressure sensing diaphragm causes the bridge to become unbalanced, producing a voltage which corresponds to the applied pressure.

Excitation of transducer is applied thru pin 1 (+5V, isolated) with the ground return thru pin 4 (isolated ground). With no pressure applied to an "ideal" transducer, the differential output across pins 2 (+) and 3 (-) would be exactly 0V, and if pressure were applied to this "ideal" transducer, the output voltage would change in exact proportion to the applied pressure. Compatible transducers have a nominal gain of 50uV/V/cm resulting in an output of 250uV for each 100mmHg applied pressure. The relatively large common-mode voltage (2.5V) and small signal voltage (typically less than 500uV) require that a low-offset, instrumentation amplifier be used.

U1 and U2 are low offset operation amplifiers which amplify the pressure signal, and together with the floating primary winding of the signal isolation transformer, reject the transducer offset. The gain of this stage is approximately 150.

Ordinarily the applied pressure is positive and the amplifier need only amplify signals of one polarity; only small negative pressure need be passed. R5 and R6 simulate a large negative pressure when no transducer is connected. The resulting large negative pressure signal is later detected.

P1/Pulse Mod (sheet 1)

U7 is a multiplexer (MUX) which is used to chop the signal by rapidly reversing the polarity. This converts the dc pressure signal into an ac signal which can pass through T1. The chopper drive is derived from R34 (sheet 2 - Isolated Power and Mod Control) and is applied to U7-10.

Either of two analog signals are chopped and passed by U7: the differential pressure signal from the P1 amplifier, or the single-ended pulse signal from U3B.

P1/Pulse Demod (sheet 1)

U10 is a MUX which detects the pressure or pulse signal. It is driven by the "Demod Clock" from R53 on sheet 2 and it switches in sync with the chopper drive to U7. Pin 15 of U10 provides a single-ended output which is either the P1 signal or the pulse signal. C25 provides filtering to remove the chop frequency.

* 0670-00-0406 is used if invasive blood pressure is not installed in the monitor.

ISOLATED PULSE PRESSURE BOARD - 0670-00-0225 (continued)

Pulse Status Detector (sheet 1)

This circuit detects a hard-wired +5V on the anode of CR18, which is present only when a pulse transducer is plugged into the P1 jack (it is not present when either transducer or a pressure transducer is plugged in). +5V forward biases CR18, turns Q1 off, turns off Q5, and causes a logic one (+7.5V) at U7, pin 9. This causes U7 to multiplex the pulse signal at pin 2 and 11.

With no pulse transducer connected, a logic zero is applied to U7, pin 9 causing modulation of the differential pressure signal.

The output of this circuit passes through U34, an opto-isolator that communicates to the "Pulse Status" circuit. It also drives U9, a MUX which routes the pulse signal to U3A when a pulse transducer is plugged in.

Pulse Bandpass Filter/Rapid Offset Reset (sheet 1)

With a pulse transducer connected, U9 supplies +5V through R14 and R40 to bias the photo cell in the pulse transcducer. Voltage division, proportional to peripheral pulse takes place between R40 and the photocell.

The resulting signal is routed to U3A, the first pole of a 3-pole Butterworth filter, and then to U3B, the second and third poles of the Butterworth filter. U3B has feedback through low-offset, operational amplifier U4, which is configured as a Miller circuit (integrator) to remove the offset from the pulse signal. This provides a low frequency response to 0.5Hz. When the pulse signal has an extreme offset outside the display window, Q2 changes the time constant of the circuit. This "Offset Reset" signal is passed through U35, turning on Q2 through CR15 and R19. The duration of the "Offset Reset" pulse is the length of time the offset is outside the window.

Isolated Power and Demod Control (sheet 2)

The system clock (SCLK) is applied to U14A, pin 2, a decoder that provides complementary outputs at pins 4 and 5. These have the falling edges "slowed up" and their rising edges unchanged by the diode-R-C configruation. The signals are then squared up by U33B and U33C. This eliminates overlap at the edges of the square waves (approximately 10% "dead time").

Q3 and Q4 drive the primary of isolation transformer, T2. The "Demod Control" signal is derived from the primary of T2 through C33, R54 and R53. The output is routed to U17 (for P2) and to U10 (for P1 - sheet 1).

ISOLATED PULSE PRESSURE BOARD - 0670-00-0225 (continued)

Isolated Power and Modulator Control (sheet 2)

The secondary signal of T2 is rectified by CR1 thru CR4 to generate isolated power supplies. U8 provides isolated +5V for the transducer excitation and for the pulse sensor. R32, R33, R35, and R36, along with associated capacitors, decouple supplies + VA and + VB which power U5, U6, U1, and U2. The ±7.5 I is used for the multiplexers and rapid reset control.

The secondary signal to T2 is routed thru R34 to the U9 (P2 Mod) and U7 (P1/Pulse Mod - sheet 1).

P2 Input Amp (sheet 2)

U5 and U6 are low offset operational amplifiers which amplify the pressure signal and, together with the floating primary winding of the signal isolation transformer, reject the transducer offset. Gain of this stage is approximately 150.

Ordinarily the applied pressure is positive and the amplifier need only amplify signals of one polarity; only small negative pressures need be passed. R25 and R31 simulate a large negative pressure when no transducer is connected. The resulting large negative pressure signal is later detected.

P2 Mod (sheet 2)

U9 is a multiplexer (MUX) which is used to chop the signal by rapidly reversing the polarity. This converts the dc pressure signal into an ac signal which can pass through T3. The chopper drive is derived from R34 and is applied to U9, pins 10 and 11.

P2 Demod (sheet 2)

U17 is a MUX which detects the P2 signal. It switches in sync with the chopper drive to U9. Pin 14 of U17 provides a single-ended output of the P2 signal. C40 provides filtering to remove the chop frequency.

ISOLATED PULSE PRESSURE BOARD - 0670-00-0225 (continued)

P1/P2 Pulse Status Output (sheet 2)

The system processor (on uP-Character Generator Board) sends out address B (ADRB) which is inverted by U33A. ADRB serves as a poll for pulse status. The U11A output supplies pulse status to the system P1 status, obtained from comparator U12A, which provides a logic one when there is no transducer connected; otherwise, a logic one is present.

The U11C output provides similar information concerning P2.

The U11E output serves as a pulse status indicator to the (optional) recorder.

P2 Zero Offset (sheet 4)

The P2 signal output is applied to pin 5 of U12D. The system microprocessor supplies digital data to U20, U14B, and U24 to generate an offset voltage to nulify the transducer offset and small circuit offsets. The digital data is routed on the data bus. DAC U20 contains latches to store eight most significant bits of the digital information. U21 converts the current output of U20 into a voltage which is summed thru R88. The information becomes latched in the DAC when the address 5 pulse arrives from the system microprocessor.

The microprocessor examines the final pressure output during the zeroing process to determine the magnitude of the cancellation voltage necessary to zero the pressure transducer. The two least significant bits are received by U14B from the data bus and are decoded and latched into U24. U24's output is summed thru R82, R83, and R85 and is added to the output of U21 to arrive at a composite offset voltage.

The output of U12D at pin 7 consists, therefore, of the pressure signal output summed with an analog voltage to cancel the offset as determined by the microprocssor during the zeroing operation.

R91 and R92 form an atenuator where R91 permits a course adjustment of the P2 gain on the circuit board. The front panel P2 CAL adjustment allows the user of the instrument to make a fine adjustment for variation in sensitivity of the particular transducer in use. During adjustment of R91, the front panel P2 CAL control is centered and R91 is adjusted for a nominal gain; this permits the user to swing above and below a nominal setting of the P2 gain by changing the front panel control. The output at pin 8 of U25D is clamped by CR14 to prevent the signal from exceeding +5V as a means of preventing overload of subsequent circuits. C76 prevents noise from being applied to the amplifier from external sources, primarily noise from an electrosurgical unit.

ISOLATED PULSE PRESSURE BOARD - 0670-00-0225 (continued)

P2/CAL Select (sheet 4)

U28C is a multiplexer which selects either the pressure signal (with offset adjustment) or a 40mm CAL signal.

Buffered P2 Record Out (sheet 4)

U13D supplies a 25mV/mmHg blood pressure signal. This output is not currently used in the instrument. Available on J-16 Pin 8.

An additional output of the circuit at pin 31 of J16 is a 10mV/mmHg Blood Pressure 2 signal. This signal is routed to the Analog Processor Board for computation of systolic, diastolic and mean pressure values.

P2 Gain Select (sheet 4)

U31 provides a variable gain with low absolute and delta (difference at various gain settings) offset voltage Blood Pressure 2 signal for display on the monitor CRT. The output at pin 6 of U31 is routed to the Refresh Memory Board where the information becomes digitized. This output is also routed to the recorder.

U32 is a multiplexer which controls the gain of U31. The output of U31 at pin 6 is applied to a series of resistors, part of U16. Various taps from the resistor ladder network are applied to inputs of U32. U32 selects a portion of the output voltage (depending on which tap is electronically selected) and applies feedback to pin 2 of U31. In this way, gain of the stage is controlled. The control signal to U32 is obtained from U27, which is a latch. U27 obtains digital information from the data bus, which ultimately determines the gain at the P2 Gain Select Stage. This is controlled by the microprocessor. Gain of the stage is in 4 discreet levels. There are: 7.5mV/mmHg, 15mV/mmHg, 30mV/mmHg and 60mVmmHg.

ISOLATED PULSE PRESSURE BOARD - 0670-00-0225 (continued)

P1 Zero Offset and Pulse Gain (sheet 3)

This circuit performs one of two possible functions. It either provides variable gain to the pulse signal or it performs a zero offset adjustment for the P1 Pressure Signal.

Zero Offset

The P1 signal (obtained from sheet 1) is routed thru R60 to pin 3 of U12C. Pin 2 receives current to neutralize transducer offset. DAC U19 receives digital information on the data bus, determined by the microprocessor. This is the most significant bit of the zero offset information. U22 recceives the least significant two bits of this information. The arrival of an address nine pulse causes U19 to latch the most significant offset bits. In the Pressure Zero Mode MUX U18A provides 5 volts to U23, which supplies U19 with its required low impedance reference voltage. U23 is now in a voltage follower configuration becauses U18C is connecting the output of U23 to its inverting input.

U21 converts the current output of U19 into an analog voltage at pin 7. This is applied to pin 2 of U12C thru R61. The output of U22 is applied thru R64 and R65, forming a composite at pin 2 of the offset cancellation current.

Pulse Gain

In this mode U18A connects the non-inverting input of U23 to ground thru R74. Also, the output of U23 at pin 6 is connected to pin 15 of U19. Pin 1 of U19 is routed to pin 2 of U23 thru the operation of U19C. U18B obtains the pulse signal by connecting pin 2 to pin 15 and, subsequently, to pin 16 of U19. In this mode, U19 controls the overall gain of low offset amp U23. The gain range of the circuit is 64.

Pulse Limiter and Offset Reset (sheet 3)

A 2-stage Butterworth filter is built around U25B. The bridge which follows U25B acts as a clipper which limits the signal to $\pm$2V. U25C is a comparator which senses when the waveform is being clipped and generates an offset reset signal whenever the signal is being clipped.

ISOLATED PULSE PRESSURE BOARD - 0670-00-0225 (continued)

Regulator and CAL Gen (sheet 3)

U36 is a 5V regulator which generates references for the offset circuits, DACs and for 5V logic on the board. R49, R51, and R50 form an atenuator. R51 is adjusted to obtain a 40mm CAL signal through U13C, a buffer, and U28B. The CAL signal alternates between 40mV and ground.

An alternate path for the 40mm CAL voltage is thru U13A, which generates a -4V level used in the pulse limiter circuit for negative clipping and as an offset reference for the pulse output to the memory and recorder.

P1 CAL Select (sheet 3)

U28 selects either the pressure signal at pin 12 or the CAL signal at pin 13. U10 selects either the output of U28A or the pulse signal.

Buffered P1 Record Out (sheet 3)

U13 provides a buffered output signal (pressure or pulse) to pin 42 of U16 to pin 35 of J16 for the analog processor.

P1 Gain Select (sheet 3)

U29 and U30 form a variable gain amplifier. Gain of the stage is electronically controlled by information on pins 9 and 10 of U30. This information is derived from sheet 4 of the schematic from U27. The output of U29 is applied to a resistor ladder network formed by U15. U30 selects a portion of the output signal and applies it as feedback to the inverting input of U29. In this way gain of the stage is controlled. Gain is provided in four discreet steps: 7.5mV/mmHg, 15mV/mmHg, 30mV/mmHg, and 60mV/mmHg.

When this stage is used to control the gain of the pulse signal the requirements are that a fixed gain be provided and that an offset voltage be generated. An offset of .9V is intentionally introduced to shift the waveform upward 3cm on the screen. U37C supplies this offset, derived from R79. In this mode gain is determined by feedback thru R43 and U37C. Inverting input resistor R41 and non-inverting resistor divider R101 and R102. The pulse signal is routed into U29-2 via U37C. In this mode U30 is inhibited (is in a high impedance state) by U37B, which is controlled by the pulse status signal.

REFRESH MEMORY BOARD - 0670-01-0226/0670-00-0397

Frequency Divider

492kHz master clock is applied to U12A and U12C and U1. U1 and U2 perform divisions to provide a number of frequencies, the lowest of which is 60Hz, the frame rate of the monitor display. Two outputs, the power supply clock of 123kHz, and the system clock of 61.5kHz are generated by U1 and routed off the board to provide a clock for the switching power supply and for the isolated power supply, respectively.

Reading and writing into the memory is performed at 480Hz. A control signal for this operation is provided by U3 at pin 13 and subsequently U4A, U6A, U11B, U5A, and U5B.

Pressure Memory Address Clock

U5A provides a signal designated CLK2 to control the pressure memory operation.

ECG Memory Address Clock

These control signals are obtained from U5B, U7D, and U12D and they control operation of ECG memory.

Reference Trace Output Control

U6B and U12E generate four signals which enable the data registers to provide the zero line, the 2/3 scale line and the reference line.

Freeze and Speed Control Switch

U10A and U10B, in conjunction with U9, provide a signal for loading data in the memory. When the monitor is operated in the 50mm/sec sweep speed loading occurs at a rate of 480Hz. When running at 25mm/sec loading occurs at 240Hz. When the monitor is in the freeze mode, however, no loading occurs.

Digital information describing the sweep speed and freeze status are provided to U37 via P4-4, P4-5, P4-6, and P4-7, part of the system bus. The instruction to U37 to latch this data (and subsequently control U9) are provided by U38, which decodes instructions on P5-0, P5-1, P5-2, and P5-3, provided by the system bus. The system bus is controlled by the microprocessor/character generator board.

Trace Blanking Control

There are three possible requirements for blanking the trace. First, during transitions in sweep direction and in vertical transitions of the trace. Pulses to control this blanking are provided by U11A to U13. The second possible requirement for blanking the trace is to eliminate the pressure traces in the event no pressure transducer is in use. This condition is detected by U37 (with appropriate control by U38) generating control signals BD 0 and BD 2. The arrival of the DS0 and DS2 pulses to U10D and U35C, respectively, will turn on the trace if it is appropriate to do so. The third possible requirement for blanking the trace is from an external signal applied to P14, pin 7 thru CR2. In any case, the output at pin 13 of U13 is the blanking control signal and is provided at pin 36 of P14.

Reference Trace Register (sheet 2)

When pressing the reference trace key on the front panel the system microprocessor provides U36 with digital data which describes the position of the reference trace. U36 is a latch which stores this data when addressed by U38 at pin 11.

Zero and 2/3 Scale Register

The input to U47 is obtained from the reference trace output control circuit. When U47 is enabled it provides a digital number on the trace data bus which describes and fixes the position of the 2/3 trace and the zero trace.

Input Switching

U31 is a multiplexer which alternately selects the analog signals for ECG, blood pressure 1, external signal, and blood pressure 2. These are provided by the Analog Processor Board. When clocked by the 240Hz and 480Hz signals at inputs A and B, U31 selects each input in sequence, as well as an offset generated by U15C and U15A, to shift the ECG signal DC level in a positive direction. U15B differentially sums the selected analog signal and, via R21, routes it to the analog-to-digital converter.

ADC Reference

U30 provides a regulated 2.5V supply to U15D. R49 and R50 form an attenuator which causes the output of U15D to be +1.28V. This is the gain control voltage for the analog-to-digital converter, U29.

Analog to Digital Converter

U29 converts the analog voltage at pin 6 into a series of digital data which represent the amplitude of the signal at pin 6. This operation is repeated at a frequency of 960Hz with a clock rate of 246kHz. The maximum sampling time of U29 is 74 cycles of the clock.

ECG Data Holding Register

Since loading of the ECG memory and pressure memories occur at half the frequency of the sampling rate, it is necessary to temporarily store the digital output of the A to D converter. This is accomplished by U28.

Memory Operation

ECG data is stored in U23 and U22. The data is obtained from the ECG memory data bus. Pressure information is stored in U18 and U19. Data is obtained from the trace data bus. U27 and U26A are buffers which are included to provide a means of separating the three independent buses. When reading the ECG memory, the address is controlled by U24 and U32. When reading the pressure memory the address is controlled by U32A and U17.

To read the ECG memory data stored in U23 and U22 (addressed by U24 and U32) is placed on the ECG memory data bus. This data is routed thru U26B and U25 and is placed on the trace data bus. To read the pressure data memory, U18 and U19 (addressed by U32A and U17) also place data onto the trace data bus. The trace data bus is routed to sheet 3 of the schematic where it subsequently creates a trace signal.

To read the ECG for display on the recorder (delayed output) data is routed from U23 and U22 via the ECG memory data bus to the delay out DAC.

Delay Output DAC

U21 is a digital-to-analog converter which receives data for display on the recorder. This data is routed on the ECG memory data bus. U16A converts the current output of U21 into a voltage. An RC band pass filter smoothes out the staircase and U16B output at pin 7 is a delayed ECG which is routed off the board. An offset is introduced thru R15 to shift the ECG back to a zero base line.

Vertical Linearity Correction

Data relating to both ECG and pressure traces is routed via the trace data bus to U42. U42 is an EPROM which acts as a look-up table. The data applied to the inputs of U42 corresponds directly to the output of the analog to digital converters, where it was initially generated. U42 replaces this data with slightly different data to correct for non-linearities in the display system.

Trace Output DAC

U20 is a digital-to-analog converter which converts the digital output of U42 into an analog signal. U33A converts the current output of U20 into a voltage that is routed via U40B to U33.

Gain Offset Control

Display of the ECG and pressure signals differ in two respects. First, the gain for each signal is different (ECG occupies 5cm on screen, while pressure zone is 8cm) and these signals are riding at different DC levels on the screen (ECG on top, pressure on bottom). Gain switching is achieved by U40B, while offset change is controlled by U40A.

Reconstruction Filter

U39 and associated RC filtering removes the star-case from the output of U33 at pin 7 and provides a "smoothed out" analog signal within the specified frequency response for display on the screen.

The output is controlled by the vertical control signal at pin 29 of P14, which is supplied by the character generator board. This signal enables or disables the output by way of U40. Similarly, a trend mode signal is present at pin 37 of P14, which disables the pressure real time output when trend data is being displayed.

Horizontal Ramp Generator

An RC filter formed by R7 and C3 integrates the 480Hz signal into a ramp. U14A provides inversion, as well as level shifting. The signal at pin 1 of U14A is a correction signal.

The 240Hz input to U14C is integrated by R20 and C2 and forms the actual horizontal ramp signal. The linearity correction signal at pin 1 of U14A is routed via U43A and R23 to U14C. This signal alters the 240Hz ramp in such a way that the geometric distortion of the horizontal axis of the CRT is corrected. The corrected ramp generator is routed via U14D, which provides further level shifing and the output at pin 14 of U14D forms the horizontal ramp signal which is routed to the deflection amplifier.

TREND RECORDER BOARD - 0670-00-0371

Trend/Recorder

The trend board controls all recorder functions in the 3000. Patient waveforms (ECG, BP, CO_2 and Pleth) are converted to digital signals via U17. This signal is then scaled, when necessary, and written to a FIFO, U16. Trend waveforms are generated from the data in trend memory. This data is read thru U25 is then scaled and written to U16. All commands bytes, waveform data, and annotation data are passed to the recorder via U16. Timing for all recorder functions are controlled by U26 and are based on the state of the recorder (busy or not busy) and the FIFO (full or empty).

The processor (U24) latches the requested channel and starts the A to D conversion. The end of conversion is monitored thru U14 - Bit 1, and signals the processor to read the converted waveform.

U21 is used to offset the ECG signal to 1/2 full scale of the A to D. This allows printing of both + and - ECG signals.

Trend Display

Timing for the trend display is controlled by U3. The uP controls the requested trend page display by latching the upper six bits of the trend RAM address thru U15. U3 will then supply the clock and enable for U2 which controls the lower 7 bits of the RAM address. As each address is accessed U7 gates any blank data (OFFH) back into U3. U3 also controls the CRT blanking thru Q2.

As data addresses U4 (linearity correction and gain table), the compensated value of that data will then be converted to an analog value via U9 (DAC). U6 is the final offset control and buffer for the trend waveform as it appears on the CRT.

The gain of each trend page is set by U10. The first byte of data in each page is used to set U10 gain outputs, which in turn control the desired gain page of U4.

Led Display

SaO_2 and NIBP LEDs are updated via U12 and U13. The processor writes the values for all the LEDs to U12 and U13. The control for these drivers is performed by U26. Mode controls type of instruction and WR0 and WR1 are write commands for U12 and U13 respectively.

Interrupts

NMI - The NMI occurs on the falling edge of DS0. While this interrupt is being serviced, DS0 and DS2 are monitored. It is the composite of these two signals that enable the trend board to display any waveform on the CRT.

Also, during NMI the LEDs are updated. Writing to U12 resets the hardware watchdog timer.

IRQ - The 492KHz clock is divided down to 240Hz which is the IRQ rate. Recordings of patient waveforms are processed during IRQ.

FIRQ - FIRQs are generated by U14. An interrupt is generated for each character transmitted or received on the High Speed Serial Bus (HSSB) or the Datascope Serial Bus (DSB).

Communication with the Host processor is accomplished over the HSSB and all external devices are linked via the DSB.

Memory

U22 is a 64K EPROM which contains all the necessary software to perform a download operation.

U20 is the system RAM which contains all the downloaded software. The smart socket into which this RAM is installed provides a backup power source so that data/code stored in RAM is never lost due to power failure or turning the system off.

HOST PROCESSOR BOARD - 0670-00-0380

Frequency Generators

U27 is a quartz crystal oscillator IC. It generates the 14.7Mhz frequency from which all the system's clocks are derived. Frequencies that are local to the host PCB are:

- 7.37Mhz for the microprocessor
- 3.185Mhz (CLK) for communication ICs
- 2.1Mhz for character generator timing circuits.

In addition, ICs U28, U29, U30 also generate the MCLK (4.92Khz) for the refresh memory. 2.1Mhz is converted from the TTL level to the +12V level by the MOS clock driver U34. It is used by the deflection Amp.

Watchdog Timer

U20 monitors the program execution of the host processor. If Pin 7 does not receive reset pulses regularly, a RESET/signal at Pin 6 forces a system power-up. This IC also senses the +5V power supply for proper operating range at Pin 1 and generates a pulse with preset width for power supply transitions.

Keyboard Encoder

U23 is a multi-channel communication device. The input/output lines of this IC are controlled by the software to implement a 4 X 8 switch matrix. The processor energizes the eight (8) output pins alternately and receives the signal back from the four (4) input pins. When a switch is depressed, the processor determines which one of the switches is activated and takes appropriate actions.

Some of the input lines of this IC are used to determine options. When options are not installed, the status line on the LCD is blank. When jumpers on TPI - TP6 are installed wrong, failure messages will appear on the LCD.

Monitor Control Junction

Various status input and control lines are used to change amplifier gain, screen display and trigger select functions.

The eight data lines label "3870 Data Bus" and the outputs of U32 decoder are used to control the ECG amplifier, BP amplifier and the refresh memory. PCBs that share this data bus are assigned a address or addresses to facilitate data transfer to and from the host processor. This data bus is active only when the host processor is not executing the character generating routines.

LCD Display Control

The LCD also shares the above mentioned data bus. Its control pulses, however, are part of the U24 output lines. An active STB/signal, on the LCD connector, updates the status on the LCD.

Microcomputer

U25 is an Intel 80C196 microcontroller IC. It is used as a processor that requires external memories, Datasette ROM and U19 RAM, for code space and data storage. It also has a shared data/address architecture, therefore, U18 is required to lock the lower eight-bit of the address at each memory cycle.

U21 is a programmable logic device for address decoding. The memory address space is divided into 8K blocks:

- Datasette ROM (32K)
- Red/write memory (8K)
- Communication IC 1 (8K)
- Communication IC 2 (8K)
- Audio control (8K)

The READY signal is generated when the communication ICs are active. It inserts a WAIT state in the processor execution to guarantee proper timing for slow I/O responses.

The Datasette ROM consists of four (4) 32KX8 codes for all the processors in the monitor. The download protocol at power-up will verify the programs in the trend, NIBP and SaO_2 PCBs. If discrepancies are found in the program, a download sequence is initiated to reload the processor memory.

The SMART/TIMER RAM IC, U19, contains a real time clock for time-keeping functions. Only 8K of the memory space is allocated for processor use. This IC also has a built-in lithium battery for memory/clock retention purposes.

The host processor has a 10 bit analog to digital converter. The temperatures and invasive blood pressure inputs are digitized and computed for CRT display. This ADC requires a +5.11V stable voltage reference and inputs must be limited to -.3V. The U35, U36 op. amps and clamping circuits are employed to serve this purpose.

The heart rate calculation is done in software by timing the frequency of interrupts at the E and P trigger inputs. The 60hz interrupt at U30C pin-10 is used to synchronize the character display with the refresh memory generated waveforms.

Serial Communication

U23 and U24 are serial communication ICs. Each IC contains two independent channels. All host and optional processor communication is through an assigned channel. They are:

Channel 1 - NIBP module

Channel 2 - Trend/Recorder

Channel 3 - Oximeter

Channel 4 - External RS232

With the exception of the trend/recorder channel, the serial input/output lines are converted to standard RS232 levels by U22 and U33 transceivers. All channels are running at 2400 baud rate, which corresponds to a 240 bytes per second data rate. When downloading is required, it could take as long as three (3) minutes for each module. When downloading is in progress, the LCD displays the status until it's done.

Character Generator Timing

The character generator is implemented in real time under the processor control. EPLDs, U14 and U31 decode timing signals from the processor high speed I/O lines and these programmed outputs are responsible for controlling analog and digital circuits for character generation.

Character Sweep

Each character consists of six (6) vertical ramps. By opening and closing Q2 of the integrator U10A, a series of ramps at the integrator output become up strokes on character display.

The horizontal movement of the electron beam is provided by the horizontal sweep integrator U10B. The opening of Q1 starts the horizontal ramp generation. Each line of character associates with one horizontal sweep and the duration varies with the number of characters per line.

The size of the characters is determined by the slope of the vertical and horizontal ramps. When the R value of the integrator RC constant changes, so does the slope. The SIZE signal on U12C, pm-q switches R38 and R36 in and out of the integretor to accomplish the size control.

Character Positions

Each line position is changed at the beginning of the character line. The X-position and Y-position DAC, U15, and U16, receive the position data from the processor and convert them into analog form. The composite signal of the position and sweep becomes the final drive signal for the deflection amplifier.

Trimming potentiometers R41 and R49 are used for fine-tuning the character positions, with respect to waveforms. Overall screen controls are located on the deflection amplifier PCB.

Temperature Amplifier

U13A amd U13B, with carefully chosen and high precision resistors linearize and amplify the voltage from 700 series temperature probes. The output of the circuits must first be nulled at 0°C input by R65 and R73. The final gain controls are adjusted by R79 and R80 to provide a sensitivity of 1/10°C to the analog to digital converter.

ECG Trigger

The ECG signal is obtained from the ECG amplifier board. An RC filter is imposed prior to U2A to limit the band width of the trigger signal. U1B changes C23 to a peak value of the R-wave by forward biasing CR3. A portion of this voltage is the basis for the auto-threshold voltage at the comparator. A trigger signal at the comparator U1C interrupts the processor for heart rate computation.

U2B and CR6 are used to hold the ECG threshold voltage when CAL pulses are present in order to minimize trigger interferences.

Blood Pressure Trigger

IBP signal is routed through the band-pass filter to U1A. U1D acts as a zero crossing detector, with hysteresis, provides a trigger pulse on the rising edge of the blood pressure signal.

Audio Circuit

When the processor needs to generate an audio output, it sends a PWM signal to the frequency divider implemented in EPLD (U21). The output of the divider is then scaled down and becomes a feedback voltage to U5. The output of the DAC, U5, is controlled by the processor. By writing an 8 bit byte into the DAC, the processor can vary the output of U6B. This is the way that the beeper and alarm volume are controlled. An audio amplifier at the final output drives the rear panel speaker.

Zero Crossing Detectors

The IBP1 and IBP2 channels can be zeroed electronically by changing the offset voltage at a 10 bit DAC of the BP amplifiers. When varying these offset voltages, the processor monitors the zero crossing detector outputs of U3. Transition of the detector outputs assist the software to determine the positive or negative nature of the offset.

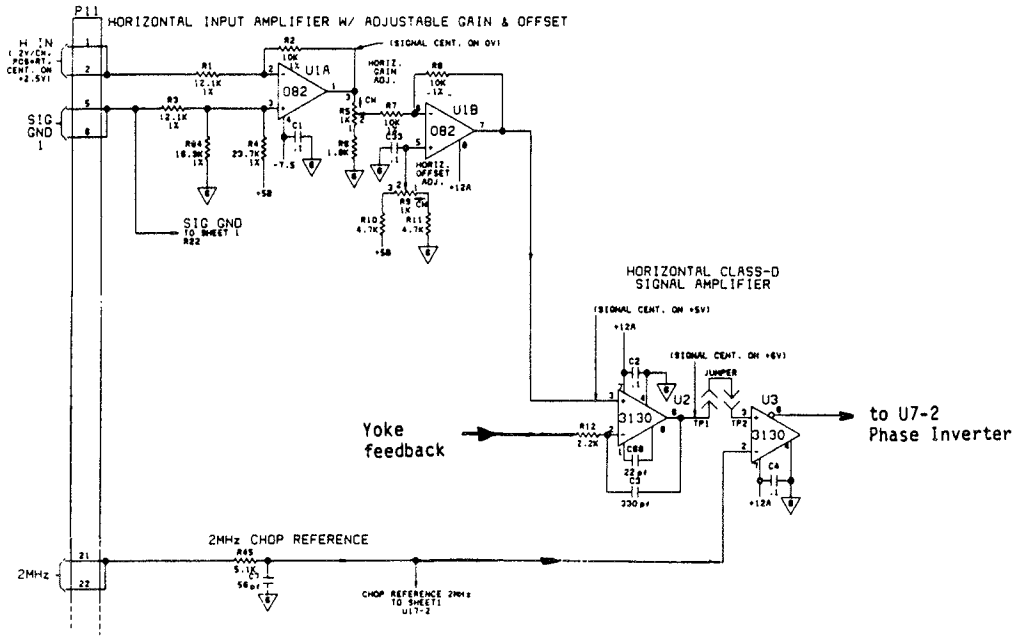
Lower Trace Selection

The delayed ECG signal is biased positively and scaled before it is routed to the analog switch. The other inputs to the analog switch can be selected by the control lines TR3SW0 and TR3SW1. The processor switches the available selection to the buffer amplifier U6D and to the refresh memory PCB.

DEFLECTION AMPLIFIER CIRCUIT - 0670-00-0230

Horizontal Input Amplifier with Adjustable Gain and Offset (sheet 2)

A differentail horizontal deflection signal is applied to the board on pin 1 and 2 referenced to pin 5 and 6 of P11. U1A is a differential amplifier which rejects low frequency noise. R5 provides variable gain to the stage. U1B forms a stage which permits adjustment of the offset. The input signal to the board was centered on 2.5V; this level is removed by U1A so the output at pin 1 of U1A is essentially riding on zero volts. At the U1B stage an offset of 5 volts is intentionally introduced.

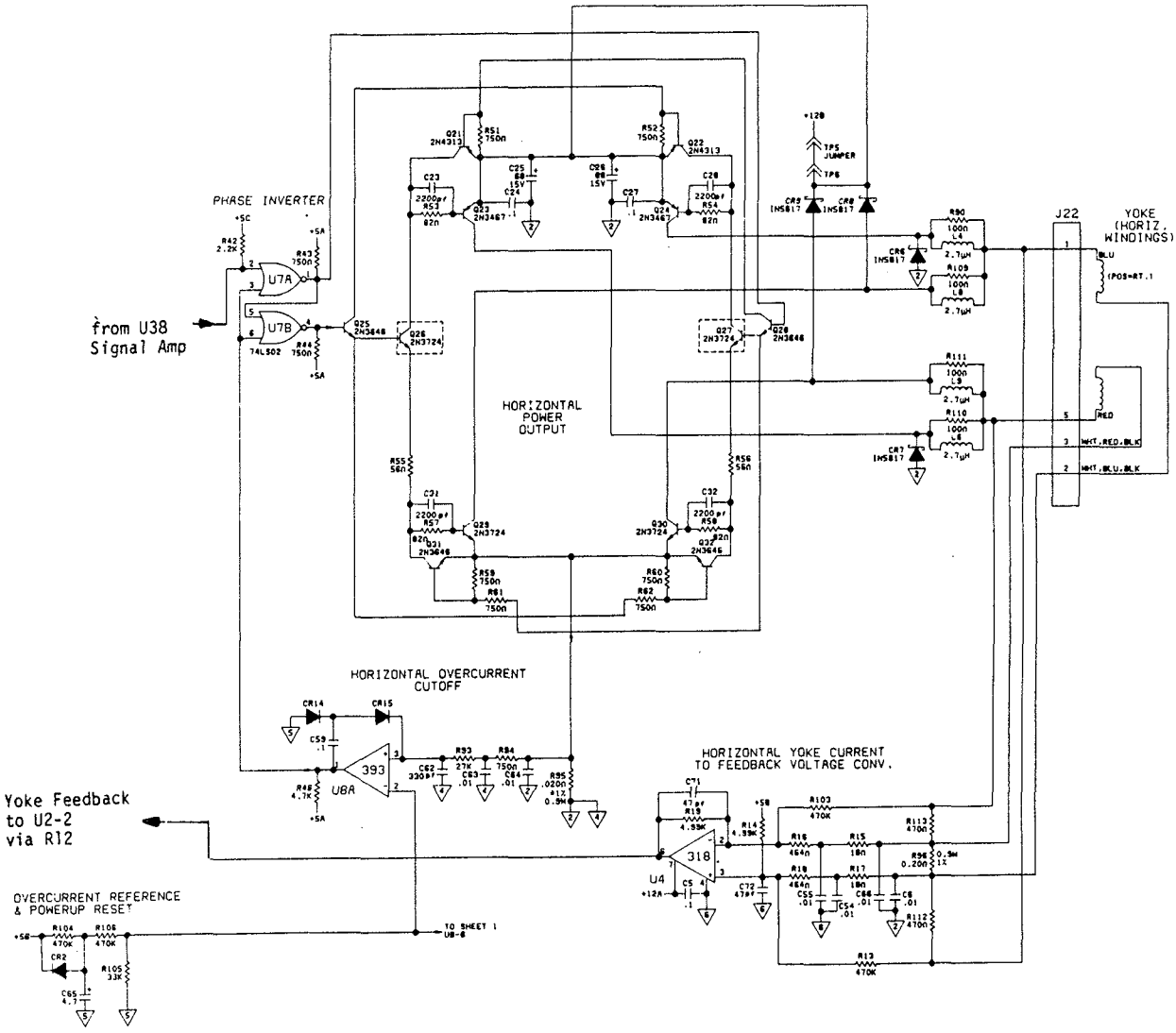


Horizontal Class D Signal Amplifier (sheet 2)

The horizontal signal (riding on +5V) is applied to pin 3 of U2. Overall negative feedback of the horizontal amplifier is obtained by examining the current to the deflection yoke and converting that current into a feedback current which is ultimately applied to pin 2 of U2 thru R12. U3 is a comparator which compares the signal from pin 6 of U2 with a chopped reference signal obtained external to the circuit board. A 2MHz, 12V square wave is applied to the board thru pins 21 and 22 of P11. R45 and C7 integrate the signal to form, essentially, a saw tooth or triangular wave form. This signal is centered on 6 volts. By comparing the saw tooth waveform to the horizontal signal a variable duty-cycle chop is achieved.

Phase Inverter (sheet 2)

The output of U3 at pin 8 is applied to NOR-gates U7A and U7B, which generate complementary outputs. These gates may be disabled by the horizontal over-current circuit which is capable of shutting off the amplifier.



Horizontal Power Output (sheet 2)

This amplifier switches 12 volts across the horizontal yoke windings in either of two directions. +12V is applied to one side of the yoke winding either thru Q23 or Q24. When Q23 is conducting, Q29 acts as a sink transistor. When Q24 is conducting, Q30 serves as a sink transistor. Q21, Q22, Q31, and Q32 are used as an aid in turning off either side of the amplifier, thus helping to prevent overlap and shorting of the rails. Also helping to prevent shorting of the power supply to ground are L4, L8, L9, and L6. The diodes CR9, CR8, CR6, and CR7 support current when the respective transistors are not conducting. R90, R109, R111, and R110 critically damp resonance between the 2.7uH chokes and the distributed capacitance of the horizontal yoke winding.

DEFLECTION AMPLIFIER CIRCUIT - 0670-00-0230 (continued)

Horizontal Yoke Current to Feedback Voltage Converter (sheet 2)

The horizontal yoke is split into two portions with R96, a .2 Ohm power resistor placed in series with the two windings at its midpoint. The voltage across R96 is a replica of the yoke current. U4 is a differential amplifier which amplifies this voltage, without amplifing the common mode signal of 6 volts which is present on the yoke. The input RC stages to U4 filter out any high frequency switching components present in the yoke deflection signal. The output of U4 at pin 6 (a voltage which corresponds to yoke current) is routed to pin 2 of U2 thru R12 and acts as a composite negative feedback signal which sets the overall gain of the amplifier.

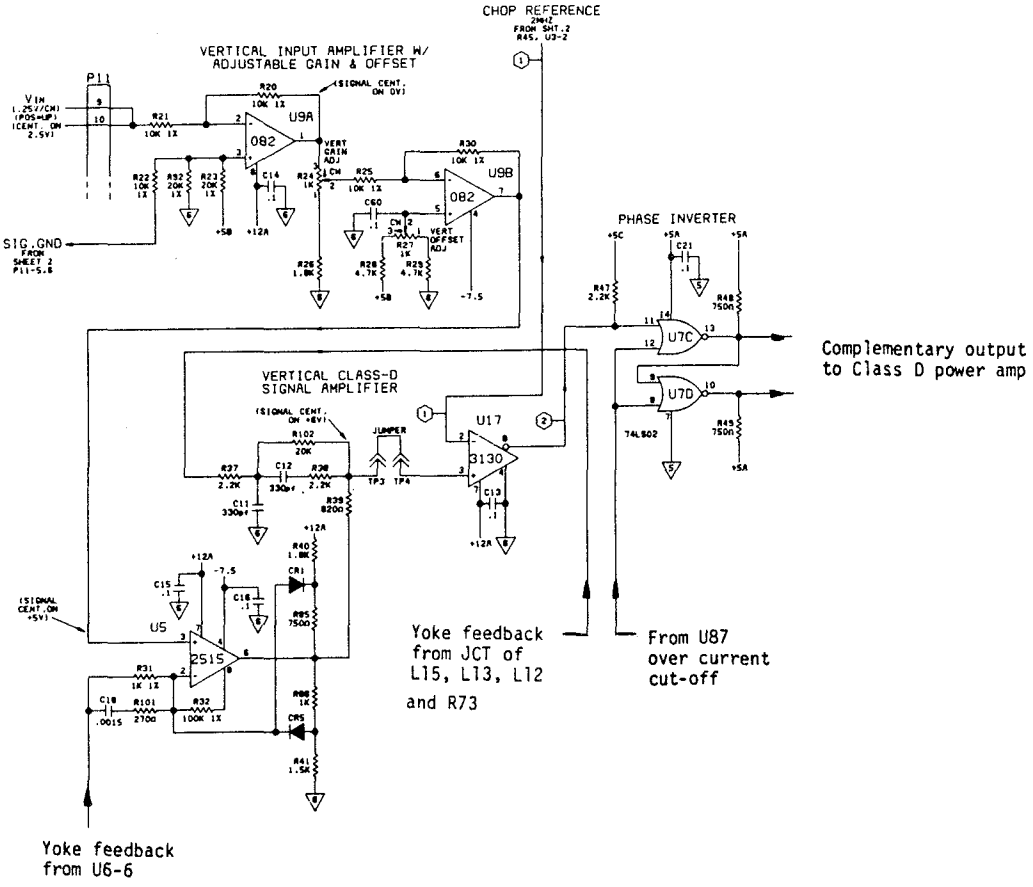
Horizontal Over-Current Cutoff (sheet 2)

Current flowing thru either leg of the amplifier is sampled by R95, a 0.2 Ohm power resistor. A voltage across R95 corresponds to the absolute value of the net current flowing in the amplifier. After high frequency filtering it is applied to pin 3 of U8A. U8A acts as a comparator that compares the absolute value of the amplifier current to a reference that appears at pin 2. This reference is derived from the +5V supply after attentuation by R104, R106 and R105. Capacitor C65 inhibits the amplifier during initial turn-on of the instrument; CR2 permits rapid reset of this inhibit circuit when the instrument is turned off.

DEFLECTION AMPLIFIER CIRCUIT - 0670-00-0230 (continued)

Vertical Input Amplifier with Adjustable Gain and Offset (sheet 1)

The vertical signal input to the amplifier is obtained on P11, pins 9 and 10, referenced to P11, pins 5 and 6. U9A is a differential amplifier which removes offset from the signal. R24 allows for the adjustment of the vertical gain. U9B with R27 introduced offset to the signal of approximately 5 volts. Overall gain of the amplifier is controlled at U5 by feedback obtained from the vertical yoke current to feedback voltage converter. The output at pin 6 of U5 is applied to pin 3 of U17. U17 chops the signal by comparing it to a chop reference 2MHz signal applied at pin 2. The output of U17, pin 8 is applied to U7C, pin 11.



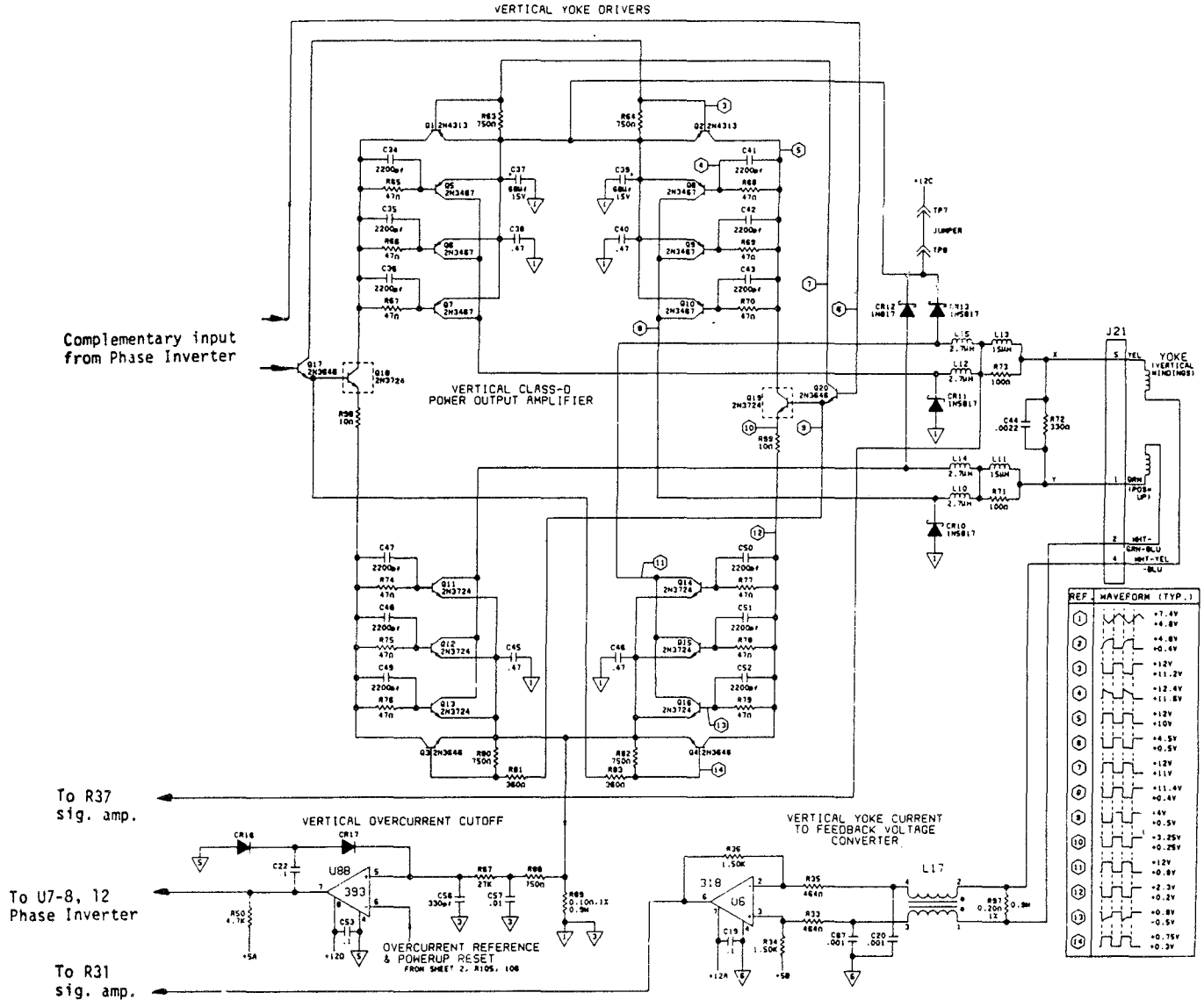
Phase Inverter (sheet 1)

U7C and U7D NOR-gates convert the single-ended signal into two complementary signals that are applied to the Class D power amplifier.

DEFLECTION AMPLIFIER CIRCUIT - 0670-00-0230 (continued)

Vertical Class D Power Output Amplifier (sheet 1)

The final output stage is comprised of power transistor sets (3 in parallel) rather than single transistors. L13, C44, and L11 filter out or attenuate the residual chop in the vertical winding. R71, R72, and R73 damp resonances of L11, C44, L13, and the vertical yoke winding.



DEFLECTION AMPLIFIER CIRCUIT - 0670-00-0230 (continued)

Vertical Yoke Current to Feedback Voltage Converter (sheet 1)

The vertical yoke winding consists of two sections placed in series with R72, a .2 Ohm power resistor. The voltage across R97 is a replica of the yoke current. This signal is passed thru a Ballun common mode choke, L17, to reject any high frequency common mode components due to switching, while allowing lower frequency differential signal components to pass through. U6 is an amplifier that amplifies the yoke current voltage and provides over-all negative feedback at U5, pin 6 to pin 2. A clamping network, around U5, prevents it from latching up when it is in a slewing state, thus allowing for a rapid recovery from an open loop situation.

Vertical Over-Current Cutoff (sheet 1)

Current thru either leg of the power amplifier is sampled across R89. U8B is a comparator which compares this voltage to a reference at pin 6. When current thru the amplifier exceeds a predetermined value, the output at pin 7 of U8B turns off the amplifier by inhibiting gates U7C and U7D.

LED DISPLAY BOARD - 0670-00-0365

The LED Display Board provides measured SaO_2 and non-invasive blood pressure (systolic, diastolic, and mean) values. All measurements are presented in a digital format.

All of the displayed parameters relate to the optional functions of the 3000. Some or all displays may be blanked if the option is not included.

This circuit board does not contain active driver circuits. The twelve display digits are all of a 7-segment, common anode type.

The anodes for each digit are enabled high by the address bus. The individual segments (A thru G) are enabled low by the multiplexed segment driver bus.

The control logic is located on the Host Processor Board.

CRT BLANKING BOARD - 0670-00-0366

The CRT Blanking Board controls the intensity of the CRT trace. This board also controls the global brightness for the trace(s) and the large character displays (R-4).

A secondary control (R-3) will establish the brightness of the smaller characters. (The brightness of the smaller characters is always less than the larger characters.) R-3 and R-4 control the cathode current of the CRT. Thus, beam current varies in proportion to the cathode voltage. Cathode voltage is always positive with respect to ground but never exceeds +70 Vdc.

Q-3 controls when the electron beam can write within the larger character zone. Q-2 performs a similar function for the smaller characters. The settings of R-2 and Q-1 determine CRT blanking during vertical and horizontal retrace. In this circuit, when Q-1 conducts, it shunts to ground a portion of the cathode bias voltage, thus extinguishing the trace for the required blanking period.

CRT interface is thru J-32

Pin 1 - Control grid, fixed biased thru R10
Pin 2 - Cathode connection, control trace intensity and blanking functions
Pin 3 - Ground side of heater filament
Pin 4 - +12 Vdc heater voltage, operating current of 70 to 90 mA
Pin 5 - No connection
Pin 6 - Accelerating grid with a fixed +400 Vdc bias
Pin 7 - Grid 3 used for static focus of the electron beam; focus voltage is controlled by R-1 and can vary between ground and +400 Vdc

FRONT JACK and SWITCH BOARD - 0670-00-0367

This circuit board provides connections for the dual temperature probes (Y.S.I. 700 type only). In addition to the input jacks, two momentary, normally open switches are provided for zeroing the blood pressure transducers offset.

Recessed in the front panel are two calibration controls providing for P-1 and P-2 gain trimming. These trim pots (R-1 and R-2) have a nominal range of ±15%. They are preset at the factory to yield blood pressure signal display of 1.0 volt for every 100mmHg of pressure applied to a transducer. In this manner, a standard transducer with a nominal gain of 5 micro volts/ volt/mmHg will yield accurate pressure readings.

CAUTION: The trim pots are intended solely to compensate for inaccuracies in transducers or to normalize non-standard transducer types. It is important to remember that once these trim pots are readjusted from factory settings, the pressure amplifier gains will match only the transducer that was connected. Accuracy of the transducer and gain combination should always be checked following transducer replacement or adjustment of R-1 or R-2. This circuit board interfaces to the Mother Board thru J29.

The temperature input jack connections are routed through the Mother Board to the Host Processor Board.

The pressure zero switches and R-1 and R-2 gain trim potentiometers are routed to the Pressure/Pulse Board.

SaO2 Sensor Input Connector

Accepts various types of Datascope SaO_2 sensors. If the SaO_2 option is installed in the monitor, the connector directly interfaces to the SaO_2 analog processor circuits. A detailed description of the connector is in Section 5.4, SaO_2 Option.

PROGRAM MEMORY MODULE - DATA SETTE - 0670-00-0372

This module contains the operating system software for the monitor through a 1 megabit EPROM. The module contains no serviceable parts.

The module is externally accessible. It is intended that the customer replace the module. NEVER SAVE AND REINSTALL OLD PMM MODULES.

New modules contain new software (adding or deleting functions, or correcting deficiencies).

Each EPROM device is labeled with a part number and revision level for identification.

POWER SUPPLY/CHARGER BOARD - P/N 0670-00-0368

Overview

The function of this system is to provide power for the monitor's electronics and to charge the system's battery.

System Description

AC line power enters a double-fused receptacle, passing through a programmable block for selecting primary voltage configurations. Following the transformer, the power is rectified by a bridge rectifier (CR22) and a capacitor (C24) and is then provided to the power supply/charger. A three pin connector to the power supply/charger board is used for providing power to the board and for charging the battery.

Control inputs to the power supply/charger board consists of four lines to the front panel power switch. These lines are for monitor/power activation and a single clock line (J8-1) to sync power switching operations with the display. Eight regulated or semi-regulated outputs are provided. In addition, a scaled battery output level line (J8-9) is provided to indicate low battery condition for alarm purpose.

DC-DC Converter Description

A flyback transformer (T2) develops six output voltages. It is run in a continuous mode for optimum efficiency. The voltage outputs are regulated by the output voltage feedback of a 12.6V output. This output voltage has greater transient requirements due to the NIBP turn on. +7.5, -7.5, +15, -15, and +22V outputs follow the regulation of the 12.6V output. A linear post regulator (U12) running off the +7.5V output provides the seventh output, which is a regulated 5V supply.

A subloop is closed about the primary current (T1, CR8, R23, R77, U8) which serves multiple purposes. This current sense is used for both average and instantaneous current limiting. In the instantaneous case, it also serves to limit output currents under shorted output conditions. The primary function of the current feedback is to dramatically improve susceptability of the loop dynamics. An oscillator (U6) provides a free-running clock for the switcher. However, in the presence of a clock from the circuit, the SCLK will provide synchronization.

Multiple pulse supression (U8) is implemented to avoid excessive dissipation. Maximum pulse width is limited to 50% (U6) for both current limiting and encountering sudden current pulses. There is a soft start circuit (U4A) which brings the supply up slowly either on power-up, or after an average overcurrent condition (U11B, U2A).

Even with the instantaneous current limitation circuitry, some other protective means is required. Some of these currents are on the order of 25A and would otherwise require massive heatsinking. U2C and Q4 is a circuit that senses a collapse of the regulated 5V output. This condition occurs when any of the outputs are shorted to ground. The circuit sets a time limit of approximately 10 seconds for such a short and then will shut all power down. Power can only be activated again by cycling the power switch.

Dual Voltage Level Float Charger

The UC2906 (U3) is configured as a dual voltage level, float charger. All high currents are handled by Q1, PNP pass transistor, with U3 supplying the base drive to Q1. U3 uses the trickle bias output and the charge enable comparator to give the charger a low current turn on mode. The output current of the charger is limited to a low level, until the battery reaches a specified voltage. This will prevent high current charging if a battery cell is shorted.

FIGURE 1 on page 1-74 shows the different stages of the charger. At turn on, the UV (under voltage) sense circuitry puts the charger into State 1, the current limited state. In this state, once the enable threshold has been exceeded, the charger will supply a peak current. This current is determined by the 250mv offset in the C/L amplifier and the sensing resistor, R48 and R49.

Typical Charge Cycle: UC2906 Dual Level Float Charger

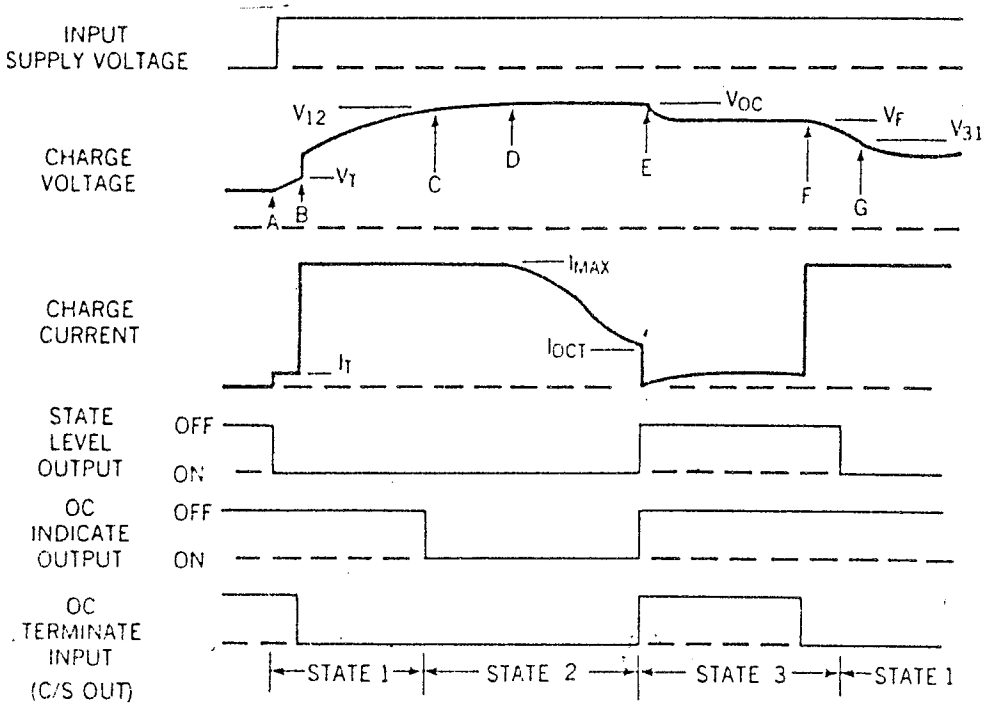


FIGURE 1

Explanation: Dual Level Float Charger

A. Input power turns on, battery charges at trickle current rate.

B. Battery voltage reaches V_T enabling the driver and turning off the trickle bias output, battery charges at I_{MAX} rate.

C. Transition voltage V_{12} is reached and the charger indicates that it is now in the over-charge state, state 2.

D. Battery voltage approaches the over-charge level V_{OC} and the charge current begins to taper.

E. Charge current tapers to I_{OCT}. The current sense amplifier output, in this case tied to the OVER-CHG input, goes high. The charger changes to the float state and holds the battery voltage at V_F.

F. Here a load ($>I_{MAX}$) begins to discharge the battery.

G. The load discharges the battery such that the battery voltage falls below V_{31}. The charger is now in state 1, again.

To guarantee a full re-charge of the battery, the charger's voltage loop has an elevated regulating level, V_{OC}, during State 1 and State 2. When the battery voltage reaches 95% of V_{OC}, the charger enters the OVER-CHARGE TERMINATE pin goes high. If a load is applied to the battery and the battery begins to discharge, the charger will contribute its full output to the load. If the battery drops 10% below the float level, the charger will reset itself to State 1. When the load is removed, a full charge cycle will follow.

When the charger is in the float state, the battery will be maintained at a precise float voltage, VF. The accuracy of this float state will maximize the standby life of the battery, while the bulk charge and over charge states guarantee a rapid and full re-charge. All of the voltage thresholds on the UC2906 (U3) are derived from the internal reference. This reference has a temperature coefficient that tracks the temperature characteristics of the optimum charge and hold levels for sealed lead acid batteries. This further guarantees that proper charging occurs, even at extreme temperatures.

Miscellaneous Power Supply Circuitry

Input power from the line generated bulk supply (CR22 and C24) and the battery, are diode OR'ed (CR11 and CR10) for rapid and smooth transition between the sources. Power to the DC/DC control circuitry is controlled by Q2 and the 12V regulator, U1. The front panel switch is a low-current DC switch supplying operating current to the controlled circuitry through diode OR CR20 and CR21.

Power to the control circuitry can also be switched by the battery sensing circuit, U2C. Should the battery voltage fall to approximately 20V, the power to the control circuitry is shut down and the monitor is turned off. This circuit re-starts only after the power is cycled ON and OFF or when a high voltage pulse, from the bulk supply, is present. This prevents the monitor from turning itself ON again. The battery voltage moves higher than the cutoff point after the monitor load is removed. A scaled battery voltage output is sensed by the uP for low battery warning. A 37 volt linear regulator is also used to regulate the bulk supply to insure reliable charger operations for AC line variations.

1.5 Specifications

1.5.1 Physical Characteristics

Size:	10.5"H x 12"W x 13"L 26.7cm H x 30.5cm W x 33cm L
Weight:	28 lbs (12.7 kg) 32.5 lbs (fully configured with battery pack)

1.5.2 Power Supply

Power Consumption:	45 W (typical)
Voltage Input:	Selectable 100, 120, 220, or 240 VAC; ±10%
Mains Frequency:	50-60 Hz nominal, ±10%

1.5.3 Environmental

Temperature:	Operating: 10 to 45°C Storage: -40 to 70°C
Humidity:	Operating: 0 to 90%; non-condensing Storage: 5 to 95%; non-condensing

1.5.4 Display

Screen size:	10.5 cm x 14.0 cm
Channels:	3
Sweep speed:	25 mm/sec (12.5 mm/sec with CO_2 selected)
Display time:	4 sec waveform
Message advisory:	Alphanumeric LCD for messages, alarms, and pulse level
LED:	7 segment LEDs for SaO_2 and NIBP measurments
Display Sensitivity	
ECG:	0.5, 1.0, 2.0, or 3.0 cm/mV, ±10%
BP:	5, 10, 20, or 40 mmHg/cm, ±10

1.5.5 ECG

Leads:	I, II, III, aVR, aVL, aVF, V
Gain:	1000X at AUX output
Frequency Response to Screen Display @ 25mm/sec:	normal response - .5 to 25 Hz, -3dB max. @ 1cm deflection extended response - .5 to 40 Hz, -3dB max. @ 1cm deflection 0.05 to 100 Hz (at diagnostic output)
CMRR:	100 dB min, at 50/60 Hz with 5K imbalance and 0 DC offset. 80dB min, maximun output of 1mVp-p (RTI) over a 60 second period with a 51K ohm lead imbalance and ±300mVdc offset. ANSI/AAMI EC13-1983.

Leakage current:	Source: Less than 10 uA from any patient connection to ground. Sink: Less than 10 uA from any patient connection to ground.
Defibrillator protection:	Fully protected against 500J discharge.
Recovery time:	2 sec maximum

1.5.6 Heart Rate Meter

Range:	30 to 250 BPM (Pediatric/Adult) 30 to 250 BPM (Neonatal)
Accuracy:	+3 BPM or ±3%, whichever is greater
Source:	ECG, pressure, or pulse with auto selection, SaO_2, and NIBP.
Pacer rejection:	Rejects spikes and displays pacer representation on screen.

1.5.7 Invasive Blood Pressure (IBP)

Channels: Two

Scales and Ranges: Each channel has four ranges and is independently scaled.

Scale (mm/cm)	Range (mm/Hg)
40	-20 to 300
20	-10 to 150
10	-5 to 75
5	-2.5 to 37.5

Accuracy:	2 mmHg or 2%, whichever is greater
Frequency Response:	DC to 15 Hz, +2/-0 Hz (+0/-3dB) for 1 cm of deflection
Isolation:	500 VAC minimum from transducer circuit to chassis ground
Auto Zero:	Balance range of ±120 mmHg
Transducer Requirements:	50 uV/V/cm Hg
Calibration Adjustment Range:	±15%

Pressure Amplifiers

Frequency Response to Display and Aux Connector:	DC to 15 Hz, +2/-0 Hz (+0/-3dB) for 1 cm of deflection
Auto-Zero Time:	Approximately 2 seconds
Digital Display Range:	0 to 300 mmHg

1.5.8 NIBP

Technique:	Measures and displays systolic, mean, and diastolic pressures using the oscillometric technique.
Cuff deflation:	Adaptive linear bleed. Adaptively adjusts bleed rate for volume of cuff in use.
Measurement cycle:	From initiation of cuff inflation to display of readings typically requires 30 seconds depending on BP, HR, and motion artifact.

Pressure Readouts:

	Range (mm/Hg)	
	Neonate	Child/Adult
Systolic	15 - 150	50 - 250
Diastolic	10 - 150	30 - 200
Mean	10 - 150	30 - 250

1.5.9 Temperature

Range:	15 to 45°C
Accuracy:	±0.2°C
Number of channels:	2
Probe:	YSI Series 700

Temperature Amplifiers °C

Accuracy at 25°C	36 to 42 ±0.1
Ambient:	15 to 45 ±0.2 plus probe error of 0.1°C

1.5.10 O2 Saturation

Range:	0 to 100%
Accuracy:	70 to 100 ±2%

SaO2 (Pulse Oximeter Device)

Display Range:	0 to 100%	
Accuracy:	70 to 100%	±2% SaO_2 (1.S.D.)
	60 to 69%	±4% SaO_2 (1.S.D.)
	0 to 59%	unspecified

1.5.11 Alarm

Limits

Alarms and limits are available for heart rate, systolic and diastolic pressure, for IBP1 and IBP2, saturated O_2, and NIBP.

PARAMETER		LO LIMIT RANGE	HI LIMIT RANGE	INCREMENTS IN STEPS OF
Heart Rate:	NEO	20 - 100	100 - 250	5 bpm
	ADULT/ PED	20 - 100	100 - 220	5 bpm
IBP1:	SYS	20 - 130	130 - 240	5 mmHg
	DIA	20 - 90	40 - 130	5 mmHg
IBP2:	SYS	20 - 130	130 - 240	5 mmHg
	DIA	20 - 90	40 - 130	5 mmHg
NIBP:	SYS	20 - 130	130 - 240	5 mmHg
	DIA	20 - 90	40 - 130	5 mmHg
SaO_2		50 - 95	80 - 99	1% or 5%

1.5.12 Real-Time Clock

Display Format	24 hrs.
Battery Life:	5 years (typical)

1.5.13 Refresh Memory & Display System

Data Storage and Display:	4 seconds per channel, 8 seconds ECG in cascaded mode.
Sweep Speed:	25 mm/second, $\pm$2.5%

1.5.14 Trend

Graphic Display: On-screen display of heart rate, invasive blood pressures, non-invasive blood pressure, SaO_2 and temperatures.

Trend readings are displayed on a 1-, 2-, 4-, 8-, or 24-hour format.

Trends CO_2, Respiration Rate, and Agent when interfaced with a DATASCOPE MULTINEX monitor.

1.5.14 Trend (continued)

Time Resolution:	Forty, 1.5 minute samples representing the latest 60-minutes of data
	Forty, 3.0 minute samples representing the latest 2-hours of data
	Forty, 6.0 minute samples representing the latest 4-hours of data
	Forty, 12 minute samples representing the latest 8-hours of data
	Forty, 36 minute samples representing the latest 24-hours of data
List Trend:	Displays up to 120 NIBP measurements, HR, SaO_2, and T1.
Battery Backup:	1-hr backup for trend memory

1.5.15 Communication

RS232:	Serial Output:	High Speed RS232
	Baud Rate:	2400
	Signal Level:	+3V to +25V
		-3V to -25V
Datascope Interface:	Serial Output:	Async.
	Baud Rate:	300
	Signal Level:	TTL, 0 to +2.4V

1.5.16 Recorder

Records:	Analog record of dual trace, diagnostic and delayed ECG, pulse, IBP pressure, CO_2, and SaO_2 trend graphics.
Annotates:	Alphanumeric display of: Time, Heart Rate, ECG lead and size, invasive blood pressure, non-invasive blood pressure, temperatures, CO_2, O_2, Respiration Rate, SaO_2, N_2O, Agent, List Trend for NIBP.
Speeds:	25mm/sec for all traces except CO_2. Choice of 1mm/sec or 12.5mm/sec for CO_2 print speed.

Trace Frequency Response:	0 to 100 Hz single channel -3 dB max. 0 to 50 Hz dual channel -3 dB max.
Usable Chart Size:	50 mm, ±2mm
Recording Sensitivity:	Diagnostic ECG: 1:1 to screen ±5% Delayed ECG: 1:2 to screen ±5% BP: 1:2 to screen ±5% Trend: 1:2 to screen ±5% CO_2: 20 Torr/cm to screen ±5%

1.5.17 Battery System (Optional)*

Type:	Rechargeable, sealed, lead-acid, 24V
Operating Time:	30 minutes from full charge; varies with number of features (The recorder function cannot be used when operating on battery.)
Recharge Time:	16 hours, maximum

1.5.18 Agency Compliances

Submitted for Testing:
- Canadian Standards Association, C.S.A. Standard C-22.2, NO. 125
- Electrical Testing Laboratories of the City of Los Angeles, CA, based on requirements of U.L. Standard 544.

Designed for compliance with the recommendations of Underwriters Laboratories, U.L. Standard 544, of the International Electro-technical Commission, as described in I.E.C. Standard 601-1 and submitted for testing by the German (T.U.V.) and British (B.S.I.) national testing agencies.

* Battery option is not available in countries that require IEC.601-1 Standards compliance of this instrument. Please contact the Datascope Service Department for further information.

1.5.19 Input/Output Voltage Limits

RS232 Connector

Pin	Description	I/O	Min/Max
1	Chasis G		0V
2	TXD HS4	Output	+9V
3	RXD HS4	Input	±12V
4	RTS HS4	Output	+9V
5	CTS HS4	Input	±12V
6	NC		-
7	GND		0V
8 - 25	NC		-

Datascope Interface

Pin	Description	I/O	Min/Max
1	GND		0V
2,3	NC		-
4	REC DEL	NOT USED	-
5	PULSE/	OUTPUT	±6.5V
6	TM PRINT	NOT USED	-
7	TRACE 3 IN	INPUT	0/+5.25V
8	NC		-
9	SERIAL	INPUT/OUTPUT	0/+5.25V
10	BP1 RM	OUTPUT	+6.5V
11	BP2 RM	OUTPUT	±6.5V
12	A1 GND		0V
13,14	NC		-
15	REC REL	NOT USED	-
16	CO2 IN	INPUT	±6.5V
17	TM REC	NOT USED	-
18	ECG DELAY	OUTPUT	±6.5V
19	NC		-
20	BP2 REC	OUTPUT	±6.5V
21	GND		0V
22	BP1 REC	OUTPUT	±6.5V
23	ECG DIR	OUTPUT	±6.5V
24	A1 GND		0V

2. REPAIR INFORMATION Page

2.1 Introduction

This chapter of the Service Manual provides the necessary technical information to perform electrical repairs to the instrument. The most important prerequisites for effective troubleshooting are a thorough understanding of the instrument functions and an understanding of the Theory of Operation. If necessary, refer to the Operating Instructions (P/N 0070-00-0218) which describes the instrument's functions and features, and Chapter 1 of this manual for the Theory of Operation.

2.2 Safety Precautions

When the instrument covers are removed, observe the following warnings and general guidelines.

A. Avoid contacting line voltages and high voltage of CRT supply.

B. Do not short component leads together.

C. The troubleshooting section is not intended as a rapid course on how to repair devices of this type. Rather, it is intended as a guide for qualified technical personnel only. The instrument covers must not be removed by other than technically qualified personnel who have received supplementary instructions regarding maintenance of medical electronic equipment or have had equivalent experience in this area.

2.3 Troubleshooting Guidelines

In an instrument as complex as this, it is virtually impossible to list each and every potential problem and appropriate action. Any given problem, however, can be effectively identified through an understanding of the instrument's features and the Theory of Operation. These are prerequisites for repair. If necessary, read the Operating Instructions manual and study the Theory of Operation presented in Chapter 1 of this manual. The time spent reading and absorbing this information is generally realized by a reduction in repair time and ultimately, the gaining of overall experience of service personnel.

General Troubleshooting Guidelines

1. IDENTIFY THE PROBLEM. Due to the wide range of potential symptoms, certain problems may be more subtle than others. One approach to troubleshooting is to set-up the instrument for testing as described in Chapter 4 and attempt testing. If successful, there is reasonable assurance that no problem exists. By contrast, the fact that a particular test is not successful is generally indicative of a failure in that specific area.

   The cause of the symptom can now be further isolated by referring to Chapter 1. An examination of the Table of Contents (page 1-1) will reveal a listing of specific circuits or areas in the instrument, each of which is dedicated to provide a specific function. Once the operation of that circuit is understood, troubleshooting can be completed by making measurements in that circuit to determine which component(s) is at fault.

2. AVOID SHORTING COMPONENT LEADS. During repair procedure it can become tempting to make a series of quick measurements. Always turn the power off before connecting and disconnecting test leads and probes. The accidental shorting of component leads can easily overstress components, resulting in a second unnecessary, failure (aside from creating a possible safety risk).

3. USE THE PROPER EQUIPMENT. The equipment listed in Section 2.4 is suggested to fulfill a wide range of troubleshooting requirements. Use a soldering iron at the appropriate wattage for a given job. For example, use a pencil-type iron (25 watts max.) for repairs to printed wiring boards and a pistol-girp (75 watts) for repairs requiring this much power. Do not use the high powered iron to repair the printed wiring boards as the conductors will lift from the board under the extreme heat, ruining it.

4. CLEAN THE REPAIR AREA. After soldering operations, clean off the repaired area with alcohol and a stiff hair brush. This will remove residual solder flux, making the repaired area more visible for inspection and returning the instrument to its original, neat appearance. Removal of the flux will also facilitate making electrical measurements in the affected area as the flux itself is not conductive.

EXCHANGE PROGRAM

Datascope offers an exchange program for certain assemblies in the instrument. In many cases, replacement of the complete assembly will result in the most expedient repairs. See Section 3.4 for details concerning the Exchange Program.

2.4 Test Equipment Required

- oscilloscope, dual trace, 100mHz storage
- digital voltmeter, 3 1/2 digits
- ECG, 5 lead simulator
- pressure simulator, dynamic and static 0-300mm/Hg
- pressure reference gauge, mercury column or gauge manometer, 0-300mm/Hg
- adult size blood pressure cuff with Y fitting to connect to pressure reference gauge and monitor
- DIGISENSOR or compatible SaO_2 sensor
- circuit board extenders:

ECG	0670-00-0235
Pressure, Invasive	0670-00-0237
Refresh Memory	0670-00-0237
SaO_2 Analog	0670-00-0334
SaO_2 Digital	0670-00-0334
Trend-Recorder	0670-00-0392
Host Processor	0670-00-0393
Deflection	0670-00-0238

2.5 Troubleshooting Typical System Level Problems

The goal of this procedure is to symptomatically identify the defective printed circuit board, subassembly, or accessory and by using the available exchange boards, assemblies, and accessories, return the instrument to proper operation.

Identify the problem:

a) Observe on-screen indicators
b) Observe LCD indication
c) Observe LED indicators
d) Listen for audio beeps, alarm tone

2.5.1 On Screen Indicators

Problem: Missing analog waveforms.
Solution: Identify missing waveform, replace the board with that function.

Problem: No trace or numerics on screen.
Solution: Check the LED window for normal status. If OK, then most of the power supply functions and digital processing functions are OK. Check for QRS and P-1 trigger beeper. Disconnect yoke leads. If a dot does not appear on the screen, replace H.V. module. If a dot still does not appear, replace CRT.

Problem: Analog waveforms present, one or more digital fields are missing, but LCD appears OK.
Solution: Verify insertion of Datasette. Verify proper seating of Host Processor Board. Finally replace Host Processor Board.

Problem: Unable to call up trace 3 for any accessory (i.e., ACCUCAP).
Solution: Check corresponding trend screen. If trend has accumulated, then the problem most likely exists in the Host Processor Board, followed by a defective keyboard. If trend information is not being shown, and there is no analog waveform being displayed, check for output from outside monitor, or replace the resident option board (SaO_2 analog and digital).

NOTE: To display external ACCUCAP or ACCUSAT waveform, the "trace display switch" on the external monitor must be enabled.

Problem: Unable to display cascaded ECG on trace 3.
Solution: Press Freeze key to verify freeze function. All traces should freeze. Release freeze function. Press Trace 3 key to verify cycling through all other trace 3 choices. If all signals (except ECG) appear on trace 3 then replace Host Processor Board. If problem still exists, replace Refresh Memory Board.

2.5.2 Printer Problems

Problem: Printing too light or too dark.
Solution: Wrong paper or paper installed backwards.

Problem: Record button fails to activate recorder even when paper is visibly exiting the recorder.
Solution: End of chart sensor has been activated. Paper will feed out, up to about the last .5 inches and stop. Pull out remaining paper, load new roll.

Problem: New roll of chart paper will not auto-load.
Solution: Fold approximately three inches of the chart paper over and feed folded end into the recorder. Recorder will feed about one inch, then stop. Pull through double edge of paper manually, then press Record Run button.

Problem: Recorder paper jammed in roller assembly.
Solution: Remove static guard bar. Using a very thin piece of plastic, guide plastic through normal paper path. If not successful, replace recorder.

Problem: Recorder prints test pattern and "Recorder Failed" message.
Solution: Wrong digital data sent by Host Processor Board. Replace Host Processor Board. If problem still exists, replace recorder.

Problem: Recorder skips or fails to move.
Solution: Loose drive belt. If the motor is turning, tighten belt on recorder drive motor.

Problem: Recording length varies.
Solution: Not a failure. Any recording of ECG, BP-1, BP-2, CO_2, or SaO_2 analog will be printed for 15 seconds or longer depending on length of edgewise digital annotation. Trend or list charts will print only until the data is output.

Problem: Missing segments in printout.
Solution: One or more of the 400 thermal dots is clogged with deposits or burned out. Remove recorder and printhead and clean with alcohol and cotton swab. If this fails to correct problem, replace printhead or recorder.

NOTES: This recorder is serviceable to only sub-assembly level (i.e., printhead and plug in boards). No field repairs of boards.

Recorder speed is under software control and cannot be varied.

2.5.3 LCD Panel Indicators

Problem: No back lighting for LCD.
Solution: 100 Vac oscillator module has failed. Replace LCD.

Problem: A single failure message appears.
Solution: Any single failure message (i.e., SaO_2 Failed) is most likely that option failing to respond with proper software checksum. For SaO_2, replace digital, then analog boards. For NIBP, replace module. For Trend, replace Trend Board.

Problem: Multiple failure messages appear.
Solution: Most likely a Host Processor failure. Verify insertion of Datasette. Remove and re-install all plugs in I.C.'s. If problem still persists, replace board.

Problem: LCD panel display is blank or multiple rows of square blocks display.
Solution: Either end of LCD connector cable may be reversed.

NOTE: The intensity or view angle on LCD cannot be changed. It has a fixed back light system.

2.5.4 LED Displays

Problem: SaO_2 window shows LL in place of digits.
Solution: Low saturation alarm has been violated.

Problem: SaO_2 window shows HL in place of digits.
Solution: High alarm violation.

Problem: SaO_2 display alternates between a valid number (i.e., 95%) and --.
Solution: Check sensor integrity, and application. Check LCD light level meter (should be at least two boxes). Replace sensor if required. If not a sensor problem, replace Analog Board then Digital Board.

Problem: NIBP values displayed are not correct (high or low).
Solution: Most likely a user or an application problem. If application, review NIBP techniques. If hardware related, enter accuracy test mode. Step by step procedure under NIBP Calibration, see Chapter 4.

Problem: Random segements of all or most LED's illuminate upon power-up or during operation.
Solution: Probable digital decoding or LED driver failure. Decoding on Host Processor Board, drivers are on Trend Board. Replace in most convenient sequence.

2.5.5 NIBP Module

Problem: Pump starts but cuff will not inflate or inflation is sluggish.
Solution: Check for kinked or twisted hose in NIBP module and pump assembly.

Problem: Unable to obtain measurement on patient with low blood pressure (systolic < 100mmHg).
Solution: Manually select initial cuff pressure of 120mmHg.

Problem: CUFF OVERPRESSURE message on LCD display.
Solution: Indicates that cuff pressure has momentarily exceeded 315mmHg and overpressure safety switch has activated. Reset by turning monitor OFF then ON.

Problem: NO PULSATION message on LCD display.
Solution: Indicates that pulsations are absent or too weak to measure. The cuff will re-inflate automatically three times. If unable to measure with first four attempts, it will terminate further cycles.

Problem: FAULT AUTO, UNABLE TO MEASURE message.
Solution: This message appears after three unsuccessfull attempts to detect pulsations. Reset by pressing start.

Problem: CHECK CUFF AND HOSE, UNABLE TO MEASURE message.
Solution: This message appears, following normal inflation, if a large artifact has resulted in a momentary pressure surge (approximately 30mmHg higher then normal). Reset by pressing start.

Problem: NIBP FAIL message on LCD display about 20 seconds after START has been activated.
Solution: Internal NIBP failure, most likely U-5 failed.

Problem: NIBP FAIL following power ON software downloading.
Solution: Failure may reside in the NIBP module (i.e., U-1 RAM or U-5 processor) or the Host Processor Board (i.e., U-23 or U-24 DUART's). Replace the Host Processor Board to isolate the problem.

2.5.6 Miscellaneous System Problems

Problem: Unable to trigger on ECG or P-1.
Solution: Verify presence of adequate amplitude ECG or P-1. Replace Host Processor Board if neither signal triggers. If only one signal fails to trigger, replace the analog amplifier at fault.

Problem: Length of analog traces is unequal or their respective position is improper.
Solution: Calibrate Host Processor Board.

Problem: Screen information, analog and digital is compressed vertically or horizontally.
Solution: Timing problem on Host Processor Board (most likely intermittent). Remove and re-install all socketed I.C.'s, clean board contacts, re-install board. If problem persists, replace board.

Problem: BP-1 or BP-2 will not zero.
Solution: Replace pressure amplifier. If problem persists, replace Host Processor Board.

Problem: Single flashing amber dot on left center of screen.
Solution: This is a normal event if the program in the battery backed RAM of NIBP, TREND, SaO_2 is erased or corrupted. It is also normal, if the Datasette has been replaced with new, revised or any RAM removed/replaced. Check LCD. The program being down loaded will be indicated on the LCD. Allow the process to complete. This can take as much as nine minutes for a full download. Check LCD. Should read, "Down Loading Complete" and revert to normal display. Any readout on LCD, indicating a single failure (i.e., NIBP Failed) is probably a failed option, in this case NIBP. Anytime the LCD reads multiple failures (i.e., NIBP and SaO_2), failure is probably in the Host Processor Board. Replace accessory module for simple failure or Host Processor for multiple failures.

Problem: Temperatures are not displayed, or incorrect.
Solution: If a Type 700 Series probe is being used, and the probe is good, replace the Host Processor Board.

Problem: Overlapping digital displays.
Solution: Host Processor failure, replace board.

Problem: Most or all keys of keyboard dead.
Solution: Verify keyboard connector to Mother Board is connected. If so, replace Host Processor Board.

2.6 Troubleshooting to Component Level Procedures

Component level servicing requires a thorough understanding of the theory of operation of the particular circuit, state of the art test equipment (i.e., 100MHz oscilloscopes, digital logic analyzers, pulse generators, etc.) as well as the applicable data books for the larger scale digital processing integrated circuits.

Most of the circuit boards utilize multiple layer high density architecture, resulting in increased product reliability, but this same technology puts greater demand on the service technicians. Extreme care is a mandatory procedure when soldering or unsoldering compenents from these circuit boards.

CAUTION: Static discharges will damage most integrated circuits, and circuit boards. Static dissipating work surfaces and personal grounding wrist straps are mandatory precatuions when servicing these circuit boards. Soldering irons that are AC line operated MUST HAVE proper grounding connections to prevent static build-up on the soldering tips. L.P.G. operated soldering pencils are not acceptable for service operation.

Use grounded 110 Vac operated or low voltage AC operated soldering irons. Battery operated irons are also suitable. In any case, use a fine trapezoid or conical point soldering tip with power dissipation not to exceed 35 watts. Tip temperature must not exceed 700°F.

