SERIES
66XXB
PROGRAMMABLE SWEEP GENERATOR

MAINTENANCE MANUAL

Wiltron

490 JARVIS DRIVE ● MORGAN HILL, CA 95037-2809

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MANUAL:
Title: 66XXB Series Programmable Sweep Generator, Maintenance Manual
Part Number: 10350-00028
Rev. Ltr/Date: A

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2. **Pages A1-66 through A1-70B**
   Replace with enclosed pages A1-66 and A1-70B, Changed: June 1995

3. **Pages A2-68 through A2-70**
   Replace with enclosed pages A2-67 and A2-70, Changed: June 1995

MANUAL CONTENTS
(Detailed “Contents” page precedes each section)

Chapter 1 - General Information

Chapter 1 provides general information about the sweep generator and a list of performance specifications.

Chapter 2 - Functional Description

Chapter 2 provides functional description at both a general and detailed level.

Chapter 3 - Troubleshooting

Chapter 3 provides troubleshooting to the major assembly level.

Chapter 4 - Maintenance Procedures

Chapter 4 provides remove and replace procedures for major assemblies and other maintenance-significant parts.

Chapter 5 - Performance Tests

Chapter 5 provides tests for verifying that the sweep generator meets guaranteed performance specifications.

Chapter 6 - Adjustments

Chapter 6 provides adjustment procedures for major assemblies.

Appendix 1 – Parts Lists

Appendix 1 provides parts lists for major assemblies.

Appendix 2 – Service Drawings

Appendix 2 provides parts locator drawings and schematics for circuit card assemblies.

CHAPTER 1
GENERAL INFORMATION

CONTENTS

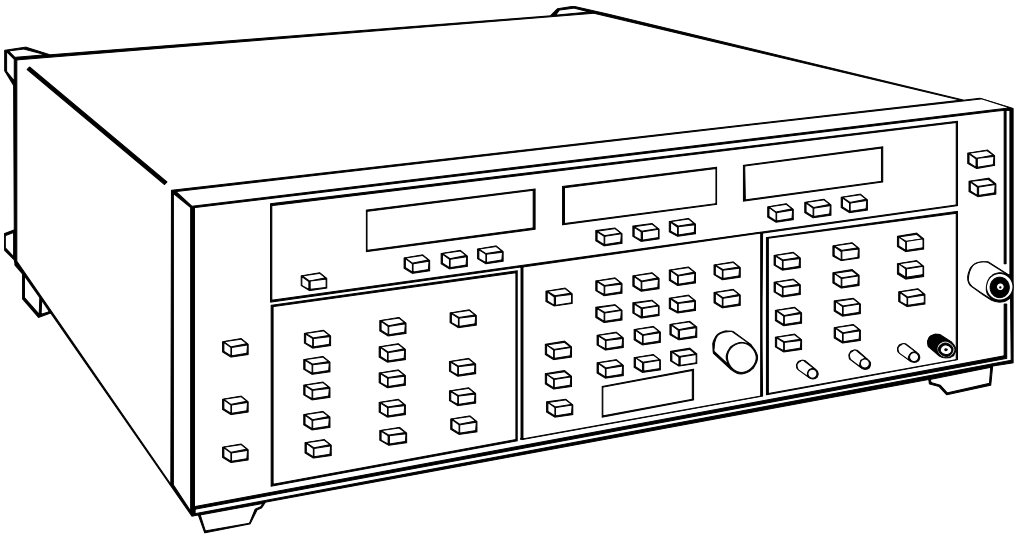


Figure 1-1. 66XXB Series Sweep Generator

CHAPTER 1
GENERAL INFORMATION

1-1. SCOPE OF MANUAL

This is the maintenance manual for the 66XXB Programmable Sweep Generator, hereafter called "sweep generator." This manual provides general information, functional description, troubleshooting, maintenance (remove and replace) procedures, performance test, and adjustments for all 66XXB models. This manual supports maintenance of the sweep generator to the major-subassembly level. Parts lists data and service drawings (schematics and parts locators), which are located in Appendixes 1 and 2, are provided for reference purposes.

1-2. INTRODUCTION

Chapter 1 provides product description; equipment characteristics, capabilities, features; option information; and performance specifications. It also includes a listing of recommended test equipment for maintaining the sweep generator.

1-3. DESCRIPTION

The sweep generator is a microprocessor-based source of RF and microwave energy. It uses from one to four YIG-tuned oscillators to cover one or more frequency bands within a range of 10 MHz to 60 GHz. The sweep generator is capable of producing both broad (full range) and narrow band sweeps, along with discrete CW frequencies, across its entire range. It is fully controllable locally from the front panel or remotely (except for power on/off) via the IEEE-488 bus (GPIB).

1-4. IDENTIFICATION NUMBER

All WILTRON instruments are assigned a unique six-digit ID number. The ID number is imprinted on a decal that is affixed to the rear panel of the unit. In any correspondence with WILTRON Customer Service, please include the correct serial number, along with the specific instrument model number.

1-5. OPTIONS

a. *Rack Mounting, Option 1:* Unit supplied with mounting ears and chassis track slide (90° tilt) installed.

b. *Attenuator, Option 2A:* Adds 10 dB step attenuator with 70 dB range for models having high-end frequency ≤20 GHz. Output power is selected on keypad or control knob directly in dBm over an 82 dB range.

c. *Attenuator, Option 2B:* Adds 10 dB step attenuator with 70 dB range for models having high-end frequency of 26.5 GHz. Output power is selected on keypad or control knob directly in dBm over an 82 dB range.

d. *Attenuator, Option 2C:* Adds 10 dB step attenuator with 70 dB range for models having high-end frequency of 40 GHz. Output power is selected on keypad or control knob directly in dBm over an 82 dB range.

e. *Rear Panel RF Output, Option 9:* Option 9S adds an SMA female and Option 9N adds a Type N female rear panel RF output connector and deletes the front panel RF connector. This degrades output power (typically 1 dB at 20 GHz), source SWR (typically 2 at >8 GHz), and power variation. Not available on units with upper frequency above 26.5 GHz.

f. *Auxiliary Rear Panel RF Connector, Option 10:* Adds SMA female connector to rear panel, providing an attenuated (approximately –15 to –25 dBm) sample of the reduced RF output signal (typically 1.5 dB ≤20 GHz; 2 dB >20 GHz). Not available on models with upper frequency limit above 26.5 GHz.

g. *External Square Wave Input, Option 11:* Adds rear-panel BNC connector for externally applied TTL-compatible signal that modulates RF at rates from dc to 50 kHz. On/Off ratio, typically 40 dB. Maximum input, ±20 volts. Accommodates ±6V square wave. Option for 6610B, 6616B, 6619B, 6619B-40, 6620B, 6624B, 6627B, 6628B, 6628B–50, 6630B, 6630B–50, 6631B, 6632B, 6636B, 6640B, 6640B-10, and 6672B. Standard on all others.

h. *Auxiliary Rear Panel RF Connector, Option 12A:* Adds SMA female connector to rear panel for models having frequency range between 2 and 20 GHz. Option provides an RF sample that is approximately 10 dB below output power.

i. *Auxiliary Rear Panel RF Connector, Option 12B:* Adds SMA female connector to rear panel for models having frequency range between 2 and 26.5 GHz. Option provides an RF sample that is approximately 10 dB below output power.

j. *Frequency Counter Interface, Option 13:* Adds rear panel BNC connector to provide interface with HP 5343A counter for counting marker frequencies.

k. *Model 360B VNA Compatability, Option 14:* Adds side cover weldments, special bottom cover, and intelligent interface to allow WILTRON 360 or 360B Vector Network Analyzer to control the 66XXB as an RF source.

1-6. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

a. *Characteristics.*

- Sweep frequency or continuous wave operation over the full band
- Five front-panel or GPIB selectable sweep-frequency ranges: Full, F_1-F_2, M_1-M_2, ΔF CF, ΔF M1
- Fine-frequency adjustments (Frequency Vernier operation) in CW and ΔF sweep modes
- Three sweep triggering modes: Auto, Line, and External

b. *Capabilities and Features.*

- Eight frequency markers: M1 thru M8
- Three marker display modes: Video, RF, Intensity
- Alternately sweeps between two sets of front panel sweep parameters, such as Full and F1-F2
- Sweeps power over an up-to-15 dB range
- Retains front panel control settings in nonvolatile memory for up to 10 years. Whenever the instrument is turned on, it comes on line having the same control settings and values as when turned off last.

1-7. EQUIPMENT DATA

a. *Weights and Dimensions.*

Weight	32 lb (14.5 kg)
Height	5.25 in. (133 mm)
Width	17 in. (432 mm)
Depth	18.75 in. (476 mm)

b. Power Requirements.

Voltage	115/230V ±20%
Frequency	48 to 400 Hz
Input Power	250 VA maximum
Fuses (2)	4 Amp SB, 115/230 Vac operation

c. Environmental.

Operating temperature range	0 to +55°C
Storage temperature range	–40 to +70°C
Relative humidity	95%±5% (10 to 30°C) 75% ±5% (30 to 40°C) 45% ±5% (40 to 50°C)
Operating altitude	0 to 10,000 ft
Storage altitude	0 to 40,000 ft

d. Performance. See Figure 1-2.

1-8. RECOMMENDED TEST EQUIPMENT

Table 1-1 provides a listing of recommended equipment for test and maintenance.

Table 1-1. Recommended Test Equipment List

Instrument	Critical Specifications	Recommended Manufacturer
Digital Multimeter	DC Volts: 0.05% to 30V 0.002% to 10V 5½ digit resolution	Keithley Model 191
Oscilloscope	Bandwidth: DC to 150 MHz Vertical Sensitivity: 1 mV/division Horizontal Sensitivity: 50 ns/division	Tektronix Inc. Model 2445
Frequency Counter	Frequency Range: 0.01 to 60 GHz Input Impedance: 50Ω Resolution: 1 Hz External Time Base Input	EIP Microwave Inc., Model 548A, with External Mixers: Option 91 (26.5 to 40 GHz) Option 92 (40 to 60 GHz
Power Meter	Frequency Range: 0.01 to 40 GHz Measurement capability: +13 dBm	Hewlett-Packard Model 436A
Power Sensor	Frequency Range: 0.05 to 40 GHz Power Range: –30 to +20 dBm (1µW to 100 mW)	Hewlett-Packard Model 8487A
Spectrum Analyzer with Diplexer and External Mixer	Frequency Range: 0.01 to 60 GHz Resolution Bandwidth: 10 Hz	Tektronix Model 494 with External Mixers WM490K (18 to 26.5 GHz) WM490A (26.5 to 40 GHz) WM490U (40 to 60 GHz) Diplexer PN: 015-3085-00
Modulation Meter	Bandwidth: 15 kHz Sensitivity: –60 dB	Marconi TF2304
True RM Voltmeter	Bandwidth: 10 kHz Sensitivity: –60 dB	Fluke 8921A
Adjustable AC Line Transformer (Variac)	Line Voltage: 100/120V Line Voltage: 220/240V	General Radio W5MTB General Radio W10HM73
RF Detector	Frequency Range: DC to 40 GHz	WILTRON 70KC50
RF Detector	Frequency Range: 18 to 40 GHz	HP R422A
Waveguide Attenuator	Frequency Range: 18 to 40 GHz Attenuation: 20 dB	HP R382A and K382A
Directional Coupler	Frequency Range: 18 to 40 GHz	HP R752C
Power Supply	0-5 Vdc	HP 6281
Waveguide Section	40 to 60 GHz	Baytron Co., Inc. PN: 3-R-69.Q
Waveguide Transitions (2ea)	40 to 60 GHz	Baytron Co., Inc. PN: 3-28-669/19
Adapter	K-female to WR-28 Waveguide	WILTRON WR28KF
Controller	GPIB (IEEE-488) Configured	HP85A or 85B

Model	Frequency Range (GHz)	Output Power (25°C ±5°C)		Power Level Accuracy			Leveled Power Variation		Source SWR (Leveled Power)	Source SWR With Opt., 2 70 dB Attenuator	Signal Purity @ Rated Power			Frequency Accuracy⑤		Frequency Stability		
		Internally Leveled Maximum (mW)	With Opt. 2, 70 dB Attenuator (mW)	Leveled (dB)	With Opt. 2, 70 dB Attenuator (dB)	Attenuator Accuracy Per Step Add (dB)	With Frequency (dB)	With Frequency Opt. 2, 70 dB Attenuator (dB)			Harmonics (dBc)	Non-Harmonics (dBc)	Residual FM③ (kHz peak)	Cw Mode (MHz)	Sweep Mode ≤50 MHz (MHz)	With Temperature (MHz/°C)	With 10 dB Power Level Change (kHz)	With 3:1 Load SWR (kHz)
6609B **6609B-50**	**0.01 to 2**	>20 >50	>17.8 >44.5	±0.6	±0.8	±0.3	±0.3	±0.8	1.3	1.5	<–30 <–20	<–40	<7	±5	±10	±1	±100	±100
6610B	**1 to 2**	>20	>17.8	±1	±1.5	±0.4	±0.3	±0.5	1.3	1.5	<–30②	<–60	<7	±10	±15	±0.5	±500	±300
6616B	**1.7 to 4.3**	>10	>7.8	±1	±1.5	±0.4	±0.4	±0.7	1.2	1.5	<–20 (<2.26 GHz) <–30 (≥2.26 GHz)	<–60	<7	±10	±15	±0.5	±500	±300
6617B **6617B-40**	**0.01 to 8**	>10 >40	>7.9 >31.6	±0.9	±1	±0.4	±0.5	±1	1.5	1.5	<–30 (≤2 GHz) <–40 (>2 GHz) <–20 (≤2 GHz) <–25 (>2 GHz)	<–40 (≤2 GHz) <–60 (>2 GHz)	<7	±5	±10	±1 (≤2 GHz) ±0.5 (>2 GHz)	±100	±100
6619B **6619B-40**	**2 to 8**	>10 >40	>7.9 >31.6	±1	±1.5	±0.4	±0.4	±0.9	1.5	1.5	<–40 <–25	<–60	<7	±10	±15	±0.5	±100	±100
6620B	**3.6 to 6.5**	>20	>15.6	±1	±1.5	±0.4	±0.3 (±0.03 dB/30 MHz)	±0.8	1.5	1.5	<–40	<–60	<7	±10	±15	±0.5	±500	±300
6621B **6621B-40**	**2 to 12.4**	>10 >40	>7.4 >29.5	±1	±1.5	±0.4	±0.5	±1.4	1.5	1.5 (<8 GHz) 1.6 (8-12.4 GHz)	<–40 <–25	<–60	<10	±10	±15	±0.5	±500	±300
6622B **6622B-40**	**0.01 to 12.4**	>10 >40	>7.4 >29.5	±1	±1.5	±0.4	±0.5	±1.4	1.5	1.5	<–30 (≤2 GHz) <–40 (>2 GHz) <–20 (≤2 GHz) <–25 (>2 GHz)	<–40 (≤2 GHz) <–60 (>2 GHz)	<7 (≤8 GHz) <10 (>8 GHz)	±10	±15	±1 (≤2 GHz) ±0.5 (>2 GHz)	±500	±300
6624B	**4 to 8**	>10	>7.8	±1	±1.5	±0.4	±0.4	±0.9	1.5	1.5	<–30②	<–60	<7	±10	±15	±0.5	±500	±300
6627B	**5.9 to 9.0**	>10	>7.8	±1	±1.5	±0.4	±0.3	±0.8	1.5	1.8	<–40	<–60	<10	±10	±15	±0.5	±500	±300
6628B **6628B-50**	**8 to 12.4**	>10 >50	>7.4 >37.2	±1	±1.5	±0.4	±0.4	±0.9	1.5	1.8	<–40 <–25	<–60	<10	±10	±15	±0.5	±500	±300
6629B **6629B-40**	**8 to 20**	>10 >40	>6.6 >26.3	±1	±1.5	±0.4	±0.5	±1.5	1.5	1.6 (≤12.4 GHz) 1.8 (>12.4 GHz)	<–40 <–25	<–60	<10	±10	±15	±0.5	±500	±300
6630B **6630B-50**	**12.4 to 20**	>10 >50	>6.6 >33.9	±1	±1.5	±0.4	±0.5	±1	1.5	1.8	<–32 <–25	<–60	<10	±10	±15	±0.5	±500	±300
6631B	**10 to 15.5**	>10	>7	±1	±1.5	±0.4	±0.4	±0.9	1.5	1.8	<–40	<–60	<10	±10	±15	±0.5	±500	±300
6632B	**17 to 22**	>5	>3.2	±1	±3	±0.7	±0.8	±2.3	1.7	2	<–40	<–60	<10	±15	±25	±1	±500	±300
6635B **6635B-40**	**2 to 18**	>10 >40	>6.6 >26.3	±1	±1.5	±0.4	±0.5	±1.5	1.5	1.5 (<8 GHz) 1.6 (8–12.4 GHz) 1.8 (>12.4 GHz)	<–40 <–25	<–60	<7 (<8 GHz) <10 (>8 GHz)	±10	±15	±0.5	±500	±300
6636B	**18 to 26.5**	>3.1	>1.2	±1	±3	±0.7	±1	±2.5	1.7	2	<–40	<–60	<30	±15	±25	±2	±500	±300
6637B **6637B-40**	**2 to 20**	>10 >40	>6.6 >26.3	±1	±1.5	±0.4	±0.5	±1.5	1.5	1.7 (≤12.4 GHz) 2 (>12.4 GHz)	<–40 <–25	<–60	<7 (<8 GHz) <10 (>8 GHz)	±10	±15	±0.5	±500	±300
6640B **6640B-10**	**26.5 to 40**	>1① >10	N/A >5	N/A ±1	N/A æ2	N/A ±1	N/A ±1	N/A ±2	N/A 2.0	N/A	<–30②	<–60	<40	±20	±30	±2	±500	±300
6645B **6645B-40**	**0.01 to 18**	>10 >40	>6.6 >26.3	±1	±1.5	±0.4	±0.6	±1.5	1.5	1.5 (<8 GHz) 1.6 (8–12.4 GHz) 1.8 (>12.4 GHz)	<–30 (≤2 GHz) <–40 (>2 GHz) <–20 (≤2 GHz) <–25 (>2 GHz)	<–40 (≤2 GHz) <–60 (>2 GHz)	<7 (≤8 GHz) <10 (>8 GHz)	±10	±15	±1 (≤2 GHz) ±0.5 (>2 GHz)	±500	±300
6647B **6647B-40**	**0.01 to 20**	>10 >40	>6.6 >26.3	±1	±1.5	±0.4	±0.6	±1.5	1.5	1.7 (≤12.4 GHz) 2 (>12.4 GHz)	<–30 (≤2 GHz) <–40 (>2 GHz) <–20 (≤2 GHz) <–25 (>2 GHz)	<–40 (≤2 GHz) <–60 (>2 GHz)	<7 (≤8 GHz) <10 (>8 GHz)	±10	±15	±1 (≤2 GHz) ±0.5 (>2 GHz)	±500	±300
6653B	**2 to 26.5**	>10 (≤18 GHz) >5 (>18 GHz)	>5 (≤18 GHz) >2 (>18 GHz)	±1.5	±2.0	±0.7	±1.0	±1.5	1.5 (≤18 GHz) 1.7 (>18 GHz)	1.7 (≤12.4 GHz) 2 (>12.4 GHz)	<–40	<–60	<7 (<8 GHz) <10 (8–18 GHz) <15 (>18 GHz)	±20	±30	±1	±500	±300
6659B	**0.01 to 26.5**	>10 (≤18 GHz) >5 (>18 GHz)	>5 (≤18 GHz) >2 (>18 GHz)	±1.5	±2.0	±0.7	±1.0	±1.5	1.5 (≤18 GHz) 1.7 (>18 GHz)	1.7 (≤12.4 GHz) 2 (>12.4 GHz)	<–30 (<2 GHz) <–40 (>2 GHz)	<–40 (≤2 GHz) <–60 (>2 GHz)	<7 (<8 GHz) <10 (8–18 GHz) <15 (>18 GHz)	±20	±30	±1 (≤2 GHz) ±0.5 (>2 GHz)	±500	±300
6660B	**12.4 to 40**	>4	>2	±2	±2.5	±1	±1.5	±2	1.5 (≤18 GHz) 1.7 (18-26.5 GHz) 2 (>26.5 GHz)	N/A	<–40 (≤26.5 GHz) <–20 (>26.5 GHz)	<–60	<10 (<18 GHz) <15 (18–26.5 GHz) <20 (>26.5 GHz)	±20	±30	±1 (≤26.5 GHz) ±2 (>26.5 GHz)	±300	±300
6662B⑦ **6663B**	**2 to 40**	>10 (≤18 GHz) >4 (>18 GHz) >3.1	N/A >1.5	±1.5 N/A (>26.5 GHz) ±2	N/A ±2.5	N/A ±1	±1 N/A (>26.5 GHz) ±1.5	N/A ±2	1.5 (≤18 GHz) 1.7 (>18 GHz) N/A (>26.5 GHz) 1.5 (≤18 GHz) 1.7 (>18 GHz) 2 (>26.5 GHz)	1.25 (<8 GHz) 1.45 (8–12.4 GHz) 1.6 (12.4–20 GHz) 1.8 (20–26.5 GHz) 2.1 (26.5–40 GHz)	<–40 (2–26.5 GHz) <–30 (>26.5 GHz)②	<–60	<7 (<8 GHz) <10 (8–18 GHz) <15 (18–26.5 GHz <20 (>26.5 GHz)	±20	±30	±1 (≤26.5 GHz) ±2 (>26.5 GHz)	±500	±300
6668B⑥ **6669B**	**0.01 to 40**	>10 (≤18 GHz) >4 (>18 GHz) >3.1	N/A >1.5	±1.5 N/A (>26.5 GHz) ±2	N/A ±2.5	N/A ±1	±1 N/A (>26.5 GHz)① ±1.5	N/A ±2	1.5 (≤18 GHz) 1.7 (>18 GHz) N/A (>26.5 GHz)① 1.5 (≤18 GHz) 1.7 (>18 GHz) 2 (>26.5 GHz)	1.25 (<8 GHz) 1.45 (8–12.4 GHz) 1.6 (12.4–20 GHz) 1.8 (20–26.5 GHz) 2.1 (26.5–40 GHz)	<–30 (<2 GHz) <–40 (2–26.5 GHz) <–30 (>26.5 GHz)②	<–40 (≤2 GHz) <–60 (>2 GHz)	<7 (<8 GHz) <10 (8–18 GHz) <15 (18–26.5 GHz <20 (>26.5 GHz)	±20	±30	±1 (≤26.5 GHz) ±2 (>26.5 GHz)	±500	±300
6672B	**40 to 60**	>1①	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<–20④	<–60	<50	±30	±45	±3	N/A	±300

①External leveling only ②Excluding 5% band edges where specification is >20 dBc ③Measured in 30 Hz-15 kHz bandwidth ④Subharmonics ⑤At 25°C ⑥ Dual outputs: 0.01–26.5 GHz and 26.5–40 GHz ⑦ Dual outputs: 2–26.5 GHz and 26.5–40 GHz

Figure 1-2. Performance Specifications

CHAPTER 2
FUNCTIONAL DESCRIPTION

CONTENTS

CHAPTER 2
FUNCTIONAL DESCRIPTION

2-1. INTRODUCTION

This chapter provides a general description of the sweep generator and detailed functional descriptions for major assemblies.

