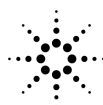


***SERVICE GUIDE***  
**for Agilent 66000A**  
**MPS Mainframe**

**Serial Numbers:**

**Agilent Model 66000A: 3522A01561 thru 03295**  
**US35220101 and up**



**Agilent Technologies**

**Agilent Part No. 66000-90003**  
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## SAFETY SUMMARY

*The following general safety precautions must be observed during all phases of operation of this mainframe. Failure to comply with these precautions or with specific warnings elsewhere in this guide violates safety standards of design, manufacture, and intended use of the mainframe. Agilent Technologies assumes no liability for the user's failure to comply with these requirements.*

### GROUND THE MAINFRAME.

This product is a Safety Class 1 instrument (provided with a protective earth terminal). To minimize shock hazard, the mainframe must be connected to an electrical ground. The mainframe must be connected to the ac power supply mains through a three-conductor power cable, with the third wire firmly connected to an electrical ground (safety ground) at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

### DO NOT EXCEED INPUT RATINGS.

This mainframe is equipped with a power line filter to reduce electromagnetic interference and must be connected to a properly grounded receptacle to minimize electric shock hazard. Operation at line voltages or frequencies in excess of those stated on the line rating label may cause leakage currents in excess of 5.0 mA peak.

### DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE.

Do not operate the mainframe in the presence of flammable gases or fumes.

### BEFORE APPLYING POWER.

Verify that the power cord is correctly connected to the mainframe.

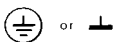
### SAFETY SYMBOLS.



Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual (refer to Table of Contents) .



Indicates hazardous voltages.



Indicate earth (ground) terminal.

#### WARNING

The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

#### CAUTION

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

Mainframes that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

## Printing History

The current edition of this guide is indicated below. Reprints of this guide containing minor corrections and updates may have the same printing date. New editions are identified by a new printing date and, in some cases, by a new part number. A new edition incorporates all new or corrected material since the previous edition. Changes to the guide occurring between editions are covered by change sheets shipped with this guide. Also, if the serial number prefix of your mainframe is higher than those listed on the title page of this guide, then it may or may not include a change sheet. That is because even though the higher serial prefix indicates a design change, that change may not affect the content of the guide.

Edition 1 . . . November, 1992

Updated        June, 2000

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# Table of Contents

|                                                           |           |
|-----------------------------------------------------------|-----------|
| <b>Overview.....</b>                                      | <b>7</b>  |
| About This Manual .....                                   | 7         |
| Related Documents .....                                   | 8         |
| Revisions and Updates.....                                | 8         |
| Manual .....                                              | 8         |
| Firmware.....                                             | 8         |
| Safety Considerations .....                               | 8         |
| Electrostatic Discharge .....                             | 9         |
| Service Tools and Equipment .....                         | 9         |
| <b>Verification.....</b>                                  | <b>11</b> |
| Preliminary Checkout .....                                | 11        |
| POWER-ON Checkout .....                                   | 12        |
| Selftest Sequence .....                                   | 12        |
| In Case of Trouble .....                                  | 12        |
| Output Checkout .....                                     | 14        |
| In Case of Trouble .....                                  | 14        |
| Problem Not Identified .....                              | 14        |
| <b>Disassembly .....</b>                                  | <b>15</b> |
| Disassembly Procedures .....                              | 15        |
| Removing the Modules and Module Connectors .....          | 15        |
| Removing the Cover .....                                  | 15        |
| Removing the Front Frame .....                            | 15        |
| Removing the Front Bezels and Keyboard Plug .....         | 16        |
| Removing the Rear Subchassis .....                        | 16        |
| Removing the Pc Boards.....                               | 16        |
| Reassembly Procedures .....                               | 17        |
| Installing the Pc Boards .....                            | 17        |
| Assembling the Rear Subchassis.....                       | 18        |
| Assembling the Keyboard Plug and Front Bezels.....        | 18        |
| Assembling the Front Frame .....                          | 18        |
| Assembling the Cover .....                                | 19        |
| <b>Troubleshooting.....</b>                               | <b>21</b> |
| Troubleshooting Sequence.....                             | 21        |
| Accessing the Flowcharts.....                             | 21        |
| If You Experienced a Selftest Failure .....               | 21        |
| If You Experienced Other Problems With the Mainframe..... | 22        |
| Troubleshooting Flowcharts .....                          | 22        |
| <b>Replacement Parts .....</b>                            | <b>33</b> |
| <b>Diagrams.....</b>                                      | <b>39</b> |
| Test Point and Component Location Diagram.....            | 39        |
| Main Board Schematics .....                               | 39        |
| Sheet 1 Circuit Functions .....                           | 39        |

|                                 |           |
|---------------------------------|-----------|
| Sheet 2 Circuit Functions ..... | 39        |
| Sheet 3 Circuit Functions ..... | 40        |
| Backplane Board Schematic ..... | 40        |
| Exploded View Diagram.....      | 40        |
| Schematic Notes .....           | 41        |
| <b>Manual Backdating .....</b>  | <b>49</b> |
| <b>Index .....</b>              | <b>51</b> |

# Overview

---

## About This Manual

This manual is a complete guide for servicing the Agilent 66000A Modular Power System (MPS) Mainframe. Troubleshooting information for the Agilent 661xxA MPS Power Modules is provided in the module service manual (see "Related Documents"), which should be used with this manual.

---

|             |                                                                                                                   |
|-------------|-------------------------------------------------------------------------------------------------------------------|
| <b>Note</b> | Troubleshooting the Agilent 66000A MPS Mainframe requires the use of one working Agilent 661xxA MPS Power Module. |
|-------------|-------------------------------------------------------------------------------------------------------------------|

---

This manual is organized into the following major sections:

- **Overview** discusses safety and equipment considerations to be aware of when troubleshooting. It also lists the tools and equipment required for troubleshooting.
- **Verification** consists of a series of tests that are used to help isolate a fault. It includes the selftest sequence that runs automatically at power-on and verifies the integrity of the microprocessor, the GPIB and serial interfaces, and the memory.
- **Disassembly** procedures are used to disassemble the instrument for repair.
- **Troubleshooting** procedures systematically verify selected circuits to isolate the cause of a problem. Suggestions for remedying the problem are also provided. Troubleshooting procedures are provided for the following circuits:
  - Bias Supplies.
  - Microprocessor.
  - RAM and ROM Memory.
  - GPIB and Serial Interfaces.
  - Discrete Fault Indicator/Remote Inhibit (DFI/RI) Circuitry.
  - Trigger Circuits.
  - Power Module Communication.
  - Keyboard Accessory Port.
- Replacement Parts lists part numbers for electrical components and miscellaneous chassis parts.
- Schematics and component location diagrams are provided as an aid in troubleshooting and repair.

## Related Documents

The following documents are related to this manual:

| Manual                                                    | Part Number | Description                                                                                                                      |
|-----------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------|
| Agilent 66000A MPS Mainframe Installation Guide           | 66000-90001 | Provides product specifications, installation, and connection information.                                                       |
| Agilent Series 661xxA MPS Power Modules User's Guide      | 5959-3386   | Describes the operation of the MPS Power Modules.                                                                                |
| Agilent Series 661xxA MPS Power Modules Programming Guide | 5959-3362   | Describes SCPI programming commands, status reporting.                                                                           |
| Agilent Series 661xxA MPS Power Modules Service Manual    | 5959-3364   | Provides replaceable-parts lists, circuit diagrams, and verification procedures for the Agilent Series 661xxA MPS Power Modules. |

---

## Revisions and Updates

### Manual

Agilent Technologies instruments are identified by a two-part, ten-character serial number, such as 3138A-00101. The first five characters (e.g. 3138A) are the serial prefix, which is the same for all identically made instruments. The last five digits (e.g. 00101) are a unique serial number assigned to each instrument. If a significant design change is made, the prefix changes but the last five numbers continue in sequence.

This manual applies to Agilent 66000A MPS Mainframes with the same serial prefixes and serial numbers equal to or higher than the ones shown on the title page. If the prefix number on your mainframe is higher than the one on the title page, then the mainframe was made after publication of the manual and may have hardware and/or firmware differences not covered in the manual. If there are such differences, they are documented in one or more "Manual Changes" sheets sent with the manual.

### Firmware

This manual applies to mainframes that run on software revisions A.00.01 through A.00.05. The mainframe ROM chip has a label that specifies the firmware revision.

---

## Safety Considerations

The Agilent 66000A MPS Mainframe is a Safety Class 1 instrument that has a protective earth terminal. Refer to the Safety Summary page at the beginning of this manual for general safety procedures and the meaning of safety symbols appearing in the manual and on the mainframe.



---

## Electrostatic Discharge

**CAUTION**

The Modular Power System has components that can be damaged by ESD (electrostatic discharge). Failure to observe standard anti-static practices can result in serious degradation of performance even when complete failure does not occur.

---

When working on the Modular Power System, observe all anti-static work practices. This includes, but is not limited to:

- Working at a static-free station, such as a table covered with static-dissipative laminate or with a conductive table mat (Agilent P/N 9300-0797).
- Using a conductive wrist strap (Agilent P/N 9300-0969 or 9300-0970).
- Grounding all metal equipment at the station to a single, common ground.
- Connecting low-impedance test equipment to static sensitive components only when those components have power applied to them.
- Removing power from the Modular Power System before removing or installing printed circuit boards.

---

## Service Tools and Equipment

The following tools are required to repair the Agilent 66000A MPS Mainframe:

- T15 and T25 TORX drivers.
- 10mm and 7mm HEX NUT drivers.
- #2 POZI driver.
- Slot-head screwdrivers - small and medium.
- DIP component removal tool.
- Soldering iron and solder.
- De-solder removal tool.
- Needle-nose pliers.
- Anti-static work mat and wrist strap.

The following equipment is required to troubleshoot the Agilent 66000A MPS Mainframe:

**Table 1-1. Service Test Equipment**

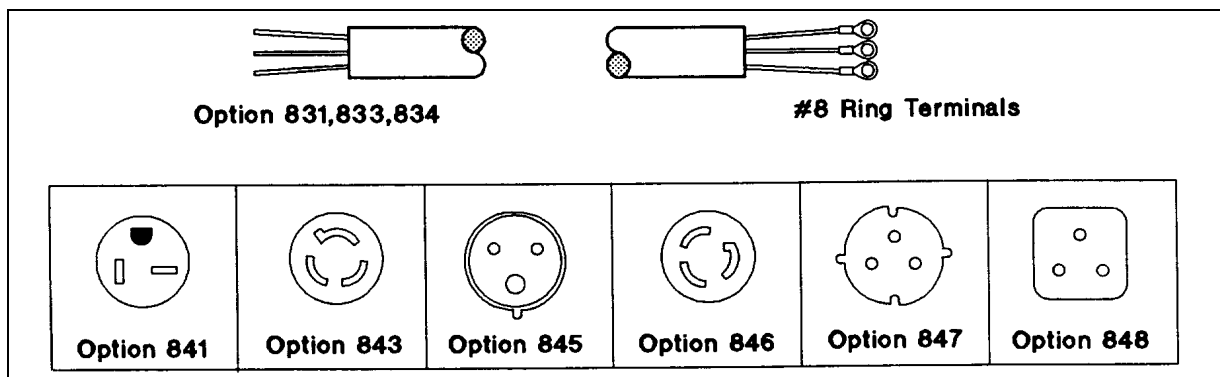
| Instrument Required          | Critical Specifications                                  | Recommended Model          | Use <sup>1</sup> |
|------------------------------|----------------------------------------------------------|----------------------------|------------------|
| Power Cords (see Figure 1-1) | Option #831                                              | P/N 8120-5573              | V,T              |
|                              | Option #833                                              | P/N 8120-5568              |                  |
|                              | Option #834                                              | P/N 8120-5566              |                  |
|                              | Option #841                                              | P/N 8120-5572              |                  |
|                              | Option #843                                              | P/N 8120-5571              |                  |
|                              | Option #845                                              | P/N 8120-5570              |                  |
|                              | Option #846                                              | P/N 8120-5565              |                  |
|                              | Option #847                                              | P/N 8120-5567              |                  |
|                              | Option #848                                              | P/N 8120-5569              |                  |
| Test Cable                   | BNC (male) to BNC (male)                                 | P/N 8120-1838              | V,T              |
| Mini-Grappier clip leads     | Wire Size: 24 AWG                                        | P/N 8120-3326 or 8120-3327 | V,T              |
| DFI RI connector             | Type: Terminal Block 4-pos.<br>(supplied with mainframe) | P/N 1252-1488              | V,T              |

**Table 1-1. Service Test Equipment (continued)**

| Instrument Required                                                                                          | Critical Specifications | Recommended Model                                                                                                                     | Use <sup>1</sup>             |
|--------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| MPS Power Module<br>DMM<br>Logic Probe<br>Oscilloscope<br>MPS Keyboard <sup>2</sup><br>Isolation transformer | Bandwidth: 100 MHz      | Agilent 661xxA Series<br>Agilent 34401A or equivalent<br>Agilent 545A or equivalent<br>Agilent 54504A or equivalent<br>Agilent 66001A | V,T<br>T<br>T<br>T<br>V<br>T |

1 V = Verification; T = Troubleshooting.

2 Use of the keyboard is recommended for displaying selftest error messages.



**Figure 1-1. Power Cords**

## Verification

Operation verification of the Agilent 66000A MPS Mainframe consists of performing the procedure that is located in this section. This procedure verifies that the mainframe is performing properly without testing all specified parameters. The tests include a preliminary checkout, power-on selftest, and module communication.

---

### Preliminary Checkout

1. Make sure that the front power switch is off **(0)**.
2. Look at the "Line Rating" chart on the rear of the mainframe.
  - a. Verify the modules are set to the appropriate line voltage setting. Line selector switches are located on the bottom of the modules.

---

**Note** At least one module is required to verify the operation of the mainframe.

---

- b. Remove the fuse and verify that the fuse is as specified on the label.
  - c. Install the module(s).
3. Make sure that the power cord is connected to the terminal block in accordance with the prevailing color code.

---

**CAUTION**

Connection of this instrument to an ac power source should be done only by qualified personnel.

---

#### Power Cord Wire Color Codes

| Label                                                                                      | UL/CSA Cords                      | Harmonized Cordage       |
|--------------------------------------------------------------------------------------------|-----------------------------------|--------------------------|
| Line "L"                                                                                   | Black                             | Brown                    |
| Neutral "N"                                                                                | White                             | Blue                     |
| Ground  | Green or Green with Yellow stripe | Green with Yellow stripe |

4. Make sure that there is no load connected to the output connector by removing the output connector assembly.
5. Verify that the GPIB address switch is set to the desired address (0 - 31).

---

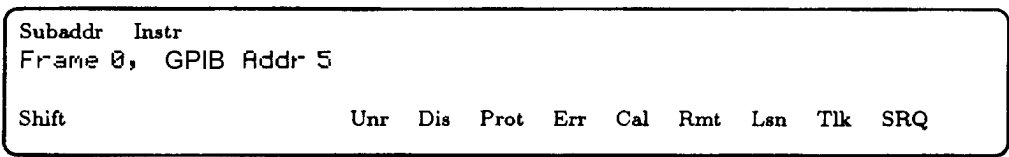
# POWER-ON Checkout

1. Connect the instrument to the power source and turn the front power switch to ON (1).
2. Listen to confirm the modules' fans are on.

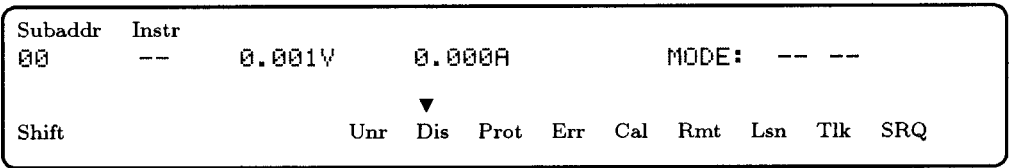
The power supply undergoes a selftest when you turn it on. The power-on selftest sequence tests the microprocessor, GPIB interface, and serial communications.

## Selftest Sequence

3. All display digits and annunciators on the keyboard briefly turn on.
4. All front panel LEDs and annunciators on the modules briefly turn on.
5. The keyboard briefly displays the message:



6. The keyboard then displays the state of the addressed module.



---

### Note

- The information displayed on the keyboard assumes:
- At least one power module is installed,
  - Factory default state still stored in location 0,
  - Frame mode switch on the back of the mainframe is set to **MAIN**,
  - GPIB address of the mainframe is set to 5,
  - Module configuration switches set to factory default states (all OPEN).

---

## In Case of Trouble

---

### Note

In case of a module failure, the front panel will display an Error Code -Uxx. Refer to the Agilent *Series 661xxA Service Manual* for information on troubleshooting the dc power modules.