CAUTION: Removal and installation of leadless carrier-type integrated circuits. These devices are pressure fit into their respective sockets. Release socket retaining clips if equipped. Lift I.C. out of its socket by gently prying up at diagonal opposite corners. Note location of Pin 1, typically a molded-in dot in the plastic package of the I.C.

LOCATION OF PIN 1 VARIES, DEPENDING ON THE TYPE OF DEVICE. Some device packages are keyed with an angle cut on one corner that matches with similar angle in the socket.

2.6.1 Troubleshooting Digital Circuits to Component Level

1. Examine the voltages and signals available on the test connectors of each circuit board (i.e., Host Processor Board, test connector JP-2 on page 2 of 3 schematics).

2. Determine missing voltages or signals. Identify the source of the voltage or signals, based on the block diagram in Chapter 1.

3. Missing or loaded-down DC voltages are best identified by monitoring the voltage sources and individually removing each circuit card that uses that voltage. Once the problem area is narrowed down, singly remove the I.C.'s that are connected to the particular voltage.

   The most productive approach is to verify that supply voltages are present, a CLOCK pulse is present at the device and WRITE, READ, CLEAR, and RESET are active during operations. Most of these signals are exclusive (will not happen simultaneously).

4. Examine the circuit for automatic reset circuits, ("Watchdog Timers"). The output pulse of these circuits is typically connected to RESET pins of microprocessors and logic devices. The presence of Watchdog Timer pulses during READ and WRITE cycles of a microprocessor normally idicates a processor or associated logic failure.

5. Systematically replace the devices that connect to the output ports of the suspected processor, memory, or interface type logic chips.

6. Examine the diagram of the failed circuit card. Double width lines of the diagram typically represent a common communication "bus" tied to like named pins of all devices where they connect.

   Remove the I.C.'s supporting external or peripheral functions (i.e., line drivers, external interfaces, etc.).

   Monitor the common digital bus for return of logic activity. If this approach does not yield good results, replace the most complex device first (i.e., microprocessor) followed by devices that supply predetermined operating logic (i.e., RAM, ROM, EPLD).

7. If still unable to locate, and remedy the problem, return the defective circuit board for factory repair.

2.7 Disassembly Instructions

The Datascope 3000 consists of four major assemblies

- Plug-In PCBs (Upper Card Cage)
- Power Supply Modules, Chart Recorder, and NIBP Module (Lower Case)
- CRT, LCD Advisory, and all Patient Signal Input Connectors (Front Panel)
- Interface Connector, RS232 Connector, Battery, Datasette , Main Power Switch, Line Cord Recepticle, Fuses (Rear Panel)

2.7.1 Plug-In PCBs

1. Remove all power and interface cables at the rear panel.

2. Remove the top cover.

   a. Remove the four screws on the top rear edge of the top cover.

   b. Remove the two screws on each side panel at diagonally opposite corners.

   c. Loosen the two thumb screws retaining the Data-Sette software module.

   d. Remove software module.

   e. Lift the cover at the rear edge. Pull back approximately one-half inch, then lift straight up.

3. Removing Printed Circuit Boards

   Proceed in a left to right direction as you face the monitor.

   a. Deflection PCB

      1) Disconnect the deflection yoke leads, J-21 and J-22.
      2) Pull the board straight up.

   b. CRT Blanking PCB

      1) Gently pull the board off the CRT pins. Make sure the socket clears the tip of the gun neck.

      CAUTION: The 0.1mfd/600V disc capacitor may retain up to 400VDC of stored voltage. Short and discharge the capacitor with insulated test leads.

      2) Disconnect the 8-pin ribbon cable connector and the captive cable connector at the CRT high voltage module.

c. Host Processor PCB

1) Disconnect the JP-1 ribbon cable from the PCB to the LCD display module.
2) Remove the Data-Sette program module if installed.
3) Pull the PCB straight up and remove it from the monitor.

d. Trend/Record PCB

1) Disconnect the ribbon cable from JP-1 to the chart recorder.
2) Remove the board from the monitor.

e. Refresh Memory PCB

1) Lift the circuit board straight up and remove it from the monitor.

f. SaO_2 Analog PCB

1) Disconnect the ribbon cable from J-9.
2) Lift the board straight up and remove it from the monitor.

g. SaO_2 Digital PCB

1) Lift the PCB straight up and remove it from the monitor.

h. Pressure Amplifier (IBP) PCB

1) Disconnect the P-23 and P-24 cables from the circuit board. These cables connect to the front panel pressure connector.
2) Lift the board straight up and remove it from the monitor.

i. ECG Amplifier PCB

1) Disconnect the cable connecting J-25 and the front panel ECG connector.
2) Lift the board and remove it from the monitor.

2.7.2 Power Supply Module, Chart Recorder, and NIBP Module

1. Remove the lower panel.

   a. Remove the three screws at the front edge of the bottom panel.

   b. Remove the four screws from the lower edge of the rear panel.

   c. Remove the screw attaching the bottom panel to the power supply module located at the left rear of the panel.

   d. Lift the bottom panel at the rear and pull back one-half inch, then remove the panel from the monitor.

2. Power Supply

   a. Loosen the top screws on the right side and the two screws on the left side of the metal frame. Slide the power supply so the screw heads align with the keyhole slot.

   b. Remove the grounding screw on the left side edge of the metal frame.

   c. Remove the interface cables from J-8, J-13, and J-10.

   d. Remove the power supply by lifting up its front and pivoting it clear of the recorder and NIBP module.

3. Chart Recorder

   a. Loosen the four screws attaching the recorder bracket. Slide the recorder so the screw heads align with the keyhole slot.

   b. Remove the three flathead screws attaching the recorder bracket to the recorder.

      1) Pull the chart holder slide out to its stop.

         This exposes the plastic retaining clip that holds the slide in place (This clip is an integral part of the recorder plastic case, and is located about one-half inch to the right of the chart motor retaining screw.)

      2) Slightly depress the plastic retainer clip while pulling on the chart holder slide.

      3) Remove the slide.

c. Disconnect the four wire connector at the right of the recorder's control board (from the power supply module).

d. Lift the recorder at its rear and pivot it out to clear the power supply module while guiding the gray ribbon cable through the mother board.

e. Disconnect the gray interface ribbon cable connector from the recorder control board.

4. NIBP Module

a. Loosen the four screws on the support bracket of the NIBP assembly. Slide the NIBP module so that the screw heads align with the keyhole slots.

b. Lift and pivot the NIBP module to gain access to the hose connection at the "CUFF" connections.

c. Disconnect the hose.

d. Disconnect the P-3 interface connector from the module.

2.7.3 CRT, LCD Advisory, and all Patient Signal Input Connectors

1. CRT

a. Disconnect the CRT Blanking PCB.

b. Disconnect the CRT 2nd anode high voltage lead.

CAUTION: Discharge any remaining high voltage on the high voltage lead by grounding against one of the two CRT mounting screws.

c. Remove the grounding wire from the lower left screw of the CRT mounting clamp.

d. Disconnect the flex circuit connector from J-31 on the Mother Board, located on the right side of the front panel, under the LCD display.

e. Place the monitor flat on it's front panel face.

f. Lift the remaining mother board/rear panel assembly and rest it on the tables' surface.

g. Remove the four CRT mounting screws and separate the CRT from the front panel of the monitor.

2. CRT Faceplate

   a. Remove the CRT as described above in Section 2.7.3, 1.

   b. Remove the two metal brackets that retain the faceplate.

   c. Lift the faceplate out of the front panel.

3. LCD Advisory

   a. Separate the front panel assembly as described in Section 2.7.3, 2, CRT.

   b. Locate and remove the two screws supporting the LCD display assembly.

   c. Disconnect the ribbon cable from J-30 on the Mother Board.

   d. Remove the display assembly.

4. Front Jack and Switch Assembly

   a. Remove the NIBP module as described in Section 2.7.2, 4, NIBP.

   b. Disconnect the ribbon cable interface from J-29 on the mother board.

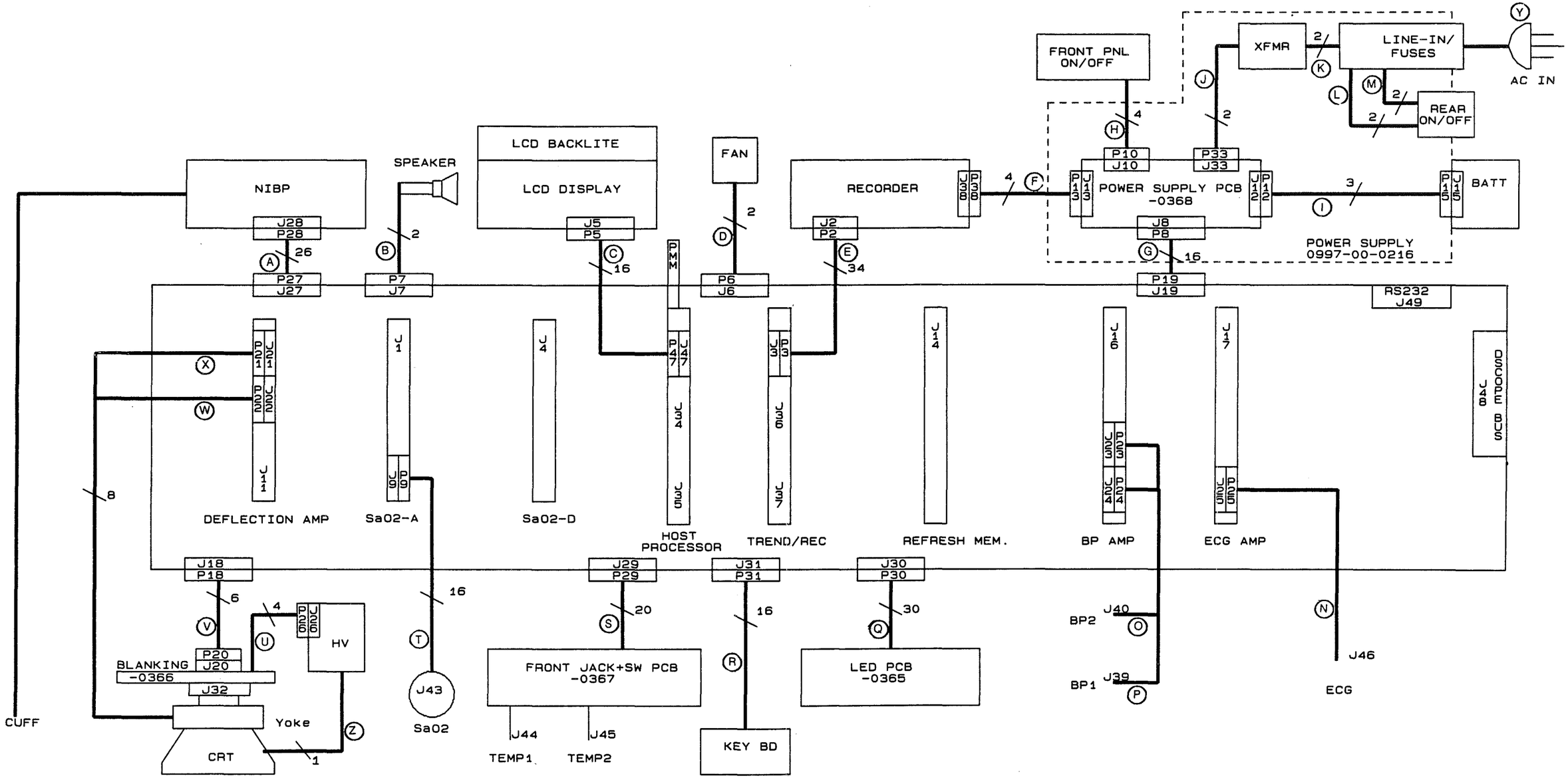
   c. Remove the two screws retaining the PCB and slide the PCB out of the guide rails.

2.8 Assembly and Schematic Drawings

Schematic diagrams and accompanying assembly drawings of printed circuit boards are provided in the remainder of this chapter.

The following is a list of the diagrams with the corresponding drawing number (if available) and the page where it can be found.

* 0670-00-0406 is used if invasive blood pressure option is not installed in the monitor.



| - INDICATES NUMBER OF CONDUCTORS

Ⓐ - INDICATES INTERCONNECT CABLE NUMBER (see page 2-18 for part numbers)

CONNECTOR DIAGRAM

Revised 10/27/89

Replacement Cables as Shown on Page 2-17

A 0012-00-0593-01
B 0012-00-0267-01
C 0012-33-1000
D 0012-00-0229
E 0012-35-2000

F 0012-00-0531
G 0012-00-0535
H 0012-00-0553* Part of On/Stby Switch Assembly
I 0012-00-0557
J 0012-00-0543-01

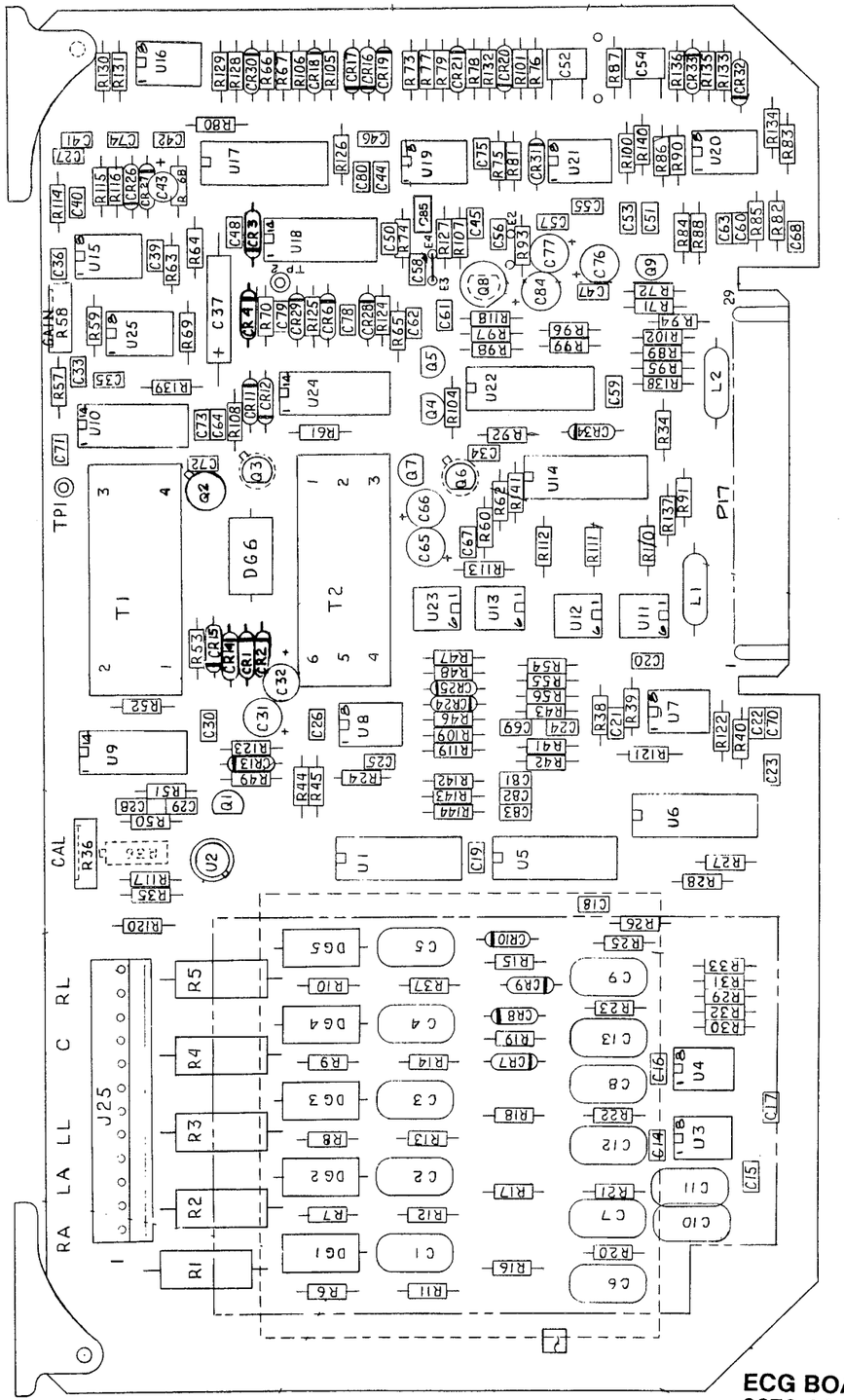
K Part of Power Transformer Assembly*
L Part of Power Transformer Assembly*
M Part of Power Transformer Assembly*
N 0012-00-0377-03
O 0012-00-0544

P 0012-00-0545
Q 0012-32-0450* Part of LED Display Assembly
R Part of Keyboard Assembly*
S 0012-31-0400* Part of Jack and Switch Board Assembly
T 0012-00-0431-02

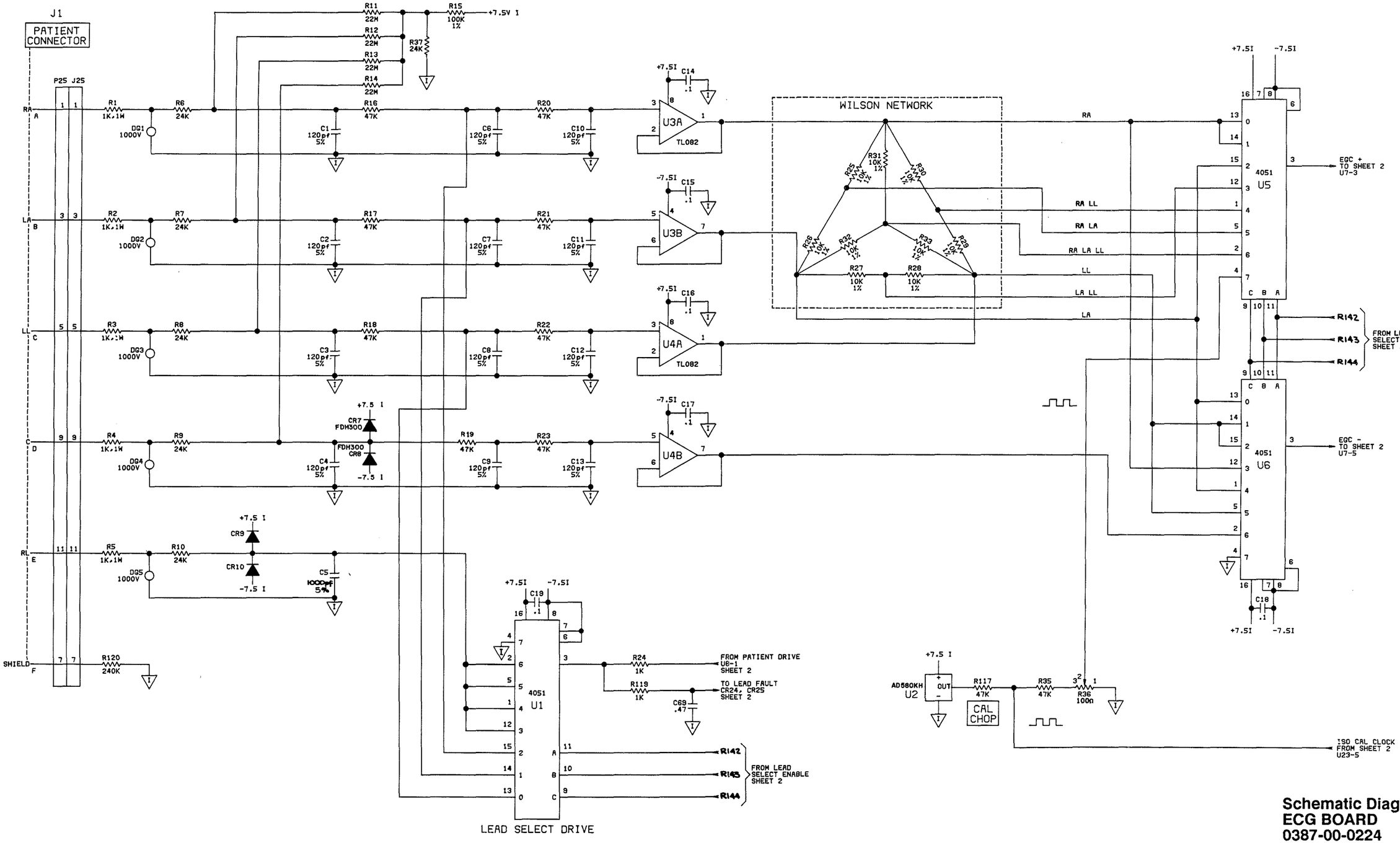
U Part of Blanking Circuit Assembly*
V 0012-00-0592
W Part of CRT Deflection Yoke*
X Part of CRT Deflection Yoke*
Y AC Power Cord 110V 0012-25-0001
AC Power Cord 220V 0012-25-0002

Z Anode Lead from HV Module*

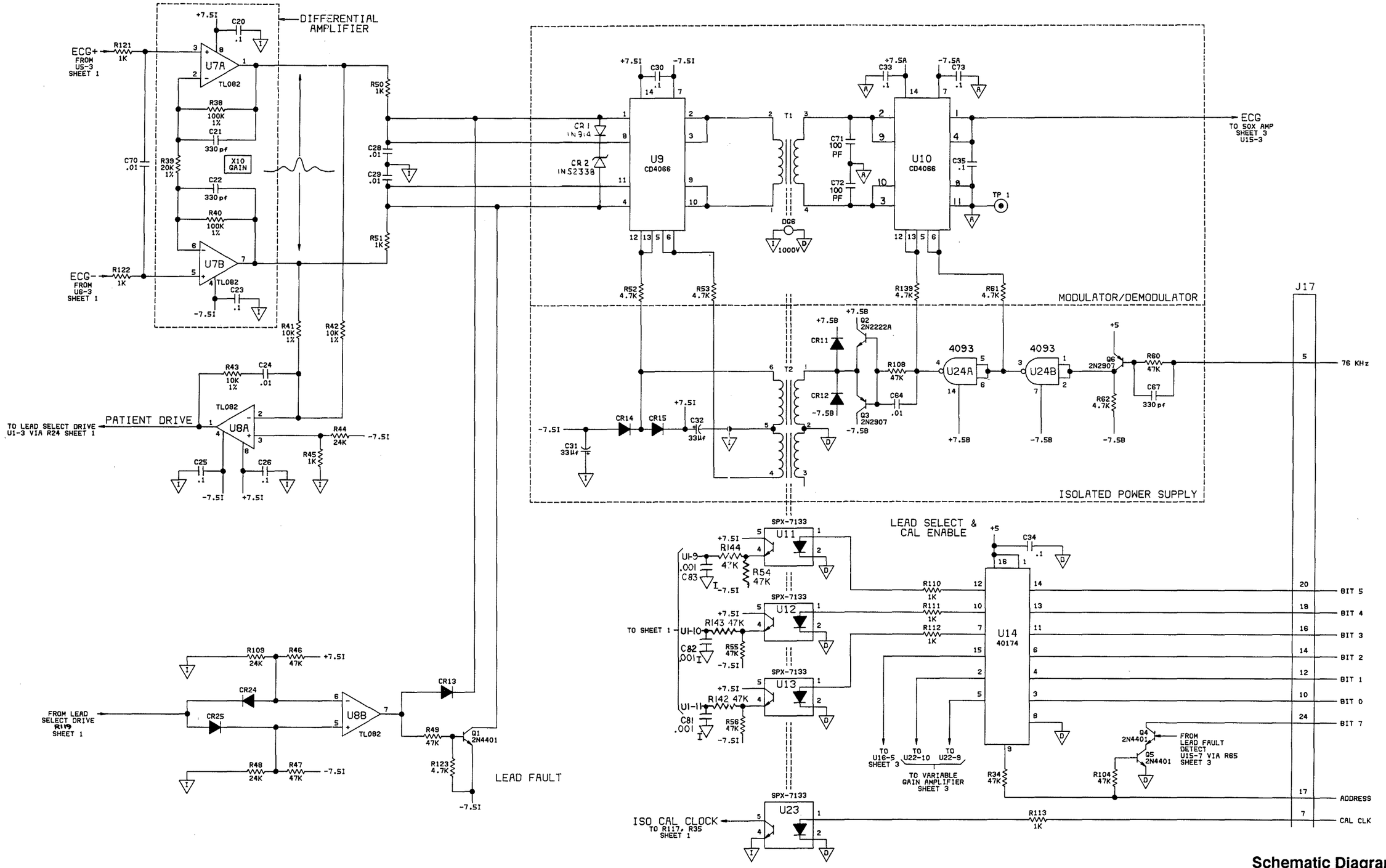
*These cables are not available separtely from it's assembly.



ECG BOARD
0670-00-0224
Revised06/12/90

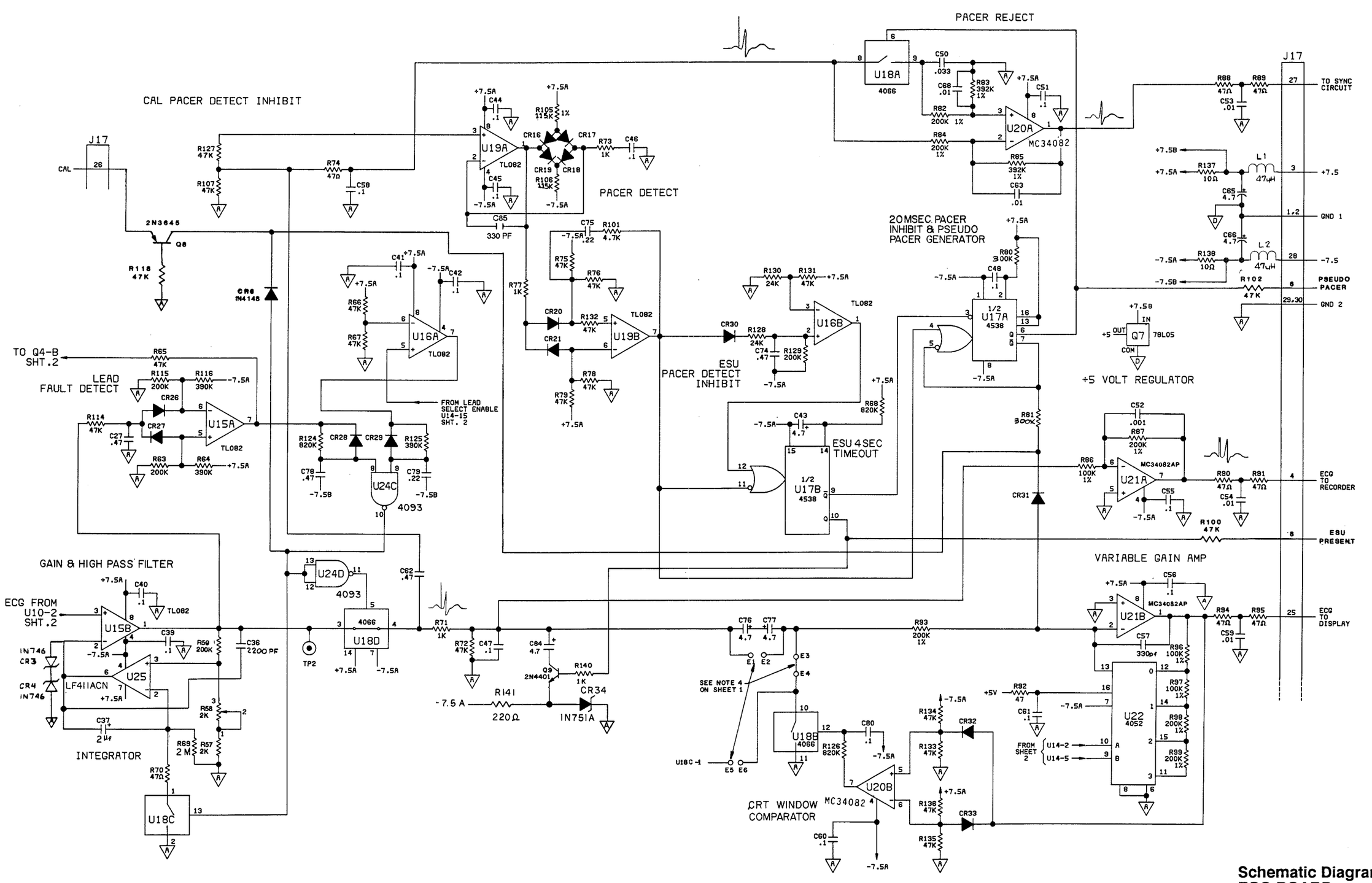


Schematic Diagram
ECG BOARD
0387-00-0224
Sheet 1 of 3



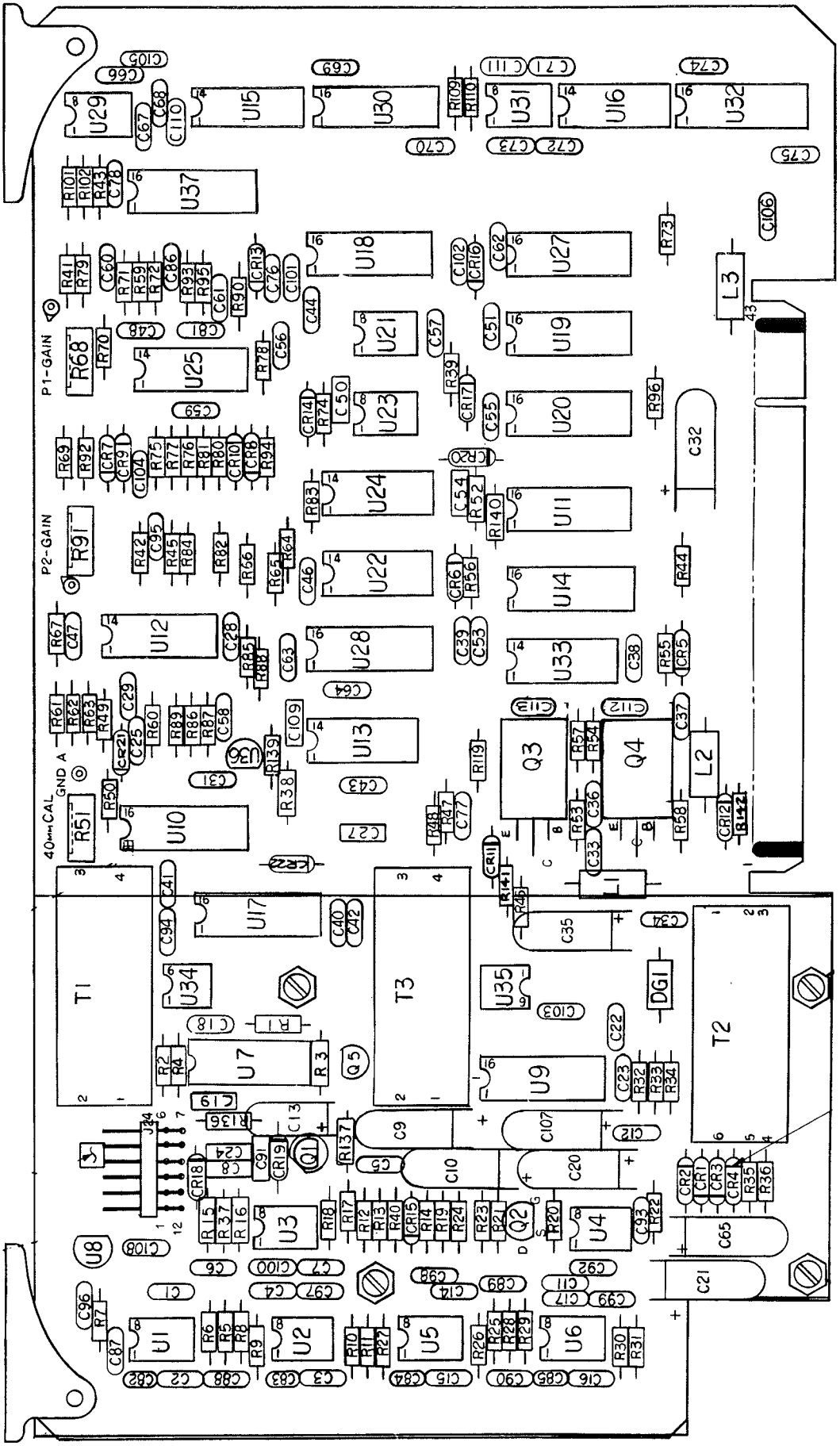
Schematic Diagram
ECG BOARD
0387-00-0224
Sheet 2 of 3

Revised06/12/90

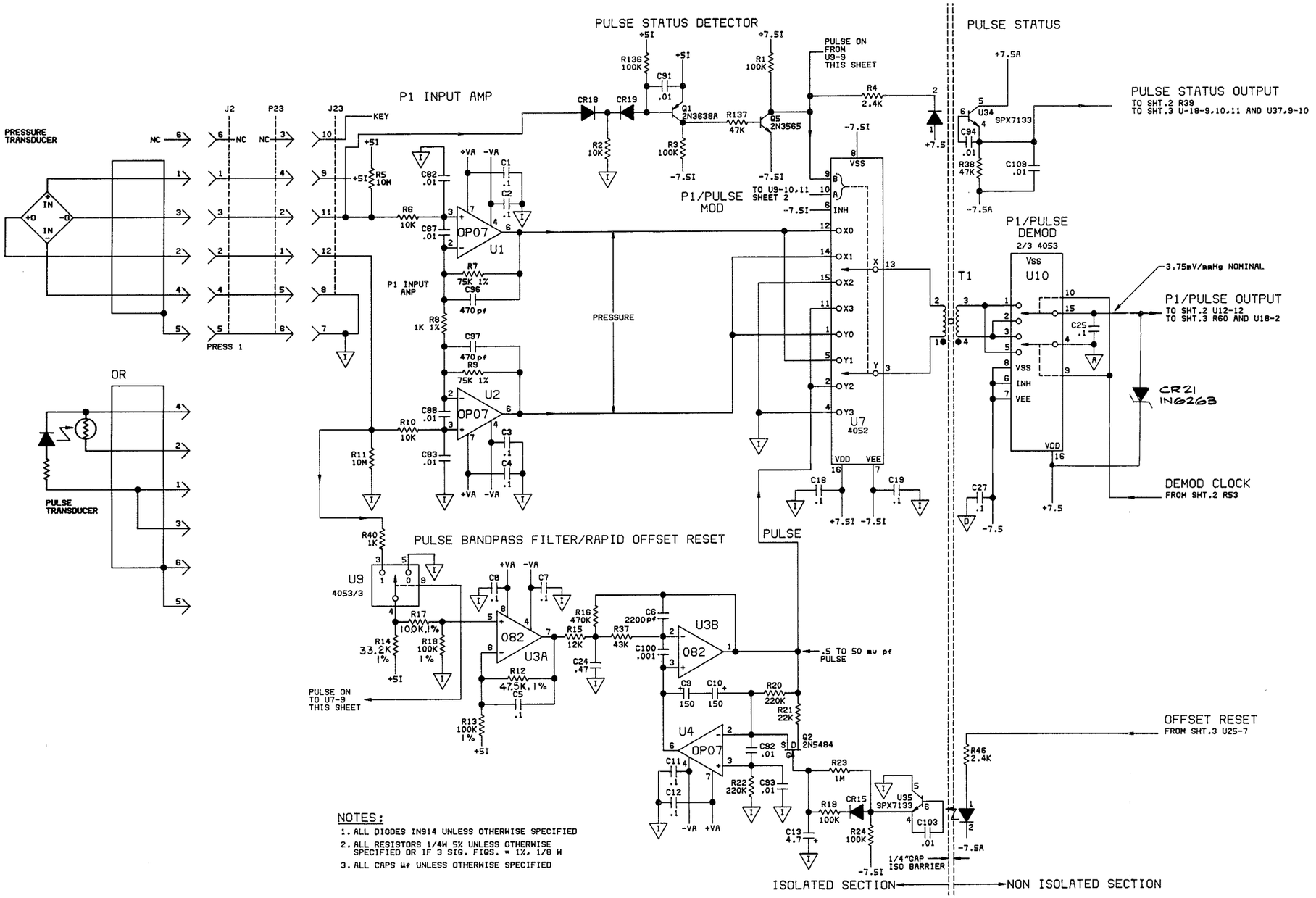


Schematic Diagram
ECG BOARD
0387-00-0224
Sheet 3 of 3

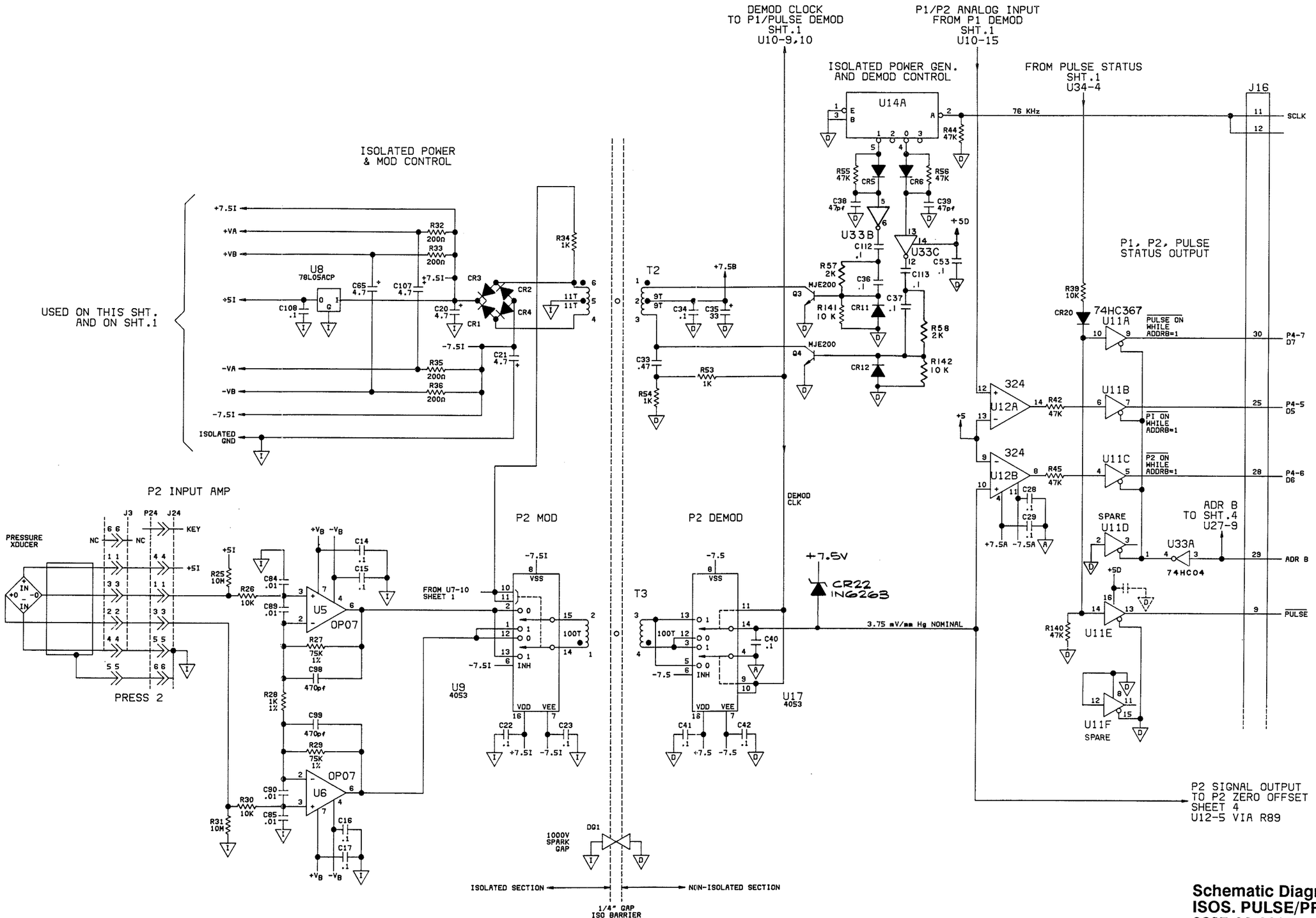
Revised 08/06/91



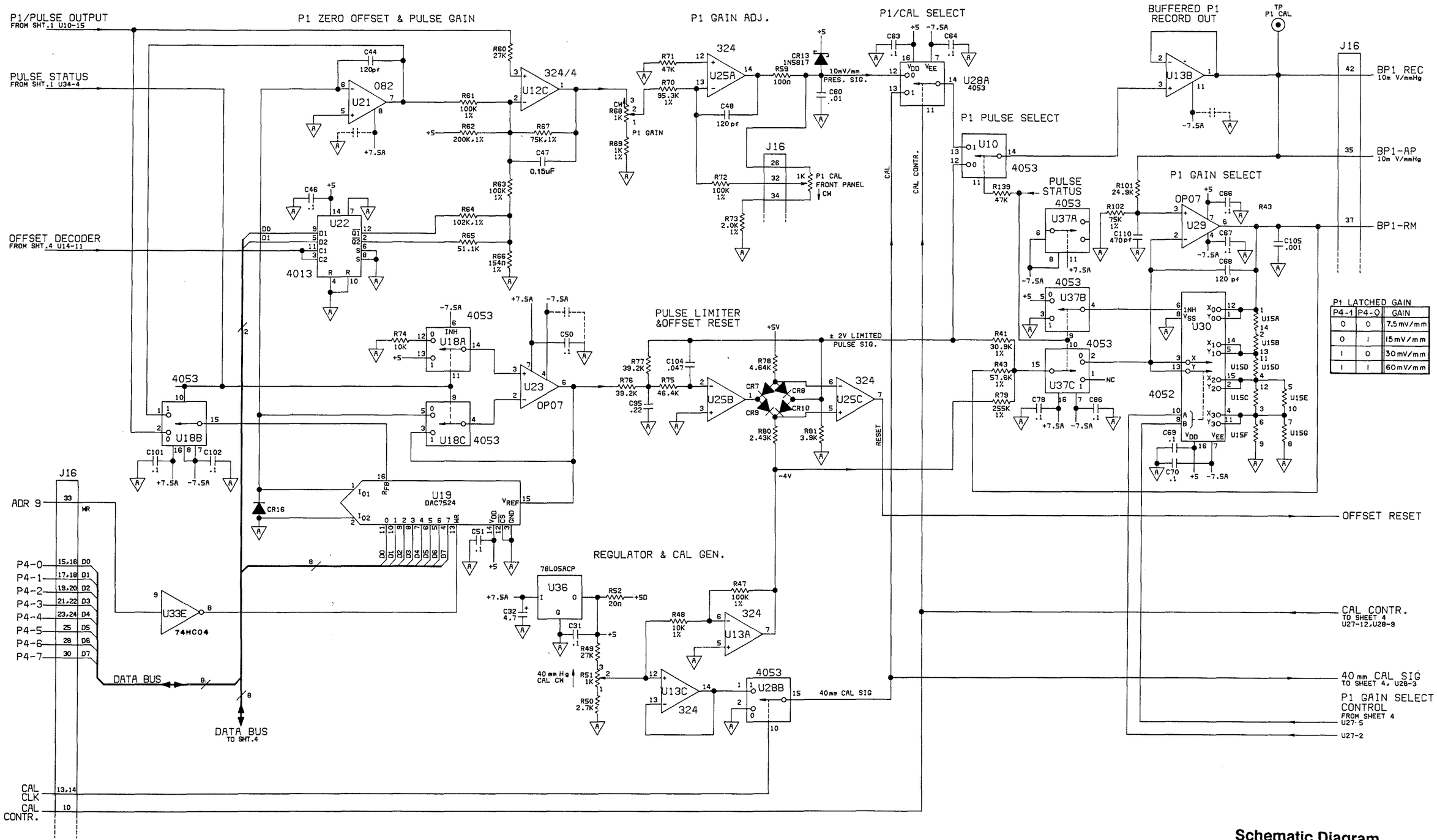
ISOS. PULSE PRESSURE BOARD
0670-00-0225



Schematic Diagram
ISOS. PULSE/PRESSURE BOARD
0387-00-0225
Sheet 1 of 4



Schematic Diagram
ISOS. PULSE/PRESSURE BOARD
0387-00-0225
Sheet 2 of 4



Schematic Diagram
ISOS. PULSE/PRESSURE BOARD
0387-00-0225
Sheet 3 of 4

Revised 10/11/89

DATA BUS
TO SHT.3

OFFSET DECODER
TO SHT.3, U22-11

P1 GAIN SELECT CONTROL
TO SHT.3 U30-10

U30-9

40mm CAL SIG
FROM SHT.3 U28-15

CAL CONTROL
TO SHT.3 U28-11 AND J16-10

TP
P2-CAL

OFFSET DECODER

PRESSURE GAIN & CAL
SELECT LATCH

P2 GAIN SELECT

ADR B
FROM SHT.2,U33-3
AND J16-29

U27
40174

U14B
4556

74HC04
U33F

J16

ADR 8

ADR 5

WR

DATA BUS

PRESS GAIN & PRESSURE CAL
LATCHED BY F ADDR B
P4-4=1 CAL ON
P4-4=0 CAL OFF

OP07
U31

J16

BP2-RM

P2-(4) GAIN SCALES

U32
4052

U16A
U16B
U16C
U16D
U16E
U16F
U16G

U24
4013

U33D
74HC04

P2 ZERO OFFSET

P2 GAIN ADJUST

BUFFERED P2 RECORD OUT

J16

BP2-AD
10mv/mmHg

DAC7524
U20

U21
082

U12D
324

U25D
324

U13D
324

U28C
4053/3

P2/CAL SELECT

P2 GAIN

PRESSURE SIGNAL
10MV/MM

BP2-REC
25mv/mmHg

SPARE

SPARE

P2 SIGNAL OUTPUT
FROM SHT.2 U17-14

P2 CAL
FRONT PANEL

J16

+7.5

-7.5

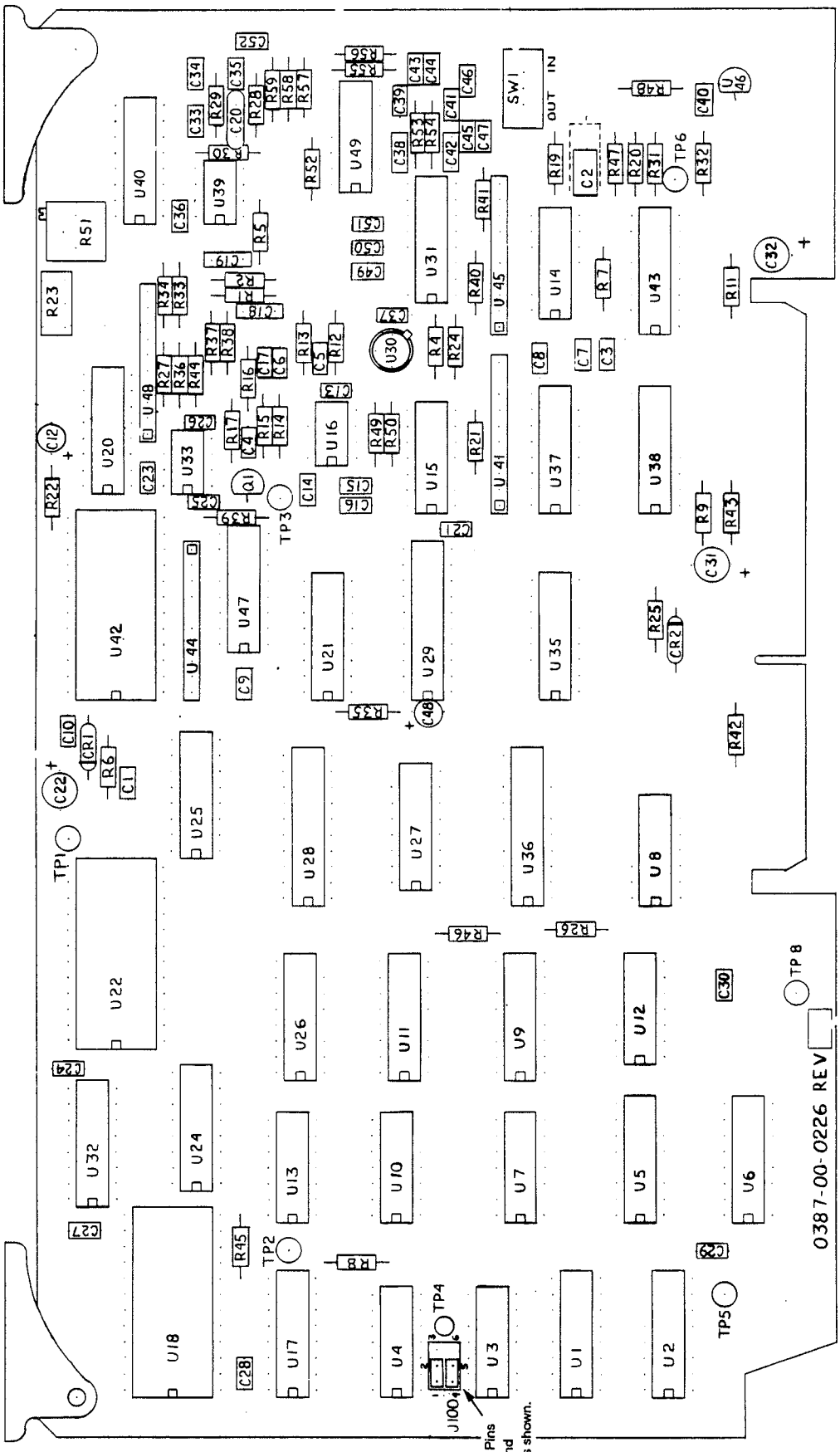
GND A

GND D

TP
GND A

Schematic Diagram
ISOS. PULSE/PRESSURE BOARD
0387-00-0225
Sheet 4 of 4

Revised 10/11/89



REFRESH MEMORY BOARD
0670-01-0226
Revised 06/15/89

FREQUENCY DIVIDER

REFERENCE TRACE OUTPUT CONTROL

MEMORY READ/WRITE CONTROL

PRESSURE MEMORY ADDRESS CLOCK
(1024 +1) PER 4MS

ECG MEMORY ADDRESS CLOCK
(1024 -1) PER 2MS

FREEZE AND SPEED CONTROL SWITCH

DISPLAY CONTROL LATCH

TRACE BLANKING CONTROL

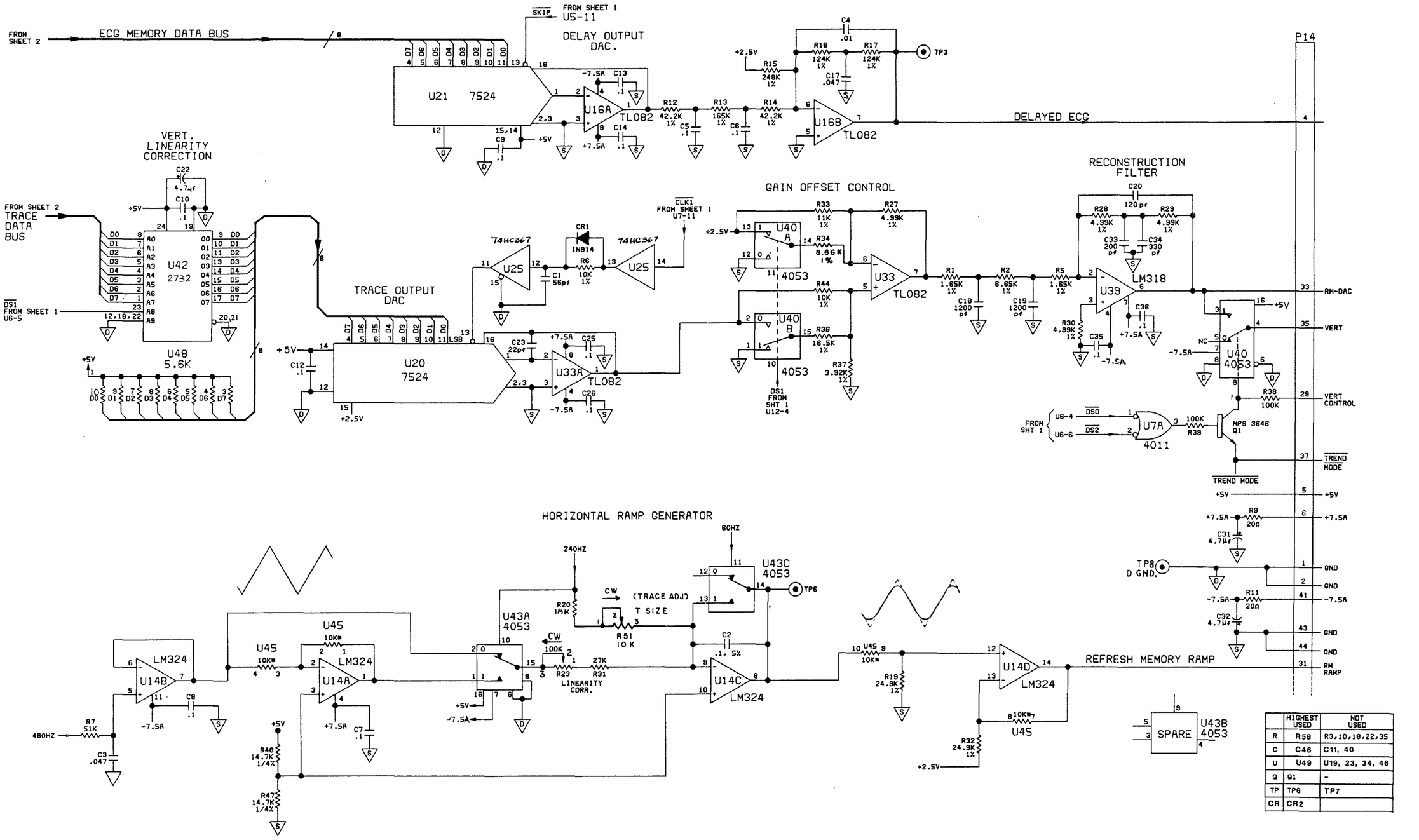
NOTES: UNLESS OTHERWISE NOTED
1. ALL RESISTORS ARE OHMS 5%.
2. ALL CAPACITORS ARE MICROFARADS.

Schematic Diagram
REFRESH MEMORY BOARD
0387-01-0226
Sheet 1 of 3
Revised 06/15/89

ADC REFERENCE
U30 AD580 KH
+7.5A
+2.5V
.047µF C37
R49 14.0K 1%
R50 14.7K 1/4%
U15D LM324
U41-4
+1.25V
P14
ECG-RM 39
BP1-RM 38
EXT. SIG. 8
BP2-RM 40
EXT. SW. 7
S1 IN OUT
R40 9.76K, 1%
R41 10K 1%
R42 10K, 1%
R43 10K, 1%
U35B 4053
INPUT SWITCHING
R25 3.9K
240Hz
480Hz
U31 4052
U41 10K
U15A LM324
U15B LM324
R21 100n
U41 5 10K
U41 8 10K
U41 10 10K
ANALOG TO DIGITAL CONVERTER
U29 ADC 0804
C21 .01
246 KHz
960Hz
ECG DATA HOLDING REGISTER
U28 74C374
REFRESH DATA BUS
WR1 FROM SHEET 1 U5-10
480Hz
C27 .1
CLK1 FROM SHEET 1 U12-8
U24 4520
1/2 U32 4520
ECG MEMORY (1024 X 8)
ECG MEMORY ADDRESS BUS
6116 U22
492KHz
ECG MEMORY DATA BUS
TO SHEET 3 DELAY OUTPUT DAC
U26B
U25 LSB
ENA 1 FROM SHEET 1 U8-3
+7.5A
-7.5A
C39
C38 .1 2%
C41 .12 2%
C42 .1 2%
C43 .15
C44 .068 2%
C45 .15
C47 .12
C46 .027 2%
U49 LM324
R4 20.5K
R24 174K
U15C LM324
C15 .1
C16 .1
-7.5A +7.5A
R52 47.5K
R53 56.2K
R54 56.2K
R55 56.2K
R56 56.2K
R57 56.2K
R58 56.2K
REF. TRACE REGISTER
FROM SHEET 1 U38-14 ADRE
U36 74C374
REF FROM SHT. 1 U6-9
U44 5.6K
LD23 FROM SHEET 1 U11-11
U27
U26A
TP2 LD23
TRACE DATA BUS
ZERO @ 2/3 SCALE REGISTER
FROM SHEET 1
U6-12 Z EN
U6-11 SCALE
U12-10 Z OR S
U47
PRESSURE MEMORY ADDRESS BUS
1/2 U32A 4520
U17 4520
CLK2 FROM SHEET 1 U7-10
MADR FROM SHEET 1 U35-14
CS2 FROM SHEET 1 U4-10

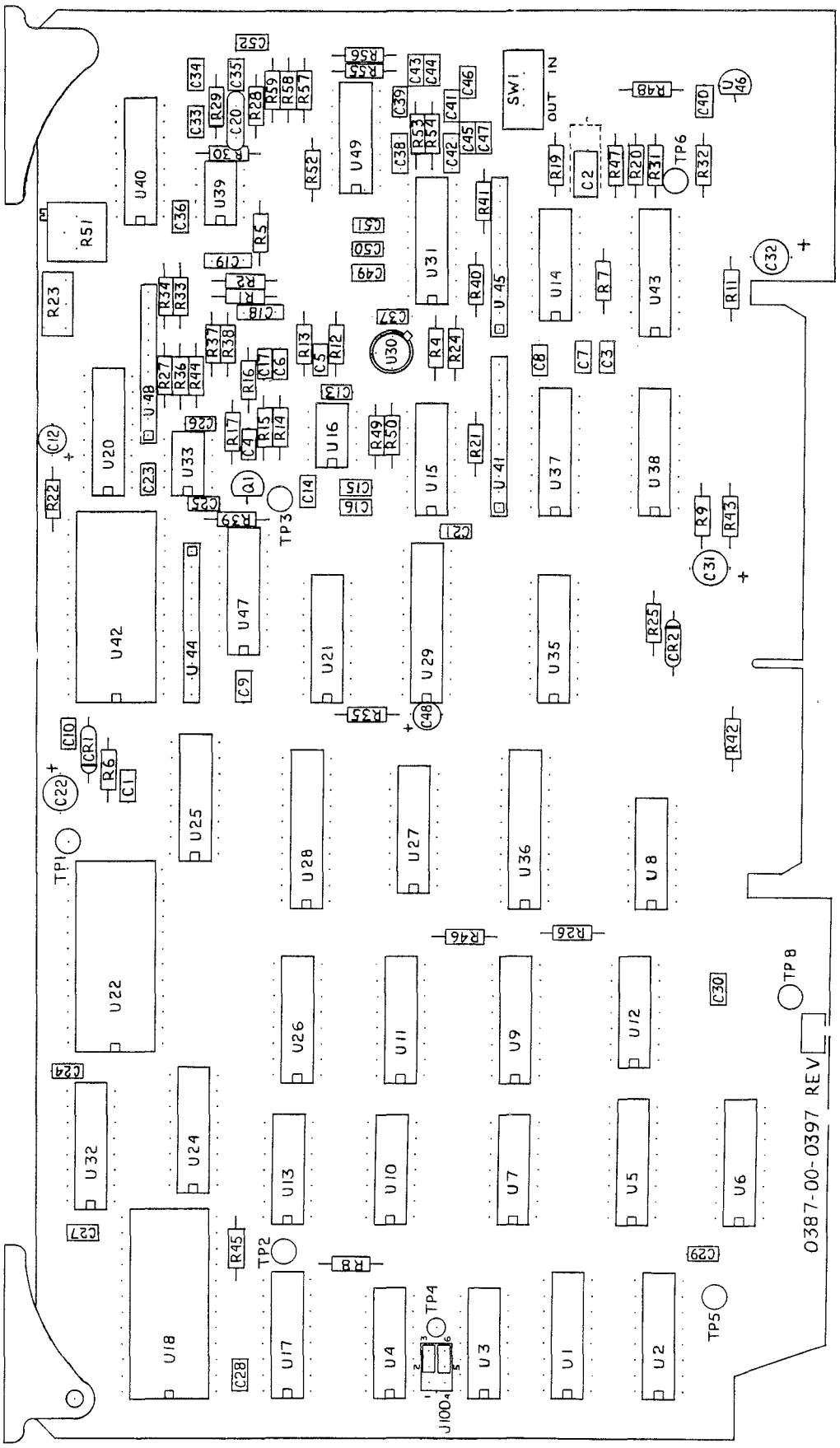
	A7	A6	A5	A4	A3	A2	A1	A0	
2/3 F.S.	1	0	1	1	0	1	0	0	(180)D
ZERO	0	0	0	1	1	1	1	0	(30)D

Schematic Diagram
REFRESH MEMORY BOARD
0387-01-0226
Sheet 2 of 3
Revised 06/15/89

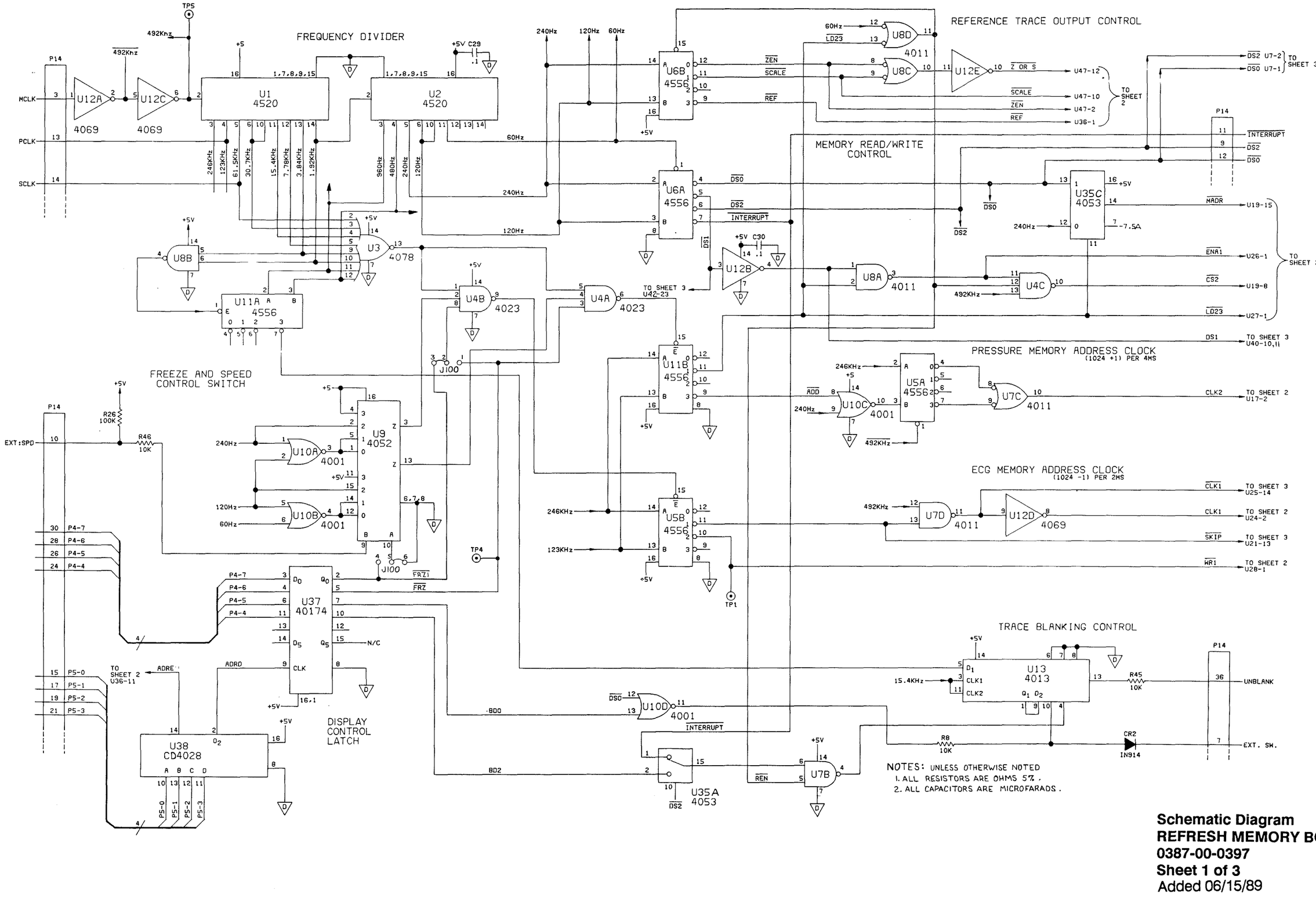


	HIGHEST USED	NOT USED
R	R58	R3,10,18,22,35
C	C46	C11, 40
U	U49	U19, 23, 34, 46
Q	Q1	-
TP	TP8	TP7
CR	CR2	

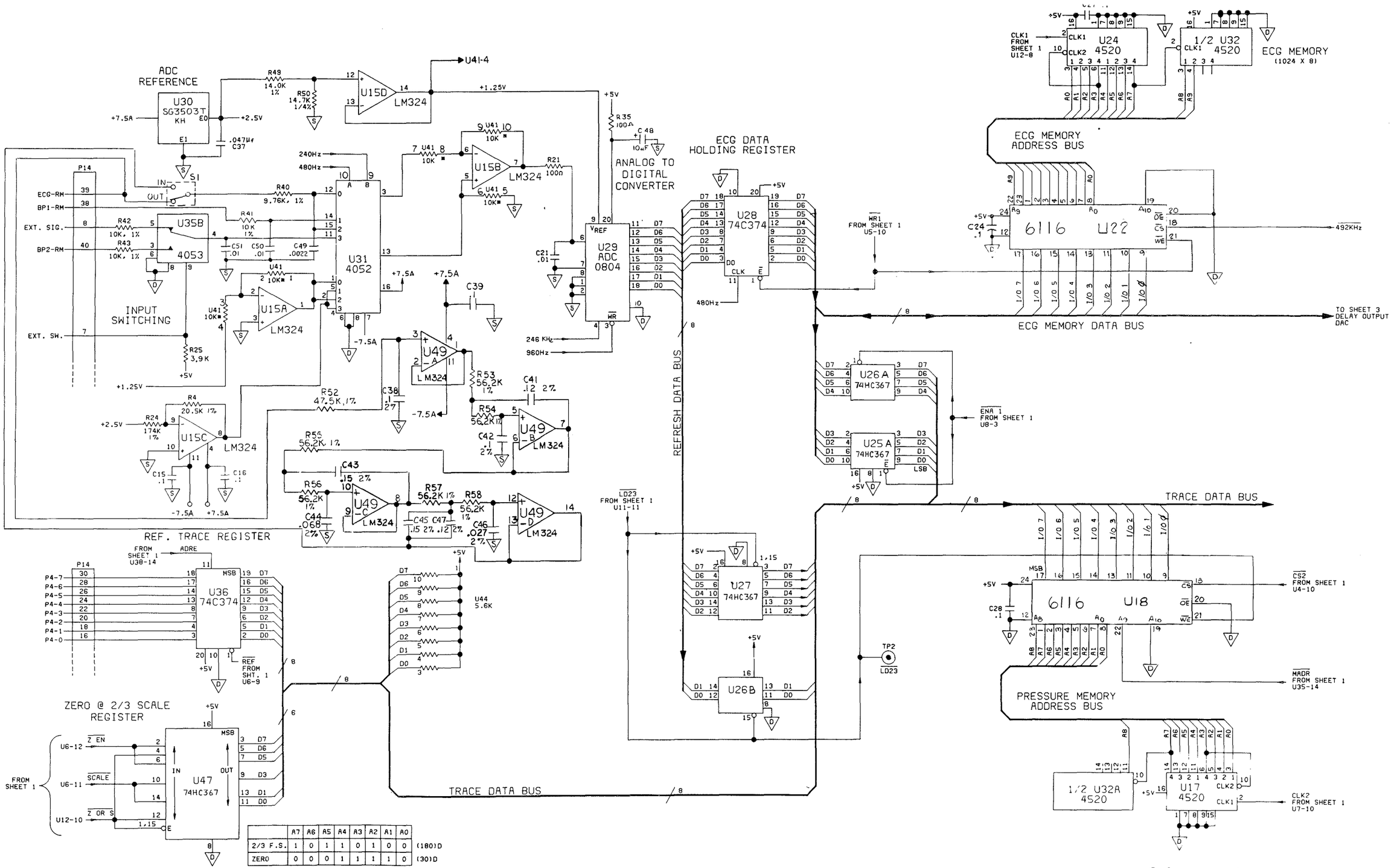
Schematic Diagram
REFRESH MEMORY BOARD
0387-01-0226
Sheet 3 of 3
Revised 06/15/89



REFRESH MEMORY BOARD
0670-00-0397
Added 06/15/89

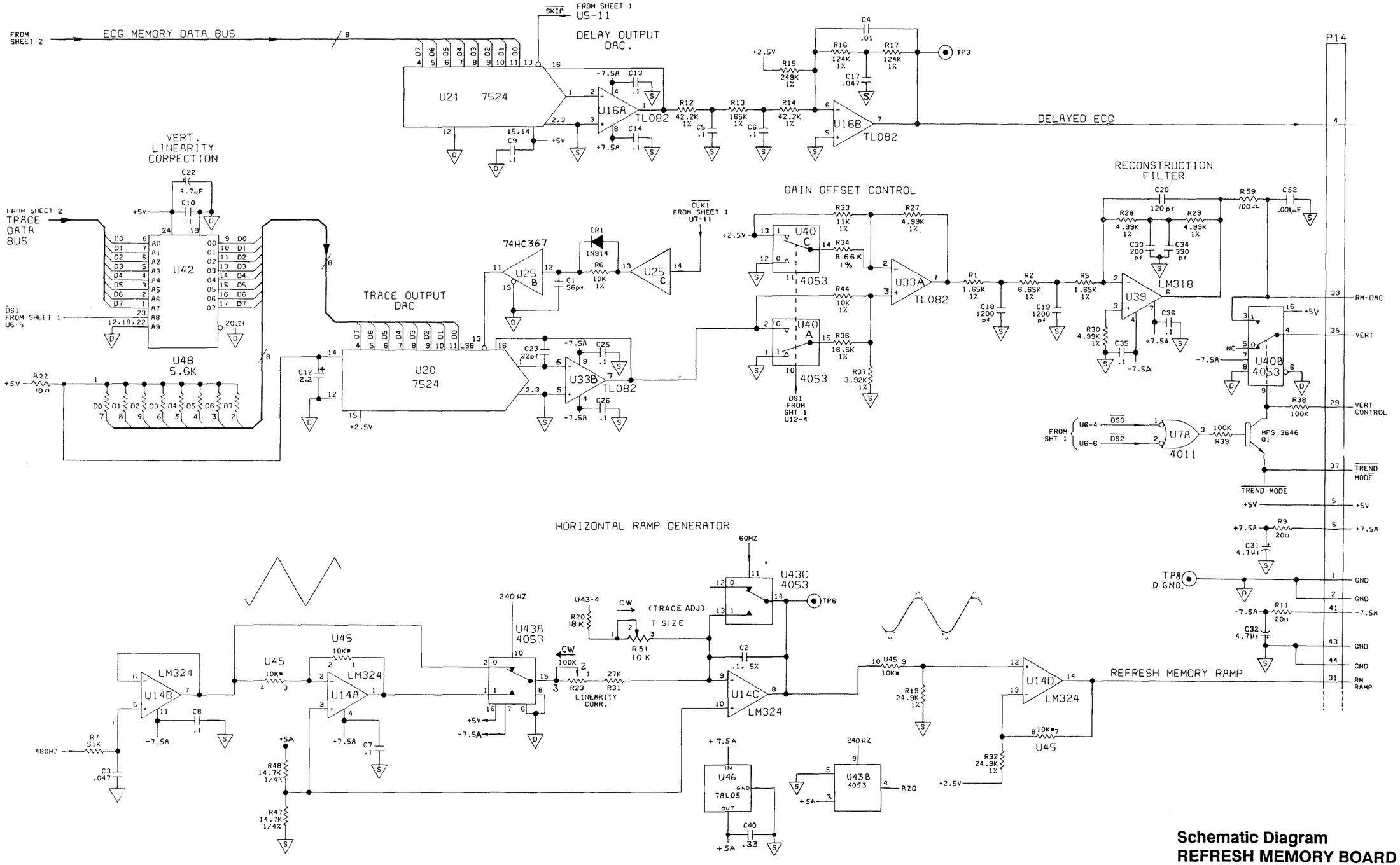


Schematic Diagram
REFRESH MEMORY BOARD
0387-00-0397
Sheet 1 of 3
Added 06/15/89

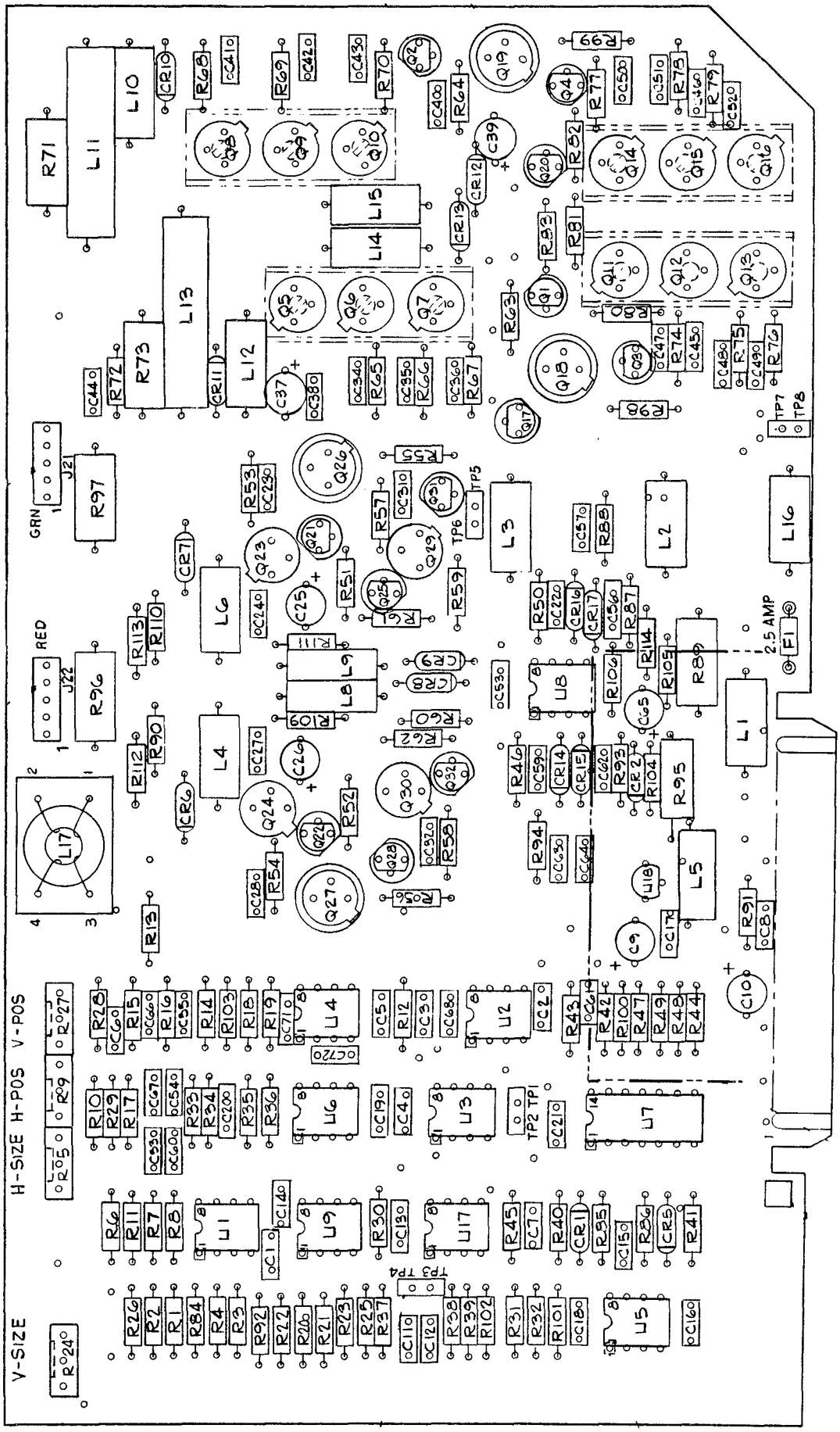


	A7	A6	A5	A4	A3	A2	A1	A0	
2/3 F.S.	1	0	1	1	0	1	0	0	(180)D
ZERO	0	0	0	1	1	1	1	0	(30)D

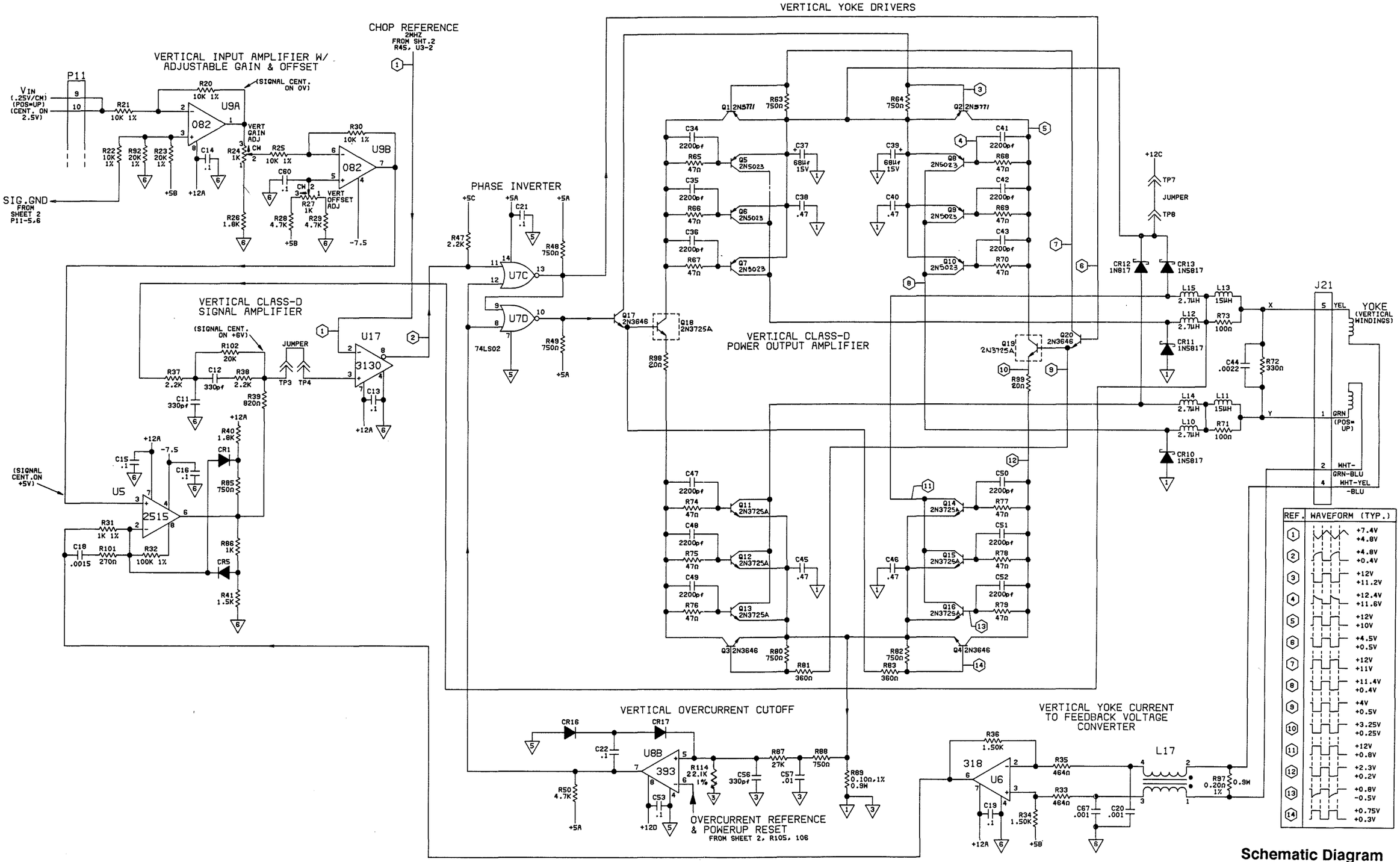
Schematic Diagram
REFRESH MEMORY BOARD
0387-00-0397
Sheet 2 of 3
Added 06/15/89



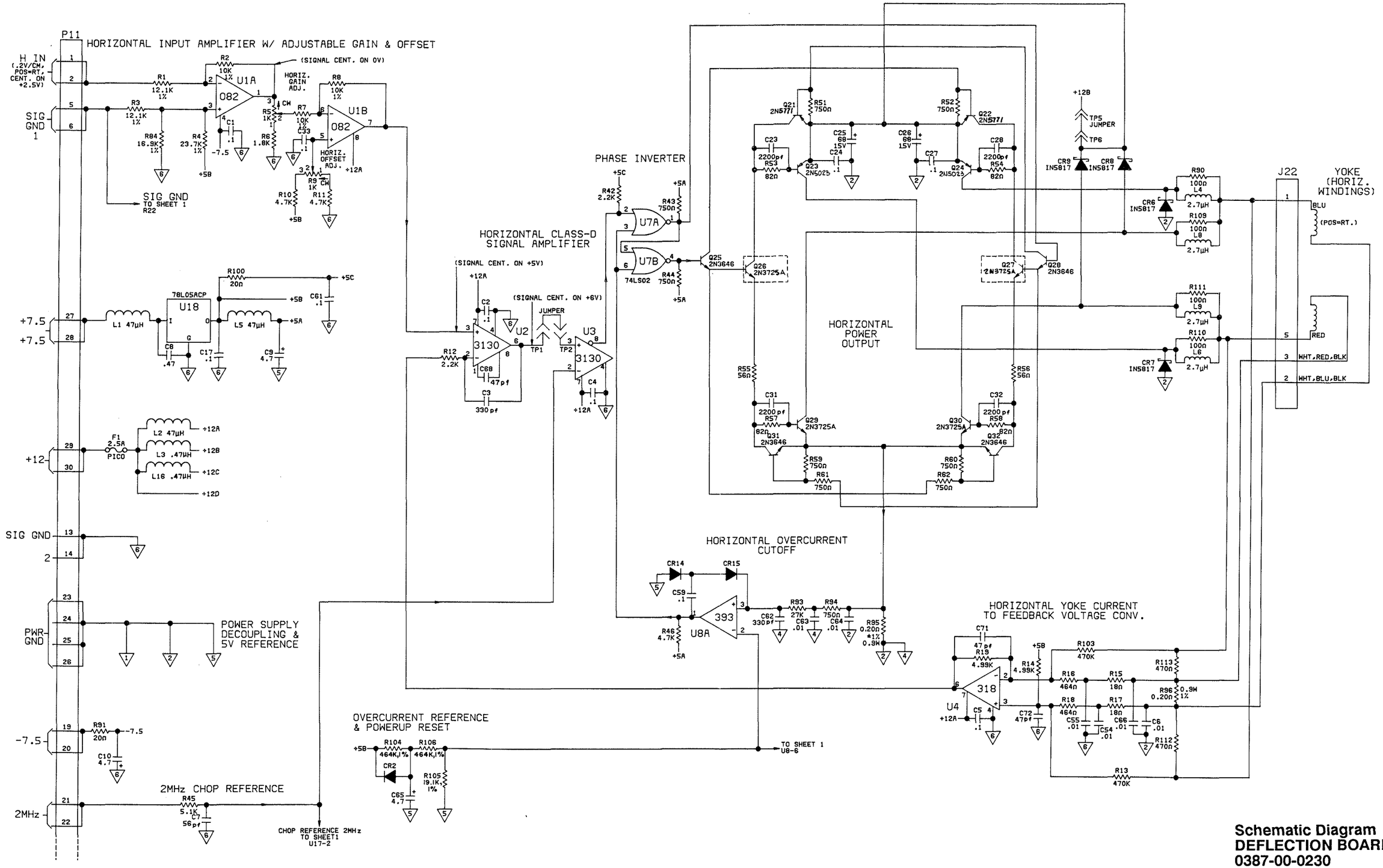
Schematic Diagram
REFRESH MEMORY BOARD
0387-00-0397
Sheet 3 of 3
Added 06/15/89