2-2. GENERAL FUNCTIONAL DESCRIPTION

The sweep generator is a microprocessor-controlled, broadband, sweep-frequency and continuous-wave (CW) signal source. It is physically organized into four assemblies and functionally organized into nine groups. The four physical assemblies are as follows:

- A1 Basic Frame
- A2 Front Panel
- A3 Rear Panel
- A4 RF Deck

The nine functional groups are as follows:

- User Interface and Instrument Control
- Sweep Ramp
- Marker Generator
- ALC
- Frequency Instruction
- FM
- Frequency Generation
- RF Control and Sampling
- Power Supply.

Refer to foldout Figure 2-11, located at the end of this chapter, while reading the following description. This figure is for a 10 MHz to 40 GHz model, which has the maximum number of frequency bands. The operation for other models is similar, except they have fewer frequency-generating elements.

Operationally, the functional groups consist of printed circuit boards (PCBs) and microwave assemblies that are both physical and functional groupings. The overall block diagram shows the PCBs and microwave assemblies and how they relate to the higher physical and functional groups.

(1) A1A1 GPIB Interface PCB interfaces the sweep generator with the IEEE-488 Bus (GPIB). The PCB has two sets of input and output (I/O) lines. One set is via the rear panel GPIB connector to an external controller; the other set is via on-board connectors to A2A12 Microprocessor PCB.

(2) A2A12 Microprocessor PCB controls the operation of the sweep generator. It has I/O links with A2A11 Front Panel PCB and all of the PCBs in the A1 Basic Frame Assembly. It also routes the signals from the front panel MARKER AMPL'D, RF SLOPE, and MANUAL SWEEP controls to PCBs in the basic frame. The Marker Amplitude signal goes to A1A3 Markers Generator PCB, the RF Slope signal goes to A1A4 ALC PCB, and the Manual Sweep signal goes to the A1A5 Frequency Instruction PCB. Digital latches on A1A14 Motherboard PCB link A1 PCBs to A2A12 for error code reporting.

3 A2A11 Front Panel PCB, in conjunction with A2A1 Front Panel Subassembly, is the mounting plane for the front panel keys, indicators, and numeric displays. It communicates with A2A12 Microprocessor PCB via an I/O data bus. The External Input and External ALC Gain signals are routed directly to A1A4 ALC PCB. They do not go through A2A12 Microprocessor PCB.

4 A1A2 Ramp Generator PCB generates the analog sweep ramp, one of the three voltage-tuning signals used to produce the sweep generator swept-frequency output. It has I/O communication with A2A12 Microprocessor PCB. Other inputs and outputs are as follows:

Inputs	Outputs
External ramp trigger signal from the rear panel SWEEP TRIGGER INPUT connector	Ramp Out signal to A1A5 Frequency Instruction PCB
End-of-Band (EOB) signal from A1A10 FM/Attenuator	Blanking signals to the rear panel POS Z BLANKING and NEG Z BLANKING connectors
Intensity Marker signal from A1A3 Markers Generator PCB	

5 A1A3 Markers Generator PCB generates the M1 thru M8 RF, Video, and Intensity markers. It has I/O communication with A2A12 Microprocessor PCB. Other inputs and outputs are as follows:

Inputs	Outputs
Marker Amplitude signal from A2A12 Microprocessor PCB	Routes ramp generated on A1A2 Ramp Generator PCB to the front and rear panel HORIZ OUTPUT connectors
Ramp signal from A1A5 Frequency Instruction PCB	Marker signals to the rear panel MARKER OUTPUT connector and to A1A4 ALC PCB

6 A1A4 ALC PCB controls the automatic leveling of the RF output power. It has I/O communication with A2A12 Microprocessor PCB. Other inputs and outputs are as follows:

Inputs	Outputs
RF Markers from A1A3 Markers Generator PCB	PIN Modulator Driver signal to A1A6, A1A7, A1A8, A1A9 YIG Driver PCBs
RF Slope signal from A2A12 Microprocessor PCB	ATTN 1-4 control voltages to A1A10 FM/Attenuator PCB
External Input signal from A2A1 Front Subpanel	
ALC IN >2 GHz signal from internal A4DC1 Directional Coupler	
ALC IN <2 GHz signal from directional coupler in A4A1 Down Converter	

7 A1A5 Frequency Instruction PCB provides overall control for the Frequency Generation function. This function consists of the four YIG Driver PCBs and their associated A4 RF Deck Assembly components. It has I/O communication with A2A12 Microprocessor PCB. Other inputs and outputs are as follows:

Inputs	Outputs
A2 Ramp signal from A1A2 Ramp Generator PCB	Control signals (FCen/VPF, FCorr, FCen, ΔF>50 MHz) to the YIG Driver PCB(s)
Manual Sweep signal from A2A12 Microprocessor PCB	ΔF ≤50MHz signal to A1A10 FM/Attenuator PCB Frequency Correction Bus from A1A6, A1A7, A1A8, and/or A1A9 YIG Driver PCB(s)

8 A1A10 FM/Attenuator PCB controls frequency modulation for the YIG oscillators. It also provides drive signals for the Band 1 YIG tracking filter and control voltages for A4AT1 Step Attenuator. It has I/O communication with A2A12 Microprocessor PCB. Other inputs and outputs are as follows:

Inputs	Outputs
Microprocessor control data (ATTN 1-4) to set attenuation for A4AT1 Step Attenuator	Tracking Filter control signal to Band 1 YIG Oscillator
ΔF ≤50 MHz control signal from A1A5 Frequency Instruction PCB	FM coil tuning voltages to YIG oscillators
FM control input from rear panel EXT FM ∅ LOCK INPUT connector	Attenuator control voltages to A4AT1 Step Attenuator
Control signals from A1A6, A1A7, A1A8, A1A9 YIG Driver PCBs	EOB signal to A1A2 Ramp Generator PCB

9 A1A6, A1A7, A1A8, and A1A9 YIG Driver PCBs provide drive currents for the PIN switches and for their associated YIG oscillator tuning coils. Their inputs and outputs are as follows:

Inputs	Outputs
Frequency data (ROM Bus) from A2A12 Microprocessor PCB	YIG oscillator linearity data (FC Bus) to A1A5 Frequency Instruction PCB
Control signals (FCen/VPF, FCorr, FCen, ΔF >50 MHz) from A1A5 Frequency Instruction PCB	Tuning currents and bias voltages to respective YIG oscillator
SNB and SNR control lines between YIG Driver PCBs	Control signals (Het Yig Sel, YIG FM Coil Sel, Track Filter) to A1A10 FM/Attenuator PCB
PIN Mod Driver signal from A1A4 ALC PCB	

10 The YIG-tuned oscillators are microwave oscillators providing precisely controlled wideband tuning. Such tuning is accomplished by controlling current through a tuning solenoid that acts as a resident YIG-tuned filter. In the sweep generator, the oscillators are GaAs FET types.

(11) The Modulator is a current-controlled variable attenuator. It provides amplitude modulation and power leveling for the Band 1 YIG Osc output, along with impedance matching and isolation.

(12) A4S1 and A4S2 PIN Switches are current-controlled switches and variable attenuators. They switch between the four YIG oscillators so as to couple only one at a time to the RF OUTPUT circuit. The resident variable attenuators provide for amplitude-modulating and power-leveling the RF output signal. PIN Switch A4S2 is only used in models having a high-end frequency of 40 GHz.

(13) A1A6 Frequency Doubler doubles the 13.75-to-20 GHz output from the Ku/Ka-Band oscillator to provide the 27.5-to-40 GHz Ka-band output. This component is only used in models having a high-end frequency of 40 GHz.

(14) A4A1 Down Converter generates the 0.01-to-2 GHz sweep and CW-frequency outputs. When the operator selects a frequency between 0.01 and 2 GHz, the Band 1 YIG oscillator sweeps between 4.61 and 6.6 GHz. This output, via A4S1 PIN Switch, mixes with the output from a 4.6 GHz local oscillator in the A4A1 Down Converter. The difference frequency, after being amplified, provides the 0.01-to-2 GHz output. A portion of this energy is detected and fed to the A1A4 ALC PCB for internal power leveling.

(15) A4DC1 Directional Coupler detects and couples a portion of the 2-to-40 GHz RF output for power leveling. It sends a detected sample to A1A4 ALC PCB for internal power leveling.

(16) A4AT1 Step Attenuator (Option 2X) provides up to 70 dB of attenuation for the RF output. A1A10 FM/Attenuator PCB provides the drive current for the attenuator.

(17) A1A14 Motherboard PCB connects the various A1 Basic Frame Assembly and A2 Front Panel Assembly PCBs with the A3 Rear Panel Assembly connectors and A4 RF Deck Assembly components. This PCB also contains PIN Switch port drive circuits, part of the switching power supply circuit, and digital latches used with circuits on A1A12 PCB for error code reporting.

(18) A1A13 Switching Power Supply PCB works in conjunction with circuits on A1A14 Motherboard PCB to supply operating voltages for sweep generator circuits.

2-3. DETAILED FUNCTIONAL DESCRIPTION

The following is a detailed functional description of key sweep generator assemblies.

a. A1A1 GPIB Interface PCB. This PCB (Figure 2-1) provides the interface between the sweep generator and the IEEE-488 Bus (GPIB). It has its own Microprocessor and GPIB Interface ICs. The Microprocessor IC provides both control for the GPIB Interface IC and other on-board circuits and communications between this PCB and the A2A12 Microprocessor PCB. The GPIB Interface IC provides communications between the sweep generator and the GPIB controller.

A1A1 GPIB Interface PCB is functionally organized into the following circuits:

- Analog Interface Circuits. These circuits provide the interface between the analog circuits in the Sweep Generator that can cause an SRQ (service request) and the GPIB microprocessor.
- LED Drivers. These circuits drive the REMOTE, LOCAL LOCKOUT, TALK, LISTEN, and SRQ front panel GPIB LED indicators.
- Read Only Memory (ROM). The ROM contains the operational program that controls A1A1 PCB.
- Random Access Memory (RAM). The RAM temporarily stores the received GPIB command.

NOTE

In the circuit discussion, the L or H that precedes a signal-line name indicates the line's active (or true) logic state. L = Low Active State and H = High Active State.

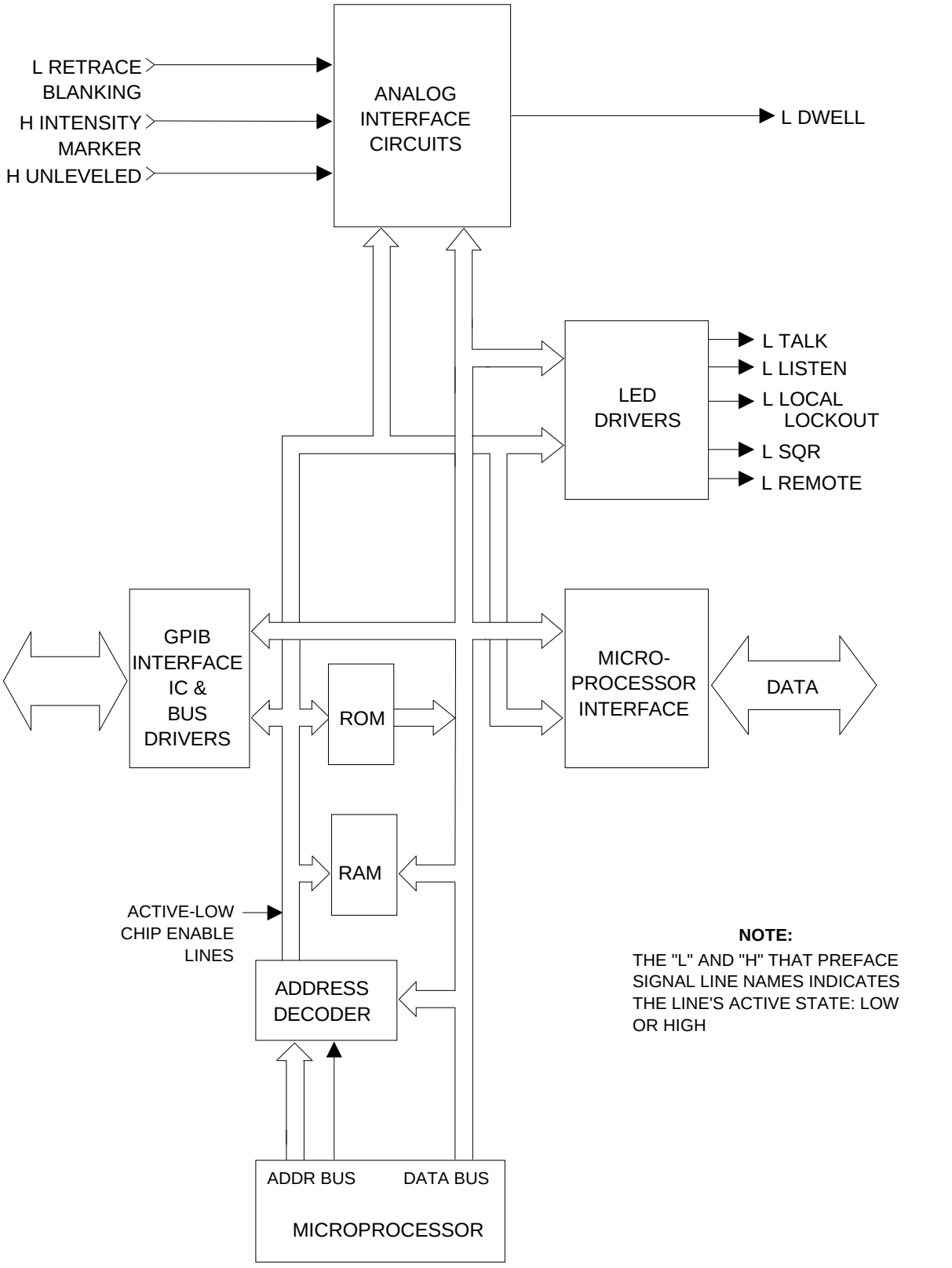


Figure 2-1. A1A1 GPIB Interface CCA Functional Block Diagram

b. A2A12 Microprocessor PCB. This PCB (Figure 2-2) provides the following functions:

- It interfaces front panel keys with analog sweep and microwave-signal generation circuits. This interface is via A2A11 Front Panel PCB.
- It controls the operation of the sweep generator using its kernel elements. This kernel comprises a Microprocessor IC (microprocessor), a Keyboard/Display Interface IC, 16K bytes of ROM, and 8K bytes of RAM.

NOTE

In the following circuit discussion, the L or H that precedes a signal-line name indicates the line's active (or true) logic state.

- L = Low Active State.
- H = High Active State.

The Keyboard/Display Interface IC interfaces the microprocessor with the front panel keys and numeric displays. This IC sends scan lines to A2A11 PCB via the SL0-SL3 Bus. These lines cause continuous scanning of front panel keys and numeric-display digits. When a key is pressed, an 8-bit word representing that key goes out over the COL1-COL8 Bus to the Keyboard/Display Interface IC. This word is known as the keycode. The intelligence contained therein eventually finds its way to the microprocessor. Conversely, when the microprocessor selects a numeric display for update, a likewise-coded word representing that display-segment is sent over the NA0-NA3/NB0-NB3 Bus to one of the three displays.

The I/O Buffer #2 circuit interfaces the microprocessor with A1A2 thru A1A5 analog PCBs, the ROM Bus latch, and the diagnostic (self-test) latches on A1A14 Motherboard PCB. Also, the bidirectional buffer #2 circuit interfaces the microprocessor with A1A1 GPIB Interface PCB.

The Input Buffer routes control signal data. This data comes from analog PCBs A1A2, A1A3, and A1A4, digital PCB A1A1, and the A2A11 Front Panel PCB. It goes to the microprocessor.

The I/O Buffer #1 circuit buffers the input/output interface circuit from the kernel elements in the microprocessor. This kernel consists of the following:

- Microprocessor. The microprocessor is a complete central-processing unit. It contains all of the necessary registers, plus the arithmetic logic unit and control lines that provide addresses for the memory circuits.
- Battery Backed-up RAM. The RAM circuit stores the data input from the front panel keys. The internal RAM Battery provides operating power for the read/write memory when the ac power is turned off. This makes this memory non-volatile.
- ROM. The ROM contains both the microprocessor operational program and the reset (default) parameter data.
- Port Decoders. The port decoders are divided between input and output ports. The microprocessor output-port data are decoded and select one of 64 output ports. The selected port then receives the data that the microprocessor has concurrently sent over the data bus.