---

A problem exists in the mainframe when one of these conditions is observed during selftest:

**Table 2-1. Problem Symptoms**

| <b>Symptoms</b>                                               | <b>Probable Cause</b>                                 | <b>Troubleshooting Procedure<sup>1</sup></b>    |
|---------------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------|
| Keyboard and modules remain turned off (fans not ON)          | Input Line Voltage, check fuse F8                     | <i>Bias Troubleshooting</i>                     |
| Module fans turn ON, front displays remain blank (Turned OFF) | No bias voltages, check fuses F1 & F2                 | <i>Bias Troubleshooting</i>                     |
| Modules remain OFF, keyboard displays blinking cursor         | Primary Microprocessor (U44) defective, check fuse F1 | <i>ROM &amp; Microprocessor Troubleshooting</i> |
| Keyboard displays<br>Self-test Failed, ROM Checksum Test      | ROM (U51) defective                                   | <i>ROM &amp; Microprocessor Troubleshooting</i> |
| Keyboard displays<br>Self-test Failed, Internal RAM Test      | Primary Microprocessor (U44) defective                | <i>ROM &amp; Microprocessor Troubleshooting</i> |
| Keyboard displays<br>Self-test Failed, External RAM Test      | RAM (U52) defective                                   | <i>ROM &amp; Microprocessor Troubleshooting</i> |
| Keyboard displays<br>Self-test Failed, GPIB Test              | GPIB Controller (U17) defective                       | <i>Overall Troubleshooting</i>                  |
| Keyboard displays<br>Self-test Failed, Serial Comm Test       | DUART (U91) defective                                 | <i>Overall Troubleshooting</i>                  |
| Keyboard displays<br>NO MODULES INSTALLED                     | Backplane power-up or communication defective         | <i>Overall Troubleshooting<sup>2</sup></i>      |
| Keyboard displays<br>MODULE NOT FUNCTIONING                   | Module defective or backplane communication defective | <i>Overall Troubleshooting</i>                  |

<sup>1</sup> Refer to Chapter 4 of this manual for detailed troubleshooting procedures.

<sup>2</sup> Assumes that at least one module has been installed and is connected to the mainframe backplane.

---

## Output Checkout

1. Make sure that there is no load connected to the output connector by removing the output connector assembly.
2. Check the basic voltage functions and module communications as shown in following table:

| Action                                        | Keyboard Display | Explanation                     |
|-----------------------------------------------|------------------|---------------------------------|
| Press <b>*</b> <b>R</b> <b>▼</b> <b>Enter</b> | *RST             | Resets the Modular Power System |
| Press <b>0</b> <b>1</b> <b>Enter</b>          | :OUTP ON         | Enables the output              |
| Press <b>C</b> <b>▼</b> <b>1</b> <b>Enter</b> | :CURR 1          | Sets the output current to 1 A  |
| Press <b>V</b> <b>5</b> <b>Enter</b>          | :VOLT 5          | Sets the output voltage to 5 V  |

3. The keyboard display should now be in meter mode indicating the voltage and status of the dc power module:

---

**WARNING**

Disable the output prior to connecting a load.  
Press **0** **0** **Enter**

---

## In Case of Trouble

If the keyboard and module displays do not read the correct voltage, check the operation of the module. Refer to the "Performance Measurement" section of the Agilent *Series 661xxA Power Modules Service Manual*.

---

## Problem Not Identified

If after performing the checkout procedures you were unable to isolate the problem, refer to the "Overall Troubleshooting" procedure in Chapter 4. The overall troubleshooting procedure will verify whether the mainframe is at fault and will isolate the problem to a functional block.

# Disassembly

This chapter provides disassembly and reassembly instructions for the Agilent 66000A MPS Mainframe. Refer to Chapter 6 for an exploded view diagram of the mainframe. Major mechanical components are identified with "MP" designations and are referenced in this section. Refer to Chapter 5 for the component descriptions. Refer to Chapter 1 for the tools required to disassemble and reassemble the unit.

---

## Disassembly Procedures

**WARNING**

**SHOCK HAZARD** To avoid the possibility of personal injury, remove the mainframe from operation before removing the top cover. Turn off ac power and disconnect the line cord, GPIB cable, and load leads before attempting any disassembly.

When servicing the Main assembly and Backplane assembly, ac line voltages are present on the Main board and backplane connectors.

---

**CAUTION**

Most of the attaching hardware is metric. Use of other types of fasteners will damage threaded inserts.

---

## Removing the Modules and Module Connectors

Before you can disassemble the mainframe, you must first remove all of the power supply modules as well as the module connectors on the back of the mainframe.

1. Use the slot-head screwdriver and release the pull tab at the front of each module.
2. Pull all of the modules out of the mainframe.
3. Use the Pozi driver and disconnect all of the module connectors from the back of the mainframe.

## Removing the Cover

1. Use the T25 driver and remove the four screws that attach the handles (MP22) to the chassis .
2. Slide the cover (MP6) back, spread the sides slightly, and lift the cover up.
3. Lift the top tray (MP3) out of the chassis.

## Removing the Front Frame

The cover must be removed from the unit before you can remove the front frame.

1. Use the T15 driver and remove the four screws that attach the front frame (MP18) to the chassis.
2. Slide the front frame forward about two inches.
3. Carefully unplug the cable (MP23) from the keyboard plug.

## Removing the Front Bezels and Keyboard Plug

The front frame must be removed from the chassis before you can remove the bezel pieces (MP11-12).

---

|             |                                                                                                                 |
|-------------|-----------------------------------------------------------------------------------------------------------------|
| <b>Note</b> | The keyboard plug (A3) can only be removed from the front frame after the bottom bezel (MP11) has been removed. |
|-------------|-----------------------------------------------------------------------------------------------------------------|

---

1. Insert the slot-head screwdriver into the notch at the bottom of each side bezel (MP12) to remove the bezels.
2. While applying upward pressure with the screwdriver to clear the latch, pull the side bezel away from the frame. When the latch clears the bottom bezel (MP11), the side bezel will come right out.
3. Repeat this procedure for the other side bezel.
4. When the side bezels have been removed, simply grasp the top (MP10) or bottom bezel (MP11) at either end and pull the bezels away from the frame. The bezels will snap out of the front frame.
5. Use the T15 driver to remove the two screws that attach the keyboard plug (A3).

## Removing the Rear Subchassis

The cover must be removed from the unit before you can remove the rear subchassis (MP4).

1. Use the T15 driver and remove the six screws (three on each side) that attach the rear subchassis (MP4) to the chassis.
2. Slide the subchassis backward about three inches.
3. Carefully unplug the keyboard cable assembly (MP23) from the subchassis.
4. Grasp the on/off pushrod (MP13) firmly and unsnap it from the switch located inside the subchassis. Pull the pushrod straight back from the subchassis to unsnap it.
5. Remove the rear subchassis from the chassis.

## Removing the PC Boards

The rear subchassis must be removed from the unit before you can remove the pc boards (A1, A2).

---

|                |                                                                                                              |
|----------------|--------------------------------------------------------------------------------------------------------------|
| <b>CAUTION</b> | Observe all standard anti-static procedures when removing the pc boards from the subchassis (see Chapter 1). |
|----------------|--------------------------------------------------------------------------------------------------------------|

---



1. Use the Pozi driver and remove the line cord from the unit. Note the color code and location of each wire on the terminal block before removing the cord.
2. Use the T15 driver and remove the four screws (two on the front and two on the back) that attach the backplane cover (MP5) to the subchassis (MP4).
3. Pull the bottom edge of the cover out slightly so that it clears the alignment pins and lift the cover straight up.
4. Grasp the Backplane board (A2) firmly and lift it straight out of its plug-in sockets.
5. Check to make sure that the FLT/INH connector is unplugged from the back of the unit.
6. Use the 7mm hex driver and remove the two nuts that connect the GPIB connector to the rear panel.
7. Use the 10mm hex driver and remove the nut that connects the ground wire to the rear panel.
8. Use the T15 driver and remove the three screws that attach the Main board (A1) to the subchassis (MP4).
9. Carefully lift up the pc board and remove it from the subchassis.

---

## Reassembly Procedures

---

### CAUTION

Most of the attaching hardware is metric. Use of other types of fasteners will damage threaded inserts.

---

## Installing the PC Boards

1. Align the connectors on the Main board (A1) with the cutouts in the rear panel and carefully install the board in the subchassis (MP4).
2. Make sure the Main board is fully inserted in the notches along the edge of the subchassis.
3. Use the T15 driver and install the three screws that attach the Main board to the subchassis .
4. Use the 7mm hex driver and install the two flat washers, split washers, and nuts that fasten the GPIB connector to the rear panel.
5. Install the Backplane board (A2) into the connectors on the Main board.
6. Connect the ground hardware to the chassis in the following order:
  - a. lock washer.
  - b. ground wire.
  - c. lock washer.
  - d. nut.
7. Use the 10mm hex driver and tighten the grounding nut.
8. Align the slots in the backplane cover (MP5) with the notches on the Backplane board (A2) and snap the cover into place. Use the slot-head screwdriver to align the board in the slots.

9. Make sure that the pins on the bottom of the cover are in their holes and that the cover is flush against the subchassis.
10. Use the T15 driver and install the four screws (two on the front and two on the back) that attach the backplane cover to the subchassis.

## Assembling the Rear Subchassis

1. Slide the rear subchassis (MP4) under the sides of the chassis but don't push it all the way in yet; leave about two inches of space.
2. Connect the keyboard cable (MP23) to the connector inside the subchassis.
3. Make sure that the on/off pushrod (MP13) and the chassis pins line up with the openings on the rear subchassis and slide the subchassis into place.
4. Use the T15 driver and install the six screws (three on each side) that attach the rear subchassis to the chassis. Don't tighten the screws until all six have been started.
5. Push the on/off pushrod (MP13) in from the front panel in until it snaps twice. The pushrod must snap twice to indicate that it is firmly connected to the switch inside the subchassis .

## Assembling the Keyboard Plug and Front Bezels

1. Use the T15 driver to install the two screws that attach the keyboard plug (A3) in the second and third hole on the bottom right corner of the front frame (MP18) when viewed from the front. The bottom of the frame is thicker than the top.
2. Align the pins on the top and bottom bezels (MP10, MP11) with the corresponding holes on the frame and snap the bezels into place.
3. Check along the edges of the top and bottom bezels to make sure that they are snapped all the way into place.
4. Install the side bezels (MP 12) by inserting the top corner of each bezel first, then push the bottom corner toward the side of the frame until it snaps into place.

## Assembling the Front Frame

1. Position the front frame (MP18) close to the front of the chassis. Insert the on/off pushrod (MP13) into its opening and connect the keyboard cable (MP23) to keyboard plug (A3).
2. Insert the sides of the chassis between the front frame (MP18) and the side bezels (MP12). Push the front frame onto the chassis as far it will go.
3. Use the T15 driver and install the four screws that attach the front frame to the chassis.
4. Look through the slots in the bottom tray and check that the keyboard cable (MP23) is positioned in the cable clamp. If not, insert the slot-head screwdriver through the slots in the bottom tray and slide the cable into the cable clamp. Don't force the tiewrap under the cable clamp; position the tiewrap in **front** of the cable clamp.

## Assembling the Cover

1. Place the top tray (MP3) on the chassis with the vents toward the front of the unit.
2. Spread the sides of the cover (MP6) and slide it onto the chassis so that it fits into the slot behind the front panel assembly. Check that the cover is flush against the rear panel.
3. Use the T25 driver and install the four screws that attach the handles and the cover to the chassis.
4. Reattach the line cord if it has been removed from the unit using the Pozi driver. If necessary, refer to the *Mainframe Installation Guide* for more information.



# Troubleshooting

This chapter provides troubleshooting and repair information for the Agilent 66000A MPS Mainframe. Before attempting to troubleshoot the mainframe, ensure that the problem is not with an external circuit or application, an MPS Power Module, the GPIB controller, the application program, or the input power line.

## WARNING

**SHOCK HAZARD** Most of the troubleshooting procedures given in this chapter are performed with power applied and protective covers removed. Such maintenance should be performed only by service trained personnel who are aware of the hazards (for example, fire and electrical shock).

## Troubleshooting Sequence

1. Verify that the Modular Power System mainframe is at fault.
2. Use the flowcharts to locate the mainframe functional block at fault.
3. Troubleshoot the functional block per flowchart instructions.

Troubleshooting tests built into firmware are provided to isolate a problem to one of the circuit boards or to a particular circuit on the board. Once a problem has been isolated to a particular circuit, suggestions are given as to what component may be at fault.

## CAUTION

This instrument uses components that can be damaged or suffer serious performance degradation as a result of ESD (electrostatic discharge). Observe the standard anti-static precautions discussed in Chapter 1 to avoid damage to components.

## Accessing the Flowcharts

### If You Experienced a Selftest Failure

If you experienced a selftest failure as described in Chapter 2, Table 2-1, disassemble the pc boards and proceed directly to the flowchart indicated in the "Troubleshooting Procedure" columns of Table 2-1.

- Figure 4-1 - Overall Troubleshooting.
- Figure 4-2 - Bias Troubleshooting.
- Figure 4-3 - ROM & Microprocessor Troubleshooting.

## If You Experienced Other Problems with the Mainframe

If you experienced problems other than a selftest failure with the mainframe, proceed directly to Figure 4-1- Overall Troubleshooting.

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### Troubleshooting Flowcharts

The following troubleshooting flowcharts are provided to help you identify and isolate a problem to a specific circuit on the Main (A1) board. Once a problem has been narrowed down to a specific circuit, suggestions are provided as to the components that may be responsible for the problem. Refer to the schematic diagrams for detailed information on circuit wiring and component function.

The overall troubleshooting flowchart (Figure 3-1) will identify most of the problems in the mainframe. The flowcharts of Figure 3-2 and Figure 3-3 will identify problems in the bias circuits and in the microprocessor circuits.

To aid in troubleshooting, the GPIB address switch (S7) can be set to run various test routines as described in the flowchart. Placing a jumper on test header J5 is also required to configure and run certain tests. You must provide jumper clips for test header J5.

Also, oscilloscope waveforms are provided on the flowchart along with the settings required to generate the waveforms.

---

**WARNING**

Connect the A1 board to ac mains through an isolation transformer when making measurements with an oscilloscope.

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The Backplane (A2) board contains no active components. The schematic diagram provides point-to-point wiring information of the connectors on the Backplane board.

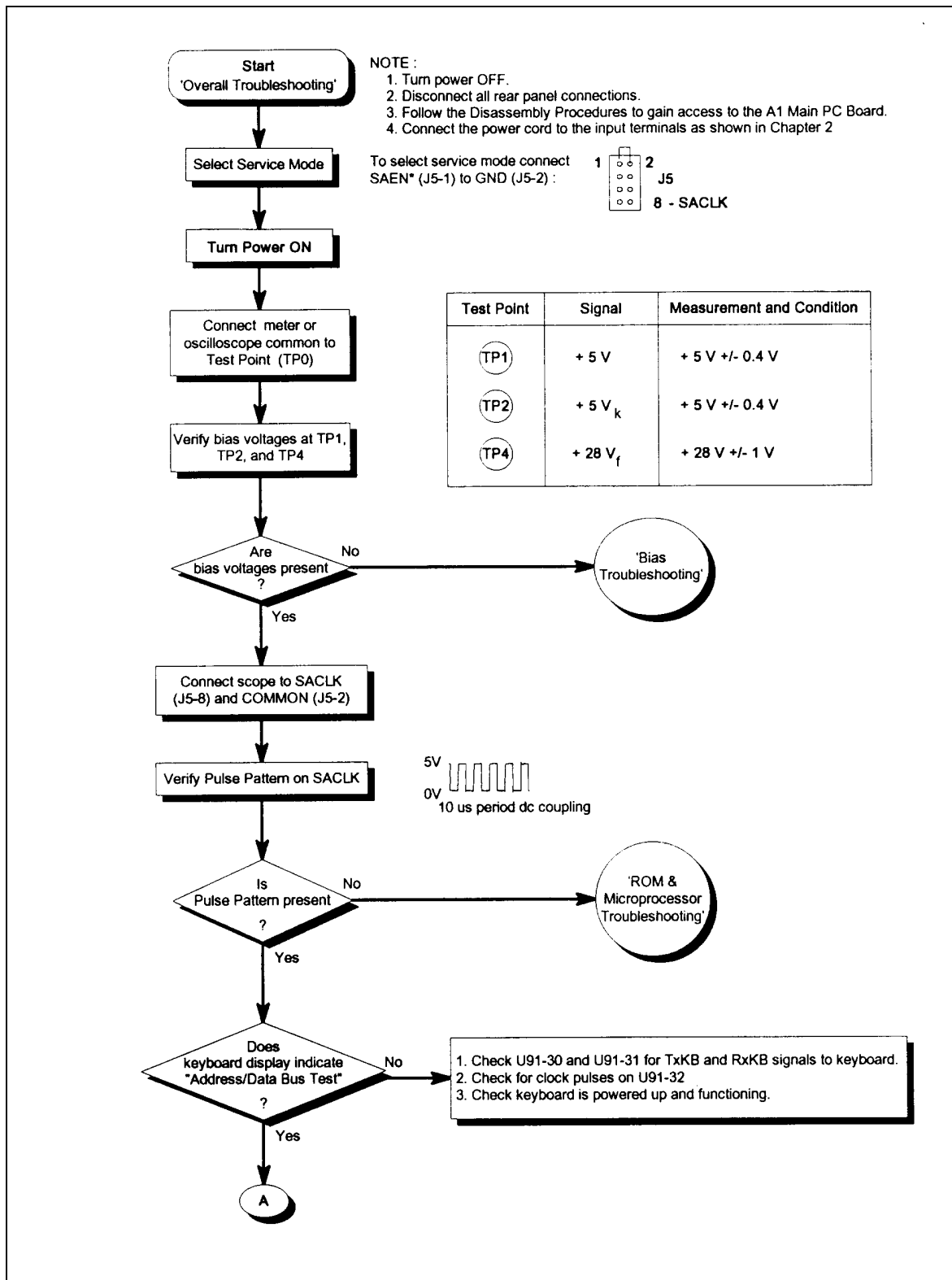


Figure 4-1. Overall Troubleshooting (Sheet 1 of 7)