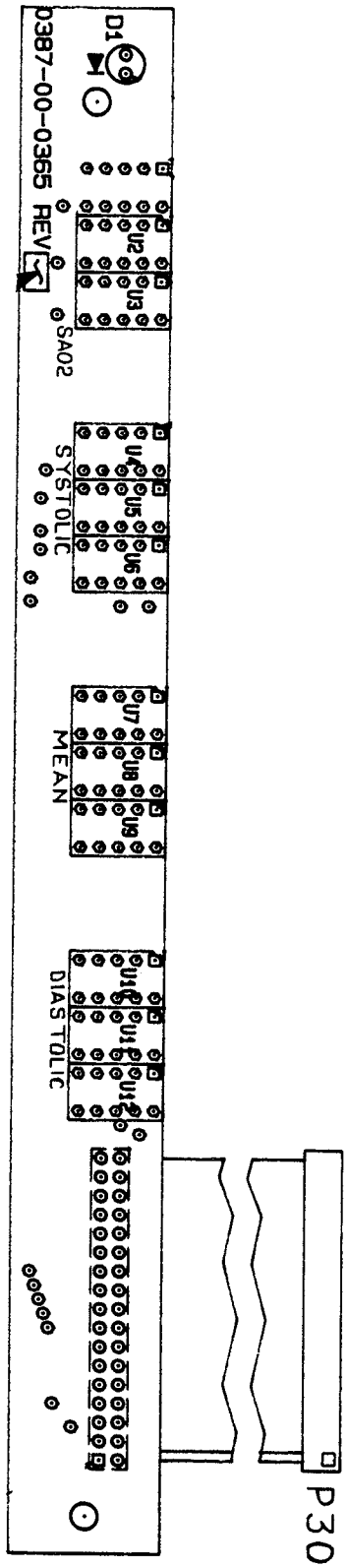
DEFLECTION BOARD
0670-00-0230

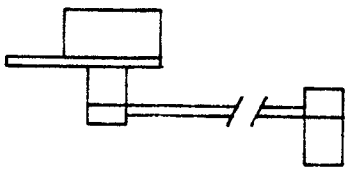


Schematic Diagram
DEFLECTION BOARD
0387-00-0230
Sheet 1 of 2

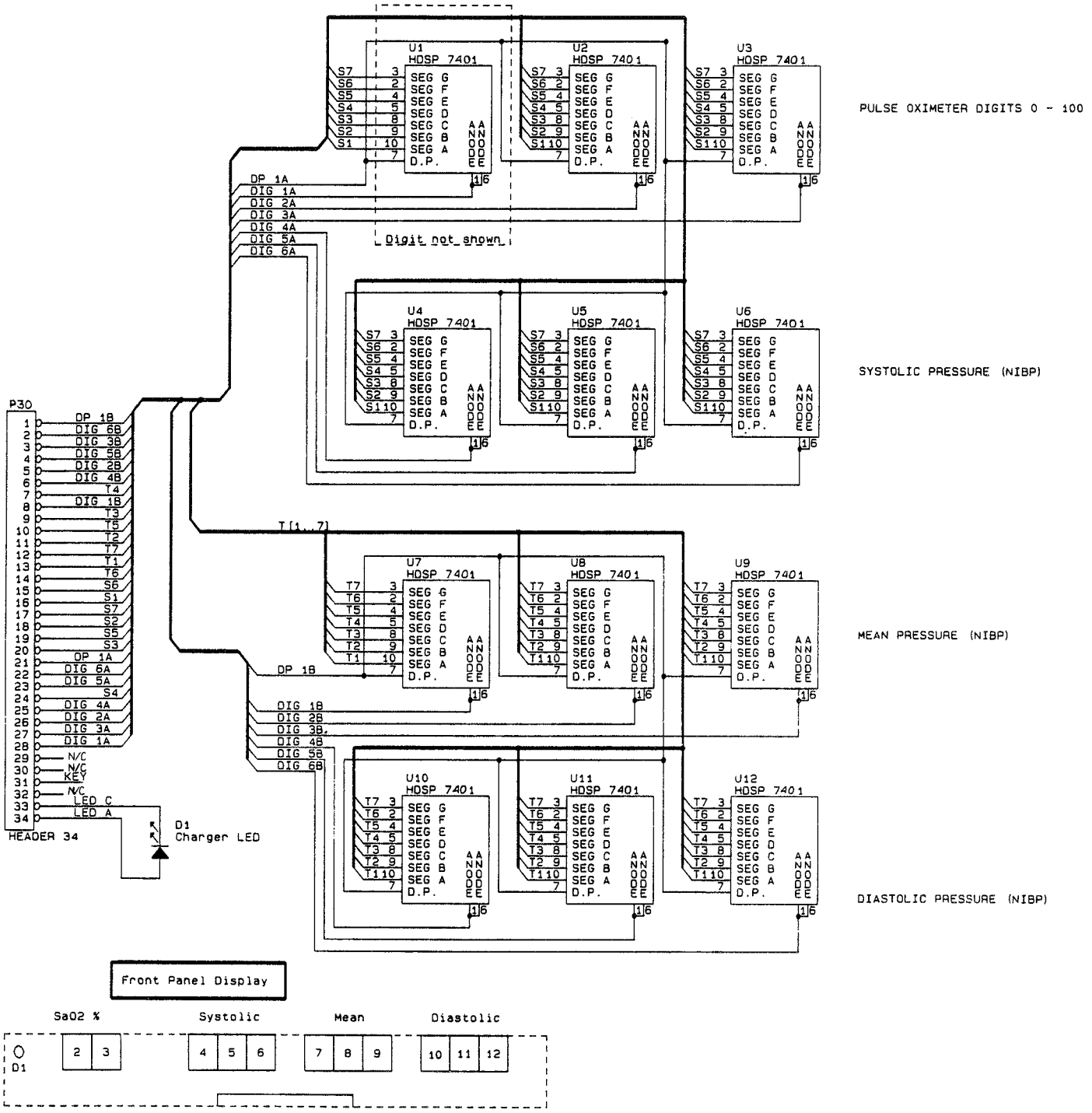


Schematic Diagram
DEFLECTION BOARD
0387-00-0230
Sheet 2 of 2

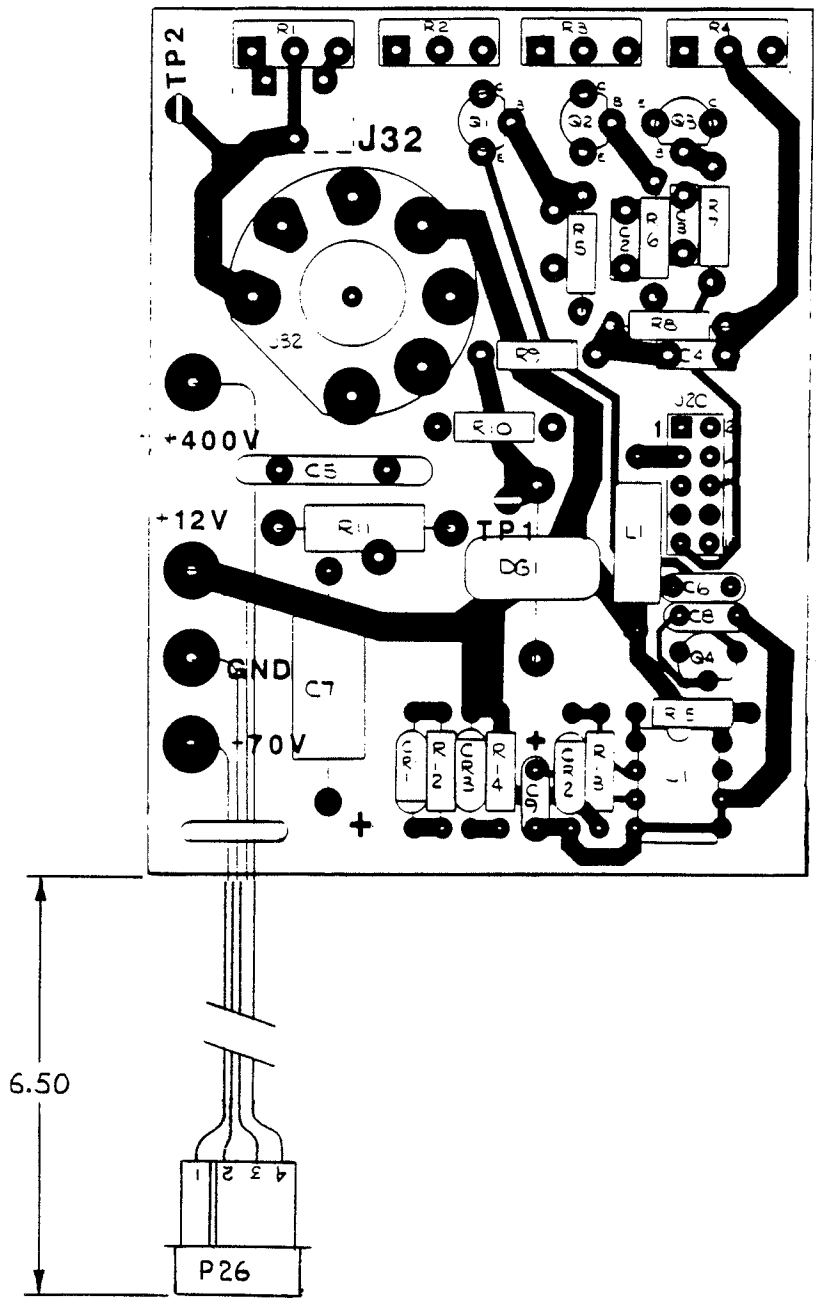




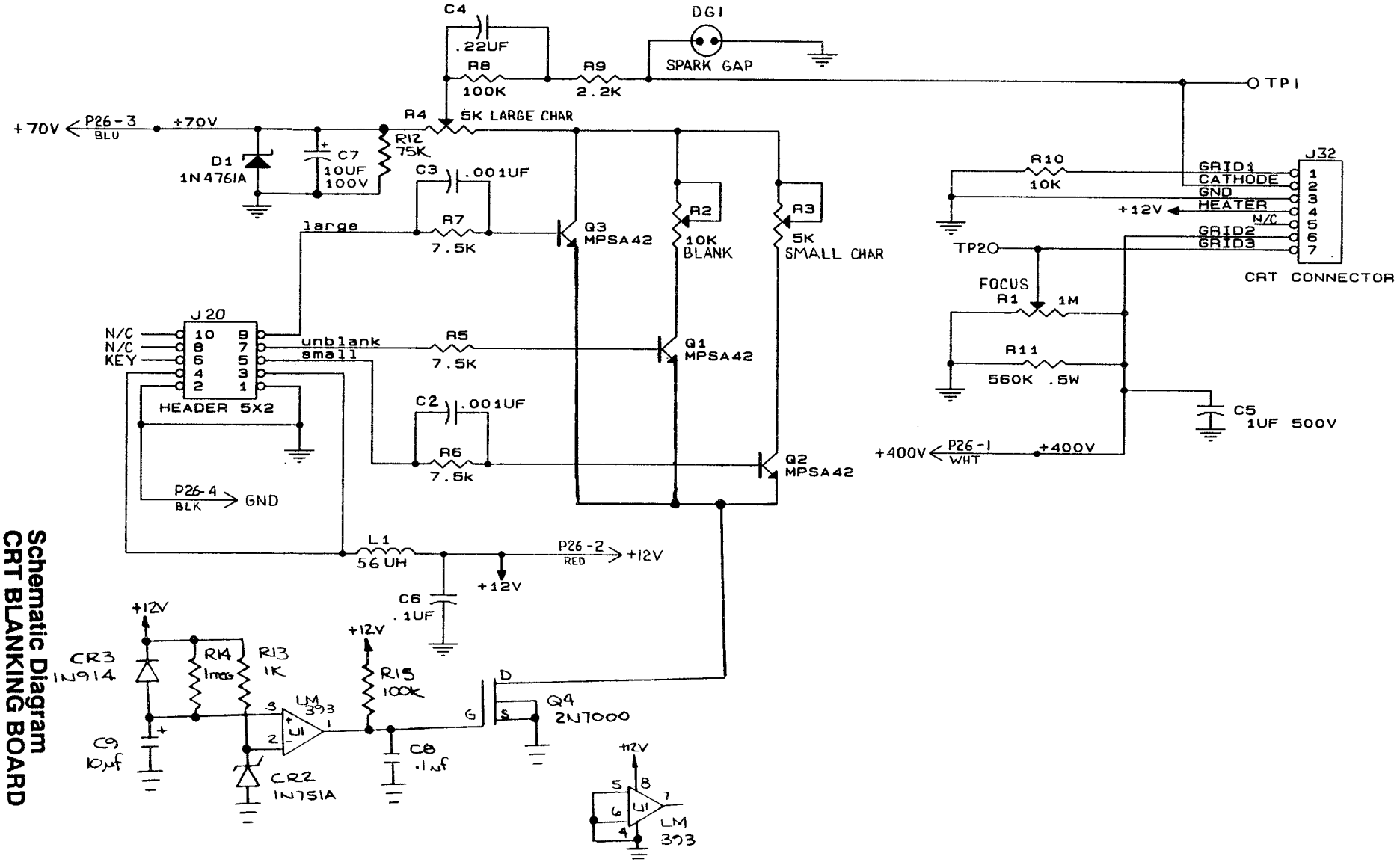
LED BOARD
0670-00-0365



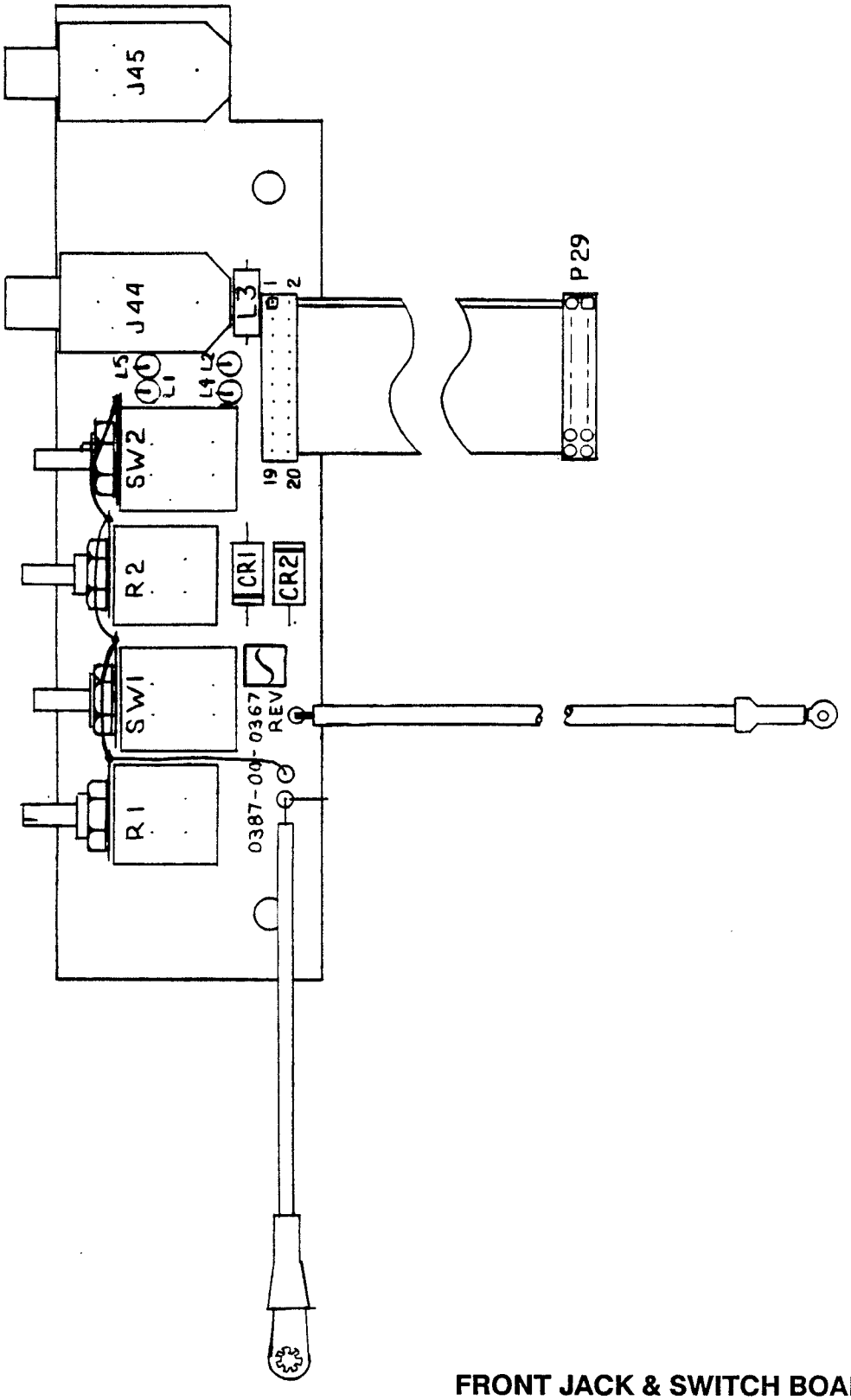
Schematic Diagram
LED BOARD
0387-00-0365
Sheet 1 of 1



CRT BLANKING BOARD
0670-00-0366
Revised 03/26/91

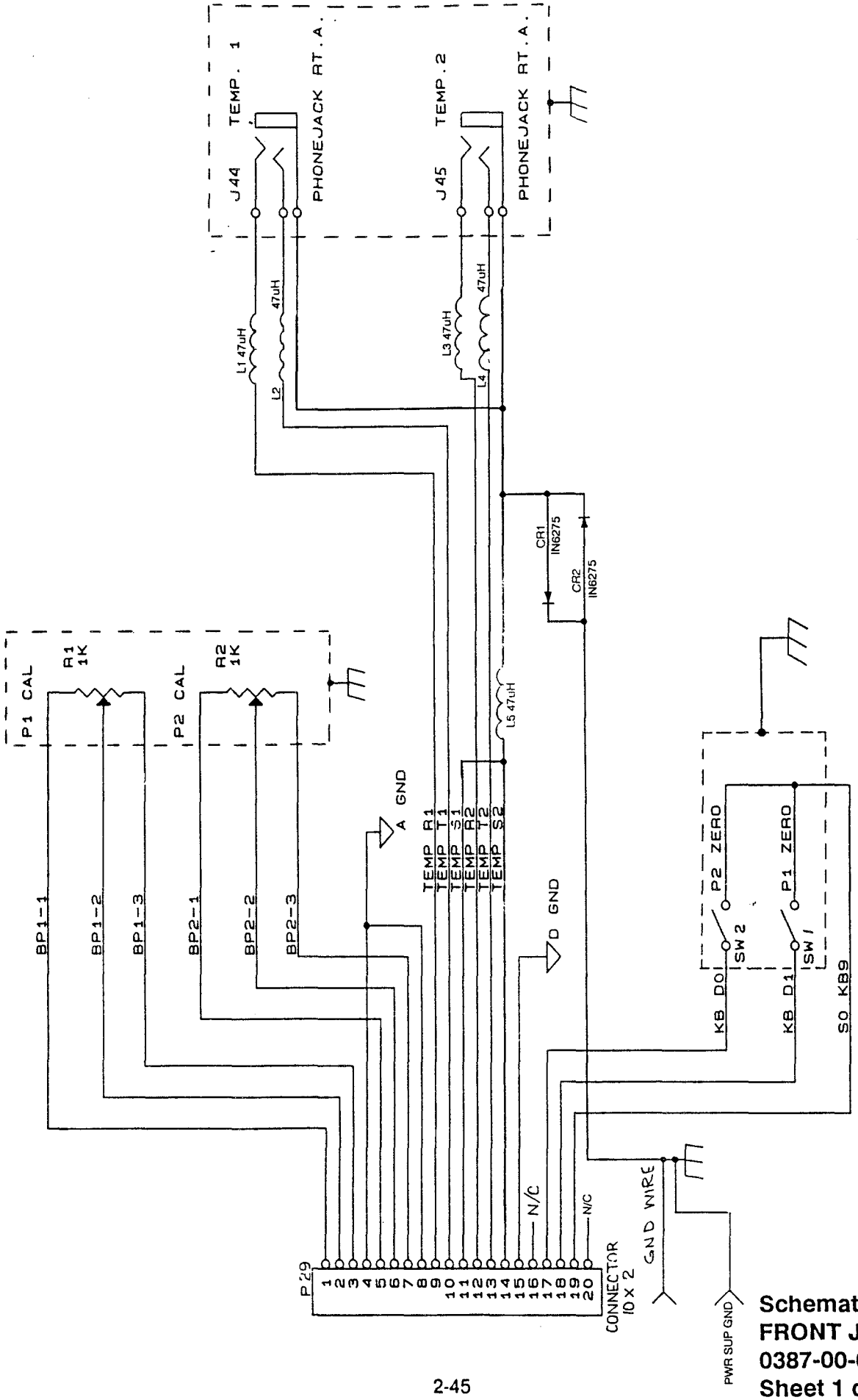


Schematic Diagram
CRT BLANKING BOARD
0387-00-0366
Sheet 1 of 1
Revised 03/26/91

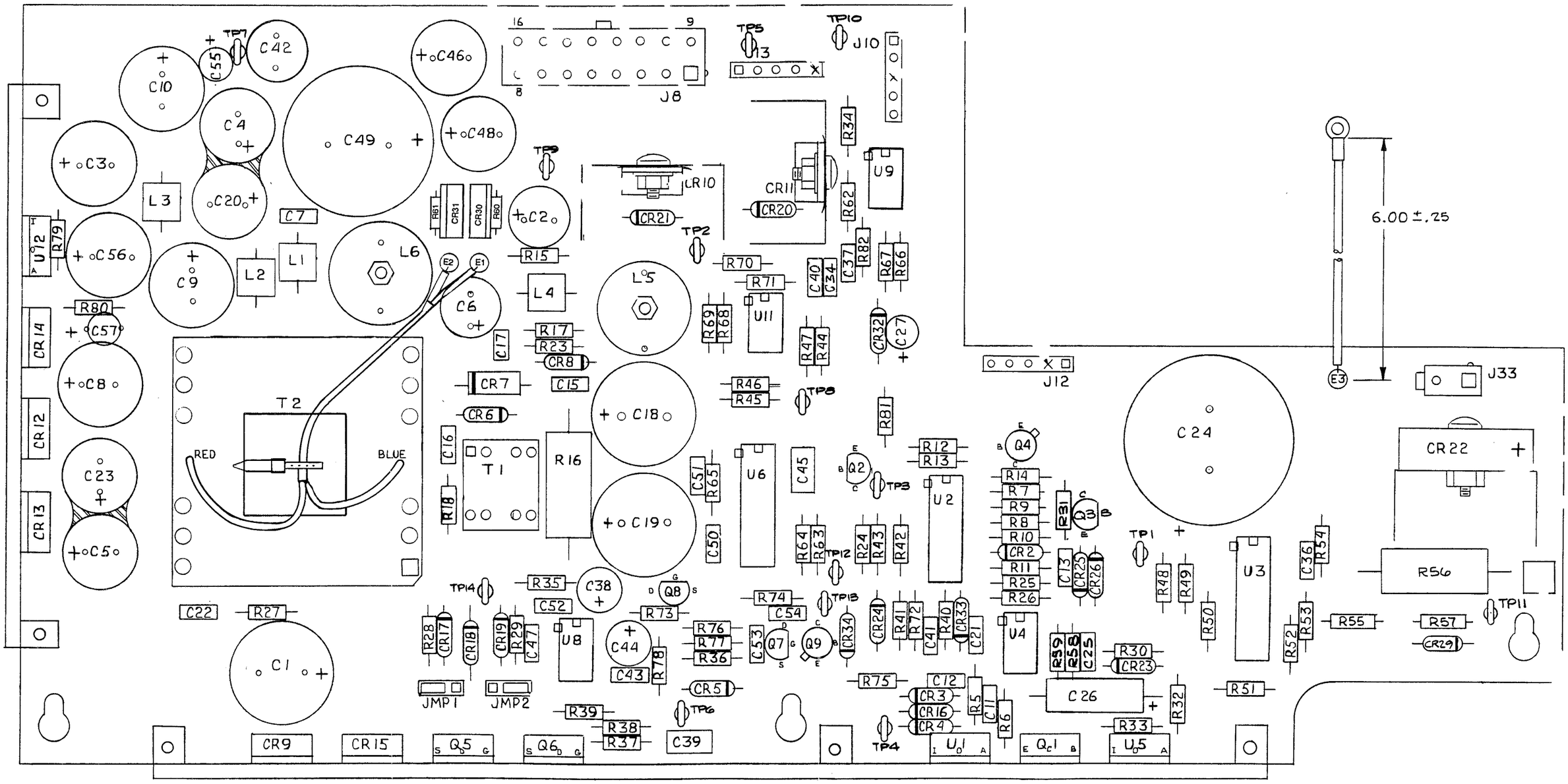


FRONT JACK & SWITCH BOARD
0670-00-0367

Revised 08/02/90

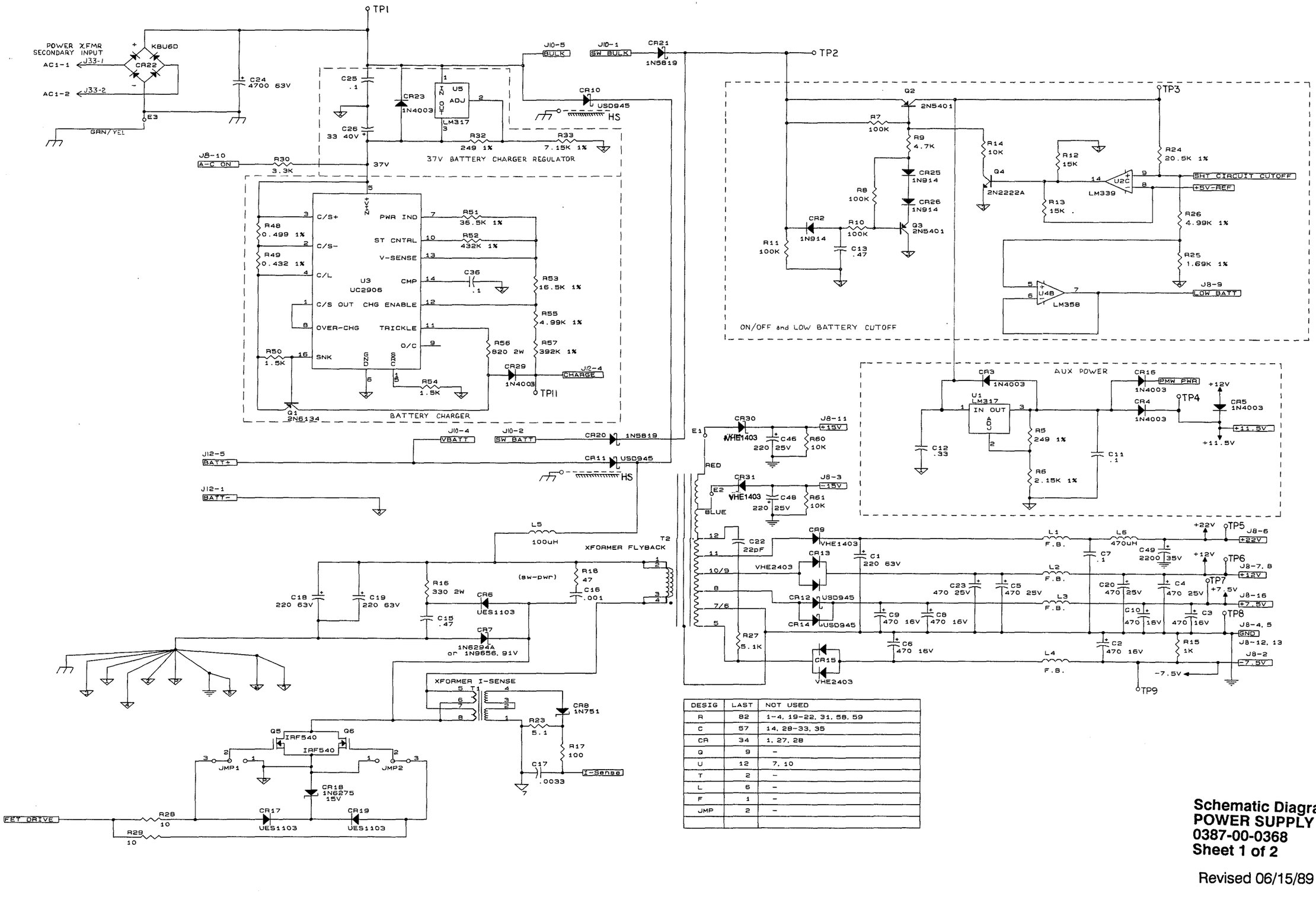


Schematic Diagram
FRONT JACK & SWITCH
0387-00-0367 BOARD
Sheet 1 of 1
Revised 06/16/89



POWER SUPPLY BOARD
0670-00-0368

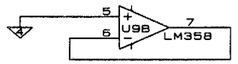
Revised 09/08/89

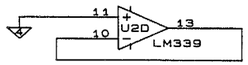


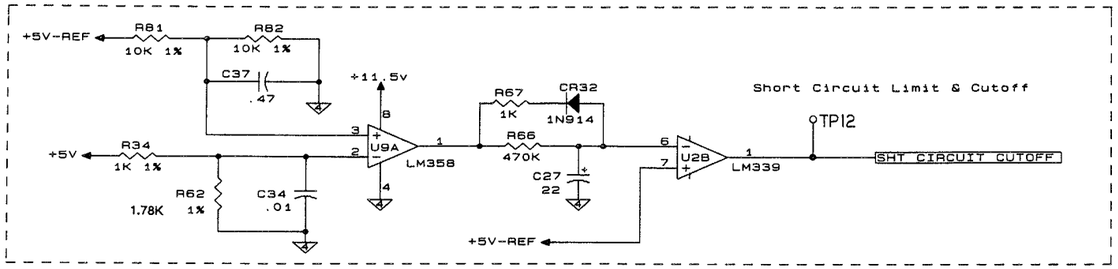
DESIG	LAST	NOT USED
R	82	1-4, 19-22, 31, 58, 59
C	57	14, 28-33, 35
CR	34	1, 27, 28
Q	9	-
U	12	7, 10
T	2	-
L	6	-
F	1	-
JMP	2	-

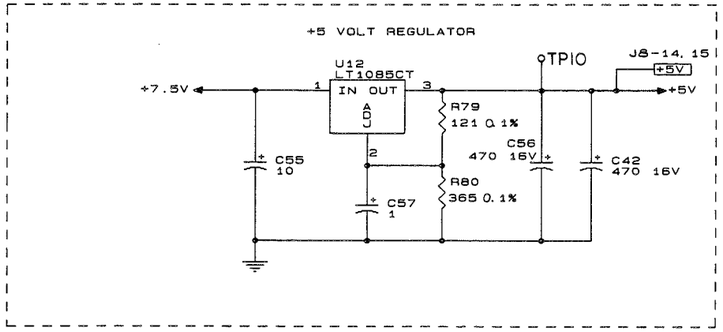
Schematic Diagram
POWER SUPPLY BOARD
0387-00-0368
Sheet 1 of 2

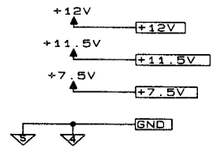
Revised 06/15/89

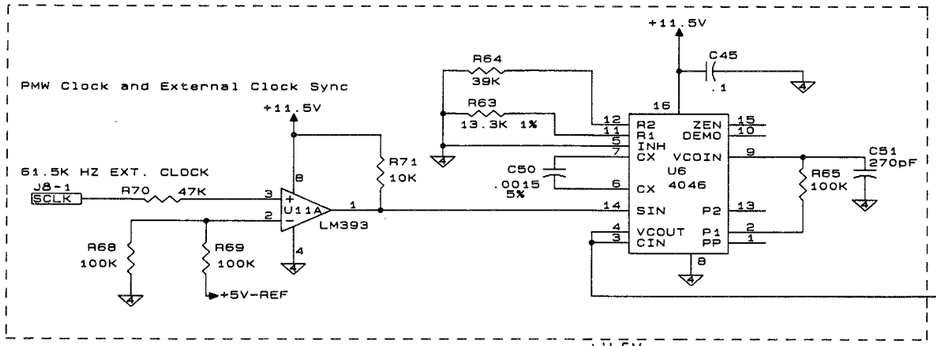


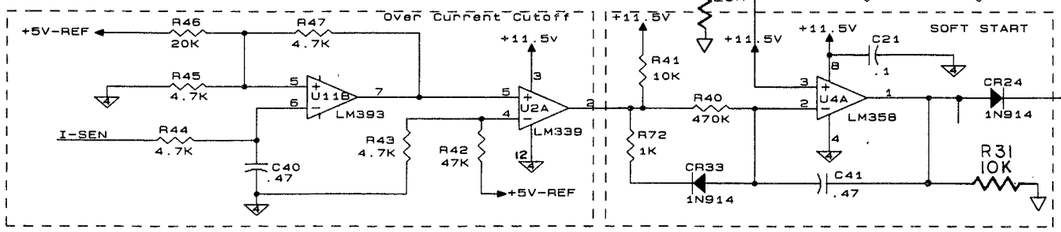


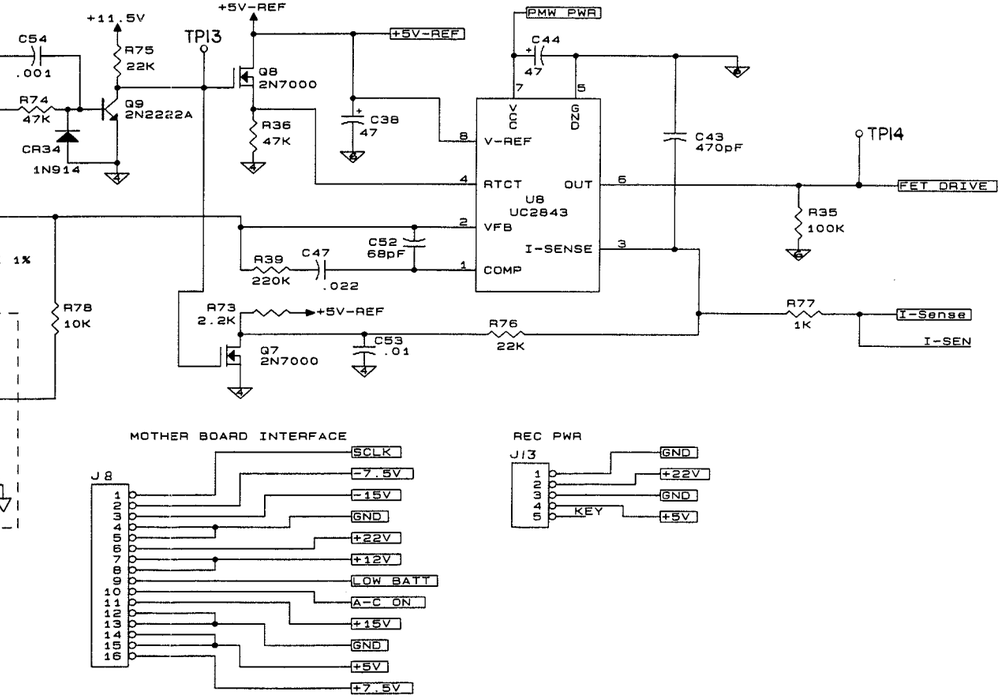


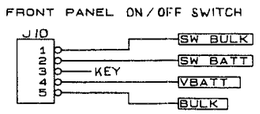


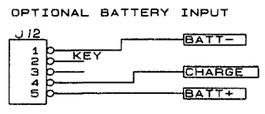






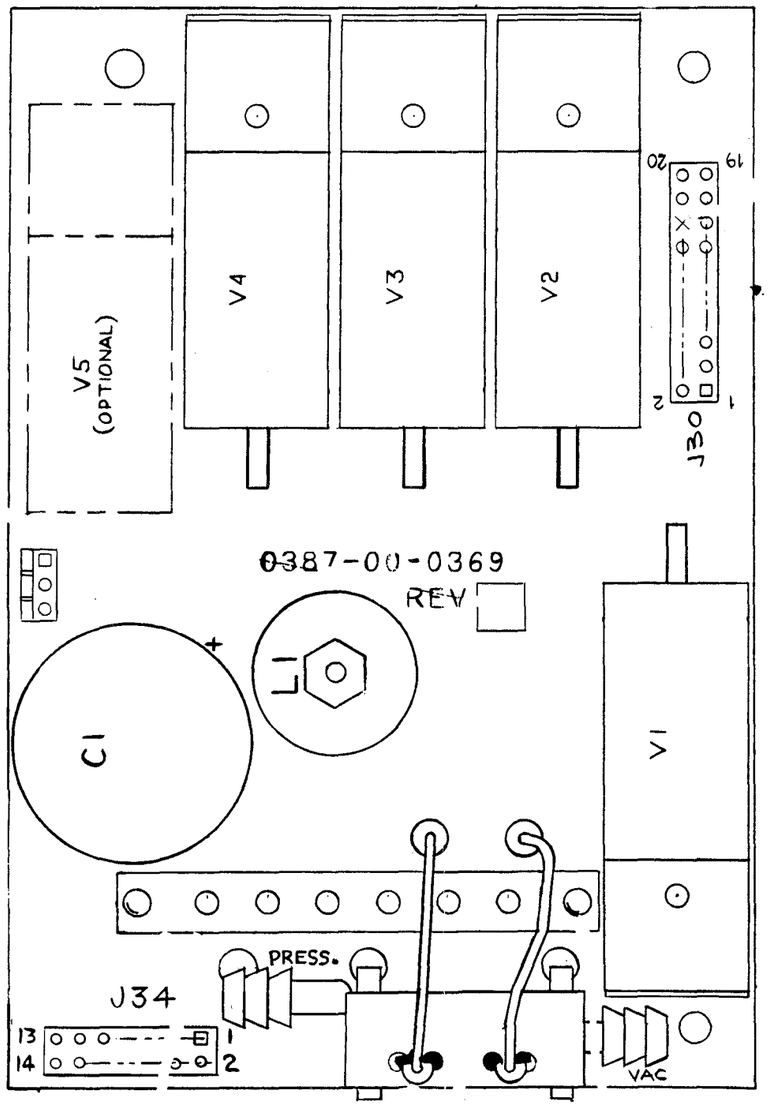






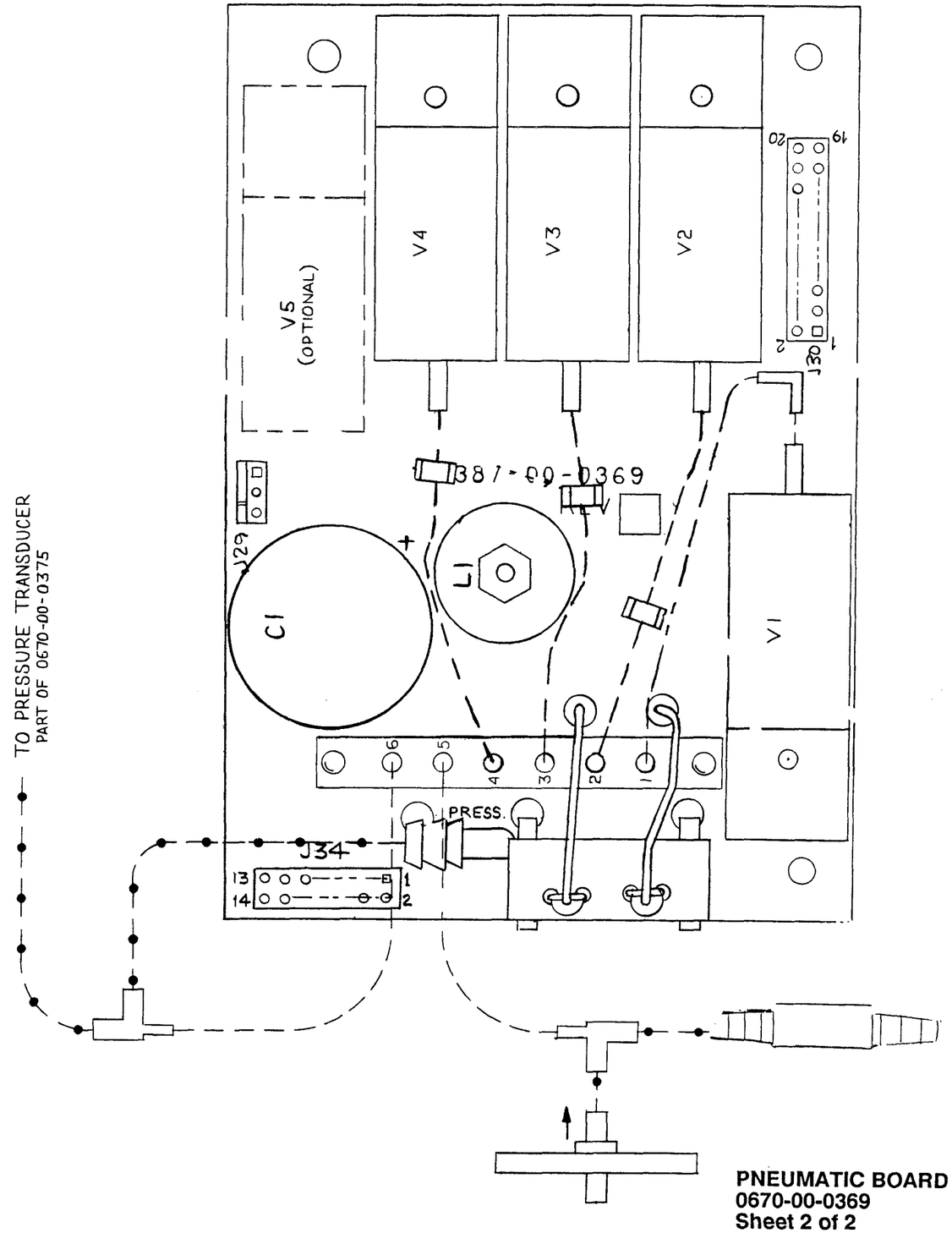
Schematic Diagram
POWER SUPPLY BOARD
0387-00-0368
Sheet 2 of 2

Revised 06/15/89

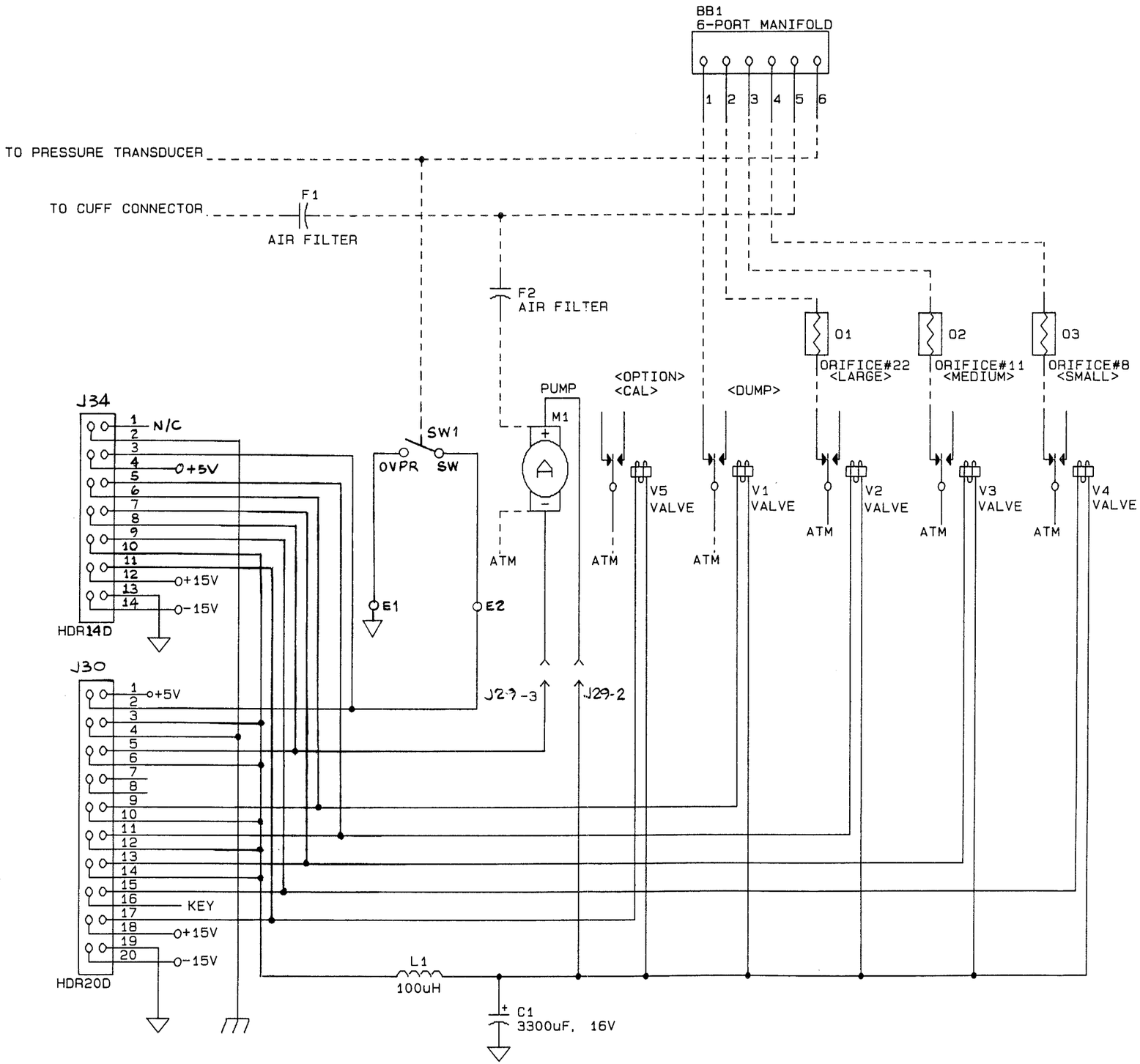


PNEUMATIC BOARD
0670-00-0369
Sheet 1 of 2

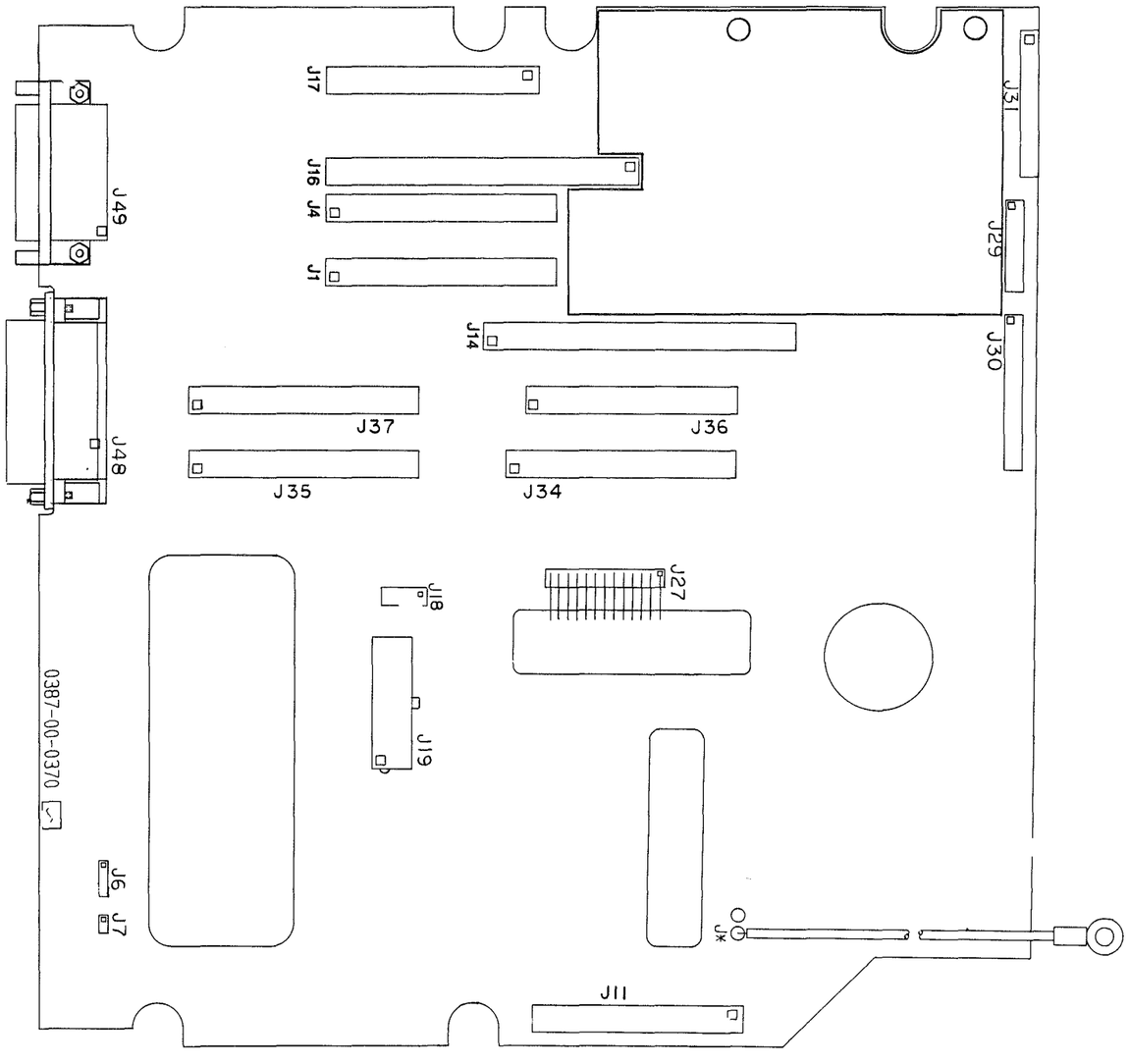
TO PRESSURE TRANSDUCER
PART OF 0670-00-0375



PNEUMATIC BOARD
0670-00-0369
Sheet 2 of 2
Revised 07/15/91



Schematic Diagram
PNEUMATIC BOARD
0387-00-0369
Sheet 1 of 1
Revised 11/16/89



MOTHER BOARD
0670-00-0370
Revised 08/08/89

DEFLECTION
J11
1 HORIZ
2 HORIZ
3
4
5 SIG GND
6 SIG GND
7
8
9 VERT
10 VERT
11
12
13 D4 GND
14 D4 GND
15
16
17
18
19 -7.5V
20 -7.5V
21 2MHZ
22 2MHZ
23 GND
24 GND
25 GND
26 GND
27 +7.5V
28 +7.5V
29 +12V
30 +12V
CONNECTOR RB30

DSP/CG-1
J35
1 D1 GND
2 D1 GND
3 MCLK
4 2MHZ
5 +5V
6 +5V
7 RESET\
8 TXD HS1
9 RXD HS1
10 RTS HS1
11 CTS HS1
12 TXD HS2
13 RXD HS2
14 TXD HS3
15 RXD HS3
16 TXD HS4
17 RXD HS4
18 RTS HS4
19 CTS HS4
20 CTS HS2
21 RTS HS2
22 CTS HS3
23 RTS HS3
24
25 REC DEL
26 REC REL
27 CCLK
28 CAL
29 TRACE3 DSP
30 TRACE SPD
31 P5-0
32 P4-0
33 P5-1
34 P4-1
35 P5-2
36 P4-2
37 P5-3
38 P4-3
39 P5-4
40 P4-4
41 P4-5
42 P4-6
43 P4-7
44 ADRB
45 ADRA
46 ADRB
47 ADRC
48 ADRF
49 +12V
50 +12V
CONNECTOR RB50S

TREND/RECORDER/1
J37
1 D1 GND
2 D1 GND
3
4 RESET\
5 ECG DIR
6 ECG DELAY
7 BP1 RM
8 BP2 RM
9 CO2 IN
10 PLSOUT
11 ECG RM
12 TXD HS2
13 RXD HS2
14 RTS HS2
15 CTS HS2
16
17
18
19
20 S7
21 S6
22 S5
23 S4
24 S3
25 S2
26 S1
27 DP 1A
28 DIG 1A
29 DIG 6A
30 DIG 5A
31 DIG 4A
32 DIG 3A
33 DIG 2A
34 DIG 1A
35 T7
36 T6
37 T5
38 T4
39 T3
40 T2
41 T1
42 DP 1B
43 DIG 1B
44 DIG 2B
45 DIG 3B
46 DIG 4B
47 DIG 5B
48
49
50
CONNECTOR RB50S

REFRESH MEMORY
J14
1 D1 GND
2 D1 GND
3 MCLK
4 ECG DELAY
5 +5V
6 +7.5V
7
8
9 DS2
10 TRACE SPD
11
12 DS0
13
14 SCLK
15 PB-0
16 P4-0
17 PB-1
18 P4-1
19 P5-2
20 PB-2
21 P4-2
22 P4-3
23
24 P4-4
25
26 P4-5
27
28 P4-6
29 VERT CONT
30 P4-7
31 RM RAMP
32
33 RM DAC
34
35 VERT
36 UNBLANK
37 TREND MD\
38 BP1 RM
39 ECG RM
40 TRACE3 DSP
41 -7.5V
42 -7.5V
43 A3 GND
44 A3 GND
CONNECTOR RB44

SAO2
J1
1
2 CLKSEQ
3
4
5
6 D7
7
8 D6
9
10 D5
11
12 D4
13
14 D3
15
16 D2
17
18 D1
19
20 D0
21
22
23
24 APOUT 2M
25
26 APOUT 1M
27
28 APOUT 0M
29
30 COMPOUT*
31
32 INTERF*
33
34
35
36
37
38 +15V
39
40 A2 GND
41
42 -15V
43
44
45
46
47
48 +5V
49
50 D2 GND
CONNECTOR RB50S

SAO2
J4
1
2 CLKSEQ
3 RTS HS3
4 PLSOUT
5 D7
6
7 D6
8
9 D5
10
11 D4
12
13 D3
14 CO2 IN
15 D2
16 A2 GND
17 D1
18
19 D0
20 SERIAL
21 CTS HS3
22 D2 GND
23 APOUT 2M
24 RXD HS3
25 APOUT 1M
26 TXD HS3
27 APOUT 0M
28
29 COMPOUT*
30
31 INTERF*
32
33
34
35
36 RESET\
37 +15V
38 +15V
39 A2 GND
40 A2 GND
41 -15V
42 -15V
43
44
45 BEEP
46 RESET\
47 +5V
48 +5V
49 D2 GND
50 D2 GND
CONNECTOR RB50S

BP
J16
1 D3 GND
2 D3 GND
3
4
5 +7.5V
6 +7.5V
7 ADRF
8 BP2 REC
9 PULSE\
10 CAL
11 SCLK
12 SCLK
13 CCLK
14 CCLK
15 P4-0
16 P4-0
17 P4-1
18 P4-1
19 P4-2
20 P4-2
21 P4-3
22 P4-3
23 P4-4
24 P4-4
25 P4-5
26 BP1-1
27 ADRB
28 P4-6
29 ADRB
30 P4-7
31 BP2 AP
32 BP1-2
33 ADRB
34 BP1-3
35 BP1 AP
36 BP2-1
37 BP1 RM
38 BP2-2
39 BP2 RM
40 BP2-3
41 -7.5V
42 BP1 REC
43 A1 GND
44 A1 GND
CONNECTOR RB44

ECG
J17
1 D3 GND
2 D3 GND
3 +7.5V
4 ECG DIR
5 SCLK
6
7 CCLK
8
9
10 P4-0
11
12 P4-1
13
14 P4-2
15
16 P4-3
17 ADRC
18 P4-4
19
20 P4-5
21
22 P4-6
23
24 P4-7
25 ECG RM
26 CAL
27 ECG HR
28 -7.5V
29 A1 GND
30 A1 GND
CONNECTOR RB30

POWER INPUT
J19
GND
D1 GND
D2 GND
D3 GND
D4 GND
AUDIO GND
SCLK
-7.5V
-15V
D GND
D GND
+22V
+12V
+12V
LOW BAT
A-C ON
+15V
ANALOG GND
PWR GND
+5V
+5V
+7.5V
A1 GND
A2 GND
A3 GND
A4 GND
MOLEX 8X2
(0131-28-0016)

J7
SPEAKER
1 AUDIO
2 AUDIO GND
HEADER 2

J31
KEY BOARD
1 SO KBB
2 S1 KBA
3 S2 KBB
4 S3 KBC
5 KB D3
6 KB D2
7 KB D1
8 KB D0
9 KB D4
10 KB D5
11 KB D6
12 KB D7
13 OPT 0
14 OPT 1
15 OPT 2
16 CHASIS G
HEADER 16

J48
1 GND
13
2
14
3
15 REC REL
4 REC DEL
16 CO2 IN
5 PULSE\
17 TM REC
6 TM PRINT
18 ECG DELAY
7 PLSOUT
19
8
20 BP2 REC
9 SERIAL
21 GND
10 BP1 RM
22 BP1 REC
11 BP2 RM
23 ECG DIR
12 A1 GND
24 A1 GND
CONNECTOR IEEE 488
(0131-00-0165)

J18
PWR GND 1 2
+12V 3 4 KEY
SMALL 5 6
UNBLANK 7 8
LARGE 9 10
HEADER 5X2
BLANKING

J29
BP1-1 1 2 BP1-2
BP1-3 3 4 A1 GND
BP2-1 5 6 BP2-2
BP2-3 7 8 A1 GND
TEMP R1 9 10 TEMP T1
TEMP S1 11 12 TEMP R2
TEMP T2 13 14 TEMP S2
D GND 15 16
KB D3 17 18 KB D2
SO KB9 19 20 CHASIS G
HEADER 10X2
JACK BD

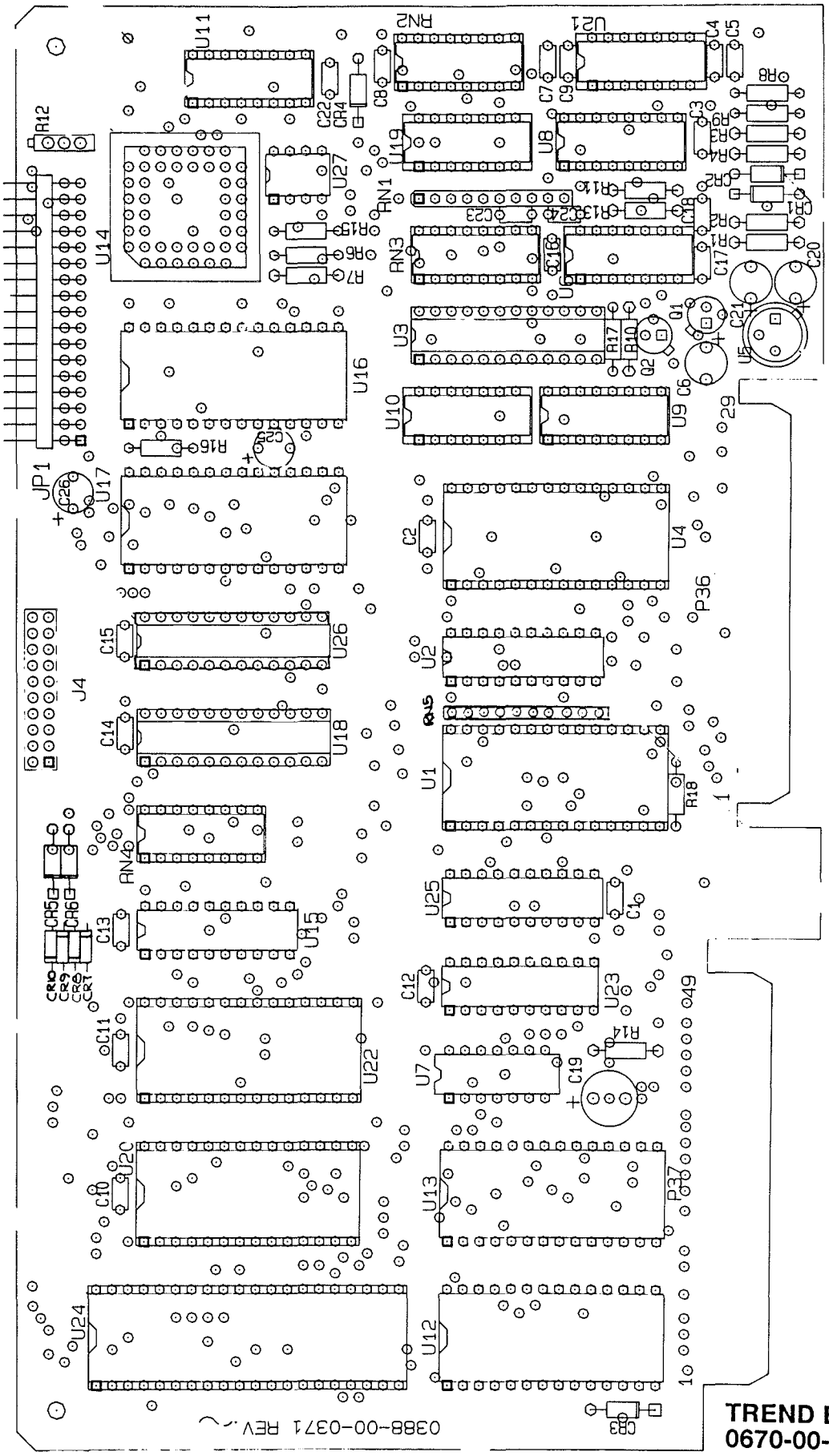
J6
1 FAN
2 +12V
3 PWR GND
4 KEY
FAIL
HEADER 4

J27
GND 1 2 ECG HR
TXD HS1 3 4 SERIAL
RXD HS1 5 6
RTS HS1 7 8 RESET\
CTS HS1 9 10 GND
11 12
GND 13 14 GND
+5V 15 16 +5V
PWR GND 17 18 PWR GND
+12V 19 20 +12V
+15V 21 22 +15V
A4 GND 23 24 A4 GND
-15V 25 26 -15V
HEADER 13X2
NIBP

J30
1 DP 1B
2 DIG 6B
3 DIG 3B
4 DIG 5B
5 DIG 2B
6 DIG 4B
7 DIG 1B
8 T3
9 T2
10 T1
11 T7
12 T6
13 T5
14 T4
15 S6
16 S5
17 S7
18 S4
19 S3
20 S2
21 DP 1A
22 DIG 6A
23 DIG 5A
24 S1
25 DIG 4A
26 DIG 2A
27 DIG 3A
28 DIG 1A
29
30 KEY
31 B-ALARM
32 GND
33 A-C ON
34
HEADER 17X2
ONF

J49
1 CHASIS G
14
2 TXD HS4
15
3 RXD HS4
16
4 RTS HS4
17
5 CTS HS4
18
6
19
7 GND
20
8
21
9
22
10
23
11
24
12
25
13
CONNECTOR DB25
(0131-00-0142)

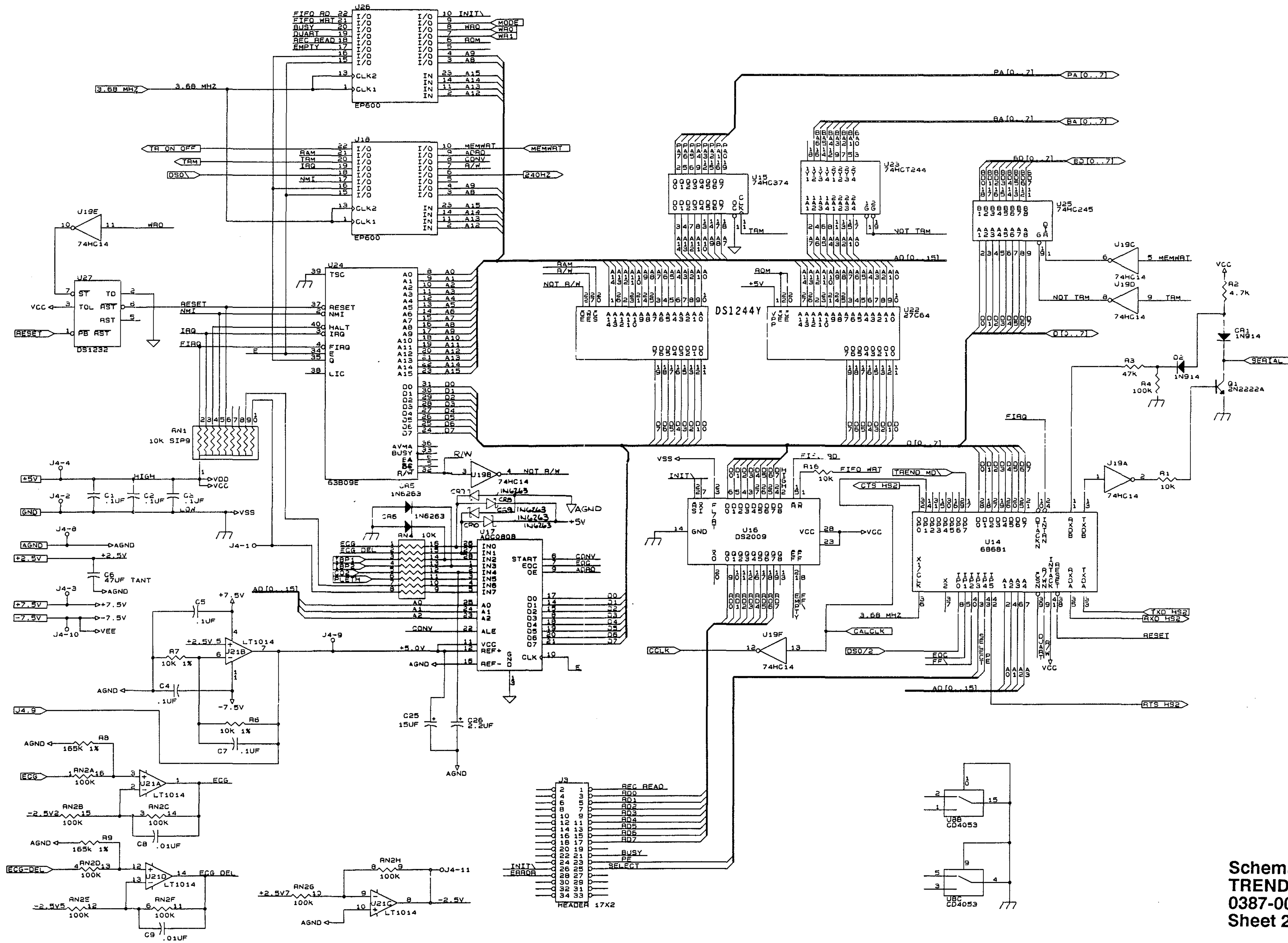
Schematic Diagram
MOTHER BOARD
0387-00-0370
Sheet 1 of 1
Revised 08/10/89



TREND BOARD
0670-00-0371
Revised 12/11/90

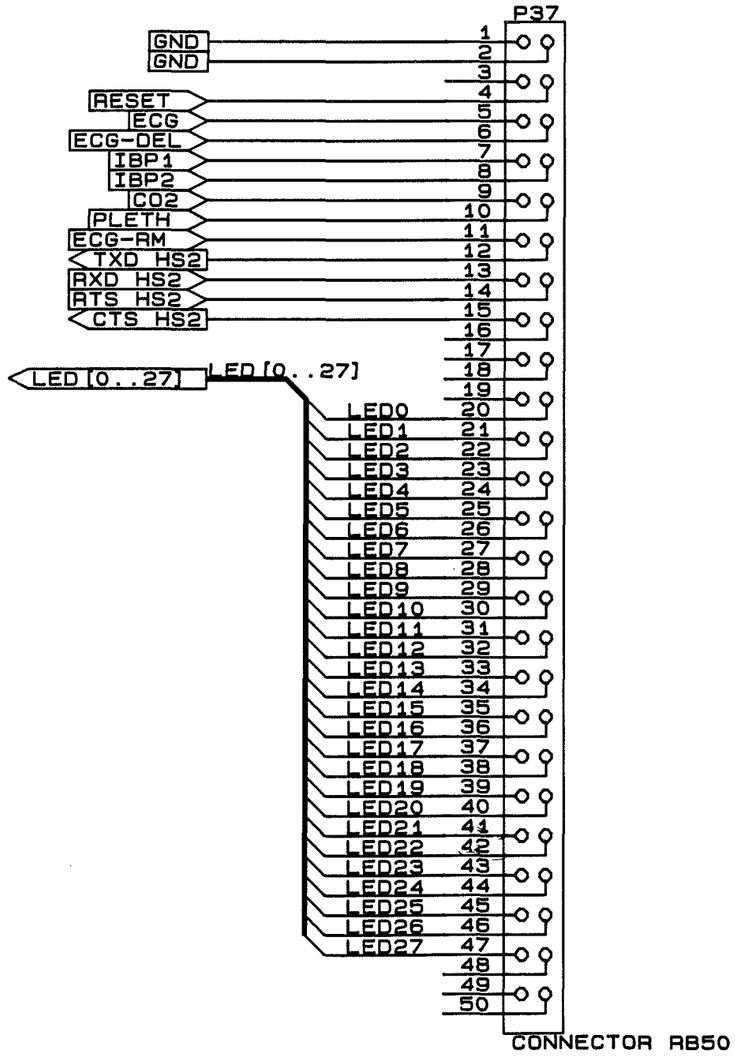
Schematic Diagram
TREND BOARD
0387-00-0371
Sheet 1 of 3

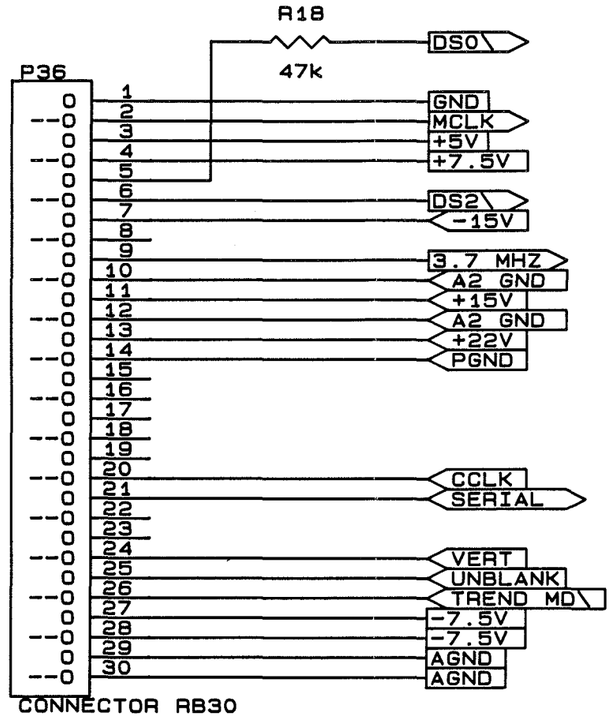
Revised 07/31/90



Schematic Diagram
TREND BOARD
0387-00-0371
Sheet 2 of 3

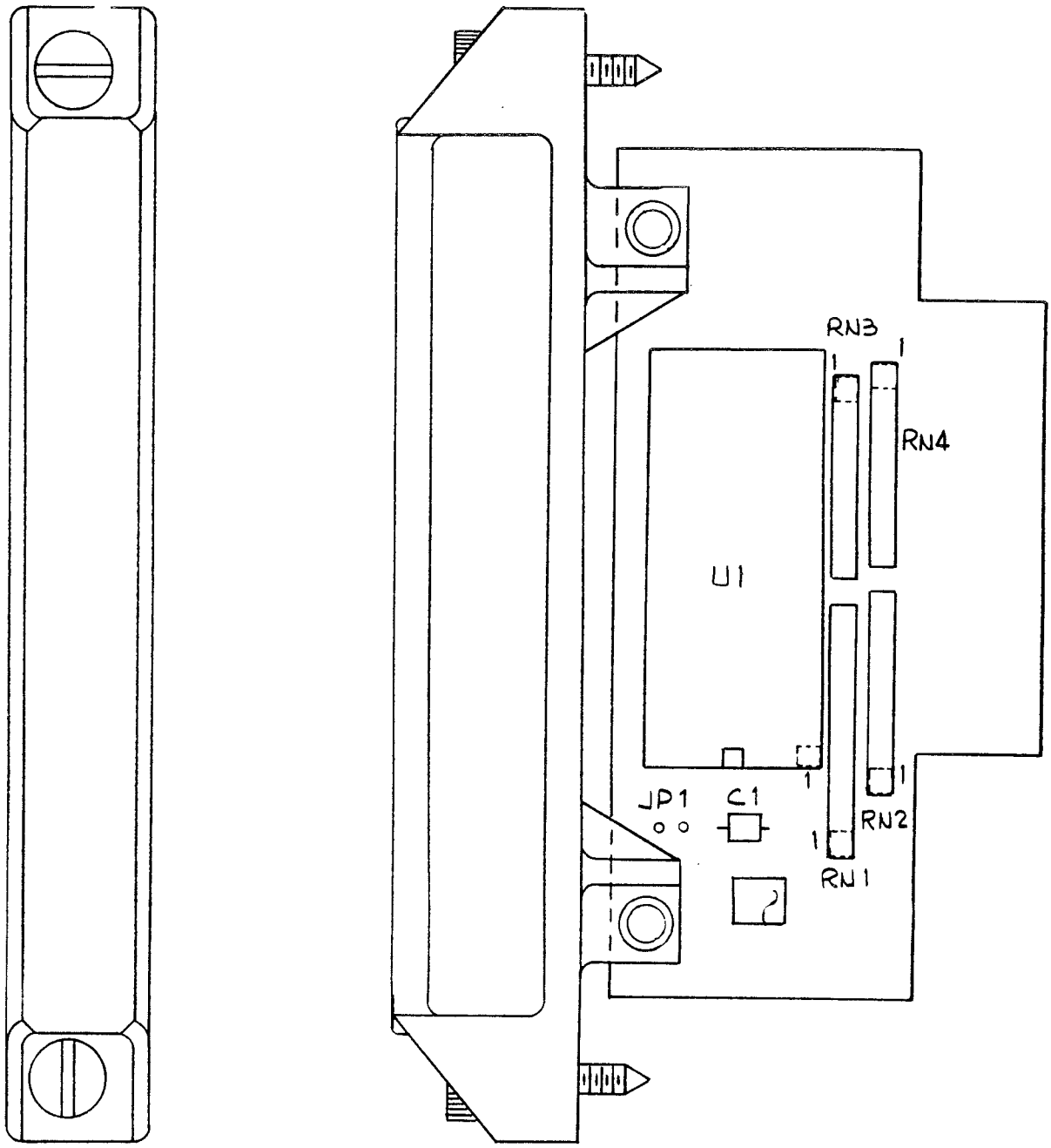
Revised 07/11/91



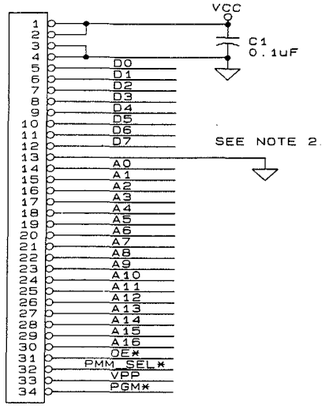


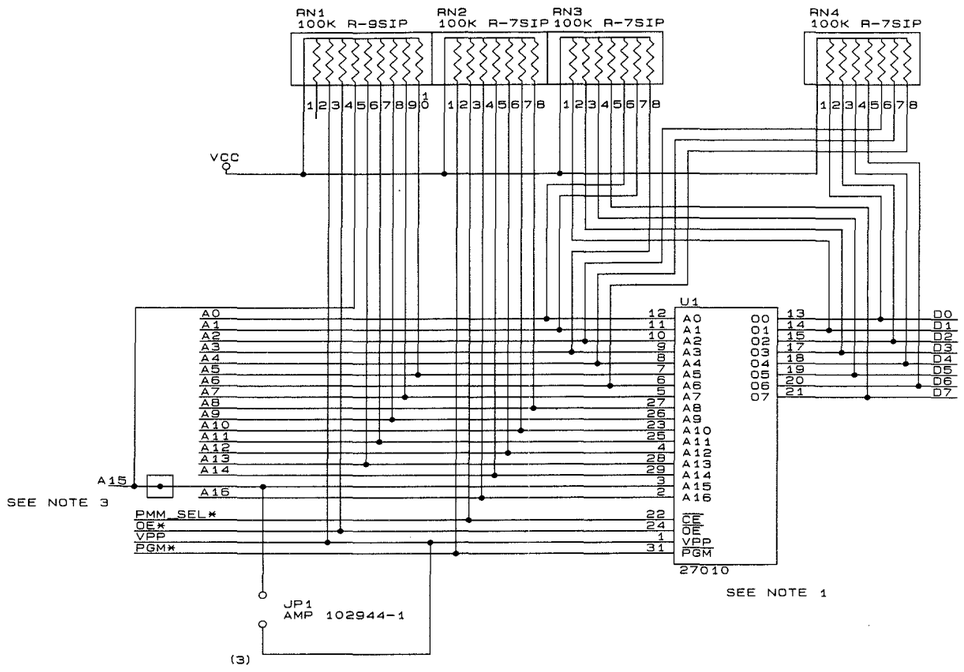
Schematic Diagram
TREND BOARD
0387-00-0371
Sheet 3 of 3

Revised 06/15/89



PMM BOARD
0670-00-0372
Revised 03/21/91





PIN CONFIGURATIONS

27512	27256
A15	VPP
A12	A12
A7	A7
A6	A6
A5	A5
A4	A4
A3	A3
A2	A2
A1	A1
A0	A0
O0	O0
O1	O1
O2	O2
GND	GND

27010

VPP	1	32	VCC
A16	2	31	PGM
A15	3	30	N/C
A12	4	29	A14
A7	5	28	A13
A6	6	27	A8
A5	7	26	A9
A4	8	25	A11
A3	9	24	OE
A2	10	23	A10
A1	11	22	CE
A0	12	21	O7
O0	13	20	O6
O1	14	19	O5
O2	15	18	O4
GND	16	17	O3

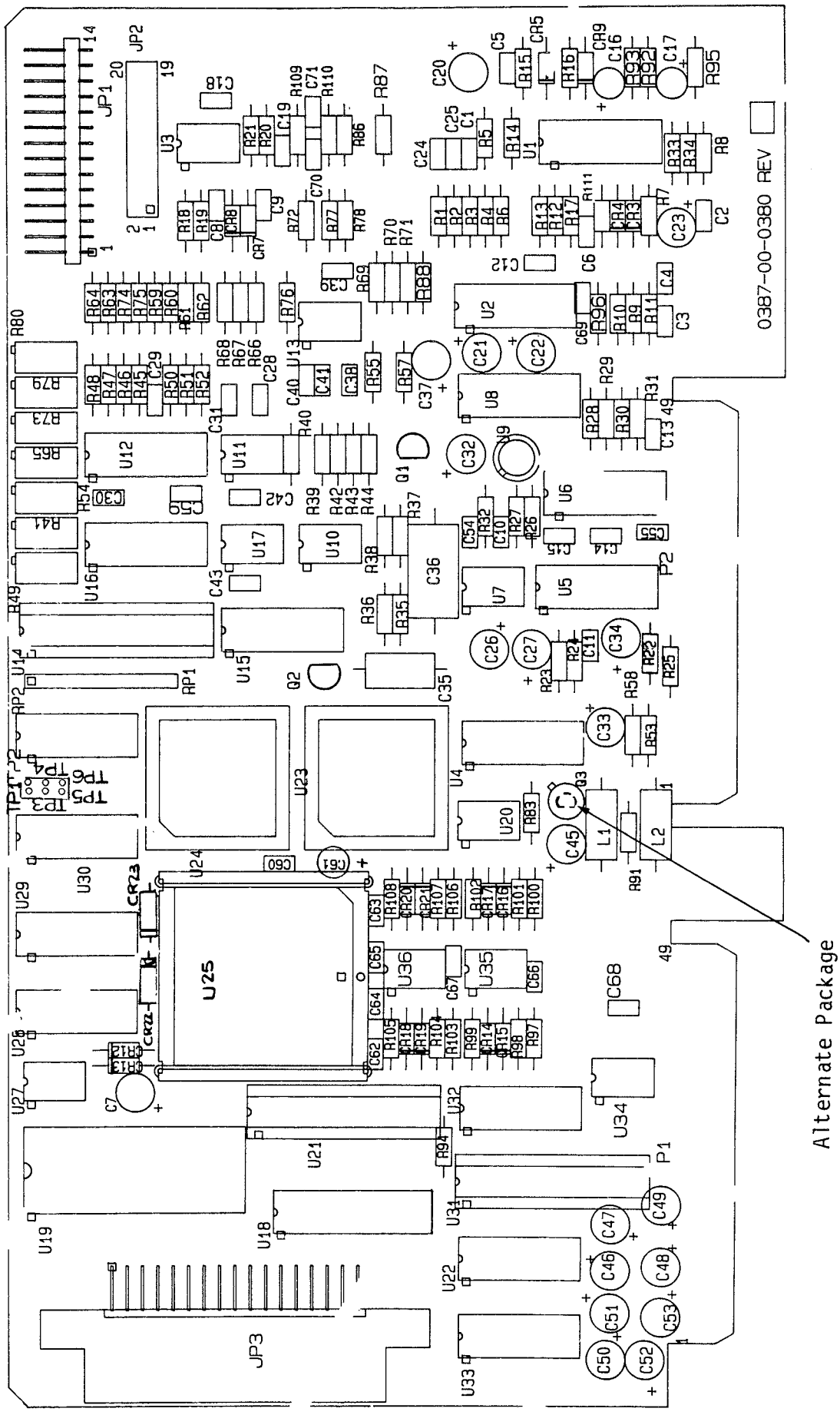
27256	27512
VCC	VCC
A14	A14
A13	A13
A8	A8
A9	A9
A11	A11
OE	OE/VPP
A10	A10
CE	CE
O7	O7
O6	O6
O5	O5
O4	O4
O3	O3

NOTES:

1. THIS 32 PIN JEDEC FOOTPRINT ACCOMODATES THE 28 PIN JEDEC FOOTPRINT BY PLACING THEM TWO (2) PINS DOWN SHIFTED. PIN 30 IS CONNECTED TO 32 (VCC).
2. MISSING / UNPLUGED PMM INDICATOR.
3. JP1: WHEN USING 2764, 27128 OR 27256, A PAD TO BE DRILLED IS PROVIDED ON A15.