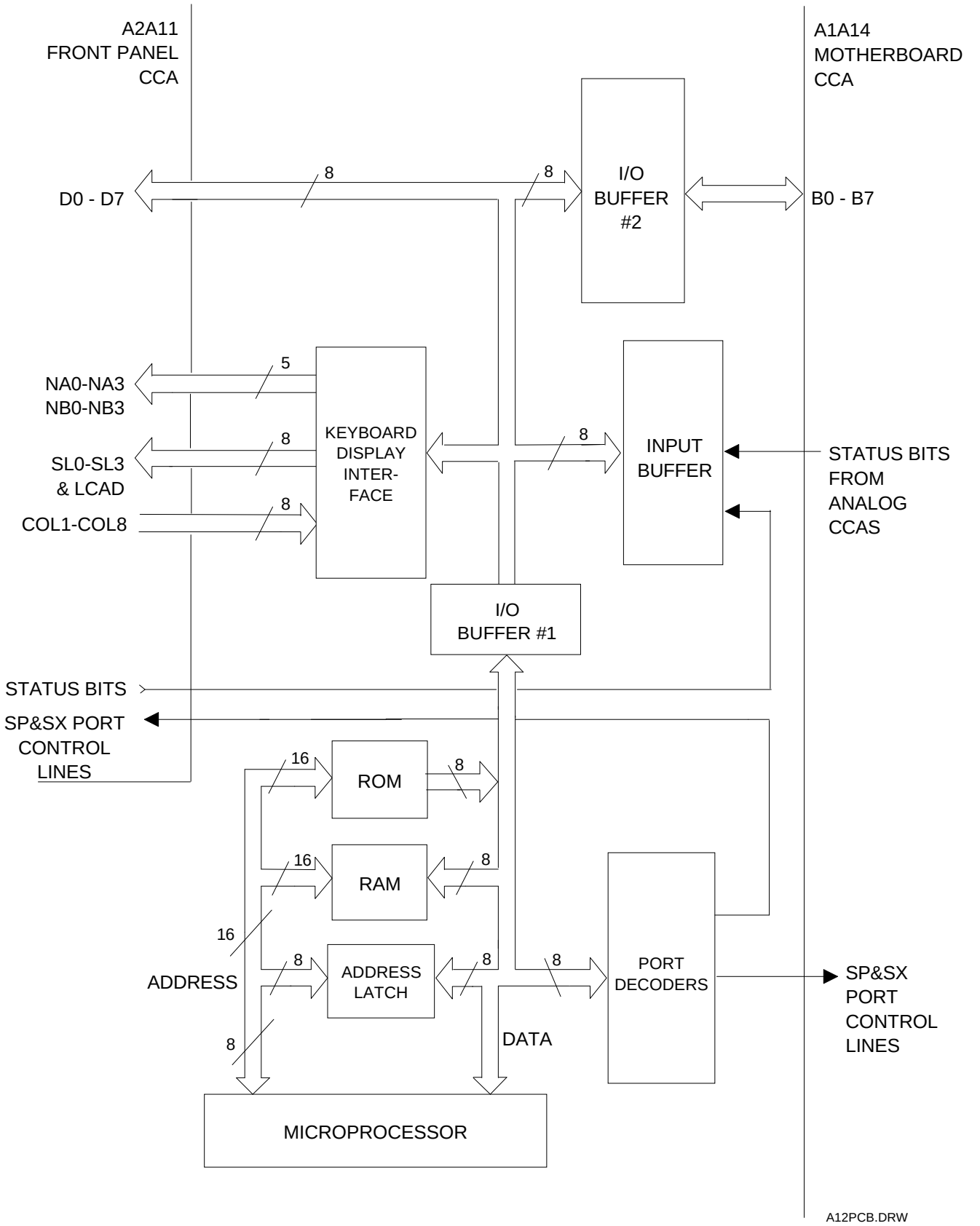


Figure 2-2. A2A12 Microprocessor CCA Functional Block Diagram

c. *A2A11 Front Panel PCB*. This PCB (Figure 2-3)—along with A2A1 Front Subpanel Assembly—is the mounting plane for the front panel keys, indicators, and numeric displays. A2A11 PCB is functionally divided into three circuits: Display, Switch, and LED. The display circuitry consists of the following:

- 4-to-16 Decoder circuit
- Current Source circuit
- Numeric Display digits
- Current Sink circuit

The inputs to the display circuit are scanning data via the SL0-SL3 Bus and display-segment data via the NA0-NA3/NB0-NB3 Bus. Both buses are from the Keyboard/Display Interface IC on A2A12 PCB. When decoded, this scanning data scan the display digits; the segment data light the selected segment.

The switch circuit contains two groups of switches. The main switch group consists of the 3-to-8 Decoder and the 8x8 Switch Matrix. The inputs to this switch circuit are the SL0-SL3 scan-bus lines from the Keyboard/ Display Interface IC. When decoded, these lines sequentially scan the eight rows of switch-matrix switches. Key status goes to the Keyboard/Display Interface IC via the 8-bit COL1-COL8 Bus.

The second switch group is the FREQUENCY VERNIER, INCREASE and DECREASE switches. These switches communicate information when held depressed. Each switch has two sets of contacts—the ones shown and another located within the switch matrix.

The LED circuitry consists of three groups of LEDs:

- LEDs showing GPIB status
- LEDs that flash
- LEDs that light steadily

The GPIB LEDs are the REMOTE, LOCAL LOCKOUT, TALK, LISTEN, and SRQ indicators. The flashing LEDs are the UNLEVELED, RF OFF, SWEEPING FREQUENCY, SWEEPING POWER, and EXTERNAL ALC GAIN CAL (ALC CAL) indicators. A2A12 PCB directly controls both the GPIB and the flashing LEDs. Except for those LEDs mentioned, all the other front panel LEDs are non-flashing types. A2A12 PCB controls these non-flashing LEDs via the LED Latches. The latches are clocked by select-port lines SP16-SP21.

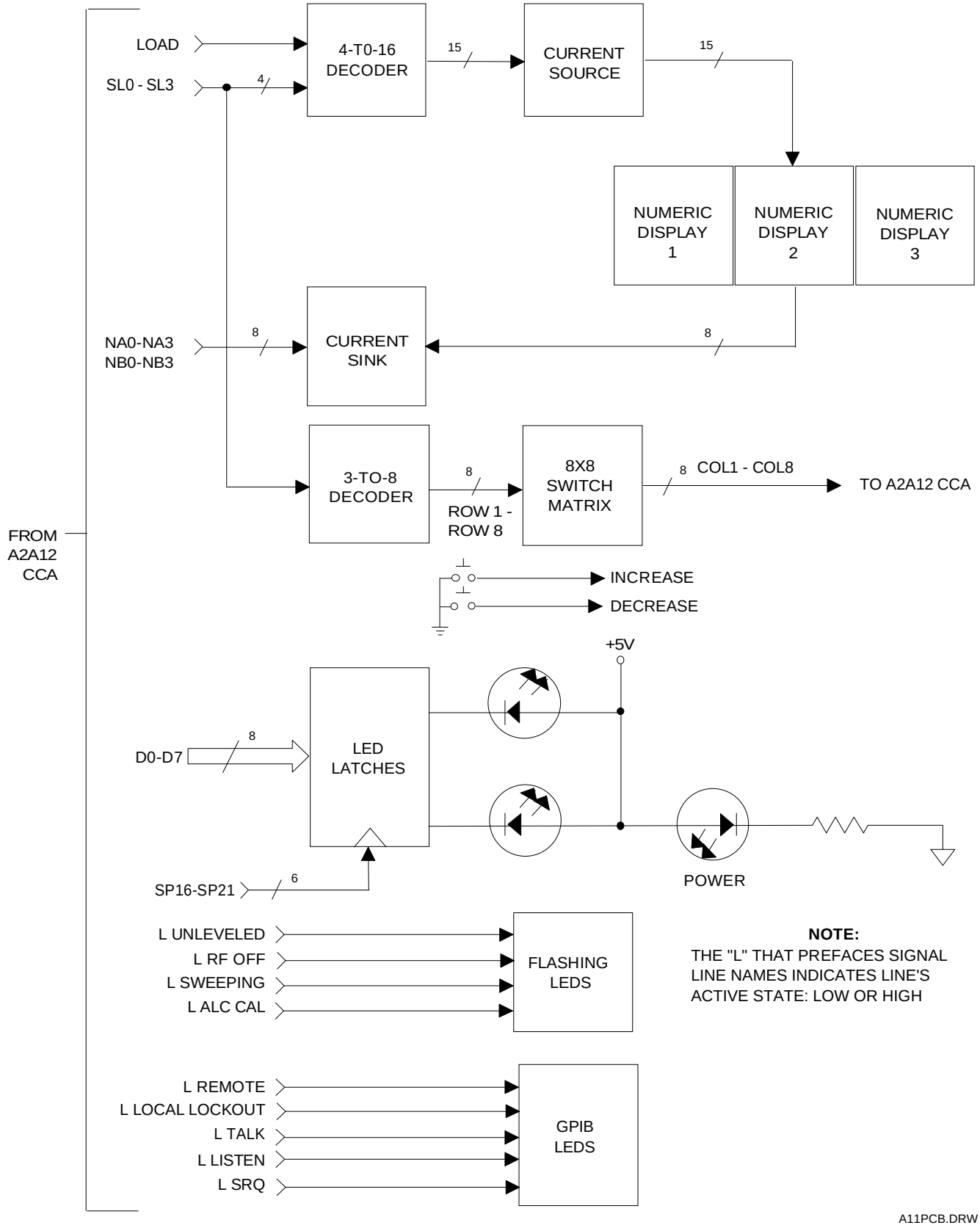


Figure 2-3. A2A11 Front Panel CCA Functional Block Diagram

d. A1A2 Ramp Generator PCB. This PCB (Figure 2-4) generates the analog sweep ramp (Figure 2-5). This ramp is one of the voltage-tuning signals used to produce the sweep generator swept-frequency output. The PCB also generates the Seq Sync signal for the rear panel connector. The A1A2 Ramp Generator PCB can be said to contain three functional blocks. These blocks are described below.

- Ramp Generator. These circuits generate the 0–10V ramp available from the rear panel HORIZ OUTPUT connector. The A2 Ramp signal goes to the A1A5 Frequency Instruction PCB, then to the rear panel. The Ramp Generator circuits also generate four other signals, as shown. The L Retrace Blanking and L Pen Relay Active signals go to rear panel connectors. The former is a negative-going blanking signal that occurs during sweep retrace; the latter controls the A1A14K1 penlift relay. This relay connects to the PENLIFT OUTPUT connector. The relay controls the lifting and dropping of the pen on an external X-Y recorder. The remaining two output signals, Ext FM Enable and H Sweep, are used by A1A10 FM/Attenuator PCB and the diagnostic circuit on A1A14 Motherboard PCB. The inputs to this functional block are (1) data and strobe pulses from A2A12 Microprocessor PCB and (2) control signals from both the Sweep Trigger Control and Dwell Timing Circuits.
- Dwell Timing Circuits. These circuits control the dwell (halting) of the sweep ramp to allow coordinate actions, such as bandswitching, to occur. Figure 2-5 shows the various dwell-signals and describes how they affect the sweep ramp.
- Sweep Trigger Control. These circuits control the recurrence of the sweep ramp. The inputs to this block are of two types: digital data from A2A12 Microprocessor PCB and analog signals from the power supply and rear panel. The digital data contains front panel TRIGGER keys information (AUTO, LINE, EXT OR SINGLE). The two analog signals (AC Line Voltage and External Trigger Pulse) provide drive for their respective control circuits.

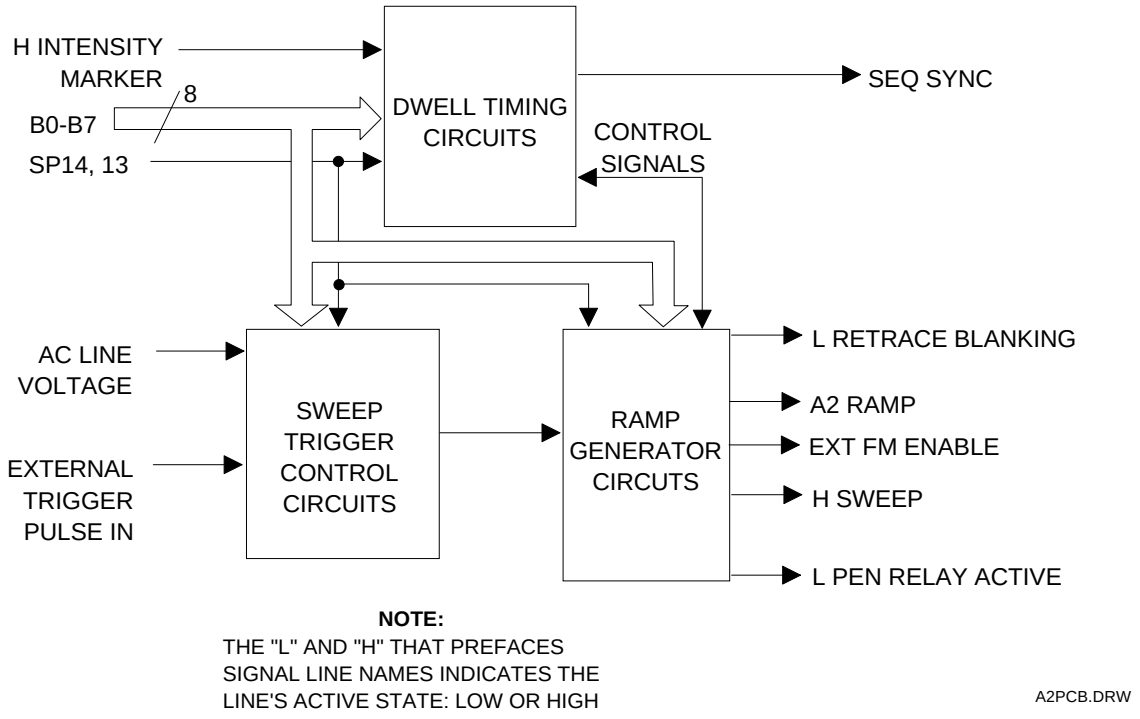
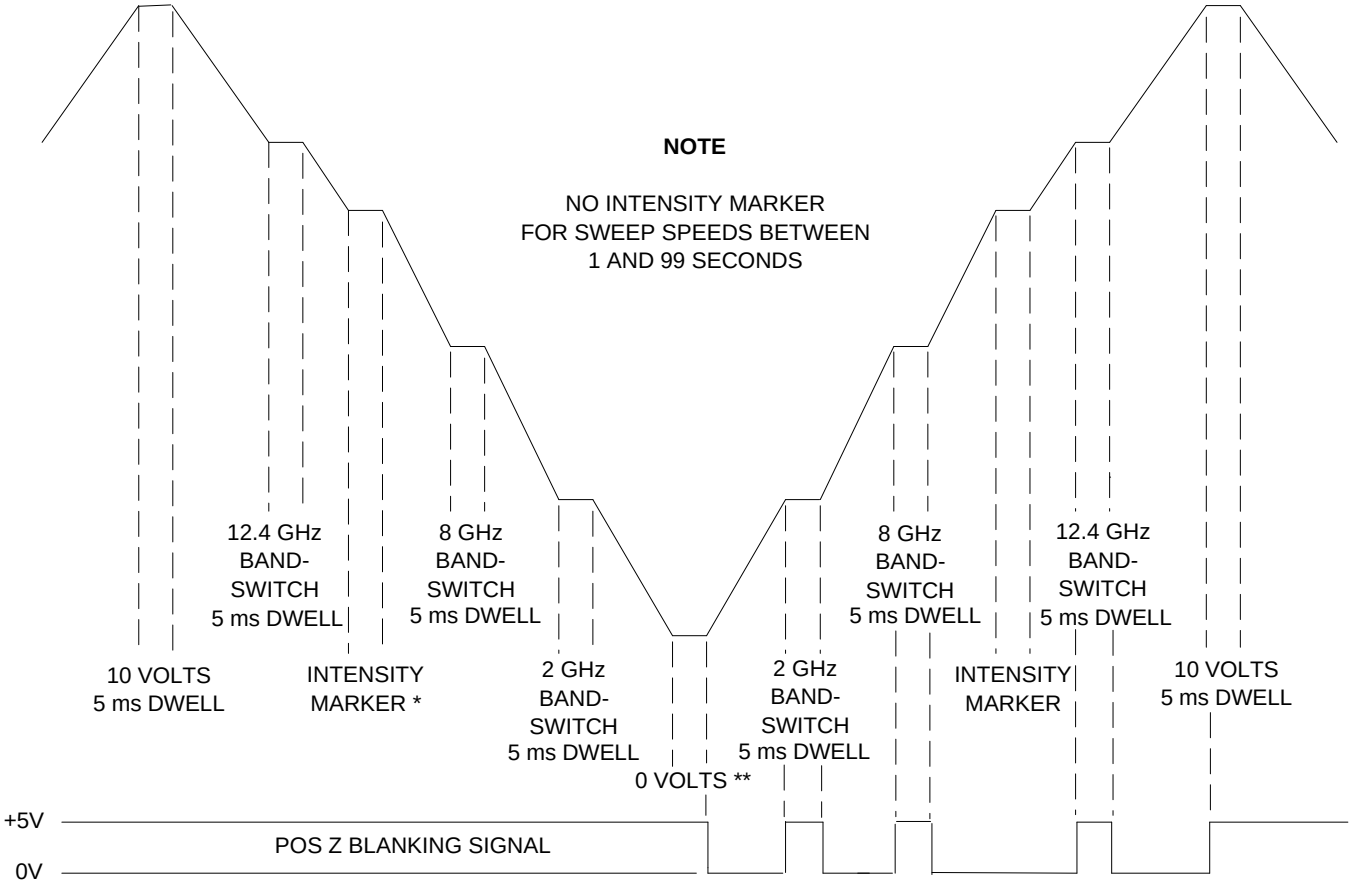


Figure 2-4. A1A2 Ramp Generator CCA Functional Block Diagram



* DWELL IS PROPORTIONAL TO SWEEP TIME
** DWELL IS 5 ms FOR SWEEP TIMES OF 1 SECOND OR LESS, AND
PROPORTIONAL TO SWEEP TIME FOR SWEEP TIMES GREATER THAN 1 SECOND.

A2RAMP.DRW

Figure 2-5. Analog Sweep Ramp

e. A1A3 Markers Generator PCB. This PCB (Figure 2-6) generates the M1 thru M8 RF, Video, and Intensity markers. This PCB has four functional blocks. Inputs to the PCB are as follows:

- Retrace Blanking control lines from A1A2 Ramp Generator PCB
- 0–10V sweep ramp from A1A5 PCB. The 0–10V Sweep Ramp may be either of the following:
  - Ramp Output signal from A1A2 Ramp Generator PCB
  - Manual sweep input from the front panel
  - Step frequency DAC signal from A1A1 GPIB Interface PCB
- A2A12 Microprocessor PCB inputs. These inputs are an 8-bit data bus, a 3-bit marker -select digital word, or seven strobe pulses that serve as latch-clock-control bits. The data bus provides marker frequency and mode data.

The main functional block of the A1A3 PCB is the Marker Generator. Containing eight identical circuits, it converts the data bus M1-M8 frequency data to appropriate M1-M8 analog voltages. It then compares these M1-M8 voltages with the 0-10V Sweep Ramp input signal and generates appropriate M1-M8 frequency markers. The eight circuits provide output signals that are summed into one composite-marker signal. This signal goes to the Marker Output circuit via the front panel MARKER AMPL'D control. The composite marker signal also goes directly to the Intensity Marker output circuit.

The Marker Select, Control, and Mode Enable Logic block processes the data bus mode information to decode between Video, RF, or Intensity marker modes. This block outputs control signals to the Marker Generator block and mode-enable signals to the Marker Output circuit. The control signals determine which of the up-to-eight markers are to be generated, and the mode-enable signals determine marker mode: Video, RF, or Intensity.

The Marker Output circuit outputs the following:

- Video Marker signal to the rear panel.
- Intensity Marker signal to A1A2 Ramp Generator PCB.
- RF Marker to the Power Sweep circuit. The output of the Power Sweep circuit goes to A1A4 ALC PCB, where it modifies the RF output level to produce a dip in power at the marker frequency.