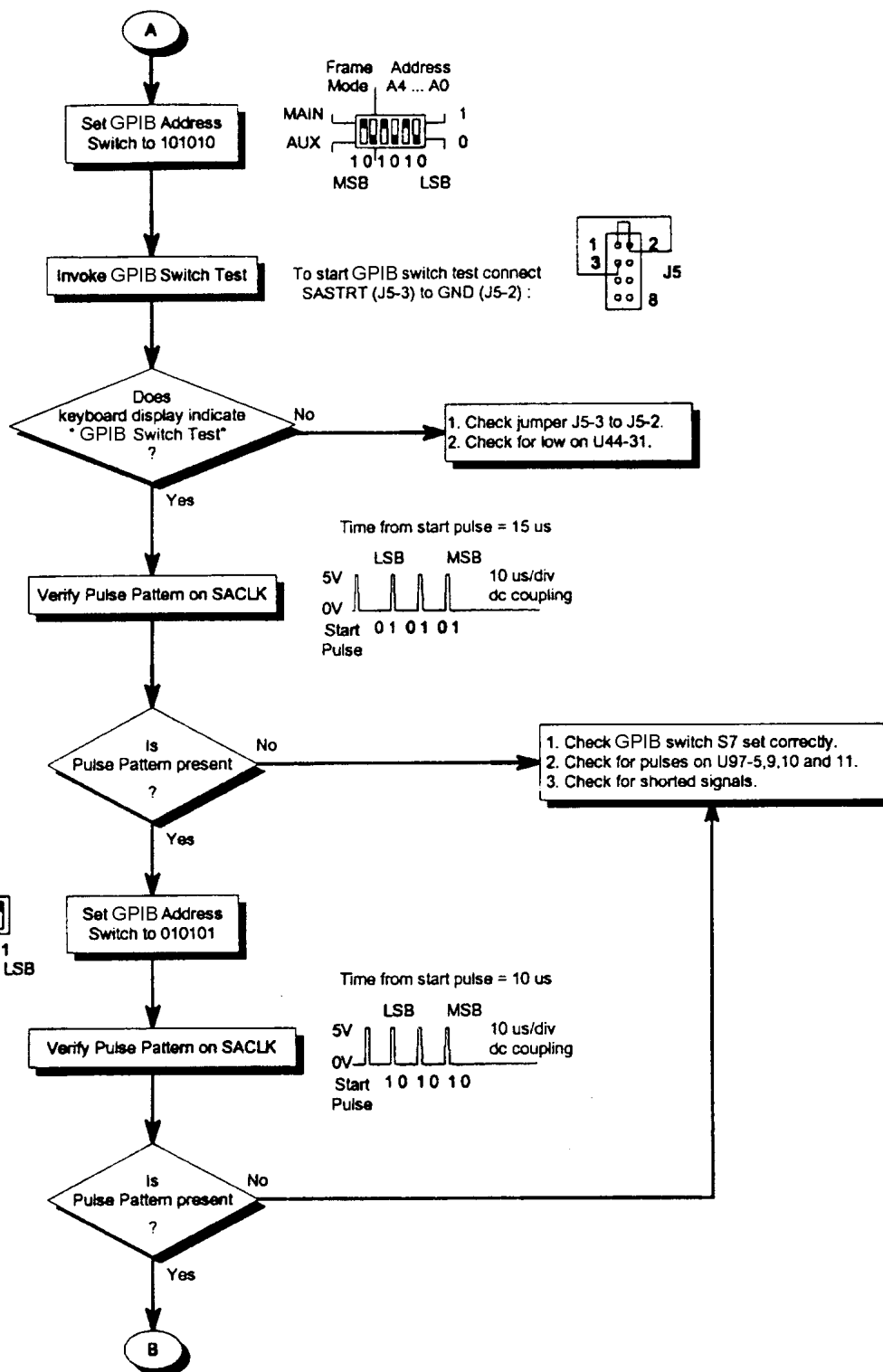


Figure 4-1. Overall Troubleshooting (Sheet 2 of 7)



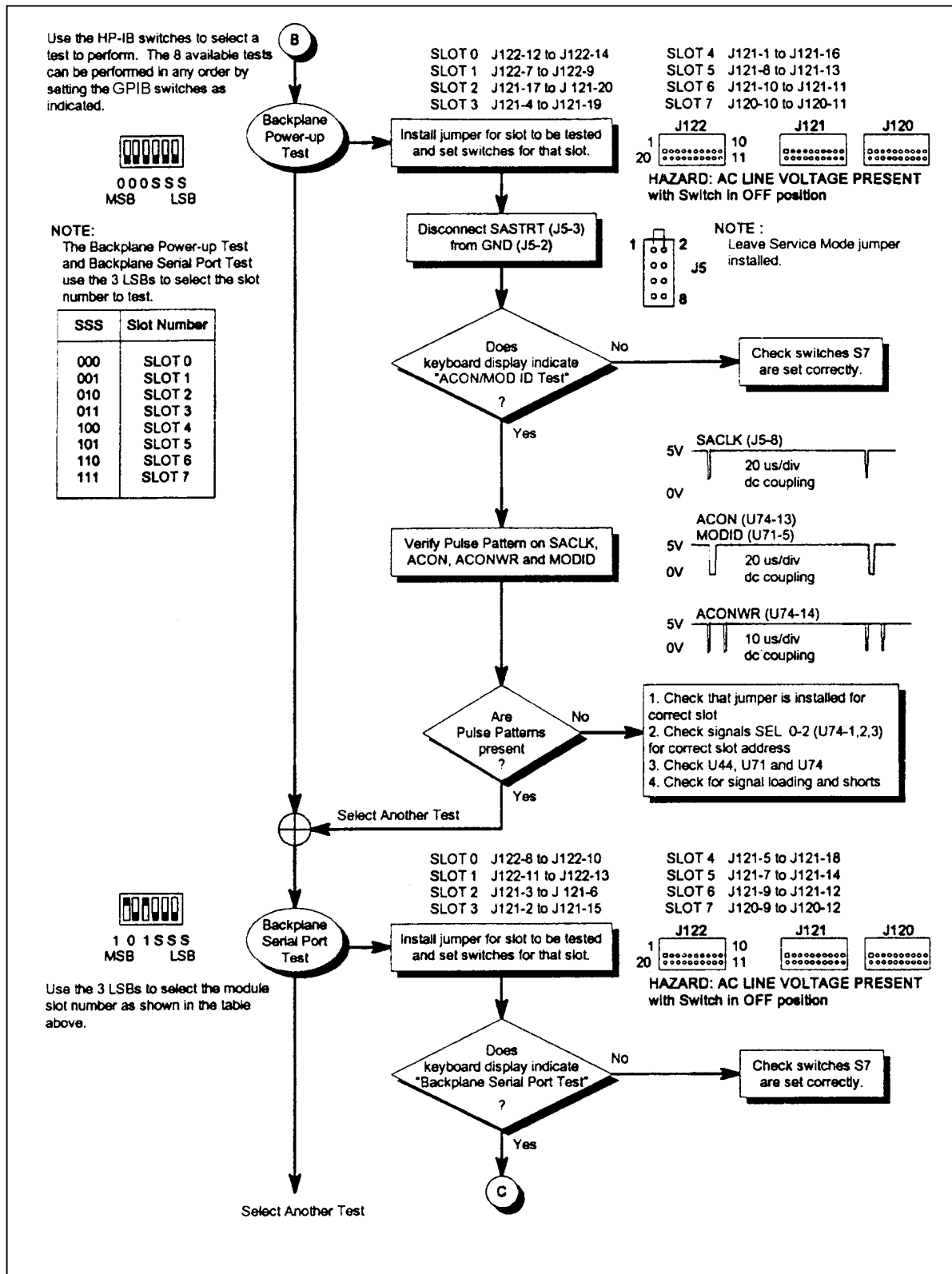


Figure 4-1. Overall Troubleshooting (Sheet 3 of 7)

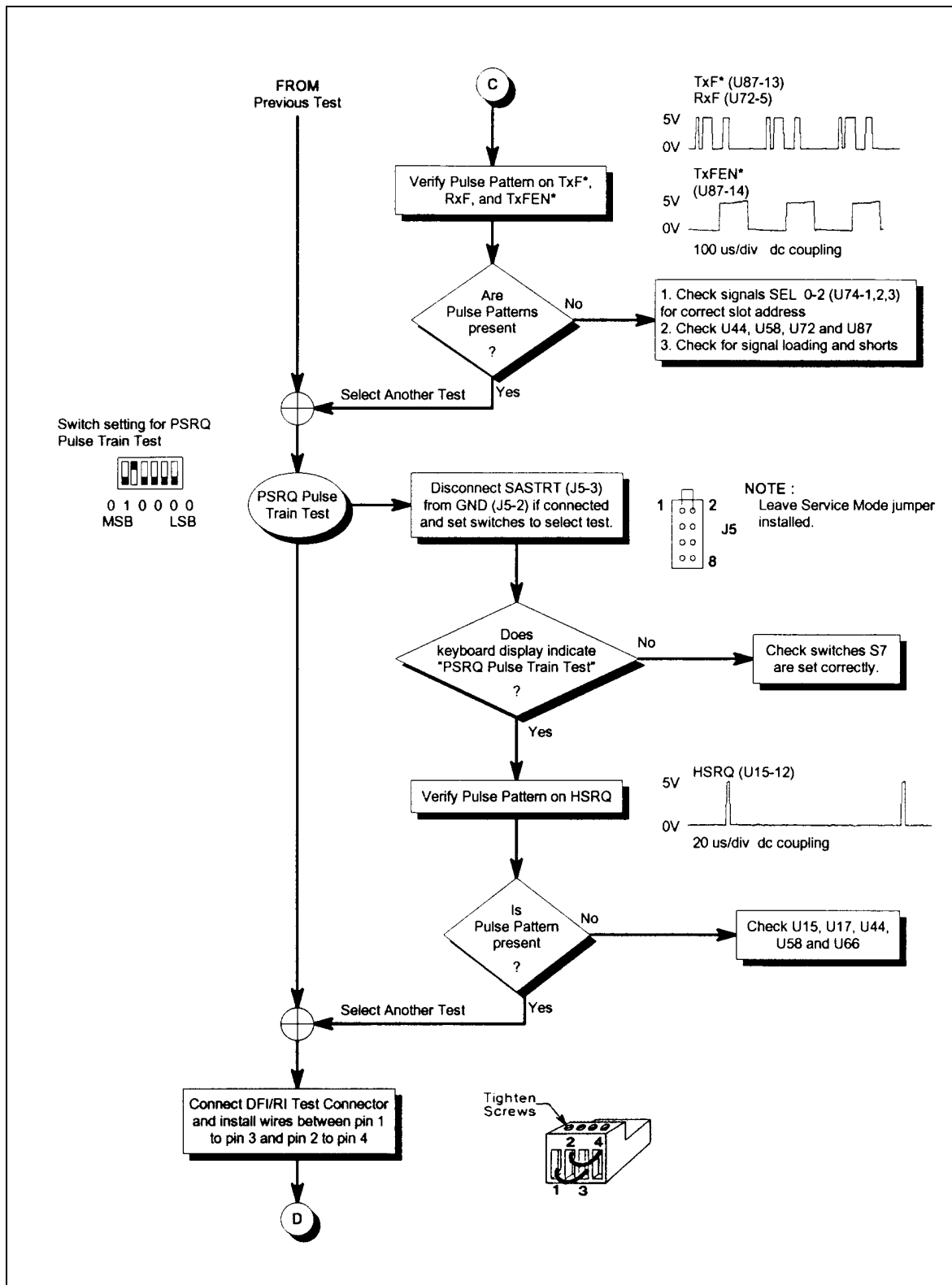


Figure 4-1. Overall Troubleshooting (Sheet 4 of 7)

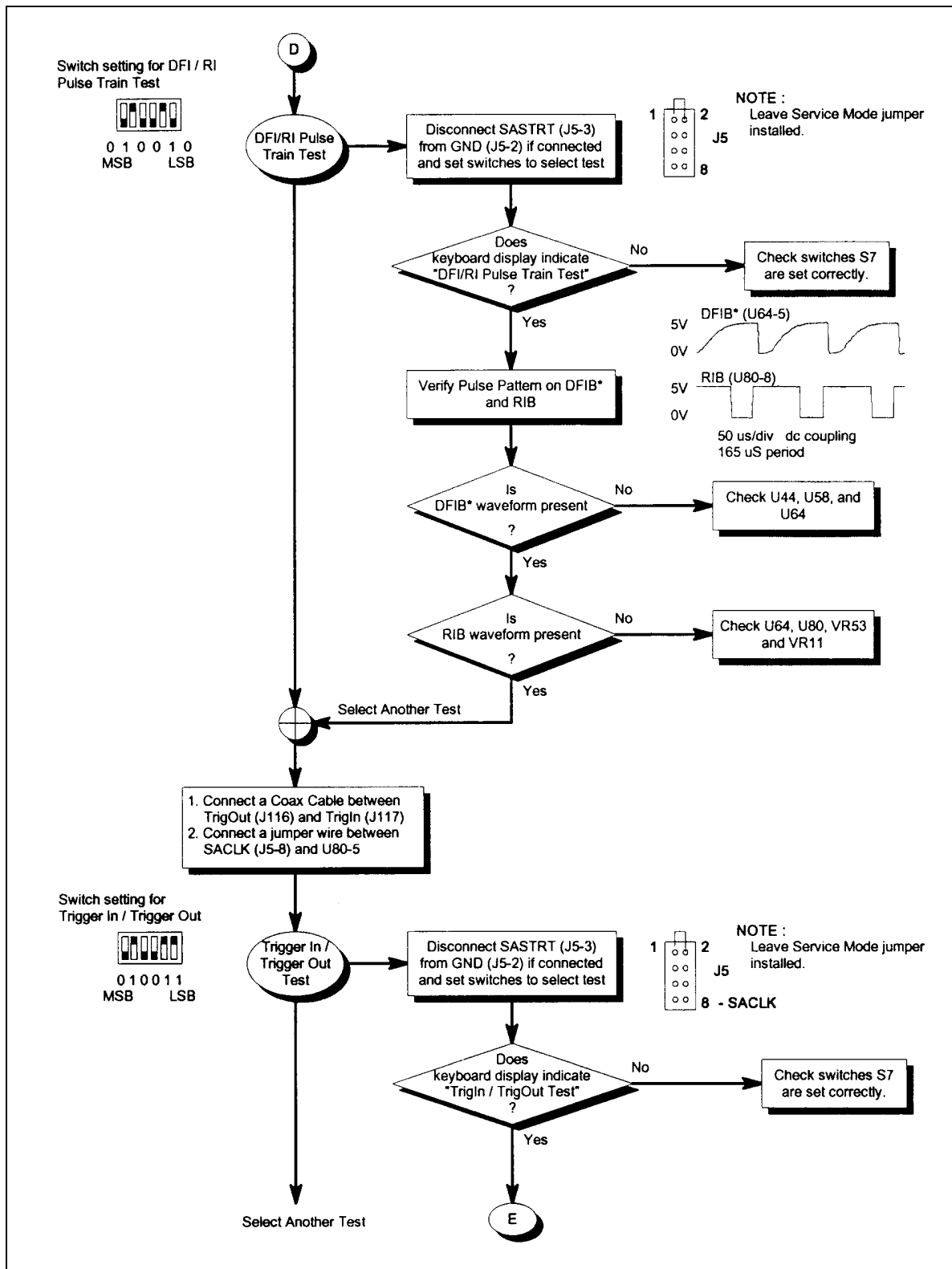


Figure 4-1. Overall Troubleshooting (Sheet 5 of 7)