Schematic Diagram
PMM BOARD
0387-00-0372
Sheet 1 of 1

Revised 03/13/90



HOST PROCESSOR BOARD
0670-00-0380
Revised 03/22/91

Host Microprocessor Board
Installed Options Table

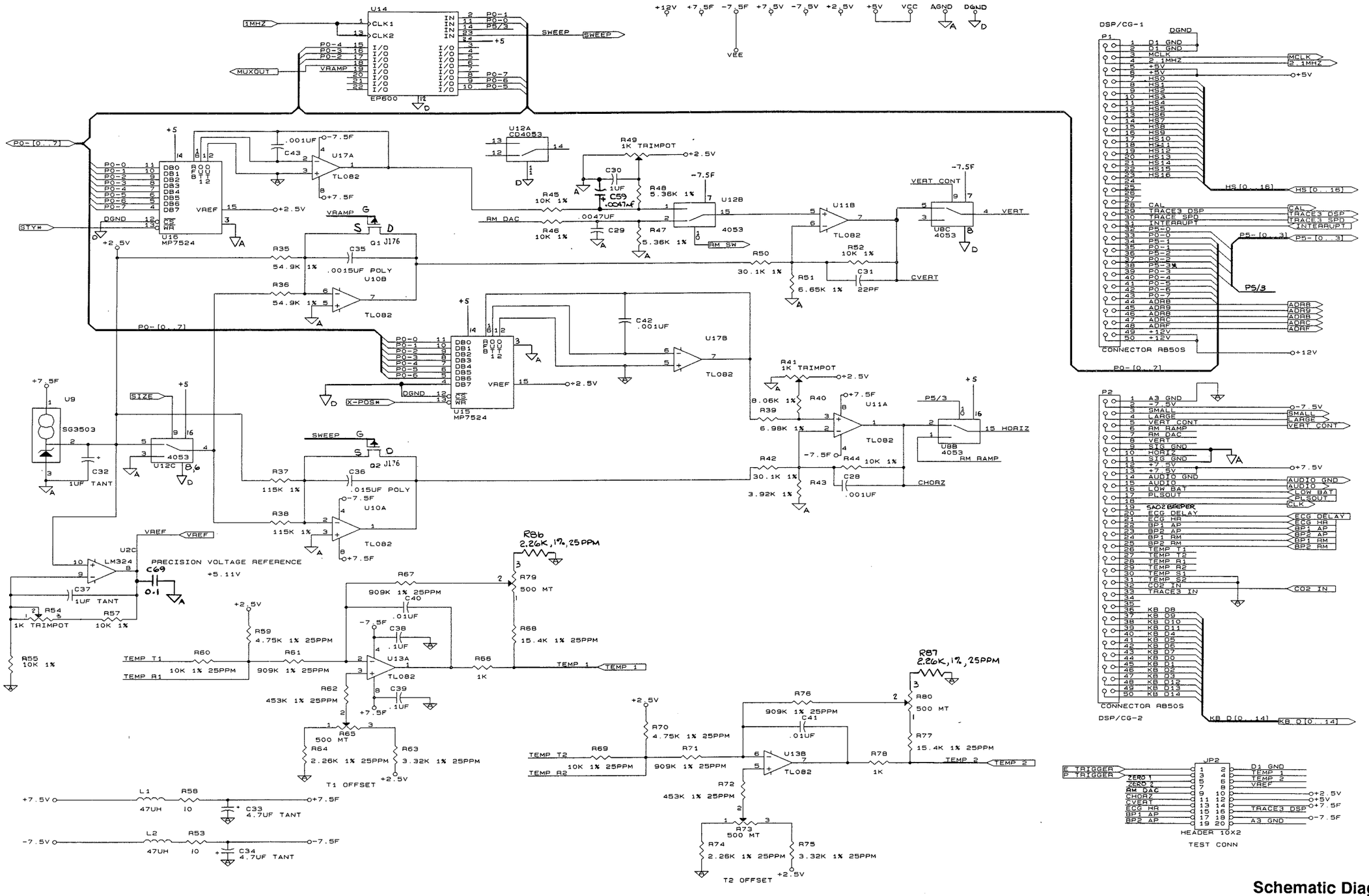
TP PINS		
1-2	3-4	5-6
NIBP	SaO_2	REC'D
X	X	-
-	X	-
-	-	-
-	-	-
X	X	X
-	X	X
-	-	X
-	-	X
X	-	-
X	-	-
-	X	-
X	-	X
X	-	X
-	X	X

NOTE: Position jumpers, supplied with PCB, across TP Pins as indicated by the X to recognize installed options.

SERIAL COMMUNICATION CHANNELS
CH1 ---- NIBP MODULE
CH2 ---- TREND PIB
CH3 ---- OXIMETER PIB
CH4 ---- EXTERNAL

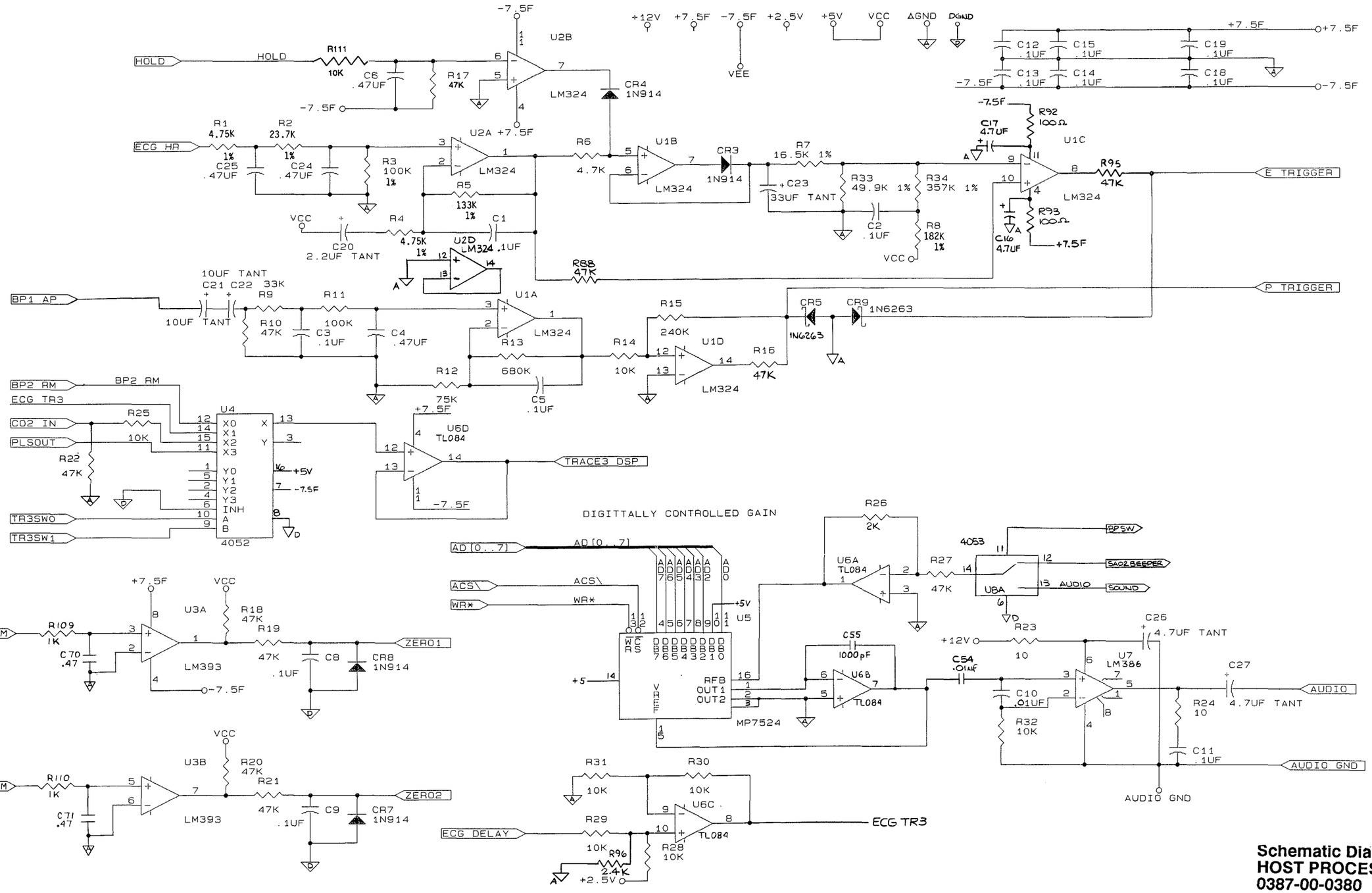
Schematic Diagram
HOST PROCESSOR BOARD
0387-00-0380
Sheet 1 of 3

Revised 07/11/91



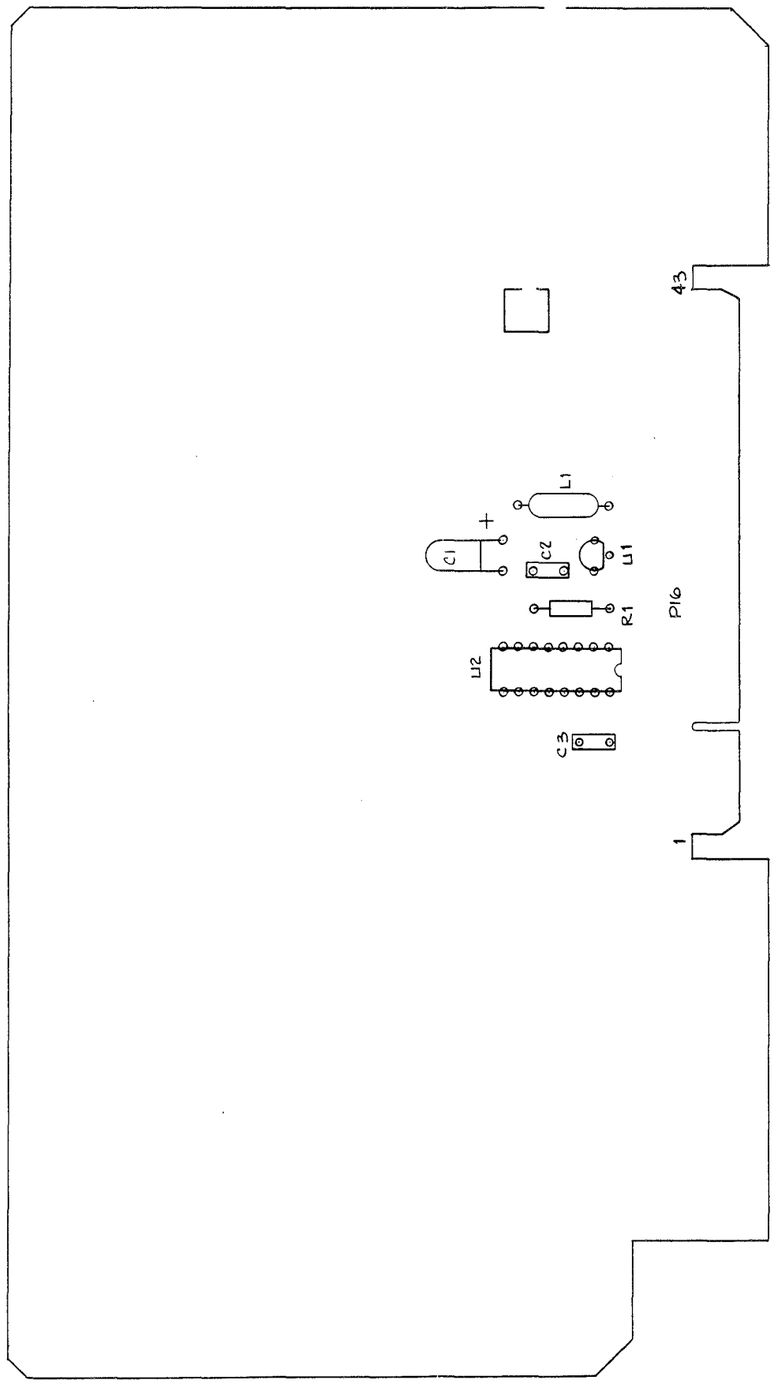
Schematic Diagram
HOST PROCESSOR BOARD
0387-00-0380
Sheet 2 of 3

Revised 01/10/90

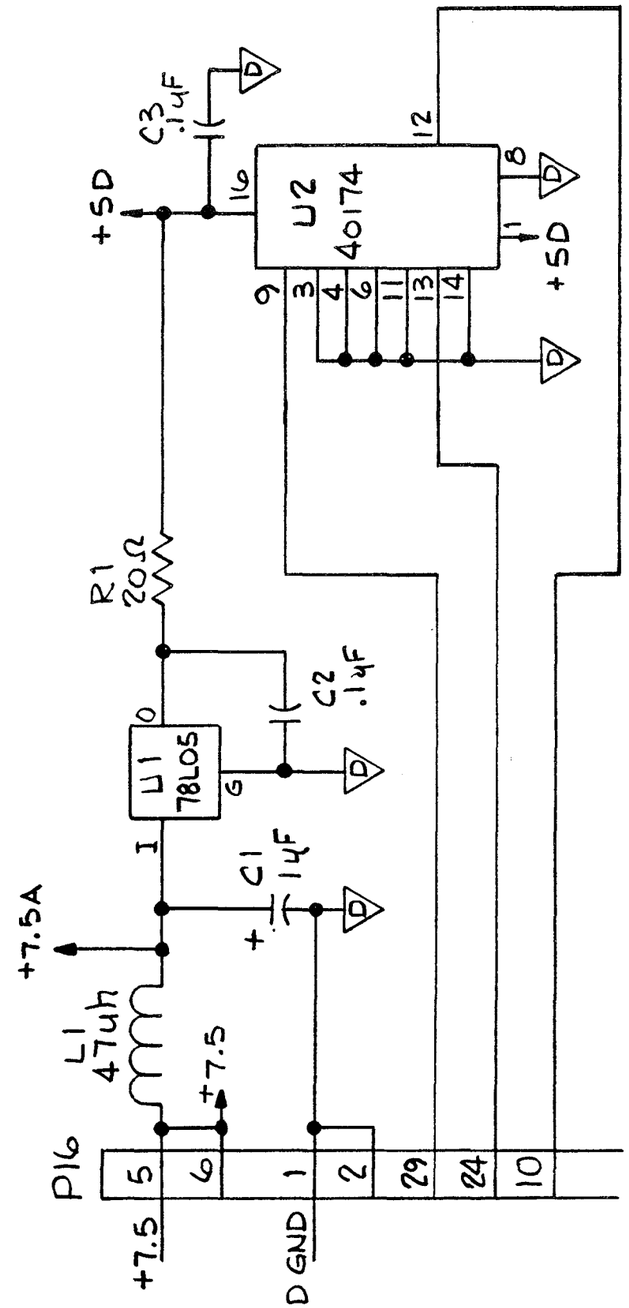


Schematic Diagram
HOST PROCESSOR BOARD
0387-00-0380
Sheet 3 of 3

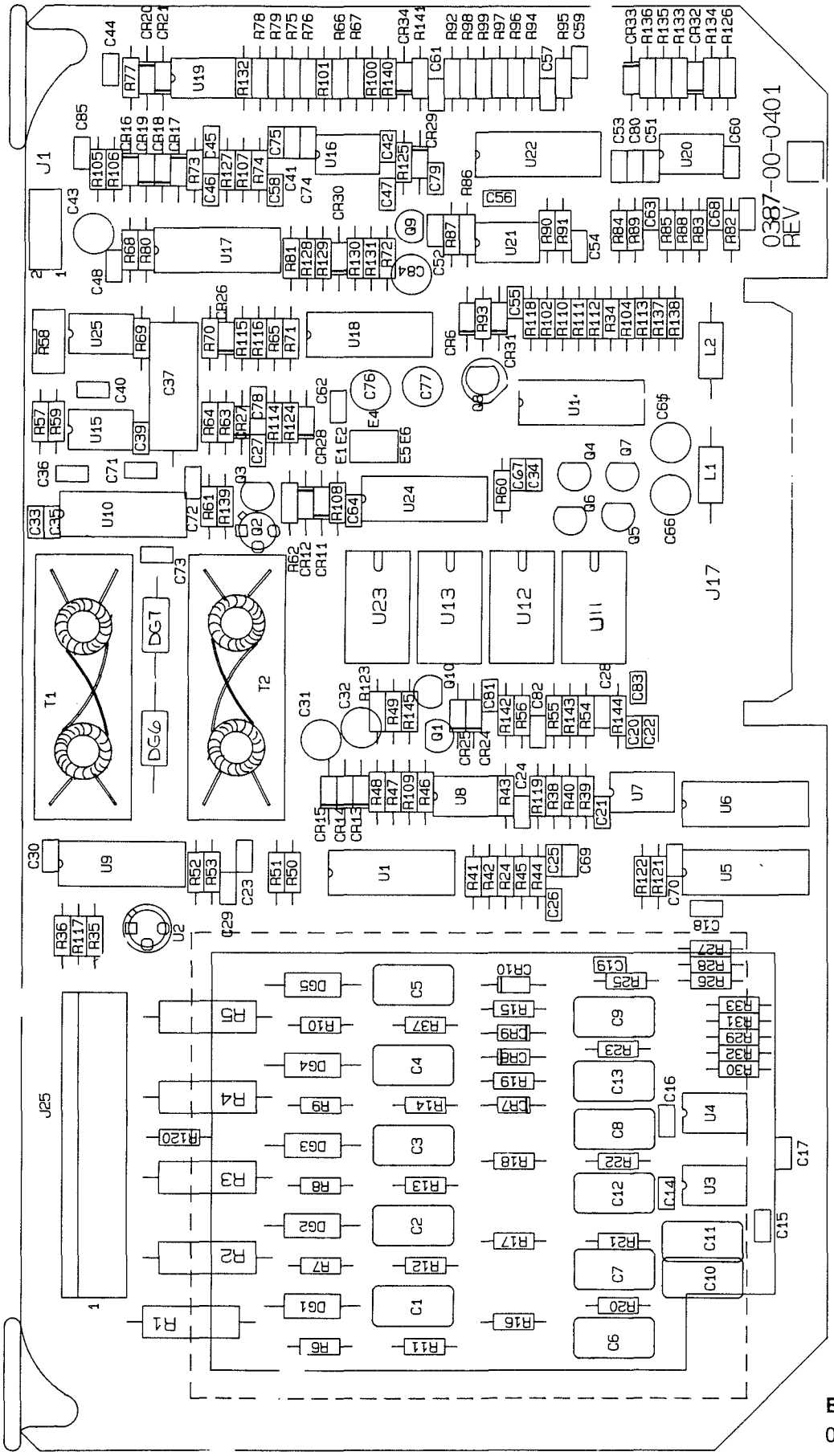
Revised 03/22/91



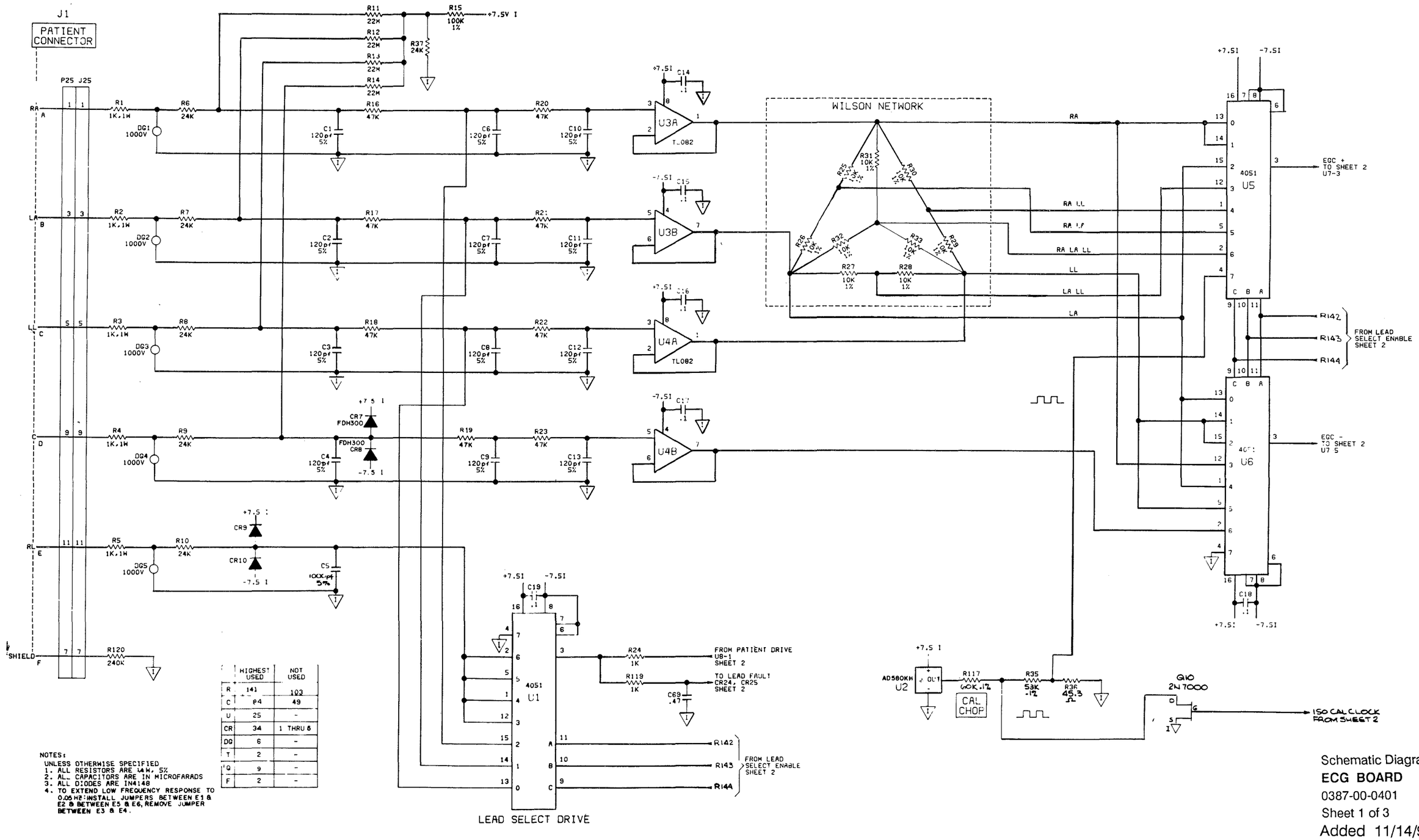
BP SUB BOARD
0670-00-0406



Schematic Diagram
BP SUB BOARD
0387-00-0406
Sheet 1 of 1
Added 11/15/89



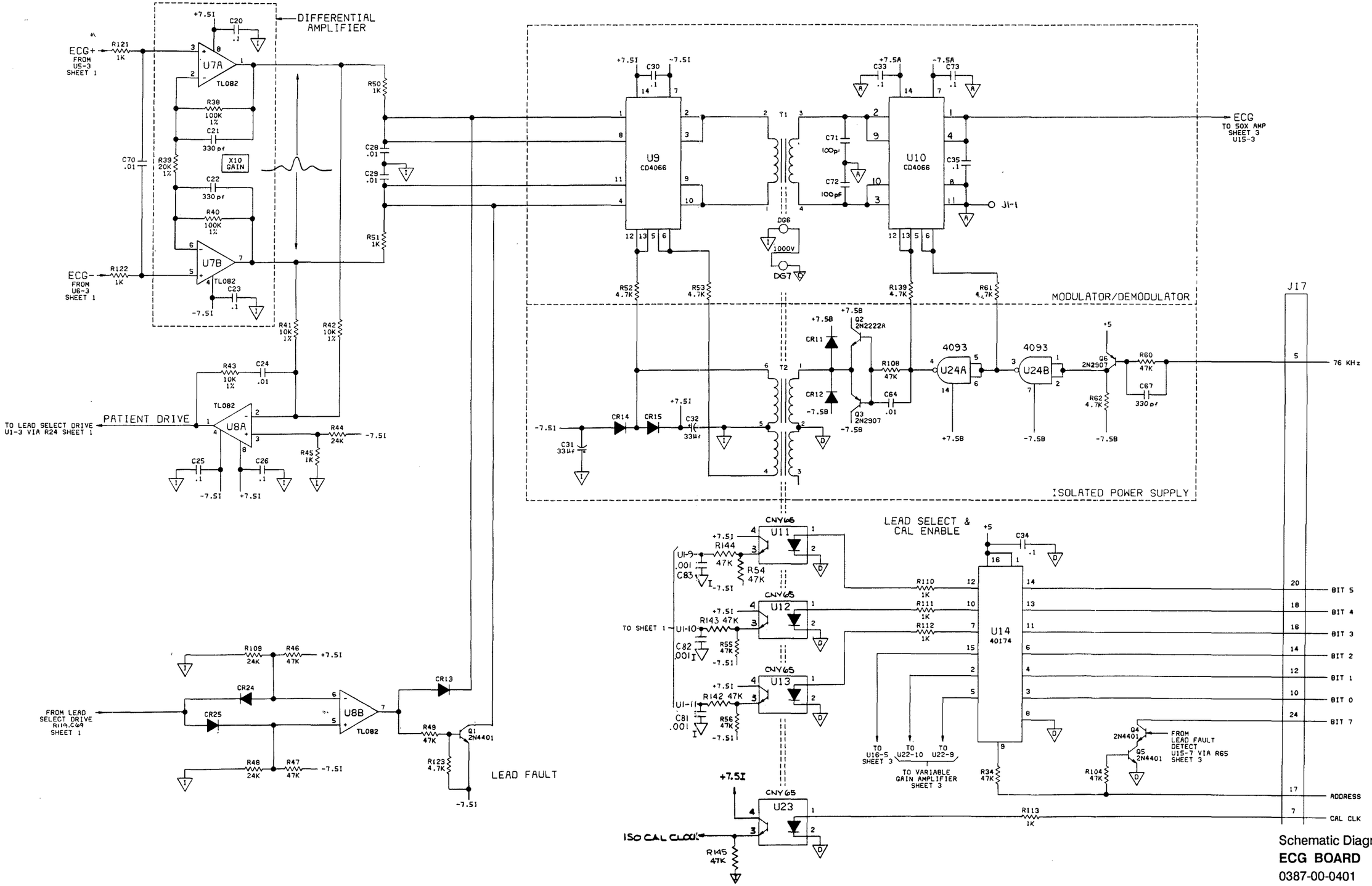
ECG BOARD
0670-00-0401
Added 11/14/90



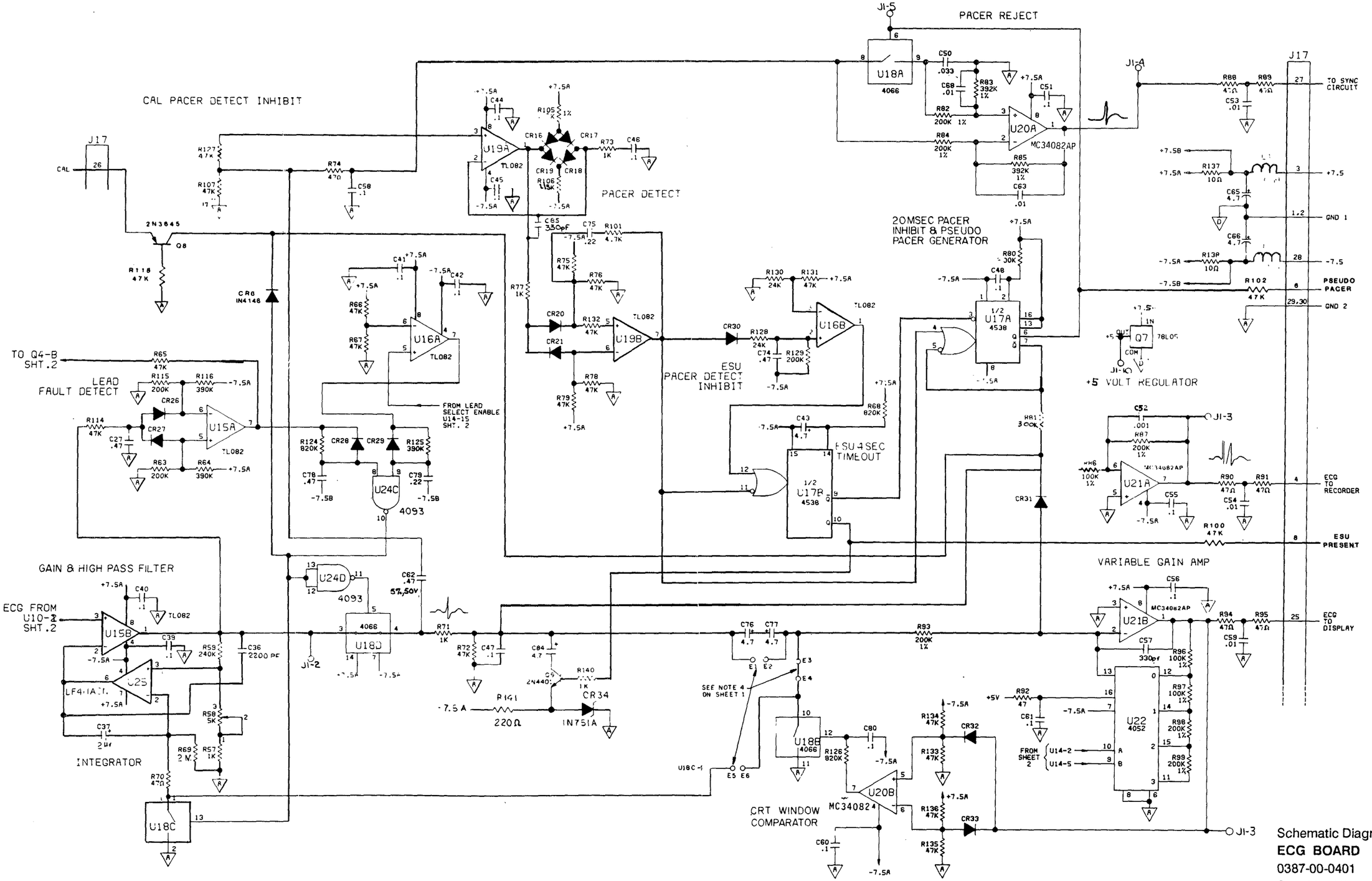
	HIGHEST USED	NOT USED
R	141	103
C	84	49
U	25	-
CR	34	1 THRU 8
DG	6	-
T	2	-
Q	9	-
F	2	-

NOTES:
UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE 1/4W, 5%
2. ALL CAPACITORS ARE IN MICROFARADS
3. ALL DIODES ARE IN4148
4. TO EXTEND LOW FREQUENCY RESPONSE TO 0.05 HZ: INSTALL JUMPERS BETWEEN E1 & E2 & BETWEEN E5 & E6, REMOVE JUMPER BETWEEN E3 & E4.

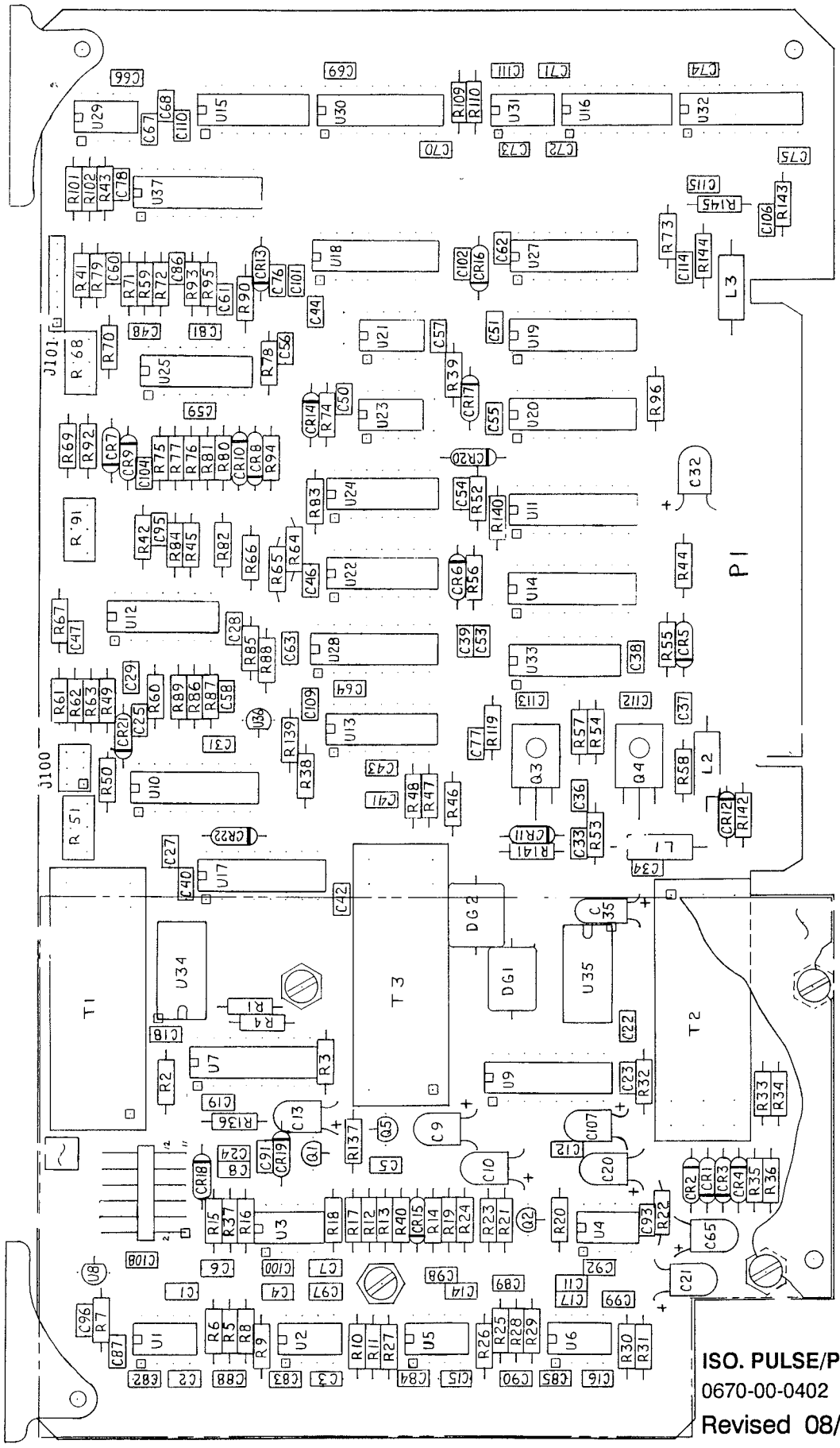
Schematic Diagram
ECG BOARD
0387-00-0401
Sheet 1 of 3
Added 11/14/90



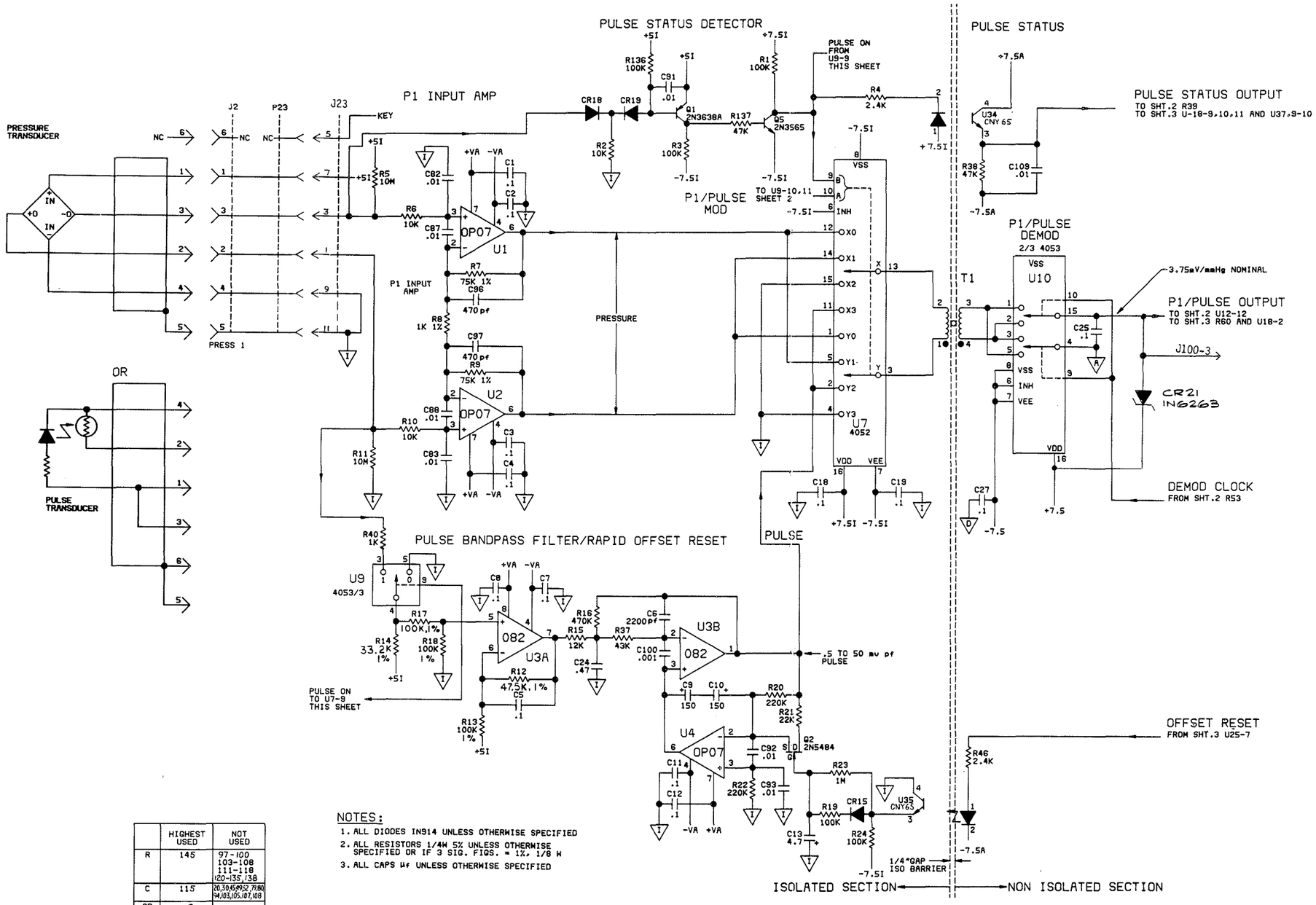
Schematic Diagram
ECG BOARD
0387-00-0401
Sheet 2 of 3
Added 11/14/90



Schematic Diagram
ECG BOARD
0387-00-0401
Sheet 3 of 3
Revised 08/06/91 2-68



ISO. PULSE/PRESSURE BOARD
0670-00-0402
Revised 08/09/91

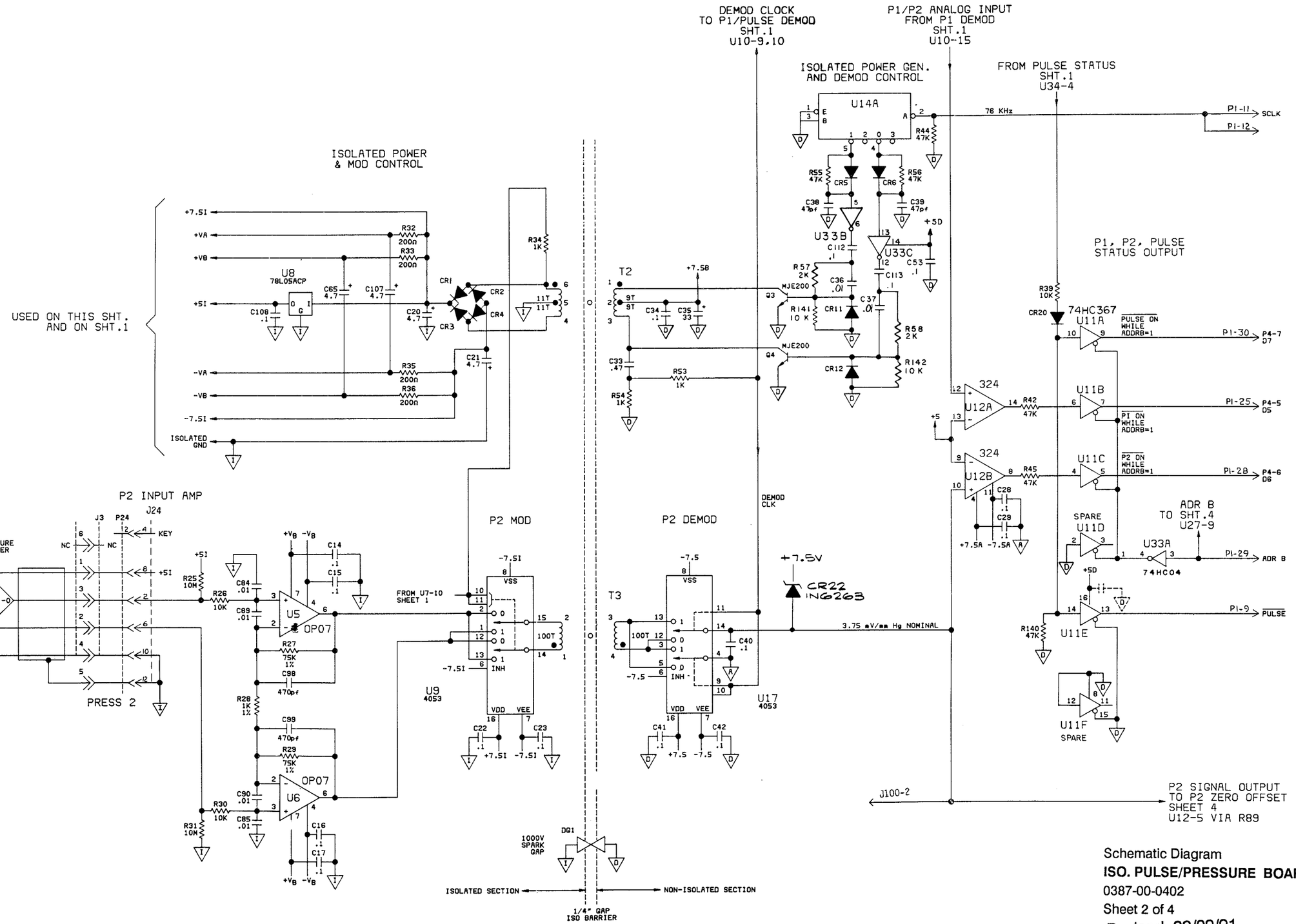


	HIGHEST USED	NOT USED
R	145	97-100, 103-108, 111-118, 120-135, 138
C	115	20,30,65,92,78,80, 94,103,105,107,108
CR	22	-
U	37	26
DG	1	-
Q	5	-
L	3	-
T	3	-

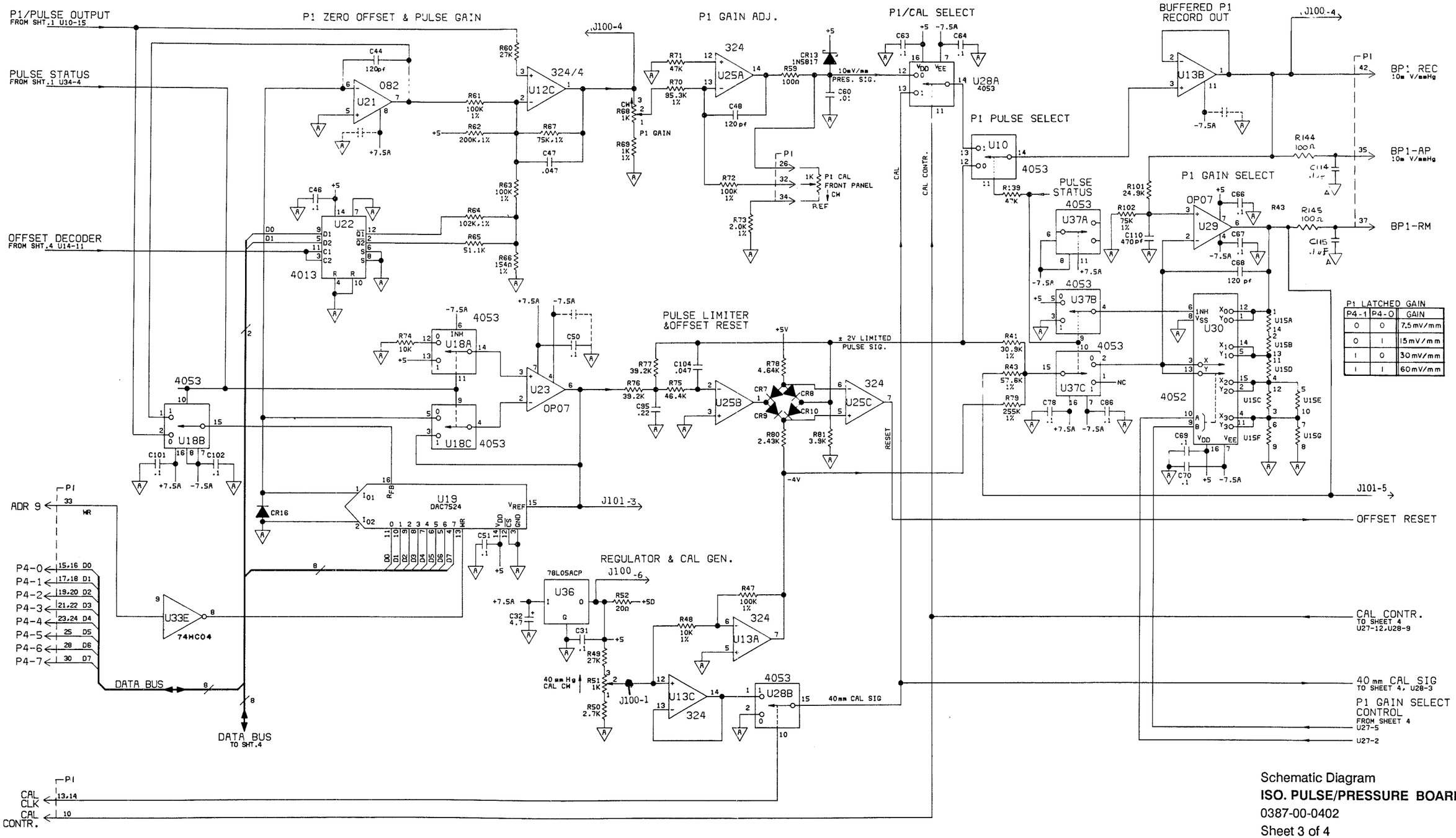
NOTES:

1. ALL DIODES IN914 UNLESS OTHERWISE SPECIFIED
2. ALL RESISTORS 1/4W 5% UNLESS OTHERWISE SPECIFIED OR IF 3 SIG. FIGS. = 1%, 1/8 W
3. ALL CAPS Uf UNLESS OTHERWISE SPECIFIED

Schematic Diagram
ISO. PULSE/PRESSURE BOARD
0387-00-0402
Sheet 1 of 4
Revised 08/09/91



Schematic Diagram
ISO. PULSE/PRESSURE BOARD
0387-00-0402
Sheet 2 of 4
Revised 08/09/91



Schematic Diagram
ISO. PULSE/PRESSURE BOARD
0387-00-0402
Sheet 3 of 4
Revised 08/09/91

P1/PULSE OUTPUT
FROM SHT.1 U10-15

PULSE STATUS
FROM SHT.1 U34-4

OFFSET DECODER
FROM SHT.4 U14-11

P1 ZERO OFFSET & PULSE GAIN

P1 GAIN ADJ.

P1/CAL SELECT

BUFFERED P1
RECORD OUT

P1 PULSE SELECT

P1 GAIN SELECT

PULSE STATUS

PULSE LIMITER
&OFFSET RESET

REGULATOR & CAL GEN.

P1 LATCHED GAIN		
P4-1	P4-0	GAIN
0	0	7.5mV/mm
0	1	15mV/mm
1	0	30mV/mm
1	1	60mV/mm

BP1 REC
10m V/mmHg

BP1-AP
10m V/mmHg

BP1-RM

J101-5

OFFSET RESET

CAL CONTR.
TO SHEET 4
U27-12, U28-9

40mm CAL SIG
TO SHEET 4, U28-3

P1 GAIN SELECT
CONTROL
FROM SHEET 4
U27-5

U27-2

ADR 9

P4-0
P4-1
P4-2
P4-3
P4-4
P4-5
P4-6
P4-7

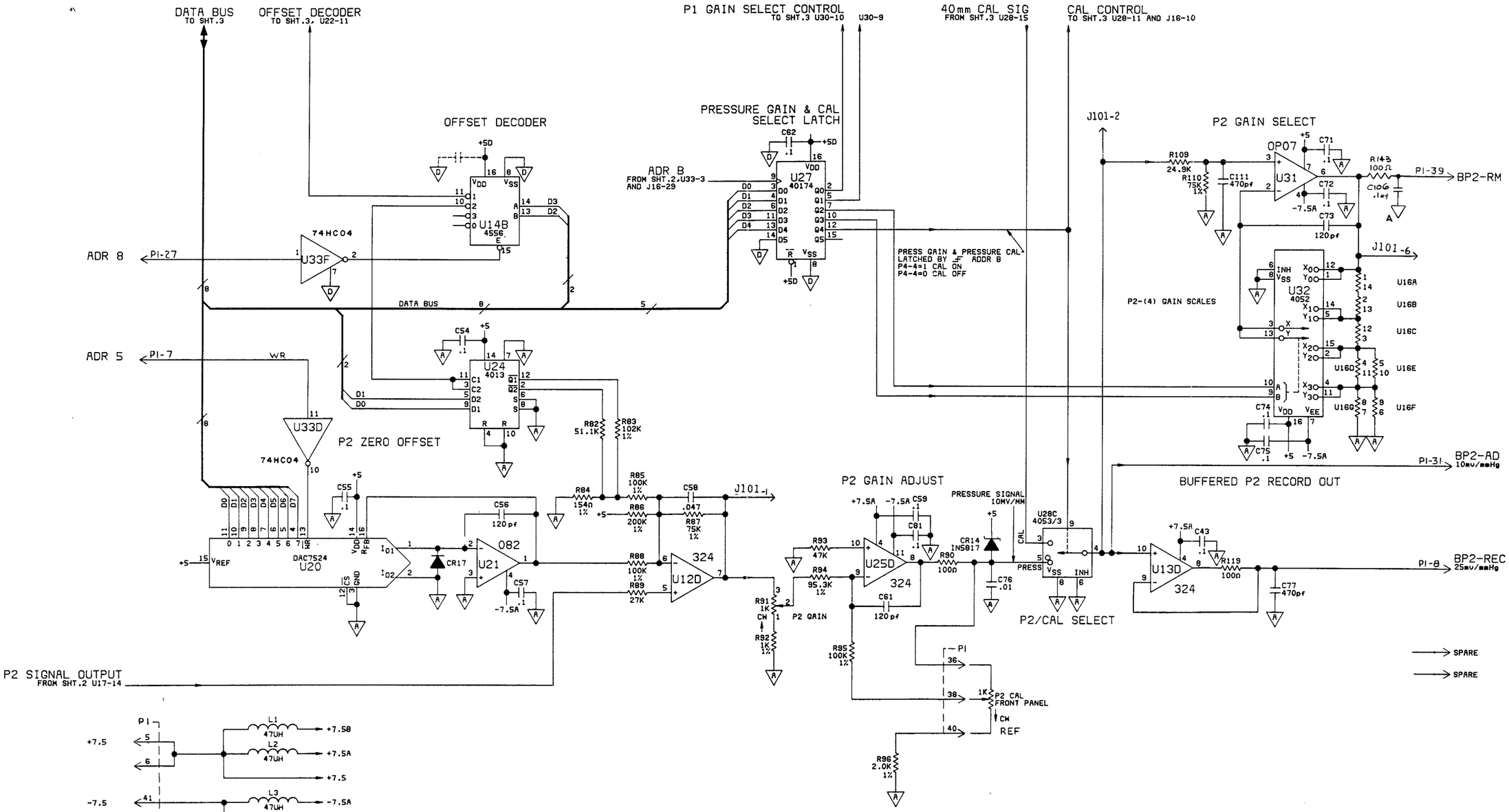
DATA BUS

DATA BUS
TO SHT.4

CAL CLK

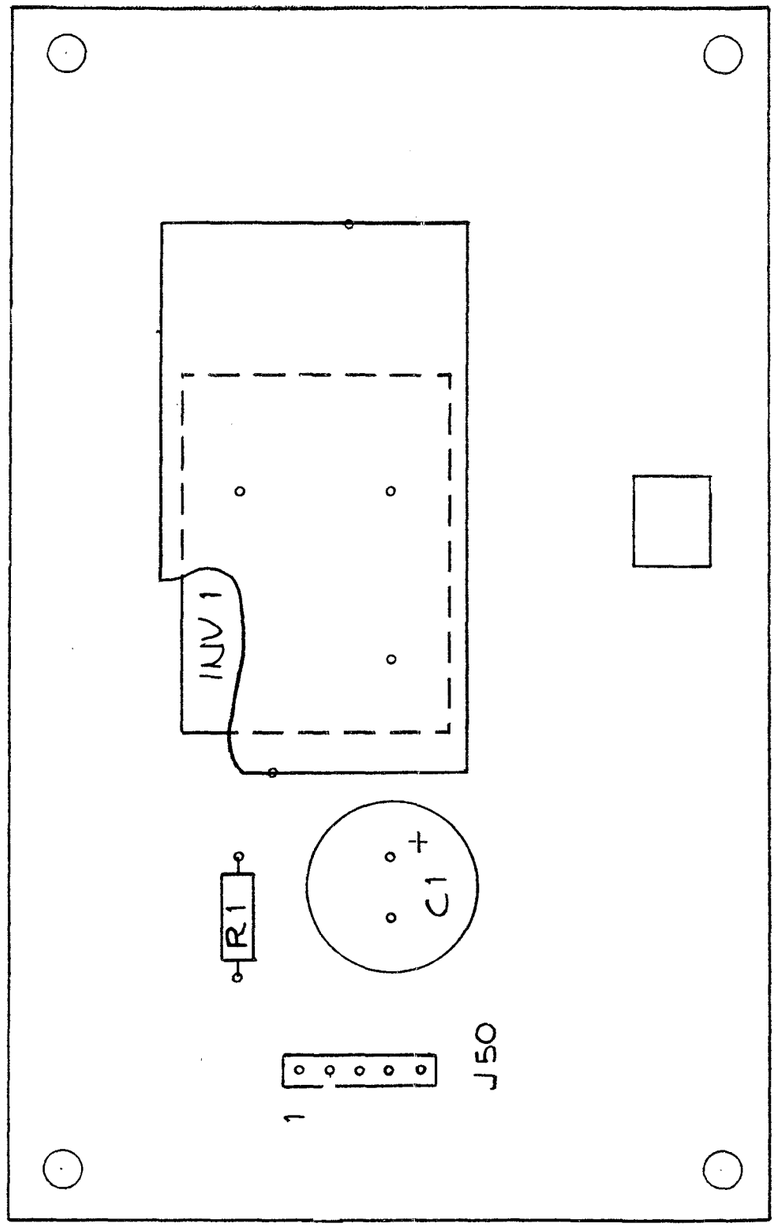
CAL CONTR.

Schematic Diagram
ISO. PULSE/PRESSURE BOARD
0387-00-0402
Sheet 3 of 4
Revised 08/09/91



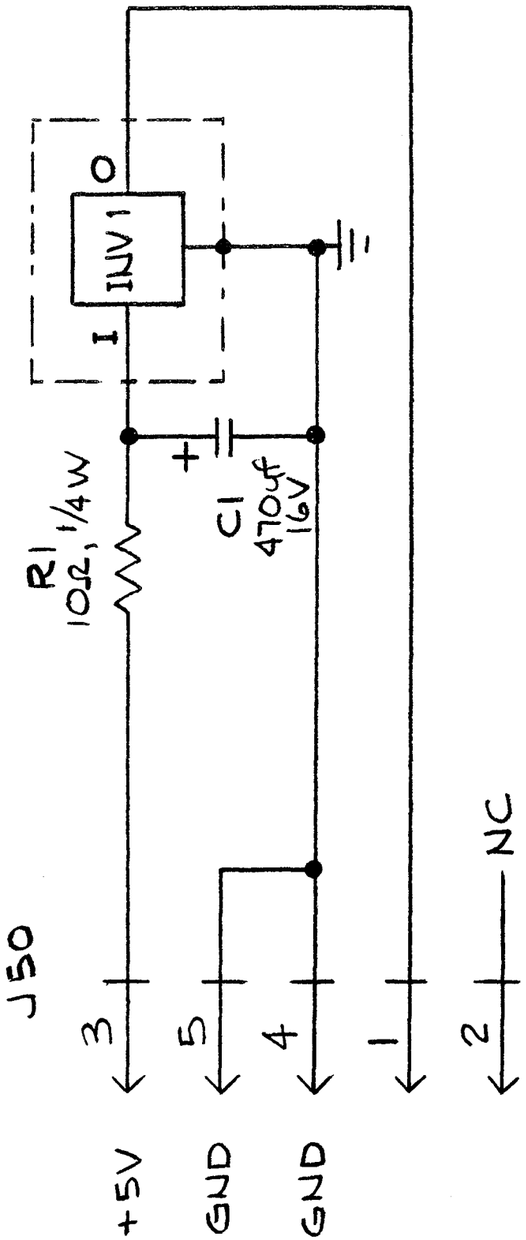
Schematic Diagram
ISO. PULSE/PRESSURE BOARD
0387-00-0402
Sheet 4 of 4

Revised 08/09/91



LCD PANEL POWER SUPPLY BOARD
0670-00-0391

Added 03/21/91



Schematic Diagram
LCD PANEL POWER SUPPLY BOARD
0387-00-0391

Added 03/21/91

3. REPLACEMENT PARTS

3.1 Introduction

This chapter of the Service Manual provides information necessary to identify the replacement parts and assemblies of the instrument.

3.2 Available Replacement Parts and Sub-Assemblies

The parts listings that follow are divided into two sections. The Isometric Drawings and the accompanying lists identify the available chassis mounted components. A listing for the components on each circuit-board then follows.

3.3 Product Variations

Product variations, due to differences for various line voltages, may require different components. These variations are reflected where necessary, on the parts lists.

3.4 Exchange Program

Datascope offers an exchange policy for most of the printed circuit board assemblies. This program may provide the most expedient method of servicing the equipment. A standard charge for this service is made. Contact the Datascope Service Department for details concerning the Exchange Program.

Many circuit boards make extensive use of multilayer technology and high density packaging. Individual component replacement is not recommended on these boards unless the technician is properly equipped to repair multilayer circuit boards.

Circuit boards, returned as part of the exchange program, that show evidence of improper repair techniques and are damaged in the process are not considered for exchange. Damaged boards will be invoiced at full value and no exchange credit will be applied.

3.5 Replacement Parts Pricing Information

Current parts prices and exchange charges can be determined by contacting Datascope Corp., Order Entry Department.

3.6 Ordering Information

Replacement parts and assemblies are available from Datascope Corp.; in Europe from Datascope B.V. Please follow these guidelines when ordering replacement items for the instrument:

1. Include the model and serial number of the instrument.

2. Include the Datascope Part Number exactly as it appears in the Parts List under the column, "Datascope Part Number."

3. Include a description of the item.

EXAMPLE ORDERS: (1) ea. P/N 0119-00-0064
Yoke, Magnetic Deflection Serial No. XXXX

(2) ea. P/N 0210-00-0116
Washer, Shoulder, Nylon Serial No. XXXX

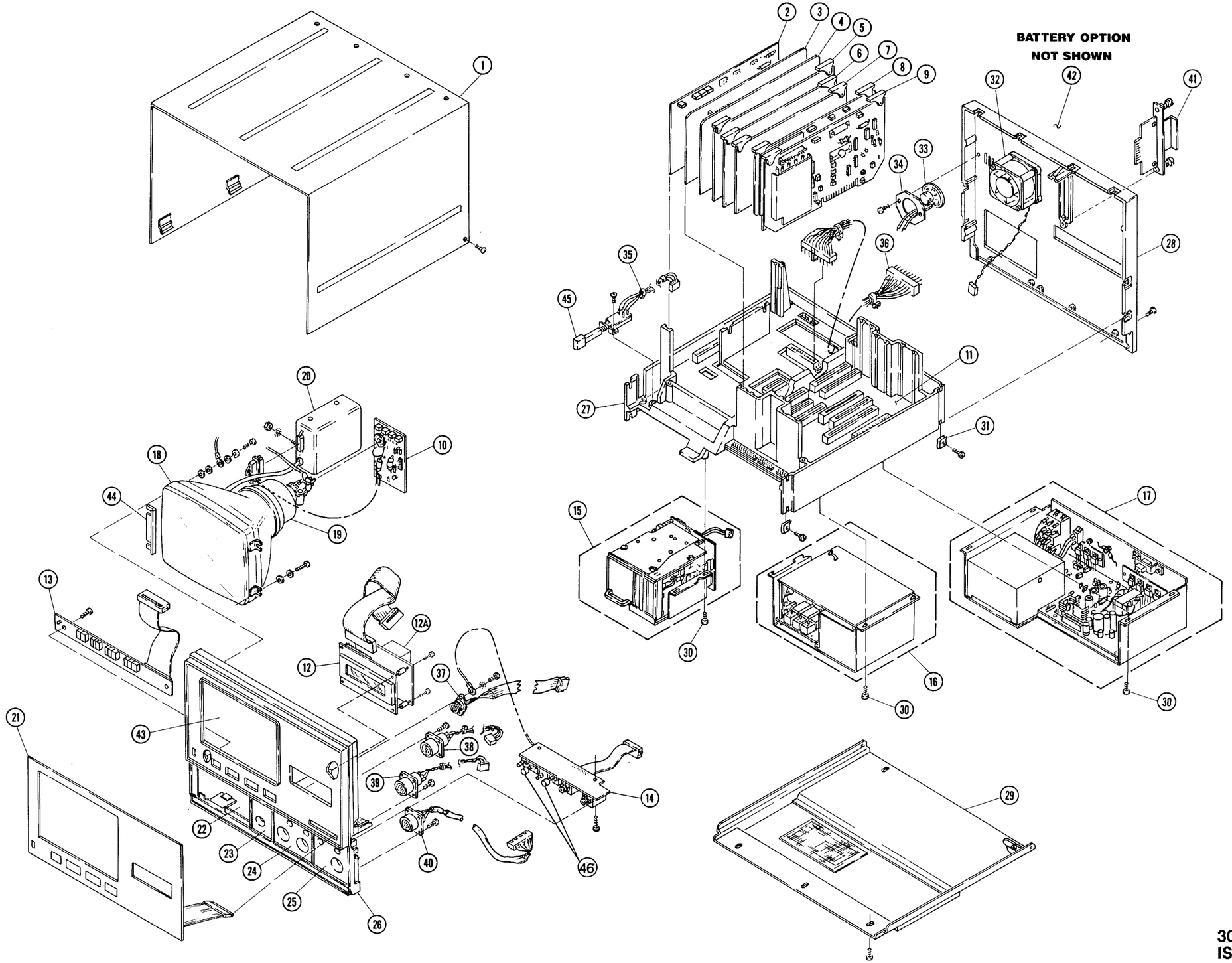
NOTE 1: Datascope Corp. maintains a policy of continuous development for product improvement and reserves the right to change materials, specifications and prices without notice.

NOTE 2: Many components are described with sufficient detail to permit procurement through local commercial channels. This applies to hardware, (i.e., screws and fasteners), as well as to certain electronic components, (i.e., resistors, capacitors, certain integrated circuits, transistors). However, in some cases, components are selected by Datascope to meet special performance criteria above and beyond the component manufacturer's specifications. This may apply to solid state components, relays, and batteries. The use of other than Datascope components in these applications may result in degradation of reliability or instrument performance characteristics.

3.7 Abbreviations

The following abbreviations may appear in the parts listings which follow.

Abbreviation	Term
A/D	Analog to Digital
AMP	Amplifier
BUF	Buffer
CAP	Capacitor
CC	Carbon Composition
CER	Ceramic
CERM	Ceramic
CNTR	Counter
CONN	Connector
CONT	Controller
CONV	Converter
CPU	Central Processor Unit
DCDR	Decoder
DIFF	Differential
DIO	Diode
D/A	Digital to Analog
ELEC	Electrolytic
EPROM	Erasable Programmable Read Only Memory
FXD	Fixed
I.C.	Intergrated Circuit
INT. CKT	Intergrated Circuit
KYBD	Keyboard
LED	Light Emitting Diode
MF	Metal Film
MONO	Monostable
MYLR	Mylar
NTWK	Network
OP	Operational
PB	Pushbutton
PIA	Peripheral Interface Adaptor
POT	Potentiometer
PRESS	Pressure
PWR	Power
RAM	Random Access memory
REC	Receiver
RECT	Rectangular
REG	Regulated
RES	Resistor
STG	Stage
STK	Stacked
SUP	Supply
SW	Switch
SYST	Systolic
TANT	Tantalum
TRANS	Transistor
TRANSIS	Transistor
VAR	Variable
VIA	Versatile Interface Adapter
XDCR	Transducer
XFMR	Transformer
XSTL	Crystal
XSTR	Transistor



3000 MONITOR
ISOMETRIC

Revised 08/10/89

Fig. No.	Description	Datascope Part Number
1	Cover Assy, Top	0997-00-0284
2	Deflection Board	0670-00-0230
3	Host Processor Board	0670-00-0380
4	Trend/Record Board	0670-00-0371
5	Refresh Memory Board	0670-01-0226
5	Refresh Memory Board	0670-00-0397
6	SaO_2 Analog Board	0670-00-0327***
7	SaO_2 Digital Board	0670-00-0378
8	Pressure Amplifier Board	0670-00-0225* or 0670-00-0402
9	ECG Amplifier Board	0670-00-0224 or 0670-00-0401
10	CRT Blanking Board	0670-00-0366
11	Mother Board	0670-00-0370
12	LCD Display Board	0997-00-0223
12a	LCD DC-to-AC Converter Board	0670-00-0391
13	LED Display Board	0670-00-0365
14	Jack/Switch Board	0670-00-0367
15	Recorder Assembly	0683-00-0407
16	NIBP Assembly	0997-00-0213
17	Power Supply Assembly	0997-00-0216
18	CRT	0157-00-0019
NS	Gasket, P-Section, Self-Sticking	0348-00-0152
19	Yoke, Magnetic Deflection	0119-00-0064
20	CRT High Voltage Module	0014-00-0010
21	Switch, Membrane	0261-00-0177**
22	Label, Recorder, Blank	0334-00-0747-08
23	Label, SaO_2 Patient	0334-00-0747-05
23a	Label, Blank, No SaO_2 Option	0334-00-0747-06
24	Label, Dual Pressure Connectors	0334-00-0747-03
24a	Label, Single Pressure Connector	0334-00-0747-04
24b	Label, Blank, No Pressure Connector	0334-00-0747-02
25	Label, ECG, Temp, and NIBP Cuff	0334-00-0747-01
26	Panel, Front Fascia	0380-00-0141
27	Chassis, Plastic, Mid Section	0380-00-0142
28	Panel, Rear	0997-00-0212
29	Cover, Bottom	0333-00-0208
30	Screw, Stainless, 6/32	

* 0670-00-0406 is used if invasive blood pressure is not installed in the monitor.

** See page 3-19 for Graticule/Keyboard label part numbers and descriptions (P/N 0334-00-0822-XX).

***See page 3-7 for detail of assembly of board and shield.

Fig. No.	Description	Datascope Part Number
31	Nut, Tinnerman, 6/32	0220-00-0072
32	Fan Assembly	0997-00-0229
33	Speaker Assembly	0012-00-0257-01
34	Bracket, Speaker	0406-00-0442
35	Switch/Cable Assembly, OFF/ON	0012-00-0553
36	Cable, Power Supply	0012-00-0535
37	Cable Assembly, SaO_2	0012-00-0431
38	Cable Assembly, ECG	0012-00-0261
39	Cable Assembly, P-1	0012-00-0545
40	Cable Assembly, P-2	0012-00-0544
41	Program Memory Module (Data-Sette)	0670-00-0372
42	Battery, Complete Assembly	0997-00-0226
43	Panel/Graticule Implosion Protector	0333-00-0205
44	Bracket, CRT/Implosion Protector Retainer	0406-00-0457
45	Cap, ON/OFF Switch	0366-00-0075
46	Cap Zero Button	0200-00-0215
NS	Tape, Double Sided	0215-00-0071
NS	Shield	0337-00-0061

NS = Not Shown

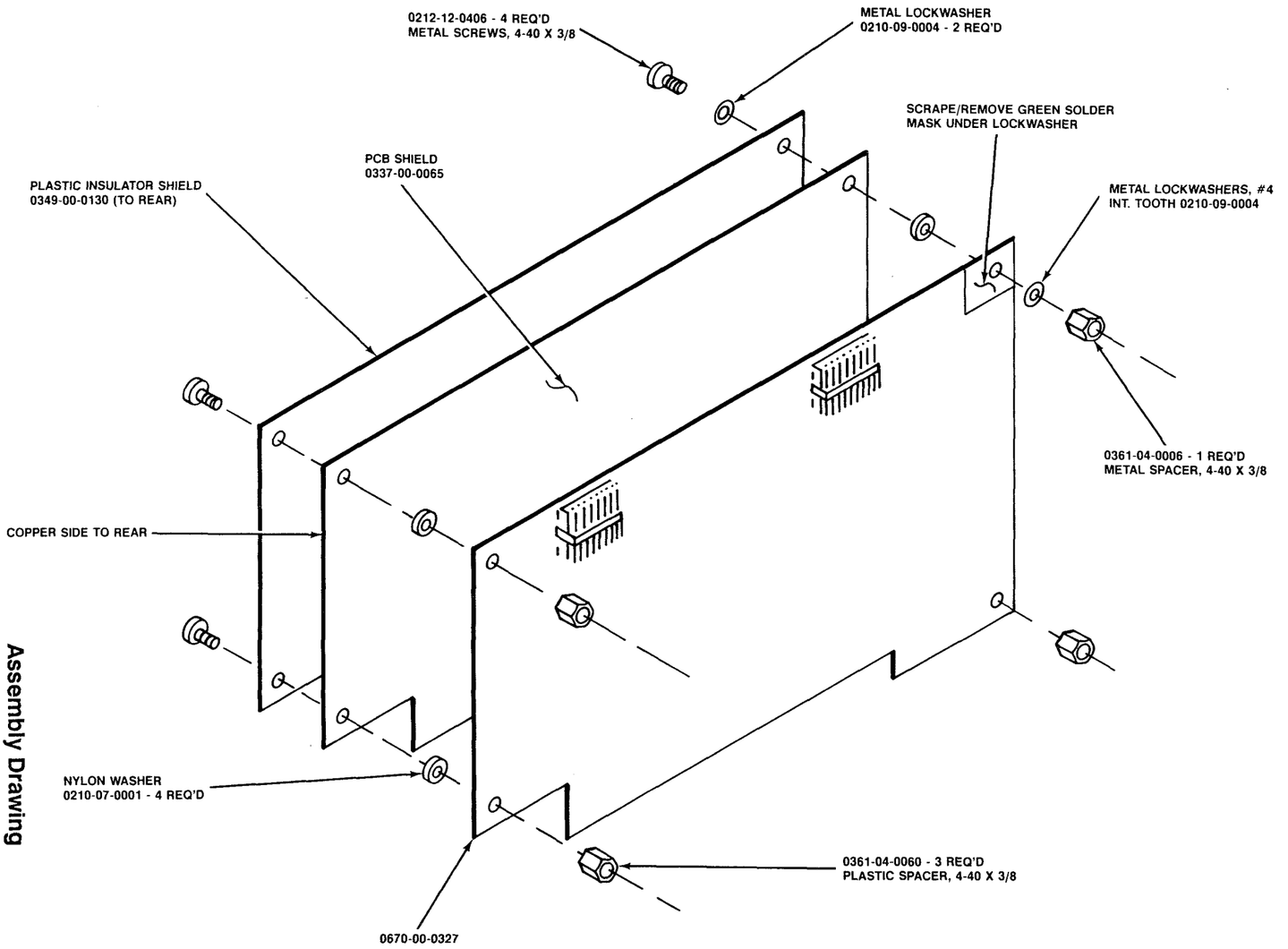
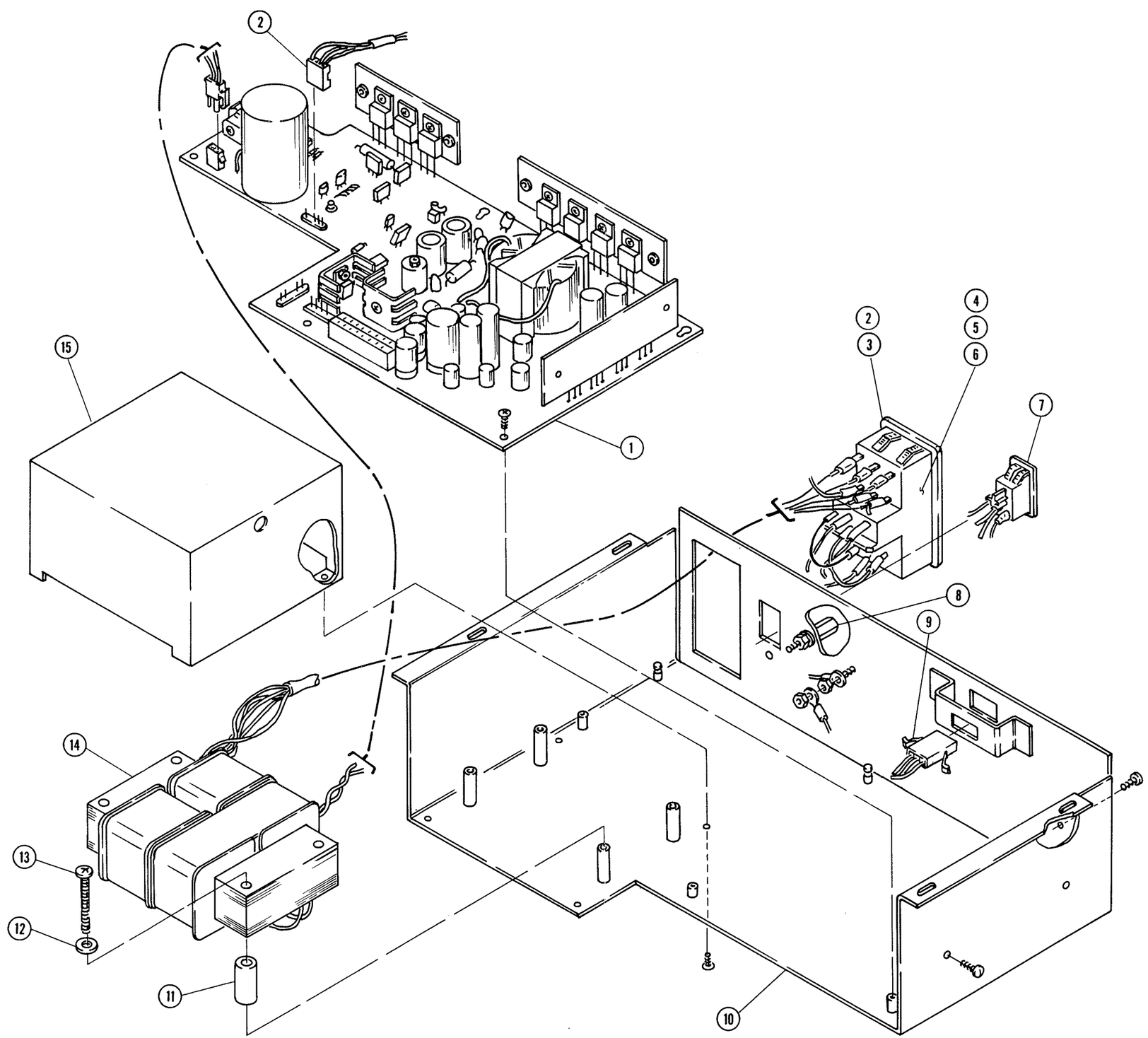


FIGURE 1

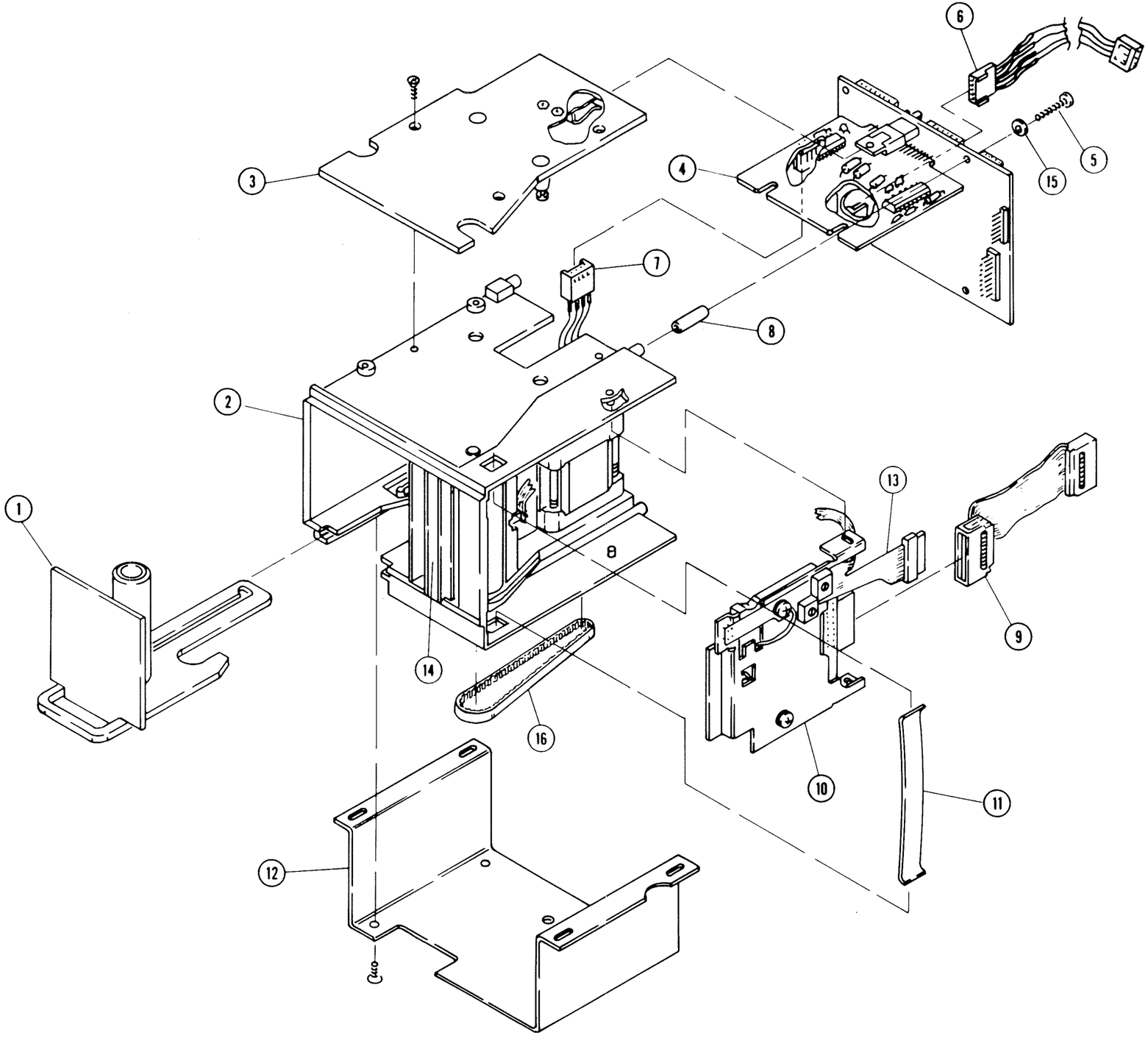
Assembly Drawing
Analog Board and Shield
Added 07/31/90