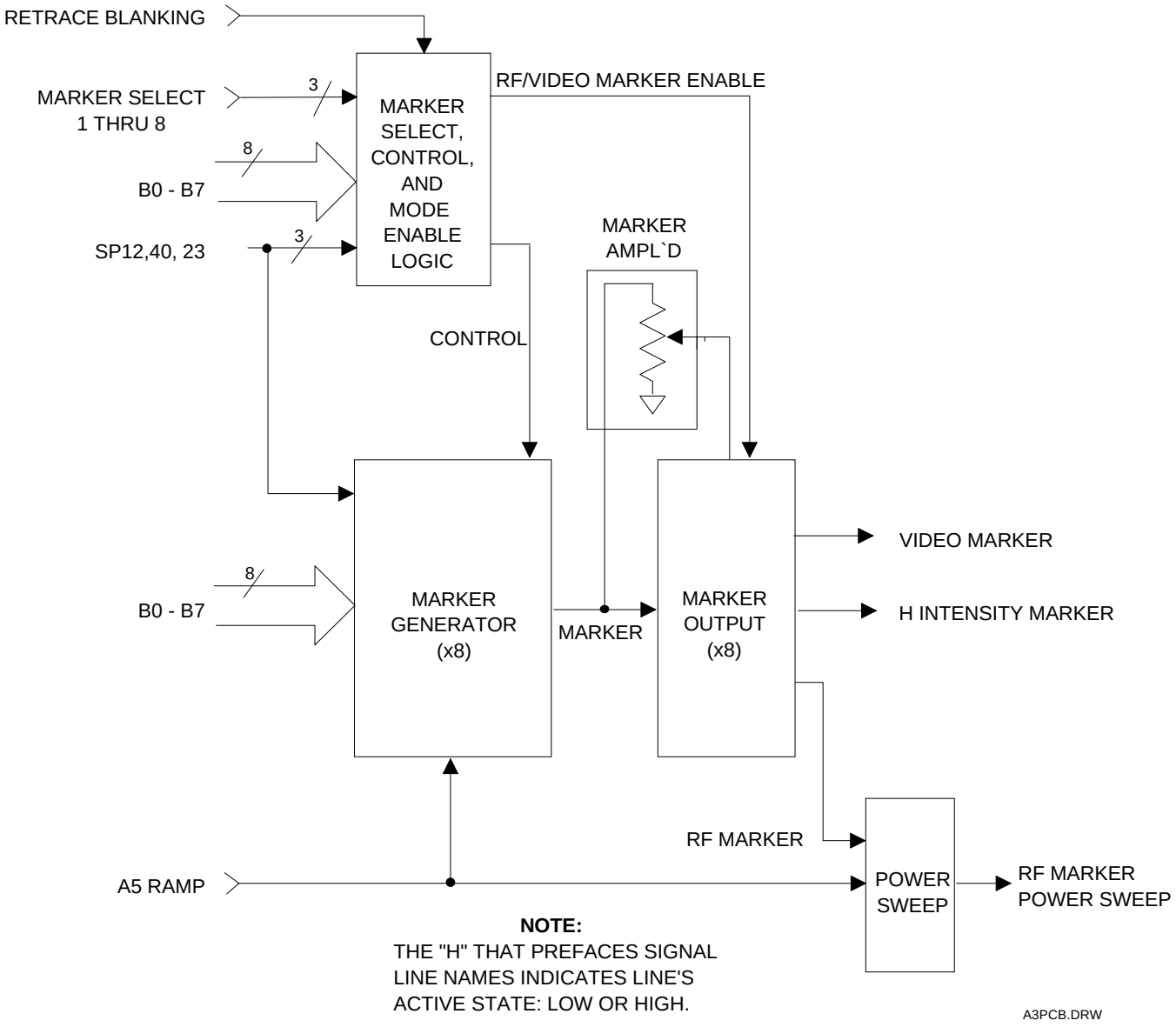


Figure 2-6. A1A3 Marker Generator CCA Functional Block Diagram

f. A1A4 ALC PCB. This PCB, along with circuits on A4 RF Deck Assembly and the appropriate Band 1, 2, 3, or 4 YIG Driver, provides for automatically leveling RF output power (Figure 2-7). Although not shown, this PCB also processes A4AT1 Step Attenuator control bits. It receives these bits (ATTN 1 thru ATTN 4 lines) from A2A12 Microprocessor PCB. It then routes them to A4AT1, via current-drivers on A1A10 FM/Attenuator PCB.

The output from the microprocessor-selected YIG oscillator goes to A4DC1 Directional Coupler via A4S1 PIN Switch. The directional coupler sends a sample of the RF power to its built-in RF detector. If the operator selects internal leveling, the detected power goes to the Log Amp/Shaper. Routing is via either the appropriate >2 GHz or <2 GHz Preamp. If external leveling is selected, an externally connected detector couples its output to the Log Amp/Shaper via the Absolute Value circuit. At the Log Amp/Shaper, the detected signal gets amplified and shaped. Its relationship to the main power signal also changes from logarithmic to linear. The changed signal goes to the Level Amp. There it is summed with the voltage output from the Latch/DAC IC.

One Log Amp/Shaper output is the analog-voltage representation of the digital power-word selected using the front panel LEVEL key. The Level Amp output goes to the PIN Driver/Linearizer circuit on A1A6, A1A7, A1A8, or A1A9 YIG Driver PCB. Which of these PCBs it goes to depends on which YIG oscillator is supplying the output frequency. The PIN Driver/Linearizer circuit customizes loop gain for each YIG oscillator. The other output provides the input to the Unlevel Compare circuit. This circuit provides drive for the front panel UNLEVELED indicator LED. If the output of the Level Amp goes positive (more power called for than YIG oscillator can deliver) the UNLEVELED indicator lights.

Other inputs to the Level Amp are as follows:

- EXT AM signal from the rear panel EXT AM INPUT connector.
- RF Marker signal from A1A3 Markers Generator PCB.
- RF Slope signal from the front panel RF SLOPE control. This signal provides a linear boost in output power as the RF oscillator sweeps across its frequency band. The RF Slope input is a negative-going voltage ramp that is proportional to frequency. It provides an increase in output power at the higher frequencies.

The Compensation circuit that bridges the Level Amp stabilizes the loop. It also slows the response of the ALC loop when the operator selects power meter leveling. This is necessary because of the power meter's slower response to variations in output power.

The circuit associated with the front panel EXTERNAL INPUT connector provides two functions:

- The Absolute Value circuit provides for using a positive or negative external detector. The circuit output is positive for either input polarity.
- The External Gain Compare circuit provides for calibrating the gain of the external leveling loop. When the operator presses the EXTERNAL ALC GAIN control, this control applies the EXTERNAL INPUT signal to the External Gain Compare circuit. With this signal in place, EXTERNAL ALC GAIN control is adjusted such that the voltage from the external detector equals that from the internal detector. When equal, the CAL indicator lights and remains lit until EXTERNAL ALC GAIN control is released.

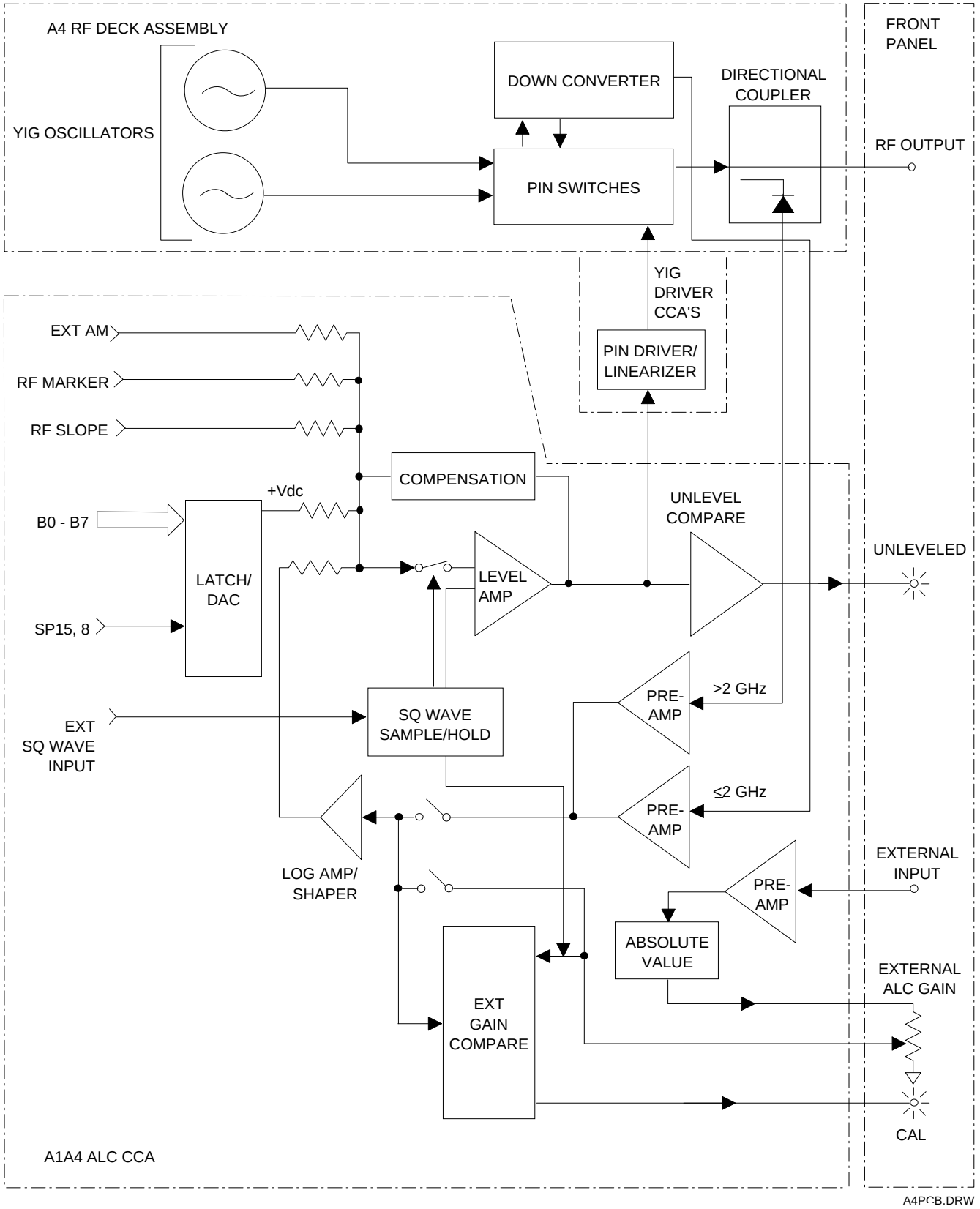


Figure 2-7. ALC Loop Functional Block Diagram

g. A1A5 Frequency Instruction PCB. This PCB (Figure 2-8) provides frequency control from the sweep generator. It outputs the following signals:

- YIG oscillator tuning and bandswitching voltages to A1A6, A1A7, A1A8, and A1A9 YIG Driver PCBs
- Narrow (≤50 MHz) sweep-tuning-voltage ramp to A1A10 FM/Attenuator PCB
- Regulated +10V bandswitch-reference voltage to the four YIG Driver PCBs
- RF Slope control voltage to A1A4 ALC PCB via the front panel RF SLOPE control
- V/GHz signal to rear panel connector
- A5 Ramp signal to A1A3 PCB
- CW Filter signal to YIG Driver PCBs
- L CW Mode signal to A1A4 PCB

The three main YIG tuning voltages are the F Cen, ΔF >50 MHz, and F Corr signals. They are used by the YIG Driver PCBs to generate the YIG tuning current.

The F Cen signal is the output of the Center Frequency digital-to-analog converter (DAC) circuit. The input to this circuit is a word from the microprocessor that represents

- The center frequency in a FULL, F1-F2, or M1-M2 sweep
- The CF frequency in a ΔF CF sweep
- The M1 frequency in a ΔF M1 sweep
- The selected CW CF, CW F1, CW F2, CW M1, or CW M2 frequency

The ΔF >50 MHz signal is the output from the Sweep Width (ΔF) DAC. The microprocessor feeds this DAC with a word that represents (1) the sweep width in a FULL, F1-F2, or M1-M2 sweep; (2) the ΔF value in a ΔF CF or ΔF M1 sweep; or (3) a zero value in any of the five CW frequency modes. The ΔF DAC also has analog inputs. They are the 0 to 10V manual tuning voltage from the front panel MANUAL SWEEP control and the 0 to 10V ramp from A1A2 Ramp Generator PCB.

The F Corr signal is derived from the Freq Offset signal and FC (Frequency Correction) Bus. It is used to provide frequency correction to the selected YIG oscillator signal on A1A6 thru A1A9 PCBs.

The bandswitching voltage is the FCen/VPF signal. It provides wide/medium/narrow bandwidth information to the A6–A9 PCBs.

The V/GHz signal is derived from the FCen, ΔF >50 MHz, and ΔF ≤50 MHz signals. Its value equates to output frequency.

The 0–10V A5 Ramp signal is from the Ramp Buffer Amp circuit. The input to this circuit is either the 0–10V A2 Ramp from the A1A2 PCB, the 0–10V manual tuning voltage from the front panel MANUAL SWEEP control, or the 0–10V digital-step sweep from the Step Sweep DAC on this PCB.

The CW Filter signal is from the CW Filter Current Driver circuit. The input to this circuit is from the microprocessor.

The L CW Mode signal is a logic-low that tells the A1A4 PCB that the sweep generator is in a CW mode.

The RF Slope Control signal is a ramp that applies an offset voltage to the front panel RF SLOPE control.

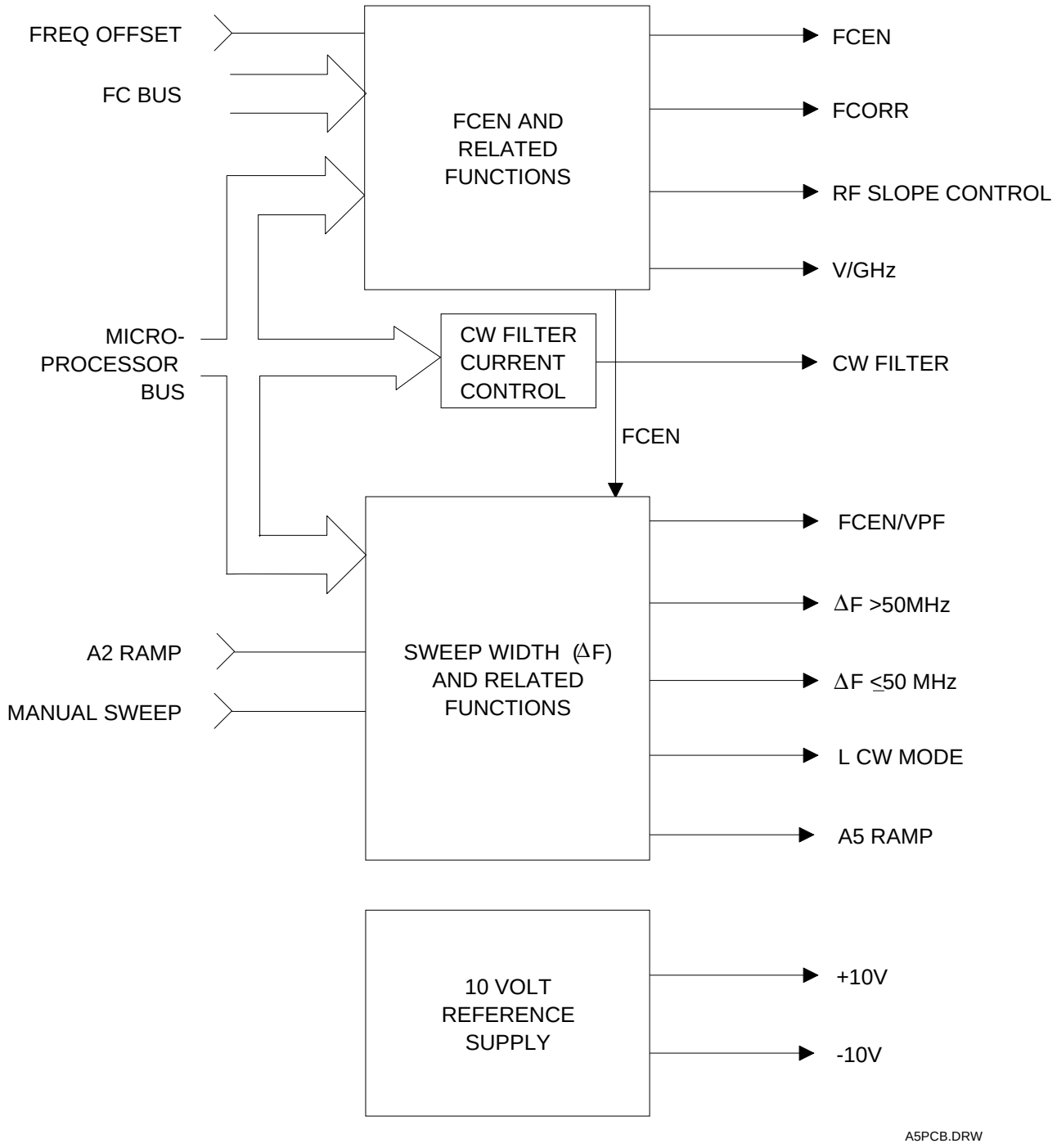


Figure 2-8. A1A5 Frequency Instruction CCA Functional Block Diagram

h. A1A6, A1A7, A1A8, and A1A9 YIG Driver.

These PCBs provide drive currents for their associated YIG oscillator tuning coils and for A4S1 and A4S2 PIN Switches. They also provide modulating currents for the ALC-loop PIN attenuator. The PCBs also develop the oscillator-bandswitch logic voltages.

The sweep generator uses up to four YIG oscillators, a down converter, and a frequency doubler to sweep its frequency range. Each oscillator requires a YIG Driver PCB (A1A6, A1A7, A1A8, A1A9). To describe how these YIG Driver PCBs interrelate to provide a continuous sweep from 10 MHz to 40 GHz, refer to foldout Figure 2-11 (located at end of chapter) and the discussion below. (The 6672B uses one YIG-tuned oscillator and a frequency tripler to generate its 40 GHz to 60 GHz output.)

The three main signals used to develop tuning and bias currents are the F Cen, ΔF >50 MHz, and F Corr from A1A5 PCB. These three signals feed in parallel to all four YIG driver PCBs. However, because the SNB (select next band) oscillator-bandswitch line on A1A7, A1A8, and A1A9 is initially false, A1A6 PCB is the only one that can use the signal. There, it is used to generate the frequency sweep.

In addition to the three signals mentioned, a fourth A1A5 PCB signal (FCen/VPF) provides for oscillator bandswitching. A bandswitch occurs on A1A6 PCB at 2 GHz and again at 8 GHz. At 2 GHz, the 0.01-to-2 GHz A4A1 Down Converter Band—also referred to as Het (heterodyne band)—is switched out and the 2-to-8 GHz Band 1 YIG is switched in. At 8 GHz: (1) the Band 1 YIG Osc is tuned to its rest frequency of 8 GHz, (2) the Modulator is set to maximum attenuation, (3) the Band 1 element in the A4S1 PIN Switch is turned off, and (4) the SNB and SNR (select-next-band and select-next-ROM) lines cause the 8-to-12.4 GHz Band 2 Osc and the A1A7 PCB linearizer ROM to be selected.

The F Cen, ΔF >50 MHz, and F Corr signals now cause the A1A7 PCB to generate the Band 2 sweep, which starts at 8 GHz. The FCen/VPF signal provides for oscillator bandswitching at 12.4 GHz. When this frequency is reached, (1) the Band 2 YIG Osc is tuned to its rest frequency of 12.4 GHz, (2) the Band 2 attenuator in the A4S2 PIN Switch goes to maximum attenuation, (3) the A4S2 Band 2 switch is turned off**,** and the SNB and SNR lines cause the Band 3 YIG Osc and A1A8 PCB ROM to be selected.

The Band 3 (A1A8 PCB) action is similar to that described for Band 2 (A1A7 PCB). Bandswitching for the 12.4-to-18 GHz Band 4 YIG occurs at 18 GHz, after which the Band 4 oscillator (A1A9 PCB) is switched in.

Band 4 (A1A9 PCB) functions like the other three, except that it bandswitches at 27.5 GHz. At this frequency, the A1A8 PCB is switched back in and the Band 3 YIG Osc is tuned from 13.75 GHz to 20 GHz. This oscillator output is routed to the A1A6 Frequency Doubler. The 27.5 to 40 GHz Ka-band doubler output is then passed through A4S1 and to the output circuit.

The four YIG Driver PCBs are similar in their design and operation. The major difference is that the A1A6 PCB also drives the A4A1 Down Converter. Additionally, it contains circuits for controlling the tracking filter that is built into the Band 1 YIG Osc package. The following functional description is for the Band 1 circuit. The Band 2, 3, and 4 circuits are similar, except for the absence of tracking filter and Het (down converter) lines.

The A1A6 PCB (Figure 2-9) contains four functional blocks. The YIG Osc and Tracking Filter Control circuits tune the YIG oscillator and its built-in tracking filter. The tracking filter provides harmonic suppression. The inputs to this block are the F Corr, ΔF >50 MHz, F Cen, and CW Filter control signals from A1A5 PCB.

The Bandswitch and ROM Select Logic and Control circuits provide for bandswitching between the four YIG Driver PCBs. The input is FCen/VPF. The outputs are the L YIG FM Coil Sel, L Het YIG Sel, L Het Pin Sel, L Pin Sel, L SNB, L SNR, and L YIG Sel control lines.