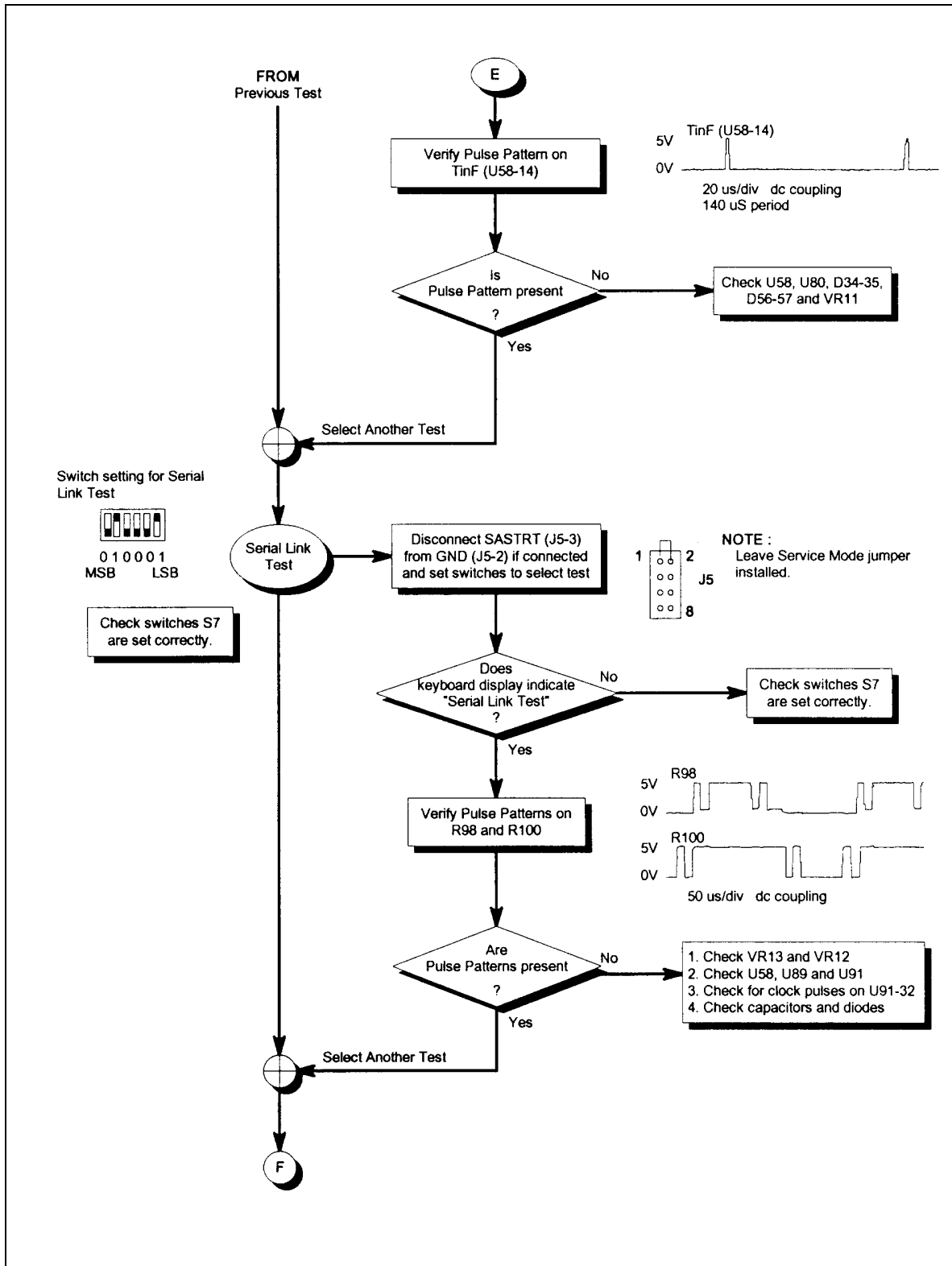


Figure 4-1. Overall Troubleshooting (Sheet 6 of 7)

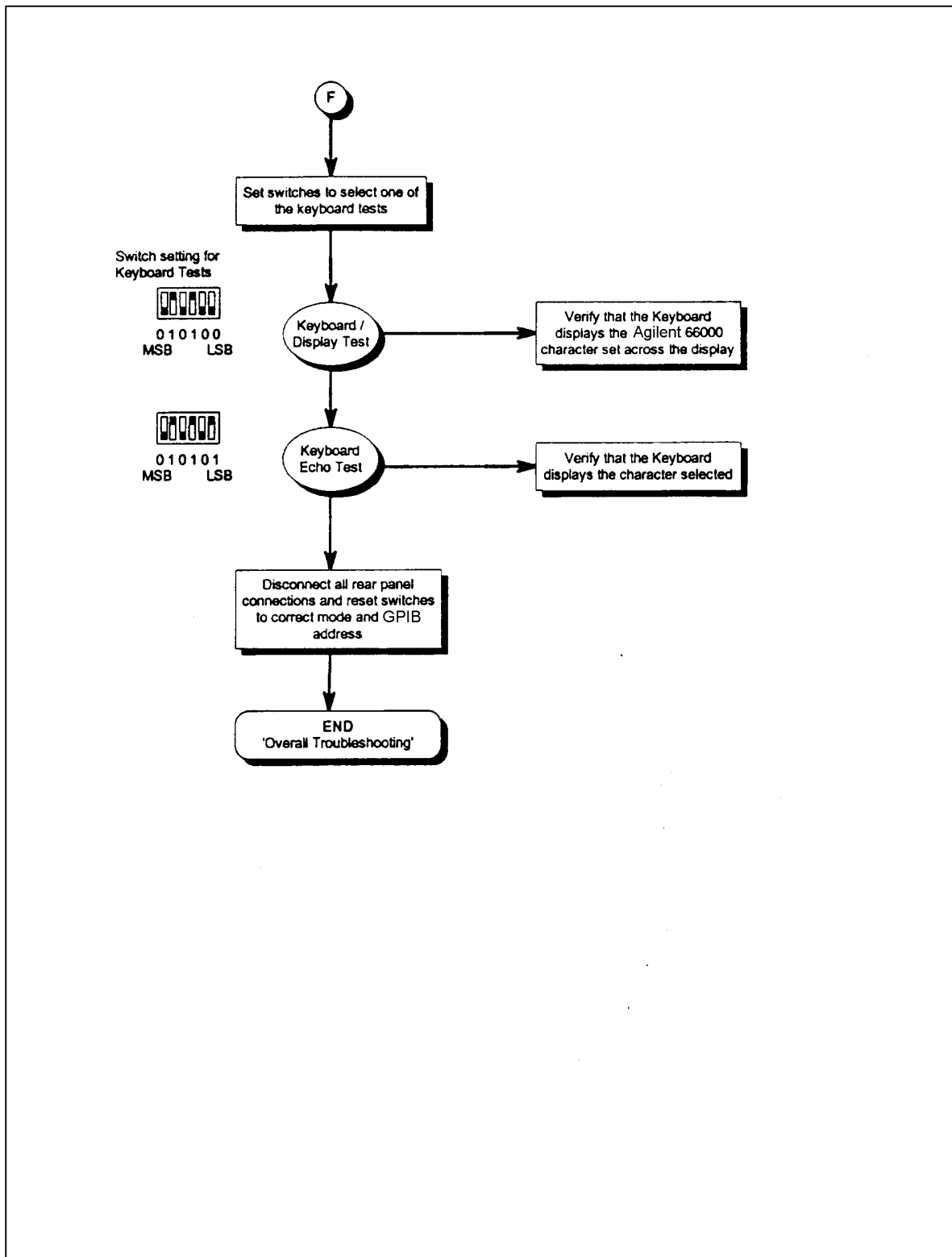


Figure 4-1. Overall Troubleshooting (Sheet 7 of 7)

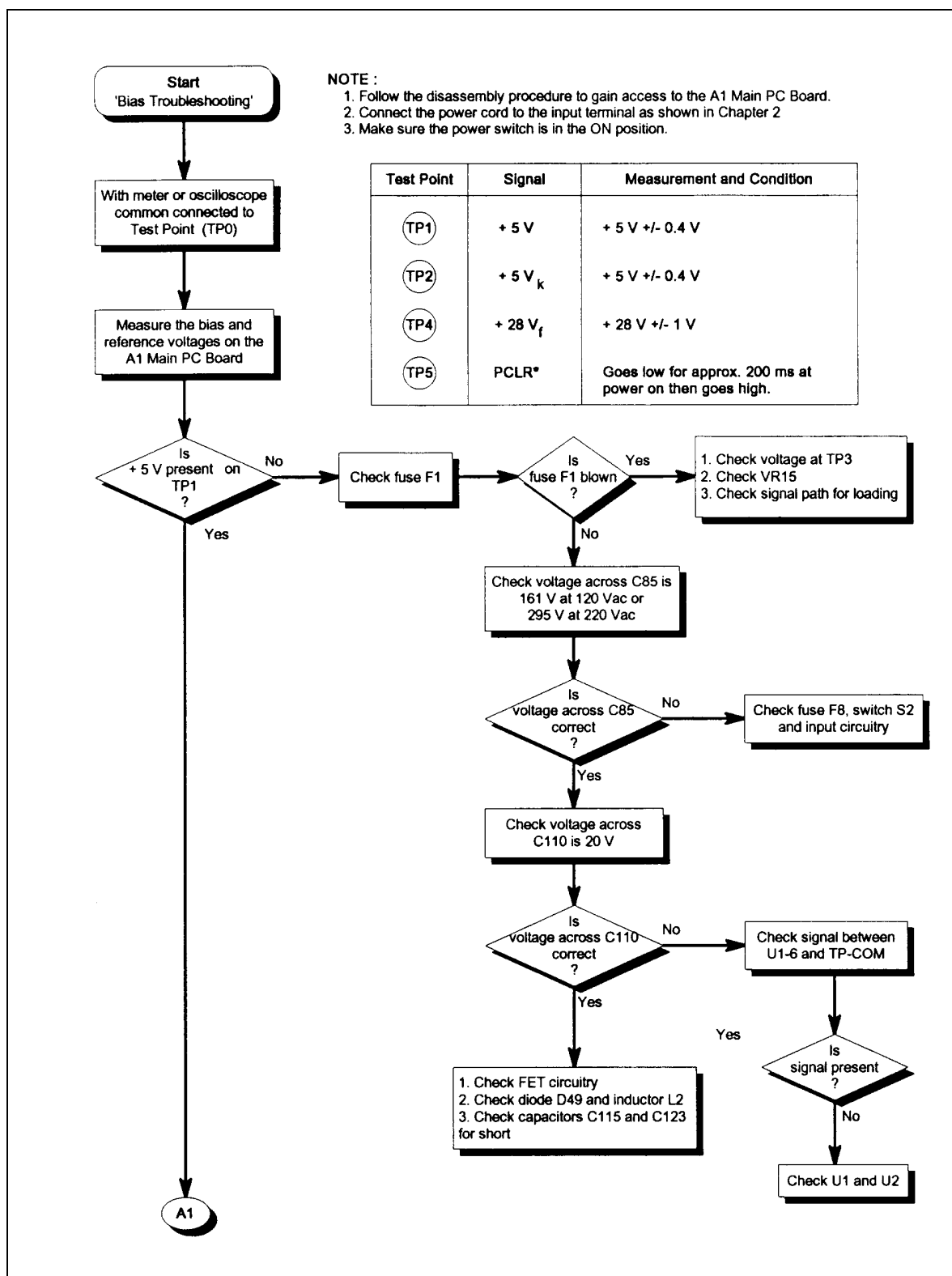


Figure 4-2. Bias Troubleshooting (Sheet 1 of 2)

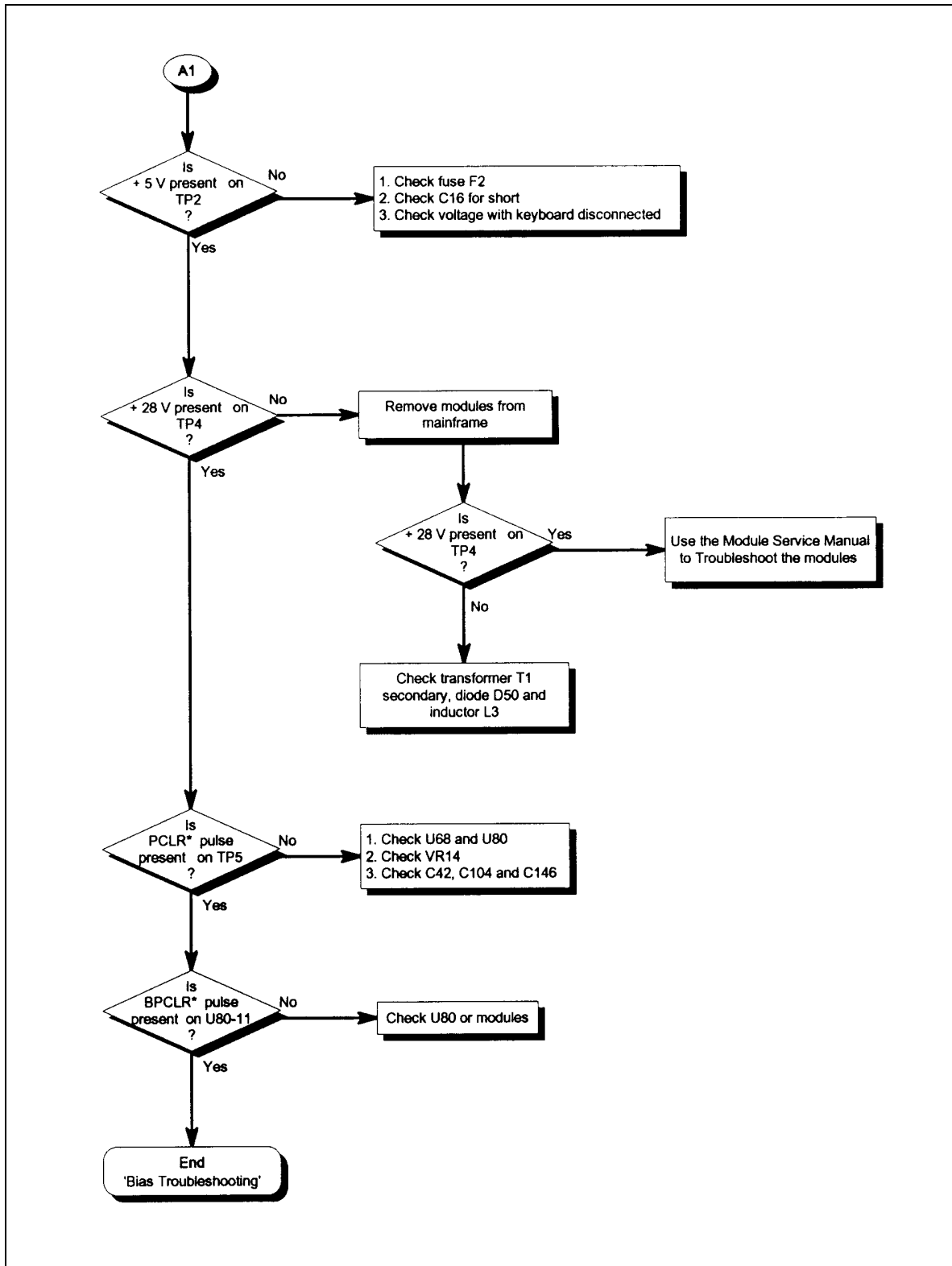


Figure 4-2. Bias Troubleshooting (Sheet 2 of 2)

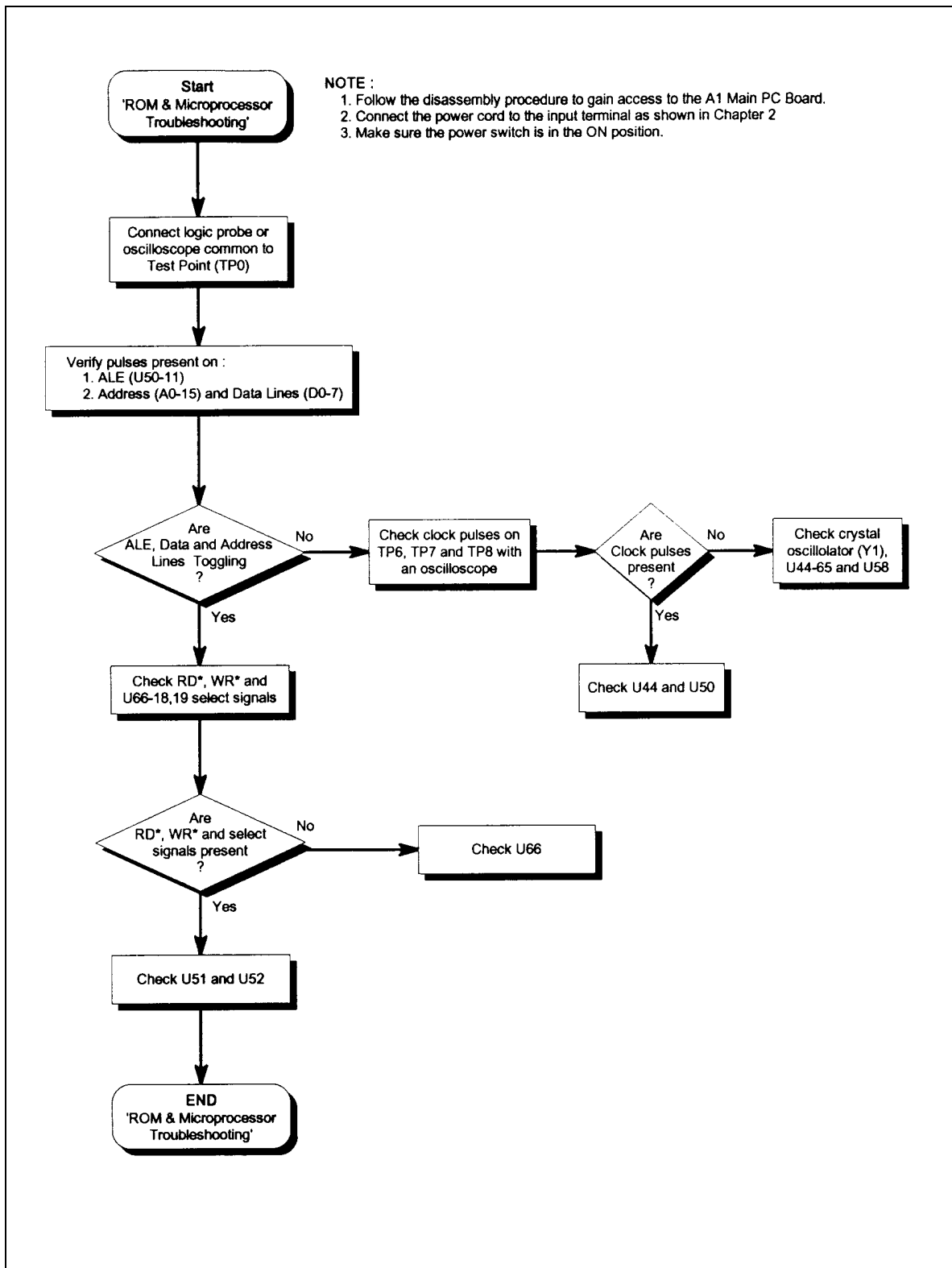


Figure 4-3. ROM & Microprocessor Troubleshooting



## Replacement Parts

Table 5-1 lists the electrical components and Table 5-2 lists the mechanical components for the Agilent 66000A MPS Mainframe. These tables provide the following information:

- Reference designation.
- Agilent Technologies part number.
- Description of part.