POWER SUPPLY ASSEMBLY ISOMETRIC

Power Supply Assembly

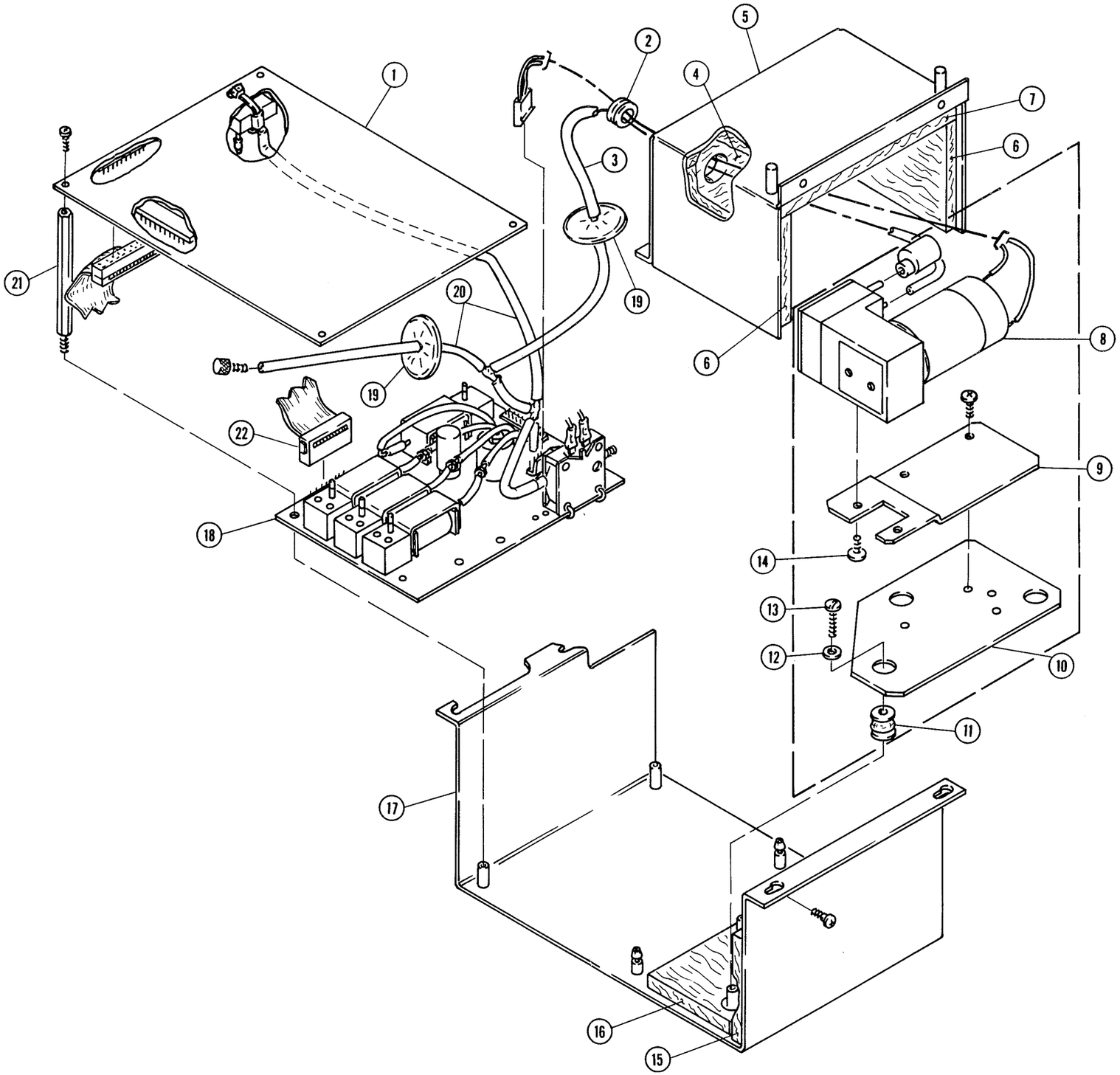
Fig. No.	Description	Datascope Part Number
1	Power Supply Board	0670-00-0368
2	Fuse, .65A	xxxx-xx-xxxx
3	Power Input/Fuse Module; Prewired	0012-00-0543
4	Power Input Module, not Wired	0131-18-0002
5	Fuse Clip, Replacement for Input Module	0131-18-0006
6	Fuse, 1.25A	xxxx-xx-xxxx
7	Switch, Rocker, Power OFF/ON	0261-00-0139-02
8	Post Binding, Ground	0124-00-0062
9	Cable, Battery Connector	0012-00-0557
10	Chassis, Power Supply	0441-00-0059
11	Stand-Off, Nylon	0361-08-0013
12	Washer, Shoulder, Nylon	0210-00-0116
13	Screw, 6/32 x 1.5"	0212-12-0624
14	Transformer, Power, with Connectors	0120-00-0118
15	Can, Transformer Shield	0202-00-0078



RECORDER ASSEMBLY
ISOMETRIC

Recorder Assembly

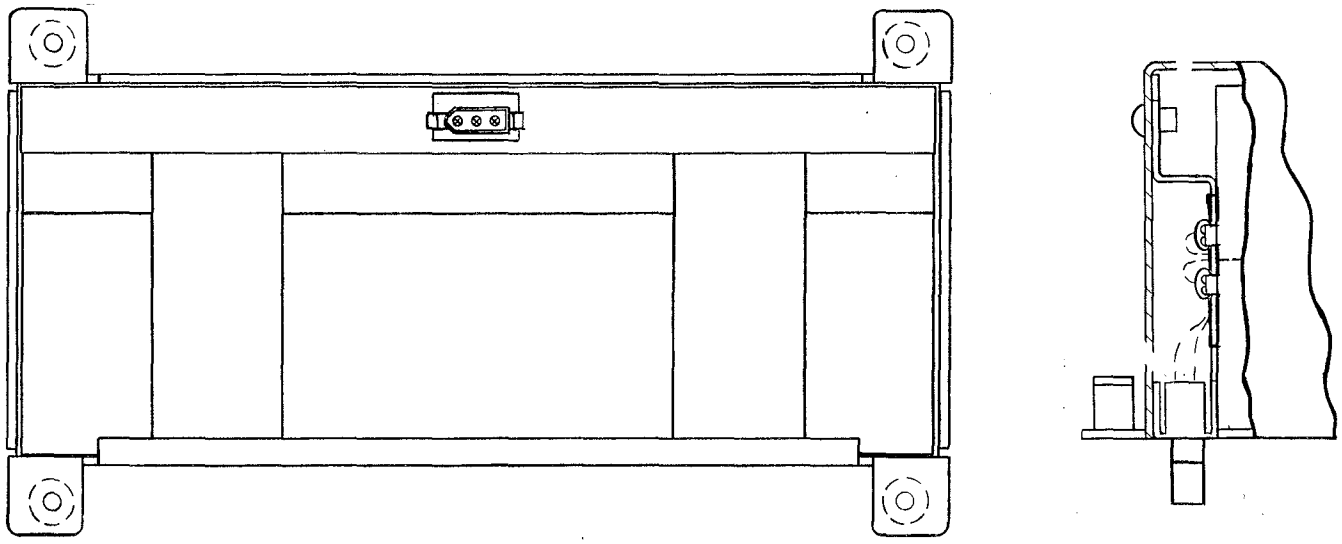
Fig. No.	Description	Datascope Part Number
1	Door Assembly, Chart Roll	0105-00-0065
2	Chassis, Plastic	0441-00-0062
3	Assembly, Heatsink	0373-00-0043
4	Logic and Motor Drive Board	0670-00-1124
5	Screw, Self-Tapping #4 x .75	0212-00-0093
6	Cable, Recorder to Power Supply	0012-00-0531
7	Motor Assembly, Stepper	0683-00-0425
8	Spacer, Nylon	0361-00-0145
9	Cable, Printhead to Logic Board	0012-00-0596
10	Printhead Assembly, Thermal	0683-00-0426
11	Retaining Clip, Printhead	0344-00-0022
12	Bracket, Retainer	0406-00-0458
13	Assembly, Flexible Circuit	0012-00-0597
14	Assembly, Static Eliminator Tearbar	0683-00-0427
15	Washer, Nylon .120 x .250	0221-00-0080
16	Drivebelt, Rubber	0683-00-0290



NIBP ASSEMBLY
ISOMETRIC

NIBP Assembly

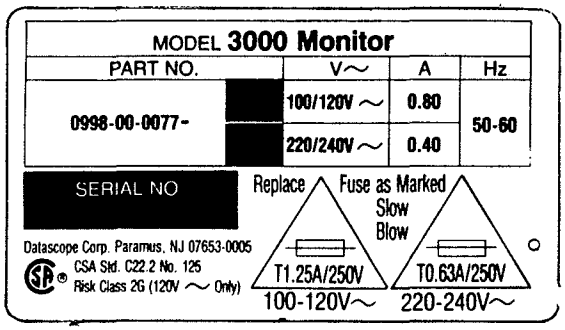
Fig. No.	Description	Datascope Part Number
1	Control Board	0670-00-0375
2	Grommet, Rubber	0348-01-0016
3	Tubing, Tygon	0008-04-0002
4	Foam, Rear	0349-00-0113
5	Housing	0380-00-0139
6	Foam, Sides	0349-00-0082-05
7	Foam, Top	0349-00-0082-04
8,9, 10,11, 12,13, 14,	Pump Assembly, Complete - Primary	0997-00-0227-02
	- Alternate	0997-00-0227-01
8	Pump only - Primary (AFS)	0119-00-0116
	- Alternate (ROMEGA)	0119-00-0114
9	Plate, Pump Mount Adapter for Primary Assy	0386-00-0135
10	Plate, Pump Mount-Universal	0386-00-0134
11	Mount, Shock	0348-08-0001
12	Part of Pump Assembly above	xxxx-xx-xxxx
13	Part of Pump Assembly above	xxxx-xx-xxxx
14	Part of Pump Assembly above	xxxx-xx-xxxx
15	Foam, Front	0349-00-0082-03
16	Foam, Bottom	0349-00-0112
17	Chassis	0441-00-0058
18	Pneumatic Board	0670-00-0369
19	Filter, Pneumatic	0378-01-0001
20	Tubing, Tygon 1/8 I.D.	0008-04-0002
21	Standoff, Hex	0361-30-2500
22	Cable Assembly, 20 Pin	0012-00-0370



BATTERY MODULE

Battery Module

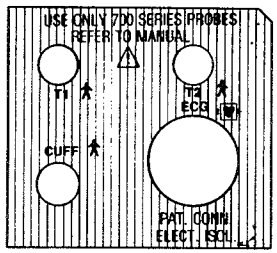
Description	Datascope Part Number
Can, Battery Module	0202-00-0076
Sub-Assy, Battery	0997-00-0219
Bracket, Battery	0406-00-0456
Screw, Pan Hd. 4-40 x .25 Lg.	0212-12-0404
Battery, 12V	0146-00-0037
Connector, Plug, P15	0134-00-0043
Fuse, Microfuse, F5A, 125V	0159-22-5000
Holder, Microfuse	0352-00-0041
Terminal, Female Push On .187	0210-27-0001
Tubing, Heat Shrink	0008-01-0005
Tape, Nylon	0215-04-0002
Wire Hook-Up Stranded, Orange	0006-02-2233
Wire Hook-Up Stranded, White	0006-02-2299
Wire Hook-Up Stranded, Black	0006-02-2200
Wire Hook-Up Stranded, Red	0006-02-2222
Terminal #18-24	0124-01-0007



0334-00-0746
Serial number label

Datascope

0334-00-0694
Front Panel Label



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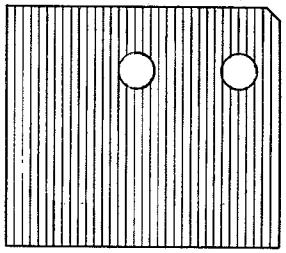

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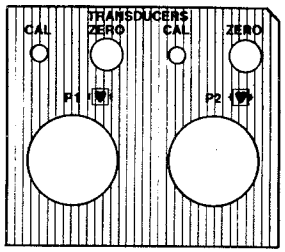

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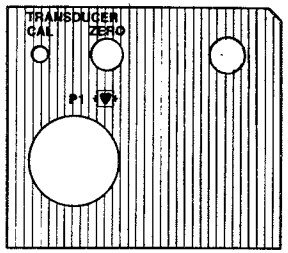

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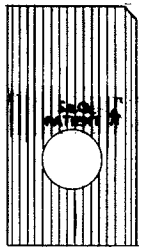

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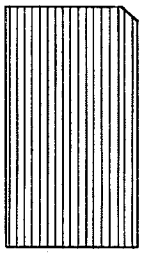

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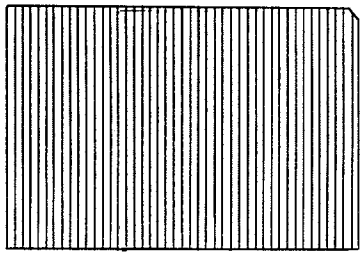
-07



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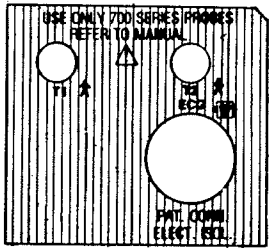
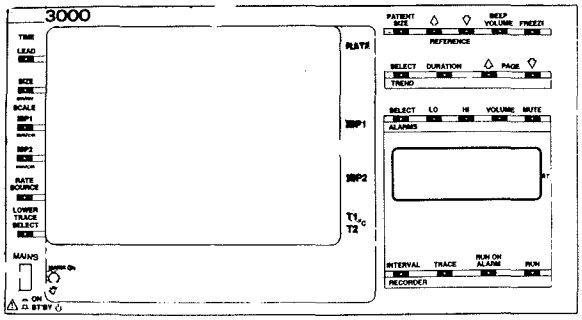


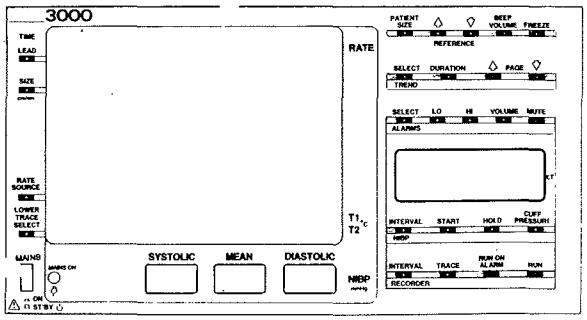
-09

0334-00-0747
Front Panel Label

GRATICULE/KEYBOARD LABEL PART NUMBERS



0334-00-0822-11 (-51)*
Installed Options:
IBP-1, IBP-2, Recorder



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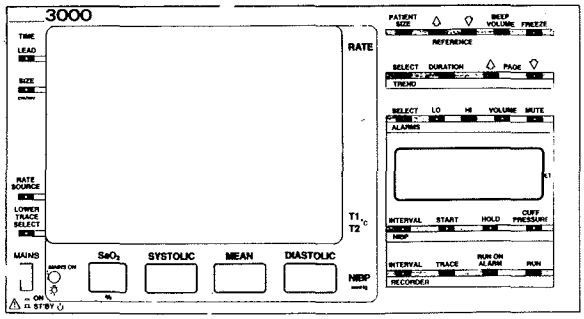
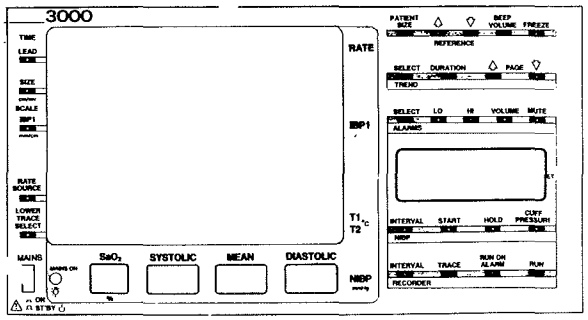
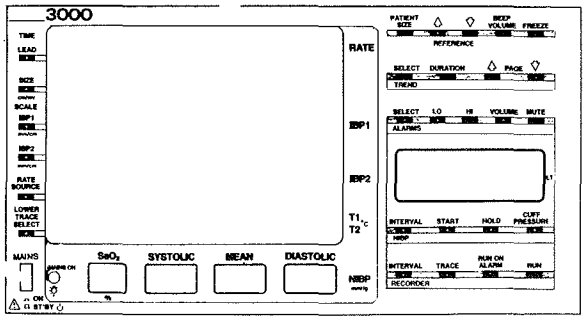
NIBP, Recorder



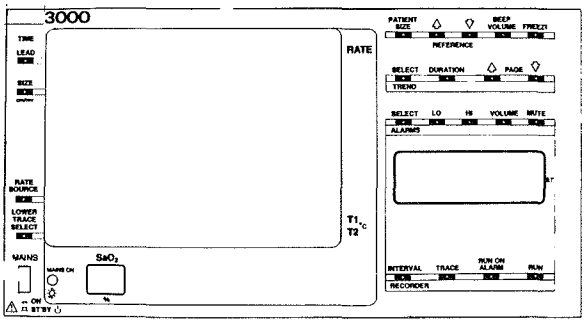
0334-00-0822-13 (-53)*
Installed Options:
NIBP, SaO_2, Recorder



0334-00-0822-14 (-54)*
Installed Options:
NIBP, SaO_2, IBP-1, Recorder



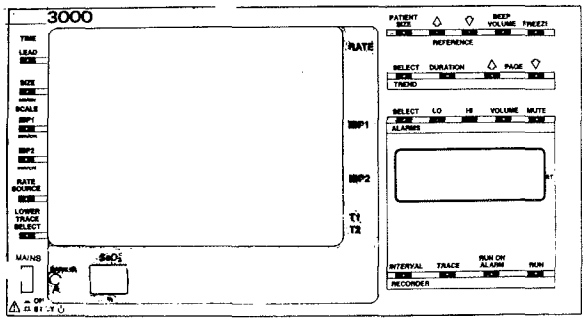
0334-00-0822-15 (-55)*
Installed Options:
NIBP, SaO_2, IBP-1, IBP-2, Recorder



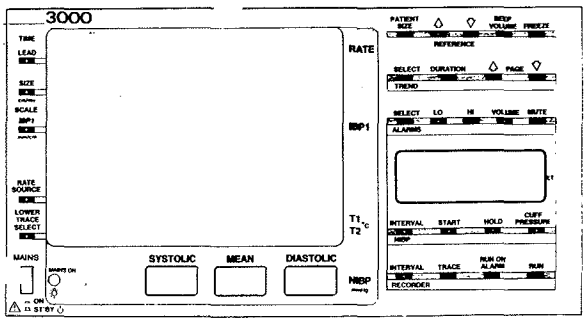
0334-00-0822-16 (-56)*
Installed Options:
SaO_2, Recorder

* numbers in parentheses are for 220V version.

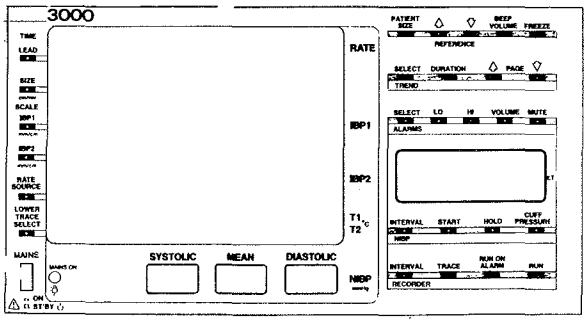
GRATICULE/KEYBOARD LABEL PART NUMBERS



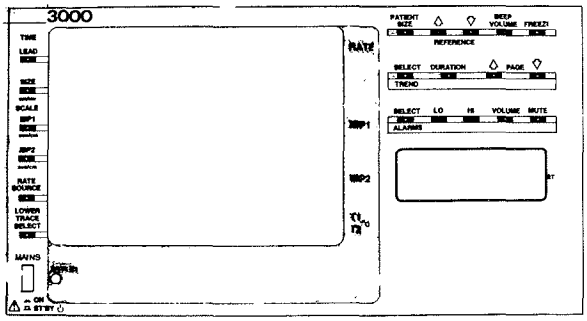
0334-00-0822-18 (-58)*
Installed Options:
SaO_2, IBP-1, IBP-2, Recorder



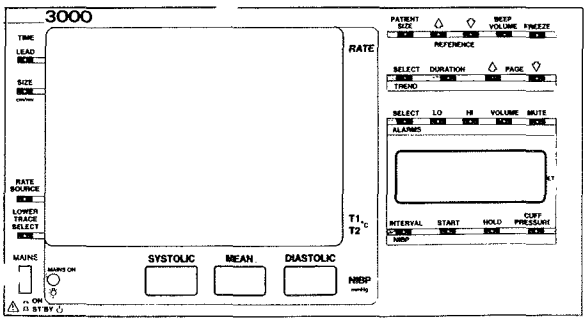
0334-00-0822-19 (-59)*
Installed Options:
NIBP, IBP-1, Recorder



0334-00-0822-20 (-60)*
Installed Options:
NIBP, IBP-1, IBP-2, Recorder



0334-00-0822-31 (-71)*
Installed Options:
IBP-1, IBP-2



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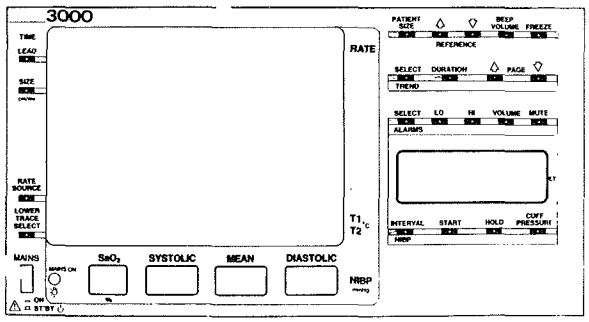
Installed Options:
NIBP



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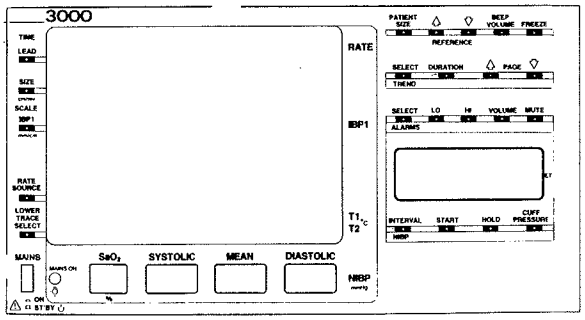
NIBP, SaO_2

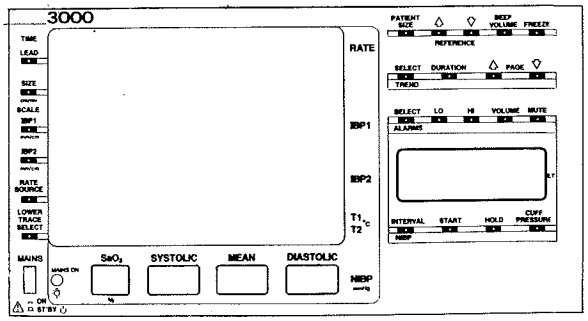
* numbers in parentheses are for 220V version.

Revised 05/17/90

GRATICULE/KEYBOARD LABEL PART NUMBERS



0334-00-0822-34 (-74)*
Installed Options:
NIBP, SaO_2, IBP-1



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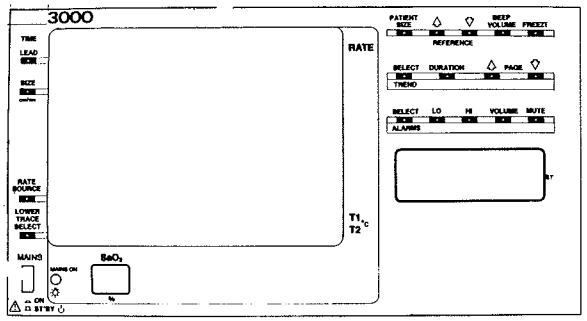
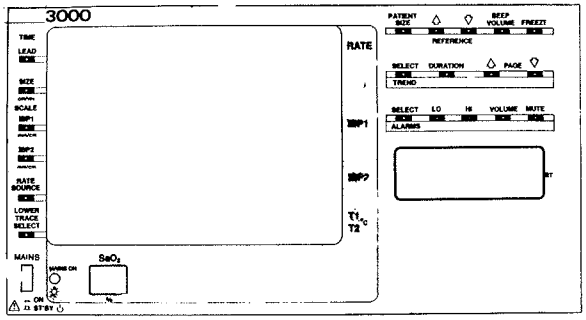
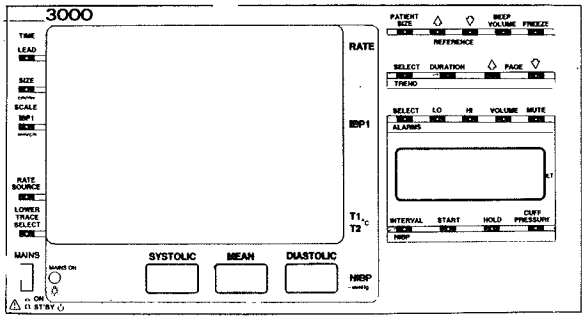


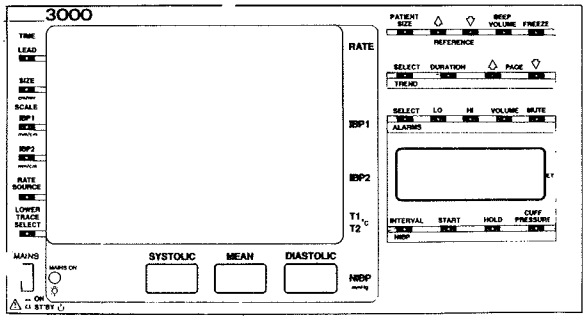
0334-00-0822-36 (-76)*
Installed Options:
SaO_2



0334-00-0822-38 (-78)*
Installed Options:
SaO_2, IBP-1, IBP-2



0334-00-0822-39 (-79)*
Installed Options:
NIBP, IBP-1



0334-00-0822-40 (-80)*
Installed Options:
NIBP, IBP-1, IBP-2

* numbers in parentheses are for 220V version.

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REPLACEMENT PARTS FOR: **ECG BOARD 0670-00-0224**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	ECG Amp Board	0670-00-0224
-	Exchange Board	0670-00-0224E
C1	CAP., 120pf, 5%, 500V	0283-01-5121
C2	CAP., 120pf, 5%, 500V	0283-01-5121
C3	CAP., 120pf, 5%, 500V	0283-01-5121
C4	CAP., 120pf, 5%, 500V	0283-01-5121
C5	CAP., 1000pfd, 5%, 300V	0283-01-3102
C6	CAP., 120pf, 5%, 500V	0283-01-5121
C7	CAP., 120pf, 5%, 500V	0283-01-5121
C8	CAP., 120pf, 5%, 500V	0283-01-5121
C9	CAP., 120pf, 5%, 500V	0283-01-5121
C10	CAP., 120pf, 5%, 500V	0283-01-5121
C11	CAP., 120pf, 5%, 500V	0283-01-5121
C12	CAP., 120pf, 5%, 500V	0283-01-5121
C13	CAP., 120pf, 5%, 500V	0283-01-5121
C14	CAP., .1uf, 10%, 100V	0283-04-0104
C15	CAP., .1uf, 10%, 100V	0283-04-0104
C16	CAP., .1uf, 10%, 100V	0283-04-0104
C17	CAP., .1uf, 10%, 100V	0283-04-0104
C18	CAP., .1uf, 10%, 100V	0283-04-0104
C19	CAP., .1uf, 10%, 100V	0283-04-0104
C20	CAP., .1uf, 10%, 100V	0283-04-0104
C21	CAP., 330pf, 10%, 200V	0283-05-0331
C22	CAP., 330pf, 10%, 200V	0283-05-0331
C23	CAP., .1uf, 10%, 100V	0283-04-0104
C24	CAP., .01uf, 10%, 100V	0283-05-0103
C25	CAP., .1uf, 10%, 100V	0283-04-0104
C26	CAP., .1uf, 10%, 100V	0283-04-0104
C27	CAP., .47uf, 10%, 50V	0283-04-0474
C28	CAP., .01uf, 10%, 100V	0283-05-0103
C29	CAP., .01uf, 10%, 100V	0283-05-0103
C30	CAP., .1uf, 10%, 100V	0283-04-0104
C31	CAP., 33uf, 20%, 10V	0290-02-0336
C32	CAP., 33uf, 20%, 10V	0290-02-0336
C33	CAP., .1uf, 10%, 100V	0283-04-0104
C34	CAP., .1uf, 10%, 100V	0283-04-0104
C35	CAP., .1uf, 10%, 100V	0283-04-0104
C36	CAP., 220pf, 10%, 100V	0283-05-0222
C37	CAP., 2uf, 10%, 50V	0285-09-0039
C39	CAP., .1uf, 10%, 100V	0283-04-0104
C40	CAP., .1uf, 10%, 100V	0283-04-0104
C41	CAP., .1uf, 10%, 100V	0283-04-0104
C42	CAP., .1uf, 10%, 100V	0283-04-0104
C43	CAP., 4.7uf, 20%, 35V	0290-02-3475
C44	CAP., .1uf, 10%, 100V	0283-04-0104
C45	CAP., .1uf, 10%, 100V	0283-04-0104
C46	CAP., .1uf, 10%, 100V	0283-04-0104
C47	CAP., .1uf, 10%, 100V	0283-04-0104
C48	CAP., .1uf, 10%, 100V	0283-04-0104
C50	CAP., .033uf, 10%, 100V	0283-04-0333

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
C51	CAP., .1uf, 10%, 100V	0283-04-0104
C52	CAP., .001uf, 10%, 100V	0283-05-0102
C53	CAP., .01uf, 10%, 100V	0283-05-0103
C54	CAP., .01uf, 10%, 100V	0283-05-0103
C55	CAP., .1uf, 10%, 100V	0283-04-0104
C56	CAP., .1uf, 10%, 100V	0283-04-0104
C57	CAP., 330pf, 10%, 200V	0283-05-0331
C58	CAP., .1uf, 10%, 100V	0283-04-0104
C59	CAP., .01uf, 10%, 100V	0283-05-0103
C60	CAP., .1uf, 10%, 100V	0283-04-0104
C61	CAP., .1uf, 10%, 100V	0283-04-0104
C62	CAP., .47uf, 10%, 50V	0283-04-0474
C63	CAP., .01uf, 10%, 100V	0283-05-0103
C64	CAP., .01uf, 10%, 100V	0283-05-0103
C65	CAP., 4.7uf, 20%, 35V	0290-02-3475
C66	CAP., 4.7uf, 20%, 35V	0290-02-3475
C67	CAP., 330pf, 10%, 200V	0283-05-0331
C68	CAP., .01uf, 10%, 100V	0283-05-0103
C69	CAP., .47uf, 10%, 50V	0283-04-0474
C70	CAP., .01uf, 10%, 100V	0283-05-0103
C71	CAP., .100pf, 10%, 200V	0283-05-0101
C72	CAP., .100pf, 10%, 200V	0283-05-0101
C73	CAP., .1uf, 10%, 100V	0283-04-0104
C74	CAP., .47uf, 10%, 50V	0283-04-0474
C75	CAP., .22uf, 10%, 50V	0283-04-0224
C76	CAP., 4.7uf, 20%, 35V	0290-02-3475
C77	CAP., 4.7uf, 20%, 35V	0290-02-3475
C78	CAP., .47uf, 10%, 50V	0283-04-0474
C79	CAP., .22uf, 10%, 50V	0283-04-0224
C80	CAP., .1uf, 10%, 100V	0283-04-0104
C81	CAP., 270pf, 10%, 1000V	0283-01-7271
C82	CAP., 270pf, 10%, 1000V	0283-01-7271
C84	CAP., 4.7uf, 20%, 35V	0290-02-3475
C85	CAP., 300pf, 10%, 200V	0283-05-0331
CR1	DIODE, IN914	0153-00-0014
CR2	DIODE, IN5233B	0153-00-0028
CR3	DIODE, IN746	0153-00-0009
CR4	DIODE, IN746	0153-00-0009
CR6	DIODE, 1N914	0153-00-0014
CR7	DIODE, Low Leakage FDH300	0153-00-0080
CR8	DIODE, Low Leakage FDH300	0153-00-0080
CR9	DIODE, 1N914	0153-00-0014
CR10	DIODE, 1N914	0153-00-0014
CR11	DIODE, 1N914	0153-00-0014
CR12	DIODE, 1N914	0153-00-0014
CR13	DIODE, 1N914	0153-00-0014
CR14	DIODE, 1N914	0153-00-0014
CR15	DIODE, 1N914	0153-00-0014
CR16	DIODE, 1N914	0153-00-0014
CR17	DIODE, 1N914	0153-00-0014
CR18	DIODE, 1N914	0153-00-0014
CR19	DIODE, 1N914	0153-00-0014
CR20	DIODE, 1N914	0153-00-0014
CR21	DIODE, 1N914	0153-00-0014
CR24	DIODE, 1N914	0153-00-0014
CR25	DIODE, 1N914	0153-00-0014

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REPLACEMENT PARTS FOR: **ECG BOARD 0670-00-0224**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
CR26	DIODE, 1N914	0153-00-0014
CR27	DIODE, 1N914	0153-00-0014
CR28	DIODE, 1N914	0153-00-0014
CR29	DIODE, 1N914	0153-00-0014
CR30	DIODE, 1N914	0153-00-0014
CR31	DIODE, 1N914	0153-00-0014
CR32	DIODE, 1N914	0153-00-0014
CR33	DIODE, 1N914	0153-00-0014
CR34	DIODE, 1N751A	0153-00-0040
Q1	Transistor, 2N4401	0151-00-0052
Q2	Transistor, 2N2222A	0151-00-0061
Q3	Transistor, 2N2907A	0151-00-0073
Q4	Transistor, 2N4401	0151-00-0052
Q5	Transistor, 2N4401	0151-00-0052
Q6	Transistor, 2N2907A	0151-00-0073
Q7	Transistor, 78L05	0151-00-0072
Q8	Transistor, 2N3645	0151-00-0037
Q9	Transistor, 2N4401	0151-00-0052
R1	RES., 1K, 5%, 1W	0303-00-0102
R2	RES., 1K, 5%, 1W	0303-00-0102
R3	RES., 1K, 5%, 1W	0303-00-0102
R4	RES., 1K, 5%, 1W	0303-00-0102
R5	RES., 1K, 5%, 1W	0303-00-0102
R6	RES., 24K, 5%, 1/4W	0315-01-0243
R7	RES., 24K, 5%, 1/4W	0315-01-0243
R8	RES., 24K, 5%, 1/4W	0315-01-0243
R9	RES., 24K, 5%, 1/4W	0315-01-0243
R10	RES., 24K, 5%, 1/4W	0315-01-0243
R11	RES., 22M, 5%, 1/4W	0315-01-0226
R12	RES., 22M, 5%, 1/4W	0315-01-0226
R13	RES., 22M, 5%, 1/4W	0315-01-0226
R14	RES., 22M, 5%, 1/4W	0315-01-0226
R15	RES., 100K, 1%, 1/8W	0309-00-1003
R16	RES., 47K, 5%, 1/4W	0315-01-0473
R17	RES., 47K, 5%, 1/4W	0315-01-0473
R18	RES., 47K, 5%, 1/4W	0315-01-0473
R19	RES., 47K, 5%, 1/4W	0315-01-0473
R20	RES., 47K, 5%, 1/4W	0315-01-0473
R21	RES., 47K, 5%, 1/4W	0315-01-0473
R22	RES., 47K, 5%, 1/4W	0315-01-0473
R23	RES., 47K, 5%, 1/4W	0315-01-0473
R24	RES., 1K, 5%, 1/4W	0315-00-0102
R25	RES., 10K, 1%, 1/8W	0309-00-1002
R26	RES., 10K, 1%, 1/8W	0309-00-1002
R27	RES., 10K, 1%, 1/8W	0309-00-1002
R28	RES., 10K, 1%, 1/8W	0309-00-1002
R29	RES., 10K, 1%, 1/8W	0309-00-1002
R30	RES., 10K, 1%, 1/8W	0309-00-1002

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
R31	RES., 10K, 1%, 1/8W	0309-00-1002
R32	RES., 10K, 1%, 1/8W	0309-00-1002
R33	RES., 10K, 1%, 1/8W	0309-00-1002
R34	RES., 47K, 5%, 1/4W	0315-00-0473
R35	RES., 47K, 5%, 1/4W	0315-00-0473
R36	RES., VAR., 100 ohms, 1T	0311-01-2101
R37	RES., 24K, 5%, 1/4W	0315-00-0243
R38	RES., 100K, 1%, 1/8W	0309-00-1003
R39	RES., 20K, 1%, 1/8W	0309-00-2002
R40	RES., 100K, 1%, 1/8W	0309-00-1003
R41	RES., 10K, 1%, 1/8W	0309-00-1002
R42	RES., 10K, 1%, 1/8W	0309-00-1002
R43	RES., 10K, 1%, 1/8W	0309-00-1002
R44	RES., 24K, 5%, 1/4W	0315-00-0243
R45	RES., 1K, 5%, 1/4W	0315-00-0102
R46	RES., 47K, 5%, 1/4W	0315-00-0473
R47	RES., 47K, 5%, 1/4W	0315-00-0473
R48	RES., 24K, 5%, 1/4W	0315-00-0243
R49	RES., 47K, 5%, 1/4W	0315-00-0473
R50	RES., 1K, 5%, 1/4W	0315-00-0102
R51	RES., 1K, 5%, 1/4W	0315-00-0102
R52	RES., 4.7K, 5%, 1/4W	0315-00-0472
R53	RES., 4.7K, 5%, 1/4W	0315-00-0472
R54	RES., 47K, 5%, 1/4W	0315-00-0473
R55	RES., 47K, 5%, 1/4W	0315-00-0473
R56	RES., 47K, 5%, 1/4W	0315-00-0473
R57	RES., FIXED METAL FILM, 2K, 1%	0309-00-2001
R58	RES., VAR., 2K, 1/2W	0311-01-2202
R59	RES., 200K, ±1%, 1/8W	0309-00-2003
R60	RES., 47K, 5%, 1/4W	0315-00-0473
R61	RES., 4.7K, 5%, 1/4W	0315-00-0472
R62	RES., 4.7K, 5%, 1/4W	0315-00-0472
R63	RES., 200K, 5%, 1/4W	0315-00-0204
R64	RES., 390K, 5%, 1/4W	0315-00-0394
R65	RES., 47K, 5%, 1/4W	0315-00-0473
R66	RES., 47K, 5%, 1/4W	0315-00-0473
R67	RES., 47K, 5%, 1/4W	0315-00-0473
R68	RES., 820K, 5%, 1/4W	0315-00-0824
R69	RES., 2M, 5%, 1/4W	0315-00-0205
R70	RES., 47 ohms, 5%, 1/4W	0315-00-0470
R71	RES., 1K, 5%, 1/4W	0315-00-0102
R72	RES., 47K, ±5%, 1/4W	0315-00-0473
R73	RES., 3.92K, 1%, 1/8W	0309-00-3921
R74	RES., 47 ohm, 5%, 1/4W	0315-00-0470
R75	RES., 47K, ±5%, 1/4W	0315-00-0473
R76	RES., 47K, 5%, 1/4W	0315-00-0473
R77	RES., 1K, 5%, 1/4W	0315-00-0102
R78	RES., 47K, 5%, 1/4W	0315-00-0473
R79	RES., 47K, 5%, 1/4W	0315-00-0473
R80	RES., 300K, 5%, 1/4W	0315-00-0304

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REF. NO.	DESCRIPTION	DATASCOPE PART NO.
R81	RES., 300K, 5%, 1/4W	0315-00-0304
R82	RES., 200K, 1%, 1/8W	0309-00-2003
R83	RES., 392K, 1%, 1/8W	0309-00-3923
R84	RES., 200K, 1%, 1/8W	0309-00-2003
R85	RES., 392K, 1%, 1/8W	0309-00-3923
R86	RES., 100K, 1%, 1/8W	0309-00-1003
R87	RES., 200K, 1%, 1/8W	0309-00-2003
R88	RES., 47 ohms, 5%, 1/4W	0315-00-0470
R89	RES., 47 ohms, 5%, 1/4W	0315-00-0470
R90	RES., 47 ohms, 5%, 1/4W	0315-00-0470
R91	RES., 47 ohms, 5%, 1/4W	0315-00-0470
R92	RES., 47 ohms, 5%, 1/4W	0315-00-0470
R93	RES., 200K, 1%, 1/8W	0309-00-2003
R94	RES., 47 ohms, 5%, 1/4W	0315-00-0470
R95	RES., 47 ohms, 5%, 1/4W	0315-00-0470
R96	RES., 100K, 1%, 1/8W	0309-00-1003
R97	RES., 100K, 1%, 1/8W	0309-00-1003
R98	RES., 200K, 1%, 1/8W	0309-00-2003
R99	RES., 200K, 1%, 1/8W	0309-00-2003
R100	RES., 47K, 5%, 1/4W	0315-00-0473
R101	RES., 4.7K, 5%, 1/4W	0315-00-0472
R102	RES., 47K, 5%, 1/4W	0315-00-0473
R104	RES., 47K, 5%, 1/4W	0315-00-0473
R105	RES., 115K, 1%, 1/8W	0309-00-1153
R106	RES., 115K, 1%, 1/8W	0309-00-1153
R107	RES., 47K, 5%, 1/4W	0315-00-0473
R108	RES., 47K, 5%, 1/4W	0315-00-0473
R109	RES., 24K, 5%, 1/4W	0315-00-0243
R110	RES., 1K, 5%, 1/4W	0315-00-0102
R111	RES., 1K, 5%, 1/4W	0315-00-0102
R112	RES., 1K, 5%, 1/4W	0315-00-0102
R113	RES., 1K, 5%, 1/4W	0315-00-0102
R114	RES., 47K, 5%, 1/4W	0315-00-0473
R115	RES., 200K, 5%, 1/4W	0315-00-0204
R116	RES., 390K, 5%, 1/4W	0315-00-0394
R117	RES., 47K, 5%, 1/4W	0315-00-0473
R118	RES., 47K, 5%, 1/4W	0315-00-0473
R119	RES., 1K, 5%, 1/4W	0315-00-0102
R120	RES., 240K, 5%, 1/4W	0315-00-0244
R121	RES., 1K, 5%, 1/4W	0315-00-0102
R122	RES., 1K, 5%, 1/4W	0315-00-0102
R123	RES., 4.7K, 5%, 1/4W	0315-00-0472
R124	RES., 820K, 5%, 1/4W	0315-00-0824
R125	RES., 390K, 5%, 1/4W	0315-00-0394
R126	RES., 820K, 5%, 1/4W	0315-00-0824
R127	RES., 47K, 5%, 1/4W	0315-00-0473
R128	RES., 24K, 5%, 1/4W	0315-00-0243
R129	RES., 200K, 5%, 1/4W	0315-00-0204
R130	RES., 24K, 5%, 1/4W	0315-00-0243
R131	RES., 47K, 5%, 1/4W	0315-00-0473
R132	RES., 47K, 5%, 1/4W	0315-00-0473
R133	RES., 47K, 5%, 1/4W	0315-00-0473
R134	RES., 47K, 5%, 1/4W	0315-00-0473
R135	RES., 47K, 5%, 1/4W	0315-00-0473

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
R136	RES., 47K, 5%, 1/4W	0315-00-0473
R137	RES., 10 ohms, 5%, 1/4W	0315-00-0100
R138	RES., 10 ohms, 5%, 1/4W	0315-00-0100
R139	RES., 4.7K, 5%, 1/4W	0315-00-0472
R140	RES., 1K, 5%, 1/4W	0315-00-0102
R141	RES., 220 ohms, 5%, 1/4W	0315-00-0221
U1	I.C. 4051	0155-00-0122
U2	REG., AD580KH or SC3503T	0153-00-0093
U3	I.C. TL082	0155-00-0151
U4	I.C. TL082	0155-00-0151
U5	I.C. 4051	0155-00-0122
U6	I.C. 4051	0155-00-0122
U7	I.C. TL082	0155-00-0151
U8	I.C. TL082	0155-00-0151
U9	I.C. 4066	0155-00-0075
U10	I.C. 4066	0155-00-0075
U11	I.C. SPX-7133	0155-00-0121
U12	I.C. SPX-7133	0155-00-0121
U13	I.C. SPX-7133	0155-00-0121
U14	I.C. 40174	0155-00-0101
U15	I.C. TL082	0155-00-0151
U16	I.C. TL082	0155-00-0151
U17	I.C. 4538	0155-00-0112
U18	I.C. 4066	0155-00-0075
U19	I.C. TL082	0155-00-0151
U20	I.C. MC34082AP	0155-00-0407
U21	I.C. MC34082	0155-00-0407
U22	I.C. 4052	0155-00-0089
U23	I.C. SPX-7133	0155-00-0121
U24	I.C. 4093	0155-00-0225
U25	I.C. LF411ACN	0155-00-0224
T1	Transformer, Signal	0120-00-0072
T2	Transformer, Isolation	0120-00-0075
TP1	Terminal	0124-00-0064
TP2	Terminal	0124-00-0064
DG1 to DG6	Spark Gap, 1000V	0167-00-0003
XU2	Mounting Pad	0432-01-0002
J25	Connector, Male	0131-01-0012
F1	Fuse, 2.5A	0159-07-0006
F2	Fuse, 2.5A	0159-07-0006
	Wire, Bus, Solid	0007-02-0022
	Shrink Tubing	0008-01-0007
	Connector, Jack, P.C.	0136-00-0085
	Shield, Top	0200-00-0168
	Shield, Bottom	0200-00-0167
	Card Ejector	0367-00-0018

REPLACEMENT PARTS FOR: **ISOS. PULSE/PRESSURE BOARD 0670-00-0225 ***

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	Pressure Amp Board	0670-00-0225
-	Exchange Board	0670-00-0225E
C1	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C2	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C3	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C4	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C5	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C6	CAP., FXD., 2200pf, 10%, 100Vd	0283-05-0222
C7	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C8	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C9	CAP., FXD., 150uf, 20%, 15V	0290-02-4157
C10	CAP., FXD., 150uf, 20%, 15V	0290-02-4157
C11	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C12	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C13	CAP., FXD., 4.7uf, 20%, 35V	0290-02-3475
C14	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C15	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C16	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C17	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C18	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C19	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C20	CAP., FXD., 4.7uf, 20%, 35V	0290-02-3475
C21	CAP., FXD., 4.7uf, 20%, 35V	0290-02-3475
C22	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C23	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C24	CAP., FXD., 0.47uf, 10%, 50V	0283-04-0474
C25	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C27	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C28	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C29	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C31	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C32	CAP., FXD., 4.7uf, 20%, 35V	0290-02-3475
C33	CAP., FXD., 0.47uf, 10%, 50V	0283-04-0474
C34	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C35	CAP., FXD., 33uf, 20%, 10V	0290-02-0336
C36	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C37	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C38	CAP., FXD., 47pf, 10%, 200V	0283-05-0470
C39	CAP., FXD., 47pf, 10%, 200V	0283-05-0470
C40	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C41	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C42	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C43	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C44	CAP., FXD., 120pf, 10%, 200V	0283-05-0121
C46	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C47	CAP., FXD., 0.15uf, 2%, 50V	0285-10-0154
C48	CAP., FXD., 120pf, 10%, 200V	0283-05-0121
C50	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
C51	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C53	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C54	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C55	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C56	CAP., FXD., 120pf, 10%, 200V	0283-05-0121
C57	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C58	CAP., FXD., 0.15uf, 2%, 50V	0285-10-0154
C59	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C60	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C61	CAP., FXD., 120pf, 10%, 200V	0283-05-0121
C62	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C63	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C64	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C65	CAP., FXD., 4.7uf, 20%, 35V	0290-02-3475
C66	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C67	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C68	CAP., FXD., 120pf, 10%, 200V	0283-05-0121
C69	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C70	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C71	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C72	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C73	CAP., FXD., 120pf, 10%, 200V	0283-05-0121
C74	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C75	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C76	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C77	CAP., FXD., 470pf, 10%	0283-05-0471
C78	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C81	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C82	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C83	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C84	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C85	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C86	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C87	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C88	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C89	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C90	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C91	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C92	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C93	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C94	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C95	CAP., FXD., .22uf, 10%, 50V	0283-04-0224
C96	CAP., FXD., 470pf, 10%	0283-05-0471
C97	CAP., FXD., 470pf, 10%	0283-05-0471
C98	CAP., FXD., 470pf, 10%	0283-05-0471
C99	CAP., FXD., 470pf, 10%	0283-05-0471
C100	CAP., FXD., .001uf	0283-05-0102
C101	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C102	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C103	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C104	CAP., FXD., 0.047uf, 10%, 100V	0283-04-0473
C105	CAP., FXD., .001uf	0283-05-0102

* 0670-00-0406 is used if invasive blood pressure option is not installed in the monitor.

REPLACEMENT PARTS FOR: **ISOS. PULSE/PRESSURE BOARD 0670-00-0225 ***

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
C106	CAP., FXD., .001uf	0283-05-0102
C107	CAP., FXD., 4.7uf, 20%, 35V	0290-02-3475
C108	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C109	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C110	CAP., FXD., 470pf, 10%	0283-05-0471
C111	CAP., FXD., 470pf, 10%	0283-05-0471
C112	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C113	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
CR1	DIODE, 1N914	0153-00-0014
CR2	DIODE, 1N914	0153-00-0014
CR3	DIODE, 1N914	0153-00-0014
CR4	DIODE, 1N914	0153-00-0014
CR5	DIODE, 1N914	0153-00-0014
CR6	DIODE, 1N914	0153-00-0014
CR7	DIODE, 1N914	0153-00-0014
CR8	DIODE, 1N914	0153-00-0014
CR9	DIODE, 1N914	0153-00-0014
CR10	DIODE, 1N914	0153-00-0014
CR11	DIODE, 1N914	0153-00-0014
CR12	DIODE, 1N914	0153-00-0014
CR13	DIODE, 1N5817	0153-00-0069
CR14	DIODE, 1N5817	0153-00-0069
CR15	DIODE, 1N914	0153-00-0014
CR16	DIODE, 1N914	0153-00-0014
CR17	DIODE, 1N914	0153-00-0014
CR18	DIODE, 1N914	0153-00-0014
CR19	DIODE, 1N914	0153-00-0014
CR20	DIODE, 1N914	0153-00-0014
R1	RES., FXD., 100K, +5%, 1/4W	0315-00-0104
R2	RES., FXD., 10K, ±5%, 1/4W	0315-00-0103
R3	RES., FXD., 100K, ±5%, 1/4W	0315-00-0104
R4	RES., FXD., 2.4K, ±5%, 1/4W	0315-00-0242
R5	RES., FXD., 10 Meg, ±5%, 1/4W	0315-00-0106
R6	RES., FXD., 10K, ±5%, 1/4W	0315-00-0103
R7	RES., FXD., 75.0K, ±1%, 1/8W	0309-00-7502
R8	RES., FXD., 1.0K, ±1%, 1/8W	0309-00-1001
R9	RES., FXD., 75.0K, ±1%, 1/8W	0309-00-7502
R11	RES., FXD., 10 Meg, ±5%, 1/4W	0315-00-0106
R12	RES., FXD., 47.5K, 1%, 1/8W	0309-00-4752
R13	RES., FXD., 100K, ±1%, 1/8W	0309-00-1003
R14	RES., FXD., 33.2K, 1%, 1/8W	0309-00-3322
R15	RES., FXD., 12K, ±5%, 1/4W	0315-00-0123
R16	RES., FXD., 470K, ±5%, 1/4W	0315-00-0474
R17	RES., FXD., 100K, ±1%, 1/8W	0309-00-1003
R18	RES., FXD., 100K, ±1%, 1/8W	0309-00-1003
R19	RES., FXD., 100K, ±5%, 1/4W	0315-00-0104
R20	RES., FXD., 220K, ±5%, 1/4W	0315-00-0224
R21	RES., FXD., 22K, ±5%, 1/4W	0315-00-0223
R22	RES., FXD., 220K, ±5%, 1/4W	0315-00-0224
R23	RES., FXD., 1 Meg, ±5%, 1/4W	0315-00-0105
R24	RES., FXD., 100K, ±5%, 1/4W	0315-00-0104
R25	RES., FXD., 10 Meg, ±5%, 1/4W	0315-00-0106

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
R26	RES., FXD., 10K, ±5%, 1/4W	0315-00-0103
R27	RES., FXD., 75.0K, ±1%, 1/8W	0309-00-7502
R28	RES., FXD., 1.0K, ±1%, 1/8W	0309-00-1001
R29	RES., FXD., 75.0K, ±1%, 1/8W	0309-00-7502
R30	RES., FXD., 10K, ±5%, 1/4W	0315-00-0103
R31	RES., FXD., 10 Meg, ±5%, 1/4W	0315-00-0106
R32	RES., FXD., 200 ohm, ±5%, 1/4W	0315-00-0201
R33	RES., FXD., 200 ohm, ±5%, 1/4W	0315-00-0201
R34	RES., FXD., 1K, ±5%, 1/4W	0315-00-0102
R35	RES., FXD., 200 ohm, ±5%, 1/4W	0315-00-0201
R36	RES., FXD., 200 ohm, ±5%, 1/4W	0315-00-0201
R37	RES., FXD., 43K, ±5%, 1/4W	0315-00-0433
R38	RES., FXD., 47K, ±5%, 1/4W	0315-00-0473
R39	RES., FXD., 10K, ±5%, 1/4W	0315-00-0103
R40	RES., FXD., 1K, ±5%, 1/4W	0315-00-0102
R41	RES., FXD., 30.9K, ±1%, 1/8W	0309-00-3092
R42	RES., FXD., 47K, ±5%, 1/4W	0315-00-0473
R43	RES., FXD., 57.6K, ±1%, 1/8W	0309-00-5762
R44	RES., FXD., 47K, ±5%, 1/4W	0315-00-0473
R45	RES., FXD., 47K, ±5%, 1/4W	0315-00-0473
R46	RES., FXD., 100K, ±5%, 1/4W	0315-00-0104
R47	RES., FXD., 100K, ±1%, 1/8W	0309-00-1003
R48	RES., FXD., 10K, ±1%, 1/8W	0309-00-1002
R49	RES., FXD., 27K, ±5%, 1/4W	0315-00-0273
R50	RES., FXD., 2.7K, ±5%, 1/4W	0315-00-0272
R51	RES., VAR., 1K, 1 Turn	0311-01-2102
R52	RES., FXD., 20 ohm, ±5%, 1/4W	0315-00-0101
R53	RES., FXD., 1K, ±5%, 1/4W	0315-00-0102
R54	RES., FXD., 1K, ±5%, 1/4W	0315-00-0102
R55	RES., FXD., 47K, ±5%, 1/4W	0315-00-0473
R56	RES., FXD., 47K, ±5%, 1/4W	0315-00-0473
R57	RES., FXD., 2K, 5%, 1/4W	0315-00-0202
R58	RES., FXD., 2K, 5%, 1/4W	0315-00-0202
R59	RES., FXD., 100 ohm, ±5%, 1/4W	0315-00-0101
R60	RES., FXD., 27K, ±5%, 1/4W	0315-00-0273
R61	RES., FXD., 100K, ±1%, 1/8W	0309-00-1003
R62	RES., FXD., 200K, ±1%, 1/8W	0309-00-2003
R63	RES., FXD., 100K, ±1%, 1/8W	0309-00-1003
R64	RES., FXD., 102K, ±1%, 1/8W	0309-00-1023
R65	RES., FXD., 51.1K, ±1%, 1/8W	0309-00-5112
R66	RES., FXD., 154 ohm, ±1%, 1/8W	0309-00-1540
R67	RES., FXD., 75.0K, ±1%, 1/8W	0309-00-7502
R68	RES., VAR., 1K, 1 Turn	0311-01-2102
R69	RES., FXD., 1.0K, ±1%, 1/8W	0309-00-1001
R70	RES., FXD., 95.3K, ±1%, 1.8W	0309-00-9532
R71	RES., FXD., 47K, ±5%, 1/4W	0315-00-0473
R72	RES., FXD., 100K, ±1%, 1/8W	0309-00-1003
R73	RES., FXD., 2.0K, ±1%, 1/8W	0309-00-2001
R74	RES., FXD., 10K, ±5%, 1/4W	0315-00-0103
R75	RES., FXD., 46.4K, ±1%, 1/8W	0309-00-4642

* 0670-00-0406 is used if invasive blood pressure option is not installed in the monitor.

REPLACEMENT PARTS FOR: **ISOS. PULSE/PRESSURE BOARD 0670-00-0225 ***

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
R76	RES., FXD., 39.2K, ±1%, 1/8W	0309-00-3922
R77	RES., FXD., 39.2K, ±1%, 1/8W	0309-00-3922
R78	RES., FXD., 4.64K, ±1%, 1/8W	0309-00-4641
R79	RES., FXD., 255K, ±1%, 1.8W	0309-00-2553
R80	RES., FXD., 2.43K, ±1%, 1/8W	0309-00-2431
R81	RES., FXD., 3.9K, ±5%, 1/4W	0315-00-0392
R82	RES., FXD., 51.1K, ±1%, 1/8W	0309-00-5112
R83	RES., FXD., 102K, ±1%, 1/8W	0309-00-1023
R84	RES., FXD., 154 ohm, ±1%, 1/8W	0309-00-1540
R85	RES., FXD., 100K, ±1%, 1/8W	0309-00-1003
R86	RES., FXD., 200K, ±1%, 1/8W	0309-00-2003
R87	RES., FXD., 75.0K, ±1%, 1/8W	0309-00-7502
R88	RES., FXD., 100K, ±1%, 1/8W	0309-00-1003
R89	RES., FXD., 27K, ±5%, 1/4W	0315-00-0273
R90	RES., FXD., 100 ohm, ±5%, 1/4W	0315-00-0101
R91	RES., VAR., 1K, 1 Turn	0311-01-2102
R92	RES., FXD., 1.0K, ±1%, 1/8W	0309-00-1001
R93	RES., FXD., 47K, ±5%, 1/4W	0315-00-0473
R94	RES., FXD., 95.3K, ±1%, 1.8W	0309-00-9532
R95	RES., FXD., 100K, ±1%, 1/8W	0309-00-1003
R96	RES., FXD., 2.0K, ±1%, 1/8W	0309-00-2001
R101	RES., FXD., 24.9K, ±1%, 1/8W	0309-00-2492
R102	RES., FXD., 75.0K, ±1%, 1/8W	0309-00-7502
R109	RES., FXD., 24.9K, ±1%, 1/8W	0309-00-2492
R110	RES., FXD., 75.0K, ±1%, 1/8W	0309-00-7502
R119	RES., FXD., 100 ohm, ±5%, 1/4W	0315-00-0101
R136	RES., FXD., 100K, ±5%, 1/4W	0315-00-0104
R137	RES., FXD., 47K, ±5%, 1/4W	0315-00-0473
R139	RES., FXD., 47K, ±5%, 1/4W	0315-00-0473
R140	RES., FXD., 47K, ±5%, 1/4W	0315-00-0473
R141	RES., FXD., 10K, ±5%, 1/4W	0315-00-0103
R142	RES., FXD., 10K, ±5%, 1/4W	0315-00-0103
Q1	Transistor, 2N3638A	0151-00-0009
Q2	Transistor, 2N5484	0151-00-0028
Q3	Transistor, MJE-200	0151-00-0062
Q4	Transistor, MFE-200	0151-00-0062
Q5	Tranisitor, 2N3565	0151-00-0021
T1	Transformer, Signal	0120-00-0072
T2	Transformer, Isolation	0120-00-0075
T3	Transformer, Signal	0120-00-0072
L1	Inductor, 47uh	0108-05-0033
L2	Inductor, 47uh	0108-05-0033
L3	Inductor, 47uh	0108-05-0033
DG1	Spark Gap, 1KV	0167-00-0003

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
J23	Header, Right Angle, 12 Pin	0136-20-1012
J24	Header, Right Angle, 12 Pin	0136-20-1012
U1	I.C. Op-07	0155-00-0159
U2	I.C. Op-07	0155-00-0159
U3	I.C. TLO 82	0155-00-0151
U4	I.C. Op-07	0155-00-0159
U5	I.C. Op-07	0155-00-0159
U6	I.C. Op-07	0155-00-0159
U7	I.C. CD 4052	0155-00-0089
U8	Voltage Reg., ±5%, 78L05ACP	0151-00-0072
U9	I.C. CD 4053	0155-00-0086
U10	I.C. CD 4053	0155-00-0086
U11	I.C. MC74HC367	0155-00-0191
U12	I.C. LM324	0155-00-0053
U13	I.C. LT1014	0155-00-0443
U14	I.C. CD4556B	0155-00-0181
U15	RES. Ntwk, 10K, .5%, 14 Pin DIP	0307-00-0029
U16	RES. Ntwk, 10K, .5%, 14 Pin DIP	0307-00-0029
U17	I.C. CD 4053	0155-00-0086
U18	I.C. CD 4053	0155-00-0086
U19	I.C. DAC 7524	0155-00-0201
U20	I.C. DAC 7524	0155-00-0201
U21	I.C. TLO 82	0155-00-0151
U22	I.C. CD 4013	0155-00-0066
U23	I.C. Op-07	0155-00-0159
U24	I.C. CD 4013	0155-00-0066
U25	I.C. LM 324	0155-00-0053
U27	I.C. DC40174	0155-00-0101
U28	I.C. CD 4053	0155-00-0086
U29	I.C. Op-07	0155-00-0159
U30	I.C. CD 4052	0155-00-0089
U31	I.C. Op-07	0155-00-0159
U32	I.C. CD 4052	0155-00-0089
U33	I.C. 74HC04	0155-00-0212
U34	I.C. SPX 7133	0155-00-0121
U35	I.C. SPX 7133	0155-00-0121
U36	Voltage Reg., ±5%, 78L05ACP	0151-00-0072
U37	I.C. CD 4053	0155-00-0086
	Wire Hook-up, Solid, 22 AWG BLK	0006-04-2200
	Terminal, Turret	0124-00-0064
	Insulator Assy	0349-00-0052
	Standoff, Nylon, 4-40 UNC thru	0361-04-0022
	Screw, Nylon, 4-40 x 3/16	0212-01-0403
	Standoff, Alum 4-40 thru	0361-04-0028
	Screw, Nylon FH 4-40 x 1/4 Lg	0222-01-0404

* 0670-00-0406 is used if invasive blood pressure option is not installed in the monitor.

REPLACEMENT PARTS FOR: **REFRESH MEMORY BOARD 0670-01-0226**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	Refresh Memory Board	0670-01-0226
-	Exchange Board	0670-01-0226E
C1	Cap., 56pf, 200V, 10%	0283-05-0560
C2	Cap., .1uF, 5%	0290-04-2104
C3	Cap., .047uF, 100V, 10%	0283-04-0473
C4	Cap., .01uF, 100V, 10%	0283-05-0103
C5	Cap., .1uF, 100V, 10%	0283-04-0104
C6	Cap., .1uF, 100V, 10%	0283-04-0104
C7	Cap., .1uF, 100V, 10%	0283-04-0104
C8	Cap., .1uF, 100V, 10%	0283-04-0104
C9	Cap., .1uF, 100V, 10%	0283-04-0104
C10	Cap., .1uF, 100V, 10%	0283-04-0104
C12	Cap. Tant, 2.2uF, 35V, 20%	0290-02-3225
C13	Cap., .1uF, 100V, 10%	0283-04-0104
C14	Cap., .1uF, 100V, 10%	0283-04-0104
C15	Cap., .1uF, 100V, 10%	0283-04-0104
C16	Cap., .1uF, 100V, 10%	0283-04-0104
C17	Cap., .047uF, 100V, 10%	0283-04-0473
C18	Cap., 1200pf, 100V, 2%	0283-05-2122
C19	Cap., 1200pf, 100V, 2%	0283-05-2122
C20	Cap., 120pf, 500V, 5%	0283-01-5121
C21	Cap., .01uF, 100V, 10%	0283-05-0103
C22	Cap., 4.7uF, 35V	0290-02-3475
C23	Cap., 22pf, 200V, 10%	0283-05-0220
C24	Cap., .1uF, 100V, 10%	0283-04-0104
C25	Cap., .1uF, 100V, 10%	0283-04-0104
C26	Cap., .1uF, 100V, 10%	0283-04-0104
C27	Cap., .1uF, 100V, 10%	0283-04-0104
C28	Cap., .1uF, 100V, 10%	0283-04-0104
C29	Cap., .1uF, 100V, 10%	0283-04-0104
C30	Cap., .1uF, 100V, 10%	0283-04-0104
C31	Cap., 4.7uF, 35V	0290-02-3475
C32	Cap., 4.7uF, 35V	0290-02-3475
C33	Cap., 200pf, 100V, 2%	0283-05-2201
C34	Cap., 330pf, 100V, 2%	0283-05-2331
C35	Cap., .1uF, 100V, 10%	0283-04-0104
C36	Cap., .1uF, 100V, 10%	0283-04-0104
C37	Cap., .047uF, 100V, 10%	0283-04-0473
C38	Cap., .1uF, 50V, 2%	0285-10-0104
C39	Cap., .1uF, 100V, 10%	0283-04-0104
C40	Cap., .33uF, 50V, 10%	0283-04-0334
C41	Cap., .12uF, 50V, 2%	0285-10-0124
C42	Cap., .1uF, 50V, 2%	0285-10-0104
C43	Cap., .15uF, 50V, 2%	0285-10-0154
C44	Cap., .068uF, 50V, 2%	0285-10-0683
C45	Cap., .15uF, 50V, 2%	0285-10-0154
C46	Cap., .027uF, 75V, 2%	0285-10-0273
C47	Cap., .12uF, 50V, 2%	0285-10-0124
C48	Cap. Tant, 10uF, 25V, 20%	0290-02-2106
C49	Cap., .0022uF, 100V, 10%	0283-05-0222
C50	Cap., .01uF, 100V, 10%	0283-05-0103
C51	Cap., .01uF, 100V, 10%	0283-05-0103
C52	Cap., .001uF, 200V, 10%	0283-05-0102

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
CR1	Diode, 1N914	0153-00-0014
CR2	Diode, 1N914	0153-00-0014
R1	Res., 1.65K, 1/8W, 1%	0309-00-1651
R2	Res., 6.65K, 1/8W, 1%	0309-00-6651
R4	Res., 20.5K, 1/8W, 1%	0309-00-2052
R5	Res., 1.65K, 1/8W, 1%	0309-00-1651
R6	Res., 10K, 1/8W, 1%	0309-00-1002
R7	Res., 51K, 1/4W, 5%	0315-00-0513
R8	Res., 10K, 1/4W, 5%	0315-00-0103
R9	Res., 20ohm , 1/4W, 5%	0315-00-0200
R11	Res., 20ohm , 1/4W, 5%	0315-00-0200
R12	Res., 42.2K, 1/8W, 1%	0309-00-4222
R13	Res., 165K, 1/8W, 1%	0309-00-1653
R14	Res., 42.2K, 1/8W, 1%	0309-00-4222
R15	Res., 249K, 1/8W, 1%	0309-00-2493
R16	Res., 124K, 1/8W, 1%	0309-00-1243
R17	Res., 124K, 1/8W, 1%	0309-00-1243
R19	Res., 24.9K, 1/8W, 1%	0309-00-2492
R20	Res., 18K, 1/4W, 5%	0315-00-0183
R21	Res., 100ohm, 1/4W, 5%	0315-00-0101
R22	Res., 10ohm, 1/4W, 5%	0315-00-0100
R23	Res., Var., 100K	0311-01-2104
R24	Res., 174K, 1/8W, 1%	0309-00-1743
R25	Res., 3.9K, 1/4W, 5%	0315-00-0392
R26	Res., 100K, 1/4W, 5%	0315-00-0104
R27	Res., 4.99K, 1/8W, 1%	0309-00-4991
R28	Res., 4.99K, 1/8W, 1%	0309-00-4991
R29	Res., 4.99K, 1/8W, 1%	0309-00-4991
R30	Res., 4.99K, 1/8W, 1%	0309-00-4991
R31	Res., 27K, 1/4W, 5%	0315-00-0273
R32	Res., 24.9K, 1/8W, 1%	0309-00-2492
R33	Res., 11K, 1/8W, 1%	0309-00-1102
R34	Res., 8.66K, 1/8W, 1%	0309-00-8661
R35	Res., 100ohm, 1/4W, 5%	0315-00-0101
R36	Res., 16.5K, 1/8W, 1%	0309-00-1652
R37	Res., 3.92K, 1/8W, 1%	0309-00-3921
R38	Res., 100K, 1/4W, 5%	0315-00-0104
R39	Res., 100K, 1/4W, 5%	0315-00-0104
R40	Res., Fxd., 9.76K, 1/8W, 1%	0309-00-9761
R41	Res., 10K, 1/8W, 1%	0309-00-1002
R42	Res., 10K, 1/8W, 1%	0309-00-1002
R43	Res., 10K, 1/8W, 1%	0309-00-1002
R44	Res., 10K, 1/8W, 1%	0309-00-1002
R45	Res., 10K, 1/4W, 5%	0315-00-0103
R46	Res., 10K, 1/4W, 5%	0315-00-0103
R47	Res., MF, 14.7K, 1/8W, 1/4%	0320-00-1472
R48	Res., MF, 14.7K, 1/8W, 1/4%	0320-00-1472
R49	Res., 14.0K, 1/8W, 1%	0309-00-1402
R50	Res., MF, 14.7K, 1/8W, 1/4%	0320-00-1472

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
R51	Res., Var., 10K Multi-Turn	0311-05-2103
R52	Res., 47.5K, 1/8W, 1%	0309-00-4752
R53	Res., 56.2K, 1/8W, 1%	0309-00-5622
R54	Res., 56.2K, 1/8W, 1%	0309-00-5622
R55	Res., 56.2K, 1/8W, 1%	0309-00-5622
R56	Res., 56.2K, 1/8W, 1%	0309-00-5622
R57	Res., 56.2K, 1/8W, 1%	0309-00-5622
R58	Res., 56.2K, 1/8W, 1%	0309-00-5622
R59	Res., 100ohm, 1/4W, 5%	0315-00-0101
J100	Header, Dbl Row	0136-24-1006
TP1	Terminal, Male	0124-00-0064
TP2	Terminal, Male	0124-00-0064
TP3	Terminal, Male	0124-00-0064
TP4	Terminal, Male	0124-00-0064
TP5	Terminal, Male	0124-00-0064
TP6	Terminal, Male	0124-00-0064
TP8	Terminal, Male	0124-00-0064
Q1	Transistor, MPS3646 NPN	0151-00-0083
U1	IC, F4520, Dual Binary Cntr	0155-00-0104
U2	IC, F4520, Dual Binary Cntr	0155-00-0104
U3	IC, F4078, 8-Input Nor	0155-00-0125
U4	IC, CD4023, 3-Input, Nand	0155-00-0065
U5	IC, CD4556, 1/4 Decoder	0155-00-0181
U6	IC, CD4556, 1/4 Decoder	0155-00-0181
U7	IC, CD4011, 2-Input Nand	0155-00-0059
U8	IC, CD4011, 2-Input Nand	0155-00-0059
U9	IC, CD4052, 4 Channel Mux	0155-00-0089
U10	IC, CD4001, 2-Input Nor	0155-00-0074
U11	IC, CD4556, 1/4 Decoder	0155-00-0181
U12	IC, CD4069, Hex. Inverter	0155-00-0081
U13	IC, CD4013, Dual D F/F	0155-00-0066
U14	IC, LM324, Quad Op-Amp	0155-00-0053
U15	IC, LM324, Quad Op-Amp	0155-00-0053
U16	IC, TL082, Dual Bi-Fet Op-Amp	0155-00-0151
U17	IC, F4520, Dual Binary Cntr	0155-00-0104
U18	IC, 6116, CMOS ST. RAM	0155-00-0207
U20	IC, AD7524 or MP7524, DAC	0155-00-0201
U21	IC, AD7524 or MP7524, DAC	0155-00-0201
U22	IC, 6116, CMOS ST. RAM	0155-00-0207
U24	IC, F4520, Dual Binary Cntr	0155-00-0104
U25	IC, MC74HC367	0155-00-0191
U26	IC, MC74HC367	0155-00-0191
U27	IC, MC74HC367	0155-00-0191
U28	IC, 74C374, Octal D F/F	0155-00-0129
U29	IC, ADC0804, 8-Bit ADC	0155-00-0183
U30	IC, AD580KH or SG3503T	0153-00-0093

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
U31	IC, CD4052, 4 Channel Mux	0155-00-0089
U32	IC, F4520, Dual Binary Cntr	0155-00-0104
U33	IC, TL082, Dual Bi-Fet Op-Amp	0155-00-0151
U35	IC, CD4053, Analog Switch	0155-00-0086
U36	IC, 74C374, Octal D F/F	0155-00-0129
U37	IC, F40174, Hex. D F/F	0155-00-0101
U38	IC, CD4028, 1/10 Decoder	0155-00-0132
U39	IC, LM318, Op-Amp	0155-00-0158
U40	IC, CD4053, Analog Switch	0155-00-0086
U41	Res. Ntwk., 785-3-R10K	0307-01-0103
U42	Eprom, 2000 Refresh Memory	0155-90-0122-A
U43	IC, CD4053, Analog Switch	0155-00-0086
U44	Res. Ntwk., 10 Pin, 5.6K, 1/2W	0307-00-0020
U45	Res. Ntwk., 785-3-R10K	0307-01-0103
U46	IC, 78L05 Volt Reg	0155-00-0274
U47	IC, MC74HC367	0155-00-0191
U48	Res. Ntwk., 10 Pin, 5.6K, 1/2W	0307-00-0020
U49	IC, LM324, Quad Op-Amp	0155-00-0053
S1	Switch, S.P.D.T.	0261-00-0154
XJ100	Shunt	0131-00-0095
XU30	Mounting Pad	0432-01-0002
	Card Ejectors	0367-00-0018

REPLACEMENT PARTS FOR: **REFRESH MEMORY BOARD 0670-00-0397**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	Refresh Memory Board	0670-00-0397
-	Exchange Board	0670-00-0397E
C1	Cap., 56pf, 200V, 10%	0283-05-0560
C2	Cap., .1uF, 5%	0290-04-2104
C3	Cap., .047uF, 100V, 10%	0283-04-0473
C4	Cap., .01uF, 100V, 10%	0283-05-0103
C5	Cap., .1uF, 100V, 10%	0283-04-0104
C6	Cap., .1uF, 100V, 10%	0283-04-0104
C7	Cap., .1uF, 100V, 10%	0283-04-0104
C8	Cap., .1uF, 100V, 10%	0283-04-0104
C9	Cap., .1uF, 100V, 10%	0283-04-0104
C10	Cap., .1uF, 100V, 10%	0283-04-0104
C12	Cap. Tant, 2.2uF, 35V, 20%	0290-02-3225
C13	Cap., .1uF, 100V, 10%	0283-04-0104
C14	Cap., .1uF, 100V, 10%	0283-04-0104
C15	Cap., .1uF, 100V, 10%	0283-04-0104
C16	Cap., .1uF, 100V, 10%	0283-04-0104
C17	Cap., .047uF, 100V, 10%	0283-04-0473
C18	Cap., 1200pf, 100V, 2%	0283-05-2122
C19	Cap., 1200pf, 100V, 2%	0283-05-2122
C20	Cap., 120pf, 500V, 5%	0283-01-5121
C21	Cap., .01uF, 100V, 10%	0283-05-0103
C22	Cap., 4.7uF, 35V	0290-02-3475
C23	Cap., 22pf, 200V, 10%	0283-05-0220
C24	Cap., .1uF, 100V, 10%	0283-04-0104
C25	Cap., .1uF, 100V, 10%	0283-04-0104
C26	Cap., .1uF, 100V, 10%	0283-04-0104
C27	Cap., .1uF, 100V, 10%	0283-04-0104
C28	Cap., .1uF, 100V, 10%	0283-04-0104
C29	Cap., .1uF, 100V, 10%	0283-04-0104
C30	Cap., .1uF, 100V, 10%	0283-04-0104
C31	Cap., 4.7uF, 35V	0290-02-3475
C32	Cap., 4.7uF, 35V	0290-02-3475
C33	Cap., 200pf, 100V, 2%	0283-05-2201
C34	Cap., 330pf, 100V, 2%	0283-05-2331
C35	Cap., .1uF, 100V, 10%	0283-04-0104
C36	Cap., .1uF, 100V, 10%	0283-04-0104
C37	Cap., .047uF, 100V, 10%	0283-04-0473
C38	Cap., .1uF, 50V, 2%	0285-10-0104
C39	Cap., .1uF, 100V, 10%	0283-04-0104
C40	Cap., .33uF, 50V, 10%	0283-04-0334
C41	Cap., .12uF, 50V, 2%	0285-10-0124
C42	Cap., .1uF, 50V, 2%	0285-10-0104
C43	Cap., .15uF, 50V, 2%	0285-10-0154
C44	Cap., .068uF, 50V, 2%	0285-10-0683
C45	Cap., .15uF, 50V, 2%	0285-10-0154
C46	Cap., .027uF, 75V, 2%	0285-10-0273
C47	Cap., .12uF, 50V, 2%	0285-10-0124
C48	Cap. Tant, 10uF, 25V, 20%	0290-02-2106
C49	Cap., .0022uF, 100V, 10%	0283-05-0222
C50	Cap., .01uF, 100V, 10%	0283-05-0103
C51	Cap., .01uF, 100V, 10%	0283-05-0103
C52	Cap., .001uF, 200V, 10%	0283-05-0102

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
CR1	Diode, 1N914	0153-00-0014
CR2	Diode, 1N914	0153-00-0014
R1	Res., 1.65K, 1/8W, 1%	0309-00-1651
R2	Res., 6.65K, 1/8W, 1%	0309-00-6651
R4	Res., 20.5K, 1/8W, 1%	0309-00-2052
R5	Res., 1.65K, 1/8W, 1%	0309-00-1651
R6	Res., 10K, 1/8W, 1%	0309-00-1002
R7	Res., 51K, 1/4W, 5%	0315-00-0513
R8	Res., 10K, 1/4W, 5%	0315-00-0103
R9	Res., 20ohm , 1/4W, 5%	0315-00-0200
R11	Res., 20ohm , 1/4W, 5%	0315-00-0200
R12	Res., 42.2K, 1/8W, 1%	0309-00-4222
R13	Res., 165K, 1/8W, 1%	0309-00-1653
R14	Res., 42.2K, 1/8W, 1%	0309-00-4222
R15	Res., 249K, 1/8W, 1%	0309-00-2493
R16	Res., 124K, 1/8W, 1%	0309-00-1243
R17	Res., 124K, 1/8W, 1%	0309-00-1243
R19	Res., 24.9K, 1/8W, 1%	0309-00-2492
R20	Res., 18K, 1/4W, 5%	0315-00-0183
R21	Res., 100ohm, 1/4W, 5%	0315-00-0101
R22	Res., 10ohm, 1/4W, 5%	0315-00-0100
R23	Res., Var., 100K	0311-01-2104
R24	Res., 174K, 1/8W, 1%	0309-00-1743
R25	Res., 3.9K, 1/4W, 5%	0315-00-0392
R26	Res., 100K, 1/4W, 5%	0315-00-0104
R27	Res., 4.99K, 1/8W, 1%	0309-00-4991
R28	Res., 4.99K, 1/8W, 1%	0309-00-4991
R29	Res., 4.99K, 1/8W, 1%	0309-00-4991
R30	Res., 4.99K, 1/8W, 1%	0309-00-4991
R31	Res., 27K, 1/4W, 5%	0315-00-0273
R32	Res., 24.9K, 1/8W, 1%	0309-00-2492
R33	Res., 11K, 1/8W, 1%	0309-00-1102
R34	Res., 8.66K, 1/8W, 1%	0309-00-8661
R35	Res., 100ohm, 1/4W, 5%	0315-00-0101
R36	Res., 16.5K, 1/8W, 1%	0309-00-1652
R37	Res., 3.92K, 1/8W, 1%	0309-00-3921
R38	Res., 100K, 1/4W, 5%	0315-00-0104
R39	Res., 100K, 1/4W, 5%	0315-00-0104
R40	Res., Fxd., 9.76K, 1/8W, 1%	0309-00-9761
R41	Res., 10K, 1/8W, 1%	0309-00-1002
R42	Res., 10K, 1/8W, 1%	0309-00-1002
R43	Res., 10K, 1/8W, 1%	0309-00-1002
R44	Res., 10K, 1/8W, 1%	0309-00-1002
R45	Res., 10K, 1/4W, 5%	0315-00-0103
R46	Res., 10K, 1/4W, 5%	0315-00-0103
R47	Res., MF, 14.7K, 1/8W, 1/4%	0320-00-1472
R48	Res., MF, 14.7K, 1/8W, 1/4%	0320-00-1472
R49	Res., 14.0K, 1/8W, 1%	0309-00-1402
R50	Res., MF, 14.7K, 1/8W, 1/4%	0320-00-1472

Added 06/15/89

REPLACEMENT PARTS FOR: **REFRESH MEMORY BOARD 0670-00-0397**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
R51	Res., Var., 10K Multi-Turn	0311-05-2103
R52	Res., 47.5K, 1/8W, 1%	0309-00-4752
R53	Res., 56.2K, 1/8W, 1%	0309-00-5622
R54	Res., 56.2K, 1/8W, 1%	0309-00-5622
R55	Res., 56.2K, 1/8W, 1%	0309-00-5622
R56	Res., 56.2K, 1/8W, 1%	0309-00-5622
R57	Res., 56.2K, 1/8W, 1%	0309-00-5622
R58	Res., 56.2K, 1/8W, 1%	0309-00-5622
R59	Res., 100ohm, 1/4W, 5%	0315-00-0101
J100	Header, Dbl Row	0136-24-1006
TP1	Terminal, Male	0124-00-0064
TP2	Terminal, Male	0124-00-0064
TP3	Terminal, Male	0124-00-0064
TP4	Terminal, Male	0124-00-0064
TP5	Terminal, Male	0124-00-0064
TP6	Terminal, Male	0124-00-0064
TP8	Terminal, Male	0124-00-0064
Q1	Transistor, MPS3646 NPN	0151-00-0083
U1	IC, F4520, Dual Binary Cntr	0155-00-0104
U2	IC, F4520, Dual Binary Cntr	0155-00-0104
U3	IC, F4078, 8-Input Nor	0155-00-0125
U4	IC, CD4023, 3-Input, Nand	0155-00-0065
U5	IC, CD4556, 1/4 Decoder	0155-00-0181
U6	IC, CD4556, 1/4 Decoder	0155-00-0181
U7	IC, CD4011, 2-Input Nand	0155-00-0059
U8	IC, CD4011, 2-Input Nand	0155-00-0059
U9	IC, CD4052, 4 Channel Mux	0155-00-0089
U10	IC, CD4001, 2-Input Nor	0155-00-0074
U11	IC, CD4556, 1/4 Decoder	0155-00-0181
U12	IC, CD4069, Hex. Inverter	0155-00-0081
U13	IC, CD4013, Dual D F/F	0155-00-0066
U14	IC, LM324, Quad Op-Amp	0155-00-0053
U15	IC, LM324, Quad Op-Amp	0155-00-0053
U16	IC, TL082, Dual Bi-Fet Op-Amp	0155-00-0151
U17	IC, F4520, Dual Binary Cntr	0155-00-0104
U18	IC, 6116, CMOS ST. RAM	0155-00-0207
U20	IC, AD7524 or MP7524, DAC	0155-00-0201
U21	IC, AD7524 or MP7524, DAC	0155-00-0201
U22	IC, 6116, CMOS ST. RAM	0155-00-0207
U24	IC, F4520, Dual Binary Cntr	0155-00-0104
U25	IC, MC74HC367	0155-00-0191
U26	IC, MC74HC367	0155-00-0191
U27	IC, MC74HC367	0155-00-0191
U28	IC, 74C374, Octal D F/F	0155-00-0129
U29	IC, ADC0804, 8-Bit ADC	0155-00-0183
U30	IC, AD580KH or SG3503T	0153-00-0093