The PIN Driver Linearizer circuit processes the modulation control signal for the Band 1 Modulator circuit, which is a separate component. For Bands 2 and 3, the modulator/attenuator pad is built into A4S2 PIN Switch. For Band 4, it is part of the A4S1 PIN Switch. The modulators provide ALC control for their associated YIG oscillator output signal.

The Linearity ROM circuit provides compensation for its associated YIG oscillator. ROM addressing is from A2A12 PCB, via A1A4 PCB. Circuit output goes to A1A5 PCB.

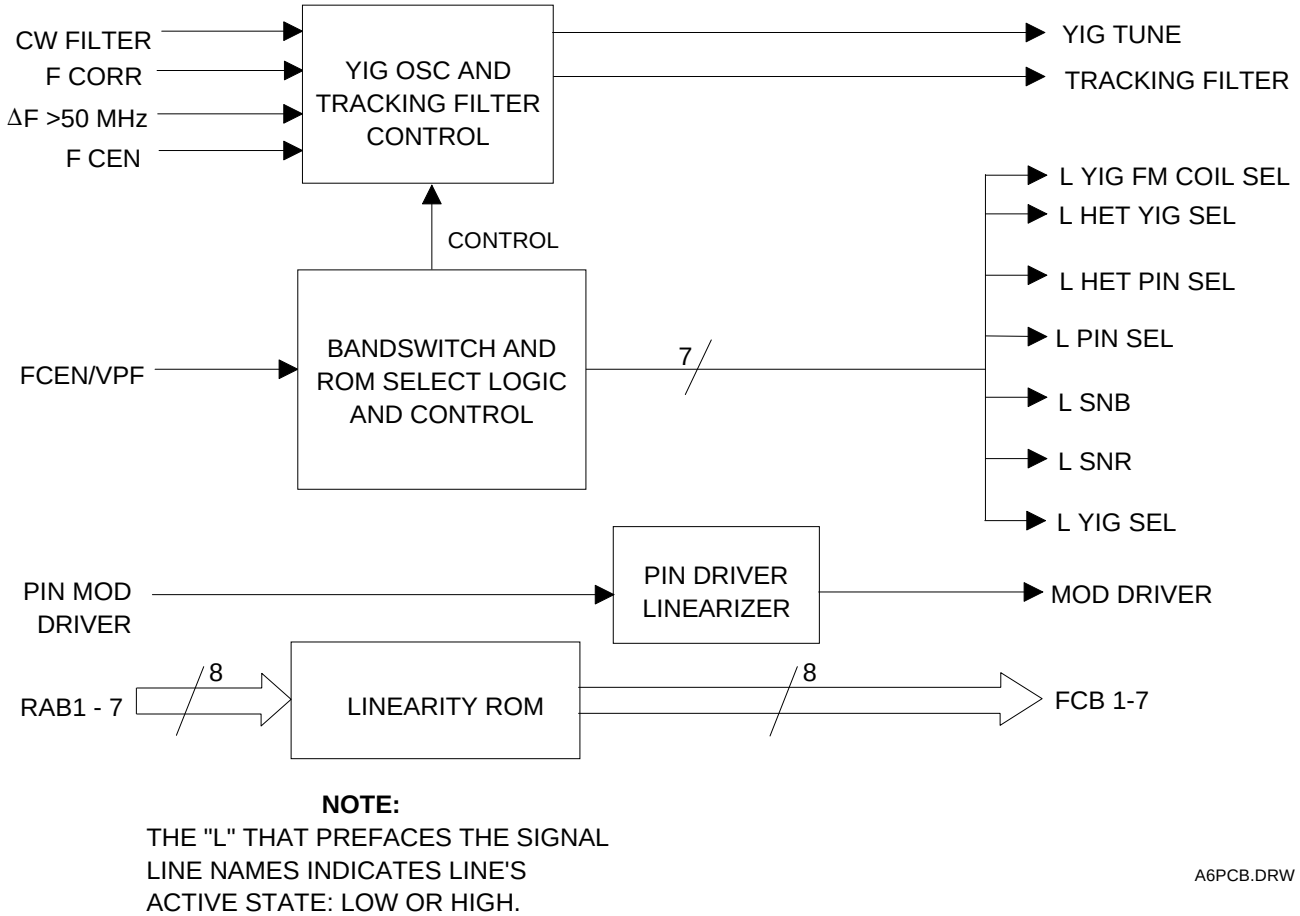


Figure 2-9. YIG Driver CCAs Functional Block Diagram

i. A1A10 FM/Attenuator PCB. This PCB (Figure 2-10) generates currents that control (1) FM modulation for the YIG oscillators, (2) drive for the 2-to-8 GHz YIG oscillator tracking filter, and (3) operation of A4AT1 Step Attenuator. Additionally, it generates the End of Band (EOB) signal used on A1A2 Ramp Generator PCB.

NOTE

In the following circuit discussion, the L or H that precedes a signal-line name indicates the line's active (or true) logic state.

- L = Low Active State and
- H = High Active State.

The signal input for this PCB enters on either the Ext FM Input signal line, the ΔF ≤50 MHz signal line, or on both concurrently. The ΔF ≤50 MHz signal line is from the A1A5 PCB. If the operator selects a delta-frequency sweep mode (ΔF CF, ΔF M1) and a sweep width (ΔF) of 50 MHz or less, this input is a voltage ramp. The amplitude of this ramp depends on the sweep width. For a sweep width of 50 MHz, the amplitude of the ramp is 10V (from –5V to +5V). For sweep widths less than 50 MHz, the amplitude of the ramp is proportionally less than 10V. The Ext FM Input signal line is from the rear panel EXT FM ∅ LOCK INPUT connector.

The Variable Gain circuit provides a voltage gain for the FM input signal. Stage gain depends on which of the available YIG oscillators is supplying the output frequency. The output of this circuit goes to the FM Coil Current Driver circuit. The output from the FM Coil Current Driver circuit drives the YIG oscillator FM tuning coils. This coil current returns to ground via the Current Sense resistor, which is effectively in series with the FM coils. The voltage drop across the Current Sense resistor is proportional to the current through the FM coils.

The Band 1 and 2 YIG oscillators receive their drive and FM coil currents in series, as do the Band 3 and 4 YIG oscillators. However, only one oscillator band at a time has its output switched to the RF output circuit. This RF output switching is a function of A4S1 and A4S2 PIN Switches.

Besides supplying the input for the FM coil-current driver circuits, the Variable Gain circuit also supplies the input for the Tracking Filter Current Driver circuit. A tracking filter is used only with the Band 1 YIG Osc. This filter is a high-Q YIG bandpass filter that resides in the same module as the YIG oscillator. It is in series with the YIG oscillator and tracks at the same frequency. It attenuates harmonic and spurious signals.

The fourth current driver circuit is the High Current Drivers circuit. It controls A4AT1 Step Attenuator (Option 2X). These drivers provide the operating currents for the attenuator circuits.

The remaining circuit on A1A10 PCB is the End-of-Band Pulse Generator. This circuit generates a low-true pulse at all bandswitch points. Inputs to this circuit are the Het YIG Sel line and the YIG Sel lines from the four YIG Driver PCBs. Another output from this circuit goes to the Diagnostic Comparator circuit. The output of the Diagnostic Comparator circuit is normally 0 volts. If the output goes to a TTL high (+3.5 to +5V), it causes Error Code 23 to appear on the front panel.

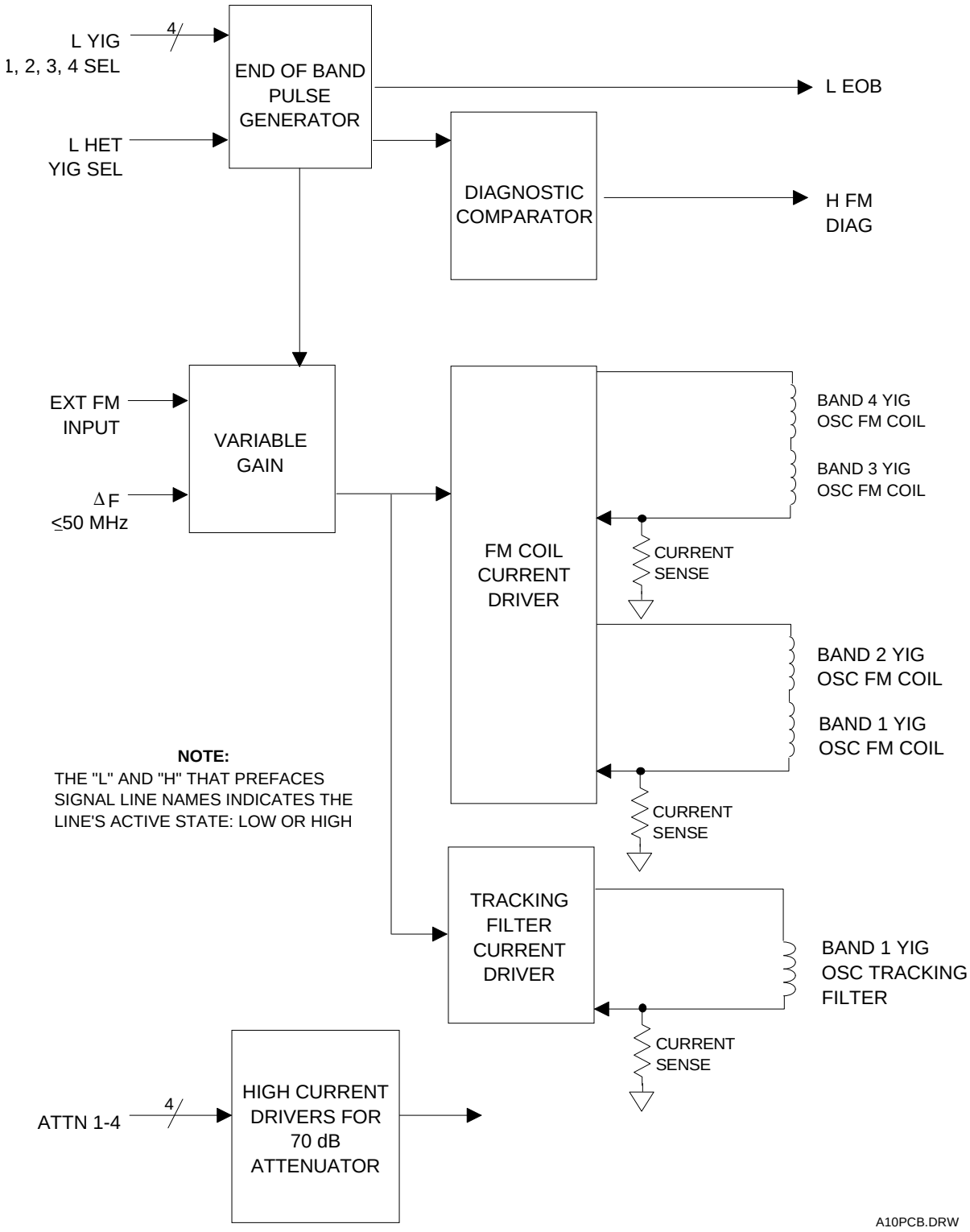


Figure 2-10. A1A10 FM/ATTN CCA Functional Block Diagram

j. Switching Power Supply. This power supply is a half-bridge, quasi-square-wave, high-efficiency +5V converter. It includes the following supplies:

- ±15V LC (low current)
- ±15V HC (high current)
- +12V regulated
- +24V regulated
- –38V regulated
- +18V unregulated
- +28V unregulated

Refer to foldout Figure 2-12, located at the end of this chapter, while reading the following circuit description.

The switching power supply circuits and components are distributed over the following PCBs and assemblies:

- A3 Rear Panel Assembly
- A1A14 Motherboard PCB
- A1A13 Switching Power Supply PCB
- A4 RF Deck Assembly

The ac line power is applied to the Off-Line Rectifier circuit. Depending on the input line, this circuit is a full-wave voltage doubler (115V line) or a full-wave bridge rectifier (230V line). The voltage output for either input-line voltage is 330V (±165V). Resistors on the A1A13 PCB sense the circuit output current. If the current exceeds 3 amperes, it activates the optically coupled Over-Current Sense circuit. When activated, this circuit causes the Shut Down Timer to turn off the switching transistor drive voltage. The ±165V output from the Off-Line Rectifier circuit goes to the dc-isolated Switching Transistors on A1A13 Switching Power Supply PCB.

The Switching Transistors alternately switch between +165V and –165V at a 50 kHz rate. These transistors are driven by the Pulse-Width Modulator (PWM) circuit. The PWM pulse output is controlled by the Control Amplifier, the Soft-Start Control circuit, and the Shut-Down Timer circuit.

The input to the Control Amplifier is the +5V Sense line from A1A14 Motherboard PCB. This line senses the voltage across the +5V load. The output of Control Amplifier forces the PWM to adjust the duty cycle to whatever is necessary to maintain +5V at the sense line.

The input to the Soft-Start Control circuit is from the +12V Regulator. This circuit provides for a linearly increasing output voltage at turn-on. When, at turn-on, the Control Amplifier senses that 5V has been reached (approximately 20 ms), regulation occurs. Should a malfunction occur, the Over-Voltage circuit (A14Q4) would trigger the Shut-Down Timer circuit at approximately 5.7V.

The input to the Shut-Down Timer circuit is a trigger pulse caused by the Over-Voltage/Current line going low. When triggered, this circuit generates a 1-second pulse (approximately) that causes the PWM output to be maximum. This shuts down the Switching Transistors. After the Shut-Down Timer times out, the power supply soft-starts. However, if the condition causing the timer trigger is still present, the timer generates another pulse and shuts the supply down again. This pulsing operation continues until the overvoltage/current condition is corrected**,** or the POWER switch is pressed to OFF.

The PWM output is coupled to the Switching Transistors, the output of which is a composite waveform. The peak-to-peak value of this waveform is directly proportional to the peak-to-peak value of the 115V line (or directly proportional to the peak value of the 230V line). This waveform is coupled to five

secondaries. The reduced voltages appearing in these secondaries are also proportional to the line voltage. These reduced voltages are rectified and passed to rectifiers on the A1A14 PCB.

The four rectifier circuits, excepting for the +5V circuit, supply their respective outputs to voltage regulators. The –38V Regulator is driven by the –43V supply. The +24V Regulator is driven by the +28V supply. The –15V LC (low current) and HC (high current) Regulators are driven by the –18V supply. And the +15V LC and HC Regulators are driven by the +18V supply. The unregulated +18V also goes to the YIG driver bias supply on the YIG Driver PCBs, to the +15V Rectifier circuit, and the +12V rectifier on A1A13 PCB.

The remaining two circuits are the Out of Reg Sense and the Line Voltage Sense circuits. The Out of Reg Sense circuit detects when any of the regulated supplies go out of tolerance. If such a condition exists, the L OR diagnostic line goes true and the A14 OUT OF REG indicator lights. The Line Sense circuit detects when the ac line exceeds the ±20 percent limits required for circuit operation.

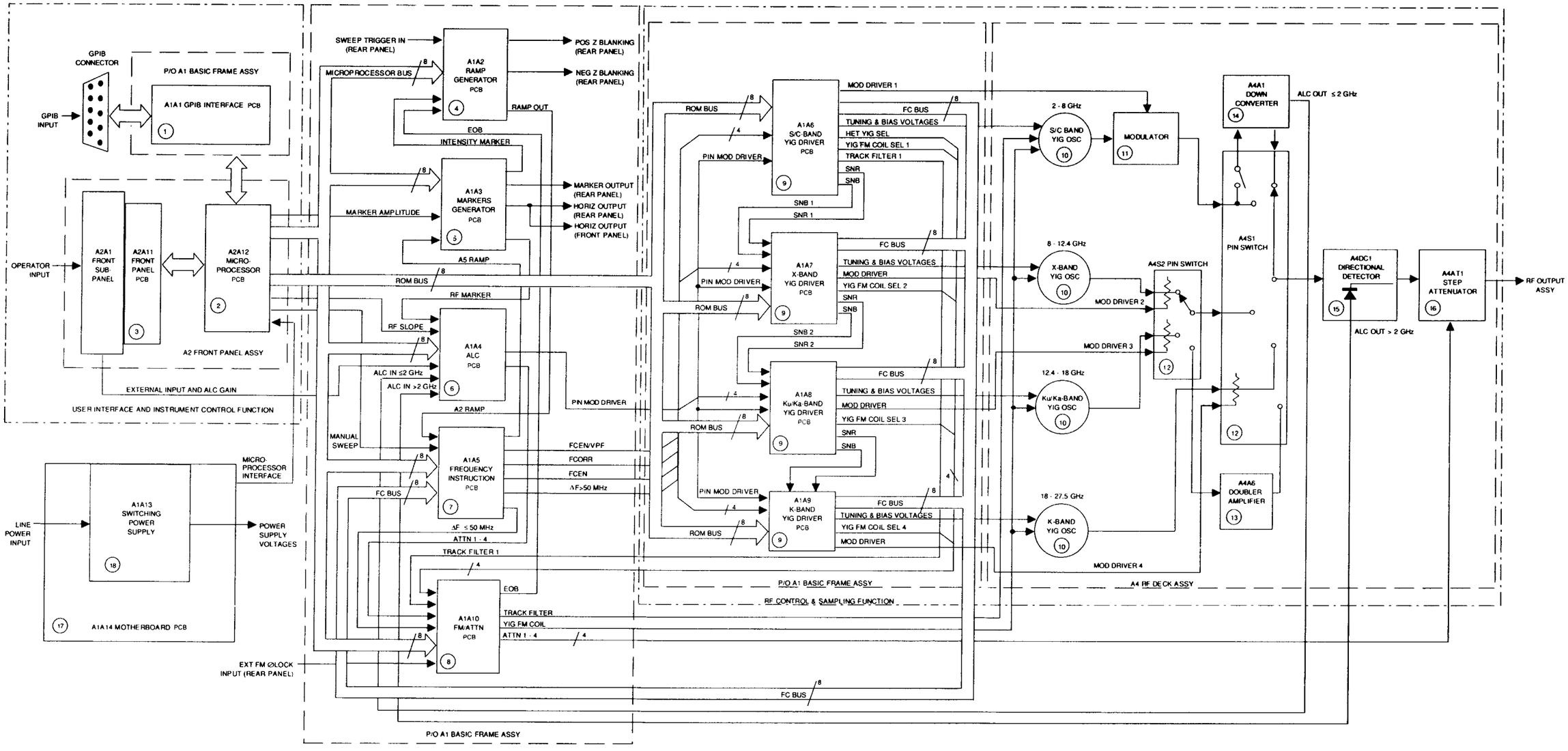


Figure 2-11. 66XXB Overall Block Diagram

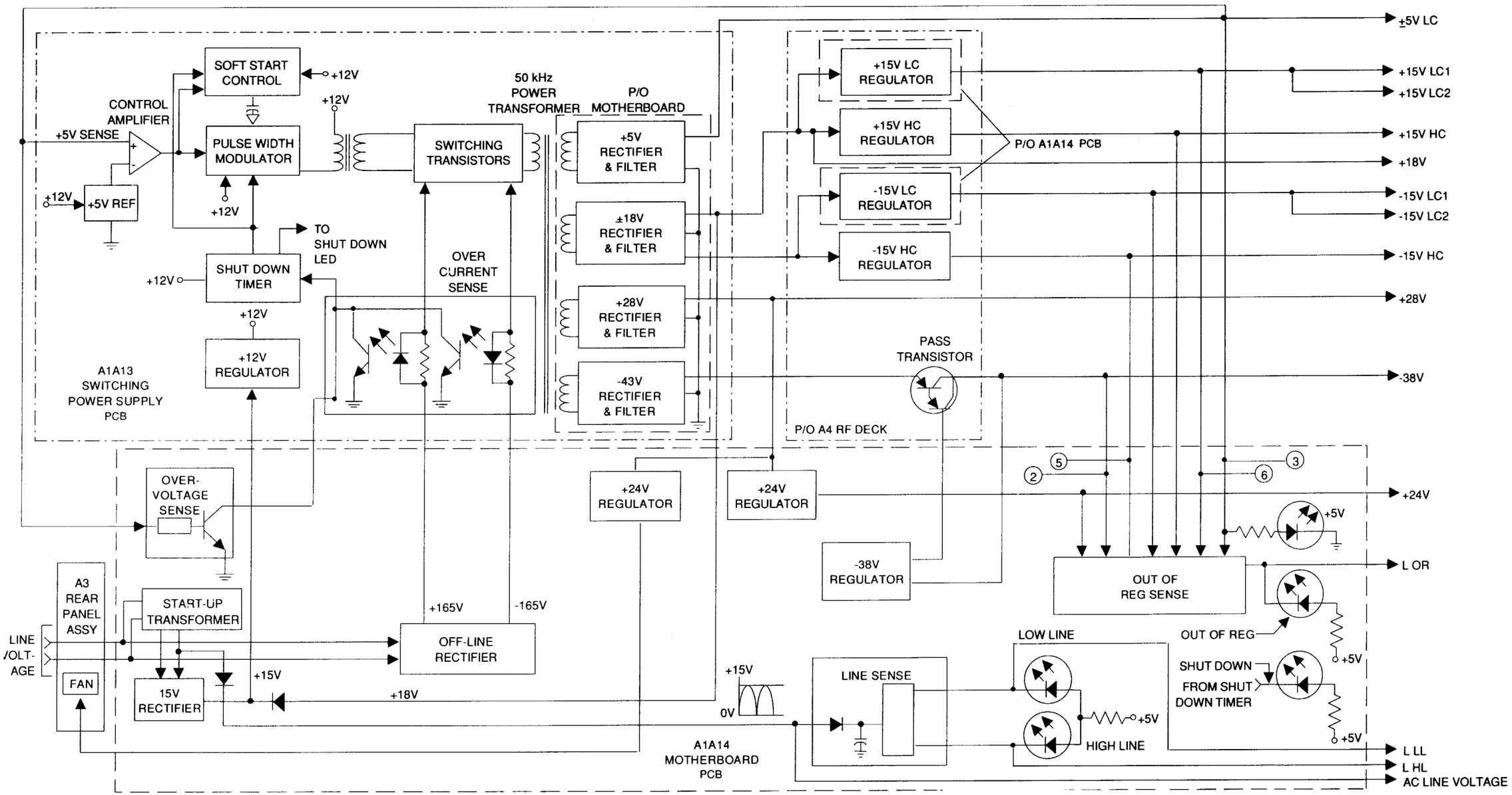


Figure 2-12. Switching Power Supply Overall Block Diagram

CHAPTER 3
TROUBLESHOOTING

CONTENTS

CONTENTS (Continued)

CHAPTER 3
TROUBLESHOOTING

3-1. INTRODUCTION

This chapter provides troubleshooting tables and procedures that provide for fault isolation to a major subassembly. In most cases, the major subassembly is a printed circuit board (PCB) or microwave module. However, in the case of the automatic level control (ALC) circuit the major assembly is the A1A4 PCB and the directional coupler located on the RF deck. For the YIG oscillators, the major assembly is the YIG oscillator assembly itself, plus the associated YIG Driver PCB and heat-sink mounted transistors (Table A1-6).