You can order parts from your local Agilent Technologies sales office. A list of the regional sales offices is given at the back of this manual. When ordering parts, include the following information:

- Agilent Technologies part number.
- Description of the part.
- Quantity desired.
- MPS model number (Agilent 66000A).

The test point and locations diagram in Chapter 6 identifies the location of the electrical components on the Main board. The exploded view diagram in Chapter 6 identifies some of the major mechanical components of the mainframe and how they are assembled. Parts with "MP" designations identify components that are referenced in the parts list.

**Table 5-1. Agilent 66000A MPS Mainframe Parts List - Electrical**

| Reference Designators | Part Number | Description                    |
|-----------------------|-------------|--------------------------------|
| A1                    | 66000-61020 | <b>ASSEMBLY-MAIN BOARD</b>     |
| Cl,2                  | 0160-2025   | CAPACITOR-FXD 220pF ±5% 500V   |
| C3                    | 0160-4808   | CAPACITOR-FXD 470pF ±5% 100V   |
| C4                    | 0160-4835   | CAPACITOR-FXD 0.1uF ±10% 50V   |
| C5                    | 0160-5534   | CAPACITOR-FXD 0.1uF ±10% 63V   |
| C9-11                 | 0160-4822   | CAPACITOR-FXD 1000pF ±5% 100V  |
| C12                   | 0160-2025   | CAPACITOR-FXD 220pF ±5% 500V   |
| C14                   | 0160-4787   | CAPACITOR-FXD 22pF ±5% 100V    |
| C15                   | 0160-5422   | CAPACITOR-FXD 0.047uF ±20% 50V |
| C16                   | 0180-4136   | CAPACITOR-FXD 10uF ±10% 20V    |
| C17,18                | 0160-5422   | CAPACITOR-FXD 0.047uF ±20% 50V |
| C20                   | 0180-4405   | CAPACITOR-FXD 470uF ±20% 50V   |
| C42                   | 0180-4136   | CAPACITOR-FXD 10uF ±10% 20V    |
| C50-53                | 0160-5422   | CAPACITOR-FXD 0.047uF ±20% 50V |
| C56                   | 0160-5422   | CAPACITOR-FXD 0.047uF ±20% 50V |
| C64                   | 0160-5422   | CAPACITOR-FXD 0.047uF ±20% 50V |
| C65                   | 0180-4136   | CAPACITOR-FXD 10uF ±10% 20V    |
| C68                   | 0180-4136   | CAPACITOR-FXD 10uF ±10% 20V    |
| C85                   | 0180-4396   | CAPACITOR-FXD 390uF ±20% 400V  |
| C87                   | 0160-5422   | CAPACITOR-FXD 0.047uF ±20% 50V |
| C88                   | 0180-4136   | CAPACITOR-FXD 10uF ±10% 20V    |
| C89                   | 0160-4807   | CAPACITOR-FXD 33pF ±5% 100V    |
| C90-92                | 0160-5422   | CAPACITOR-FXD 0.047uF ±20% 50V |
| C96                   | 0160-5422   | CAPACITOR-FXD 0.047uF ±20% 50V |
| C98                   | 0160-4807   | CAPACITOR-FXD 33pF ±5% 100V    |
| C100,101              | 0160-4822   | CAPACITOR-FXD 1000pF ±5% 100V  |
| C102,103              | 0160-4807   | CAPACITOR-FXD 33pF ±5% 100V    |
| C104                  | 0160-4835   | CAPACITOR-FXD 0.1uF ±10% 50V   |
| C106                  | 0160-5422   | CAPACITOR-FXD 0.047uF ±20% 50V |
| C108                  | 0160-4281   | CAPACITOR-FXD 2200pF ±20% 250V |
| C110                  | 0180-3805   | CAPACITOR-FXD 10uF ±20% 50V    |
| C115                  | 0180-4394   | CAPACITOR-FXD 1000uF ±20% 40V  |
| C116                  | 0160-4831   | CAPACITOR-FXD 4700pF ±10% 100V |
| C118                  | 0180-4395   | CAPACITOR-FXD 470uF ±20% 50V   |
| C123                  | 0180-4405   | CAPACITOR-FXD 470uF ±20% 50V   |
| C124                  | 0160-4830   | CAPACITOR-FXD 2200pF ±10% 100V |
| C125                  | 0160-5469   | CAPACITOR-FXD 1uF ±10% 50V     |
| C126,127              | 0160-5422   | CAPACITOR-FXD 0.047uF ±20% 50V |
| C133                  | 0160-7606   | CAPACITOR-FXD 1uF ±20% 250V    |
| C135,136              | 0160-4281   | CAPACITOR-FXD 2200pF ±20% 250V |
| C137                  | 0160-7606   | CAPACITOR-FXD 1uF ±20% 250V    |
| C138,139              | 0160-4183   | CAPACITOR-FXD 1000pF ±20% 250V |
| C140-143              | 0160-4822   | CAPACITOR-FXD 1000pF ±5% 100V  |
| C146                  | 0160-4835   | CAPACITOR-FXD 0.1uF ±10% 50V   |
| C150                  | 0160-4830   | CAPACITOR-FXD 2200pF ±10% 100V |
| C151                  | 0160-4822   | CAPACITOR-FXD 1000pF ±5% 100V  |
| C160,161              | 0160-4439   | CAPACITOR-FXD 4700pF ±20%      |

**Table 5-1. Agilent 66000A MPS Mainframe Parts List - Electrical (continued)**

| Reference Designators | Part Number | Description                                     |
|-----------------------|-------------|-------------------------------------------------|
| C162                  | 0160-5422   | CAPACITOR-FXD 0.047uF ±20% 50V                  |
| C163                  |             | NOT USED                                        |
| D26                   | 1901-1087   | DIODE-POWER RECTIFIER 600V 3A 200ns             |
| D30-32                | 1901-1087   | DIODE-POWER RECTIFIER 600V 3A 200ns             |
| D34-40                | 1901-1098   | DIODE-SWITCHING IN4150 50V 200mA 4ns            |
| D45                   | 1901-1214   | DIODE-POWER RECTIFIER 600V 1A 50ns              |
| D46                   | 1901-1128   | DIODE-SCHOTTKY 40V 1A                           |
| D47,48                | 1901-1130   | DIODE-GENERAL PURPOSE 600V 8A 50ns TO-220AC     |
| D49,50                | 66000-60003 | DIODE-WITH HEATSINK ASSEMBLY                    |
| D51,52                | 1901-1098   | DIODE-SWITCHING IN4150 50V 200mA 4ns            |
| D56-58                | 1901-1098   | DIODE-SWITCHING IN4150 50V 200mA 4ns            |
| F1                    | 2110-0688   | FUSE-SUBMINIATURE 3A 125V NTD AX UL CSA         |
| F2                    | 2110-0699   | FUSE-SUBMINIATURE 5A 125V NTD AX UL CSA         |
| F8                    | 2110-0655   | FUSE (METRIC) 3.15A 250V NTD FE IEC             |
| J1                    | 1252-0268   | CONNECTOR-RECT MICRORBN 24-CKT 24-CONTACT       |
| J3                    | 1252-4307   | CONNECTOR-UTIL P-&-SKT 4-CKT 4-CONTACT          |
| J5                    | 1251-4926   | CONNECTOR-POST TYPE .100-PIN-SPCG 8-CONTACT     |
| J114                  | 1251-7330   | MODULAR PHONE RECEPTACLE RIGHT ANGLE PC MOUNT   |
| J116,117              | 1250-1842   | CONNECTOR-RF BNC FEM PC-W-STANDOFFS 50-OHM      |
| J119                  | 1252-1014   | CONNECTOR-RECT SDL 6-CKT 6-CONTACT              |
| J120-122              | 1251-8667   | CONNECTOR-POST TYPE .100-PIN-SPACING 20-CONTACT |
| J126                  | 1251-8675   | CONNECTOR-POST TYPE .100-PIN-SPACING 5-CONTACT  |
| J200                  |             | NOT USED                                        |
| L1                    | 66000-80004 | CHOKE - INPUT                                   |
| L2,3                  | 66000-80003 | CHOKE- OUTPUT                                   |
| L4                    | 06024-80094 | CHOKE - RFI                                     |
| Q5,6                  | 66000-60002 | TRANSISTOR, FET WITH HEATSINK ASSEMBLY          |
| Q7                    |             | NOT USED                                        |
| R1,2                  | 0699-3196   | RESISTOR 150 ±5% 10W                            |
| R3                    | 0698-3155   | RESISTOR 4.64K ±1% .125W                        |
| R4                    | 0698-3136   | RESISTOR 17.8K ±1% .125W                        |
| R5                    | 0757-0465   | RESISTOR 100K ±1% .125W                         |
| R6                    | 0757-0463   | RESISTOR 82.5K ±1% .125W                        |
| R7                    | 0757-0273   | RESISTOR 3.01K ±1% .125W                        |
| R9,10                 | 0698-6348   | RESISTOR 3K ±0.1% .125W                         |
| R11                   | 0698-3155   | RESISTOR 4.64K ±1% .125W                        |
| R12                   | 0757-0394   | RESISTOR 51.1 ±1% .125W                         |
| R13                   | 0757-0459   | RESISTOR 56.2K ±1% .125W                        |
| R14                   | 0757-0407   | RESISTOR 200 ±1% .125W                          |
| R15                   | 0757-0280   | RESISTOR 1K ±1% .125W                           |
| R16                   | 0699-3419   | RESISTOR                                        |
| R17                   | 0699-3420   | RESISTOR                                        |
| R18                   | 0698-3628   | RESISTOR 220 ±5% 2W                             |
| R20,21                | 0698-3155   | RESISTOR 4.64K ±1% .125W                        |
| R35                   | 0698-8827   | RESISTOR 1M ±1% .125W TF                        |
| R47                   | 0698-3155   | RESISTOR 4.64K ±1% .125W                        |
| R88                   | 0698-7933   | RESISTOR 3.83K ±0.1% .125W                      |

**Table 5-1. Agilent 66000A MPS Mainframe Parts List - Electrical (continued)**

| Reference Designators | Part Number | Description                                   |
|-----------------------|-------------|-----------------------------------------------|
| R89                   | 0698-6348   | RESISTOR 3K $\pm 0.1\%$ .125W                 |
| R93                   | 0698-3625   | RESISTOR 160 $\pm 5\%$ 2W                     |
| R95                   | 0698-3439   | RESISTOR 178 $\pm 1\%$ .125W                  |
| R98                   | 0698-4037   | RESISTOR 46.4 $\pm 1\%$ .125W                 |
| R99                   | 0698-3155   | RESISTOR 4.64K $\pm 1\%$ .125W                |
| R100                  | 0698-4037   | RESISTOR 46.4 $\pm 1\%$ .125W                 |
| R101                  | 0698-3155   | RESISTOR 4.64K $\pm 1\%$ .125W                |
| R102,103              | 0698-4037   | RESISTOR 46.4 $\pm 1\%$ .125W                 |
| R106                  | 1810-0206   | NETWORK-RESISTOR 8-SIP 10.0K OHM X 7          |
| R107,108              | 0757-0442   | RESISTOR 10K $\pm 1\%$ .125W                  |
| R109                  | 0698-0082   | RESISTOR 464 $\pm 1\%$ .125W                  |
| R110                  | 0757-0442   | RESISTOR 10K $\pm 1\%$ .125W                  |
| R113                  | 0683-1015   | RESISTOR 100 $\pm 5\%$ .25W                   |
| R114,115              | 1810-0305   | NETWORK-RESISTOR 9-SIP 4.7K OHM X 8           |
| R121                  | 0757-0394   | RESISTOR 51.1 $\pm 1\%$ .125W                 |
| R130                  | 0698-3609   | RESISTOR 22 $\pm 5\%$ 2W                      |
| R131-133              | 0757-0394   | RESISTOR 51.1 $\pm 1\%$ .125W                 |
| R146                  | 0757-0442   | RESISTOR 10K $\pm 1\%$ .125W                  |
| R147                  | 0698-0082   | RESISTOR 464 $\pm 1\%$ .125W                  |
| R149                  | 0757-0428   | RESISTOR 1.62K $\pm 1\%$ .125W                |
| R152-154              | 0683-1015   | RESISTOR 100 $\pm 5\%$ .25W                   |
| R157                  | 0698-3155   | RESISTOR 4.64K $\pm 1\%$ .125W                |
| R160-164              | 0698-8812   | RESISTOR 1 $\pm 1\%$ .125W                    |
| R165                  | 0757-0442   | RESISTOR 10K $\pm 1\%$ .125W                  |
| R166,167              | 0698-3155   | RESISTOR 4.64K $\pm 1\%$ .125W                |
| R168,169              | 0811-1848   | RESISTOR .5 $\pm 10\%$ 5W                     |
| R172                  | 0698-8827   | RESISTOR 1M $\pm 1\%$ .125W TF                |
| R174-175              | 0757-0398   | RESISTOR 75 $\pm 1\%$ .125W                   |
| R180,181              | 0698-3433   | RESISTOR 28.7 $\pm 1\%$ .1 25W                |
| R182                  | 0686-2705   | RESISTOR 27 $\pm 5\%$ 0.5W                    |
| R184                  | 0698-3155   | RESISTOR 4.64K $\pm 1\%$ .125W                |
| R185                  | 0698-0082   | RESISTOR 464 $\pm 1\%$ .125W                  |
| R186,188              |             | NOT USED                                      |
| R187                  | 0686-2705   | RESISTOR 27 $\pm 5\%$ 0.5W                    |
| SCKT1                 | 1200-1274   | SOCKET-IC-CHIP-CARRIER 68-CONTACT (REF U44)   |
| SCKT2                 | 1200-0485   | SOCKET-IC-DIP 14-CONTACT (REF S7)             |
| SCKT3                 | 1200-0567   | SOCKET-IC-DIP 28-CONTACT (REF U51)            |
| SCKT4                 | 1200-0639   | SOCKET-IC-DIP 20-CONTACT (REF U58,U66)        |
| S2                    | 3101-2808   | SWITCH-PB DPST 4A 250Vac                      |
| S7                    | 3101-2097   | SWITCH-DIP SL 6-1A 0.1A 50Vdc                 |
| TB2                   | 0360-2312   | TERMINAL BLOCK 4-TERMINAL .039 IN SQUARE      |
| TB5                   | 0360-2421   | TERMINAL BLOCK 3-TERMINAL RT-ANGLE 5-POSITION |
| T1                    | 9100-4933   | TRANSFORMER-FLYBACK FREQ: 100KHz              |
| T2                    | 66000-80001 | TRANSFORMER-BIAS                              |
| T3                    | 66000-80002 | TRANSFORMER-DRIVER                            |
| U1                    | 1826-2056   | IC V REGULATOR-SWG 4.9/5.1V 8-DIP-P           |
| U2                    | 1990-1502   | IC OPTO-ISOLATOR                              |