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
U31	IC, CD4052, 4 Channel Mux	0155-00-0089
U32	IC, F4520, Dual Binary Cntr	0155-00-0104
U33	IC, TL082, Dual Bi-Fet Op-Amp	0155-00-0151
U35	IC, CD4053, Analog Switch	0155-00-0086
U36	IC, 74C374, Octal D F/F	0155-00-0129
U37	IC, F40174, Hex. D F/F	0155-00-0101
U38	IC, CD4028, 1/10 Decoder	0155-00-0132
U39	IC, LM318, Op-Amp	0155-00-0158
U40	IC, CD4053, Analog Switch	0155-00-0086
U41	Res. Ntwk., 785-3-R10K	0307-01-0103
U42	Eprom, 2000 Refresh Memory	0155-90-0122-A
U43	IC, CD4053, Analog Switch	0155-00-0086
U44	Res. Ntwk., 10 Pin, 5.6K, 1/2W	0307-00-0020
U45	Res. Ntwk., 785-3-R10K	0307-01-0103
U46	IC, 78L05 Volt Reg	0155-00-0274
U47	IC, MC74HC367	0155-00-0191
U48	Res. Ntwk., 10 Pin, 5.6K, 1/2W	0307-00-0020
U49	IC, LM324, Quad Op-Amp	0155-00-0053
S1	Switch, S.P.D.T.	0261-00-0154
XJ100	Shunt	0131-00-0095
XU30	Mounting Pad	0432-01-0002
	Card Ejectors	0367-00-0018

REPLACEMENT PARTS FOR: **DEFLECTION BOARD 0670-00-0230**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	Deflection Board	0670-00-0230
-	Exchange Board	0670-00-0230E
C1	CAP., .1uf, 100V	0283-04-0104
C2	CAP., .1uf, 100V	0283-04-0104
C3	CAP., 330pf, 200V	0283-05-0331
C4	CAP., .1uf, 100V	0283-04-0104
C5	CAP., .1uf, 100V	0283-04-0104
C6	CAP., 0.01uf, 100V	0283-05-0103
C7	CAP., 56pf, 200V	0283-05-0560
C8	CAP., .47uf, 50V, 10%	0283-04-0474
C9	CAP., 4.7uf, 35V	0290-02-3475
C10	CAP., 4.7uf, 35V	0290-02-3475
C11	CAP., 330pf, 200V	0283-05-0331
C12	CAP., 330pf, 200V	0283-05-0331
C13	CAP., .1uf, 100V	0283-04-0104
C14	CAP., .1uf, 100V	0283-04-0104
C15	CAP., .1uf, 100V	0283-04-0104
C16	CAP., .1uf, 100V	0283-04-0104
C17	CAP., .1uf, 100V	0283-04-0104
C18	CAP., .0015uf, 100V	0283-02-0152
C19	CAP., .1uf, 100V	0283-04-0104
C20	CAP., .001uf, 200V, 10%	0283-05-0102
C21	CAP., .1uf, 100V	0283-04-0104
C22	CAP., .1uf, 100V	0283-04-0104
C23	CAP., 2200pf, 100V	0283-05-0222
C24	CAP., .1uf, 100V	0283-04-0104
C25	CAP., 68uf, 15V	0290-02-4686
C26	CAP., 68uf, 15V	0290-02-4686
C27	CAP., .1uf, 100V	0283-04-0104
C28	CAP., 2200pf, 100V	0283-05-0222
C31	CAP., 2200pf, 100V	0283-05-0222
C32	CAP., 2200pf, 100V	0283-05-0222
C33	CAP., .1uf, 100V	0283-04-0104
C34	CAP., 2200pf, 100V	0283-05-0222
C35	CAP., 2200pf, 100V	0283-05-0222
C36	CAP., 2200pf, 100V	0283-05-0222
C37	CAP., 68uf, 15V	0290-02-4686
C38	CAP., .47uf, 50V, 10%	0283-04-0474
C39	CAP., 68uf, 15V	0290-02-4686
C40	CAP., .47uf, 50V, 10%	0283-04-0474
C41	CAP., 2200pf, 100V	0283-05-0222
C42	CAP., 2200pf, 100V	0283-05-0222
C43	CAP., 2200pf, 100V	0283-05-0222
C44	CAP., 2200pf, 100V	0283-05-0222
C45	CAP., .47uf, 50V, 10%	0283-04-0474
C46	CAP., .47uf, 50V, 10%	0283-04-0474
C47	CAP., 2200pf, 100V	0283-05-0222
C48	CAP., 2200pf, 100V	0283-05-0222
C49	CAP., 2200pf, 100V	0283-05-0222
C50	CAP., 2200pf, 100V	0283-05-0222

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
C51	CAP., 2200pf, 100V	0283-05-0222
C52	CAP., 2200pf, 100V	0283-05-0222
C53	CAP., .1uf, 100V	0283-04-0104
C54	CAP., 0.01uf, 100V	0283-05-0103
C55	CAP., 0.01uf, 100V	0283-05-0103
C56	CAP., 330pf, 200V	0283-05-0331
C57	CAP., 0.01uf, 100V	0283-05-0103
C59	CAP., .1uf, 100V	0283-04-0104
C60	CAP., .1uf, 100V	0283-04-0104
C61	CAP., .1uf, 100V	0283-04-0104
C62	CAP., 330pf, 200V	0283-05-0331
C63	CAP., 0.01uf, 100V	0283-05-0103
C64	CAP., 0.01uf, 100V	0283-05-0103
C65	CAP., 4.7uf, 35V	0290-02-3475
C66	CAP., 0.01uf, 100V	0283-05-0103
C67	CAP., .001uf, 200V, 10%	0283-05-0102
C68	CAP., 47pf, 10%, 200V	0283-05-0470
C71	CAP., 47pf, 10%, 200V	0283-05-0470
C72	CAP., 47pf, 10%, 200V	0283-05-0470
CR1	DIODE, 1N4148	0153-00-0014
CR2	DIODE, 1N4148	0153-00-0014
CR3		
CR4		
CR5	DIODE, 1N4148	0153-00-0014
CR6	DIODE, 1N5817	0153-00-0069
CR7	DIODE, 1N5817	0153-00-0069
CR8	DIODE, 1N5817	0153-00-0069
CR9	DIODE, 1N5817	0153-00-0069
CR10	DIODE, 1N5817	0153-00-0069
CR11	DIODE, 1N5817	0153-00-0069
CR12	DIODE, 1N5817	0153-00-0069
CR13	DIODE, 1N5817	0153-00-0069
CR14	DIODE, 1N4148	0153-00-0014
CR15	DIODE, 1N4148	0153-00-0014
CR16	DIODE, 1N4148	0153-00-0014
CR17	DIODE, 1N4148	0153-00-0014
R1	RES., 12.1K, 1.8W, +1%	0309-00-1212
R2	RES., 10K, 1/8W, +1%	0309-00-1002
R3	RES., 12.1K, 1.8W, +1%	0309-00-1212
R4	RES., 23.7K, 1/8W, +1%	0309-00-2372
R5	RES., VAR., 1K, 1/2W, 10%	0311-01-2102
R6	RES., 1.8K, 1/4W, +5%	0315-00-0182
R7	RES., 10K, 1/8W, +1%	0309-00-1002
R8	RES., 10K, 1/8W, +1%	0309-00-1002
R9	RES., VAR., 1K, 1/2W, 10%	0311-01-2102
R10	RES., 4.7K, 1/4W, +5%	0315-00-0472
R11	RES., 4.7K, 1/4W, +5%	0315-00-0472
R12	RES., 2.2K, 1/4W, +5%	0315-00-0222
R13	RES., 470K, 1/4W, +5%	0315-00-0474
R14	RES., 4.99K, 1/8W, +1%	0309-00-4991
R15	RES., 18 ohm, 1/4W, +5%	0315-00-0180

REPLACEMENT PARTS FOR: **DEFLECTION BOARD 0670-00-0230**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
R16	RES., 464 ohm, 1/8W, ±1%	0309-00-4640
R17	RES., 18 ohm, 1/4W, ±5%	0315-00-0180
R18	RES., 464 ohm, 1/8W, ±1%	0309-00-4640
R19	RES., 4.99K, 1/8W, ±1%	0309-00-4991
R20	RES., 10K, 1/8W, ±1%	0309-00-1002
R21	RES., 10K, 1/8W, ±1%	0309-00-1002
R22	RES., 10K, 1/8W, ±1%	0309-00-1002
R23	RES., 20K, 1/8W, ±1%	0309-00-2002
R24	RES., VAR., 1K, 1/2W, 10%	0311-01-2102
R25	RES., 10K, 1/8W, ±1%	0309-00-1002
R26	RES., 1.8K, 1/4W, ±5%	0315-00-0182
R27	RES., VAR., 1K, 1/2W, 10%	0311-01-2102
R28	RES., 4.7K, 1/4W, ±5%	0315-00-0472
R29	RES., 4.7K, 1/4W, ±5%	0315-00-0472
R30	RES., 10K, 1/8W, ±1%	0309-00-1002
R31	RES., 1K, 1/8W, ±1%	0309-00-1001
R32	RES., 100K, 1/8W, ±1%	0309-00-1003
R33	RES., 464 ohm, 1/8W, ±1%	0309-00-4640
R34	RES., 1.50K, 1/8W, ±1%	0309-00-1501
R35	RES., 464 ohm, 1/8W, ±1%	0309-00-4640
R36	RES., 1.50K, 1/8W, ±1%	0309-00-1501
R37	RES., 2.2K, 1/4W, ±5%	0315-00-0222
R38	RES., 2.2K, 1/4W, ±5%	0315-00-0222
R39	RES., 820 ohm, 1/4W, ±5%	0315-00-0821
R40	RES., 1.8K, 1/4W, ±5%	0315-00-0182
R41	RES., 1.5K, 1/4W, ±5%	0315-00-0152
R42	RES., 2.2K, 1/4W, ±5%	0315-00-0222
R43	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R44	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R45	RES., 5.1K, 1/4W, ±5%	0315-00-0512
R46	RES., 4.7K, 1/4W, ±5%	0315-00-0472
R47	RES., 2.2K, 1/4W, ±5%	0315-00-0222
R48	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R49	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R50	RES., 4.7K, 1/4W, ±5%	0315-00-0472
R51	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R52	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R53	RES., 82 ohm, 1/4W, ±5%	0315-00-0820
R54	RES., 82 ohm, 1/4W, ±5%	0315-00-0820
R55	RES., 56 ohm, 1/4W, ±5%	0315-00-0560
R56	RES., 56 ohm, 1/4W, ±5%	0315-00-0560
R57	RES., 82 ohm, 1/4W, ±5%	0315-00-0820
R58	RES., 82 ohm, 1/4W, ±5%	0315-00-0820
R59	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R60	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R61	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R62	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R63	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R64	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R65	RES., 47 ohm, 1/4W, ±5%	0315-00-0470

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
R66	RES., 47 ohm, 1/4W, ±5%	0315-00-0470
R67	RES., 47 ohm, 1/4W, ±5%	0315-00-0470
R68	RES., 47 ohm, 1/4W, ±5%	0315-00-0470
R69	RES., 47 ohm, 1/4W, ±5%	0315-00-0470
R70	RES., 47 ohm, 1/4W, ±5%	0315-00-0470
R71	RES., 100 ohm, 1/4W, ±5%	0315-00-0101
R72	RES., 330 ohm, 1/4W, ±5%	0315-00-0331
R73	RES., 100 ohm, 1/4W, ±5%	0315-00-0101
R74	RES., 47 ohm, 1/4W, ±5%	0315-00-0470
R75	RES., 47 ohm, 1/4W, ±5%	0315-00-0470
R76	RES., 47 ohm, 1/4W, ±5%	0315-00-0470
R77	RES., 47 ohm, 1/4W, ±5%	0315-00-0470
R78	RES., 47 ohm, 1/4W, ±5%	0315-00-0470
R79	RES., 47 ohm, 1/4W, ±5%	0315-00-0470
R80	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R81	RES., 360 ohm, 1/4W, ±5%	0315-00-0361
R82	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R83	RES., 360 ohm, 1/4W, ±5%	0315-00-0361
R84	RES., 16.9K, 1/8W, ±1%	0309-00-1692
R85	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R86	RES., 1.0K, 1/4W, ±5%	0315-00-0102
R87	RES., 27K, 1/4W, ±5%	0315-00-0273
R88	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R89	RES., 0.10 ohm, 0.9W, ±1%	0308-00-0060
R90	RES., 100 ohm, 1/4W, ±5%	0315-00-0101
R91	RES., 20 ohm, 1/4W, ±5%	0315-00-0200
R92	RES., 20K, 1/8W, ±1%	0309-00-2002
R93	RES., 27K, 1/4W, ±5%	0315-00-0273
R94	RES., 750 ohm, 1/4W, ±5%	0315-00-0751
R95	RES., 0.20 ohm, 0.9W, ±1%	0308-00-0062
R96	RES., 0.20 ohm, 0.9W, ±1%	0308-00-0062
R97	RES., 0.20 ohm, 0.9W, ±1%	0308-00-0062
R98	RES., 10 ohm, 1/4W, ±5%	0315-00-0100
R99	RES., 10 ohm, 1/4W, ±5%	0315-00-0100
R100	RES., 20 ohm, 1/4W, ±5%	0315-00-0200
R101	RES., 270 ohm, 1/4W, ±5%	0315-00-0271
R102	RES., 20K, 1/4W, ±5%	0315-00-0203
R103	RES., 2.2K, 1/4W, ±5%	0315-00-0222
R104	RES., 464K, 1/8W, 1%	0309-00-4643
R105	RES., 19.1K, 1/8W, 1%	0309-00-1912
R106	RES., 464K, 1/8W, 1%	0309-00-4643
R109	RES., 100 ohm, 1/4W, ±5%	0315-00-0101
R110	RES., 100 ohm, 1/4W, ±5%	0315-00-0101
R111	RES., 100 ohm, 1/4W, ±5%	0315-00-0101
R112	RES., 470 ohm, 1/4W, 5%	0315-00-0471
R113	RES., 470 ohm, 1/4W, 5%	0315-00-0471
R114	RES., 22.1K, 1/8W, 1%	0309-00-2212
F1	Fuse, 2.5A, (pico	0159-07-0006
J21	Connector, Header	0136-22-0005
J22	Connector, Header	0136-22-0005

REPLACEMENT PARTS FOR: **DEFLECTION BOARD 0670-00-0230**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
Q1	Transistor, 2N4313	0151-00-0080
Q2	Transistor, 2N4313	0151-00-0080
Q3	Transistor, 2N3646	0151-00-0083
Q4	Transistor, 2N3646	0151-00-0083
Q5	Transistor, 2N5023 (set of 6)	0151-00-0135
Q6	Transistor, 2N5023 (set of 6)	0151-00-0135
Q7	Transistor, 2N5023 (set of 6)	0151-00-0135
Q8	Transistor, 2N5023 (set of 6)	0151-00-0135
Q9	Transistor, 2N5023 (set of 6)	0151-00-0135
Q10	Transistor, 2N5023 (set of 6)	0151-00-0135
Q11	Transistor, 2N3725A (set of 6)	0151-00-0136
Q12	Transistor, 2N3725A (set of 6)	0151-00-0136
Q13	Transistor, 2N3725A (set of 6)	0151-00-0136
Q14	Transistor, 2N3725A (set of 6)	0151-00-0136
Q15	Transistor, 2N3725A (set of 6)	0151-00-0136
Q16	Transistor, 2N3725A (set of 6)	0151-00-0136
Q17	Transistor, 2N3646	0151-00-0083
Q18	Transistor, 2N3725A	0151-00-0082
Q19	Transistor, 2N3725A	0151-00-0082
Q20	Transistor, 2N3646	0151-00-0083
Q21	Transistor, 2N4313	0151-00-0080
Q22	Transistor, 2N4313	0151-00-0080
Q23	Transistor, 2N5023	0151-00-0081
Q24	Transistor, 2N5023	0151-00-0081
Q25	Transistor, 2N3646	0151-00-0083
Q26	Transistor, 2N3725A	0151-00-0082
Q27	Transistor, 2N3725A	0151-00-0082
Q28	Transistor, 2N3646	0151-00-0083
Q29	Transistor, 2N3725A	0151-00-0082
Q30	Transistor, 2N3725A	0151-00-0082
Q31	Transistor, 2N3646	0151-00-0083
Q32	Transistor, 2N3646	0151-00-0083
L1	Coil, 47uh	0108-05-0033
L2	Coil, 47uh	0108-05-0033
L3	Coil, .47uf	0108-05-0009
L4	Coil, 2,7uh, Nytrncs MS21390-1	0108-05-0018
L5	Coil, 47uh	0108-05-0033
L6	Coil, 2,7uh, Nytrncs MS21390-1	0108-05-0018
L7		
L8	Coil, 2,7uh, Nytrncs MS21390-1	0108-05-0018
L9	Coil, 2,7uh, Nytrncs MS21390-1	0108-05-0018
L10	Coil, 2,7uh, Nytrncs MS21390-1	0108-05-0018
L11	Coil, 15uh, 1 amp	0108-06-0015
L12	Coil, 2,7uh, Nytrncs MS21390-1	0108-05-0018
L13	Coil, 15uh, 1 amp	0108-06-0015
L14	Coil, 2,7uh, Nytrncs MS21390-1	0108-05-0018
L15	Coil, 2,7uh, Nytrncs MS21390-1	0108-05-0018
L16	Coil, .47uf	0108-05-0009
L17	Choke, Balun	0108-00-0027

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
U1	I.C. TL 082	0155-00-0151
U2	I.C. CA3130	0155-00-0071
U3	I.C. CA3130	0155-00-0071
U4	I.C. LM 318	0155-00-0158
U5	I.C. 2515	0155-00-0196
U6	I.C. LM 318	0155-00-0158
U7	I.C. 74LS02	0155-00-0167
U8	I.C. LM 393	0155-00-0173
U9	I.C. TL 082	0155-00-0151
U17	I.C. CA3130	0155-00-0071
U18	Voltage Regulator 78L05ACP	0151-00-0072
	Connector Jack, P.C. (fuse F1)	0136-00-0085
	Connector, Jumper	0131-00-0095
	Connector, Header	0136-22-0002
	Pad, Mounting	0432-01-0002
	Bracket, Transistor	0406-00-0258
	Screw, Selflock, PH 4-40 x 3/16	0212-00-0403
	Thermal Clip	0373-00-0015
	Heat Sink TO-5	0373-00-0005

REPLACEMENT PARTS FOR: **LED DISPLAY BOARD 0670-00-0365**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	LED Display Board	0670-00-0365
U2	LED Display, HDSP 7401	0153-00-0139
U3	LED Display, HDSP 7401	0153-00-0139
U4	LED Display, HDSP 7401	0153-00-0139
U5	LED Display, HDSP 7401	0153-00-0139
U6	LED Display, HDSP 7401	0153-00-0139
U7	LED Display, HDSP 7401	0153-00-0139
U8	LED Display, HDSP 7401	0153-00-0139
U9	LED Display, HDSP 7401	0153-00-0139
U10	LED Display, HDSP 7401	0153-00-0139
U11	LED Display, HDSP 7401	0153-00-0139
U12	LED Display, HDSP 7401	0153-00-0139
D1	LED, GRN, HLMP-1502	0153-05-0031
P30	Ribbon Cable Assy, 34 Cond	0012-32-0450

REF. NO.	DESCRIPTION	DATASCOPE PART NO.

REPLACEMENT PARTS FOR: **CRT BOARD 0670-00-0366**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	CRT Board	0670-00-0366
C2	Cap., .001uF, 10%, 200V	0283-05-0102
C3	Cap., .001uF, 10%, 200V	0283-05-0102
C4	Cap., .22uF, 10%, 200V	0283-04-0224
C5	Cap., .1uF, 600V	0283-02-1104
C6	Cap., .1uF, 10%, 100V	0283-04-0104
C7	Cap., Elec., 10uF, 100V	0290-00-0076
C8	Cap., .1uF, 10%, 100V	0283-04-0104
C9	Cap., Tant., 10uF, 20%, 25V	0290-02-2106
R1	Res. Adj., 1 Meg	0311-01-2105
R2	Res. Adj., 5K	0311-01-2502
R3	Res. Adj., 10K	0311-01-2103
R4	Res. Adj., 5K	0311-01-2502
R5	Res., 7.5K, 5%, 1/4W	0315-00-0752
R6	Res., 7.5K, 5%, 1/4W	0315-00-0752
R7	Res., 7.5K, 5%, 1/4W	0315-00-0752
R8	Res., 100K, 5%, 1/4W	0315-00-0104
R9	Res., 2.2K, 5%, 1/4W	0315-00-0222
R10	Res., 10K, 5%, 1/4W	0315-00-0103
R11	Res., 560K, 5%, 1/2W	0301-00-0564
R12	Res., 1K, 5%, 1/4W	0315-00-0102
R13	Res., 100K, 5%, 1/4W	0315-00-0104
R14	Res., 1 Meg, 5%, 1/4W	0315-00-0105
TP1	Digi-Klip	0124-00-0064
TP2	Digi-Klip	0124-00-0064
CR1	Diode, Zener 1N4761A	0153-00-0140
CR2	Diode, 1N914	0153-00-0014
CR3	Diode, 1N751A	0153-00-0040
Q1	Transistor, MPS-A42	0151-00-0094
Q2	Transistor, MPS-A42	0151-00-0094
Q3	Transistor, MPS-A42	0151-00-0094
Q4	Transistor, 2N7000	0151-00-0115
L1	Choke, 56uH	0108-05-0034
DG1	Spark Gap	0167-00-0004
	Shrink Tubing for DG1	0008-01-0007
J20	Header, Dual Row, 10 Pin	0136-24-1010
J32	Socket, CRT, 7 Pin	0136-00-0103
P26	Connector Housing	0134-00-0096
U1	I.C., LM393	0155-00-0098
	Wire, 22 AWG, WHT	0006-03-2299
	Wire, 22 AWG, BLK	0006-03-2200
	Wire, 22 AWG, RED	0006-03-2222
	Wire, 22 AWG, BLU	0006-03-0066
	Cable Tie	0125-01-0001
	Contact, Crimp	0124-00-0063

REF. NO.	DESCRIPTION	DATASCOPE PART NO.

REPLACEMENT PARTS FOR: **FRONT JACK & SWITCH BOARD 0670-00-0367**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	Front Jack and Switch Board	0670-00-0367
CR1	Diode, 1N6275	0153-00-0091
CR2	Diode, 1N6275	0153-00-0091
R1	Res. Adj., 1K	0311-00-0112
R2	Res. Adj., 1K	0311-00-0112
J44	Phono Jack	0136-00-0121
J45	Phono Jack	0136-00-0121
L1	Inductor, Shielded, 47uH	0108-04-0033
L2	Inductor, Shielded, 47uH	0108-04-0033
L3	Inductor, Shielded, 47uH	0108-04-0033
L4	Inductor, Shielded, 47uH	0108-04-0033
L5	Inductor, Shielded, 47uH	0108-04-0033
SW1	Switch, Momentary	0261-00-0170
SW2	Switch, Momentary	0261-00-0170
P29	Ribbon Cable Assy 20 Cond	0012-31-0400
	Wire Bus, 20 AWG	0007-02-0020
	Lug, Solder	0210-06-0009
	Wire, 22 AWG, GRN/YEL	0006-02-2254
	Lug, Solder	0210-06-0001
	Tubing, Heat Shrink	0008-01-0004
	Wire, 18AWG, GRN/YEL	0006-02-1854
	Terminal, Crimp, Ring	0210-20-0002

REF. NO.	DESCRIPTION	DATASCOPE PART NO.

REPLACEMENT PARTS FOR: **POWER SUPPLY BOARD 0670-00-0368**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	Power Supply Board	0670-00-0368
-	Exchange Board	0670-00-0368E
C1	Cap., Alum. Elect., 220uF, 63V	0290-12-0001
C2	Cap., Elect. 470uF, 16V	0290-08-4733
C3	Cap., Elect. 470uF, 16V	0290-08-4733
C4	Cap., Elect. 470uF, 25V	0290-14-0001
C5	Cap., Elect. 470uF, 25V	0290-14-0001
C6	Cap., Elect. 470uF, 16V	0290-08-4733
C7	Cap., .1uF, 10%, 100V	0283-05-0104
C8	Cap., Elect. 470uF, 16V	0290-08-4733
C9	Cap., Elect. 470uF, 16V	0290-08-4733
C10	Cap., Elect. 470uF, 16V	0290-08-4733
C11	Cap., .1uF, 10%, 100V	0283-05-0104
C12	Cap., .33uF, 10%, 50V	0283-04-0334
C13	Cap., .47uF, 10%, 50V	0283-04-0474
C15	Cap., .47uF, 10%, 50V	0283-04-0474
C16	Cap., .001uF, 10%, 200V	0283-05-0102
C17	Cap., .0033uF, 10%, 100V	0283-03-0332
C18	Cap., Alum. Elect., 220uF, 63V	0290-12-0001
C19	Cap., Alum. Elect., 220uF, 63V	0290-12-0001
C20	Cap., Elect. 470uF, 25V	0290-14-0001
C21	Cap., .1uF, 10%, 100V	0283-05-0104
C22	Cap., 22pF, 10%, 200V	0283-05-0220
C23	Cap., Elect. 470uF, 25V	0290-14-0001
C24	Cap., Alum. Elect., 4700uF, 63V	0290-11-0027
C25	Cap., .1uF, 10%, 100V	0283-05-0104
C26	Cap., Elect. 33uF, 40V	0290-01-4330
C27	Cap., Fixed Tant., 22uF, 20V	0290-02-1226
C34	Cap., .01uF, 10%, 100V	0283-05-0103
C36	Cap., .1uF, 10%, 100V	0283-05-0104
C37	Cap., .47uF, 10%, 50V	0283-04-0474
C38	Cap., Tant. 47uF, 20%, 20V	0290-02-1476
C39	Cap., .47uF, 10%, 50V	0283-04-0474
C40	Cap., .47uF, 10%, 50V	0283-04-0474
C41	Cap., .47uF, 10%, 50V	0283-04-0474
C42	Cap., Elect. 470uF, 16V	0290-08-4733
C43	Cap., 470pF, 10%, 100V	0283-05-0471
C44	Cap., Tant. 47uF, 20%, 20V	0290-02-1476
C45	Cap., .1uF, 10%, 100V	0283-05-0104
C46	Cap., Elect. 220uF, 25V	0290-12-0002
C47	Cap., .022uF, 10%, 100V	0283-04-0223
C48	Cap., Elect. 220uF, 25V	0290-12-0002
C49	Cap., Elect. 2200uF, 35V	0290-11-0013
C50	Cap., .0015uF, 10%, 1000V	0283-02-0152
C51	Cap., 270pF, 10%, 200V	0283-05-0271
C52	Cap., 68pF, 10%, 200V	0283-05-0680
C53	Cap., .01uF, 10%, 100V	0283-05-0103
C54	Cap., .001uF, 10%, 200V	0283-05-0102
C55	Cap., Tant. 10uF, 20%, 25V	0290-02-2106
C56	Cap., Elect. 470uF, 16V	0290-08-4733
C57	Cap., 1uF, 20%, 35V	0290-02-3105

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
CR2	Diode, 1N914	0153-00-0014
CR3	Diode, 1N4003	0153-00-0001
CR4	Diode, 1N4003	0153-00-0001
CR5	Diode, 1N4003	0153-00-0001
CR6	Diode, UES1103	0153-00-0086
CR7	Diode, 1N6294A, 91V	0153-07-0091
CR8	Diode, 1N751, 5.1V	0153-00-0040
CR9	Diode, VHE1403	0153-00-0096
CR10	Diode, USD945	0153-08-0004
CR11	Diode, USD945	0153-08-0004
CR12	Diode, USD945	0153-08-0004
CR13	Diode, VHE2403	0153-09-0003
CR14	Diode, USD945	0153-08-0004
CR15	Diode, VHE2403	0153-09-0003
CR16	Diode, 1N4003	0153-00-0001
CR17	Diode, UES1103	0153-00-0086
CR18	Diode, 1N6275	0153-00-0091
CR19	Diode, UES1103	0153-00-0086
CR20	Diode, 1N5819	0153-00-0127
CR21	Diode, 1N5819	0153-00-0127
CR22	Diode, Bridge KBU6D	0153-00-0088
CR23	Diode, 1N4003	0153-00-0001
CR24	Diode, 1N914	0153-00-0014
CR25	Diode, 1N914	0153-00-0014
CR26	**Diode, 1N914**	0153-00-0014
CR29	**Diode, 1N4003**	0153-00-0001
CR30	**Diode, VHE1403**	0153-00-0096
CR31	**Diode, VHE1403**	0153-00-0096
CR32	**Diode, 1N914**	0153-00-0014
CR33	**Diode, 1N914**	0153-00-0014
CR34	**Diode, 1N914**	0153-00-0014
Q1	Transistor, 2N6134	0151-00-0053
Q2	Transistor, 2N5401	0151-00-0059
Q3	Transistor, 2N5401	0151-00-0059
Q4	Transistor, 2N2222A	0151-00-0061
Q5	Transistor, IRF540	0151-00-0101
Q6	Transistor, IRF540	0151-00-0101
Q7	Transistor, 2N7000	0151-00-0115
Q8	Transistor, 2N7000	0151-00-0115
Q9	Transistor, 2N2222A	0151-00-0061
R5	Res., 249 ohm, 1%, 1/8W	0309-00-2490
R6	Res., 2.15K, 1%, 1/8W	0309-00-2151
R7	Res., 100K, 5%, 1/4W	0315-00-0104
R8	Res., 100K, 5%, 1/4W	0315-00-0104
R9	Res., 4.7K, 5%, 1/4W	0315-00-0472
R10	Res., 100K, 5%, 1/4W	0315-00-0104
R11	Res., 100K, 5%, 1/4W	0315-00-0104
R12	Res., 15K, 5%, 1/4W	0315-00-0153
R13	Res., 15K, 5%, 1/4W	0315-00-0153
R14	Res., 10K, 5%, 1/4W	0315-00-0103
R15	Res., 1K, 5%, 1/4W	0315-00-0102

REPLACEMENT PARTS FOR: **POWER SUPPLY BOARD 0670-00-0368**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
R16	Res., 330 ohm, 5%, 2W	0305-00-0331
R17	Res., 100 ohm, 5%, 1/4W	0315-00-0101
R18	Res., 47 ohm, 5%, 1/4W	0315-00-0470
R23	Res., 5.1 ohm, 5%, 1/4W	0315-00-051X
R24	Res., 20.5K, 1%, 1/8W	0309-00-2052
R25	Res., 1.69K, 1%, 1/8W	0309-00-1691
R26	Res., 4.99K, 1%, 1/8W	0309-00-4991
R27	Res., 5.1K, 5%, 1/4W	0315-00-0512
R28	Res., 10 ohm, 5%, 1/4W	0315-00-0100
R29	Res., 10 ohm, 5%, 1/4W	0315-00-0100
R30	Res., 3.3K, 5%, 1/4W	0315-00-0332
R31	Res., 10K, 5%, 1/4W	0315-00-0103
R32	Res., 249 ohm, 1%, 1/8W	0309-00-2490
R33	Res., 7.15K, 1%, 1/8W	0309-00-7151
R34	Res., 1K, 1%, 1/8W	0309-00-1001
R35	Res., 100K, 5%, 1/4W	0315-00-0104
R36	Res., 47K, 5%, 1/4W	0315-00-0473
R37	Res., 49.9K, 1%, 1/8W	0309-00-4992
R38	Res., 12.1K, 1%, 1/8W	0309-00-1212
R39	Res., 220K, 5%, 1/4W	0315-00-0224
R40	Res., 470K, 5%, 1/4W	0315-00-0474
R41	Res., 10K, 5%, 1/4W	0315-00-0103
R42	Res., 47K, 5%, 1/4W	0315-00-0473
R43	Res., 4.7K, 5%, 1/4W	0315-00-0472
R44	Res., 4.7K, 5%, 1/4W	0315-00-0472
R45	Res., 4.7K, 5%, 1/4W	0315-00-0472
R46	Res., 20K, 5%, 1/4W	0315-00-0203
R47	Res., 4.7K, 5%, 1/4W	0315-00-0472
R48	Res., .499, 1%, 0.4W	0322-01-X499
R49	Res., .432, 1%, 0.4W	0322-01-X432
R50	Res., 1.5K, 5%, 1/4W	0315-00-0152
R51	Res., 36.5K, 1%, 1/8W	0309-00-3652
R52	Res., 432K, 1%, 1/8W	0309-00-4323
R53	Res., 16.5K, 1%, 1/8W	0309-00-1652
R54	Res., 1.5K, 5%, 1/4W	0315-00-0152
R55	Res., 4.99K, 1%, 1/8W	0309-00-4991
R56	Res., 820, 5%, 2W	0305-00-0821
R57	Res., 392K, 1%, 1/8W	0309-00-3923
R58	Res., 20K, 5%, 1/4W	0315-00-0203
R59	Res., 4.7K, 5%, 1/4W	0315-00-0472
R60	Res., 10K, 5%, 1/4W	0315-00-0103
R61	Res., 10K, 5%, 1/4W	0315-00-0103
R62	Res., 1.78K, 1%, 1/8W	0309-00-1781
R63	Res., 13.3K, 1%, 1/8W	0309-00-1332
R64	Res., 39K, 5%, 1/4W	0315-00-0393
R65	Res., 100K, 5%, 1/4W	0315-00-0104
R66	Res., 470K, 5%, 1/4W	0315-00-0474
R67	Res., 1K, 5%, 1/4W	0315-00-0102
R68	Res., 100K, 5%, 1/4W	0315-00-0104
R69	Res., 100K, 5%, 1/4W	0315-00-0104
R70	Res., 47K, 5%, 1/4W	0315-00-0473

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
R71	Res., 10K, 5%, 1/4W	0315-00-0103
R72	Res., 1K, 5%, 1/4W	0315-00-0102
R73	Res., 2.2K, 5%, 1/4W	0315-00-0222
R74	Res., 47K, 5%, 1/4W	0315-00-0473
R75	Res., 22K, 5%, 1/4W	0315-00-0223
R76	Res., 22K, 5%, 1/4W	0315-00-0223
R77	Res., 1K, 5%, 1/4W	0315-00-0102
R78	Res., 10K, 5%, 1/4W	0315-00-0103
R79	Res., 121 ohm, .1%, 1/8W	0320-00-1210
R80	Res., 365 ohm, .1%, 1/8W	0320-00-3650
R81	Res., 10K, 1%, 1/8W	0309-00-1002
R82	Res., 10K, 1%, 1/8W	0309-00-1002
TP1	Digi-Klip PC Connector	0124-00-0064
TP2	Digi-Klip PC Connector	0124-00-0064
TP3	Digi-Klip PC Connector	0124-00-0064
TP4	Digi-Klip PC Connector	0124-00-0064
TP5	Digi-Klip PC Connector	0124-00-0064
TP6	Digi-Klip PC Connector	0124-00-0064
TP7	Digi-Klip PC Connector	0124-00-0064
TP8	Digi-Klip PC Connector	0124-00-0064
TP9	Digi-Klip PC Connector	0124-00-0064
TP10	Digi-Klip PC Connector	0124-00-0064
TP11	Digi-Klip PC Connector	0124-00-0064
TP12	Digi-Klip PC Connector	0124-00-0064
TP13	Digi-Klip PC Connector	0124-00-0064
TP14	Digi-Klip PC Connector	0124-00-0064
U1	I.C., LM317, Volt Reg	0155-00-0194
U2	I.C., LM339, Quad Comparator	0155-00-0073
U3	I.C., UC2906, Batt Charger	0155-00-0405
U4	I.C., LM358, Dual Op Amp	0155-00-0049
U5	I.C., LM317, Volt Reg	0155-00-0194
U6	I.C., 4046, Phase Locked Loop	0155-00-0079
U8	I.C., UC2843, Current Mode PWM	0155-00-0395
U9	I.C., LM358, Dual Op Amp	0155-00-0049
U11	I.C., LM393, Dual Comparator	0155-00-0098
U12	I.C., LT1085CT, +5V Reg	0155-00-0441
T1	Transformer, Current Sense	0120-00-0081
T2	Transformer, Flyback, 64kHz	0120-00-0119
J8	Connector, 16 Pos	0131-28-0016
J10	Header, 5 Pos	0136-17-0005
J12	Header, 5 Pos	0136-17-0005
J13	Header, 5 Pos	0136-17-0005
J33	Connector, 2 Pos	0131-28-0002

REPLACEMENT PARTS FOR: **POWER SUPPLY BOARD 0670-00-0368**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
XL1	Bus Wire	0007-02-0022
XL2	Bus Wire	0007-02-0022
XL3	Bus Wire	0007-02-0022
XL4	Bus Wire	0007-02-0022
XL5	Screw, 4-40 x 1.12 Lg.	0212-12-0418
XL6	Screw, 4-40 x 1.12 Lg.	0212-12-0418
L1	Ferrite Bead, Inductor	0108-00-0029
L2	Ferrite Bead, Inductor	0108-00-0029
L3	Ferrite Bead, Inductor	0108-00-0029
L4	Ferrite Bead, Inductor	0108-00-0029
L5	Choke, 100uH	0108-08-1000
L6	Choke, 470uH	0108-00-0030
JMP1	Header, 3 Pos	0136-22-0003
JMP2	Header, 3 Pos	0136-22-0003
XJMP1	Shunt	0131-00-0095
XJMP2	Shunt	0131-00-0095
XCR10	Heat Sink	0373-00-0032
XCR11	Heat Sink	0373-00-0032
XCR12	Heat Sink	0373-00-0032
XCR10	Screw, 4-40 x .25 Lg.	0212-12-0404
XCR10	Screw, 4-40 x .25 Lg.	0212-12-0404
XCR22	Screw, 4-40 x 1.12 Lg.	0212-12-0418
	Heat Sink, 4 Pos	0373-00-0041
	Heat Sink, 3 Pos	0373-00-0042
	Insulating Bead	0214-00-0074
	Wire, Strnd, Awg 18, GRN/YEL	0006-03-1854
	Terminal, Ring Tongue	0210-00-0113
	Insulator, Silicon Rubber	0349-00-0056
	Washer, Shoulder, Nylon, #4	0214-00-0155
	Nut, 4-40	0223-00-0004
	Silicone Rubber, Wht	0530-00-0011-01
	Screw, 4-40 x .18 Lg.	0212-12-0403
	Clamp, 4-Way Adhesive Backed	0343-00-0058
	Cable Tie (Fastrap)	0125-01-0001
	Tubing, Heat Shrink	0008-01-0004

REF. NO.	DESCRIPTION	DATASCOPE PART NO.

REPLACEMENT PARTS FOR: **PNEUMATIC BOARD 0670-00-0369**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	Pneumatic Board	0670-00-0369
-	Exchange Board	0670-00-0369E
C1	Cap., 3300uF, 16V	0290-11-0001
L1	Choke, 100uH	0108-08-1000
J30	Header, Double Row, 20 Pos	0136-24-1020
J34	Header, Double Row, 14 Pos	0136-24-1014
J29	Header, 3 Pin	0136-50-0003
V1	Valve, 12V, 2-Way	0119-00-0073
V2	Valve, 12V, 2-Way	0119-00-0073
V3	Valve, 12V, 2-Way	0119-00-0073
V4	Valve, 12V, 2-Way	0119-00-0073
SW1	Switch, Pressure	0262-00-0003
XL1	Washer, Nylon	0210-07-0003
	Terminal, Female	0210-00-0094
	Tee	0103-00-0298
	6 Port Manifold	0103-00-0283
	Flow Restrictor	0103-11-0008
	Flow Restrictor	0103-11-0011
	Flow Restrictor	1013-11-0022
	Air Filter	0378-01-0002
	FTG, Rt. Angle, 1/16	0103-12-0001
	Tubing, PVC, 1/8 ID	0008-04-0002
	Tubing, PVC, 1/16 ID	0008-08-0001
	Tape, Single-Coated, Foam	0215-02-0001
	Screw, 4-40 x .25 Lg. PH	0212-12-0404
	Screw, 4-40 x 1.123 Lg. PH	0212-12-0418
	Nut, Hex, 4-40	0223-00-0004
	Cable Tie	0125-01-0001
	Wire, Strand, AWG 22, WHT	0006-02-2299
	FILTER, IN-LINE, 43 MICRON	**0378-00-0032**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.

REPLACEMENT PARTS FOR: **MOTHER BOARD 0670-00-0370**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	Mother Board	0670-00-0370
J1	Conn., P.C., 50P	0131-21-0025
J4	Conn., P.C., 50P	0131-21-0025
J6	Header, 4P	0136-22-0004
J7	Header, 2P	0136-22-0002
J11	Conn., P.C., 30P	0136-31-0002
J14	Conn., P.C., 44P	0136-31-0007
J16	Conn., P.C., 44P	0136-31-0007
J17	Conn., P.C., 30P	0136-31-0002
J18	Header, Dbl. Row, 10P	0136-24-1010
J19	Molex Conn, 16P	0131-28-0016
J27	Header, Rt Ang, 26P	0136-20-1026
J29	Header, Dbl. Row, 20 P	0136-24-1020
J30	Header, Dbl. Row, 34 P	0136-24-1034
J31	Header, 16 P	0136-22-0016
J35	Conn., P.C., 50P	0131-21-0025
J36	Conn., P.C., 30P	0136-31-0002
J37	Conn., P.C., 50P	0131-21-0025
J48	Recpt, Sheilded, Rt Ang, 24P	0131-00-0165
J49	Recpt, Rt Ang, Edge Conn. 25P	0131-00-0142
	Kit, Jack Post Mtg.	0132-00-0063
	Wire, Hook-Up Stranded, 22AWG GRN	0006-02-2255
	Screw, 4-40 x 3/8" Lg Pan	0212-12-0406
	Nut, 4-40	0223-00-0004
	Terminal, Ring 22-16 AWG	0210-20-0002
	Insulator, Mylar	0349-00-0123

REF. NO.	DESCRIPTION	DATASCOPE PART NO.

REPLACEMENT PARTS FOR: **TREND BOARD 0670-00-0371**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	Trend Board	0670-00-0371
-	Exchange Board	0670-00-0371E
C1	Cap., .1uF, 10%, 100V	0283-05-0104
C2	Cap., .1uF, 10%, 100V	0283-05-0104
C3	Cap., .1uF, 10%, 100V	0283-05-0104
C4	Cap., .1uF, 10%, 100V	0283-05-0104
C5	Cap., .1uF, 10%, 100V	0283-05-0104
C6	Cap. Tant., 47uF, 20%, 20V	0290-02-1476
C7	Cap., .1uF, 10%, 100V	0283-05-0104
C8	Cap., .01uF, 10%	0283-05-0103
C9	Cap., .01uF, 10%	0283-05-0103
C10	Cap., .1uF, 10%, 100V	0283-05-0104
C11	Cap., .1uF, 10%, 100V	0283-05-0104
C12	Cap., .1uF, 10%, 100V	0283-05-0104
C13	Cap., .1uF, 10%, 100V	0283-05-0104
C14	Cap., .1uF, 10%, 100V	0283-05-0104
C15	Cap., .1uF, 10%, 100V	0283-05-0104
C16	Cap., 22pF, 10%, 200V	0283-05-0220
C17	Cap., .1uF, 10%, 100V	0283-05-0104
C18	Cap., .1uF, 10%, 100V	0283-05-0104
C19	Cap. Tant., 100uF, 20%, 10V	0290-02-0107
C20	Cap. Tant., 4.7uF, 20%, 35V	0290-02-3475
C21	Cap. Tant., 4.7uF, 20%, 35V	0290-02-3475
C22	Cap., .0047uF, 10%, 100V	0283-05-0472
C23	Cap., .47uF, 10%, 50V	0283-04-0474
C24	Cap., 120pF, 10%, 200V	0283-05-0121
C25	Cap. Tant., 15uF, 20%, 10V	0290-02-0156
C26	Cap. Tant., 2.2uF, 20%, 35V	0290-02-3225
CR1	Diode, 1N914	0153-00-0014
CR2	Diode, 1N914	0153-00-0014
CR3	Diode, 1N914	0153-00-0014
CR4	Diode, 1N914	0153-00-0014
CR5	Diode, 1N6263	0153-00-0085
CR6	Diode, 1N6263	0153-00-0085
CR7	Diode, 1N6263	0153-00-0085
CR8	Diode, 1N6263	0153-00-0085
CR9	Diode, 1N6263	0153-00-0085
CR10	Diode, 1N6263	0153-00-0085
R1	Res., 10K, 1%, 1/8W	0309-00-1002
R2	Res., 4.7K, 5%, 1/4W	0315-00-0472
R3	Res., 47K, 5%, 1/4W	0315-00-0473
R4	Res., 100K, 5%, 1/4W	0315-00-0104
R6	Res., 10K, 1%, 1/8W	0309-00-1002
R7	Res., 10K, 1%, 1/8W	0309-00-1002
R8	Res., 165K, 1%, 1/8W	0309-00-1653
R9	Res., 165K, 1%, 1/8W	0309-00-1653
R10	Res., 10K, 1%, 1/8W	0309-00-1002
R11	Res., 3.3K, 5%, 1/4W	0315-00-0332
R12	Res. Pot., 2K	0311-05-1202
R13	Res., 3.3K, 5%, 1/4W	0315-00-0332
R14	Res., 15 ohm, 5%, 1/4W	0315-00-0150
R15	Res., 10K, 1%, 1/8W	0309-00-1002
R16	Res., 10K, 1%, 1/8W	0309-00-1002
R17	Res., 9.53K, 1%, 1/8W	0309-00-9531
R18	Res., 47K, 5%, 1/4W	0315-00-0473

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
RN1	Res. Net., 10K, 10 Pin Sip	0307-06-2103
RN2	Res. Net., 100K, 16 Pin Dip	0307-00-0030
RN3	Res. Net., 10K, 16 Pin Dip	0307-03-0103
RN4	Res. Net., 10K, 16 Pin Dip	0307-03-0103
RN5	Res. Net., 1K, 10P SIP	0307-06-2102
Q1	Transistor, 2N2222A	0151-00-0061
Q2	Transistor, 2N2222A	0151-00-0061
U1	I.C., 64K Nonvolatile Static Ram	0155-00-0460
U2	I.C., 74HC593, Counter	0155-00-0448
U3	I.C., Trend, EPLD	0155-90-0108-B
U4	I.C., Trend	0155-90-0115-A
U5	I.C., SG3503, Voltage Ref.	0153-00-0093
U6	I.C., TL084 Op Amp	0155-00-0178
U7	I.C., 4068, 8 in Nand	0155-00-0123
U8	I.C., CD4053, 2 in Mux	0155-00-0086
U9	I.C., MP7524, DAC	0155-00-0201
U10	I.C., 4013, Flip-Flop	0155-00-0066
U11	I.C., 4040	0155-00-0027
U12	I.C., 7218A, LED Cntlr.	0155-00-0401
U13	I.C., 7218A, LED Cntlr.	0155-00-0401
U14	I.C., 68681, Dual Art	0155-00-0462
U15	I.C., 74HC374	0155-00-0364
U16	I.C., DS2009, FIFO MEM	0155-00-0436
U17	I.C., ADC0808	0155-00-0263
U18	I.C., Trend, EPLD	0155-90-0109-A
U19	I.C., 74HC14, Inverter	0155-00-0299
U20	I.C., DS1244Y, 32K x 8	0155-00-0440
U21	I.C., LT1014	0155-00-0443
U22	I.C., Trend EPROM	0155-90-0114-A
U23	I.C., 74HCT244, 3 State Buffer	0155-00-0426
U24	I.C., 63B09E, uP	0155-00-0399
U25	I.C., 74HCT245, Octal Xcvr	0155-00-0438
U26	I.C., Trend, EPLD	0155-90-0110-A
U27	I.C., DS1232	0155-00-0425
J3	Header, Rt Angle, 34 Pin	0136-20-1034
J4	Header, 20 Pin Double	0136-24-1020
XU1	Socket, IC 28 Pin	0136-01-1028
XU3	Socket, IC 24 Pin SLM	0136-56-1324
XU4	Socket, IC 28 Pin	0136-01-1028
XU5	Mtg Pad	0432-01-0002
XU14	Socket, PLCC 44 Pin	0136-57-0044
XU18	Socket, Dip Low Profile 24P	0136-01-2024
XU22	Socket, IC 28 Pin	0136-01-1028
XU24	Socket, IC 40 Pin	0136-01-1040
XU26	Socket, Dip Low Profile 24P	0136-01-2024

REPLACEMENT PARTS FOR: **PMM BOARD 0670-00-0372**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	PMM Board	0670-00-0372
C1	Cap., 0.1uF, 10%, 100V	0283-04-0104
RN1	Res. Net., 100K, 10 Pin	0307-06-2104
RN2	Res. Net., 100K, 8 Pin	0307-06-1104
RN3	Res. Net., 100K, 8 Pin	0307-06-1104
RN4	Res. Net., 100K, 8 Pin	0307-06-1104
U1	I.C., EPROM 27010, 1MBIT	0155-00-0428
	Panel, PMM	0333-00-0199
	PCB	0388-00-0282
	Screw, 4-40 x .31 Lg., Phil. PH	0212-12-0405
	Label, 3000 DATA-SETT	0334-00-0761
	Label, EPROM	0334-00-0446
	Software, 3000 DATA-SETT	SR0155-90-0113-1

REF. NO.	DESCRIPTION	DATASCOPE PART NO.

REPLACEMENT PARTS FOR: **HOST PROCESSOR BOARD 0670-00-0380**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	Host Processor Board	0670-00-0380
-	Exchange Board	0670-00-0380E
C1	Cap., .1uF, 100V, 10%	0283-04-0104
C2	Cap., .1uF, 100V, 10%	0283-04-0104
C3	Cap., .1uF, 100V, 10%	0283-04-0104
C4	Cap., .47uF, 50V, 10%	0283-04-0474
C5	Cap., .1uF, 100V, 10%	0283-04-0104
C6	Cap., .47uF, 50V, 10%	0283-04-0474
C7	Cap., Tant., 22uF, 20V, 20%	0290-02-1226
C8	Cap., .1uF, 100V, 10%	0283-04-0104
C9	Cap., .1uF, 100V, 10%	0283-04-0104
C10	Cap., .01uF, 100V, 10%	0283-05-0103
C11	Cap., .1uF, 100V, 10%	0283-04-0104
C12	Cap., .1uF, 100V, 10%	0283-04-0104
C13	Cap., .1uF, 100V, 10%	0283-04-0104
C14	Cap., .1uF, 100V, 10%	0283-04-0104
C15	Cap., .1uF, 100V, 10%	0283-04-0104
C16	Cap. Tant., 4.7uF, 35V, 20%	0290-02-3475
C17	Cap. Tant., 4.7uF, 35V, 20%	0290-02-3475
C18	Cap., .1uF, 100V, 10%	0283-04-0104
C19	Cap., .1uF, 100V, 10%	0283-04-0104
C20	Cap. Tant., 2.2uF, 35V, 20%	0290-02-3225
C21	Cap. Tant., 10uF, 25V, 20%	0290-02-2106
C22	Cap. Tant., 10uF, 25V, 20%	0290-02-2106
C23	Cap. Tant., 33uF, 10V, 20%	0290-02-0336
C24	Cap., .47uF, 50V, 10%	0283-04-0474
C25	Cap., .47uF, 50V, 10%	0283-04-0474
C26	Cap. Tant., 4.7uF, 35V, 20%	0290-02-3475
C27	Cap. Tant., 4.7uF, 35V, 20%	0290-02-3475
C28	Cap., .001uF, 200V, 10%	0283-05-0102
C29	Cap., .0047uF, 100V, 10%	0283-05-1472
C30	Cap., .1uF, 100V, 10%	0283-04-0104
C31	Cap., 22pF, 200V, 10%	0283-05-0220
C32	Cap. Tant., 1uF, 35V, 20%	0290-02-3105
C33	Cap. Tant., 4.7uF, 35V, 20%	0290-02-3475
C34	Cap. Tant., 4.7uF, 35V, 20%	0290-02-3475
C35	Cap., .0015uF, 100V, 5%	0285-06-0152
C36	Cap., .015uF 160V 2.5%	0283-09-0153
C37	Cap. Tant., 1uF, 35V, 20%	0290-02-3105
C38	Cap., .1uF, 100V, 10%	0283-04-0104
C39	Cap., .1uF, 100V, 10%	0283-04-0104
C40	Cap., .01uF, 100V, 10%	0283-05-0103
C41	Cap., .01uF, 100V, 10%	0283-05-0103
C42	Cap., .001uF, 200V, 10%	0283-05-0102
C43	Cap., .001uF, 200V, 10%	0283-05-0102
C45	Cap. Tant., 4.7uF, 35V, 20%	0290-02-3475
C46	Cap. Tant., 22uF, 20V, 20%	0290-02-1226
C47	Cap. Tant., 22uF, 20V, 20%	0290-02-1226
C48	Cap. Tant., 22uF, 20V, 20%	0290-02-1226
C49	Cap. Tant., 22uF, 20V, 20%	0290-02-1226
C50	Cap. Tant., 22uF, 20V, 20%	0290-02-1226

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
C51	Cap. Tant., 22uF, 20V, 20%	0290-02-1226
C52	Cap. Tant., 22uF, 20V, 20%	0290-02-1226
C53	Cap. Tant., 22uF, 20V, 20%	0290-02-1226
C54	Cap., .01uF, 100V, 10%	0283-05-0103
C55	Cap., .001uF, 200V, 10%	0283-05-0102
C59	Cap., .0047uF, 100V, 10%	0283-05-1472
C60	Cap., .47uF, 50V, 10%	0283-04-0474
C61	Cap. Tant., 4.7uF, 35V, 20%	0290-02-0103
C62	Cap., .01uF, 100V, 10%	0283-05-0103
C63	Cap., .01uF, 100V, 10%	0283-05-0103
C64	Cap., .47uF, 50V, 10%	0283-04-0474
C65	Cap., .47uF, 50V, 10%	0283-04-0474
C66	Cap., .1uF, 100V, 10%	0283-04-0104
C67	Cap., .1uF, 100V, 10%	0283-04-0104
C68	Cap., .47uF, 50V, 10%	0283-04-0474
C69	Cap., .1uF, 100V, 10%	0283-04-0104
C70	Cap., .47uF, 50V, 10%	0283-04-0474
C71	Cap., .47uF, 50V, 10%	0283-04-0474
CR3	Diode, 1N914	0153-00-0014
CR4	Diode, 1N914	0153-00-0014
CR5	Diode, Schottky, 1N6263	0153-00-0085
CR7	Diode, 1N914	0153-00-0014
CR8	Diode, 1N914	0153-00-0014
CR9	Diode, Schottky, 1N6263	0153-00-0085
CR12	Diode, Schottky, 1N6263	0153-00-0085
CR13	Diode, Schottky, 1N6263	0153-00-0085
CR14	Diode, 1N914	0153-00-0014
CR15	Diode, 1N914	0153-00-0014
CR16	Diode, 1N914	0153-00-0014
CR17	Diode, 1N914	0153-00-0014
CR18	Diode, 1N914	0153-00-0014
CR19	Diode, 1N914	0153-00-0014
CR20	Diode, 1N914	0153-00-0014
CR21	Diode, 1N914	0153-00-0014
CR22	Diode, IN5817	0153-00-0069
CR23	Diode, IN5817	0153-00-0069
Q1	Transistor, J176	0151-00-0179
Q2	Transistor, J176	0151-00-0179
Q3	Transistor, 2N2222	0151-00-0061
L1	Choke, 47uH	0108-05-0033
L2	Choke, 47uH	0108-05-0033
R1	Res., 4.75K, 1%, 1/8W	0309-00-4751
R2	Res., 23.7K, 1%, 1/8W	0309-00-2372
R3	Res., 100K, 1%, 1/8W	0309-00-1003
R4	Res., 4.75K, 1%, 1/8W	0309-00-4751
R5	Res., 133K, 1%, 1/8W	0309-00-1333

REPLACEMENT PARTS FOR: **HOST PROCESSOR BOARD 0670-00-0380**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
R6	Res., 4.7K, 5%, 1/4W	0315-00-0472
R7	Res., 16.5K, 1%, 1/8W	0309-00-1652
R8	Res., 182K, 1%, 1/8W	0309-00-1823
R9	Res., 33K, 5%, 1/4W	0315-00-0333
R10	Res., 47K, 5%, 1/4W	0315-00-0473
R11	Res., 100K, 5%, 1/4W	0315-00-0104
R12	Res., 75K, 5%, 1/4W	0315-00-0753
R13	Res., 680K, 5%, 1/4W	0315-00-0684
R14	Res., 10K, 5%, 1/4W	0315-00-0103
R15	Res., 240K, 5%, 1/4W	0315-00-0244
R16	Res., 47K, 5%, 1/4W	0315-00-0473
R17	Res., 47K, 5%, 1/4W	0315-00-0473
R18	Res., 47K, 5%, 1/4W	0315-00-0473
R19	Res., 47K, 5%, 1/4W	0315-00-0473
R20	Res., 47K, 5%, 1/4W	0315-00-0473
R21	Res., 47K, 5%, 1/4W	0315-00-0473
R22	Res., 47K, 5%, 1/4W	0315-00-0473
R23	Res., 10 ohm, 5%, 1/4W	0315-00-0100
R24	Res., 10 ohm, 5%, 1/4W	0315-00-0100
R25	Res., 10K, 5%, 1/4W	0315-00-0103
R26	Res., 2K, 5%, 1/4W	0315-00-0202
R27	Res., 47K, 5%, 1/4W	0315-00-0473
R28	Res., 10K, 5%, 1/4W	0315-00-0103
R29	Res., 10K, 5%, 1/4W	0315-00-0103
R30	Res., 10K, 5%, 1/4W	0315-00-0103
R31	Res., 10K, 5%, 1/4W	0315-00-0103
R32	Res., 10K, 5%, 1/4W	0315-00-0103
R33	Res., 49.9K, 1%, 1/8W	0309-00-4992
R34	Res. FX., 357K, 1%, 1/8W	0309-00-3573
R35	Res., 54.9K, 1%, 1/8W	0309-00-5492
R36	Res., 54.9K, 1%, 1/8W	0309-00-5492
R37	Res. FX., 115K, 1%, 1/8W	0309-00-1153
R38	Res. FX., 115K, 1%, 1/8W	0309-00-1153
R39	Res. FX., 6.98K, 1%, 1/8W	0309-00-6981
R40	Res., 8.06K, 1%, 1/8W	0309-00-8061
R41	Res. Pot., 1K, MT, .5W	0311-05-1102
R42	Res., 30.1K, 1%, 1/8W	0309-00-3012
R43	Res. FX., 3.92K, 1%, 1/8W	0309-00-3921
R44	Res., 10K, 1%, 1/8W	0309-00-1002
R45	Res., 10K, 1%, 1/8W	0309-00-1002
R46	Res., 10K, 1%, 1/8W	0309-00-1002
R47	Res. FX., 5.36K, 1%, 1/8W	0309-00-5361
R48	Res. FX., 5.36K, 1%, 1/8W	0309-00-5361
R49	Res. Pot., 1K, MT, .5W	0311-05-1102
R50	Res., 30.1K, 1%, 1/8W	0309-00-3012
R51	Res. FX., 6.65K, 1%, 1/8W	0309-00-6651
R52	Res., 10K, 1%, 1/8W	0309-00-1002
R53	Res., 10 ohm, 5%, 1/4W	0315-00-0100
R54	Res. Pot., 1K, MT, .5W	0311-05-1102
R55	Res., 10K, 1%, 1/8W	0309-00-1002

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
R57	Res., 10K, 1%, 1/8W	0309-00-1002
R58	Res., 10 ohm, 5%, 1/4W	0315-00-0100
R59	Res., 4.75K, 1%, 1/10W, 25ppm	0309-02-4751
R60	Res., 10K, 1%, 1/10W, 25ppm	0309-02-1002
R61	Res., 909K, 1%, 1/10W, 25ppm	0309-02-9093
R62	Res., 453K, 1%, 1/10W, 25ppm	0309-02-4533
R63	Res., 3.32K, 1%, 1/10W,25ppm	0309-02-3321
R64	Res., 2.26K, 1%, 1/10W, 25ppm	0309-02-2261
R65	Res. Var., 500 ohm, MT	0311-05-1501
R66	Res., 1K, 5%, 1/4W	0315-00-0102
R67	Res., 909K, 1%, 1/10W, 25ppm	0309-02-9093
R68	Res., 15.4K, 1%, 1/10W, 25ppm	0309-02-1542
R69	Res., 10K, 1%, 1/10W, 25ppm	0309-02-1002
R70	Res., 4.75K, 1%, 1/10W, 25ppm	0309-02-4751
R71	Res., 909K, 1%, 1/10W, 25ppm	0309-02-9093
R72	Res., 453K, 1%, 1/10W, 25ppm	0309-02-4533
R73	Res. Var., 500 ohm, MT	0311-05-1501
R74	Res., 2.26K, 1%, 1/10W, 25ppm	0309-02-2261
R75	Res., 3.32K, 1%, 1/10W,25ppm	0309-02-3321
R76	Res., 909K, 1%, 1/10W, 25ppm	0309-02-9093
R77	Res., 15.4K, 1%, 1/10W, 25ppm	0309-02-1542
R78	Res., 1K, 5%, 1/4W	0315-00-0102
R79	Res. Var., 500 ohm, MT	0311-05-1501
R80	Res. Var., 500 ohm, MT	0311-05-1501
R86	Res., 2.26K, 1%, 1/10W, 25ppm	0309-02-2261
R87	Res., 2.26K, 1%, 1/10W, 25ppm	0309-02-2261
R88	Res., 47K, 5%, 1/4W	0315-00-0473
R91	Res., 4.7K, 5%, 1/4W	0315-00-0472
R92	Res., 100 ohm, 5%, 1/4W	0315-00-0101
R93	Res., 100 ohm, 5%, 1/4W	0315-00-0101
R94	Res., 4.7K, 5%, 1/4W	0315-00-0472
R95	Res., 47K, 5%, 1/4W	0315-00-0473
R96	Res., 47K, 5%, 1/4W	0315-00-0473
R97	Res., 270 ohm, 5%, 1/4W	0315-00-0271
R98	Res., 10K, 5%, 1/4W	0315-00-0103
R99	Res., 1K, 5%, 1/4W	0315-00-0102
R100	Res., 270 ohm, 5%, 1/4W	0315-00-0271
R101	Res., 10K, 5%, 1/4W	0315-00-0103
R102	Res., 1K, 5%, 1/4W	0315-00-0102
R103	Res., 270 ohm, 5%, 1/4W	0315-00-0271
R104	Res., 10K, 5%, 1/4W	0315-00-0103
R105	Res., 1K, 5%, 1/4W	0315-00-0102
R106	Res., 270 ohm, 5%, 1/4W	0315-00-0271
R107	Res., 10K, 5%, 1/4W	0315-00-0103
R108	Res., 1K, 5%, 1/4W	0315-00-0102
R109	Res., 1K, 5%, 1/4W	0315-00-0102
R110	Res., 1K, 5%, 1/4W	0315-00-0102
R111	Res., 10K, 5%, 1/4W	0315-00-0103
RP1	Res. NETWK., 5.6K, 10 Pin Sip	0307-06-2562
RP2	Res. NETWK., 47K, 14 Pin Sip	0307-02-0473

REPLACEMENT PARTS FOR: **HOST PROCESSOR BOARD 0670-00-0380**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
U1	I.C., LM324, DIP 14	0155-00-0053
U2	I.C., LM324, DIP 14	0155-00-0053
U3	I.C., LM393, DIP 8	0155-00-0098
U4	I.C., 4052, DIP 16	0155-00-0089
U5	I.C., High Speed 8 BIT Multiplying DAC, AD 7524	0155-00-0528
U6	I.C., TL084, DIP 14	0155-00-0178
U7	I.C., LM386, DIP 8	0155-00-0078
U8	I.C., 4053, DIP 16	0155-00-0086
U9	I.C., SG3503, T018	0153-00-0093
U10	I.C., TL082, DIP 8	0155-00-0151
U11	I.C., TL082, DIP 8	0155-00-0151
U12	I.C., 4053, DIP 16	0155-00-0086
U13	I.C., TL082, DIP 8	0155-00-0151
U14	EPLD Assy	0155-90-0116-1
U15	I.C., MP7524, DIP 16	0155-00-0201
U16	I.C., MP7524, DIP 16	0155-00-0201
U17	I.C., TL082, DIP 8	0155-00-0151
U18	I.C., 74HCT573, DIP 20	0155-00-0439
U19	I.C., DS1244Y32K x 8	0155-00-0440
U20	I.C., DS1232, DIP 8	0155-00-0425
U21	EPLD Assy	0155-90-0117-1
U22	I.C., MAX 232, DIP 16	0155-00-0400
U23	I.C., 68681, PLCC44	0155-00-0430
U24	I.C., 68681, PLCC44	0155-00-0430
U25	I.C., 80C196KB, PLCC68P	0155-00-0442
U27	I.C., 14.7mHz OSC, DIP 8	0158-03-0001
U28	I.C., 74HC393, DIP 14	0155-00-0210
U29	I.C., 74HC00, DIP 14	0155-00-0213
U30	I.C., 74HC02, DIP 14	0155-00-0219
U31	EPLD Assy	0155-90-0118-1
U32	I.C., 4028, DIP 16	0155-00-0132
U33	I.C., MAX 232, DIP 16	0155-00-0400
U34	I.C., DS0026, DIP 8	0155-00-0226
U35	I.C., MC34092	0155-00-0407
U36	I.C., MC34092	0155-00-0407
XU 14	Socket, Dip Low Profile 24P	0136-01-2024
XU21	Socket, Dip Low Profile 24P	0136-01-2024
XU23	Socket, I.C., 44 Pin SQ	0136-57-0044
XU24	Socket, I.C., 44 Pin SQ	0136-57-0044
XU25	Socket, I.C., PLCC 68 Pin	0136-57-0068

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
XU31	Socket, Dip Low Profile 24P	0136-01-2024
J1	Header, Rt. Angle, 14 Pin-S	0136-21-0014
J2	Header, Double Row, 20 Pin	0136-24-1020
J3	Conn, Rt. Angle, 34 Pin	0131-00-0209
TP1	Header, Double Row, 6 Pin	0136-19-1006
TP2	Header, Double Row, 6 Pin	0136-19-1006
TP3	Header, Double Row, 6 Pin	0136-19-1006
TP4	Header, Double Row, 6 Pin	0136-19-1006
TP5	Header, Double Row, 6 Pin	0136-19-1006
TP6	Header, Double Row, 6 Pin	0136-19-1006
	Trans., Mtg. Pad	0432-01-0002
	Conn., Jumper	0131-00-0095

REPLACEMENT PARTS FOR: **BP SUB BOARD 0670-00-0406**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	BP SUB Board	0670-00-0406
-	Exchange Board	0670-00-0406E
C1	Cap., Tant., 1mF	0290-02-3105
C2	Cap., .1mF	0283-04-0104
C3	Cap., .1mF	0283-04-0104
L1	Coil	0108-05-0033
R1	Res., 20 ohm, 1/4W, 5%	0315-00-0200
U1	Trans., Voltage Reg.	0151-00-0072
U2	I.C., Hex D Flip Flop, 4174 16P	0155-00-0101

REF. NO.	DESCRIPTION	DATASCOPE PART NO.

Added 11/15/89

REPLACEMENT PARTS FOR: ECG BOARD 0670-00-0401

REF. NO.	DESCRIPTION	DATASCOPE PART NUMBER
-	ECG Board	0670-00-0401
-	Exchange Board	0670-00-0401E
C1	CAP., 120pf, 5%, 500V	0283-01-5121
C2	CAP., 120pf, 5%, 500V	0283-01-5121
C3	CAP., 120pf, 5%, 500V	0283-01-5121
C4	CAP., 120pf, 5%, 500V	0283-01-5121
C5	CAP., 1000pfd, 5%, 100V	0283-01-1102
C6	CAP., 120pf, 5%, 500V	0283-01-5121
C7	CAP., 120pf, 5%, 500V	0283-01-5121
C8	CAP., 120pf, 5%, 500V	0283-01-5121
C9	CAP., 120pf, 5%, 500V	0283-01-5121
C10	CAP., 120pf, 5%, 500V	0283-01-5121
C11	CAP., 120pf, 5%, 500V	0283-01-5121
C12	CAP., 120pf, 5%, 500V	0283-01-5121
C13	CAP., 120pf, 5%, 500V	0283-01-5121
C14	CAP., .1uf, 10%, 100V	0283-04-0104
C15	CAP., .1uf, 10%, 100V	0283-04-0104
C16	CAP., .1uf, 10%, 100V	0283-04-0104
C17	CAP., .1uf, 10%, 100V	0283-04-0104
C18	CAP., .1uf, 10%, 100V	0283-04-0104
C19	CAP., .1uf, 10%, 100V	0283-04-0104
C20	CAP., .1uf, 10%, 100V	0283-04-0104
C21	CAP., 330pf, 10%, 200V	0283-05-0331
C22	CAP., 330pf, 10%, 200V	0283-05-0331
C23	CAP., .1uf, 10%, 100V	0283-04-0104
C24	CAP., .01uf, 10%, 100V	0283-05-0103
C25	CAP., .1uf, 10%, 100V	0283-04-0104
C26	CAP., .1uf, 10%, 100V	0283-04-0104
C27	CAP., .47uf, 10%, 50V	0283-04-0474
C28	CAP., .01uf, 10%, 100V	0283-05-0103
C29	CAP., .01uf, 10%, 100V	0283-05-0103
C30	CAP., .1uf, 10%, 100V	0283-04-0104
C31	CAP., 33uf, 20%, 10V	0290-02-0336
C32	CAP., 33uf, 20%, 10V	0290-02-0336
C33	CAP., .1uf, 10%, 100V	0283-04-0104
C34	CAP., .1uf, 10%, 100V	0283-04-0104
C35	CAP., .1uf, 10%, 100V	0283-04-0104
C36	CAP., 220pf, 10%, 100V	0283-05-0222
C37	CAP., 2uf, 10%, 50V	0285-09-0039
C39	CAP., .1uf, 10%, 100V	0283-04-0104
C40	CAP., .1uf, 10%, 100V	0283-04-0104
C41	CAP., .1uf, 10%, 100V	0283-04-0104
C42	CAP., .1uf, 10%, 100V	0283-04-0104
C43	CAP., 4.7uf, 20%, 35V	0290-02-3475
C44	CAP., .1uf, 10%, 100V	0283-04-0104
C45	CAP., .1uf, 10%, 100V	0283-04-0104
C45	CAP., .1uf, 10%, 100V	0283-04-0104
C47	CAP., .1uf, 10%, 100V	0283-04-0104
C48	CAP., .1uf, 10%, 100V	0283-04-0104
C50	CAP., .033uf, 5%, 100V	0283-04-1333

REF. NO.	DESCRIPTION	DATASCOPE PART NUMBER
C51	CAP., .1uf, 10%, 100V	0283-04-0104
C52	CAP., .001uf, 10%, 200V	0283-05-0102
C53	CAP., .01uf, 10%, 100V	0283-05-0103
C54	CAP., .01uf, 10%, 100V	0283-05-0103
C55	CAP., .1uf, 10%, 100V	0283-04-0104
C56	CAP., .1uf, 10%, 100V	0283-04-0104
C57	CAP., 330pf, 10%, 200V	0283-05-0331
C58	CAP., .1uf, 10%, 100V	0283-04-0104
C59	CAP.01uf, 10%, 100V	0283-05-0103
C60	CAP., .1uf, 10%, 100V	0283-04-0104
C61	CAP., .1uf, 10%, 100V	0283-04-0104
C62	CAP., .47uf, 5%, 50V	0283-04-1474
C63	CAP., .01uf, 10%, 100V	0283-05-0103
C64	CAP., .01uf, 10%, 100V	0283-05-0103
C65	CAP., 4.7uf, 20%, 35V	0290-02-3475
C66	CAP., 4.7uf, 20%, 35V	0290-02-3475
C67	CAP., 330pf, 10%, 200V	0283-05-0331
C68	CAP., .01uf, 10%, 100V	0283-05-0103
C69	CAP., .47uf, 10%, 50V	0283-04-0474
C70	CAP., .01uf, 10%, 100V	0283-05-0103
C71	CAP., 100pf, 10%, 200V	0283-05-0101
C72	CAP., 100pf, 10%, 200V	0283-05-0101
C73	CAP., .1uf, 10%, 100V	0283-04-0104
C74	CAP., .47uf, 10%, 50V	0283-04-0474
C75	CAP., .22uf, 10%, 50V	0283-04-0224
C76	CAP., 4.7uf, 20%, 35V	0290-02-3475
C77	CAP., 4.7uf, 20%, 35V	0290-02-3475
C78	CAP., .47uf, 10%, 50V	0283-04-0474
C79	CAP., .22uf, 10%, 50V	0283-04-0224
C80	CAP., .1uf, 10%, 100V	0283-04-0104
C81	CAP., .001uf, 10%, 200V	0283-05-0102
C82	CAP., .001uf, 10%, 200V	0283-05-0102
C83	CAP., .001uf, 10%, 200V	0283-05-0102
C84	CAP., 4.7uf, 20%, 35V	0290-02-3475
C85	CAP., 300pf, 10%, 200V	0283-05-0331
CR6	DIODE, 1N914	0153-00-0014
CR7	DIODE, Low Leakage FDH300	0153-00-0080
CR8	DIODE, Low Leakage FDH300	0153-00-0080
CR9	DIODE, 1N914	0153-00-0014
CR10	DIODE, 1N914	0153-00-0014
CR11	DIODE, 1N914	0153-00-0014
CR12	DIODE, 1N914	0153-00-0014
CR13	DIODE, 1N914	0153-00-0014
CR14	DIODE, 1N914	0153-00-0014
CR15	DIODE, 1N914	0153-00-0014
CR16	DIODE, 1N914	0153-00-0014
CR17	DIODE, 1N914	0153-00-0014
CR18	DIODE, 1N914	0153-00-0014
CR19	DIODE, 1N914	0153-00-0014
CR20	DIODE, 1N914	0153-00-0014

Added 11/14/90

REPLACEMENT PARTS FOR: ECG BOARD 0670-00-0401

REF. NO.	DESCRIPTION	DATASCOPE PART NUMBER
CR21	DIODE, 1N914	0153-00-0014
CR24	DIODE, 1N914	0153-00-0014
CR25	DIODE, 1N914	0153-00-0014
CR26	DIODE, 1N914	0153-00-0014
CR27	DIODE, 1N914	0153-00-0014
CR28	DIODE, 1N914	0153-00-0014
CR29	DIODE, 1N914	0153-00-0014
CR30	DIODE, 1N914	0153-00-0014
CR31	DIODE, 1N914	0153-00-0014
CR32	DIODE, 1N914	0153-00-0014
CR33	DIODE, 1N914	0153-00-0014
CR34	DIODE, 1N751A	0153-00-0040
Q1	Transistor, 2N4401	0151-00-0052
Q2	Transistor, 2N2222A	0151-00-0061
Q3	Transistor, 2N2907A	0151-00-0073
Q4	Transistor, 2N4401	0151-00-0052
Q5	Transistor, 2N4401	0151-00-0052
Q6	Transistor, 2N2907A	0151-00-0073
Q7	Transistor, 78L05	0151-00-0072
Q8	Transistor, 2N3645	0151-00-0037
Q9	Transistor, 2N4401	0151-00-0052
Q10	Trans, 2N7000	0151-00-0115
R1	RES., 1K, 5%, 1W	0303-00-0102
R2	RES., 1K, 5%, 1W	0303-00-0102
R3	RES., 1K, 5%, 1W	0303-00-0102
R4	RES., 1K, 5%, 1W	0303-00-0102
R5	RES., 1K, 5%, 1W	0303-00-0102
R6	RES., 24K, 5%, 1/4W	0315-01-0243
R7	RES., 24K, 5%, 1/4W	0315-01-0243
R8	RES., 24K, 5%, 1/4W	0315-01-0243
R9	RES., 24K, 5%, 1/4W	0315-01-0243
R10	RES., 24K, 5%, 1/4W	0315-01-0243
R11	RES., 22M, 5%, 1/4W	0315-01-0226
R12	RES., 22M, 5%, 1/4W	0315-01-0226
R13	RES., 22M, 5%, 1/4W	0315-01-0226
R14	RES., 22M, 5%, 1/4W	0315-01-0226
R15	RES., 100K, 1%, 1/8W	0309-00-1003
R16	RES., 47K, 5%, 1/4W	0315-01-0473
R17	RES., 47K, 5%, 1/4W	0315-01-0473
R18	RES., 47K, 5%, 1/4W	0315-01-0473
R19	RES., 47K, 5%, 1/4W	0315-01-0473
R20	RES., 47K, 5%, 1/4W	0315-01-0473
R21	RES., 47K, 5%, 1/4W	0315-01-0473
R22	RES., 47K, 5%, 1/4W	0315-01-0473
R23	RES., 47K, 5%, 1/4W	0315-01-0473
R24	RES., 1K, 5%, 1/4W	0315-00-0102
R25	RES., 10K, 1%, 1/8W	0309-00-1002

REF. NO.	DESCRIPTION	DATASCOPE PART NUMBER
R26	RES., 10K, 1%, 1/8W	0309-00-1002
R27	RES., 10K, 1%, 1/8W	0309-00-1002
R28	RES., 10K, 1%, 1/8W	0309-00-1002
R29	RES., 10K, 1%, 1/8W	0309-00-1002
R30	RES., 10K, 1%, 1/8W	0309-00-1002
R31	RES., 10K, 1%, 1/8W	0309-00-1002
R32	RES., 10K, 1%, 1/8W	0309-00-1002
R33	RES., 10K, 1%, 1/8W	0309-00-1002
R34	RES., 47K, 5%, 1/4W	0315-00-0473
R35	RES., 53K, .1%	0320-00-5302
R36	RES., 45.3 ohm, 1%, 1/8W	0309-00-4530
R37	RES., 24K, 5%, 1/4W	0315-00-0243
R38	RES., 100K, 1%, 1/8W	0309-00-1003
R39	RES., 20K, 1%, 1/8W	0309-00-2002
R40	RES., 100K, 1%, 1/8W	0309-00-1003
R41	RES., 10K, 1%, 1/8W	0309-00-1002
R42	RES., 10K, 1%, 1/8W	0309-00-1002
R43	RES., 10K, 1%, 1/8W	0309-00-1002
R44	RES., 24K, 5%, 1/4W	0315-00-0243
R45	RES., 1K, 5%, 1/4W	0315-00-0102
R46	RES., 47K, 5%, 1/4W	0315-00-0473
R47	RES., 47K, 5%, 1/4W	0315-00-0473
R48	RES., 24K, 5%, 1/4W	0315-00-0243
R49	RES., 47K, 5%, 1/4W	0315-00-0473
R50	RES., 1K, 5%, 1/4W	0315-00-0102
R51	RES., 1K, 5%, 1/4W	0315-00-0102
R52	RES., 4.7K, 5%, 1/4W	0315-00-0472
R53	RES., 4.7K, 5%, 1/4W	0315-00-0472
R54	RES., 47K, 5%, 1/4W	0315-00-0473
R55	RES., 47K, 5%, 1/4W	0315-00-0473
R56	RES., 47K, 5%, 1/4W	0315-00-0473
R57	RES., 1K, 5%, 1/4W	0315-00-0102
R58	RES., VAR., 5%, 1T	0311-01-2502
R59	RES., 240K, 5%, 1/4W	0315-00-0244
R60	RES., 47K, 5%, 1/4W	0315-00-0473
R61	RES., 4.7K, 5%, 1/4W	0315-00-0472
R62	RES., 4.7K, 5%, 1/4W	0315-00-0472
R63	RES., 200K, 5%, 1/4W	0315-00-0204
R64	RES., 390K, 5%, 1/4W	0315-00-0394
R65	RES., 47K, 5%, 1/4W	0315-00-0473
R66	RES., 47K, 5%, 1/4W	0315-00-0473
R67	RES., 47K, 5%, 1/4W	0315-00-0473
R68	RES., 820K, 5%, 1/4W	0315-00-0824
R69	RES., 2M, 5%, 1/4W	0315-00-0205
R70	RES., 47 ohms, 5%, 1/4W	0315-00-0470
R71	RES., 1K, 5%, 1/4W	0315-00-0102
R72	RES., 47K, 5%, 1/4W	0315-00-0473
R73	RES., 1K, 5%, 1/4W	0315-00-0102
R74	RES., 47 ohm, 5%, 1/4W	0315-00-0470
R75	RES., 47K 5%, 1/4W	0315-00-0473

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REPLACEMENT PARTS FOR: ECG BOARD 0670-00-0401

REF. NO.	DESCRIPTION	DATASCOPE PART NUMBER
R76	RES., 47K, 5%, 1/4W	0315-00-0473
R77	RES., 1K, 5%, 1/4W	0315-00-0102
R78	RES., 47K, 5%, 1/4W	0315-00-0473
R79	RES., 47K, 5%, 1/4W	0315-00-0473
R80	RES., 300K, 5%, 1/4W	0315-00-0304
R81	RES., 300K, 5%, 1/4W	0315-00-0304
R82	RES., 200K, 1%, 1/8W	0309-00-2003
R83	RES., 392K, 1%, 1/8W	0309-00-3923
R84	RES., 200K, 1%, 1/8W	0309-00-2003
R85	RES., 392K, 1%, 1/8W	0309-00-3923
R86	RES., 100K, 1/%, 1/8W	0309-00-1003
R87	RES., 200K, 1%, 1/8W	0309-00-2003
R88	RES., 47 ohms, 5%, 1/4W	0315-00-0470
R89	RES., 47 ohms, 5%, 1/4W	0315-00-0470
R90	RES., 47 ohms, 5%, 1/4W	0315-00-0470
R91	RES., 47 ohms, 5%, 1/4W	0315-00-0470
R92	RES., 47 ohms, 5%, 1/4W	0315-00-0470
R93	RES., 200K, 1%, 1/8W	0309-00-2003
R94	RES., 47 ohms, 5%, 1/4W	0315-00-0470
R95	RES., 47 ohms, 5%, 1/4W	0315-00-0470
R96	RES., 100K, 1%, 1/8W	0309-00-1003
R97	RES., 100K, 1%, 1/8W	0309-00-1003
R98	RES., 200K, 1%, 1/8W	0309-00-2003
R99	RES., 200K, 1%, 1/8W	0309-00-2003
R100	RES., 47K, 5%, 1/4W	0315-00-0473
R101	RES., 4.7K, 5%, 1/4W	0315-00-0472
R102	RES., 47K, 5%, 1/4W	0315-00-0473
R104	RES., 47K, 5%, 1/4W	0315-00-0473
R105	RES., 115K, 1%, 1/8W	0309-00-1153
R106	RES., 115K, 1%, 1/8W	0309-00-1153
R107	RES., 47K, 1%, 1/8W	0309-00-4702
R108	RES., 47K, 5%, 1/4W	0315-00-0473
R109	RES., 24K, 5%, 1/4W	0315-00-0243
R110	RES., 1K, 5%, 1/4W	0315-00-0102
R111	RES., 1K, 5%, 1/4W	0315-00-0102
R112	RES., 1K, 5%, 1/4W	0315-00-0102
R113	RES., 1K, 5%, 1/4W	0315-00-0102
R114	RES., 47K, 5%, 1/4W	0315-00-0473
R115	RES., 200K, 5%, 1/4W	0315-00-0204
R116	RES., 390K, 5%, 1/4W	0315-00-0394
R117	RES., 60K, .1%	0320-00-6002
R118	RES., 47K, 5%, 1/4W	0315-00-0473
R119	RES., 1K, 5%, 1/4W	0315-00-0102
R120	RES., 240K, 5%, 1/4W	0315-00-0244
R121	RES., 1K, 5%, 1/4W	0315-00-0102
R122	RES., 1K, 5%, 1/4W	0315-00-0102
R123	RES., 4.7K, 5%, 1/4W	0315-00-0472
R124	RES., 820K, 5%, 1/4W	0315-00-0824
R125	RES., 390K, 5%, 1/4W	0315-00-0394