3-2. TROUBLESHOOTING GUIDELINES

The following is a list of troubleshooting aids:

a. *Error Codes.* The sweep generator has built-in self-tests and diagnostics. Self-test is automatically initiated at power-up. It can also be initiated manually from the front panel or remotely over IEEE-488 bus (GPIB).

b. *Functional Description.* Refer to principles of operation (Chapter 2) as required. These principles provide circuit theory that can aid in troubleshooting. Parts locator and schematic diagrams for all PCBs are provided in Appendix 2.

c. *Coolant Spray.* Circuit cooler spray can be used to isolate problems. The most commonly used method is to spray suspected components to see if the malfunction can be fixed temporarily. This spray can be used to isolate a bad component. This method will not work all of the time, but it can be a great timesaver. It is especially helpful in troubleshooting intermittent problems that worsen as temperature rises. However, use this spray sparingly. Overspraying operational amplifiers, for example, can create a feedback path around the amplifier that will be detrimental to circuit operation.

d. *Corrosion.* Many problems encountered on sweep generators that have been in service for some time are caused by corrosion. Sometimes removing and reseating affected plug-in assemblies will correct a malfunction. Cleaning connector pins and/or switch contacts with alcohol will repair many types of digital and analog circuit malfunctions.

3-3. EQUIPMENT INSPECTION

The following inspection procedure can be helpful in locating obvious malfunctions within the sweep generator.

a. *Physical.* Inspect all external surfaces of sweep generator for physical damage, breakage, loose or dirty contacts, and missing components.

b. *Remove Covers.* Remove top, bottom, and side covers as required to gain access to components.

WARNING

Hazardous voltages are present when covers are removed. When maintenance can be performed without having power applied, power should be removed.

CAUTION

Do not disconnect or remove any PCBs unless sweep generator is turned off. Some PCBs contain devices that can be damaged if the PCB is removed when power is applied. Several components, including MOS devices, can be damaged by electrostatic discharge. Use conductive foam to transport or store ICs. Use a grounding strap when servicing is required around sensitive components. Use care when unplugging ICs from high-grip sockets.

c. PCBs. Inspect PCBs for discoloration, cracks, breaks, and warping.

d. Traces. Inspect PCB traces for breaks, cracks, cuts, erosion, or looseness.

e. Assemblies. Inspect all assemblies for burned or loose components.

f. Components. Inspect all chassis-mounted components for looseness, breakage, and loose contacts or conductors.

g. Wiring. Inspect sweep generator for disconnected, broken, cut, loose, or frayed cables or wires.

3-4. ERROR CODES

The sweep generator uses error codes to indicate system faults. The software routines that generate error codes are initiated (1) at instrument turn-on, (2) when the SELF TEST key is pressed, or (3) via the IEEE-488 Bus. When initiated, the error-code routines run sequentially beginning with the power supply (00) and continuing through the A1A1 GPIB Interface PCB test (24). If multiple errors are detected, each error-code number appears in turn as the error-code routines cycle through their testing. Therefore, when error codes appear, it is important to troubleshoot them in order, from lowest to highest number.

3-5. TROUBLESHOOTING SYMPTOM INDEX

The symptom index (Table 3-1) contains a listing of indicated malfunctions with references to a listing within the troubleshooting table. This table listing provides a definitive procedure or reference to another procedure.

3-6. TROUBLESHOOTING TABLE AND PROCEDURES

Table 3-2 lists common malfunctions that may be found during operation or maintenance of sweep generator. Figures A2-1 thru A2-4, in Appendix 2, provide assembly-location, cable-routing, and A1A14 PCB test point diagrams.

The troubleshooting procedures—both those in the table and in the referenced paragraphs—are mainly binary. That is, they presume that the tested-for voltage, waveform, or power level is either of two cases: present or absent. In each step, for one of the cases the sentence preceded with a bullet (•) provides a conclusive remedy. For the other case, you are directed to proceed to the next step. The last step provides remedies for either condition.

Since you may exit a procedure at any point, instructions are not given to reinstall assemblies or covers removed during the procedure. After exiting the procedure and completing the stated repair/replacement action, you should perform an instrument self-test or Chapter 5 performance test, as applicable, to ensure that the repair was successful.

As was explained in Section 1, paragraph 1-1, the troubleshooting procedures fault-isolate to a repairable major assembly. However, detailed piece/part parts listings and drawings are provided as reference-only material in the appendixes. Parts list information is located in Appendix 1 and schematics and parts-location drawings are provided in Appendix 2.

NOTE

TTL low logic level is –0.5 to +0.8 V; TTL high logic level is +3.5 to +5.5 V.

Table 3-1. Troubleshooting Symptom Index

Table 3-2. Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
1. ERROR CODE 00 IS DISPLAYED (VOLTAGE SUPPLY OTHER THAN 5 V SUPPLY IS OUT OF TOLERANCE). Troubleshoot switching power supply out-of-regulation voltages (Paragraph 3-9). • Replace faulty component/assembly.
2. ERROR CODE 01 IS DISPLAYED (LINE VOLTAGE IS TOO LOW). Step 1. Measure line voltage source. • If less than 92 Vac from nominal 115 V source, connect sweep generator to line-voltage source between 92 and 138 Vac. • If less than 184 Vac from nominal 230 V source, connect sweep generator to line-voltage source between 184 and 276 Vac. Step 2. Troubleshoot faulty line-voltage indicator circuits (Paragraph 3-19). • Replace faulty component/assembly.
3. ERROR CODE 02 IS DISPLAYED (LINE VOLTAGE IS TOO HIGH). Step 1. Measure line voltage source. • If greater than 138 Vac from nominal 115 V source, connect sweep generator to line-voltage source between 92 and 138 Vac. • If greater than 276 Vac from nominal 230 V source, connect sweep generator to line-voltage source between 184 and 276 Vac. Step 2. Troubleshoot faulty line-voltage indicator circuits (Paragraph 3-19). • Replace faulty component/assembly.
4. ERROR CODE 03 IS DISPLAYED (RAM FAILURE). None • Replace A2A12 Microprocessor PCB (Paragraph 4-4).
5. ERROR CODE 08 IS DISPLAYED (ROM FAILURE). None • Replace A2A12 Microprocessor PCB (Paragraph 4-4).
6. ERROR CODE 09 IS DISPLAYED (FREQUENCY FAILURE, DOWN CONVERTER BAND. Troubleshoot frequency error, Down Converter band (Paragraph 3-20). • Replace faulty component/assembly.
7. ERROR CODE 10 IS DISPLAYED (FREQUENCY FAILURE, BAND 1). Troubleshoot frequency error, Band 1 (Paragraph 3-21). • Replace faulty component/assembly.

Table 3-2. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
8. ERROR CODE 11 IS DISPLAYED (FREQUENCY FAILURE, BAND 2). Troubleshoot frequency error, Band 2 (Paragraph 3-22). • Replace faulty component/assembly.
9. ERROR CODE 12 IS DISPLAYED (FREQUENCY FAILURE, BAND 3). Troubleshoot frequency error, Band 3 (Paragraph 3-23). • Replace faulty component/assembly.
10. ERROR CODE 13 IS DISPLAYED (FREQUENCY FAILURE, BAND4). Troubleshoot frequency error, Band 4 (Paragraph 3-24). • Replace faulty component/assembly.
11. ERROR CODE 14 IS DISPLAYED (FREQUENCY FAILURE, OVERALL RANGE). Troubleshoot frequency error, Overall Range (Paragraph 3-26). • Replace faulty component/assembly. **NOTE** Error code 20 will always accompany ALC error codes 15 thru 19, but it may also appear independently.
12. ERROR CODES 15 IS DISPLAYED (ALC LOOP FAILURE, DOWN CONVERTER BAND). Step 1. Check whether error codes 16, 17, 18, 19, and 20 as applicable are also displayed. • If so, replace PIN Switch. Step 2. Check whether error codes 16 and 20 as applicable are also displayed. • If so, replace Band 1 YIG Assembly. Step 3. Troubleshoot Power leveling error, Down Converter band (Paragraph 3-27). • Replace faulty component/assembly.
13. ERROR CODE 16 IS DISPLAYED (ALC LOOP FAILURE, BAND 1). Step 1. Check whether error codes 17, 18, 19, and 20 as applicable are also displayed. • If so, replace ALC Assembly (A1A4 ALC PCB and Directional Coupler. Step 2. Troubleshoot power leveling error, Band 1 (Paragraph 3-28). • Replace faulty component/assembly.
14. ERROR CODE 17 IS DISPLAYED (ALC LOOP FAILURE, BAND 2). Troubleshoot power leveling error, Band 3 (Paragraph 3-29). • Replace faulty component/assembly.

Table 3-2. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
15. ERROR CODE 18 IS DISPLAYED (ALC LOOP FAILURE, BAND 3). Troubleshoot power leveling error, Band 4 (Paragraph 3-30). • Replace faulty component/assembly.
16. ERROR CODE 19 IS DISPLAYED (ALC LOOP FAILURE, BAND 4). Troubleshoot power leveling error, Band 4 (Paragraph 3-31). • Replace faulty component/assembly.
17. ERROR CODE 20 IS DISPLAYED (ALC LOOP FAILURE, ONE OR MORE BANDS). Step 1. Check whether error codes 20, 21, and 22ee are also displayed. If so, check that PCB-mounted A1A2S1 switch (Figure A2-6) is in NORM position. • If so, replace A1A2 Ramp Generator PCB. Step 2. Troubleshoot power leveling error, Overall Frequency Range (Paragraph 3-26). • Replace faulty component/assembly.
18. ERROR CODE 21 IS DISPLAYED (ANALOG SWEEP RAMP FAILURE). Troubleshoot analog sweep failure (Paragraph 3-34). • Replace faulty component/assembly.
19. ERROR CODE 22 IS DISPLAYED (FREQUENCY MARKERS FAILURE). Troubleshoot frequency markers failure (Paragraph 3-35). • Replace faulty component/assembly.
20. ERROR CODE 23 IS DISPLAYED (FM CIRCUIT FAILURE). Troubleshoot internal FM circuits (Paragraph 3-36). • Replace faulty component/assembly.
21. ERROR CODE 24 IS DISPLAYED (A1A1 PCB FAILURE). None • Replace A1A1 GPIB Interface PCB.
22. DEAD UNIT, NO FRONT PANEL LIGHTS. Step 1. Check whether line cord is connected to sweep generator and to line-voltage source. • If not, connect line cord. Step 2. Check whether line voltage module shows correct line voltage value. • If not, change to correct line voltage value. Step 3. Check whether line fuse(s) are blown. • If so, replace fuse(s).

Table 3-2. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
Step 4. Check whether fuse(s) blew again. • If so, troubleshoot blown fuse(s) (Paragraph 3-8). Step 5. Troubleshoot +5V Supply (Paragraph 3-7). • Replace faulty component/assembly.
23. DECR/INCR CONTROL HAS NO EFFECT. Troubleshoot DECR/INCR Control (Paragraph 3-38). • Replace faulty component/assembly.
24. EXTERNAL ALC GAIN CONTROL IS INOPERATIVE. Troubleshoot EXTERNAL ALC GAIN Control circuit (Paragraph 3-43). • Replace faulty component/assembly.
25. FRONT PANEL LOCKS UP WHEN TRYING TO CHANGE A PARAMETER. Step 1. Check whether any front panel keys are binding or stuck closed. • If not, replace A2A12 Microprocessor PCB (Paragraph 4-4). Step 2. Try to free stuck key; recheck several times to ensure that it operates freely. • If key continues to stick, replace A2A11 Front Panel PCB (Paragraph 4-5).
26. NO OR LOW RF OUTPUT, ALL BANDS (OPTIONAL STEP ATTENUATOR INSTALLED). Step 1. Perform RF Output Step Attenuator Accuracy Test (Paragraph 5-15d). • If performance test fails, troubleshoot RF output circuit (Paragraph 3-37).
27. NO SWEEP WITH EXTERNAL SWEEP INPUT. Step 1. Press POWER key to OFF. Step 2. Remove A1A2 PCB and install on card extender. Step 3. Press POWER key to ON. Step 4. Press RESET key. Step 5. Connect oscilloscope vertical input between A1A2P1-B (probe) and A1A2P1-K (shield) (Figure A2-6). Step 6. Check that EXTERNAL RAMP INPUT signal (0-10 V) is present. • If not, troubleshoot A1A14U11 (Figure A2-33) and associated components. Step 7. Check that PCB-mounted A1A2S1 switch is in NORM position. • If so, replace A1A2 Ramp Generator PCB. • If not, place switch in NORM position.

Table 3-2. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
28. NO SIGNAL AT HORIZ OUTPUT CONNECTOR. Troubleshoot HORIZ OUTPUT circuit (Paragraph 3-44). • Replace faulty component/assembly.
29. NO SIGNAL AT SEQ SYNC CONNECTOR. Troubleshoot SEQ SYNC circuit (Paragraph 3-45). • Replace faulty component/assembly.
30. NO SIGNAL AT V/GHz CONNECTOR. Step 1. Press POWER key to OFF. Step 2. Remove A1A5 PCB and install on card extender. Step 3. Press POWER key to ON. Step 4. Press RESET key. Step 5. Press CW CF key. Step 6. Check that voltage between A1A5P1-9 (+) and A1A5P1-13 (–) (Figure A2-12) is 10 ±0.02V. • If not, replace A1A5 PCB. • If so, check for poor connections between A1A14P41 and the rear panel connector.
31. NO VIDEO MARKERS. Step 1. Press POWER key to OFF. Step 2. Remove A1A3 PCB and install on card extender. Step 3. Press POWER key to ON. Step 4. Check that voltage between A1A3P1-K (–) and A1A3P1-M (+) (Figure A2-8) is +15 ±0.7 V. Step 5. Check that voltage between A1A3P1-K (–) and A1A3P1-N (+) is –15 ±0.7 V. • If both voltages are present, replace A1A3 Markers Generator PCB. • If not +15V, perform “Troubleshoot +15 VLC1 Supply” procedure (Paragraph 3-15), and replace defective parts. • If not –15V, perform “Troubleshoot –15 VLC1 Supply” procedure (Paragraph 3-12), and replace defective parts.

Table 3-2. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
32. REAR PANEL EXT SQ WAVE INPUT IS INOPERATIVE. Step 1. Press POWER key to OFF. Step 2. Remove A1A4 PCB and install on card extender. Step 3. Press POWER key to ON. Step 4. Press RESET key. Step 5. Press CW F0 key. Step 6. Apply +1 V signal to EXT SQ WAVE INPUT connector. Step 7. Check voltage between A1A4P1-15 and A1A4P1-9 (Figure A2-10). • If +1V, replace ALC Assembly (A1A4 ALC PCB and Directional Coupler). • If not +1V, check for poor connections between A1A14P10 and the rear panel connector.
33. REAR PANEL PENLIFT OUTPUT IS INOPERATIVE. Perform “Troubleshoot PENLIFT OUTPUT Circuit” procedure (Paragraph 3-46). • Replace faulty component/assembly.

3-7. TROUBLESHOOT +5V SUPPLY

This procedure is used to isolate malfunctions in the A1A14 PCB +5 volt supply and outlying load circuits.

NOTE

- Figures A2-1 thru A2-4 provide assembly-location, cable-routing, and A1A14 PCB test-point-location diagrams.
- Figures A2-32 and A2-33 provide parts-locator and schematic diagrams for A1A14 PCB components.

1. Press POWER key to OFF.
2. Disconnect sweep generator from line-voltage source.

WARNING

Lethal voltages exist on A1A14 PCB capacitors, even with power removed. After turning off power, wait 5 minutes for capacitors to discharge before making measurements or otherwise working on circuit under high-voltage cover.

3. Remove cable cover and high-voltage cover.
4. Reconnect sweep generator to line-voltage source, and press POWER key to ON.

WARNING

Lethal currents are present when line voltage is applied and sweep generator is switched on. Use care to avoid electric shock.

5. Check voltage between A1A14XA13-A (–) and A1A14XA13-C (+).
   - If not +270 to +390 Vac, check line voltage (115 or 230 Vac ±20%) at locations shown in following tabulation.

CHECK BETWEEN	IF VOLTAGE IS CORRECT	IF VOLTAGE IS INCORRECT
A1A14T1, pins 1 and 4	Troubleshoot A1A14- CR39 thru A1A14CR42 and associated circuit.	Go to next check.
A1A14FL1, pins 3 and 4	Replace POWER switch A1A14SW1 (para 4-16).	Go to next check.
A1A14FL1, pins 1 and 2	Replace A1A14FL1.	Troubleshoot A1A14L1, A1A14L2, and line-voltage module.

6. Check voltage between A1A14XA13-8 (+) and A1A14XA13-7 (–).
   - If +18V or greater, go to step 9.

7. Check voltage between A1A14T1-5 and A1A14T1-8.
   - If 10 to 17 Vac, troubleshoot A1A14CR6 thru A1A14CR9 and associated circuit.
   - If not 10 to 17 Vac, replace A1A14T1.
8. Press POWER key to OFF.
9. Remove A1A1 thru A1A10 PCBs.
10. Press POWER key to ON.
    - If front panel POWER indicator lights, go to subparagraph a.
11. Press POWER key to OFF.
12. Install A1A1 thru A1A10 PCBs.
13. Disconnect cables from A1A14P5, A1A14P6, and A1A14P7.
14. Press POWER key to ON.
    - If A1A14DS1 (+5V) indicator does not light, replace A1A13 PCB (Paragraph 4-4).
    - If A1A14DS1 (+5V) indicator does light, go to subparagraph b.

a. +5V Restored When Load PCBs Are Removed.