**Table 5-1. Agilent 66000A MPS Mainframe Parts List - Electrical (continued)**

| Reference Designators | Part Number | Description                                      |
|-----------------------|-------------|--------------------------------------------------|
| U4                    | 1826-1343   | IC V REGULATOR-V-REFERENCE-ADJ 2.5/36V 8-DIP-P   |
| U17                   | 1821-1740   | IC-GPIB TALKER/LISTENER                          |
| U44                   | 1821-1479   | IC-16-BIT MICROPROCESSOR, I/O, TIMER, TIMER, A/D |
| U50                   | 1820-2724   | IC LATCH TTL/ALS TRANSPARENT OCTL                |
| U51                   | 66000-80016 | IC ROM GPIB - PROGRAMMED                         |
| U52                   | 1818-4134   | IC 64K SRAM 35-NS CMOS                           |
| U58                   | 66000-80010 | IC PROGRAMMABLE-LOGIC CMOS EEPLD - PROGRAMMED    |
| U64                   | 1990-0543   | IC OPTO-ISOLATOR LED-PXSTR IF=150MA-MAX          |
| U66                   | 66000-80017 | IC GAL DECODER - PROGRAMMED                      |
| U68                   | 1826-2341   | IC V REGULATOR-SWG 8-DIP-P                       |
| U71,72                | 1820-3176   | IC MULTIPLEXER/DATA-SELECT CMOS/HC 8-TO-1-LINE   |
| U74                   | 1820-3206   | IC LATCH CMOS/HC ADDRESSABLE POS-EDGE-TRIG       |
| U80                   | 1820-3097   | IC GATE CMOS/HC AND QUAD 2-INPUT                 |
| U87                   | 1820-3206   | IC LATCH CMOS/HC ADDRESSABLE POS-EDGE-TRIG       |
| U89                   | 1820-6789   | IC INTERFACE TRANSCEIVER                         |
| U91                   | 1821-4383   | IC DUAL UART, 68000 COMPATIBLE                   |
| U97                   | 1820-3176   | IC MULTIPLEXER/DATA-SELECT CMOS/HC 8-TO-1-LINE   |
| U98                   | 1820-6045   | IC-GPIB TRANSCEIVER CHIP                         |
| U99                   | 1820-6170   | IC-GPIB TRANSCEIVER CHIP                         |
| VR4                   | 1902-0244   | DIODE-ZENER 30V 5% 1W                            |
| VR11,12               | 1902-0953   | DIODE-ZENER 6.2V 5% DO-35 PD=.4W                 |
| VR13                  | 1902-0959   | DIODE-ZENER 11V 5% DO-35 PD=.4W                  |
| VR14,15               | 1902-0953   | DIODE-ZENER 6.2V 5% DO-35 PD=.4W                 |
| VR16                  |             | NOT USED                                         |
| VR17                  | 1902-0244   | DIODE-ZENER 30V 5%                               |
| VR53                  | 1902-0766   | DIODE-ZENER 18.2V 5% DO-35 PD=.4W                |
| Y1                    | 0410-2109   | CRYSTAL-QUARTZ 12.00MHz                          |
| A2                    | 66000-61021 | <b>ASSEMBLY-BACKPLANE BOARD</b>                  |
| J1-8                  | 1251-8414   | CONNECTOR-POST TYPE .100-PIN-SPACING 48-CONTACT  |
| J9-11                 | 1251-8666   | CONNECTOR-POST TYPE .100-PIN-SPACING 20-CONTACT  |
| J12                   | 1252-4306   | CONNECTOR-UTIL P-&-SKT 4-CKT 4-CONTACT           |
| A3                    | 66000-61022 | <b>ASSEMBLY-KEYBOARD CONNECTOR BOARD</b>         |
| J301                  | 1252-1014   | CONNECTOR-RECT SDL 6-CKT 6-CONTACT               |
| J302                  | 1251-8608   | CONNECTOR-POST TYPE .100-PIN-SPACING 5-CONTACT   |

**Table 5-2. Agilent 66000A MPS Mainframe Parts List - Mechanical**

| Ref. Des | Qty | Part Number | Description                                            |
|----------|-----|-------------|--------------------------------------------------------|
| MP1      | 1   | 66000-00001 | CHASSIS- MAIN                                          |
| MP2      | 1   | 66000-00002 | CHASSIS TRAY - BOTTOM                                  |
| MP3      | 1   | 66000-00003 | CHASSIS TRAY - TOP                                     |
| MP4      | 1   | 5001-9840   | SUBCHASSIS                                             |
| MP6      | 1   | 66000-00007 | COVER - UNIT                                           |
| MP10     | 1   | 66000 40002 | BEZEL - TOP                                            |
| MP11     | 1   | 66000-40003 | BEZEL- BOTTOM                                          |
| MP12     | 2   | 66000-40004 | BEZEL- SIDE                                            |
| MP13     | 1   | 66000-40005 | PUSHROD - ON/OFF                                       |
| MP14     | 8   | 66000-40006 | PANEL - FILLER                                         |
| MP15     | 1   | 5041-8802   | TRIM - TOP                                             |
| MP16     | 2   | 5001-0540   | TRIM - SIDE                                            |
| MP17     | 1   | 66000-80007 | NAMEPLATE                                              |
| MP18     | 1   | 5021-8405   | FRAME - FRONT                                          |
| MP19     | 4   | 5041-8801   | FOOT                                                   |
| MP20     | 2   | 5041-8819   | CAP - STRAP HANDLE (FRONT)                             |
| MP21     | 2   | 5041-8820   | CAP - STRAP HANDLE (REAR)                              |
| MP22     | 2   | 5062-3705   | STRAP HANDLE                                           |
| MP23     | 1   | 66000-80008 | ASSEMBLY- KEYBOARD CABLE                               |
| MP24     | 1   | 8160-0728   | RFI STRIP                                              |
| MP25     | 1   | 5040-1676   | AC INPUT SAFETY COVER (WITH HARDWARE)                  |
| (J1)     | 2   | 0380-0644   | STANDOFF - HEX .255-IN-LG 6-32-THD                     |
| (J1)     | 2   | 2190-0034   | WASHER - LOCK HLCL                                     |
| (J1)     | 2   | 2190-0849   | WASHER- FLAT MTLC                                      |
| (J1)     | 2   | 0515-0406   | SCREW - MACHINE M3 X 0.5 8MM-LG (J1 TO PC BOARD)       |
| (L2,3)   | 2   | 0380-0625   | STANDOFF - ROUND .687-IN-LG                            |
| (L4)     | 1   | 1480-0552   | PIN - ESCUTCHEON .095-IN-DIA 2.09-IN-LG STL            |
| (F8)     | 1   | 2110-0714   | FUSEHOLDER                                             |
| (TB2)    | 1   | 1252-1488   | TERMINAL BLOCK 4-POSITION                              |
| (TB5)    | 2   | 0515-1146   | SCREW - MACHINE M3 X 0.5 6MM-LG (TB5 TO PC BOARD)      |
|          | 18  | 0515-0380   | SCREW - MACHINE M4 X 0.7 10MM-LG (CHASSIS HARDWARE)    |
|          | 4   | 0515-1384   | SCREW - MACHINE M5 X 0.810MM-LG (HANDLE HARDWARE)      |
|          | 2   | 0515-2086   | SCREW - SPCL M4 X 0.7 7MM-LG (A3 TO FRONT FRAME)       |
|          |     | 66000-60051 | ASSEMBLY- SAFETY GROUND WIRE                           |
|          |     | 0535-0038   | NUT - HEX DBL-CHAM M6 X 1.0 5.7MM-THK (SAFETY GROUND)  |
|          | 2   | 2190-0084   | WASHER - LOCK INTL T 1/4 IN .256 IN-ID (SAFETY GROUND) |
|          | 2   | 0403-0267   | BUMPER FOOT-ADHESIVE MOUNTING                          |
|          | 2   | 1400-1195   | CLAMP .38-DIA 1-WD NYLON (KEYBOARD CABLE)              |
|          |     | 1400-0308   | TIE WRAP (KEYBOARD CABLE)                              |
|          |     | 5080-2148   | CABLE - SERIAL LINK (2 METER)                          |
|          |     | 66000-80006 | LABEL - REAR PANEL                                     |
|          |     | 66000-90001 | MANUAL - MPS USER'S GUIDE                              |
|          |     | 66001-90001 | MANUAL - QUICK REFERENCE GUIDE                         |
|          |     | 66001-90003 | INSTRUCTION SHEET - KEYBOARD INSTALLATION              |
|          | 2   | 5040-1697   | BLOCK-TOP COVER                                        |

## Diagrams

This chapter contains a test point and component location diagram and schematics for troubleshooting the Agilent 66000A MPS Mainframe. An exploded view diagram of the mechanical parts is also provided.

---

### Test Point and Component Location Diagram

The test point and component location diagram identifies the location of the test points that are used in the troubleshooting procedures of Chapter 4, and are also shown on the schematic diagrams.

The test point and locations diagram also identifies all electrical components on the Main board. The diagram is divided into columns and rows designated "x coordinates" and "y coordinates". The accompanying table lists all of the components on the Main board and gives the coordinate location of each component. For example, resistor R154 is located at x coordinate 12.3 and y coordinate 3.3. Refer to Chapter 5 for the part number and description of each electrical part.

---

### Main Board Schematics

#### **WARNING**

**SHOCK HAZARD** When servicing the Main assembly and Backplane assembly, ac line voltages are present on the Main board and backplane connectors.

Three foldout sheets comprise the Main board schematic diagrams. The circuit functions of each schematic sheet are given as follows:

#### Sheet 1 Circuit Functions

Among the circuit components included on Sheet 1 are: microprocessor U44, GPIB interface chips U15 and U17, ROM chip U51, RAM chip U52, keyboard input J119 and J126, serial link input/output J114, and address switch S7.

The GPIB interface is the link between the mainframe and the system controller. The keyboard input is the link between the mainframe and the Agilent 66001A keyboard. All communication between the mainframe and the controller or keyboard is processed by U44. Data communication between the modules and the controller is also directed through U44.

Switch S7 determines the address of the mainframe. It also indicates if the mainframe is directly connected to the GPIB, or linked to another mainframe. During troubleshooting, switch S7 is used to select diagnostic tests for troubleshooting. Pins on test header J5 must be jumpered to perform certain diagnostic tests.

#### Sheet 2 Circuit Functions

Among the circuits included on Sheet 1 are: rectifier diodes D26, D30-D32, filter capacitor C85, FET switches Q5 and Q6, power transformer T1, bias transformer F2, FET pulse control chip U1, and pulse transformer T3. Isolation between the ac input and the digital circuit is provided by T1 and opto-isolator U2.

Power to the mainframe is provided by a switching power supply. Energy is stored in the magnetic field of transformer T1 when current flows in the primary, and is transferred to the secondary side when the current flow in the primary is turned off. Primary current flow is controlled by FET switches, which are turned on and off at an 85KHz rate by U1.

Regulation is accomplished by controlling the on-time of the FET switches. U1 monitors the voltage at the secondary side of T1 through opto-isolator U2 and adjusts the on-time of the FETs accordingly. T2 provides bias power for U1.

Power at the secondary side of T1 is rectified and filtered to provide +5V power to the mainframe and +5V and +28V power to the turn-on circuits in the modules.

### Sheet 3 Circuit Functions

Among the circuit components included on Sheet 1 are: multiplexers U71 and U72, demultiplexers U74 and U87, power-on chip U68, Trigger In/Out BNC connectors J116 and J117, and DFI/RI connector TB2.

The multiplexers and demultiplexers direct the digital signals from the microprocessor and distribute them among the eight module slot locations via J121 and J122. +5V and +28V bias power is distributed to the module slot locations via J120. U68 generates a power-on (power is available) signal to the module slot locations via J120.

---

|             |                                                                                                                                           |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Note</b> | J120 connects to J10 on the Backplane board, J121 connects to J9 on the Backplane board, and J122 connects to J11 on the Backplane board. |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------|

---

The Trig IN signal from J117 is distributed to the module slot locations via J120. The Trig OUT signal to J116 is directly received from the module slot locations via J120. The RI (remote inhibit) signal from TB2 is processed by U44. U44 also generates the DFI (discreet fault indicator), which is connected to TB2 via opto-isolator U64.

---

### Backplane Board Schematic

---

|                |                                                                                                                                                       |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>WARNING</b> | <b>SHOCK HAZARD</b> When servicing the Main assembly and Backplane assembly, ac line voltages are present on the Main board and backplane connectors. |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|

---

The Backplane board schematic shows the distribution of the ac power and control signals from the Main board to the eight module connectors. There are no active components on the Backplane board.

---

### Exploded View Diagram

The exploded view diagram at the end of this section documents how the major components of the Agilent 66000A MPS Mainframe are assembled. Parts with "MP" designations identify components that are referenced in the parts list. Refer to Chapter 5 for the part number and description of the mechanical parts.



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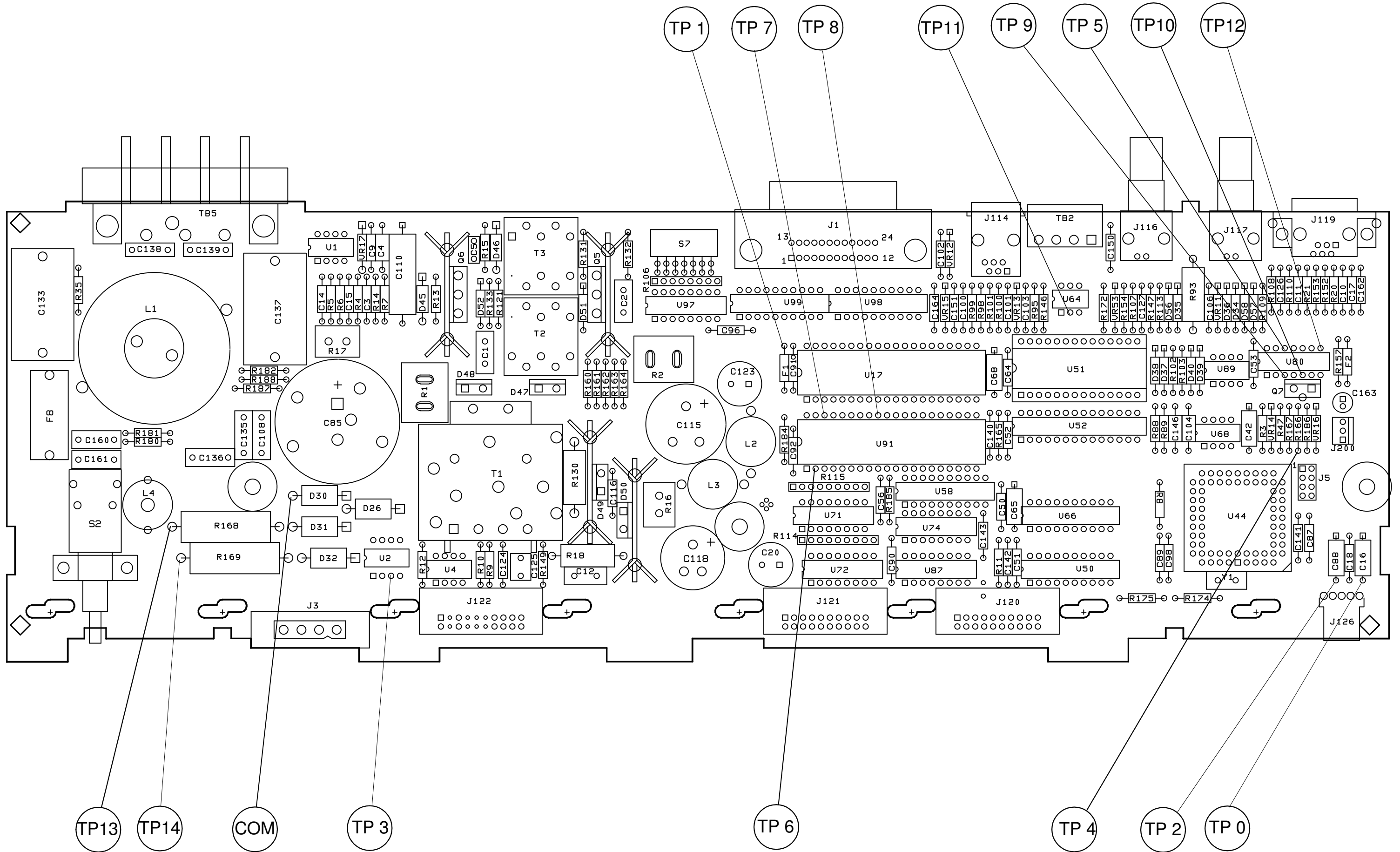
## Schematic Notes

Notes that apply to all schematic sheets are given as follows:

- All resistors are in ohms  $\pm 1\%$ , 1/8W, unless otherwise specified.
- All capacitors are in microfarads unless otherwise specified.
- An asterisk negates a signal name. For example, WR appears on the schematic as **WR\***.
- Signal line destinations are given inside the parentheses at the end of the signal lines. For example, RDY (S01A5), indicates that the **RDY** signal continues on schematic sheet 01 at grid coordinates A, 5. Coordinates are labeled on the schematic border.
- Signal lines that are terminated by flags continue onto other sheets. Note that flags do NOT indicate signal flow direction.
- Signal lines without flags go to another location of the same schematic sheet.
- Test points on the schematic sheets (e.g. TP3) identify the location of the test points used in the troubleshooting procedures in Chapter 4.
- Voltages and waveforms shown on the schematics are obtained when following the troubleshooting procedures in Chapter 4.