REF. NO.	DESCRIPTION	DATASCOPE PART NUMBER
R126	RES., 820K, 5%, 1/4W	0315-00-0824
R127	RES., 47K, 5%, 1/4W	0315-00-0473
R128	RES., 243K, 5%, 1/4W	0315-00-0243
R129	RES., 200K, 5%, 1/4W	0315-00-0204
R130	RES., 24K, 5%, 1/4W	0315-00-0243
R131	RES., 47K, 5%, 1/4W	0315-00-0473
R132	RES., 47K, 5%, 1/4W	0315-00-0473
R133	RES., 47K, 5%, 1/4W	0315-00-0473
R134	RES., 47K, 5%, 1/4W	0315-00-0473
R135	RES., 47K, 5%, 1/4W	0315-00-0473
R136	RES., 47K, 5%, 1/4W	0315-00-0473
R137	RES., 10 ohms, 5%, 1/4W	0315-00-0100
R138	RES., 10 ohms, 5%, 1/4W	0315-00-0100
R139	RES., 4.7K, 5%, 1/4W	0315-00-0472
R140	RES., 1K, 5%, 1/4W	0315-00-0102
R141	RES., 220 ohms, 5%, 1/4W	0315-00-0221
R142	RES., 47K, 5%, 1/4W	0315-00-0473
R143	RES., 47K, 5%, 1/4W	0315-00-0473
R144	RES., 47K, 5%, 1/4W	0315-00-0473
R145	RES., 47K, 5%, 1/4W	0315-00-0473
U1	I.C. 4051	0155-00-0122
U2	REG., AD580KH or SC3503T	0153-00-0093
U3	I.C. TL082	0155-00-0151
U4	I.C. TL082	0155-00-0151
U5	I.C. 4051	0155-00-0122
U6	I.C. 4051	0155-00-0122
U7	I.C. TL082	0155-00-0151
U8	I.C. TL082	0155-00-0151
U9	I.C. 4066	0155-00-0075
U10	I.C. 4066	0155-00-0075
U11	I.C. CNY65	0155-00-0391
U12	I.C. CNY65	0155-00-0391
U13	I.C. CNY65	0155-00-0391
U14	I.C. 40174	0155-00-0101
U15	I.C. TL082	0155-00-0151
U16	I.C. TL082	0155-00-0151
U17	I.C. 4538	0155-00-0112
U18	I.C. 4066	0155-00-0075
U19	I.C. TL082	0155-00-0151
U20	I.C. TL082	0155-00-0151
U21	I.C. MC34082	0155-00-0407
U22	I.C. 4052	0155-00-0089
U23	I.C. CNY65	0155-00-0391
U24	I.C. 4093	0155-00-0225
U25	I.C. LF411ACN	0155-00-0224
T1	Transformer, Signal	0120-00-0124
T2	Transformer, Isolation	0120-00-0125
TP1	Terminal	0124-00-0064
TP2	Terminal	0124-00-0064

Added 11/14/90

REPLACEMENT PARTS FOR: ECG BOARD 0670-00-0401

REF. NO.	DESCRIPTION	DATASCOPE PART NUMBER
DG1	Spark Gap, 1000V	0167-00-0003
DG2	Spark Gap, 1000V	0167-00-0003
DG3	Spark Gap, 1000V	0167-00-0003
DG4	Spark Gap, 1000V	0167-00-0003
DG5	Spark Gap, 1000V	0167-00-0003
DG6	Spark Gap	0167-00-0005
DG7	Spark Gap	0167-00-0005
XU2	Mounting Pad	0432-01-0002
J1	Connector, DBL Row, 10 Pin	0136-24-1010
J25	Connector, Male	0131-01-0012
E1	Connector, DBL Row, 6 Pin	0136-24-1006
E2	Connector, DBL Row, 6 Pin	0136-24-1006
E3	Connector, DBL Row, 6 Pin	0136-24-1006
E4	Connector, DBL Row, 6 Pin	0136-24-1006
E5	Connector, DBL Row, 6 Pin	0136-24-1006
E6	Connector, DBL Row, 6 Pin	0136-24-1006
L1	Coil, 47uH	0108-05-0033
L2	Coil, 47uH	0108-05-0033
	CONN, JUMPER	0131-00-0095
	Shrink Tubing	0008-01-0007
	Connector, Jack, P.C.	0136-00-0095
	Shield, Top	0200-00-0166
	Shield, Bottom	0200-00-0167
	Card Ejector	0367-00-0016

REF. NO.	DESCRIPTION	DATASCOPE PART NUMBER

Revised 07/11/91

REPLACEMENT PARTS FOR: ISOLATED PULSE/PRESSURE BOARD 0670-00-0402

REF. NO.	DESCRIPTION	DATASCOPE PART NUMBER
-	Pressure Board	0670-00-0225
-	Exchange Board	0670-00-0225E
C1	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C2	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C3	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C4	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C5	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C6	CAP., FXD., 2200pf, 10%, 100V	0283-05-0222
C7	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C8	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C9	CAP., FXD., 150uf, 20%, 15V	0290-02-4157
C10	CAP., FXD., 150uf, 20%, 15V	0290-02-4157
C11	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C12	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C13	CAP., FXD., 4.7uf, 20%, 35V	0290-02-3475
C14	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C15	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C16	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C17	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C18	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C19	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C20	CAP., FXD., 4.7uf, 20%, 35V	0290-02-3475
C21	CAP., FXD., 4.7uf, 20%, 35V	0290-02-3475
C22	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C23	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C24	CAP., FXD., 0.47uf, 10%, 50V	0283-04-0474
C25	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C27	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C28	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C29	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C31	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C32	CAP., FXD., 4.7uf, 20%, 35V	0290-02-3475
C33	CAP., FXD., 0.47uf, 10%, 50V	0283-04-0474
C34	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C35	CAP., FXD., 33uf, 20%, 10V	0290-02-0336
C36	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C37	CAP., FXD., .01uf, 10%, 100V	0383-05-0103
C38	CAP., FXD., 47pf, 10%, 200V	0283-05-0470
C39	CAP., FXD., 47pf, 10%, 200V	0283-05-0470
C40	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C41	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C42	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C43	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C44	CAP., FXD., 120pf, 10%, 200V	0283-05-0121
C46	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C47	CAP., FXD., 0.047uf, 10%, 100V	0283-04-0473
C48	CAP., FXD., 120pf, 10%, 200V	0283-05-0121
C50	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C51	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C53	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C54	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C55	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104

REF. NO.	DESCRIPTION	DATASCOPE PART NUMBER
C56	CAP., FXD., 120pf, 10%, 200V	0283-05-0121
C57	CAP., FXD., 0.1up, 10%, 100V	0283-04-0104
C58	CAP., FXD., 0.047uf, 10%, 100V	0283-04-0473
C59	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C60	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C61	CAP., FXD., 120pf, 10%, 200V	0283-05-0121
C62	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C63	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C64	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C65	CAP., FXD., 4.7uf, 20%, 35V	0290-02-3475
C66	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C67	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C68	CAP., FXD., 120pf, 10%, 200V	0283-05-0121
C69	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C70	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C71	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C72	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C73	CAP., FXD., 120pf, 10%, 200V	0283-05-0121
C74	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C75	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C76	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C77	CAP., FXD., 470pf, 10%	0283-05-0471
C78	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C81	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C82	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C83	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C84	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C85	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C86	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C87	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C88	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C89	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C90	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C91	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C92	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C93	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C95	CAP., FXD., .22uf, 10%, 50V	0283-04-0224
C96	CAP., FXD., 470pf, 10%	0283-05-0471
C97	CAP., FXD., 470pf, 10%	0283-05-0471
C98	CAP., FXD., 470pf, 10%	0283-05-0471
C99	CAP., FXD., 470pf, 10%	0283-05-0471
C100	CAP., FXD., .001uf	0283-05-0102
C101	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C102	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C104	CAP., FXD., 0.047uf, 10%, 100V	0283-04-0473
C106	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C107	CAP., FXD., 4.7uf, 20%, 35V	0290-02-3475
C108	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C109	CAP., FXD., .01uf, 10%, 100V	0283-05-0103
C110	CAP., FXD., 470pf, 10%	0283-05-0471

Added 11/14/90

REPLACEMENT PARTS FOR: ISOLATED PULSE/PRESSURE BOARD 0670-00-0402

REF. NO.	DESCRIPTION	DATASCOPE PART NUMBER
C111	CAP., FXD., 470pf, 10%	0283-05-0471
C112	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C113	CAP., FXD., 0.1uf, 10%, 100V	0283-04-0104
C114	CAP., FXD., 0.1uf, 10%, 100V	0284-04-0104
C115	CAP., FXD., 0.1uf, 10%, 100V	0284-04-0104
CR1	DIODE, 1N914	0153-00-0014
CR2	DIODE, 1N914	0153-00-0014
CR3	DIODE, 1N914	0153-00-0014
CR4	DIODE, 1N914	0153-00-0014
CR5	DIODE, 1N914	0153-00-0014
CR6	DIODE, 1N914	0153-00-0014
CR7	DIODE, 1N914	0153-00-0014
CR8	DIODE, 1N914	0153-00-0014
CR9	DIODE, 1N914	0153-00-0014
CR10	DIODE, 1N914	0153-00-0014
CR11	DIODE, 1N914	0153-00-0014
CR12	DIODE, 1N914	0153-00-0014
CR13	DIODE, 1N5817	0153-00-0069
CR14	DIODE, 1N5817	0153-00-0069
CR15	DIODE, 1N914	0153-00-0014
CR16	DIODE, 1N914	0153-00-0014
CR17	DIODE, 1N914	0153-00-0014
CR18	DIODE, 1N914	0153-00-0014
CR19	DIODE, 1N914	0153-00-0014
CR20	DIODE, 1N914	0153-00-0014
CR21	DIODE, 1N6263	0153-00-0085
CR22	DIODE, 1N6263	0153-00-0085
R1	RES., FXD., 100K, 5%, 1/4W	0315-00-0104
R2	RES., FXD., 10K, 5%, 1/4W	0315-00-0103
R3	RES., FXD., 100K, 5%, 1/4W	0315-00-0104
R4	RES., FXD., 2.4K, 5%, 1/4W	0315-00-0242
R5	RES., FXD., 10 Meg, 5%, 1/4W	0315-00-0106
R6	RES., FXD., 10K, 5%, 1/4W	0315-00-0103
R7	RES., FXD., 75.0K, 1%, 1/8W	0309-00-7502
R8	RES., FXD., 1.0K, 1%, 1/8W	0309-00-1001
R9	RES., FXD., 75.0K, 1%, 1/8W	0309-00-7502
R10	RES., FXD., 10K, 5%, 1/4W	0315-00-0103
R11	RES., FXD., 10 Meg, 5%, 1/4W	0315-00-0106
R12	RES., FXD., 47.5K, 1%, 1/8W	0309-00-4752
R13	RES., FXD., 100K, 1%, 1/8W	0309-00-1003
R14	RES., FXD., 33.2K, 1%, 1/8W	0309-00-3322
R15	RES., FXD., 12K, 5%, 1/4W	0315-00-0123
R16	RES., FXD., 470K, 5%, 1/4W	0315-00-0474
R17	RES., FXD., 100K, 1%, 1/8W	0309-00-1003
R18	RES., FXD., 100K, 1%, 1/8W	0309-00-1003
R19	RES., FXD., 100K, 1%, 1/8W	0309-00-1003
R20	RES., FXD., 220K, 5%, 1/4W	0315-00-0224
R21	RES., FXD., 22K, 5%, 1/4W	0315-00-0223
R22	RES., FXD., 220K, 5%, 1/4W	0315-00-0224
R23	RES., FXD., 1 Meg, 5%, 1/4W	0315-00-0105
R24	RES., FXD., 100K, 5%, 1/4W	0315-00-0104
R25	RES., FXD., 10 Meg, 5%, 1/4W	0315-00-0106

REF. NO.	DESCRIPTION	DATASCOPE PART NUMBER
R26	RES., FXD., 10K, 5%, 1/4W	0315-00-0103
R27	RES., FXD., 75.0K, 1%, 1/8W	0309-00-7502
R28	RES., FXD., 1.0K, 1%, 1/8W	0309-00-1001
R29	RES., FXD., 75.0K, 1%, 1/8W	0309-00-7502
R30	RES., FXD., 10K, 5%, 1/4W	0315-00-0103
R31	RES., FXD., 10 Meg, 5%, 1/4W	0315-00-0106
R32	RES., FXD., 200 ohm, 5%, 1/4W	0315-00-0201
R33	RES., FXD., 200 ohm 5%, 1/4W	0315-00-0201
R34	RES., FXD., 1K, 5%, 1/4W	0315-00-0102
R35	RES., FXD., 200 ohm, 5%, 1/4W	0315-00-0201
R36	RES., FXD., 200 ohm, 5%, 1/4W	0315-00-0201
R37	RES., FXD., 43K, 5%, 1/4W	0315-00-0433
R38	RES., FXD., 47K, 5%, 1/4W	0315-00-0473
R39	RES., FXD., 10K, 5%, 1/4W	0315-00-0103
R40	RES., FXD., 1K, 5%, 1/4W	0315-00-0102
R41	RES., FXD., 30.9K, 1%, 1/8W	0309-00-3092
R42	RES., FXD., 47K, 5%, 1/4W	0315-00-0473
R43	RES., FXD., 57.6K, 1%, 1/8W	0309-00-5762
R44	RES., FXD., 47K, 5%, 1/4W	0315-00-0473
R45	RES., FXD., 47K, 5%, 1/4W	0315-00-0473
R46	RES., FXD., 2.4K, 5%, 1/4W	0315-00-0242
R47	RES., FXD., 100K, 1%, 1/8W	0309-00-1003
R48	RES., FXD., 10K, 1%, 1/8W	0309-00-1002
R49	RES., FXD., 27K, 5%, 1/4W	0315-00-0273
R50	RES., FXD., 2.7K, 5%, 1/4W	0315-00-0272
R51	RES., VAR., 1K, 1 Turn	0311-01-2102
R52	RES., FXD., 20 ohm, 5%, 1/4W	0315-00-0200
R53	RES., FXD., 1K, 5%, 1/4W	0315-00-0102
R54	RES., FXD., 1K, 5%, 1/4W	0315-00-0102
R55	RES., FXD., 47K, 5%, 1/4W	0315-00-0473
R56	RES., FXD., 47K, 5%, 1/4W	0315-00-0473
R57	RES., FXD., 2K, 5%, 1/4W	0315-00-0202
R58	RES., FXD., 2K, 5%, 1/4W	0315-00-0202
R59	RES., FXD., 100 ohm, 5%, 1/4W	0315-00-0101
R60	RES., FXD., 27K, 5%, 1/4W	0315-00-0273
R61	RES., FXD., 100K, 1%, 1/8W	0309-00-1003
R62	RES., FXD., 200K, 1%, 1/8W	0309-00-2003
R63	RES., FXD., 100K, 1%, 1/8W	0309-00-1003
R64	RES., FXD., 102K, 1%, 1/8W	0309-00-1023
R65	RES., FXD., 51.1K, 1%, 1/8W	0309-00-5112
R66	RES., FXD., 154 ohm, 1%, 1/8W	0309-00-1540
R67	RES., FXD., 75.0K, 1%, 1/8W	0309-00-7502
R68	RES., VAR., 1K, 1 Turn	10311-01-2102
R69	RES., FXD., 1.0K, 1%, 1/8W	0309-00-1001
R70	RES., FXD., 95.3K, 1%, 1/8W	0309-00-9532
R71	RES., FXD., 47K, 5%, 1/4W	0315-00-0473
R72	RES., FXD., 100K, 1%, 1/8W	0309-00-1003
R73	RES., FXD., 1.0K, 1%, 1/8W	0309-00-2001
R74	RES., FXD., 10K, 5%, 1/4W	0315-00-0103
R75	RES., FXD., 46.4K, 1%, 1/8W	0309-00-4642

Added 11/14/90

REPLACEMENT PARTS FOR: ISOLATED PULSE/PRESSURE BOARD 0670-00-0402

REF. NO.	DESCRIPTION	DATASCOPE PART NUMBER
R76	RES., FXD., 39.2K, 1%, 1/8W	0309-00-3922
R77	RES., FXD., 39.2K, 1%, 1/8W	0309-00-3922
R78	RES., FXD., 4.64K, 1%, 1/8W	0309-00-4641
R79	RES., FXD., 255K, 1%, 1/8W	0309-00-2553
R80	RES., FXD., 2.43K, 1%, 1/8W	0309-00-2431
R81	RES., FXD., 3.9K, 5%, 1/4W	0315-00-0392
R82	RES., FXD., 75.0K, 1%, 1/8W	0309-00-5112
R83	RES., FXD., 102K, 1%, 1/8W	0309-00-1023
R84	RES., FXD., 154 ohm, 1%, 1/8W	0309-00-1540
R85	RES., FXD., 100K, 1%, 1/8W	0309-00-1003
R86	RES., FXD., 200K, 1%, 1/8W	0309-00-2003
R87	RES., FXD., 75.0K, 1%, 1/8W	0309-00-7502
R88	RES., FXD., 100K, 1%, 1/8W	0309-00-1003
R89	RES., FXD., 27K, 5%, 1/4W	0315-00-0273
R90	RES., FXD., 100 ohm, 5%, 1/4W	0315-00-0101
R91	RES., VAR., 1K, 1 Turn	0311-01-2102
R92	RES., FXD., 1.0K, 1%, 1/8W	0309-00-1001
R93	RES., FXD., 47K, 5%, 1/4W	0315-00-0473
R94	RES., FXD., 95.3K, 1%, 1/8W	0309-00-9532
R95	RES., FXD., 100K, 1%, 1/8W	0309-00-1003
R96	RES., FXD., 2.0K, 1%, 1.8W	0309-00-2001
R101	RES., FXD., 24.9K, 1%, 1/8W	0309-00-2492
R102	RES., FXD., 75.0K, 1%, 1/8W	0309-00-7502
R109	RES., FXD., 24.9K, 1%, 1/8W	0309-00-2492
R110	RES., FXD., 75.0K, 1%, 1/8W	0309-00-7502
R119	RES., FXD., 100 ohm, 5%, 1/4W	0315-00-0101
R136	RES., FXD., 100K, 5%, 1/4W	0315-00-0104
R137	RES., FXD., 47K, 5%, 1/4W	0315-00-0473
R139	RES., FXD., 47K, 5%, 1/4W	0315-00-0473
R140	RES., FXD., 47K, 5%, 1/4W	0315-00-0473
R141	RES., FXD., 10K, 5%, 1/4W	0315-00-0103
R142	RES., FXD., 10K, 5%, 1/4W	0315-00-0103
R143	RES., FXD., 100 ohm, 5%, 1/4W	0315-00-0101
R144	RES., FXD., 100 ohm, 5%, 1/4W	0315-00-0101
R145	RES., FXD., 100 ohm, 5%, 1/4W	0315-00-0101
Q1	Transistor, 2N3638A	0151-00-0009
Q2	Transistor, 2N5484	0151-00-0028
Q3	Transistor, MJE-200	0151-00-0062
Q4	Transistor, MJE-200	0151-00-0062
Q5	Transistor, 2N3565	0151-00-0021
T1	Transformer, Signal	0120-00-0124
T2	Transformer, Isolation	0120-00-0125
T3	Transformer, Signal	0120-00-0124
L1	Inductor, 47uh	0108-05-0033
L2	Inductor, 47uh	0108-05-0033
L3	Inductor, 47uh	0108-05-0033

REF. NO.	DESCRIPTION	DATASCOPE PART NUMBER
DG1	Spark Gap, 470V, 15%	0167-00-0005
DG2	Spark Gap, 470V, 15%	0167-00-0005
XDG1	Tubing, Heat Shrink	0008-01-0007
XDG2	Tubing, Heat Shrink	0008-01-0007
J23	Header, Right Angle, 12 Pin	0136-20-1012
J24	Header, Right Angle, 12 Pin	0136-20-1012
J100	Header, Dual Row	0136-24-1006
J101	Header	0136-22-0006
U1	I.C. Op-07	0155-00-0159
U2	I.C. Op-07	0155-00-0159
U3	I.C. TLO 82	0155-00-0151
U4	I.C. Op-07	0155-00-0159
U5	I.C. Op-07	0155-00-0159
U6	I.C. Op-07	0155-00-0159
U7	I.C. CD 4052	0155-00-0089
U8	Voltage Reg., 5%, 78L05ACP	0151-00-0072
U9	I.C. CD 4053	0155-00-0086
U10	I.C. CD 4053	0155-00-0086
U11	I.C. MC74HC367	0155-00-0191
U12	I.C. LT1014	0155-00-0443
U13	I.C. LT1014	0155-00-0443
U14	I.C. CD4556B	0155-00-0181
U15	Res. Ntwk., 10K, .5%, 14 Pin DIP	0307-00-0029
U16	Res. Ntwk., 10K, .5%, 14 Pin DIP	0307-00-0029
U17	I.C. CD 4053	0155-00-0086
U18	I.C. CD 4053	0155-00-0086
U19	I.C. DAC 7524	0155-00-0201
U20	I.C. DAC 7524	0155-00-0201
U21	I.C. TLO 82	0155-00-0151
U22	I.C. CD 4013	0155-00-0066
U23	I.C. Op-07	0155-00-0159
U24	I.C. CD 4013	0155-00-0066
U25	I.C. LT1014	0155-00-0443
U27	I.C. CD40174	0155-00-0101
U28	I.C. CD 4053	0155-00-0086
U29	I.C. Op-07	0155-00-0159
U30	I.C. CD 4052	0155-00-0089
U31	I.C. Op-07	0155-00-0159
U32	I.C. CD 4052	0155-00-0089
U33	I.C. 74HC04	0155-00-0212
U34	I.C. CNY65	0155-00-0417
U35	I.C. CNY65	0155-00-0417
U36	Voltage Reg., 5%, 78L05ACP	0151-00-0072
U37	I.C. CD 4053	0155-00-0086
	Insulator Assy	0349-00-0052
	Standoff, Nylon, 4-40 UNC thru	0361-04-0022
	Screw, Nylon, 4-40 x 3/16	0212-01-0403
	Standoff, Alum 4-40 thru	0361-04-0028

Added 11/14/90

REPLACEMENT PARTS FOR: LCD Panel Power Supply Board 0670-00-0391

REF. NO.	DESCRIPTION	DATASCOPE PART NUMBER
-	LCD Panel Power Supply Board	0670-00-0391
-	Exchange Board	0670-00-0391E
C1	CAP., 470uf, 16V	0290-08-4733
J50	Header, Conn., 5 Pin	0136-22-0005
R1	RES., 10 ohm, 1/4W, 5%	0315-00-0100
XINV1	Shield, Inverter	0337-00-0062
INV1	Power Supply, Inverter	0014-00-0023

REF. NO.	DESCRIPTION	DATASCOPE PART NUMBER

Added 03/21/91

4.1 Introduction

This chapter of the Service Manual contains detailed information necessary to test and calibrate the instrument. Instrument testing and calibration should be performed following repairs and at the noted intervals as part of a preventive maintenance program.

4.2 Warnings and General Guidelines

In the event that the instrument covers are removed, observe these following warnings and general guidelines.

A. Do not short component leads together.

B. Perform all steps in the exact order given.

C. Use extreme care when reaching inside the opened instrument. Do not contact exposed metal parts which may become live.

D. Read through each step in the procedure so it is understood prior to beginning the step.

4.3 Test Equipment Required

-oscilloscope, dual trace, 100mHz storage

-digital voltmeter, 3 1/2 digits

-ECG, 5 lead simulator

-pressure simulator, dynamic and static 0-300mmHg

-pressure reference guage, mercury column or gauge manometer, 0-300mmHg

-adult size blood pressure cuff with Y fitting to connect to pressure reference gauge and monitor

-DIGISENSOR or compatible SaO_2 sensor

-circuit board extenders:

ECG	0670-00-0235
Pressure, Invasive	0670-00-0237
Refresh Memory	0670-00-0237
SaO_2 Analog	0670-00-0334
SaO_2 Digital	0670-00-0334
Trend-Recorder	0670-00-0392
Host Processor	0670-00-0393
Deflection	0670-00-0238

4.4 Calibration Procedure

4.4.1 Preliminary Steps

A. A thorough understanding of the operation of the 3000 is required before calibration is attempted. Refer to Section 1.3, Operation.

B. Remove top cover.

C. Plug unit into a grounded AC receptacle.

D. Turn on the AC POWER switch on the rear panel.

E. Refer to Page 4-5 for board layout, test points (TP), and pot locations.

4.4.2 Power Supply Voltage Checks

A. Turn the unit on by pressing the front panel ON/ST'BY switch. Wait for a trace to appear on the screen.

B. Measure power supply voltages on test pins (TP) of the Power Supply Board using Pin 4 of J8 as GND reference, or J19 on the Mother Board.

VOLTAGE	ACCEPTABLE RANGE	LOCATION
+7.5V	6.75V to 8.25V	J8-16 (TP7)
+5 V	4.8 V to 5.2 V	J8-14 (TP10)
-7.5V	-6.75V to -8.25V	J8-2 (TP9)
-15 V	-13.5 V to -20V*	J8-3
+15 V	+13.5V to +20V*	J8-11
+22 V	+21 V to 25V	J8-6 (TP6)

* Voltage varies with SaO_2 and NIBP options installed.

4.4.3 Display Adjustments

A. Beam Centering Adjustments

1. Turn unit off by pressing the front panel ON/ST'BY switch.

2. Disconnect yoke leads from the Deflection Board and turn unit on. CAUTION: To avoid burning CRT, reduce brightness level by using the overall brightness control on the Blanking Board.

3. Locate center of the screen by drawing diagonal lines (erasable) on the CRT filter. Adjust beam to center of the screen using the yoke centering rings.

4. Turn unit off and reconnect yoke leads. Turn unit on.

B. Bias Adjustment

Check 400V BIAS at the white lead of the HV module connector. If necessary, adjust the overall brightness pot on the Blanking Board for 400V ±10 volts (usually fully clockwise).

C. Brightness Adjustments

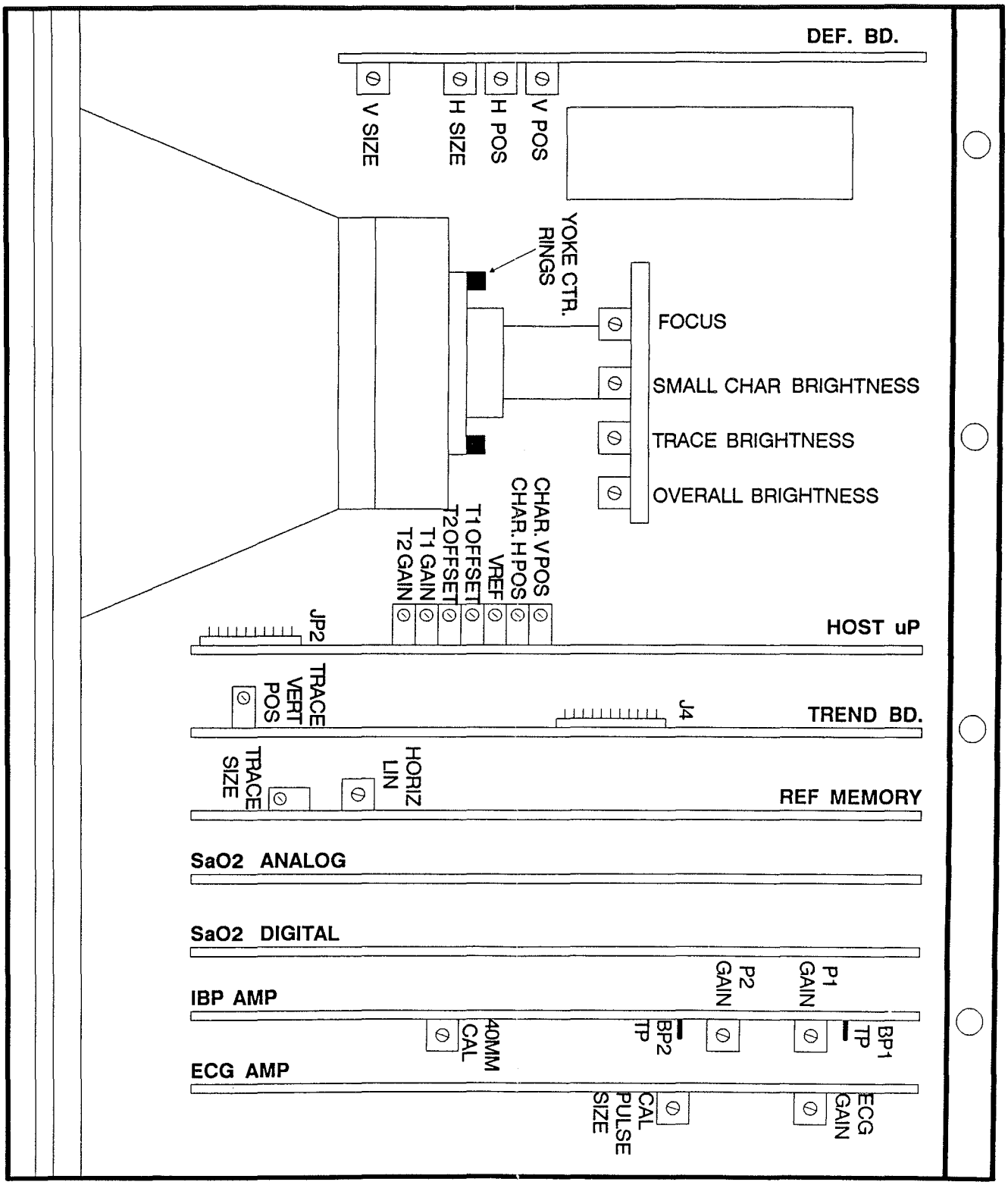
NOTE: Brightness levels are adjusted at the factory to close tolerances by the use of photometric equipment. Unless absolutely necessary, it is best to not alter the original factory setting of overall brightness, trace, small characters, and focus adjustments.

The brightness adjustments are designed to make the most important information on the display (large characters and physiological traces) twice as bright as the other information (Reference Lines, Lead, Time, etc.).

1. Apply an ECG of about 60 bpm to the ECG connector on the front panel. Do not connect anything to P1 and P2 on the front panel.

2. Adjust the overall brightness pot on the Blanking Board for the desired large character (RATE display) brightness. This will affect the small characters as well, but they are readjusted in the next step.

3. Adjust the small character pot on the Blanking Board so that the small characters (TIME, LEAD) are half as bright as the large characters.


DEF. BD.
V SIZE
H SIZE
H POS
V POS
YOKE CTR. RINGS
FOCUS
SMALL CHAR BRIGHTNESS
TRACE BRIGHTNESS
OVERALL BRIGHTNESS
CHAR. V POS
CHAR. H POS
VREF
T1 OFFSET
T2 OFFSET
T1 GAIN
T2 GAIN
JP2
HOST uP
TRACE VERT POS
J4
TREND BD.
TRACE SIZE
HORIZ LIN
REF MEMORY
SaO2 ANALOG
SaO2 DIGITAL
P2 GAIN
P1 GAIN
IBP AMP
40MM CAL
BP2 TP
BP1 TP
ECG AMP
CAL PULSE SIZE
ECG GAIN

4. Adjust the TRACE BRIGHTNESS pot on the Blanking Board so that the ECG trace brightness is slightly brighter than the large characters.

5. Adjust FOCUS on the Blanking Board for the best overall focus of all screen information. FOCUS control will affect the large and small characters in addition to trace. Focus the characters sufficiently, but do not compromise overall trace focus.

4.4.4 Deflection Board Adjustments

A. Vertical Section

1. Plug in a pressure transducer on a simulator to obtain a zero blood pressure trace.

2. Move reference trace up until the digital readout shows 100 (@ 20mmHg per cm scale).

3. Alternately adjust the V POS and V SIZE so that the blood pressure trace is 1/2 cm from the bottom edge of the display and the 100 reference line is 5cm above the blood pressure trace.

4. Check that the ECG trace is 3cm ±3mm above the reference trace.

B. Horizontal Section

1. Adjust H SIZE so that the reference trace is 10cm ±1mm.

2. Adjust T SIZE so that the ECG trace is 10cm ±1mm.

3. Adjust H POS so the reference trace is centered horizontally.

4. Repeat above steps until reference trace and ECG trace are of equal length and are centered.

4.4.5 Host Processor and Refresh Memory Board Adjustments

NOTE: Do not alter factory setting of horizontal linearity adjustment unless necessary.

A. Adjust CHAR. H POS pot on the Host Processor Board to horizontally center the reference trace with respect to the pressure trace. This will affect the horizontal position of all the digital displays.

B. Adjust the CHAR. V POS on the Host Processor Board to vertically align the digital displays with the front panel graphics.

C. Observe the ECG as it travels across the screen. Adjust horizontal linearity (linearity correction) pot on the refresh memory board, if necessary, for minimum trace distortion.

4.4.6 Pressure Board Calibration

A. Connect a pressure transducer to the P1 connector. Zero the transducer by using the P1 Zero switch.

B. Set P1 scale to 5mmHg per cm.

C. Set reference trace at 40mmHg using the REF FPTS.

D. Set the P1 CAL front panel control to center position.

E. Press RECORD and observe cal pulses on the pressure trace. Adjust 40mm CAL pot so that the peaks of the cal pulses align with the reference trace.

F. Apply 150mmHg to the transducer using a mercury column (set scale to 200mmHg).

G. Adjust P1 GAIN pot on the Pressure Board to obtain 1.5 $\pm$.015 volts at P1 TP.

H. Connect transducer to the P2 front panel connector.

I. Open the transducer to atmosphere and zero it using the P2 ZERO switch and calibrate as in Steps D-F, using CAL, P2 GAIN and P2 TP.

4.4.7 Temperature Amplifier Calibration

A. Plug in a Yellow Springs 700 series probe simulator to T1 jack and set to 0°C.

B. Connect DVM to temp 1 output (JP2-4) and analog ground (JP2-20) on the Host Processor Board.

C. Adjust R65 so that temp 1 output equals to 0 Vdc.

D. Set probe simulator to 37°C.

E. Adjust R79 so that temp 1 output is 3.7V ± 5mV.

F. Repeat Step A-E for Temperature 2 using:

Temp 2	-	(JP2-6)
Zero Adjust	-	R73
Gain Adjust	-	R80

G. Shorting the ring and sleeve on temperature probe to simulate a wrong or defective probe and verify XXXX's are displayed.

4.4.8 DVM Accuracy Calibration

A. With the temperature output set to 37°C accurately, move DVM to VREF (JP2-8) and analog ground.

B. Adjust REF pot so that the temperature display is exactly 37.0.

This adjustment must be made slowly since the display updates every two seconds.

C. Verify the VREF test point reads 5.11 ± .02V.

4.4.9 ECG Board Calibration

A. Apply a 1mv 5Hz wave differentially between RA and LA inputs of the ECG front panel input.

B. Select the 1 cm/mV sensitivity by pressing the SIZE switch and Lead I by pressing the LEAD switch.

NOTE: Do not alter factory setting of GAIN adjustment unless ECG gain is outside stated specifications.

C. Adjust the GAIN pot for a 1.0cm p-p ±.5mm signal on the CRT display. Vary the SIZE from .5cm/mV to 3cm/mV using the SIZE switch. Verify that the signal amplitude varies accordingly. With the SIZE at 2m/mV the amplitude should be 2cm ± 2mm.

D. With the SIZE set to 1cm/mV vary the input frequency from .5Hz to 40Hz and verify that the signal on the CRT is no less than 7mm p-p. Also verify that the amplitude of the DELAYED ECG signal at pin 18 of the AUX connector is no less than 700mmV p-p.

E. Observe the diagnostic ECG recorder output at pin 23 of the rear panel interface connector. Press the RECORD switch to engage the ECG cal square wave (which will appear after approximately 20 seconds). Adjust CAL PULSE SIZE, if necessary, to obtain a 1V p-p square wave ± 20mV.

F. Plug in a 37°C temperature probe simulator into the T1 jack on the front panel. The TEMP trend memory will be loading with 37°C. Remove the pressure transducer and leave the P1 and P2 connectors open.

G. After a few minutes the trend memory will have loaded sufficient data for calibration. Press the TREND switch once to display the TEMP 1 trend data. Observe that the new trend data appears on the right side of the screen and updates approximately every 10 seconds.

H. Move the Ref trace line to the position that represent 37°C. Adjust the TREND VERT. POS pot so that the TEMP (T1) trend data line overlaps the 37°C reference scale.

4.4.10 NIBP Control Board Calibration

A. Turn power off.

B. Connect the external pressure reference gauage and a rolled up adult pressure cuff.

C. Press and hold the PATIENT SIZE and RATE SOURCE keys.

D. Turn unit on.

E. Hold the PATIENT SIZE and RATE SOURCE key for 3 seconds, then release.

F. The following should be observed:

-The CRT will display all 8's in character locations.
-LCD displays downloading message followed by software status.
-After approximately 15 seconds the test cuff will be inflated to approximately 170mmHg.

G. Adjust VR1 so that the pressure reference gauge and the mean window agree. Calibration tolerance is ± 4mmHg.

4.4.11 Test Procdure, System Test

A. Cosmetic Checks

1. Clean the instrument enclosure with a mild soap and water solution or ammoniated window cleaner. Do not apply large amounts of liquid; do not use abrasive cleaning agents or organic solvents. Check unit for any obvious signs of physical damage, e.g., bent/cracked frames or scratches and replace as required.

2. Front Panel (graticule). The monitor graticule (display screen) should be cleaned carefully in order to prevent scratches. Dust and dirt particules, fingerprints and stains may be removed by using a soft cloth. Do not wipe a dry screen. Do not use alcohol or chlorinated hydrocarbon solvents. Inspect the graticule for scratches and other physical damage, replace if required.

3. Check all knobs, switches and connectors for looseness and panel clearance.

4. Check line cord for wear, damage and proper strain relief.

5. Check all graphics and labeling for wear and scratches.

B. Performance and Calibration Checks

1. Trigger Checks

   a. Apply an approximate 60 bpm QRS to the ECG channel and verify that the unit is triggering by observing the following:

      1. A beeper tone. Volume can be changed by front panel switch.

      2. A flashing "R" next to the RATE.

      3. A RATE display of approximately 60 bpm.

   b. Simultaneously apply a dynamic pressure signal to the P1 channel with the BP simulator or finger pulse sensor. There should be no change in trigger status.

   c. Turn the ECG switch on the simulator to OFF. The unit may stop triggering for a short time, then begin again, indicating the present trigger source.

   d. Verify all conditions in step 1 except a "P" will be displayed instead of an "R". Turn the ECG signal ON to return the unit to normal triggering.
   NOTE: Other trigger sources are possible.

2. Pacemaker Detector

   a. Apply a 1mV, 1Hz square wave to the ECG input.

   b. Verify that both the rising and falling edges produce a positive going narrow pulse display (20msec), and the heart rate displays " __ ".

3. Transducer Zeroing Range

   a. Apply a static +120mmHg signal at BPI Input.

   b. Press Zero BPI switch down for one second to verify zeroing is successful.

   c. Change pressure signal to 0mmHg input and verify zeroing process.

   d. Repeat above steps for BP2.

C. Lead Acid Battery (optional accessory)

Inspect the battery date code. If the battery is older than 36 months, replace the battery pack.

There are a number of factors that will affect the length of cyclic service of a battery. Generally, the most important factor is the discharge/charge cycles. The battery must be charged immediately or shortly after each battery operating cycle. To maintain it properly, it must be left in float charge even when the 3000 monitor is not in use.

Check the performance of the battery, every 90 days by doing the following:

1. Charge the battery for 16-24 hours by leaving the AC power on.

2. Turn mains switch off.

3. Turn the 3000 monitor on (note the starting time) and let it operate until the low battery cut off. Circuit shuts it off automatically. A good and well maintained battery pack should provide at least thirty minutes of operation. Replace battery pack that does not meet the performance.

D. Lead to Ground

Sink Current Patient Circuit (Test V on Model 431 Dempsey; patient leakage with line voltage on leads).

1. Connect the PATIENT CABLE from the safety analyzer to the 3000 monitor, recommended in the operating instructions of the safety analyzer.

2. Depress the "APPLY 115V" button and note the reading.

3. Repeat the test for normal and open ground and reverse polarity combinations. Verify that current reading for any test is less than 20uA (patient cable inclusive).

E. Software Version Check

1. Place AC Power switch in the "ON" position.

2. Press and hold the patient size and the dot above the lower trace select switches.

3. Switch the monitor from Standby to ON.

4. The monitor will display 8's in place of alphanumeric characters. The LCD shows the revision level of all software currently installed in the monitor.

5. If NIBP option is installed, the monitor enters NIBP CAL mode in fifteen (15) seconds. Press hold switch to exit CAL mode. Otherwise, it reverts to normal operation automatically.

F. NIBP Overpressure Switch Operation

1. Connect a blood pressure cuff to the Luer lock connector and fold the cuff and hold it.

2. Set NIBP inflation pressure to 240mmHg and press START.

3. When the cuff pressure reaches approximately 220mmHg, squeeze the cuff tightly to create a high pressure transcend in the cuff.

4. The cuff should vent immediately and CUFF OVERPRESSURE should be displayed on the LCD.

5. The over pressure condition can only be reset by cycling the monitor to standby, and then to ON.

5. Options

5.1 Introduction

This section of the manual contains proper service procedures for the major options that are available to be installed in this monitor.

5.2.1 Recorder Circuit Description

The Chart Recorder is a state-of-the-art recording device employing a solid state thermal printhead (creating all analog and digital annotations) and a microprocessor-controlled chart drive system to control paper movement. Dual photocell sensors detect the depletion of chart paper and control the automatic paper threading function (insertion of a new roll). The printhead is thermally protected by a thermistor and sensing circuits.

All operating modes are controled by the host monitor, through a modified Centronics Interface. The host places a byte on data lines DO-D7. The data byte is followed by a short low-going pulse on the -Strobe line. This latches the data into the AR41 communication port. The AR41 signals receipt of the data by setting the Busy Line high. Once the AR41 reads the data from the communications port the Busy Line is reset.

HARDWARE COMMUNICATION PROTOCOL, CENTRONICS INTERFACE

Function	Pin #	Direction	Description
-STROBE	1	I	Latches byte into DATA inputs.
DATA (DO-D7)	3-17	I	Controls and prints data presented at this location. Latched by STROBE.
BUSY	21	O	When high, the recorder is unable to accept another byte.
-ACK	19	O	Indicates recorder "not busy".
-FEED	27	I	Active low input. When asserted the operation of the recorder is interrupted and paper is fed at 25mm/sec. -FEED will not function if the recorder is out of paper.
-INIT	26	I	Active low input. When held true the recorder will enter a reset state.
ANNOTATION BUSY	29	O	Active high output. It stays high unless the recorder can accept an annotation command sequence. This automatically provides proper annotation spacing in all four trace modes.
ANNO ACTIVE	33	O	Active high output. High while recorder is printing an annotation character. May become inactive while byte is in communication input buffer.

Function	Pin #	Direction	Description
-PAG	33	O	Active low output; connected directly to cue mark detection circuit. Is low whenever a cue mark is detected. The recorder is configured for either ANNO ACTIVE or -PAG.
-ERROR	28	O	Active low output; goes low when any error condition is detected.
SELECT	25	O	Active high output; it is normally high to show that the unit is "on line". It will go low at the tenth unseccessful load in a row or if an over-temperature condition is detected. If SELECT becomes false because of a failed paper load sequence then either an idle mode command must be issued or -INIT must be activated to reset the line.
PE	23	O	Active high output. High when the recorder is out of paper. Returns to low when the problem is corrected.

ERROR CONDITIONS

-ERROR	PE	SELECT	ERROR CONDITION
1	0	1	Normal operation -- no error
0	0	0	Printhead over temperature
0	0	1	Illegal or invalid command
0	1	0	Paper feed failure
0	1	1	No paper detected

The operating modes are controlled by software words described in the following summary:

SOFTWARE COMMUNICATION PROTOCOL

Function	Command	Description
Setup: Form Feed	0CH	Feed paper till next page mark or 300mm.
Set Grid	11H	Set grid printing density (darkness).
Densisty		
Download Grid	12H	Replace standard grid with custom version.

Function	Command	Description
Setup:		
Form Feed	0CH	Feed paper till next page mark or 300mm.
Set Grid	11H	Set grid printing density (darkness).
Densisty		
Download Grid	12H	Replace standard grid with custom version.
Dither On/OFF	14H	Turns (head saving) dithering on and off.
Set Scale	16H	Turn On/Off scaling, set offset(s) when not scaling.
Factor/Trace		
Offset		
Position ANNO	15H	Positions two annotation lines in 48mm print area.
Lines		The command consists of three bytes: 1 - header 15H 2 - position of top line of annotation 3 - position of bottom line of annotation 4 - return to idle mode (1BH) Line position is in bytes from bottom of grid (valid value = 0 to 26H). A value greater than 26H will locate the line of annotation in either the top or bottom margin (see annotation command).
Set Speed	17H	Set motor stepping and print cycle period (chart speed).
Idle Mode	1BH	Return to Idle Mode.
Trace:		
One Trace Digital	01H	Enter (/reaffirm) One Trace Mode, move "pen" to passed position.
Two Trace Digital	02H	Enter (/reaffirm) Two Trace Mode, move "pens" passed position.
Annotation	04H	Print two annotation characters in top/ bottom channels or (*) where located by moveable annotation command.

Function	Command	Description
Top Event Marker On	06H	
Top Event Marker Off	07H	
Bottom Event Marker Off	0EH	
Graphics:		
High Res Graphics Mode	10H	Enter (/reaffirm) High Resolution Graphics Mode and print 1 stripe of passed data (48 bytes).
Low Res Graphics Mode	18H	Enter (/reaffirm) Low Resolution Graphics Mode and print 4 stripes of the passed data (48 bytes).
Text:		
Vertical Text Mode	0AH	Enter (/reaffirm) Vertical Text Mode, prints a 24 character line of vertically oriented text.
Horizontal Text Mode	19H	Enters (/reaffirm) Horizontal Text Mode, prints a 12 character column of horizontally oriented text.

SPECIAL FEATURES

Thermal Array Wear Equalizer	To enable even electrical wear over all the resistive elements (dots) in the thermal array, the printed image is shifted by one dot every 1.5 meters. This function may be disabled through the Dither software command.
Printhead Protection	Printhead strobe time and heat sink temperature are continuously monitored by a protection circuit. If strobe time or heat sink temperature exceed specified limits the print supply (V_{pp}) is disabled.

INTERNAL CONNECTORS AND PIN ASSIGNMENT

THERMAL ARRAY CONNECTOR (J1)

Pin #	Description	Pin #	Description
1	VHD	2	
3	VHD	4	CK
5	VHD	6	LD
7	VHD	8	-ST2
9	VHD RET	10	-ST1
11	VHD RET	12	DI
13	VHD RET	14	+5V
15	VHD RET	16	GND

HOST INTERFACE CONNECTOR (J2)

Pin #	Description	Pin #	Description
1	-STROBE	2	GND
3	D0	4	GND
5	D1	6	GND
7	D2	8	GND
9	D3	10	GND
11	D4	12	GND
13	D5	14	GND
15	D6	16	GND
17	D7	18	GND
19	-ACK	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SELECT	26	-INIT
27	-FEED	28	-ERROR
29	ANNOTATION BUSY	30	GND
31	GND	32	GND
33	ANNO ACTIVE/-PAG	34	GND

SENSOR CONNECTOR (J3)

Pin #	Description
1	GND2
2	POUT
3	+5V
4	VHD adj
5	VHD ADJ
6	PAG
7	THERM

MOTOR CONTROL CONNECTOR (P4)

Pin #	Description
1	10A
2	11A
3	PHA
4	10B
5	11B
6	PHB
7	Vcc
8	GND
9	Vpp

MOTOR CONNECTOR (J5)

Pin #	Description
1	MOTOR 4
2	MOTOR 3
3	MOTOR 2
4	MOTOR 1

POWER SUPPLY (J6)

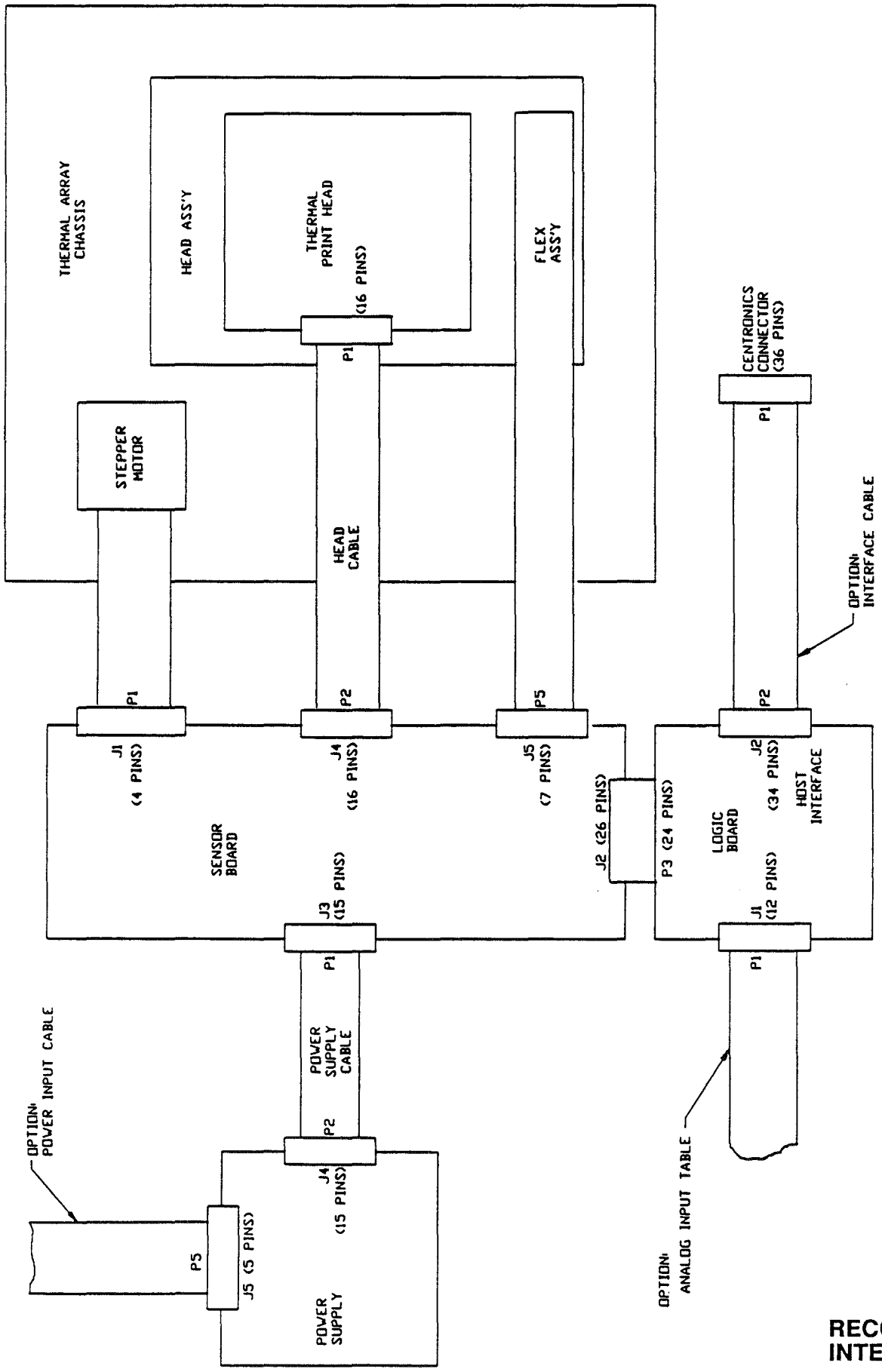
Pin #	Description
1	GND
2	Vpp
3	GND
4	Vcc
5	

ALPHANUMERIC CHARACTER GENERATION

The available characters, numerals and symbols resident in the recorder software are called upon with the following commands, sent by the host monitor:

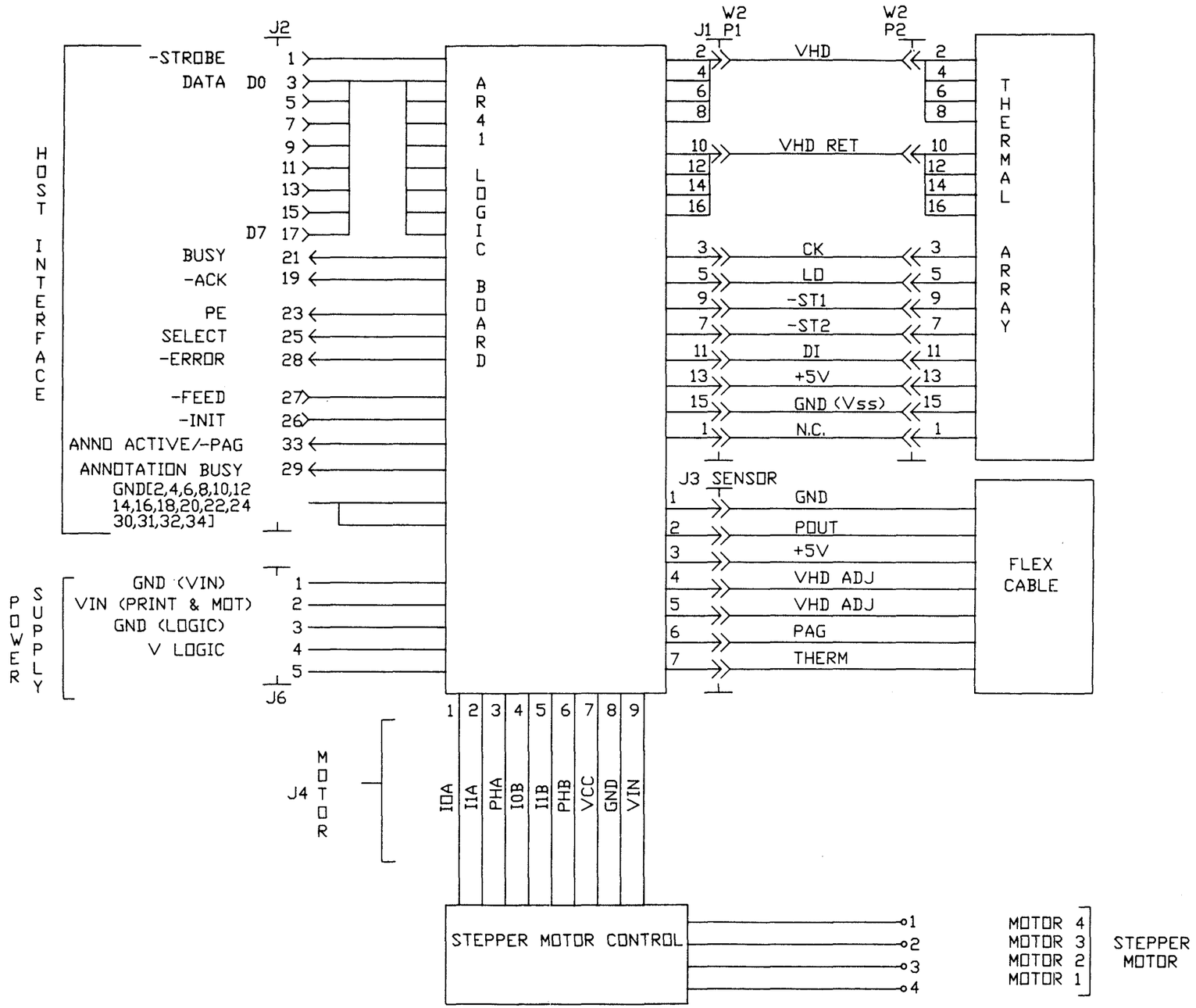
ASCOO CHARACTER SET

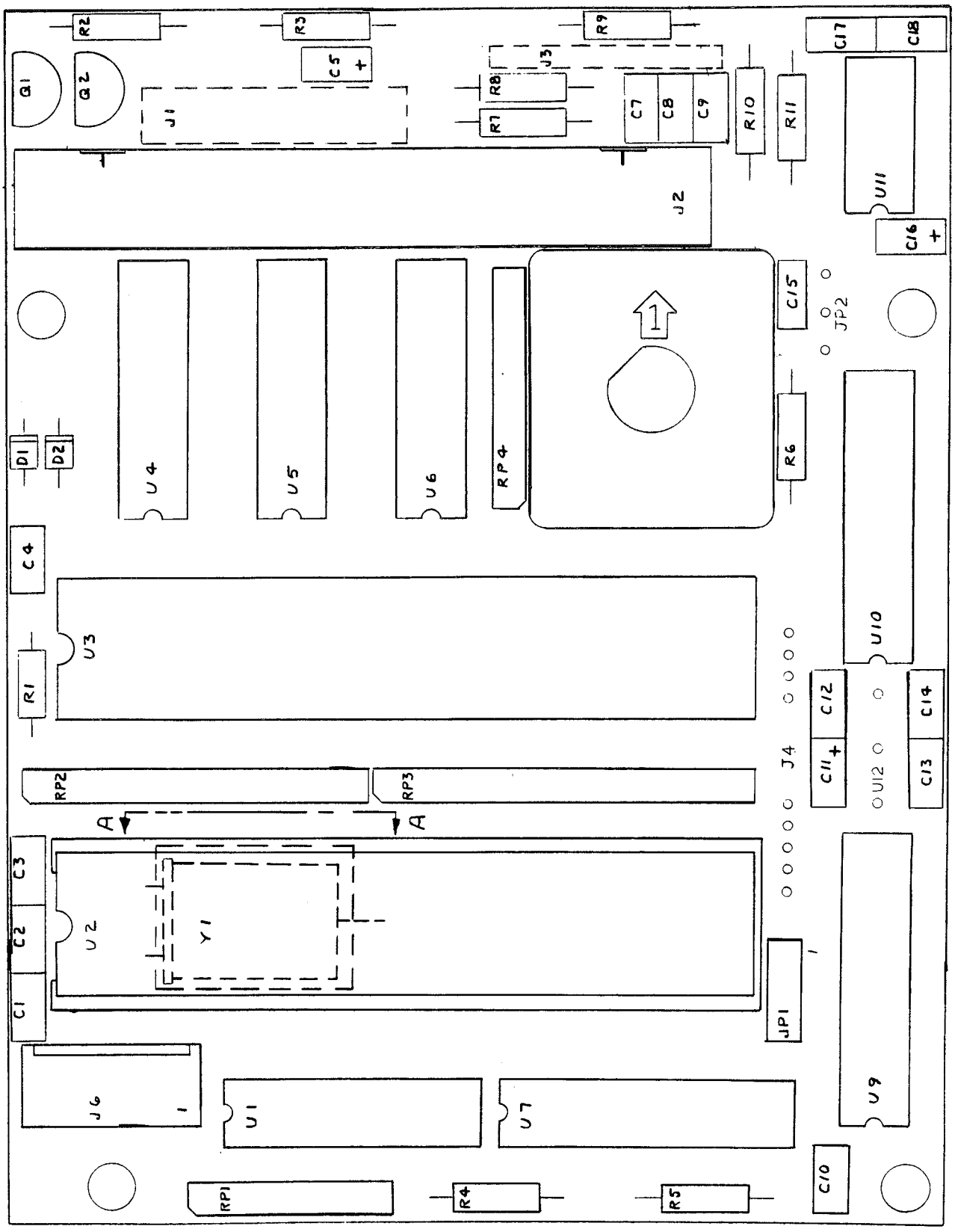
Dec	Character	Dec	Character	Dec	Character
32	--	64	@	96	'
33	!	65	A	97	a
34	"	66	B	98	b
35	#	67	C	99	c
36	$	68	D	100	d
37	%	69	E	101	e
38	&	70	F	102	f
39	'	71	G	103	g
40	(	72	H	104	h
41	)	73	I	105	i
42	*	74	J	106	j
43	+	75	K	107	k
44	'	76	L	108	l
45	--	77	M	109	m
46	"	78	N	110	n
47	/	79	O	111	o
48	0	80	P	112	p
49	1	81	Q	113	q
50	2	82	R	114	r
51	3	83	S	115	s
52	4	84	T	116	t
53	5	85	U	117	u
54	6	86	V	118	v
55	7	87	W	119	w
56	8	88	X	120	x
57	9	89	Y	121	y
58	:	90	Z	122	z
59	;	91		123	
60	<	92		124	!
61	=	93		125	
62	>	94		126	DEL
63	?	95	-	127	--



RECORDER INTERCONNECT

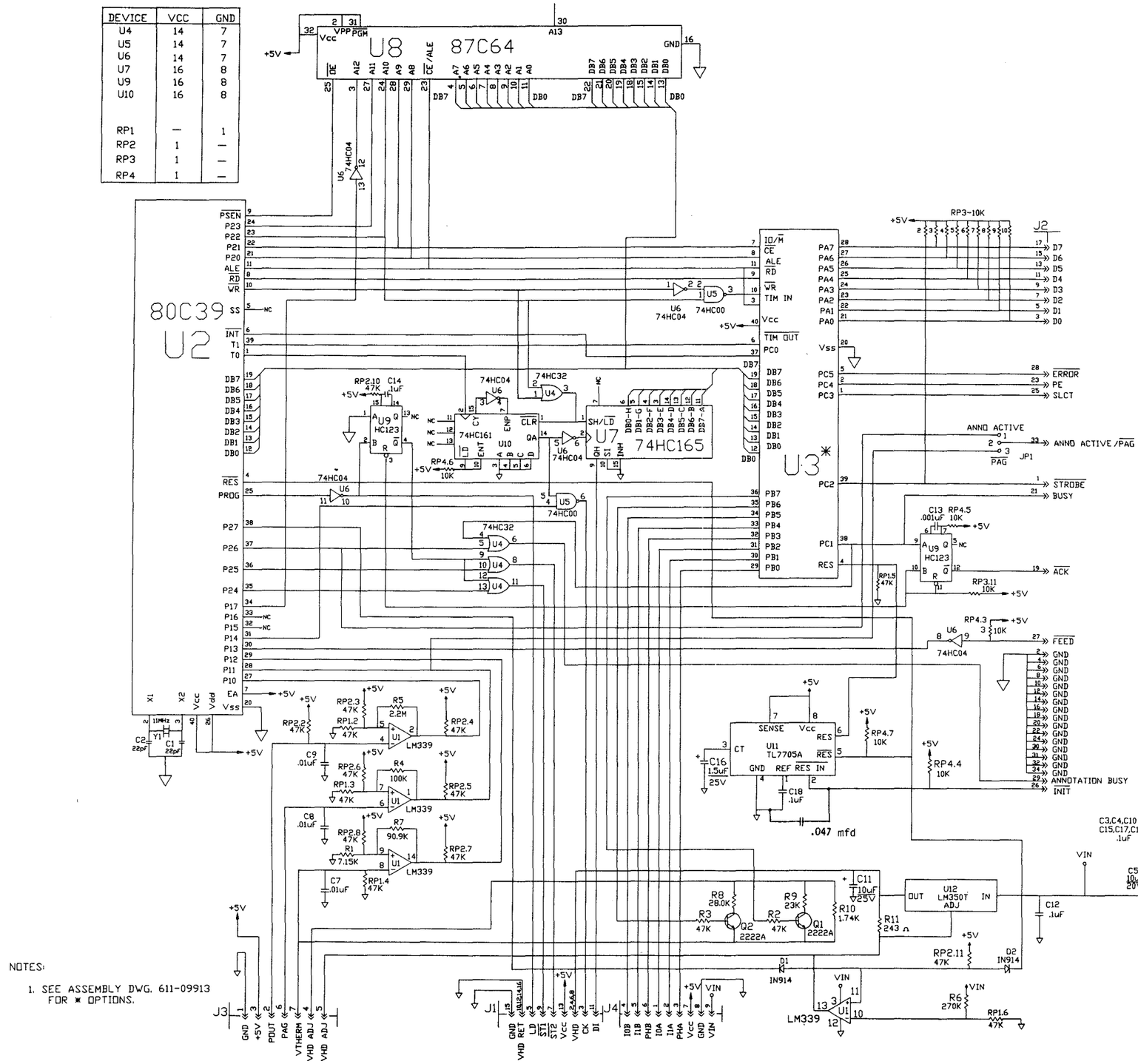
AR41 INTERCONNECT DIAGRAM





LOGIC BOARD
Revised 02/14/90

DEVICE	VCC	GND
U4	14	7
U5	14	7
U6	14	7
U7	16	8
U9	16	8
U10	16	8
RP1	—	1
RP2	1	—
RP3	1	—
RP4	1	—

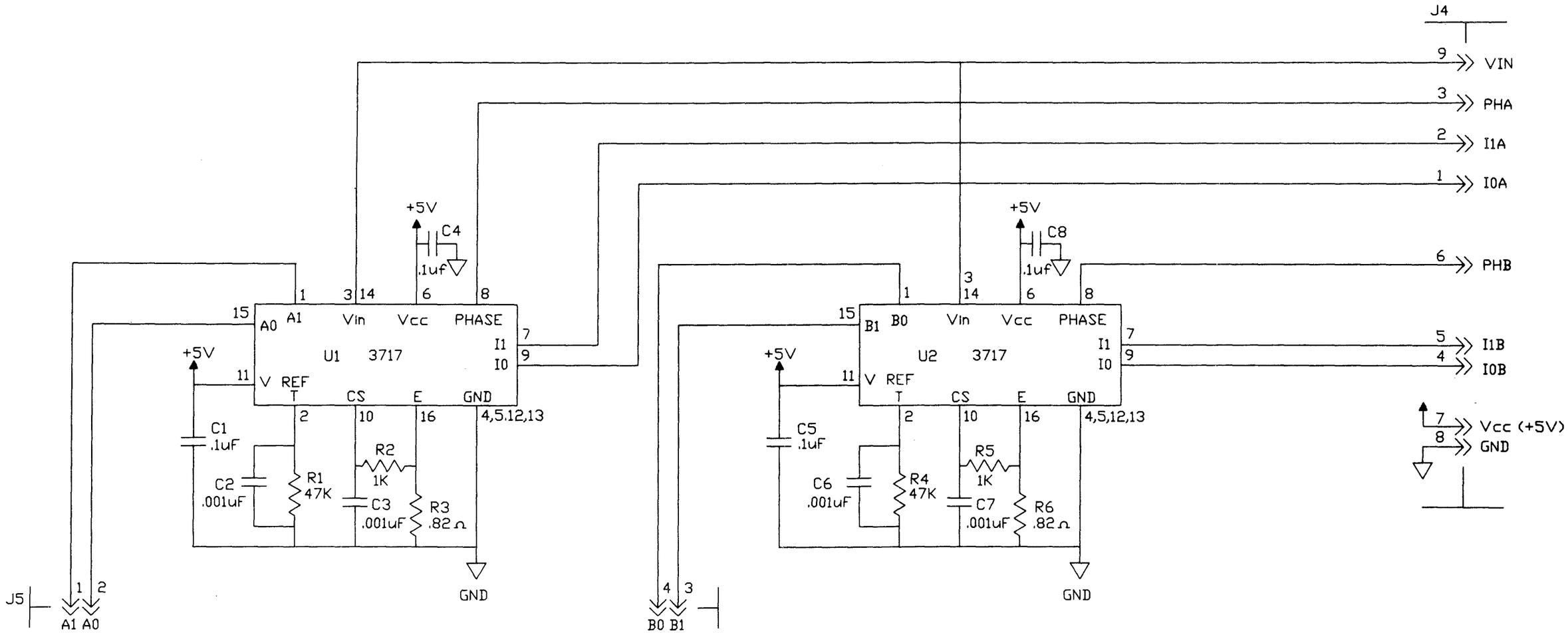


NOTES:

1. SEE ASSEMBLY DWG. 611-09913 FOR * OPTIONS.

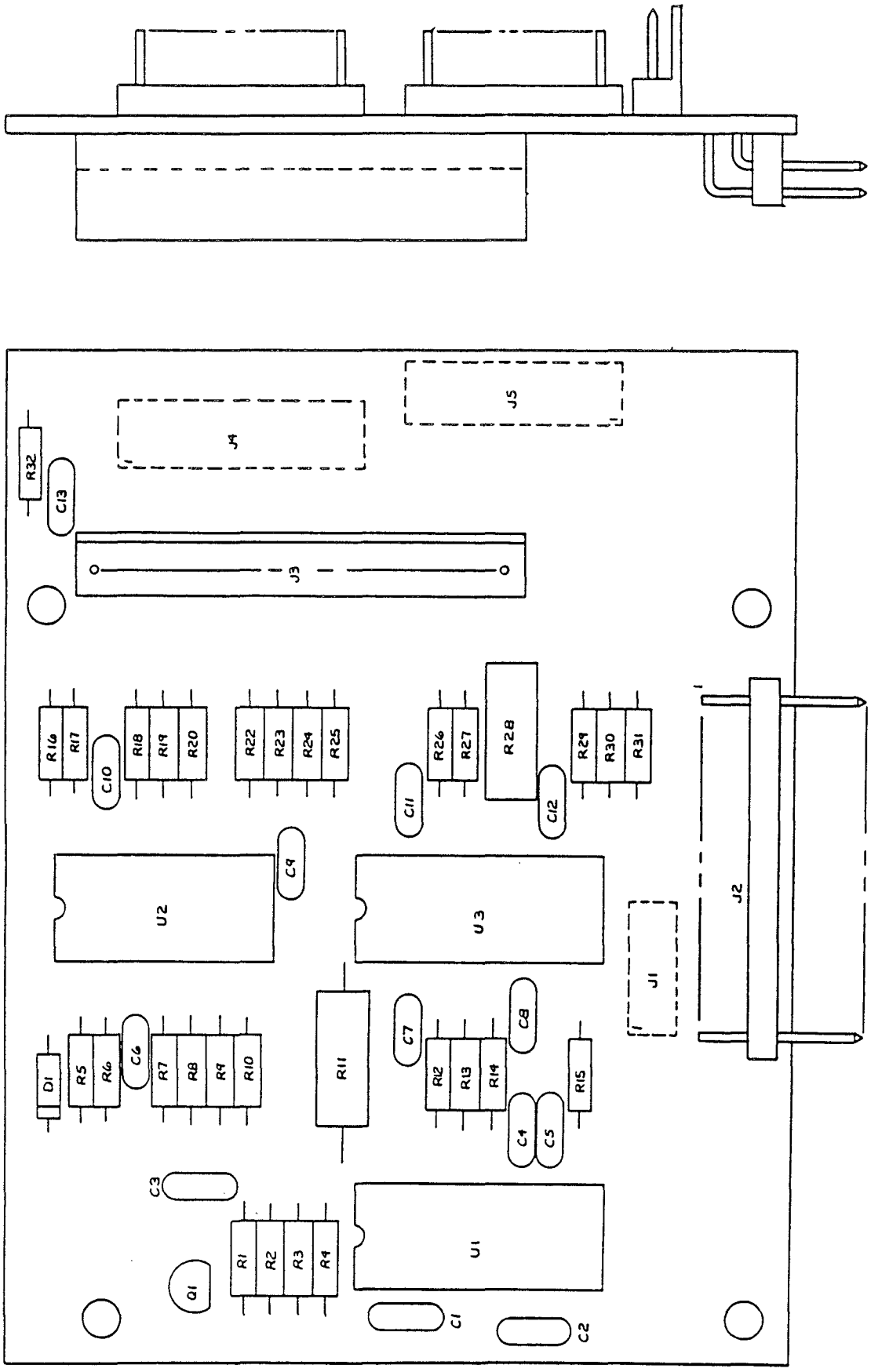
Schematic Diagram
LOGIC BOARD

Revised06/11/90



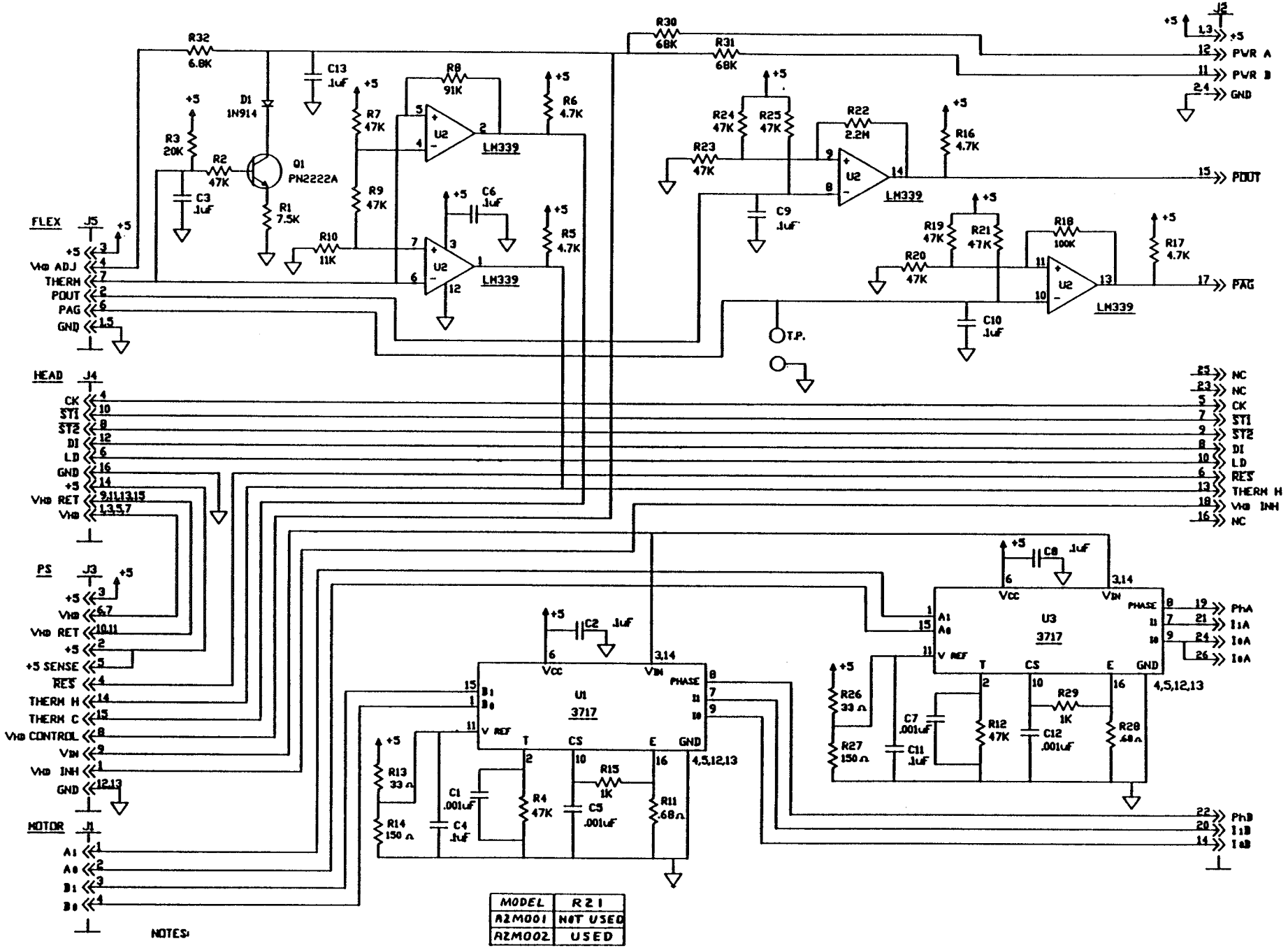
Schematic Diagram
MOTOR DRIVE LOGIC DRIVE

Revised 02/14/90



SENSOR BOARD

Schematic Diagram
SENSOR BOARD

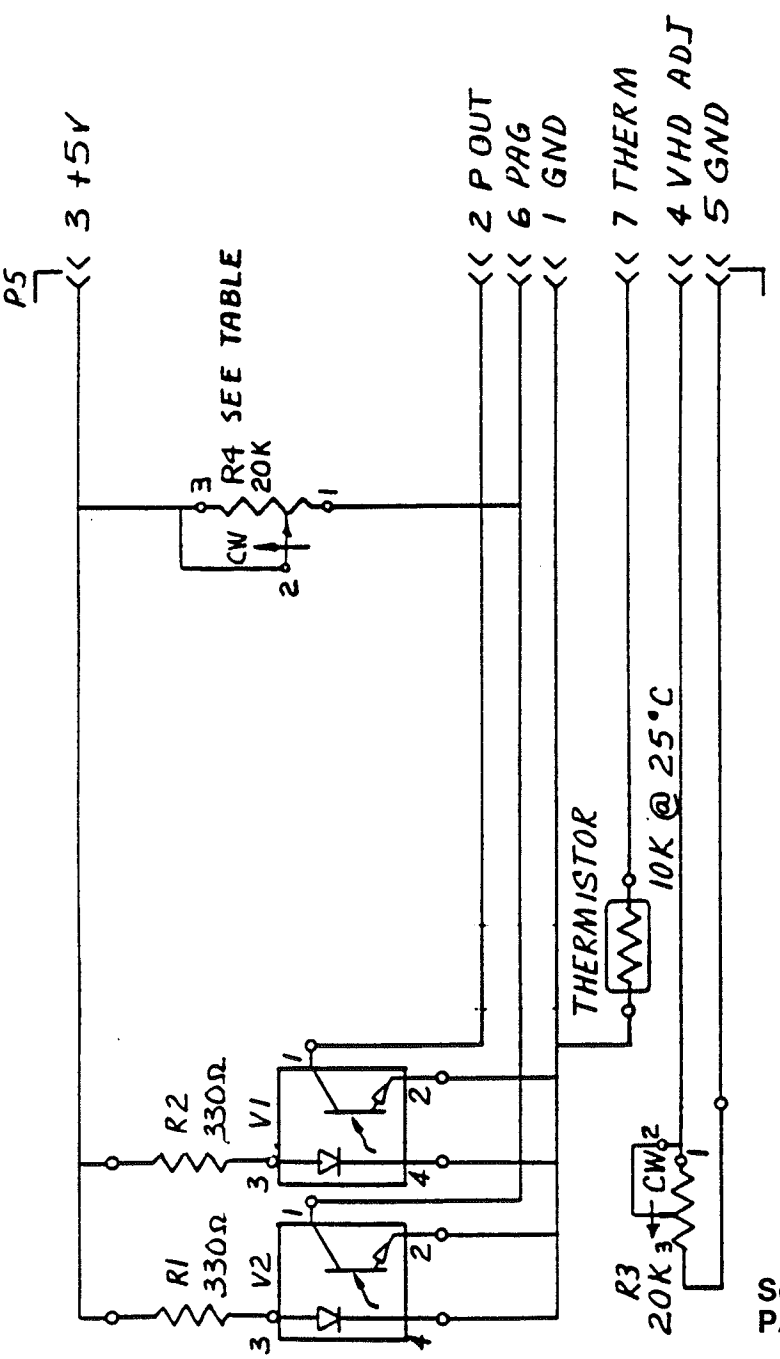


MODEL	R21
A2M001	NOT USED
A2M002	USED

NOTES:

1. REF PC ASSY DWG 611-09292.
2. ALL RESISTORS ARE 5% 1/4W, AND ALL CAPACITORS ARE MICROFARADS UNLESS OTHERWISE NOTED.

DASH	R4
-1	USED
-2	NOT USED



Schematic Diagram
PAPER SENSOR

5.3.2 NIBP Circuit Description

5.3.2.1 Introduction

The NIBP module consists of two sub-assemblies: the electronics that fit on a single PC board and a pneumatic assembly that contains all the mechanical parts. These two subassemblies are connected by a 16-pin ribbon cable and are mounted together with standoffs onto a metal bracket.

The electronics are built around a 16-bit microcontroller, the 8096, with a built-in 10-bit A/D converter and various input-output peripherials, including a UART. The NIBP module uses the oscillometric technique to determine the patient's blood pressure. Thus, the input signal is just an air pressure signal from an external cuff. The module communicates with the host via an RS232 serial link on a 26-pin ribbon cable. Power (+12V, +5V, +15V and -15V) is also supplied by the host via this cable.

5.3.2.2 Functional Description

A. The CPU

The heart of the central processing unit is an 8097BH, a member of the Intel 8096 family that has an 8-channel 10-bit A/D converter, five 8-bit I/O ports, pulse width modulators, high-speed inputs and outputs, an UART, a watchdog timer, and two 16-bit counter/timers. Although it can have 8K bytes of on-chip ROM or EPROM, external EPROM's are used. (For a more detailed discussion of the operation of the 8097BH, please refer to the Intel Microcontrollers Manual.)

An 11.0592mHz crystal is connected to the on-chip oscillator of the 8097BH. This frequency is choosen for accurate generation of standard baud rates (the on-chip UART has an integral baud rate generator). An RC circuit resets the 8097BH on power-up. The microcontroller can also be reset from an external, open-collector, active low reset signal from the RS232 port.

The non-maskable interrupt, NMI, of the 8097BH is not used (reserved for Intel emulators) and thus tied high. The BUSWIDTH input is tied low since the 8-bit data bus mode is used for external memory access. The EA/pin is tied low since external EPROM and static RAM are used for program and data memory.

The chip configuration byte of the 8097BH (at memory location 2018H) is currently set at 11100101 (E5H). This indicates no security protection, automatic limit to 3 wait states when the READY line is used, use of ADV/, WR/ and BHE/, and 8-bit external data bus mode. The READY line is connected to the decoder which selectively generates wait states for external accesses.