1. Press POWER key to OFF.
2. Reinstall A1A1 PCB removed in step 10, above.
3. Press POWER key to ON.
   - If POWER indicator goes out, press POWER key to OFF and replace A1A1 PCB.
4. Repeat steps 1 thru 3, above, sequentially for A1A2, A1A3, A1A4, A1A5, A1A6, A1A7, A1A8, A1A9, and A1A10 PCBs, as applicable for your model.
   - If A1A2, A1A3, A1A5, or A1A10 PCB is faulty, press POWER key to OFF and replace applicable PCB.
   - If A1A4 PCB is faulty, press POWER key to OFF and replace ALC Assembly (A1A4 ALC and Directional Coupler).
   - If applicable A1A6, A1A7, A1A8, or A1A9 PCB is faulty, press POWER key to OFF and replace YIG assembly.

b. +5V Restored When Front Panel Disconnected.

1. Press POWER key to OFF.
2. Reconnect ribbon cables to A1A14P5, A1A14P6, and A1A14P7.

NOTE
Do not remove PCBs from A2 assembly in following step.

3. Remove A2 Front Panel Assembly from A1 Basic Frame Assembly (Paragraph 4-3).
4. Disconnect ribbon cables from A2A11P1, A2A11P2, and A2A11P3.
5. Press POWER key to ON.
   - If A1A14DS1 (+5V) indicator lights, press POWER key to OFF and replace A2A11 PCB (Paragraph 4-5).
   - If A1A14DS1 (+5V) indicator does not light, press POWER key to OFF and replace A2A12 PCB (Paragraph 4-4).

3-8. TROUBLESHOOT BLOWN FUSE(S)

This procedure is used to correct for a short in the line-voltage-input circuit on A1A13 or A1A14 PCBs.

1. Press POWER key to OFF and disconnect power cord from line-voltage source.

WARNING

Lethal voltages are exposed on capacitors A1A13C5 and A1A13C6 when PCB is withdrawn in following step. Discharge capacitors to ground before proceeding with remainder of paragraph.

2. Remove A1A13 PCB.
3. Replace fuse(s).
4. Reconnect power cord.
   - If either or both fuses blow, troubleshoot A1A14FL1, A1A14L1, A1A14L2, and line-voltage module; replace defective part(s).
5. Press POWER key to ON.
   - If either or both fuses blow, troubleshoot A1A14T1, A1A14CR39 thru A1A14CR42, and associated circuit; replace defective part(s).
   - If neither fuse blows, replace A1A13 PCB.

3-9. TROUBLESHOOT SWITCHING POWER SUPPLY OUT-OF-REGULATION VOLTAGES

This procedure is used to isolate malfunctions in A1A14 PCB switching power supply.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-32 and A2-33 provide parts-locator and schematic diagrams for A1A14 PCB components.
- Reference voltages to A1A14TP3 (A GND).

1. Press POWER key to ON.
2. Check voltages at points shown in following tabulation.
   - If incorrect on only one supply, go to referenced paragraph.
   - If incorrect on all –15V and –5V supplies, go to step 3.
   - If incorrect on all +15V supplies, go to step 4.
   - If all voltages are correct, go to step 5.

SUPPLY	A1A14 PCB TESTING POINT	VALUE	REFER TO PARAGRAPH
–5V	P24-1	–5 ±0.7V	3-10
–15 VHC	P12-3	–15 ±0.7V	3-11
–15 VLC1	TP5 (–15V)	–15 ±0.7V	3-12
–15 VLC2	VR4-3	–15 ±0.7V	3-13
+15 VHC	P12-5	+15 ±0.7V	3-14
+15 VLC1	TP4 (+15V)	+15 ±0.7V	3-15
+15 VLC2	VR3-3	+15 ±0.7V	3-16
+24V	VR1-3	+24 ±1.5V	3-17
–38V	TP6 (–38 V)	–38 ±1.5 V	3-18

3. Check voltage at A1A14XA13-22.
   - If less than –16V, replace A1A13 PCB.

4. Check voltage at A1A14XA13-26.
   - If less than +16V, replace A1A13 PCB.
5. Check that fan is operating.
   - If operating, go to step 7.
6. Check voltage at A1A14XA13-21.
   - If not +26V (minimum), replace A1A13 PCB.
   - If +26V (minimum), troubleshoot A1A14VR1, A1A14VR2, and associated circuit.
7. Check adjustment of A1A14R89 (Paragraph 6-3).
   - If adjustment fails, troubleshoot A1A14U4B, A1A14U5C, A1A14U5D, and associated circuit; replace defective part(s).
   - If adjustment is successful and error code persists, replace self-test latch A1A14U10.

3-10. TROUBLESHOOT –5 VOLT SUPPLY

This procedure is used to isolate malfunctions in the A1A14 PCB –5V supply and outlying load circuits.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Reference voltages to A1A14TP3 (A GND).

1. Press POWER key to OFF.
2. Disconnect cable from A1A14P13.
3. Press POWER key to ON.
4. Check voltage at A1A14P24-3.
   - If not –5 ±0.7V, replace A0U5 (located on RF deck).
   - If –5 ±0.7V, replace Band 1 YIG Assembly .

3-11. TROUBLESHOOT –15 VHC SUPPLY

This procedure is used to isolate malfunctions in the A1A14 PCB –15 VHC supply and outlying load circuits.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-32 and A2-33 provide parts-locator and schematic diagrams for A1A14 PCB.
- Reference voltages to A1A14TP3 (A GND).

1. Press POWER key to OFF.
2. Remove A1A6, A1A7, A1A8, A1A9, and A1A10 PCBs, as applicable for your model.
3. Disconnect cables from applicable A1A14P12, A1A14P13, A1A14P14, A1A14P16, and A1A14P17.
4. Press POWER key to ON.
5. Check voltage at A1A14P12-3.
   - If not –15 ±0.7V, troubleshoot A0U1 and associated components.

CAUTION

In the following steps, press the POWER key to OFF before reinstalling the specified PCB and cable(s). Then press the POWER key to ON to measure voltages.

6. Check voltage at A1A14P12-3 while performing action in following tabulation.

INSTALL PCB	CONNECT CABLE TO		IF VOLTAGE NOT –15 ±0.7V, REPLACE
	CABLE CONNECTOR	A1A14 PCB CONNECTOR	
A1A6	17	P14	Band 1 YIG Assembly.
None	1	P12	Down Converter Assembly.
A1A7	16	P13	Band 2 YIG Assembly.
A1A8	20	P17	Band 3 YIG Assembly.
A1A9	21	P16	Band 4 YIG Assembly.
A1A10	N/A	N/A	A1A10 PCB.

3-12. TROUBLESHOOT –15 VLC1 SUPPLY

This procedure is used to isolate malfunctions in the A1A14 PCB –15 VLC1 supply and outlying load circuits.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figure A2-32 provides A1A14 PCB test point locations.
- Reference voltages to A1A14TP3 (A GND).

1. Press POWER key to OFF.
2. Remove A1A2, A1A3, A1A4, and A1A5 PCBs.
3. Press POWER key to ON.
4. Check voltage at A1A14TP5 (–15 V).
   - If not –15 ±0.7V, troubleshoot A1A14VR6 and associated circuit.

CAUTION

In the following steps, press the POWER key to OFF before reinstalling the specified PCB. Then press the POWER key to ON to measure voltages.

5. Check voltage at A1A14TP5 (–15 V) while performing action in below tabulation.

INSTALL PCB	IF VOLTAGE NOT –15 ±0.7V,
A1A2	Replace A1A2 PCB.
A1A3	Replace A1A3 PCB.
A1A4	Replace ALC Assembly (A1A4 PCB and Directional Coupler).
A1A5	Replace A1A5 PCB.

3-13. TROUBLESHOOT –15 VLC2 SUPPLY

This procedure is used to isolate malfunctions in the A1A14 PCB –15 VLC2 supply and outlying load circuits.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-32 and A2-33 provide parts-locator and schematic diagrams for A1A14 PCB.

1. Press POWER key to OFF.
2. Remove A1A6, A1A7, A1A8, A1A9, and A1A10 PCBs, as applicable for your model.
3. Disconnect cables from applicable A1A14P13, A1A14P14, A1A14P16, and A1A14P17.
4. Press POWER key to ON.
5. Check voltage at A1A14VR4-3.
   - If not –15 ±0.7V, troubleshoot A1A14VR4 and associated circuit.

CAUTION

In the following steps, press the POWER key to OFF before reinstalling the specified PCB and cable(s). Then press the POWER key to ON to measure voltages.

6. Check for voltage at A1A14VR4-3 while performing action in below tabulation.

INSTALL PCB	CONNECT CABLE TO		IF VOLTAGE IS
	CABLE CONNECTOR	A1A14 PCB CONNECTOR	
A1A6	17	P14	Not –15 ±0.7V, replace Band 1 YIG Assembly.
A1A7	16	P13	Not –15 ±0.7V, replace Band 2 YIG Assembly.
A1A8	20	P17	Not –15 ±0.7V, replace Band 3 YIG Assembly.
A1A9	21	P16	Not –15 ±0.7V, replace Band 4 YIG Assembly.
A1A10	N/A	N/A	Not –15 ±0.7V, replace A1A10 PCB. –15 ±0.7V, replace A2A12 PCB (Paragraph 4-4).

3-14. TROUBLESHOOT +15 VHC SUPPLY

This procedure is used to isolate malfunctions in the A1A14 PCB +15 VHC supply and outlying load circuits.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-32 and A2-33 provide parts-locator and schematic diagrams for A1A14 PCB.
- Reference voltages to A1A14TP3 (A GND).

1. Press POWER key to OFF.
2. Remove A1A6, A1A7, A1A8, A1A9, and A1A10 PCBs, as applicable for your model.
3. Disconnect cables from applicable A1A14P12, A1A14P13, A1A14P14, A1A14P16, and A1A14P17.
4. Press POWER key to ON.
5. Check voltage at A1A14P12-5.
   - If not +15 ±0.7V, troubleshoot A0U2 and associated circuit.

CAUTION

In the following steps, press the POWER key to OFF before reinstalling the specified PCB and cable(s). Then press the POWER key to ON to measure voltages.

6. Check voltage at A1A14P12-5 while performing action in below tabulation.

INSTALL PCB	CONNECT CABLE TO		IF VOLTAGE NOT +15 ±0.7V, REPLACE
	CABLE CONNECTOR	A1A14 PCB CONNECTOR	
A1A6	17	P14	Band 1 YIG Assembly.
None	1	P12	Down Converter Assembly.
A1A7	16	P13	Band 2 YIG Assembly.
A1A8	20	P17	Band 3 YIG Assembly.
A1A9	21	P16	Band 4 YIG Assembly.
A1A10	N/A	N/A	A1A10 PCB.

3-15. TROUBLESHOOT +15 VLC1 SUPPLY

This procedure is used to isolate malfunctions in the A1A14 PCB +15 VLC1 supply and outlying load circuits.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-32 and A2-33 provide parts-locator and schematic diagrams for A1A14 PCB.
- Reference voltages to A1A14TP3 (A GND).

1. Press POWER key to OFF.
2. Remove A1A2, A1A3, A1A4, and A1A5 PCBs.
3. Press POWER key to ON.
4. Check voltage at A1A14TP4 (+15 V).
   - If not +15 ±0.7V, troubleshoot A1A14VR5 and associated circuit.

CAUTION

In the following steps, press the POWER key to OFF before reinstalling the specified PCB. Then press the POWER key to ON to measure voltages.

5. Check voltage at A1A14TP4 (+15 V) while performing action in below tabulation.

INSTALL PCB	IF VOLTAGE NOT +15 ±0.7V,
A1A2	Replace A1A2 PCB.
A1A3	Replace A1A3 PCB.
A1A4	Replace ALC Assembly (A1A4 PCB; and Directional Coupler, Paragraph 4-9).
A1A5	Replace A1A5 PCB.

3-16. TROUBLESHOOT +15 VLC2 SUPPLY

This procedure is used to isolate malfunctions in the A1A14 PCB +15 VLC2 supply and outlying load circuits.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-32 and A2-33 provide parts-locator and schematic diagrams for A1A14 PCB.

1. Press POWER key to OFF.
2. Remove A1A6, A1A7, A1A8, A1A9, and A1A10 PCBs, as applicable for your model.
3. Disconnect cables from applicable A1A14P13, A1A14P14, A1A14P16, and A1A14P17.
4. Press POWER key to ON.
5. Check voltage at A1A14VR3-3.
   - If not +15 ±0.7V, troubleshoot A1A14VR3 and associated circuit.

CAUTION

In the following steps, press the POWER key to OFF before reinstalling the specified PCB and cable(s). Then press the POWER key to ON to measure voltages.

6. Check voltage at A1A14VR3-3 while performing action in below tabulation.

INSTALL PCB	CONNECT CABLE TO		IF VOLTAGE IS
	CABLE CONNECTOR	A1A14 PCB CONNECTOR	
A1A6	17	P14	Not +15 ±0.7V, replace Band 1 YIG Assembly.
A1A7	16	P13	Not +15 ±0.7V, replace Band 2 YIG Assembly.
A1A8	20	P17	Not +15 ±0.7V, replace Band 3 YIG Assembly.
A1A9	21	P16	Not +15 ±0.7V, replace Band 4 YIG Assembly.
A1A10	N/A	N/A	Not +15 ±0.7V, replace A1A10 PCB. +15 ±0.7V, replace A2A12 PCB (Paragraph 4-4).

3-17. TROUBLESHOOT +24V SUPPLY

This procedure is used to isolate malfunctions in A1A14 PCB +24V supply and outlying load circuits.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-32 and A2-33 provide parts-locator and schematic diagrams for A1A14 PCB.
- Reference voltages to A1A14TP3 (A GND).

1. Press POWER key to OFF.
2. Remove A1A10 PCB.
3. Disconnect cable from A1A14P12.
4. Disconnect cables from A1A14P31 and A1A14P49.
5. Press POWER key to ON.
6. Check voltages at A1A14VR1-3 and A1A14VR2-3.
   - If +24 ±1.5V, go to step 8.
7. Check voltage at A1A14XA13-21.
   - If not +26V (minimum), replace A1A13 PCB.
   - If +26V (minimum), troubleshoot A1A14VR1, A1A14VR2, and associated circuit.

CAUTION

In the following steps, press the POWER key to OFF before reinstalling the specified PCB and cable(s). Then press the POWER key to ON to measure voltages.

8. Check voltage at A1A14VR1-3 while performing action in following tabulation.

INSTALL PCB	CONNECT CABLE TO		IF VOLTAGE NOT +24 ±1.5V, REPLACE
	CONNECTOR	A1A14 PCB CONNECTOR	
A1A10	None	None	A1A10 PCB.
N/A	13	P31	Optional Step Attenuator
	8	P49	A3B1 Fan (Paragraph 4-10).
N/A	1	P12	Down Converter.

3-18. TROUBLESHOOT –38V SUPPLY

This procedure is used to isolate malfunctions in A1A14 PCB –38V supply and outlying load circuits.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-32 and A2-33 provide parts-locator and schematic diagrams for A1A14 PCB.
- Reference voltages to A1A14TP3 (A GND).

1. Press POWER key to OFF.
2. Remove A1A6, A1A7, A1A8, and A1A9 PCBs, as applicable for your model.
3. Disconnect cables from applicable A1A14P13, A1A14P14, A1A14P16, and A1A14P17.
4. Press POWER key to ON.
5. Check voltage at A1A14TP6 (–38 V).
6. If not –38 ±1.5V, go to step 8.

CAUTION

In the following steps, press the POWER key to OFF before reinstalling the specified PCB and cable(s). Then press the POWER key to ON to measure voltages.

7. Check voltage at A1A14TP6 (–38 V) while performing action in following tabulation.

INSTALL PCB	CONNECT CABLE TO		IF VOLTAGE NOT –38 ±1.5V, REPLACE
	CONNECTOR	A1A14 PCB CONNECTOR	
A1A6	17	P14	Band 1 YIG Assembly.
A1A7	16	P13	Band 2 YIG Assembly.
A1A8	20	P17	Band 3 YIG Assembly.
A1A9	21	P16	Band 4 YIG Assembly.

8. Check voltage between A1A14XA13-28 (+) and A1A14XA13-25 (–).
   - If not –41V (minimum), replace A1A13 PCB (Paragraph 4-4).
   - If –41V (minimum), troubleshoot A4VR1, A1A14Q1 thru A1A14Q3, and associated circuit; replace defective part(s).

3-19. TROUBLESHOOT FAULTY LINE-VOLTAGE INDICATOR CIRCUITS

This procedure is used to isolate malfunctions in A1A14 PCB low and high line-voltage indicator circuits.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-32 and A2-33 provide parts-locator and schematic diagrams for A1A14 PCB.
- Reference voltages to A1A14TP3 (A GND).

1. Press POWER key to ON.
2. Check voltage at A1A14U4-1.
   - If +4.2 ±0.1V, go to step 4.
3. Check voltage at A1A14U4-7.
   - If +12V or greater, replace A1A14U4.
   - If less than +12V, troubleshoot bridge A1A14CR6 thru A1A14CR9 and associated circuit.
4. Perform applicable low or high line-voltage adjustment (Paragraph 6-3).
   - If adjustment does not clear fault, replace A1A14U5.
5. Check applicable A1A14DS5 (LOW LINE) or A1A14DS4 (HIGH LINE) indicator.
   - If not lit, replace A1A14U10.

3-20. TROUBLESHOOT FREQUENCY ERROR, DOWN CONVERTER BAND

This procedure is used to isolate malfunctions in the down-converter band frequency-generation and control circuits on A1A5 and A1A6 PCBs.

NOTE

- Figures A2-14 and A2-15 provide A1A6 PCB parts-locator and schematic diagrams.
- TTL low logic level is –0.5V to +0.8V; TTL high logic level is +3.5V to +5.5V.
- Reference voltage measurements to A1A14TP3 (A GND).

1. Press POWER key to ON.
2. Press POWER key to OFF.
3. Remove A1A6 PCB and install on card extender.
4. Press POWER key to ON.
5. Press CW CF key and set CF frequency for 1.000 GHz.
6. Check voltage at A1A6P1-H or TP5.
   - If TTL low, replace A1A14U8 (Figure A2-25).
7. Check CF DAC voltage at A1A6P1-16.
   - If not per Table 3-3 ±0.02V, replace A1A5 PCB.
8. Check voltage at A1A6P1-12.
   - If same as step 7 voltage, replace Band 1 YIG Assembly (constituent parts are shown in Table A1-6).
   - If not same as step 7 voltage, replace A1A5 PCB.

Table 3-3. Down Converter Band Frequency Settings

Model	CF DAC	Model	CF DAC	Model	CF DAC
6609B **6609B-50**	5.00 V	**6628B** **6628B-50**	NA	**6645B** **6645B-40**	0.56V
6610B	NA	**6629B** **6629B-40**	NA	**6647B** **6647B-40**	0.50 V
6616B	NA				
6617B **6617B-40**	1.25 V	**6630B** **6630B-50**	NA	**6653B**	NA
				6659B	0.38 V
		6631B	NA		
6619B **6619B-40**	NA			**6660B**	NA
		6632B	NA	**6662B**	NA
6620B	NA	**6635B** **6635B-40**	NA	**6663B**	NA
6621B **6621B-40**	NA				
		6636B	NA	**6668B**	1.25 V
6622B **6622B-40**	1.25 V	**6637B** **6637B-40**	NA	**6669B**	0.25 V
				6672B	NA
6624B	NA	**6640B** **6640B-10**	NA		
6627B	NA				

3-21. TROUBLESHOOT FREQUENCY ERROR, BAND 1

This procedure is used to isolate malfunctions in the Band 1 frequency-generation and control circuits on A1A5 and A1A6 PCBs.

NOTE

- Figures A2-14 and A2-15 provide A1A6 PCB parts-locator and schematic diagrams.
- TTL low logic level is –0.5V to +0.8V; TTL high logic level is +3.5V to +5.5V.
- Reference voltage measurements to A1A14TP3 (A GND).

1. Press POWER key to OFF.
2. Remove A1A6 PCB and install on card extender.
3. Press POWER key to ON.
4. Press CW CF key and set CF frequency per Table 3-4.
5. Check voltage at A1A6P1-E or TP3.
   - If TTL high, go to step 8.
6. Check voltage at A1A6P1-D.
   - If TTL low, replace A1A14U7 (Figure A2-32).
7. Check CF DAC voltage at A1A6P1-19.
   - If not per Table 3-4 ±0.02V, replace A1A5 PCB.
8. Check voltage at A1A6P1-16.
   - If same as step 7 voltage, replace Band 1 YIG Assembly (constituent parts are shown in Table A1-6).
   - If not same as step 7 voltage, replace A1A5 PCB.