### Main Board Component Coordinates

|      | X    | Y   |      | X    | Y   |      | X    | Y   |      | X    | Y   |      | X    | Y   |
|------|------|-----|------|------|-----|------|------|-----|------|------|-----|------|------|-----|
| C1   | 5.2  | 2.9 | C124 | 5.4  | 0.4 | F8   | 0.4  | 2.8 | R47  | 14.1 | 2.4 | R184 | 8.5  | 2.3 |
| C2   | 6.7  | 3.5 | C125 | 5.6  | 0.5 | HS10 | 4.8  | 3.7 | R88  | 12.7 | 2.4 | R185 | 9.7  | 1.1 |
| C3   | 3.8  | 3.4 | C126 | 14.1 | 4.0 | HS11 | 6.5  | 3.7 | R89  | 12.8 | 1.9 | R186 | 14.4 | 2.4 |
| C4   | 4.0  | 3.9 | C127 | 12.5 | 3.3 | HS12 | 6.4  | 1.6 | R93  | 13.1 | 4.1 | R187 | 2.4  | 2.6 |
| C5   | 5.0  | 4.1 | C133 | 0.2  | 3.0 | HS13 | 6.8  | 1.1 | R95  | 11.3 | 3.3 | R188 | 2.4  | 2.7 |
| C9   | 3.9  | 3.9 | C135 | 2.5  | 2.3 | J1   | 8.6  | 4.2 | R98  | 10.7 | 3.3 | S2   | 1.0  | 1.5 |
| C10  | 14.8 | 3.5 | C136 | 2.3  | 1.8 | J3   | 3.5  | 0.0 | R99  | 10.6 | 3.8 | S7   | 7.1  | 3.9 |
| C11  | 14.3 | 3.5 | C137 | 2.8  | 3.0 | J5   | 14.3 | 1.7 | R100 | 10.9 | 3.3 | T1   | 4.8  | 1.0 |
| C12  | 6.2  | 0.5 | C138 | 1.6  | 4.2 | J114 | 11.1 | 4.3 | R101 | 10.8 | 3.3 | T2   | 5.5  | 3.4 |
| C14  | 3.3  | 3.9 | C139 | 2.3  | 4.2 | J116 | 12.6 | 3.9 | R102 | 12.9 | 2.6 | T3   | 5.5  | 4.3 |
| C15  | 3.6  | 3.4 | C140 | 10.8 | 1.8 | J117 | 13.6 | 3.9 | R103 | 13.0 | 3.1 | TB2  | 12.0 | 4.3 |
| C16  | 15.0 | 1.0 | C141 | 14.3 | 1.2 | J119 | 14.1 | 4.3 | R106 | 7.1  | 3.8 | TB5  | 1.4  | 4.3 |
| C17  | 14.9 | 3.5 | C142 | 11.0 | 0.9 | J120 | 10.4 | 0.0 | R107 | 12.4 | 3.3 | U1   | 3.4  | 4.0 |
| C18  | 14.8 | 1.0 | C143 | 10.7 | 1.2 | J121 | 8.5  | 0.0 | R108 | 14.0 | 4.0 | U15  | 8.3  | 3.2 |
| C20  | 8.3  | 0.6 | C146 | 12.9 | 2.4 | J122 | 4.7  | 0.0 | R109 | 13.9 | 3.8 | U17  | 8.8  | 2.5 |
| C42  | 13.7 | 2.4 | C150 | 12.2 | 3.9 | J126 | 15.0 | 0.3 | R110 | 14.2 | 3.5 | U2   | 3.9  | 0.5 |
| C50  | 10.9 | 1.5 | C151 | 10.4 | 3.8 | J200 | 14.8 | 2.0 | R113 | 12.7 | 3.3 | U4   | 4.6  | 0.4 |
| C51  | 11.1 | 0.9 | C160 | 0.6  | 2.0 | L1   | 1.5  | 3.1 | R114 | 8.7  | 0.9 | U44  | 13.6 | 0.7 |
| C52  | 11.0 | 2.3 | C161 | 0.6  | 1.8 | L2   | 8.1  | 1.7 | R115 | 8.6  | 1.5 | U50  | 11.3 | 0.4 |
| C53  | 13.8 | 3.1 | C162 | 15.0 | 3.5 | L3   | 7.4  | 1.5 | R121 | 5.3  | 3.3 | U51  | 11.2 | 2.5 |
| C56  | 9.6  | 1.6 | C163 | 14.8 | 2.5 | L4   | 1.4  | 1.3 | R130 | 6.2  | 2.0 | U52  | 11.2 | 2.0 |
| C64  | 11.0 | 3.0 | D26  | 4.2  | 1.3 | MC1  | 8.5  | 3.4 | R131 | 6.3  | 3.9 | U58  | 9.9  | 1.3 |
| C65  | 11.1 | 1.5 | D30  | 3.6  | 1.4 | Q5   | 6.4  | 3.7 | R132 | 6.8  | 3.9 | U64  | 11.6 | 3.5 |
| C68  | 10.9 | 3.0 | D31  | 3.6  | 1.1 | Q6   | 4.9  | 3.7 | R133 | 5.2  | 3.3 | U66  | 11.3 | 1.0 |
| C85  | 3.5  | 2.2 | D32  | 3.7  | 0.7 | Q7   | 14.3 | 2.5 | R146 | 11.4 | 3.3 | U68  | 13.2 | 2.0 |
| C87  | 14.4 | 0.7 | D34  | 13.6 | 3.8 | R1   | 4.5  | 2.4 | R147 | 12.6 | 3.3 | U71  | 8.7  | 1.0 |
| C88  | 14.7 | 1.0 | D35  | 12.9 | 3.8 | R2   | 7.3  | 2.9 | R149 | 5.8  | 0.4 | U72  | 8.8  | 0.4 |
| C89  | 12.7 | 0.5 | D36  | 13.5 | 3.8 | R3   | 13.9 | 2.4 | R152 | 14.6 | 4.0 | U74  | 9.9  | 0.9 |
| C90  | 9.7  | 0.9 | D37  | 12.8 | 3.1 | R4   | 3.7  | 3.4 | R153 | 14.5 | 4.0 | U80  | 13.9 | 2.8 |
| C91  | 8.6  | 3.1 | D38  | 12.7 | 3.1 | R5   | 3.4  | 3.9 | R154 | 12.3 | 3.3 | U87  | 9.9  | 0.4 |
| C92  | 8.6  | 2.2 | D39  | 13.2 | 3.1 | R6   | 3.5  | 3.4 | R157 | 14.7 | 2.7 | U89  | 13.3 | 2.7 |
| C96  | 8.1  | 3.8 | D40  | 13.1 | 3.1 | R7   | 4.0  | 3.4 | R160 | 6.3  | 2.9 | U91  | 8.8  | 1.7 |
| C98  | 12.8 | 0.5 | D45  | 4.5  | 3.9 | R9   | 5.2  | 0.9 | R161 | 6.4  | 2.9 | U97  | 7.1  | 3.4 |
| C100 | 10.5 | 3.3 | D46  | 5.3  | 4.4 | R10  | 5.1  | 0.4 | R162 | 6.5  | 2.9 | VR11 | 13.4 | 3.8 |
| C101 | 11.0 | 3.3 | D47  | 5.8  | 2.6 | R11  | 10.9 | 0.4 | R163 | 6.6  | 2.9 | VR12 | 10.4 | 4.4 |
| C102 | 10.3 | 4.4 | D48  | 4.9  | 2.6 | R12  | 4.5  | 0.9 | R164 | 6.7  | 2.9 | VR13 | 11.1 | 3.8 |
| C103 | 11.2 | 3.8 | D49  | 6.5  | 1.5 | R13  | 4.6  | 3.9 | R165 | 10.9 | 2.3 | VR14 | 14.0 | 2.4 |
| C104 | 13.0 | 2.4 | D50  | 6.7  | 1.2 | R14  | 3.9  | 3.4 | R166 | 14.3 | 2.4 | VR15 | 10.3 | 3.8 |
| C106 | 13.3 | 3.8 | D51  | 6.3  | 3.8 | R15  | 5.2  | 4.4 | R167 | 14.2 | 2.4 | VR16 | 14.5 | 2.4 |
| C108 | 2.7  | 2.3 | D52  | 5.1  | 3.8 | R16  | 7.1  | 1.2 | R168 | 2.9  | 1.1 | VR53 | 12.2 | 3.8 |
| C110 | 4.2  | 4.4 | D56  | 12.8 | 3.8 | R17  | 3.6  | 3.1 | R169 | 3.0  | 0.7 | Y1   | 13.4 | 0.5 |
| C115 | 7.4  | 2.2 | D57  | 13.8 | 3.8 | R18  | 6.7  | 0.7 | R172 | 12.1 | 3.8 |      |      |     |
| C116 | 6.6  | 1.2 | D58  | 13.7 | 3.8 | R20  | 14.7 | 4.0 | R180 | 1.1  | 2.0 |      |      |     |
| C118 | 7.5  | 0.7 | F1   | 8.5  | 3.1 | R21  | 14.4 | 4.0 | R181 | 1.6  | 2.1 |      |      |     |
| C123 | 7.9  | 2.7 | F2   | 14.8 | 2.7 | R35  | 0.6  | 3.5 | R182 | 2.4  | 2.8 |      |      |     |



D

C

B

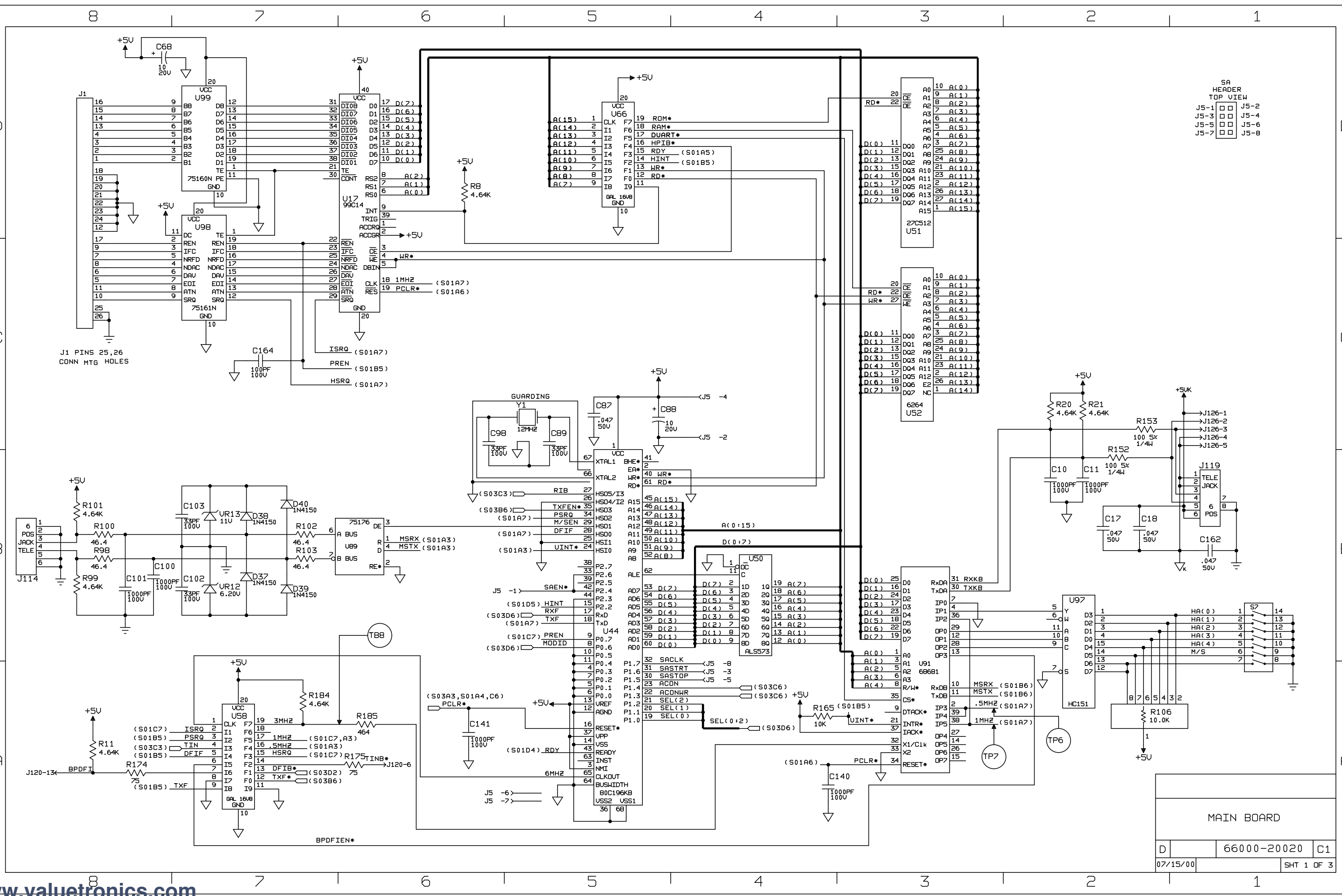
A

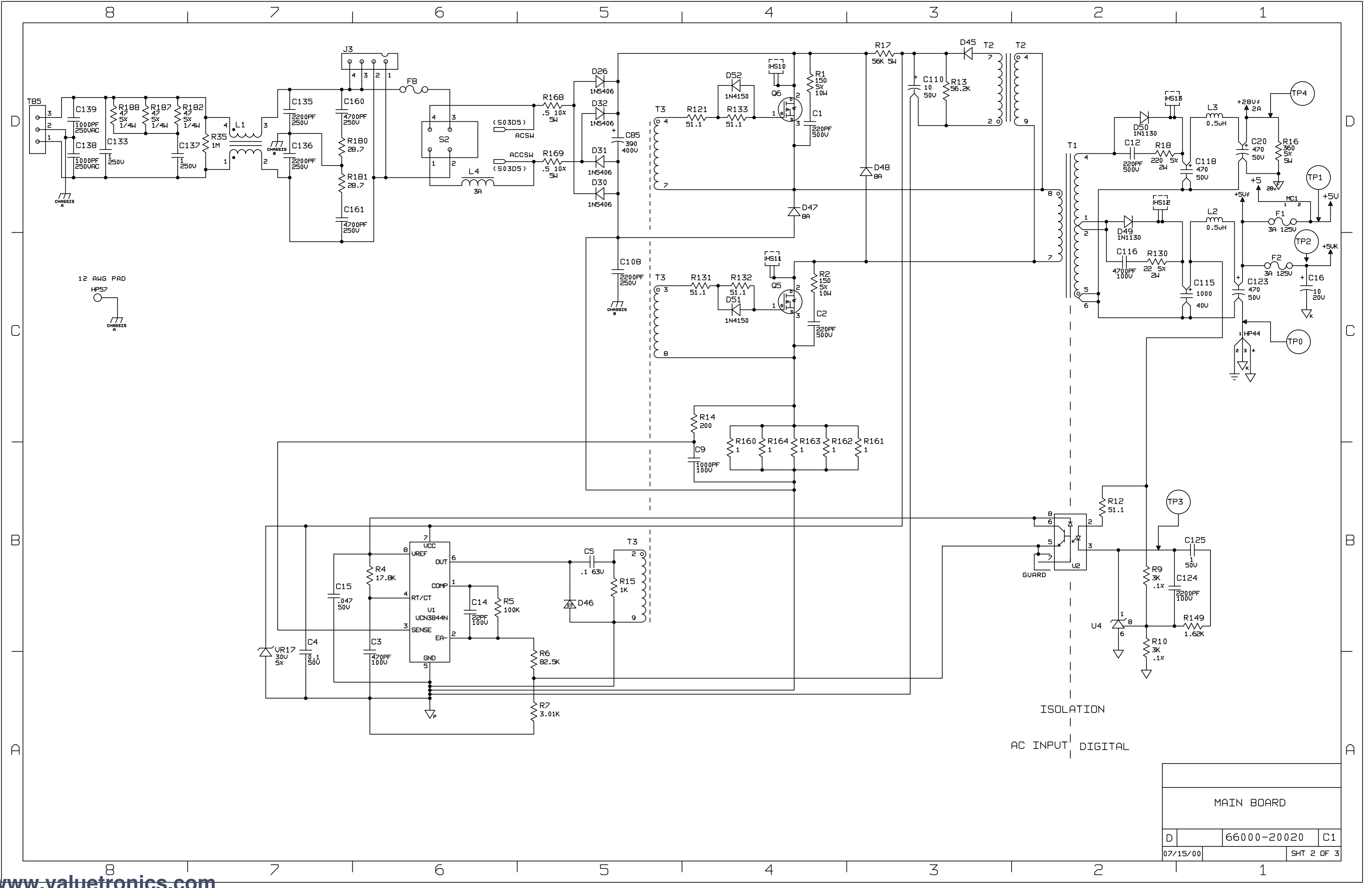
D

C

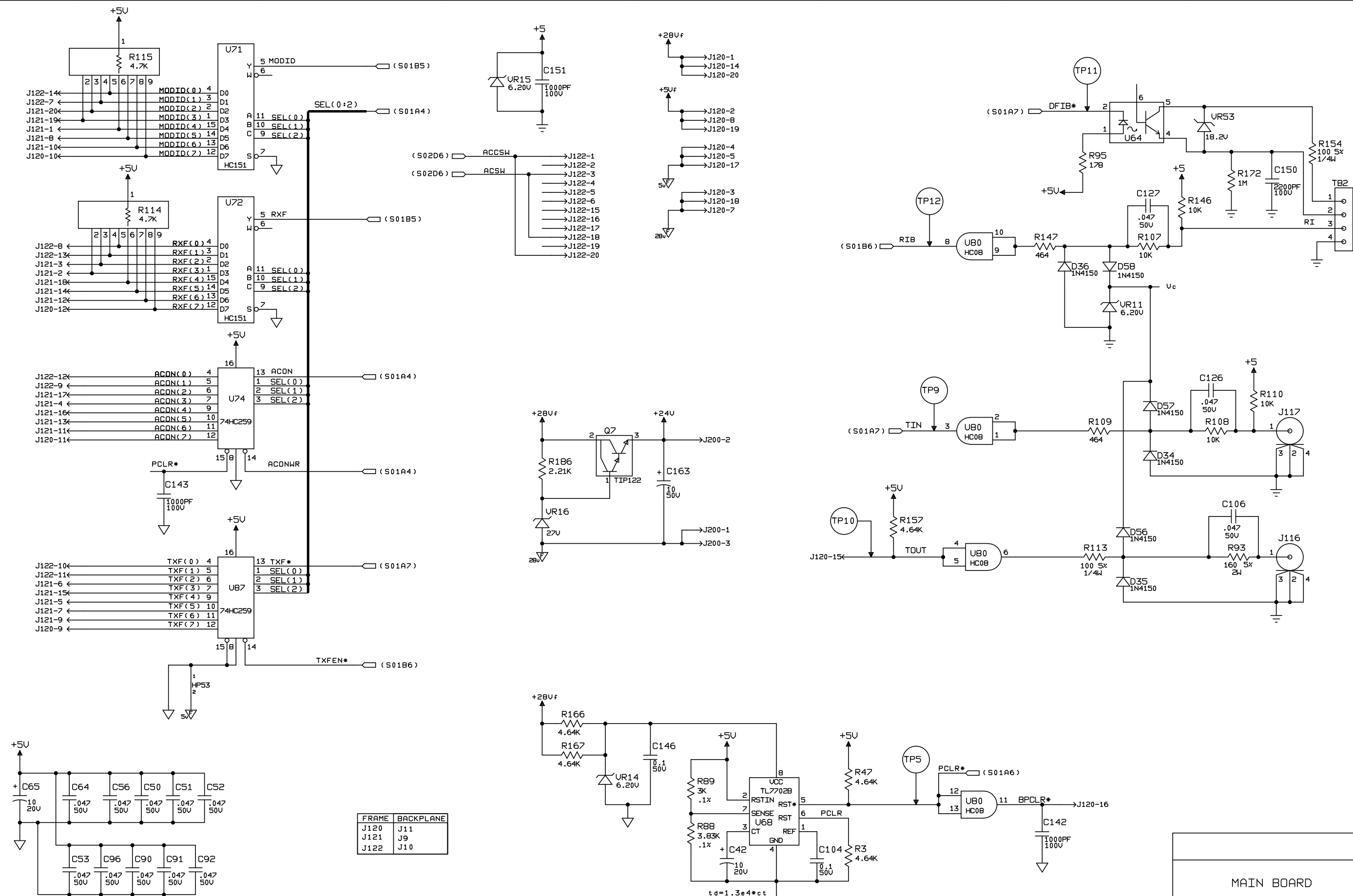
B

A





|            |             |            |
|------------|-------------|------------|
| MAIN BOARD |             |            |
| D          | 66000-20020 | C1         |
| 07/15/00   |             | SHT 2 OF 3 |



| FRAME | BACKPLANE |
|-------|-----------|
| J120  | J11       |
| J121  | J9        |
| J122  | J10       |

|            |             |    |
|------------|-------------|----|
| MAIN BOARD |             |    |
| D          | 66000-20020 | C1 |
| 07/15/00   | SHT 3 OF 3  |    |