B. Memory

The 64K address space of the 8097BH is divided by a 5C032 EPLD as follows: 32K for ROM, 28K for RAM, and 4K for I/O space. The address map is shown in Appendix A. Since the decoding is done by an EPLD, the partition can be reconfigured to any 4K boundary, normally an external 32K x 8 EPROM and an 8K x 8 RAM. A real-time clock and non-volatile RAM memory option can be obtained by installing one of the integral battery and clock sockets in the RAM socket footprint.

Two eight-bit ports, ports 3 and 4 are used to address external EPROM and RAM. They form a 16-bit multiplexed address and data bus. The chip is used in the 8-bit data bus mode when accessing external memory. Thus a 74HCT573 transparent latch is used to latch in the lower 8-bit of the address.

C. The Analog Front-End

The input air pressure signal is converted to an electrical signal by a pressure transducer. This signal is amplified by a differential amplifier circuit and then split into three signals. The first one is buffered and set to the A/D converter as DC pressure. The offset in this signal is controlled by an analog signal from a D/A converter controlled by the microcontroller such that automatic offset control is possible.

The second one is bandpass filtered and amplified by a switchable gain of 56 or 28 to observe the small pressure pulsations superimposed on the air pressure signal. A CLEAR signal can help the bandpass filter to settle quickly at the beginning of the measurement cycle, which can see relatively abrupt pressure changes.

The third one is subtracted from a LEVEL signal from the D/A converter controlled by the microcontroller such that an optional DC subtraction scheme can be implemented.

The D/A converter mentioned above is a quad 8-bit D/A converter, AD7226, connected as a bus peripheral of the microcontroller. The -5V required by the AD7226 is generated by a -5V voltage regulator, 79L05. The D/A converter also generates an AOUT signal for diagnostic purposes.

D. The A/D Converter

The 8097BH has an on-chip 10-bit, successive approximation A/D converter with internal sample and hold. It has a fixed conversion time of 88 state times. At our operating frequency, the conversion time is approximately 24us, including time for signal acquisition. The A/D converter is triggered to start a conversion approximately every 4ms (250Hz) by an interrupt routine.

There are eight channels to the A/D converter. The input signals range between 0 to 5V nominally and are referenced to the Vref input, which is generated by multiplying by two a 2.5V voltage reference source. The inputs to the A/D converters are protected by Zener diodes. Currently, only three channels are used, Channel 3, 5, and 7 for pulse by dc-subtraction, pulse, and pressure respectively. There is also an optional ECG signal from the RS232 connector going to channel 0 of the A/D converter.

E. Pneumatic and Miscellaneous Control

Appendic B lists the I/O port assignments. For I/O port 1, the 4 MSB's are used to control the air valves. All the valves are of the normally open type. The valves open during a power loss. I/O port 1 resets to a high state. Since the valve driver is inverting, an inverter is added to the dump valve control line. Allows the main valve to open on reset. As an extra precautionary step, when a certain pressure is exceeded an optional overpressure sensor can shut the power off to the pump and valve drivers.

The 4 LSB's of port 1 are used to control the gain select of the pulse amplifier. GS high will select a gain that is two times higher than normal, (56 instead of 28). CLEAR low will clamp the input to the pulse amplifier.

The high-speed outputs (HSO) of the 8097BH are used to generate pulse-width modulation outputs. HSO bit 0 generates the linear valve control signal. HSO bit 1 generates the pump control signal. These signals switch at the same rate as the A/D converter sampling rate of approximately 250Hz. The linear valve control signal is filtered by a 4-pole filter at 60Hz corner frequency to generate the appropriate analog signal. The pump control signal is PWM'ed to lower the pump speed.

I/O port 2 bits 2, 3, and 4 are used as inputs for three configuration jumpers, J1, J2, and J3.

F. The Serial Interface

The on-chip UART is used to implement an RS-232 interface. Bit 0 and 1 of port 2 is used as the UART transmitter output and receiver input respectively. Additionally, bit 6 of port 2 is used as the CTS input and bit 7 is used as the RTS output. The UART has an integral baud rate generator. Different values are written to the baud rate value register to generate different baud rates (e.g., 8011H will generate 9600 baud). For more information on the operation of the UART, refer to the Intel Microcontrollers Manual.

The signals from the UART are buffered by the MAX232 RS-232 driver/receiver and connected to a 26-pin ribbon cable connector.

Model 4000 Memory Map

Address	R/W	Description
0000H-00FFH*	R/W	Internal register file.
0100H7FFFH	RO	External EPROM (32K bytes).
8000H-8FFFH	R/W	I/O space (used for quad DAC).
A000H-BFFFH	R/W	Basic RAM (8K bytes).
9000H-FFFFH	R/W	Expanded RAM (28K bytes).

NIBP Module Port Assignments

Port 0 - Analog Inputs:

Channel 0 - ECG, optional
Channel 1 - Reserved
Channel 2 - Reserved
Channel 3 - Pulse by DC subtraction
Channel 4 - Reserved
Channel 5 - Pulse
Channel 6 - Reserved
Channel 7 - Pressure

Port 1 - Micellaneous I/O's

Bit 0 - Pulse amplifier gain select
Bit 1 - Pulse amplifier clamp
Bit 2 - Reserved
Bit 3 - Reserved
Bit 4 - Select valve 1
Bit 5 - Select valve 2
Bit 6 - Select valve 3
Bit 7 - Dump valve

Port 2 - Special Purpose I/O's

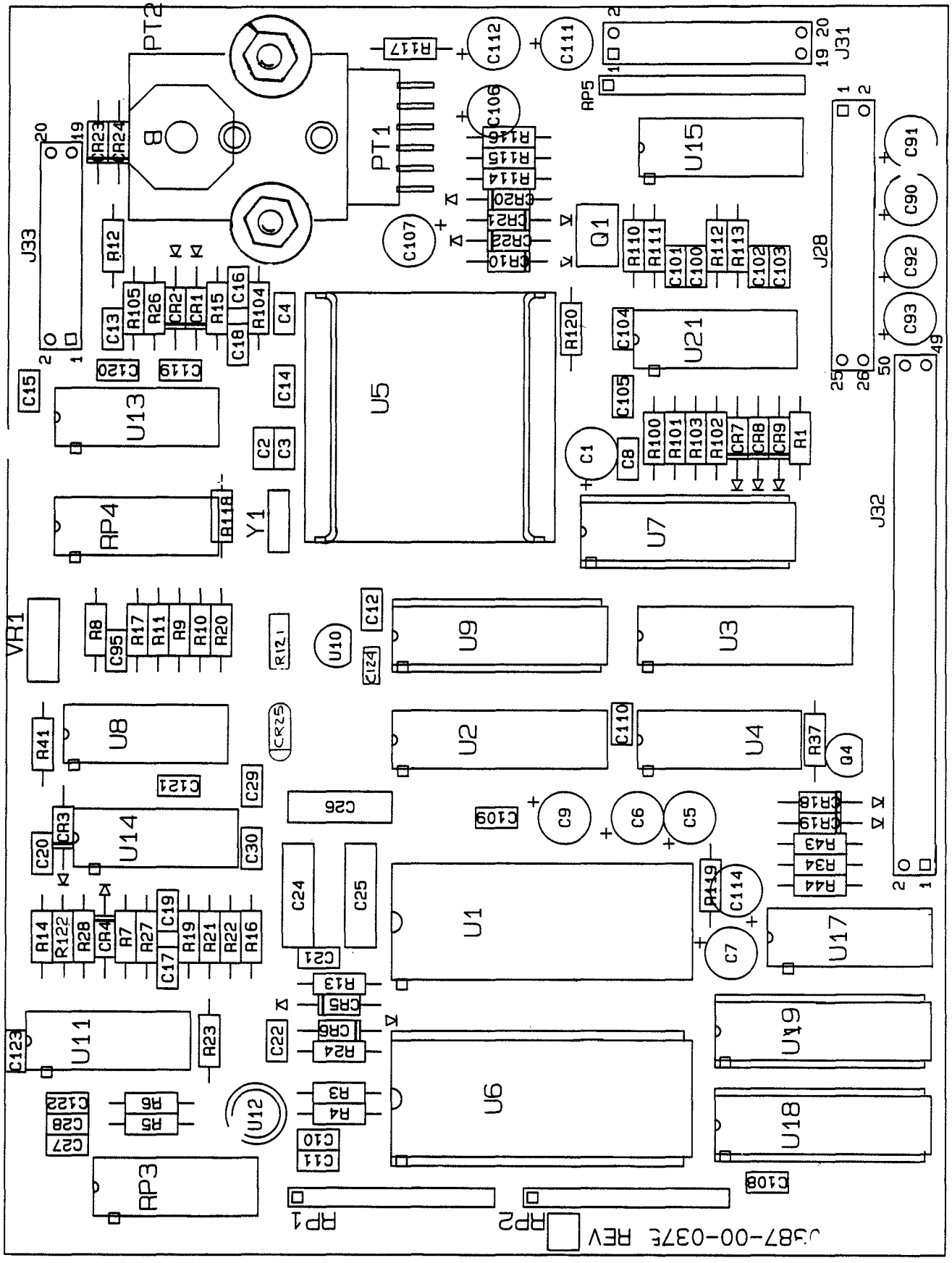
Bit 0 - UART transmitter output
Bit 1 - UART receiver input
Bit 2 - J1 configurastion jumper
Bit 3 - J2 configuration jumper
Bit 4 - J3 configuration jumper (also P1)
Bit 5 - Dedicated PWM output
Bit 6 - UART CTS input
Bit 7 - UART RTS output

Port 3 - Lower 8 bits of multiplexed address and data bus

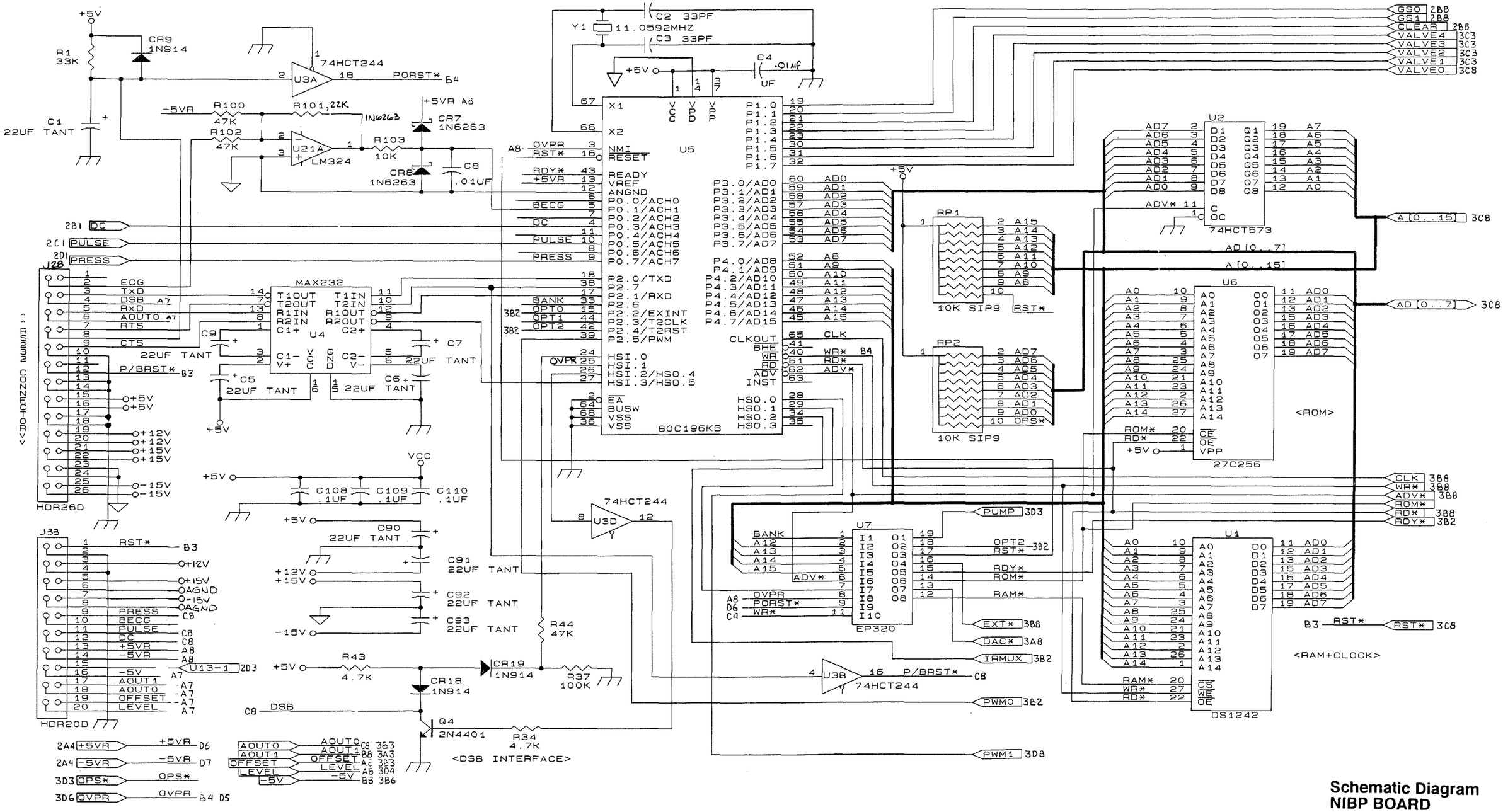
Port 4 - Upper 8 bits of addres bus

High-speed Input
Bit 0 - Reserved
Bit 1 - Reserved

High-speed Output
Bit 0 - Pulse-width modulation output for linear bleed valve
Bit 1 - Pulse-width modulation output for pump control
Bit 2 - Reserved
Bit 3 - Reserved
Bit 4 - Reserved
Bit 5 - Reserved

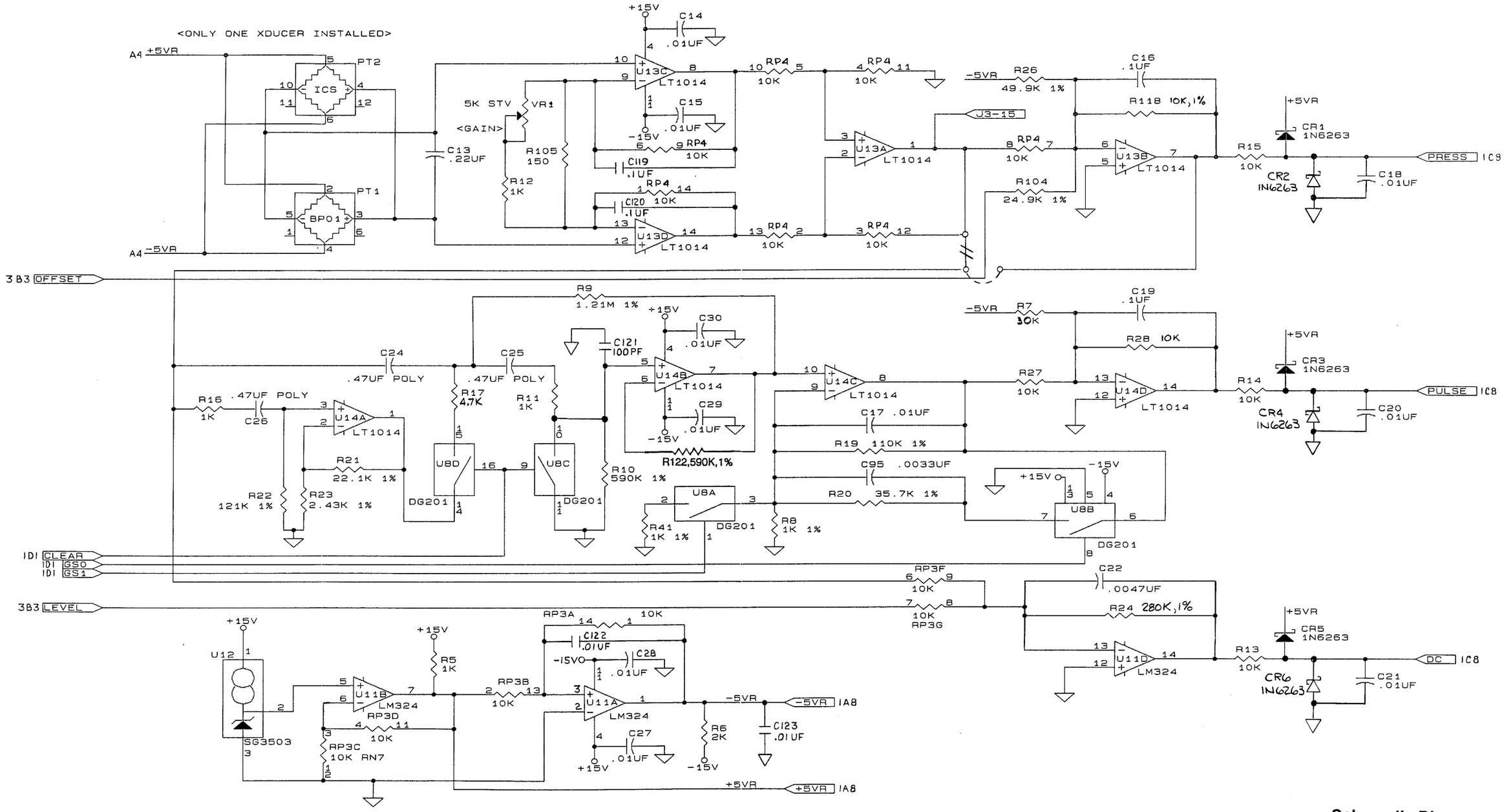


NIBP BOARD
0670-00-0375
Revised 12/11/90



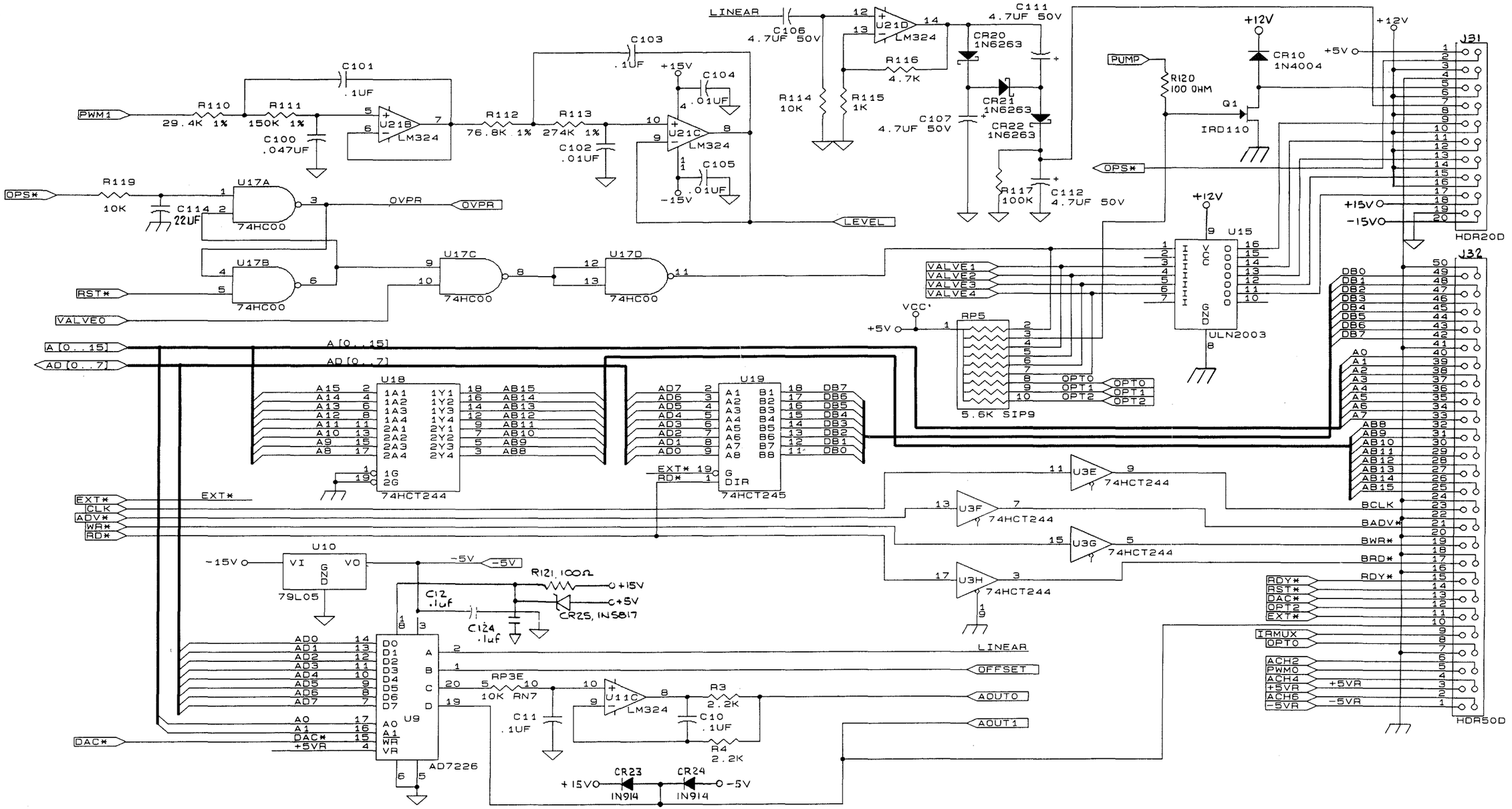
Schematic Diagram
NIBP BOARD
0387-00-0375
Sheet 1 of 3

Revised 09/28/89



Schematic Diagram
NIBP BOARD
0387-00-0375
Sheet 2 of 3

Revised 07/31/90



Schematic Diagram
NIBP BOARD
0387-00-0375
Sheet 3 of 3

REPLACEMENT PARTS FOR: **NIBP BOARD 0670-00-0375**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	NIBP BOARD	0670-00-0375
-	EXCHANGE BOARD	0670-00-0375E
C1	CAP TANT, 22uF 20%, 20V	0290-02-1226
C2	CAP, 33pF 10%, 200V	0283-05-0330
C3	CAP, 33pF 10%, 200V	0283-05-0330
C4	CAP, .01uF 10%, 100V	0283-05-0103
C5	CAP TANT, 22uF 20%, 20V	0290-02-1226
C6	CAP TANT, 22uF 20%, 20V	0290-02-1226
C7	CAP TANT, 22uF 20%, 20V	0290-02-1226
C8	CAP, .01uF 10%, 100V	0283-05-0103
C9	CAP TANT, 22uF 20%, 20V	0290-02-1226
C10	CAP, .1uF 10%, 100V	0283-04-0104
C11	CAP, .1uF 10%, 100V	0283-04-0104
C12	CAP, .1uF 10%, 100V	0283-04-0104
C13	CAP, .22uF 10%, 100V	0283-04-0224
C14	CAP, .01uF 10%, 100V	0283-05-0103
C15	CAP, .01uF 10%, 100V	0283-05-0103
C16	CAP, .1uF 10%, 100V	0283-04-0104
C17	CAP, .01uF 10%, 100V	0283-05-0103
C18	CAP, .01uF 10%, 100V	0283-05-0103
C19	CAP, .1uF 10%, 100V	0283-04-0104
C20	CAP, .01uF 10%, 100V	0283-05-0103
C21	CAP, .01uF 10%, 100V	0283-05-0103
C22	CAP, .0047uF 10%, 100V	0283-05-0472
C24	CAP POLY, .47uF	0285-00-0055
C25	CAP POLY, .47uF	0285-00-0055
C26	CAP POLY, .47uF	0285-00-0055
C27	CAP, .01uF 10%, 100V	0283-05-0103
C28	CAP, .01uF 10%, 100V	0283-05-0103
C29	CAP, .01uF 10%, 100V	0283-05-0103
C30	CAP, .01uF 10%, 100V	0283-05-0103
C90	CAP TANT, 22uF 20%, 20V	0290-02-1226
C91	CAP TANT, 22uF 20%, 20V	0290-02-1226
C92	CAP TANT, 22uF 20%, 20V	0290-02-1226
C93	CAP TANT, 22uF 20%, 20V	0290-02-1226
C95	CAP, .0033uF 10%, 100V	0283-05-0332
C100	CAP, .047uF 10%, 100V	0283-04-0473
C101	CAP, .1uF 10%, 100V	0283-04-0104
C102	CAP, .01uF 10%, 100V	0283-05-0103
C103	CAP, .1uF 10%, 100V	0283-04-0104
C104	CAP, .01uF 10%, 100V	0283-05-0103
C105	CAP, .01uF 10%, 100V	0283-05-0103
C106	CAP TANT, 4.7uF 20%, 50V	0290-00-0110
C107	CAP TANT, 4.7uF 20%, 50V	0290-00-0110
C108	CAP, .1uF 10%, 100V	0283-04-0104
C109	CAP, .1uF 10%, 100V	0283-04-0104
C110	CAP, .1uF 10%, 100V	0283-04-0104
C111	CAP TANT, 4.7uF 20%, 50V	0290-00-0110
C112	CAP TANT, 4.7uF 20%, 50V	0290-00-0110
C114	CAP TANT, 22uF, 20%, 50V	0290-02-1226
C119	CAP, .1uF, 10%, 100V	0283-04-0104
C120	CAP, .1uF, 10%, 100V	0283-04-0104
C121	CAP, 100pF, 10%, 200V	0283-05-0101
C122	CAP, .01uF, 10%, 100V	0283-05-0103
C123	CAP, .01uF, 10%, 100V	0283-05-0103
C124	CAP, .1uF, 10%, 100V	0283-04-0104

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
CR1	DIODE, 1N6263	0153-00-0085
CR2	DIODE, 1N6263	0153-00-0085
CR3	DIODE, 1N6263	0153-00-0085
CR4	DIODE, 1N6263	0153-00-0085
CR5	DIODE, 1N6263	0153-00-0085
CR6	DIODE, 1N6263	0153-00-0085
CR7	DIODE, 1N6263	0153-00-0085
CR8	DIODE, 1N6263	0153-00-0085
CR9	DIODE, 1N914	0153-00-0014
CR10	DIODE, 1N4004	0153-00-0098
CR18	DIODE, 1N914	0153-00-0014
CR19	DIODE, 1N914	0153-00-0014
CR20	DIODE, 1N6263	0153-00-0085
CR21	DIODE, 1N6263	0153-00-0085
CR22	DIODE, 1N6263	0153-00-0085
CR23	DIODE, 1N914	0153-00-0014
CR24	DIODE, 1N914	0153-00-0014
CR25	Diode, IN5817	0153-00-0069
R1	RES, 33K 5%, 1/4W	0315-00-0333
R3	RES, 2.2K 5%, 1/4W	0315-00-0222
R4	RES, 2.2K 5%, 1/4W	0315-00-0222
R5	RES, 1K 5%, 1/4W	0315-00-0102
R6	RES, 2K 5%, 1/4W	0315-00-0202
R7	RES, 30K 5%, 1/4W	0315-00-0303
R8	RES, 1K 1%, 1/8W	0309-00-1001
R9	RES, 1.21M 1%, 1/8W	0309-00-1214
R10	RES, 590K 1%, 1/8W	0309-00-5903
R11	RES, 1K 5%, 1/4W	0315-00-0102
R12	RES, 1K 5%, 1/4W	0315-00-0102
R13	RES, 10K 5%, 1/4W	0315-00-0103
R14	RES, 10K 5%, 1/4W	0315-00-0103
R15	RES, 10K 5%, 1/4W	0315-00-0103
R16	RES, 1K 5%, 1/4W	0315-00-0102
R17	RES, 4.7K 5%, 1/4W	0315-00-0472
R19	RES, 110K 1%, 1/8W	0309-00-1103
R20	RES, 35.7K 1%, 1/8W	0309-00-3572
R21	RES, 22.1K 1%, 1/8W	0309-00-2212
R22	RES, 121K 1%, 1/8W	0309-00-1213
R23	RES, 2.43K 1%, 1/8W	0309-00-2431
R24	RES, 280K 1%, 1/8W	0309-00-2803
R26	RES, 49.9K 1%, 1/8W	0309-00-4992
R27	RES, 10K 5%, 1/4W	0315-00-0103
R28	RES, 10K 5%, 1/4W	0315-00-0103
R34	RES, 4.7K 5%, 1/4W	0315-00-0472
R37	RES, 100K 5%, 1/4W	0315-00-0104
R41	RES, 1K 1%, 1/8W	0309-00-1001
R43	RES, 4.7K 5%, 1/4W	0315-00-0472
R44	RES, 47K 5%, 1/4W	0315-00-0473

REPLACEMENT PARTS FOR: **NIBP BOARD 0670-00-0375**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
R100	RES, 47K 5%, 1/4W	0315-00-0473
R101	RES, 22K 5%, 1/4W	0315-00-0223
R102	RES, 47K 5%, 1/4W	0315-00-0473
R103	RES, 10K 5%, 1/4W	0315-00-0103
R104	RES, 24.9K 1%, 1/8W	0309-00-2492
R105	RES, 150 ohm 5%, 1/4W	0315-00-0151
R110	RES, 29.4K 1%, 1/8W	0309-00-2942
R111	RES, 150K 1%, 1/8W	0309-00-1503
R112	RES, 76.8K 1%, 1/8W	0309-00-7682
R113	RES, 274K 1%, 1/8W	0309-00-2743
R114	RES, 10K 5%, 1/4W	0315-00-0103
R115	RES, 1K 5%, 1/4W	0315-00-0102
R116	RES, 4.7K 5%, 1/4W	0315-00-0472
R117	RES, 100K 5%, 1/4W	0315-00-0104
R118	RES, 10K 1%, 1/8W	0309-00-1002
R119	RES, 10K 5%, 1/4W	0315-00-0103
R12C	RES, 100 ohm, 5%, 1/4W	0315-00-0101
R121	RES, 100 ohm, 5%, 1/4W	0315-00-0101
RP1	RES NET, 10K, 10 PIN SIP	0307-06-2103
RP2	RES NET, 10K, 10 PIN SIP	0307-06-2103
RP3	RES NET, 10K 14 PIN DIP	0307-00-0029
RP4	RES NET, 10K 14 PIN DIP	0307-00-0029
RP5	RES NET, 5.6K, 10 PIN SIP	0307-00-0020
J28	HEADER, DUAL 13, 26 PIN	0136-24-1026
J31	HEADER, DUAL 10, 20 PIN	0136-24-1020
J32	HEADER, DUAL 25, 50 PIN	0136-24-1050
J33	HEADER, DUAL 10, 20 PIN	0136-24-1020
PT1	SENSOR BLOOD PRESSURE	0682-00-0059
Q1	XSTR, 1RD110 HEX FET	0151-01-0010
Q4	XSTR 2N4401	0151-00-0052
U1	**IC, DS1244Y, 32K x 8**	0155-00-0440
U2	IC, 74HCT573 OCTAL "D" LATCH	0155-00-0439
U3	IC, 74HCT244 OCTAL BUFFER	0155-00-0426
U4	IC, MAX232 DUAL CHNL RS232	0155-00-0400
U5	IC, 80C196KB uCNTLR	0155-00-0442
U6	IC, NIBP U6 EPROM	0155-90-0111
U7	IC, NIBP U7 EPLD	0155-90-0112
U8	IC, DG201 ANALOG SW	0155-00-0404
U9	IC, AD7226 QUAD 8-BIT DAC	0155-00-0424
U10	IC, 79L05 -5V REG	0151-00-0068
U11	IC, LM324 LO PWR OP-AMP	0155-00-0053
U12	IC, SG3503 VOLTAGE REF	0153-00-0093
U13	IC, LT1014 QUAD OP-AMP	0155-00-0443
U14	IC, LT1014 QUAD OP-AMP	0155-00-0443
U15	IC, ULN2003 XSTR ARRAY	0151-00-0100
U17	IC, 74HC00 QUAD 2 IN NAND	0155-00-0213
U18	IC, 74HCT244 OCTAL BUFFER	0155-00-0426
U19	IC, 74HCT245 OCTAL BUS XCVR	0155-00-0438
U21	IC, LM324 LO PWR OP-AMP	0155-00-0053

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
VR1	RES ADJ, 5K 10% S.T.	0311-01-2502
XU5	SOCKET, IC, PLCC 68 PIN	0136-57-0068
XU6	SOCKET, IC, 28 PIN	0136-01-1028
XU7	SOCKET, IC, 20 PIN	0136-01-1020
XU9	SOCKET, IC, 20 PIN	0136-01-1020
XU12	MOUNTING PAD	0432-01-0002
XU18	SOCKET, IC, 20 PIN	0136-01-1020
XU19	SOCKET, IC, 20 PIN	0136-01-1020
XPT1	Socket, 90°, 6 Pin	0131-00-0215
XPT1	Washer, Nylon	0210-07-0003
XPT1	Screw, 4-40 x .875 lg	0212-12-0414
XPTI	Nut, Hex, Cres #4-40	0223-00-0004
XY1	Insulator Bead	0214-00-0074
Y1	CRYSTAL 11.0592M Hz	0158-01-0024

5.4.4 SaO_2 Circuit Description

5.4.4.1 General Theory of Operation

The monitor coupled with a sensor is used to measure and indicate blood oxygen concentration within a patient's arterial circulation. Specifically, the monitor, within limits, determines the fraction of hemoglobin molecules carrying oxygen to the body cells. Termed $\%SaO_2$, this fraction is normally about 97% in a healthy adult.

The sensor is used to obtain information about the blood by passing light through the tissue (tissue includes arterial blood). The sensor contains three LEDs (2 red, 1 infrared) and one photodetector. The LEDs are used to illuminate a portion of the body (i.e., fingertip) while the photodetector is used to sense the amount of existing light.

The LEDs are alternately turned on so the monitor's circuitry can distinguish between the photodetectors response to each wavelength of light (red and infrared).

The light is attenuated* each time the heart pulses arterial blood and the photodetectors signal levels are correspondingly reduced. The signal returns to its original level between each heart beat. It is this difference that is processed.

Thus, only oxygenated, arterial blood is measured, not skin, bone, or venous blood, etc...

Two different color LEDs are alternately driven at a 2.5kHz rate by a sequencer circuit. A single photodetector on the opposiste side of the finger produces current pulses proportional to the amount of light received.

A preamp converts the current pulses to voltage pulses. The microprocessor can set the gain of this conversion to one of several discrete values. This gives the unit enough flexibility to acquire signals from fingers spanning a wide range of thicknesses or alternatively from other sites of the body (i.e., ears, noses or toes).

The demultiplexer circuit steers each voltage pulse to one of two channels. Sending the red pulses one way and the infrared pulses the other way is like unzipping a zipper. In addition, the circuit sends to both channels a negatively amplified version of

*For this discussion attenuation of light is based on the assumption that hemoglobin and oxyhemoglobin are the only two significant factors.

the signal level between LED pulses when neither LED is active. This residual signal is caused by ambient light on the photodetector and offset voltages from the preceeding circuitry. The negative amplification sets up cancellation of the extraneous effect of the residual signal by the filter circuits that follow.

Two parallel and matched filter blocks average the pulses to produce the two plethysmographic waveforms. They also reduce the effect of any noise source that might interfere with the measurement, (i.e., an electrosurgical unit).

A remultiplexer operating at a 240Hz rate, alternately samples the two plethysmographic waveforms, each at 120Hz. The multiplexed signal is then processed through a microprocessor controlled gain block where it is amplified by one of several discrete gains. This block functions as a coarse equalization of the multiplexed signal since it has the ability to apply a different gain to the two components.

The plethysmographic waveform consists of a small AC component varying along with the physiological pulse, sitting on top of a larger pedestal. A subtraction circuit pulls off most of this DC pedestal. (A small portion is left as a buffer against inadvertently subtracting off a portion of the varying component.) The signal subtracted off is generated by a digital to the analog converter (DAC). Two digital codes into the DAC are generated by the microprocessor - one each for the red and infrared waveforms.

The residual multiplexed signal is once again processed through a microprocessor controlled gain block. One of several discrete gains is chosen for each of the two components, such that the peak to peak size of the physiologically varying components is large enough to be digitized with sufficient resolution.

The digitization is performed under the microprocessor control of the analog-to-digital converter. The A/D voltage is successively altered by the microprocessor until it hones in on the signal being digitized (a voltage comparator cues the microprocessor). Since each multiplexed sample must be digitized, the digitizaiton happens at a 240Hz rate, 120Hz for each component.

Thus the A/D performs a dual function. It is used in both the subtraction and the digitization blocks. Every 1/240 of a second, the circuit's control functions are flipped to process the alternate component of the multiplexed signal. The multiplexer switches signals, the two microprocessor controlled gains are changed, if necessary, and a new digital input code is sent to the A/D for use in the subtraction circuit if necessary. After settling to its new value, the signal at the input to the digitizer is frozen by a sample and hold circuit. The A/D is now available for use in digitization block. At the next 1/240 second interval, all control signals revert to the previous values.

5.4.4.2 Detailed Circuit Descriptions

O_2 ANALOG BOARD

The Analog Board provides all the patient finger probe excitation and analog signal processing for the ACCUSAT.

The operation of the Analog Board is controlled by the Digital Board microprocessor via input buffers (U15, U16, U30) and latches (U17, U18, U19). The signals IR0, IR1, Red 0, Red 1, and Run/Cal determine the operation of the Digital Sequence Controller comprised of U23, U24, U25, and U26. The outputs of U25, and S1 thru S6 control the preamp (U1-A) gain and synchronous demodulation of the detected patient finger probe signal.

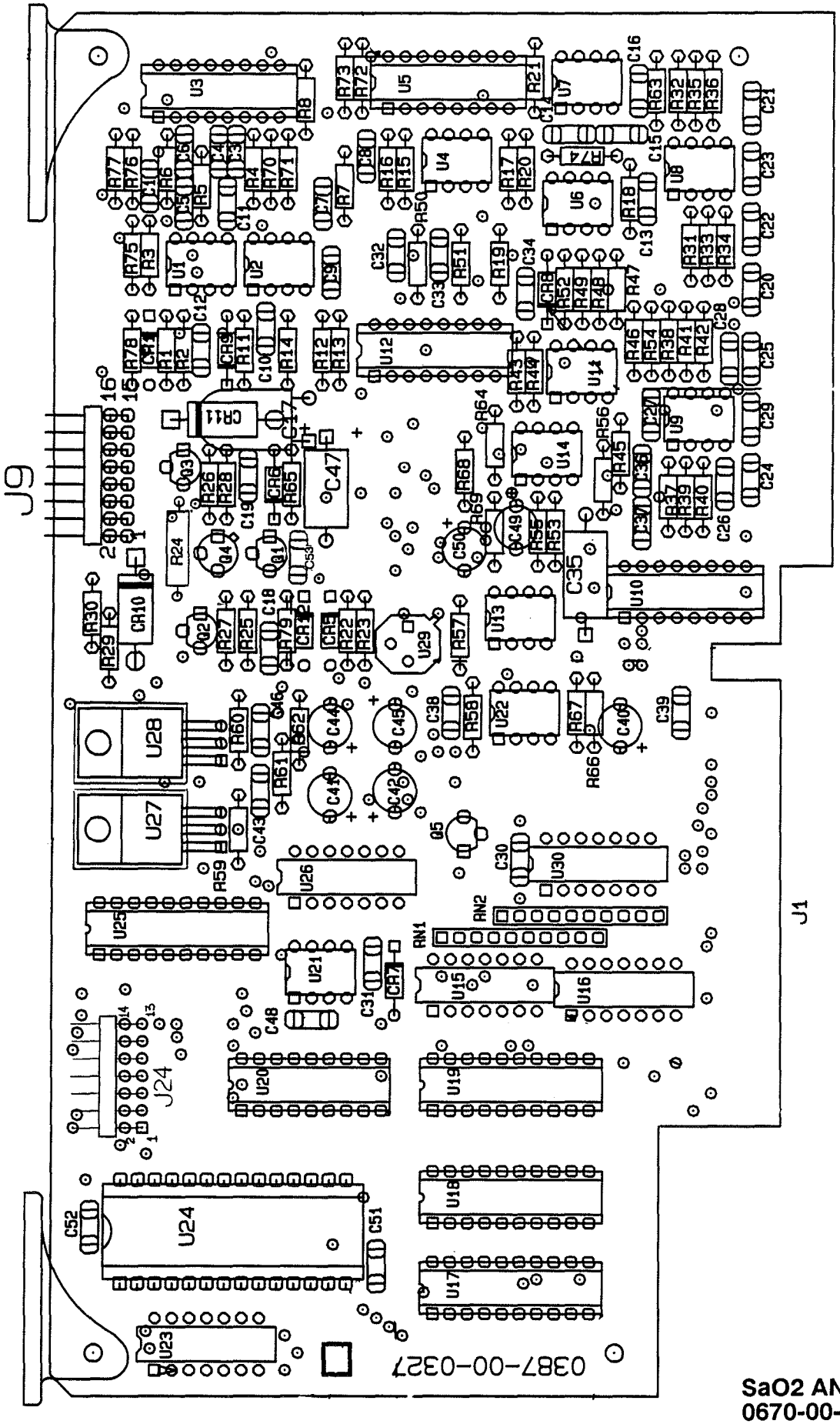
The patient finger probe is driven alternately by Q2 and Q3, which are controlled by the Digital Sequency Controller outputs IRDRV and REDDRV. Q1 provides a clean power supply voltage for the probe LED emitters.

The probe patient signal enters (J9-13, 14) the board as current pulses in the range of 0.25 - 40uA. U1-B provides filtering for noise above 15kHz. U1-A acts as a current-to-voltage converter with gain switchable via U3. U2-B is an integrator which maintains the output of U1-B at an average DC voltage of zero. U2-A acts as a comparator which will detect noise voltages larger than +6.5V in amplitude. This information is sent to the digital board for use by the microprocessor.

The preamp output red and IR signal is demodulated by U4, U5, U6 and U7. The resultant signals are filtered identically (U8, U9) and are alternately selected for further amplification via the U10 analog switch.

U11A provides voltage amplification of x 1, 2, or 4. Its output is amplified by U11B, which uses the microprocessor controlled DAC (U20, U21) voltage to maintain the resultant signal in the amplifier linear region. U11B provides switchable gains of x 5, 22, and 100, and its output is sampled by U13 for amplitude digitization via comparator U14, using the DAC voltage for comparision.

Regulated power for the Analog Board is provided by U27 and U28. Reference voltages of -8V and +3.35 are generated by U29 and U22.



SaO2 ANALOG BOARD
0670-00-0327
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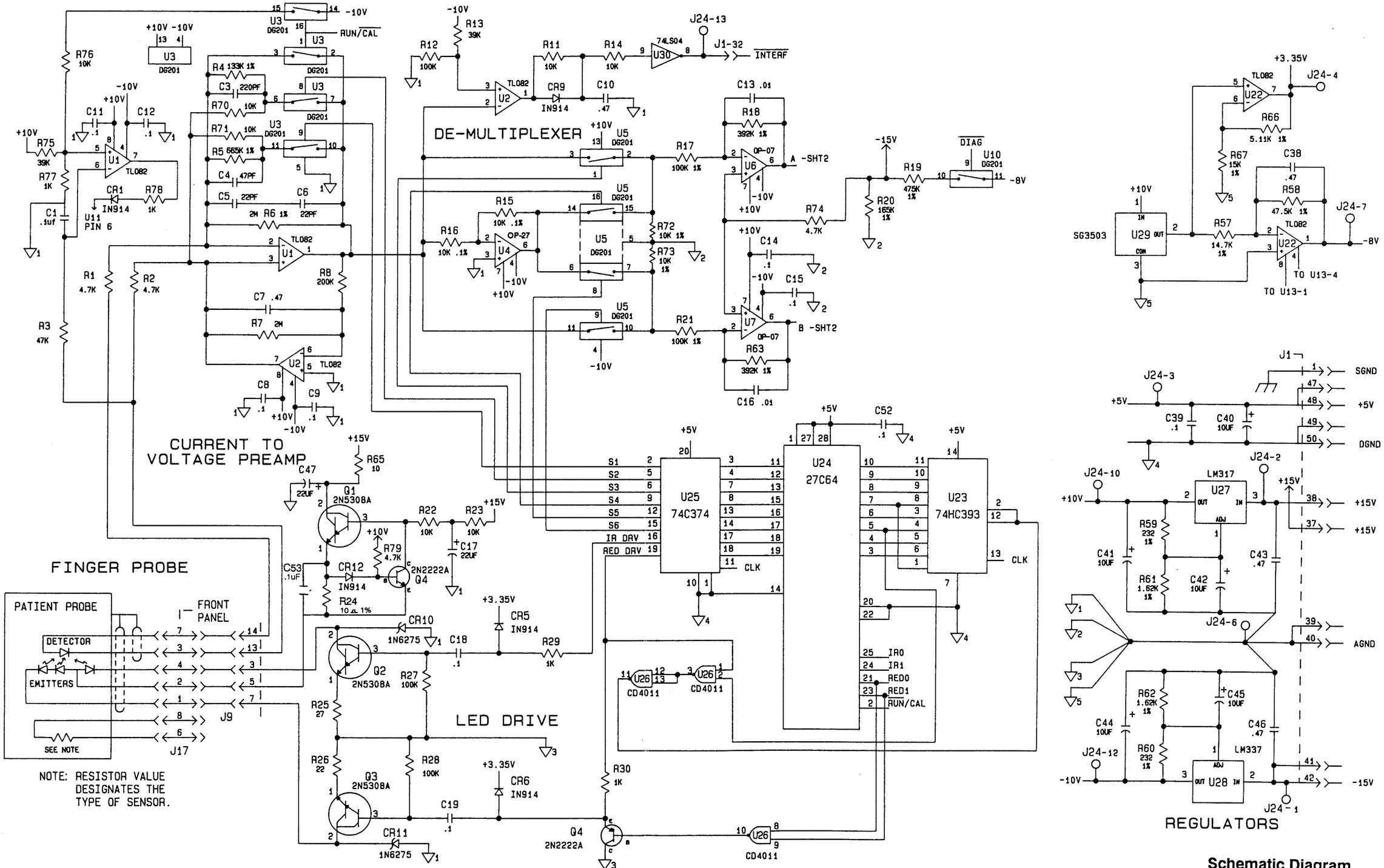
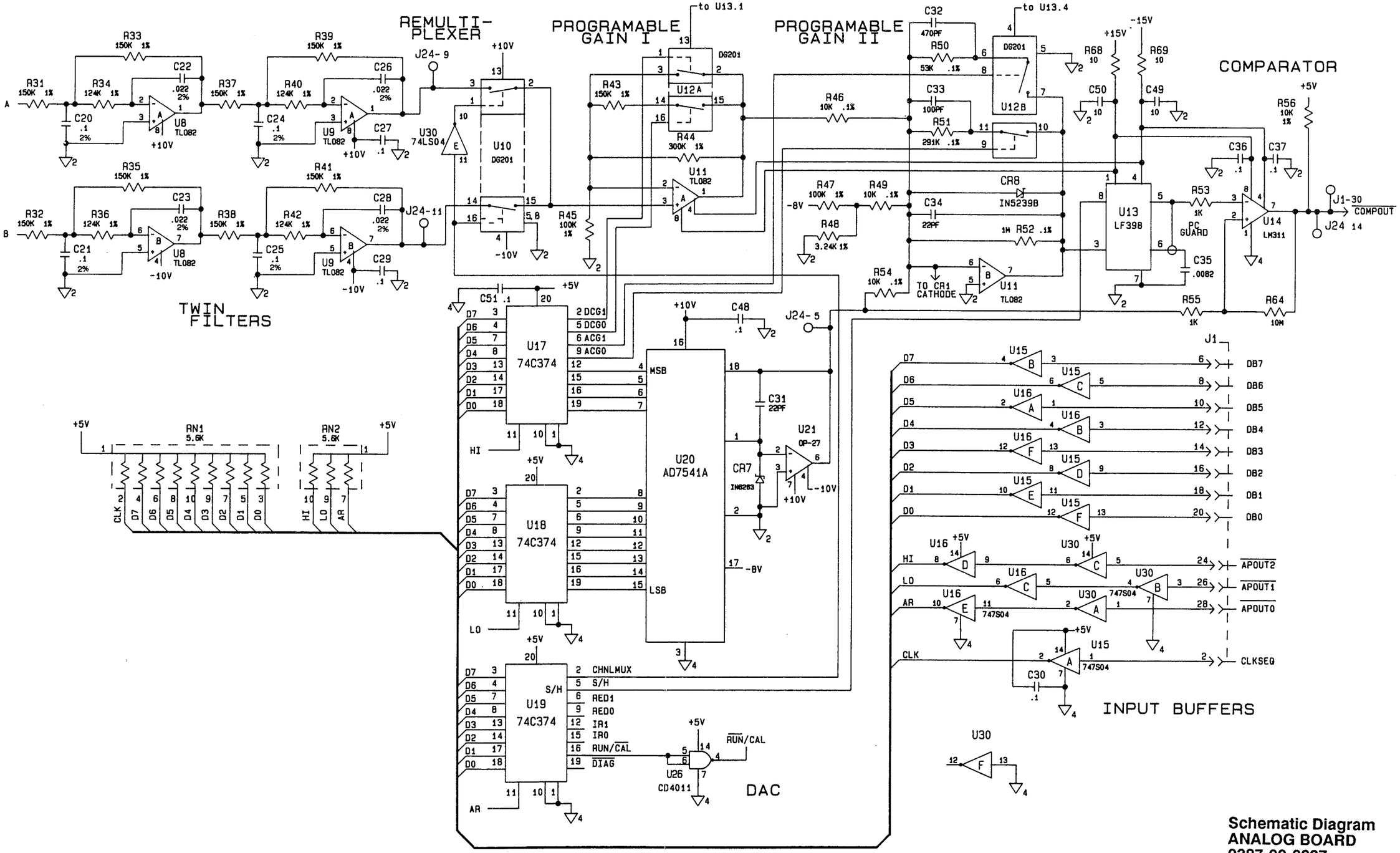
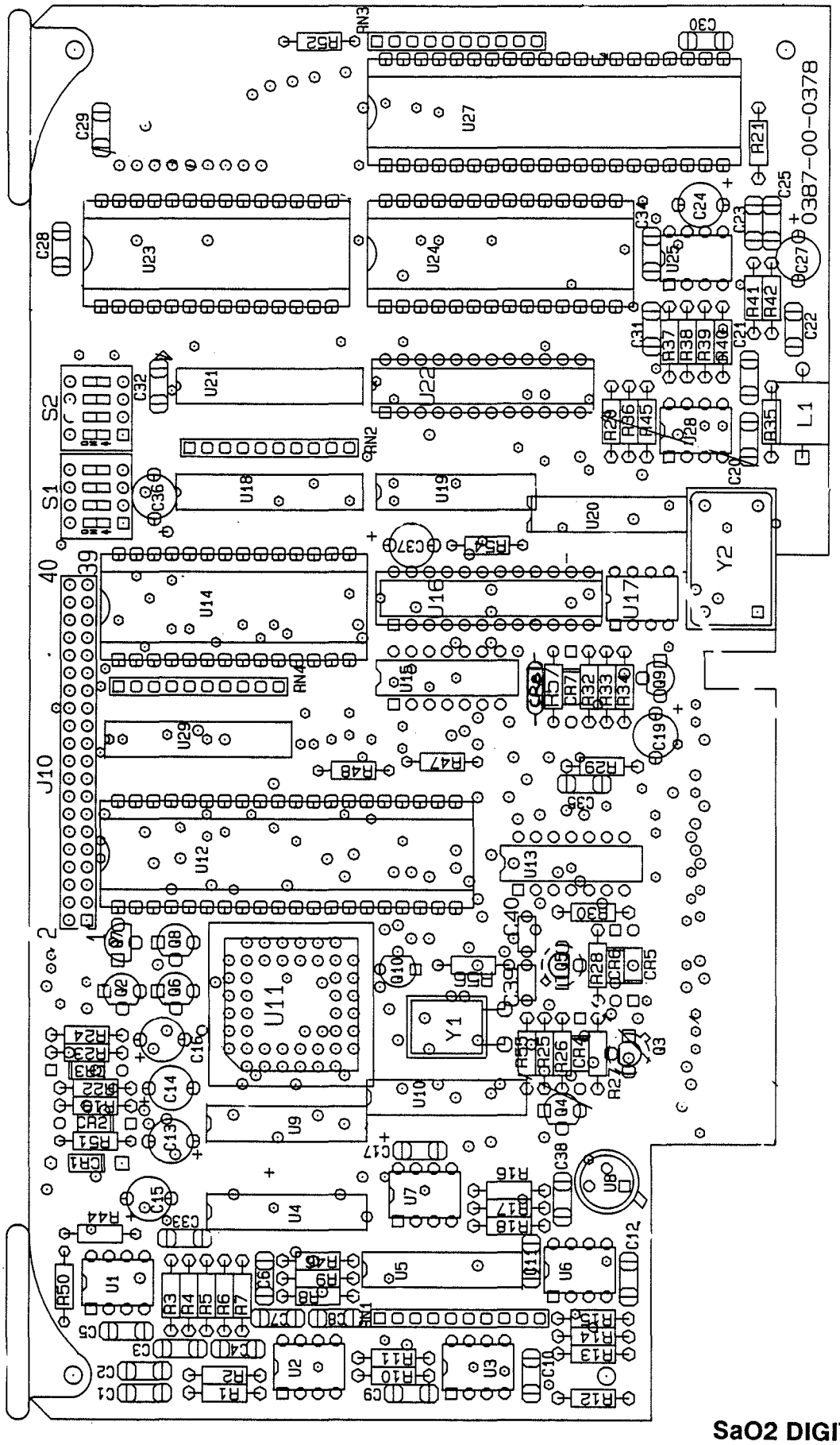


Schematic Diagram
ANALOG BOARD
0387-00-0327
Sheet 1 of 2
Revised 03/29/91



Schematic Diagram
ANALOG BOARD
0387-00-0327
Sheet 2 of 2



SaO2 DIGITAL BOARD
0670-00-0378

EPROM

U24 27C256 32KX8 CMOS UV EPROM

U23 DS1242 32KX8 CMOS STATIC RAM

D0-D7 BUS

U20 4520 — CLKSEQ

U19 4520 — KHZ, 250HZ

Y2 8.00/MHZ CRYSTAL OSC

U22 EPLD EP600 OR 5C060

U27 63B09E

U16 EP600 OR 5C060

U18 74LS240

U29 74LS245

U21 74C240

U15 74LS00

U17 DS1232

FAN FAIL DETECTOR

AUDIO AMP

CONTROL

INPUT BUFFERS

J4

J10

S1 DIP4

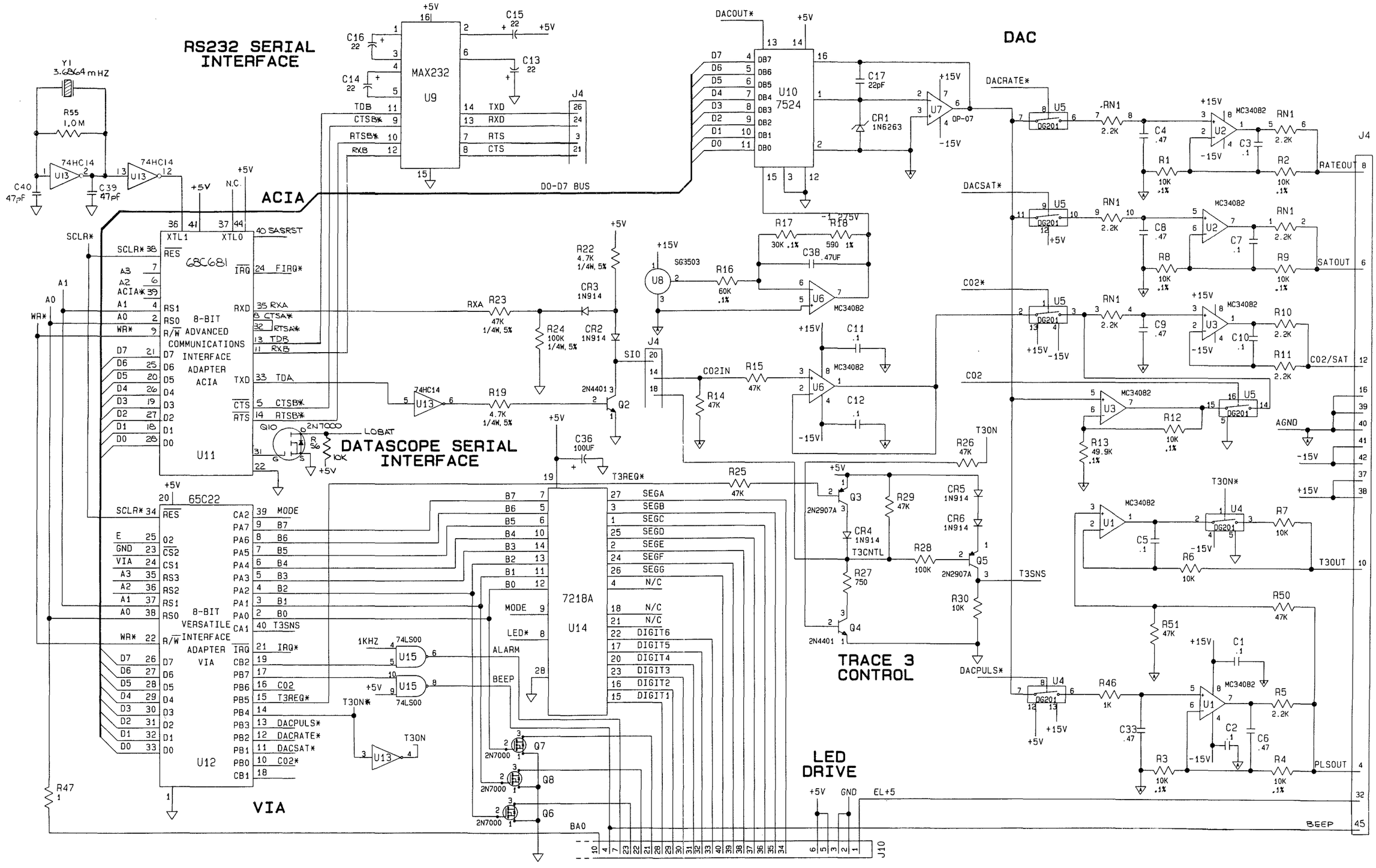
S2 DIP4

RN2 100K

RN3 100K

RN4 10K

Schematic Diagram
SaO2 DIGITAL BOARD
0387-00-0378
Sheet 1 of 2
Revised 03/22/91



Schematic Diagram
SaO2 DIGITAL BOARD
0387-00-0378
Sheet 2 of 2

REPLACEMENT PARTS FOR: **SaO2 ANALOG BOARD 0670-00-0327**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	Analog Board	
-	Exchange Board	0670-00-0327 0670-00-0327E
C1	CAP., CER., .1uF, 10%, 100V	
C3	CAP., CER., 220pF, 10%, 200V	0283-04-0104
C4	CAP., CER., 47pF, 10%, 200V	0238-05-0221
C5	CAP., CER., 22pF, 10%, 200V	0283-05-0470 0283-05-0220
C6	CAP., CER., 22pF, 10%, 200V	
C7	CAP., CER., .47uF, 10%, 50V	0283-05-0220
C8	CAP., CER., .1uF, 10%, 100V	0283-04-0474
C9	CAP., CER., .1uF, 10%, 100V	0283-04-0104
C10	CAP., CER., .47uF, 10%, 50V	0283-04-0104 0283-04-0474
C11	CAP., CER., .1uF, 10%, 100V	
C12	CAP., CER., .1uF, 10%, 100V	0283-04-0104
C13	CAP., CER., .01uF, 10%, 100V	0283-04-0104
C14	CAP., CER., .1uF, 10%, 100V	0283-05-0103
C15	CAP., CER., .1uF, 10%, 100V	0283-04-0104 0283-04-0104
C16	CAP., CER., .01uF, 10%, 100V	0283-05-0103
C17	CAP., TANT., 22uF, 10%, 20V	0290-02-1226
C18	CAP., CER., .1uF, 10%, 100V	0283-04-0104
C19	CAP., CER., .1uF, 10%, 100V	0283-04-0104
C20	CAP., .1uF, 2%, 30V	0285-10-0104
C21	CAP., .1uF, 2%, 30V	0285-10-0104
C22	CAP., .022uF, 2%, 30V	0285-10-0223
C23	CAP., .022uF, 2%, 30V	0285-10-0223
C24	CAP., .1uF, 2%, 30V	0285-10-0104
C25	CAP., .1uF, 2%, 30V	0285-10-0104
C26	CAP., .022uF, 2%, 30V	0285-10-0223
C27	CAP., CER., .1uF, 10%, 100V	0283-04-0104
C28	CAP., .022uF, 2%, 30V	0285-10-0223
C29	CAP., CER., .1uF, 10%, 100V	0283-04-0104
C30	CAP., CER., .1uF, 10%, 100V	0283-04-0104
C31	CAP., CER., 22pF, 10%, 200V	
C32	CAP., CER., 470pF, 10%, 100V	0283-05-0220
C33	CAP., CER., 100pF, 10%, 200V	0283-05-0471
C34	CAP., CER., 22pF, 10%, 200V	0283-05-0101
C35	CAP., POLYPRO., .0082uF	0283-05-0220 0285-08-8201
C36	CAP., CER., .1uF, 10%, 100V	
C37	CAP., CER., .1uF, 10%, 100V	0283-04-0104
C38	CAP., CER., .47uF, 10%, 50V	0283-04-0104
C39	CAP., CER., .1uF, 10%, 100V	0283-04-0474
C40	CAP., TANT., 10uF, 20%, 25V	0283-04-0104 0290-02-2106
C41	CAP., TANT., 10uF, 20%, 25V	
C42	CAP., TANT., 10uF, 20%, 25V	0290-02-2106
C43	CAP., CER., .47uF, 10%, 50V	0290-02-2106
C44	CAP., TANT., 10uF, 20%, 25V	0283-04-0474
C45	CAP., TANT., 10uF, 20%, 25V	0290-02-2106 0290-02-2106
C46	CAP., CER., .47uF, 10%, 50V	
C47	CAP., ALUM ELEC, 22uF, 50%, 25V	0283-04-0474
C48	CAP., CER., .1uF, 10%, 100V	0290-01-2220
C49	CAP., CER., .47uF, 10%, 50V	0283-04-0104
C50	CAP., CER., .47uF, 10%, 50V	0283-04-0474 0283-04-0474
C51	CAP., CER., .1uF, 10%, 100V	0283-04-0104
C52	CAP., CER., .1uF, 10%, 100V	0283-04-0104
C53	CAP., CER., .1uF, 10%, 100V	0283-04-0104

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
CR1	DIODE, 1N914	0153-00-0014
CR5	DIODE, 1N914	0153-00-0014
CR6	DIODE, 1N914	0153-00-0014
CR7	DIODE, 1N6263	0153-00-0085
CR8	DIODE, 1N5239B, 9.1V	0153-00-0010
CR9	DIODE, 1N914	0153-00-0014
CR10	DIODE, 1N6275	0153-00-0091
CR11	DIODE, 1N6275	0153-00-0091
CR12	DIODE, 1N914	0153-00-0014
R1	RES., 1K, 5%, 1/4W	0315-00-0102
R2	RES., 1K, 5%, 1/4W	0315-00-0102
R3	RES., 47K, 5%, 1/4W	0315-00-0473
R4	RES., 133K, 1%, 1/8W	0309-00-1333
R5	RES., 665K, 1%, 1/8W	0309-00-6653
R6	RES., 2M, 1%, 1/8W	0309-00-2004
R7	RES., 2M, 5%, 1/4W	0315-00-0205
R8	RES., 200K, 5%, 1/4W	0315-00-0204
R11	RES., 10K, 5%, 1/4W	0315-00-0103
R12	RES., 100K, 5%, 1/4W	0315-00-0104
R13	RES., 39K, 5%, 1/4W	0315-00-0393
R14	RES., 10K, 5%, 1/4W	0315-00-0103
R15	RES., 10K, .1%, 1/8W	0320-00-1002
R16	RES., 10K, .1%, 1/8W	0320-00-1002
R17	RES., 100K, 1%, 1/8W	0309-00-1003
R18	RES., 392K, 1%, 1/8W	0309-00-3923
R19	RES., 10K, 5%, 1/4W	0315-00-0103
R20	RES., 10K, 5%, 1/4W	0315-00-0103
R21	RES., 100K, 1%, 1/8W	0309-00-1003
R22	RES., 10K, 5%, 1/4W	0315-00-0103
R23	RES., 10K, 5%, 1/4W	0315-00-0103
R24	RES., MF, 10 ohm, 1%, 1/4W	0310-00-0100
R25	RES., 62 ohm, 5%, 1/4W	0315-00-0620
R26	RES., 15 ohm, 5%, 1/4W	0315-00-0150
R27	RES., 100K, 5%, 1/4W	0315-00-0104
R28	RES., 100K, 5%, 1/4W	0315-00-0104
R29	RES., 1K, 5%, 1/4W	0315-00-0102
R30	RES., 1K, 5%, 1/4W	0315-00-0102
R31	RES., 150K, 1%, 1/8W	0309-00-1503
R32	RES., 150K, 1%, 1/8W	0309-00-1503
R33	RES., 150K, 1%, 1/8W	0309-00-1503
R34	RES., 124K, 1%, 1/8W	0309-00-1243
R35	RES., 150K, 1%, 1/8W	0309-00-1503
R36	RES., 124K, 1%, 1/8W	0309-00-1243
R37	RES., 150K, 1%, 1/8W	0309-00-1503
R38	RES., 150K, 1%, 1/8W	0309-00-1503
R39	RES., 150K, 1%, 1/8W	0309-00-1503
R40	RES., 124K, 1%, 1/8W	0309-00-1243
R41	RES., 150K, 1%, 1/8W	0309-00-1503
R42	RES., 124K, 1%, 1/8W	0309-00-1243
R43	RES., 150K, 1%, 1/8W	0309-00-1503
R44	RES., 301K, 1%, 1/8W	0309-00-3013
R45	RES., 100K, 1%, 1/8W	0309-00-1003

REPLACEMENT PARTS FOR: **SaO2 ANALOG BOARD 0670-00-0327**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
R46	RES., 10K, .1%, 1/8W	0320-00-1002
R47	RES., 100K, 1%, 1/8W	0309-00-1003
R48	RES., 3.24K, 1%, 1/8W	0309-00-3241
R49	RES., 10K, .1%, 1/8W	0320-00-1002
R50	RES., 53K, .1%, 1/8W	0320-00-5302
R51	RES., 291K, .1%, 1/8W	0320-00-2913
R52	RES., 1M, .1%, 1/8W	0320-00-1004
R53	RES., 1K, 5%, 1/4W	0315-00-0102
R54	RES., 10K, .1%, 1/8W	0320-00-1002
R55	RES., 1K, 5%, 1/4W	0315-00-0102
R56	RES., 10K, 5%, 1/4W	0315-00-0103
R57	RES., 14.7K, 1%, 1/8W	0309-00-1472
R58	RES., 47.5K, 1%, 1/8W	0309-00-4752
R59	RES., 232 ohm, 1%, 1/8W	0309-00-2320
R60	RES., 232 ohm, 1%, 1/8W	0309-00-2320
R61	RES., 1.62K, 1%, 1/8W	0309-00-1621
R62	RES., 1.62K, 1%, 1/8W	0309-00-1621
R63	RES., 392K, 1%, 1/8W	0309-00-3923
R64	RES., 10M, 5%, 1/4W	0315-00-0106
R65	RES., 10 ohm, 5%, 1/4W	0315-00-0100
R66	RES., 5.11K, 1%, 1/8W	0309-00-5111
R67	RES., 15K, 1%, 1/8W	0309-00-1502
R68	RES., 10 ohm, 5%, 1/4W	0315-00-0100
R69	RES., 10 ohm, 5%, 1/4W	0315-00-0100
R70	RES., 10K, 1%, 1/8W	0309-00-1002
R71	RES., 10K, 1%, 1/8W	0309-00-1002
R72	RES., 10K, 1%, 1/8W	0309-00-1002
R73	RES., 10K, 1%, 1/8W	0309-00-1002
R74	RES., 4.7K, 5%, 1/4W	0315-00-0472
R75	RES., 39K, 5%, 1/4W	0315-00-0393
R76	RES., 10K, 5%, 1/4W	0315-00-0103
R77	RES., 1K, 5%, 1/4W	0315-00-0102
R78	RES., 1K, 5%, 1/4W	0315-00-0102
R79	RES., 4.7K, 5%, 1/4W	0315-00-0472
RN1	RES., SIP., 5.6K	0307-00-0020
RN2	RES., SIP., 5.6K	0307-00-0020
J9	HEADER, DB ROW, RT ANG, 16 POS	0136-20-1016
J24	HEADER, DBL ROW, RT ANGLE 14 PIN	0136-20-1014
Q1	TRAN., 2N5308A	0151-00-0086
Q2	TRAN., 2N5308A	0151-00-0086
Q3	TRAN., 2N5308A	0151-00-0086
Q4	TRAN., 2N2222A	0151-00-0061
Q5	TRAN., 2N3645	0151-00-0037

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
U1	I.C., TL082	0155-00-0151
U2	I.C., TL082	0155-00-0151
U3	I.C., DG201CJ	0155-00-0404
U4	I.C., OP-27 GP	0155-00-0392
U5	I.C., DG201CJ	0155-00-0404
U6	I.C., OP-07, LOW OFFSET	0155-00-0159
U7	I.C., OP-07, LOW OFFSET	0155-00-0159
U8	I.C., TL082	0155-00-0151
U9	I.C., TL082	0155-00-0151
U10	I.C., DG201CJ	0155-00-0404
U11	I.C., TL082	0155-00-0151
U12	I.C., DG201CJ	0155-00-0404
U13	I.C., LF398N	0155-00-0394
U14	I.C., LM311N	0155-00-0107
U15	I.C., 74LS04N	0155-00-0408
U16	I.C., 74LS04N	0155-00-0408
U17	I.C., 74C374, OCTAL D F/F	0155-00-0129
U18	I.C., 74C374, OCTAL D F/F	0155-00-0129
U19	I.C., 74C374, OCTAL D F/F	0155-00-0129
U20	I.C., AD7541A JN	0155-00-0393
U21	I.C., OP-27 GP	0155-00-0392
U22	I.C., TL082	0155-00-0151
U23	I.C., 74HC393	0155-00-0210
U24	SEQUENCER EPROM ASSY	0155-90-0061
U25	I.C., 74C374, OCTAL D F/F	0155-00-0129
U26	I.C., CD4011 AE	0155-00-0059
U27	I.C., LM317 T	0155-00-0194
U28	I.C., LM337T, REG, NEG ADJ	0155-00-0216
U29	I.C., SG3503, VOLTAGE REF	0153-00-0093
U30	I.C., 74LS04N	0155-00-0408
XU3	SOCKET, 16 PIN	0136-01-1016
XU5	SOCKET, 16 PIN	0136-01-1016
XU10	SOCKET, 16 PIN	0136-01-1016
XU12	SOCKET, 16 PIN	0136-01-1016
XU17	SOCKET, 20 PIN	0136-01-1020
XU18	SOCKET, 20 PIN	0136-01-1020
XU19	SOCKET, 20 PIN	0136-01-1020
XU20	SOCKET, 18 PIN	0136-01-1018
XU24	SOCKET, 28 PIN	0136-01-1028
XU25	SOCKET, 20 PIN	0136-01-1020
	TRANSISTOR PAD	0432-01-0001
	COVER SHIELD, TOP	0200-00-0222
	COVER SHIELD, BOTTOM	0200-00-0223
	FOAM TAPE, DOUBLE ADHESIVE	0215-03-0002

REPLACEMENT PARTS FOR: **SaO2 DIGITAL BOARD 0670-00-0378**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
-	SaO_2 Digital Board	0670-00-0378
-	Exchange Board	0670-00-0378E
C1	CAP, .1uF, 10%. 100V	0283-04-0104
C2	CAP, .1uF, 10%. 100V	0283-04-0104
C3	CAP, .1uF, 10%. 100V	0283-04-0104
C4	CAP, .47uf, 10%, 50V	0283-04-0474
C5	CAP, .1uF, 10%. 100V	0283-04-0104
C6	CAP, .47uf, 10%, 50V	0283-04-0474
C7	CAP, .1uF, 10%. 100V	0283-04-0104
C8	CAP, .47uf, 10%, 50V	0283-04-0474
C9	CAP, .47uf, 10%, 50V	0283-04-0474
C10	CAP, .1uF, 10%. 100V	0283-04-0104
C11	CAP, .1uF, 10%. 100V	0283-04-0104
C12	CAP, .1uF, 10%. 100V	0283-04-0104
C13	CAP, TNAT 22uF, 20%, 20V	0290-02-1226
C14	CAP, TNAT 22uF, 20%, 20V	0290-02-1226
C15	CAP, TNAT 22uF, 20%, 20V	0290-02-1226
C16	CAP, TNAT 22uF, 20%, 20V	0290-02-1226
C17	CAP, 22pF, 10%,200V	0283-05-0220
C19	CAP, TANT, 10uF, 20%, 25V	0290-02-2106
C20	CAP, .47uf, 10%, 50V	0283-04-0474
C21	CAP, .47uf, 10%, 50V	0283-04-0474
C22	CAP, .01uF, 10%, 100V	0283-05-0103
C23	CAP, .047uF, 10%, 100V	0283-04-0473
C24	CAP, TANT, 4.7uF, 20%, 35V	0290-02-3475
C25	CAP, .01uF, 10%, 100V	0283-05-0103
C27	CAP, TANT, 4.7uF, 10%, 35V	0290-05-1475
C28	CAP, .1uF, 10%. 100V	0283-04-0104
C29	CAP, .1uF, 10%. 100V	0283-04-0104
C30	CAP, .1uF, 10%. 100V	0283-04-0104
C31	CAP, .1uF, 10%. 100V	0283-04-0104
C32	CAP, .1uF, 10%. 100V	0283-04-0104
C33	CAP, .47uf, 10%, 50V	0283-04-0474
C34	CAP, .47uf, 10%, 50V	0283-04-0474
C35	CAP, .1uF, 10%. 100V	0283-04-0104
C36	CAP, TANT, 100uF, 20%, 10V	0290-02-0107
C37	CAP, TANT, 68uF, 20%, 15V	0290-02-4686
C38	CAP, .47uf, 10%, 50V	0283-04-0474
C39	CAP, 47pF, 10%, 20V	0283-05-0470
C40	CAP, 47pF, 10%, 20V	0283-05-0470

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
CR1	DIODE, IN6263	0153-00-0085
CR2	DIODE, IN914	0153-00-0014
CR3	DIODE, IN914	0153-00-0014
CR4	DIODE, IN914	0153-00-0014
CR5	DIODE, IN914	0153-00-0014
CR6	DIODE, 1N914	0153-00-0014
CR7	DIODE, 1N914	0153-00-0014
CR8	DIODE, 1N6263	0153-00-0085
R1	RES, 10K, .1%, 1/8W	0320-00-1002
R2	RES, 10K, .1%, 1/8W	0320-00-1002
R3	RES, 10K, .1%, 1/8W	0320-00-1002
R4	RES, 10K, .1%, 1/8W	0320-00-1002
R5	RES, 2.2K, 5%, 1/4W	0315-00-0222
R6	RES, 10K, 5%, 1/4W	0315-00-0103
R7	RES, 10K, 5%, 1/4W	0315-00-0103
R8	RES, 10K, .1%, 1/8W	0320-00-1002
R9	RES, 10K, .1%, 1/8W	0320-00-1002
R10	RES, 2.2K, 5%, 1/4W	0315-00-0222
R11	RES, 2.2K, 5%, 1/4W	0315-00-0222
R12	RES, 10K, .1%, 1/8W	0320-00-1002
R13	RES, 49.9K, 1%, 1/8W	0309-00-4992
R14	RES, 47K, 5%, 1/4W	0315-00-0473
R15	RES, 47K, 5%, 1/4W	0315-00-0473
R16	RES, 60K, .1%, 1/8W	0320-00-6002
R17	RES, 60K, .1%, 1/8W	0320-00-3002
R18	RES, 590 ohm, 1%, 1/8W	0309-00-5900
R19	RES, 4.7K, 5%, 1/4W	0315-00-0472
R20	RES, 10 ohm, 5%, 1/4W	0315-00-0100
R21	RES, 10 ohm, 5%, 1/4W	0315-00-0100
R22	RES, 4.7K, 5%, 1/4W	0315-00-0472
R23	RES, 47K, 5%, 1/4W	0315-00-0473
R24	RES, LOOK, 5%, 1/4W	0315-00-0104
R25	RES, 47K, 5%, 1/4W	0315-00-0473
R26	RES, 47K, 5%, 1/4W	0315-00-0473
R27	RES, 750 ohm, 5%, 1/4W	0315-00-0751
R28	RES, LOOK, 5%, 1/4W	0315-00-0104
R29	RES, 47K, 5%, 1/4W	0315-00-0473
R30	RES, 10K, 5%, 1/4W	0315-00-0103
R32	RES, 24K, 5%, 1/4W	0315-00-0243
R33	RES, 47 ohm, 5%, 1/4W	0315-00-0470
R34	RES, 4.7K, 5%, 1/4W	0315-00-0472
R35	RES, 560K, 5%, 1/4W	0315-00-0564
R36	RES, IK, 5%, 1/4W	0315-00-0102
R37	RES, 200K, 5%, 1/4W	0315-00-0204
R38	RES, 47 ohm, 5%, 1/4W	0315-00-0470
R40	RES, 47K, 5%, 1/4W	0315-00-0473
R41	RES, 100 ohm, 5%, 1/4W	0315-00-0101
R42	RES, 10K, 5%, 1/4W	0315-00-0103
R45	RES, 10K, 5%, 1/4W	0315-00-0103

REPLACEMENT PARTS FOR: **SaO2 DIGITAL BOARD 0670-00-0378**

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
R46	RES, 1K, 5%, 1/4W	0315-00-0102
R47	RES, 1 ohm, 5%, 1/4W	0315-00-010X
R48	RES, 1 ohm, 5%, 1/4W	0315-00-010X
R50	RES, 47K, 5%, 1/4W	0315-00-0473
R51	RES, 47K, 5%, 1/4W	0315-00-0473
R52	RES, 47K, 5%, 1/4W	0315-00-0473
R54	RES, 10 ohm, 5%, 1/4W	0315-00-0100
R55	RES, 1M, 5%	0315-00-0105
R56	RES, 10K, 5%, 1/4W	0315-00-0103
R57	RES, 47 ohm, 5%, 1/4W	0315-00-0470
R58	RES, 1K, 5%, 1/4W	0315-00-0102
RN1	RES, 2.2K, 10 PIN SIP	0307-01-0222
RN2	RES, 100K, 10 PIN SIP	0307-06-2104
RN3	RES, 100K, 10 PIN SIP	0307-06-2104
RN4	RES, 10K, 10 PIN SIP	0307-06-2103
J10	HEADER, DOUBLE, 40P	0136-24-1040
Q2	TRANS, 2N4401	0151-00-0052
Q3	TRANS, PN2907A	0151-00-0073
Q4	TRANS, 2N4401	0151-00-0052
Q5	TRANS, PN2907A	0151-00-0073
Q6	TRANS, 2N7000	0151-00-0115
Q7	TRANS, 2N7000	0151-00-0115
Q8	TRANS, 2N7000	0151-00-0115
Q9	TRANS, 2N4401	0151-00-0052
Q10	TRANS, 2N7000	0151-00-0115
U1	I.C., MC34082Ap, JFET OP AMP	0155-00-0407
U2	I.C., MC34082Ap, JFET OP AMP	0155-00-0407
U3	I.C., MC34082Ap, JFET OP AMP	0155-00-0407
U4	I.C., DG-201, ANALOG SW	0155-00-0404
U5	I.C., DG-201, ANALOG SW	0155-00-0404
U6	I.C., MC34082Ap, JFET OP AMP	0155-00-0407
U7	I.C., OP-07, LOW OFFSET OP	0155-00-0159
U8	I.C., SG5303, VOLT REF	0155-00-0093
U9	I.C., MAX232, RS232 XCVR	0155-00-0400
U10	I.C., 7524, DAC	0155-00-0201
U11	I.C., 68C681, ACIA	0155-00-0462
U12	I.C., 65C22, VIA CMOS	0155-00-0300
U13	I.C., 74HCIAN SCHMITT TRIGGER IN.	0155-00-0299
U14	I.C., 7218, 8 DIG, LED DR.	0155-00-0401
U15	I.C., 74LS00, QUAD 2IN NAND	0155-00-0090
U16	I.C., SAO2 EPLD-1 ASSY	0155-90-0102-1
U17	I.C., DS1232	0155-00-0425
U18	I.C., 74LS240 OCTAL BUFFER	0155-00-0298
U19	I.C., CD45208CN	0155-00-0104
U20	I.C., CD45208CN	0155-00-0104
U21	I.C., 74C240, CMOS OCTAL BUFFER	0155-03-0001
U22	I.C., SAO2-2 EPLD-2 ASSY	0155-90-0104-1

REF. NO.	DESCRIPTION	DATASCOPE PART NO.
U23	I.C., SMARTWATCH W/32X8 RAM	0155-00-0440
U24	I.C., SAO2 EPROM ASSY	0155-90-0103-1
U25	I.C., LM386N	0155-00-0078
U27	I.C., 638095, 8 BIT CMOS uP	0155-00-0399
U28	I.C., LM393	0155-00-0173
U29	I.C., 74LS245, OCTAL XCVR	0155-00-0220
L1	INDUCTOR, 4.7mH	0108-02-0473
Y1	XTAL, 3.6864 MH_z	0158-01-0023
Y2	XTAL, 8.00 MH_z	0158-02-8006
S1	DIP SW. SPST x4	0261-18-1004
S2	DIP SW. SPST x4	0261-18-1004
XU8	MOUNTING PAD	0432-01-0002
XU11	SOCKET, 44P,PLCC	0136-57-0044
XU12	SOCKET, 40P DIP	0136-01-1040
XU14	SOCKET, 28P. DIP	0136-01-1028
XU16	SOCKET, 24P SLIM	0136-56-1324
XU22	SOCKET, 24P SLIM	0136-56-1324
XU23	SOCKET, 28P. DIP	0136-01-1028
XU24	SOCKET, 28P. DIP	0136-01-1028
XU27	SOCKET, 40P DIP	0136-01-1040
	P.C. BOARD	0388-00-0378-A
	INSULATOR BEAD	0214-00-0074
	CARD EJECTOR	0367-00-0018
	DOUBLE SIDED ADHESIVE TAPE	0215-03-0002

Datascope Corp. • 580 Winters Avenue, P.O. Box 5 • Paramus, N.J. 07653-0005, U.S.A. • Tel. (201) 265-8800 •
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Datascope B.V. • Veenwal 15B • 3871 KE Hoevelaken, The Netherlands • Telephone 03495-34514 • Telex 84479254 (Scope nl)

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