D

C

B

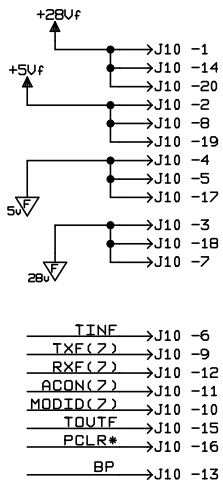
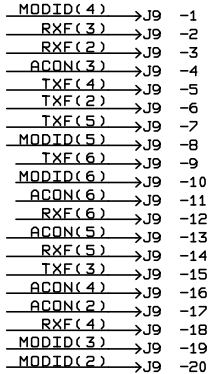
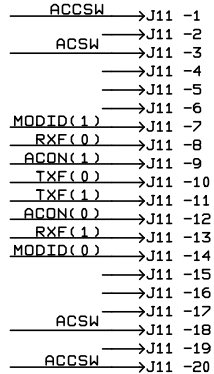
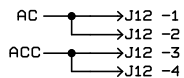
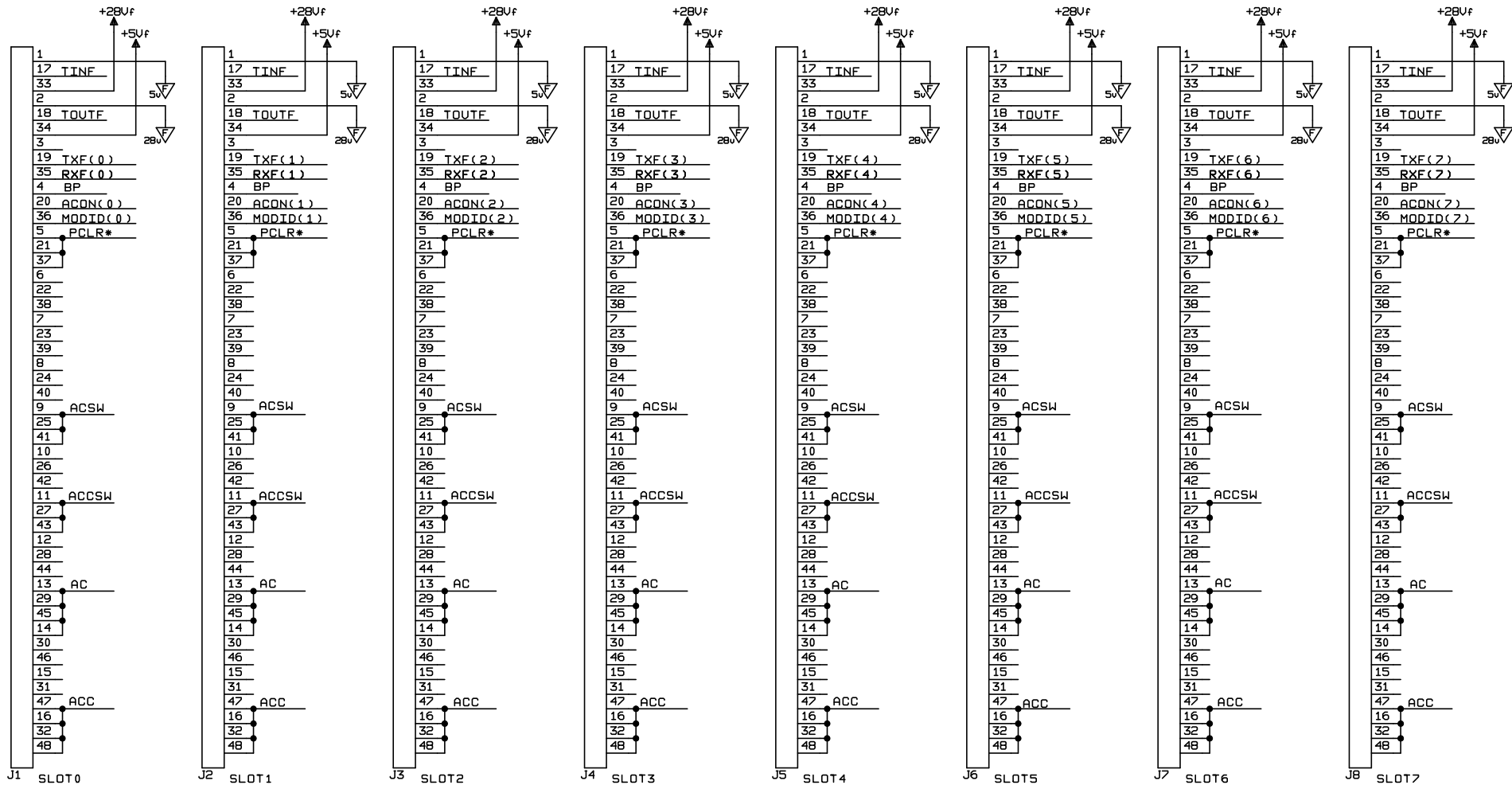
A

D

C

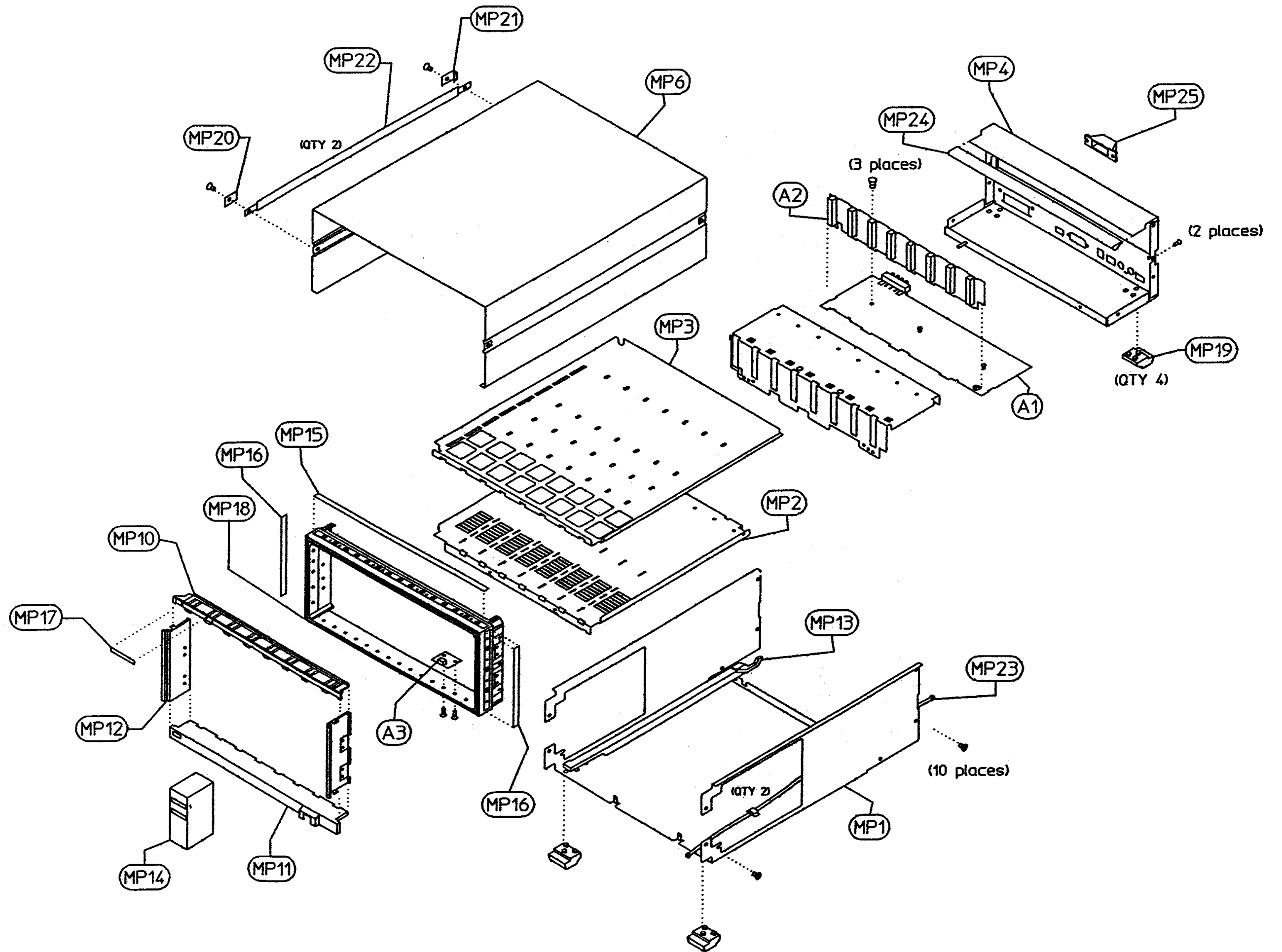
B

A



|                                     |  |             |            |
|-------------------------------------|--|-------------|------------|
| POWER MAIN FRAME<br>BACKPLANE BOARD |  |             |            |
| D                                   |  | 66000-20021 | A3         |
| 06/20/91                            |  |             | SHT 1 OF 1 |







# Manual Backdating

This section describes changes that must be made to the manual so that it applies to mainframes with serial numbers lower than those listed on the title page. Look in the following table for the serial number of your instrument, and make only those changes listed for your instrument. Note that for some changes, you may be instructed to update the instrument if certain components are being replaced during repair.

| <b>Serial Prefix</b> | <b><u>66000A</u><br/>Serial Number</b> | <b>Changes</b> |
|----------------------|----------------------------------------|----------------|
| 3302A                | 00101-00835                            | 1 - 4          |
| 3350A                | 00836-00945                            | 1 - 3          |
| 3445A                | 00946-01255                            | 1, 2           |
| 3445A                | 01256-01560                            | 1              |

## Change 1

Make the following changes in Table 5-2:

Change: MP4 from a single subchassis (p/n 5001-9840) to **two** subchassis parts: MP4 (p/n 66000-00004) and MP5 (p/n 66000-00006).

Change: Screw (p/n 0515-0380) from qty 18 to qty 20

Delete: Cover block, p/n 5040-1697

## Change 2

In Table 5-1 and on the schematic, delete VR4, p/n 1902-0244. In its place add C4, 0.1uF, 50V p/n 0160-4835.

## Change 3

In Table 5-1 and on the schematic, delete U98 (1820-6045) and U99 (1820-0244). In their place add a single IC assembly, U15, p/n 1LH4-0001.

## Change 4

In Table 5-1 and on the schematic change R182 and R187 to 42.2 ohms p/n 0757-0316. Add R188, 42.2 ohms p/n 0757-0316 in parallel with R182 and R187.



# Index

|                                    |          |        |
|------------------------------------|----------|--------|
|                                    | <b>2</b> |        |
| +28V .....                         |          | 31     |
|                                    | <b>5</b> |        |
| +5V .....                          |          | 30     |
|                                    | <b>A</b> |        |
| ACON .....                         |          | 25     |
| "ACON/MOD ID Test" .....           |          | 25     |
| ACONWR .....                       |          | 25     |
| "Address/Data Bus Test" .....      |          | 23     |
| address lines .....                |          | 32     |
| ALE .....                          |          | 32     |
|                                    | <b>B</b> |        |
| Backplane Power-up Test .....      |          | 25     |
| "Backplane Serial Port Test" ..... |          | 25     |
| bias voltages .....                |          | 23, 30 |
| BPCLR* .....                       |          | 31     |
|                                    | <b>C</b> |        |
| checkout .....                     |          | 11     |
|                                    | <b>D</b> |        |
| data lines .....                   |          | 32     |
| DFIB* .....                        |          | 27     |
| "DFI/RI Pulse Train Test" .....    |          | 27     |
| DFI/RI Test Connector .....        |          | 26     |
| disassembly                        |          |        |
| cover .....                        |          | 15     |
| front frame .....                  |          | 15     |
| modules .....                      |          | 15     |
| pc board .....                     |          | 16     |
| subchassis .....                   |          | 16     |
| documents - related .....          |          | 8      |
|                                    | <b>E</b> |        |
| electrical parts .....             |          | 34     |
| electrostatic discharge .....      |          | 9      |
| equipment .....                    |          | 9      |
| error code .....                   |          | 12     |

## F

|               |    |
|---------------|----|
| fuse .....    | 11 |
| fuse F1 ..... | 30 |
| fuse F2 ..... | 31 |

## G

|                          |    |
|--------------------------|----|
| "GPIB Switch Test" ..... | 24 |
|--------------------------|----|

## H

|           |    |
|-----------|----|
| HSRQ..... | 26 |
|-----------|----|

## K

|                             |        |
|-----------------------------|--------|
| keyboard .....              | 10, 12 |
| Keyboard Display Test ..... | 29     |
| Keyboard Echo Test .....    | 29     |

## L

|                   |    |
|-------------------|----|
| line voltage..... | 11 |
|-------------------|----|

## M

|                        |    |
|------------------------|----|
| mechanical parts ..... | 38 |
| microprocessor.....    | 32 |
| MODID.....             | 25 |

## O

|                               |    |
|-------------------------------|----|
| output checkout.....          | 13 |
| overall troubleshooting ..... | 23 |

## P

|                               |        |
|-------------------------------|--------|
| PCLR* .....                   | 31     |
| power cord .....              | 10, 11 |
| power module .....            | 7      |
| "PSRQ Pulse Train Test" ..... | 26     |

## R

|                       |    |
|-----------------------|----|
| RD .....              | 32 |
| reassembly .....      | 17 |
| revision number ..... | 8  |
| RIB .....             | 27 |
| ROM .....             | 32 |
| RXF .....             | 26 |
| RXKB .....            | 23 |

## S

|                          |                    |
|--------------------------|--------------------|
| SACLK .....              | 23, 24, 25, 27     |
| SASTRT .....             | 24, 25, 26, 27, 28 |
| schematic                |                    |
| notes.....               | 41                 |
| schematics .....         | 39                 |
| backplane board.....     | 40                 |
| main board .....         | 39                 |
| selftest.....            | 12                 |
| "Serial Link Test" ..... | 28                 |
| serial number .....      | 8                  |
| service manual .....     | 8                  |
| shock hazard .....       | 21, 39             |

## T

|                             |            |
|-----------------------------|------------|
| TINF .....                  | 28         |
| tools .....                 | 9          |
| TP0 .....                   | 23         |
| TP1 .....                   | 23, 30     |
| TP2 .....                   | 23, 30, 31 |
| TP4 .....                   | 23, 30, 31 |
| TP5 .....                   | 30, 31     |
| TP6 .....                   | 32         |
| TP7 .....                   | 32         |
| TP8 .....                   | 32         |
| "TrigIn/TrigOut Test" ..... | 27         |
| troubleshooting .....       | 21         |
| flowcharts .....            | 22         |
| TXF.....                    | 26         |
| TXFEN .....                 | 26         |
| TXKB .....                  | 23         |

## W

|          |    |
|----------|----|
| WR*..... | 32 |
|----------|----|