Table 3-4. Band 1 Frequency Settings

Model	CF Freq, CF DAC	Model	CF Freq, CF DAC	Model	CF Freq, CF DAC
6609B **6609B-50**	NA	**6628B** **6628B-50**	NA	**6645B** **6645B-40**	5 GHz, 2.78 V
6610B	1.5 GHz, 7.5 V	**6629B** **6629B-40**	NA	**6647B** **6647B-40**	5 GHz, 2.50 V
6616B	2.5 GHz, 5.81 V				
6617B **6617B-40**	5 GHz, 6.25 V	**6630B** **6630B-50**	NA	**6653B**	5 GHz, 1.89 V
		6631B	NA	**6659B**	5 GHz, 1.89 V
6619B **6619B-40**	5 GHz, 6.25 V	**6632B**	NA	**6660B**	NA
				6662B	5 GHz, 1.25 V
6620B	5 GHz, 11.63 V	**6635B** **6635B-40**	5 GHz, 2.78 V	**6663B**	5 GHz, 1.25 V
6621B **6621B-40**	5 GHz, 6.25 V	**6636B**	NA	**6668B**	5 GHz, 1.25 V
6622B **6622B-40**	5 GHz, 6.25 V	**6637B** **6637B-40**	5 GHz, 2.50 V	**6669B**	5 GHz, 1.25 V
				6672B	NA
6624B	6 GHz, 7.5 V	**6640B** **6640B-10**	NA		
6627B	NA				

3-22. TROUBLESHOOT FREQUENCY ERROR, BAND 2

This procedure is used to isolate malfunctions in the Band 2 frequency-generation and control circuits on A1A5 and A1A7 PCBs.

NOTE

- Figures A2-17 and A2-18 provide A1A7 PCB parts-locator and schematic diagrams.
- TTL low logic level is –0.5V to +0.8V; TTL high logic level is +3.5V to +5.5V.
- Reference voltage measurements to A1A14TP3 (A GND).

1. Press POWER key to OFF.
2. Remove A1A7 PCB and install on card extender.
3. Press POWER key to ON.
4. Press CW CF key and set CF frequency per Table 3-5.
5. Check voltage at A1A7P1-E.
   - If TTL high, go to step 8.
6. Check voltage at A1A7P1-D.
   - If TTL low, replace A1A14U7 (Figure A2-32).
7. Check CF DAC voltage at A1A7P1-19.
   - If not per Table 3-5 ±0.02 V, replace A1A5 PCB.
8. Check voltage at A1A7P1-16.
   - If same as step 7 voltage, replace Band 2 YIG Assembly (constituent parts are shown in Table A1-6).
   - If not same as step 7 voltage, replace A1A5 PCB.

Table 3-5. Band 2 Frequency Settings

Model	CF Freq, CF DAC	Model	CF Freq, CF DAC	Model	CF Freq, CF DAC
6609B **6609B-50**	NA	**6628B** **6628B-50**	10 GHz, 8.06 V	**6645B** **6645B-40**	10 GHz, 5.56 V
6610B	NA	**6629B** **6629B-40**	10 GHz, 5.00 V	**6647B** **6647B-40**	10 GHz, 5.00 V
6616B	NA	**6630B** **6630B-50**	10 GHz, 8.06 V	**6653B**	10 GHz, 3.77 V
6617B **6617B-40**	NA	**6631B**	10 GHz, 6.45 V	**6659B**	10 GHz, 3.77 V
6619B **6619B-40**	NA	**6632B**	NA	**6660B**	NA
6620B	NA	**6635B** **6635B-40**	10 GHz, 5.56 V	**6662B**	10 GHz, 3.75 V
6621B **6621B-40**	10 GHz, 12.50 V	**6636B**	NA	**6663B**	10 GHz, 3.75 V
6622B **6622B-40**	10 GHz, 12.50 V	**6637B** **6637B-40**	10 GHz, 5.00 V	**6668B**	10 GHz, 3.75 V
6624B	NA	**6640B** **6640B-10**	NA	**6669B**	10 GHz, 3.75 V
6627B	7.5 GHz, 8.33 V			**6672B**	NA

3-23. TROUBLESHOOT FREQUENCY ERROR, BAND 3

This procedure is used to isolate malfunctions in the Band 3 frequency-generation and control circuits on A1A5 and A1A8 PCBs.

NOTE

- Figures A2-19 and A2-20 provide A1A8 PCB parts-locator and schematic diagrams.
- TTL low logic level is –0.5V to +0.8V; TTL high logic level is +3.5V to +5.5V.
- Reference voltage measurements to A1A14TP3 (A GND).

1. Press POWER key to OFF.
2. Remove A1A8 PCB and install on card extender.
3. Press POWER key to ON.
4. Press CW CF key and set CF frequency for per Table 3-6.
5. Check voltage at A1A8P1-E.
   - If TTL high, go to step 8.
6. Check voltage at A1A8P1-D.
   - If TTL low, replace A1A14U7 (Figure A2-25).
7. Check CF DAC voltage at A1A8P1-19.
   - If not per Table 3-6 ±0.02 V, replace A1A5 PCB.
8. Check voltage at A1A8P1-16.
   - If same as step 7 voltage, replace Band 3 YIG Assembly (constituent parts are shown in Table A1-6).
   - If not same as step 7 voltage, replace A1A5 PCB.

Table 3-6. Band 3 Frequency Settings

Model	CF Freq, CF DAC	Model	CF Freq, CF DAC	Model	CF Freq, CF DAC
6609B **6609B-50**	NA	**6628B** **6628B-50**	NA	**6645B** **6645B-40**	15 GHz, 8.33 V
6610B	NA	**6629B** **6629B-40**	NA	**6647B** **6647B-40**	15 GHz, 7.50 V
6616B	NA	**6630B** **6630B-50**	15 GHz, 7.50 V	**6653B**	15 GHz, 5.66 V
6617B **6617B-40**	NA	**6631B**	12.25 GHz, 7.90 V	**6659B**	15 GHz, 5.66 V
6619B **6619B-40**	NA	**6632B**	19.5 GHz, 8.86 V	**6660B**	15 GHz, 3.75 V
6620B	NA	**6635B** **6635B-40**	15 GHz, 8.33 V	**6662B**	15GHz, 3.75 V
6621B **6621B-40**	NA	**6636B**	NA	**6663B**	15GHz, 3.75 V
6622B **6622B-40**	NA	**6637B** **6637B-40**	15 GHz, 7.50 V	**6668B**	15GHz, 3.75 V
6624B	NA	**6640B** **6640B-10**	13.25 GHz, 3.31 V	**6669B**	15GHz, 3.75 V
6627B	NA			**6672B**	NA

3-24. TROUBLESHOOT FREQUENCY ERROR, BAND 4

This procedure is used to isolate malfunctions in the Band 4 frequency-generation and control circuits on A1A5 and A1A9 PCBs.

NOTE

- Figures A2-17 and A2-18 provide A1A9 PCB parts-locator and schematic diagrams.
- TTL low logic level is –0.5V to +0.8V; TTL high logic level is +3.5V to +5.5V.
- Reference voltage measurements to A1A14TP3 (A GND).

1. Press POWER key to OFF.
2. Remove A1A9 PCB and install on card extender.
3. Press POWER key to ON.
4. Press CW CF key and set CF frequency per Table 3-7.
5. Check voltage at A1A9P1-E.
   - If TTL high, go to step 8.
6. Check voltage at A1A9P1-D.
   - If TTL low, replace A1A14U7 (Figure A2-32).
7. Check CF DAC voltage at A1A9P1-19.
   - If not per Table 3-7 ±0.02 V, replace A1A5 PCB.
8. Check voltage at A1A9P1-16.
   - If same as step 7 voltage, replace Band 4 YIG Assembly (constituent parts are shown in Table A1-6).
   - If not same as step 7 voltage, replace A1A5 PCB.

Table 3-7. Band 4 Frequency Settings

Model	CF Freqency (GHz)	Model	CF Freqency (GHz)	Model	CF Freqency (GHz)
6609B **6609B-50**	NA	**6628B** **6628B-50**	NA	**6645B** **6645B-40**	NA
6610B	NA	**6629B** **6629B-40**	NA	**6647B** **6647B-40**	NA
6616B	NA	**6630B** **6630B-50**	NA	**6653B**	22 GHz, 8.30 V
6617B **6617B-40**	NA	**6631B**	NA	**6659B**	22 GHz, 8.30 V
6619B **6619B-40**	NA	**6632B**	NA	**6660B**	22 GHz, 5.50 V
6620B	NA	**6635B** **6635B-40**	NA	**6662B**	22 GHz, 5.50 V
6621B **6621B-40**	NA	**6636B**	22 GHz, 8.30 V	**6663B**	22 GHz, 5.50 V
6622B **6622B-40**	NA	**6637B** **6637B-40**	NA	**6668B**	22 GHz, 5.50 V
6624B	NA	**6640B** **6640B-10**	NA	**6669B**	22 GHz, 5.50 V
6627B	NA			**6672B**	NA

3-25. TROUBLESHOOT FREQUENCY ERROR, DOUBLER BAND

This procedure is used to isolate malfunctions in the 27.5-to-40 GHz frequency-generation and control circuits on A1A8 PCBs.

NOTE

- Figures A2-19 and A2-20 provide A1A8 PCB parts-locator and schematic diagrams.
- TTL low logic level is –0.5V to +0.8V; TTL high logic level is +3.5V to +5.5V.
- Reference voltage measurements to A1A14TP3 (A GND).

1. Press POWER key to OFF.
2. Remove A1A8 PCB and install on card extender.
3. Press POWER key to ON.
4. Press CW CF key and set CF frequency for 33.000 GHz.
5. Check voltage at A1A8P1-19.
   - If not +8.25 ±0.02 V, replace A1A5 PCB.
6. Check voltage at A1A8P1-16.
   - If +8.25 ±0.1 V, replace Band 3 YIG Assembly (constituent parts are shown in Table A1-6).
   - If not +8.25 ±0.1 V, replace A1A5 PCB.

3-26. TROUBLESHOOT FREQUENCY ERROR, OVERALL FREQUENCY RANGE

This procedure is used to isolate malfunctions that occur at other than center frequency in one or more bands.

1. Press POWER key to ON.
2. Press SELF TEST key and check if error code 15, 16, 17, 18, or 19, as applicable, also appear.
   - Troubleshoot error code 15, 16, 17, 18, or 19 as applicable.
3. If none of the error codes listed in step 2 appear, replace A1A5 PCB.

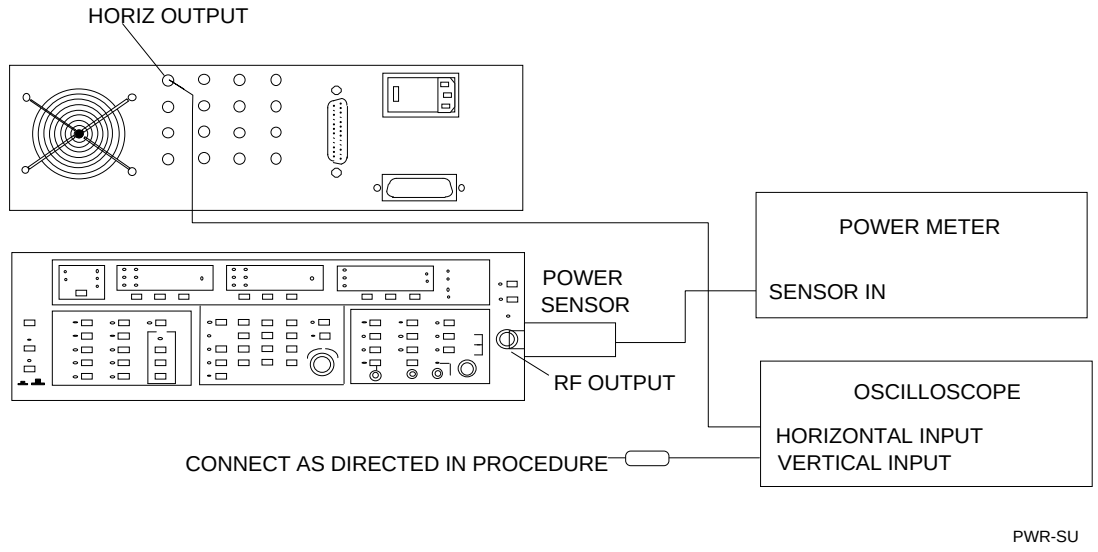
3-27. TROUBLESHOOT POWER LEVELING ERROR, DOWN CONVERTER BAND

This procedure is used to isolate malfunctions in the down-converter band ALC loop.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-15 and A2-16 provide A1A6 PCB parts-locator and schematic diagrams.
- TTL low logic level is –0.5V to +0.8V; TTL high logic level is +3.5V to +5.5V.
- Reference voltage measurements to A1A14TP3 (A GND).
- Refer to Figure 3-1 for a troubleshooting diagram.

1. Connect test equipment as shown below, and turn it on.



2. Press RESET key.
3. Press F1–F2 key.
4. Press F1 key and set F1 frequency for 0.010 GHz.
5. Press F2 key and set F2 frequency for 2.000 GHz.
6. Press MANUAL SWEEP key.

7. Check voltage at A1A14P12-5.
   - If not +15 ±1 V, troubleshoot +15 VHC supply (Paragraph 3-14); replace defective part(s).
8. Check voltage at A1A14P12-3.
   - If not –15 ±1 V, troubleshoot –15 VHC supply (Paragraph 3-11); replace defective part(s).
9. Press POWER key to OFF.

CAUTION

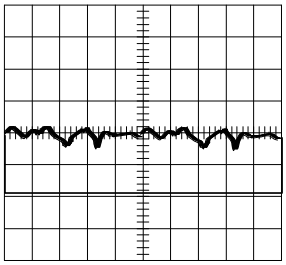
Do not twist, bend, or otherwise damage semirigid cable in the following steps.

10. Remove RF deck assembly cover.
11. Remove RF cable from between Pin Switch (Pad on 6609B/6609B-50) and RF INPUT on Down Converter; connect power sensor to PIN switch (or Pad). For 6609B/6609B-50, skip to step 21.
12. Press POWER key to ON.
13. Rotate MANUAL SWEEP control fully counterclockwise; then slowly rotate clockwise while observing power meter.
    - If power meter indicates +11 dBm or greater, go to step 21.
14. Press POWER key to OFF.
15. Remove A1A6 PCB and install on card extender.
16. Press POWER key to ON.
17. Set oscilloscope vertical input coupling for dc, and check voltage at A1A14P15-2.
    - If –3 ±0.5 V, replace PIN switch.
18. Check voltage between A1A6P1-2 (probe) and A1A6TP1 (shield).
    - If not TTL low during forward sweep, replace Band 1 YIG Assembly (constituent parts are shown in Table A1-6).
    - If TTL low during forward sweep, troubleshoot A1A14Q5, A1A14Q8, A1A14Q9, and associated components (Figures A2-32 and A2-33); replace defective part(s).
19. Press POWER key to OFF.
20. Disconnect power sensor from PIN switch. Reinstall RF cable; torque connectors to 8 inch-pounds.
21. Remove A1A4 PCB and install on card extender.
22. Press POWER key to ON.
23. Press AUTO key.
24. Set horizontal time base on oscilloscope for external, and adjust horizontal vernier control so that trace extends full width of screen (10 divisions).

25. Set oscilloscope vertical input coupling for ac, and connect between A1A4P1-S (probe) and A1A4TP2 (shield) (Figure A2-10).

- If waveform resembles that shown below, replace ALC Assembly (A1A4 ALC PCB; and Directional Coupler).

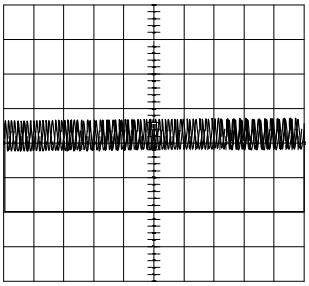
OSCILLOSCOPE SETTINGS:
HORIZONTAL SCALE: EXTERNAL
VERTICAL SCALE: 5 V/DIV



ALC-WF1

- If waveform is not present, replace Down Converter.
- If waveform is present but shows oscillations like that below, perform ALC Bandwidth and Low-Level Noise adjustments (Paragraph 6-14).

OSCILLOSCOPE SETTINGS:
HORIZONTAL SCALE: EXTERNAL
VERTICAL SCALE: 5 V/DIV



ALC-WF2

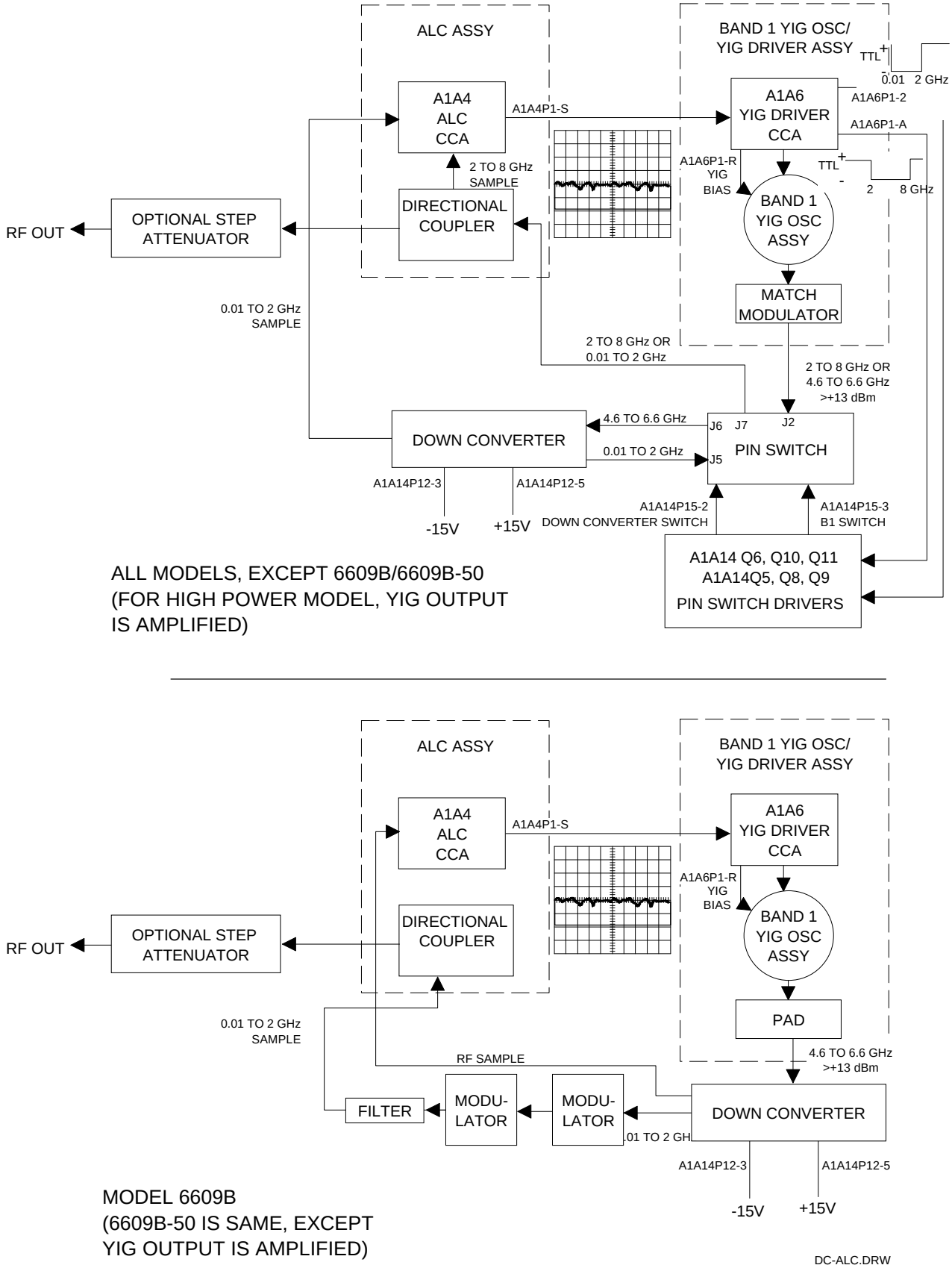


Figure 3-1. Down-Converter and Band 1 ALC Troubleshooting Diagram

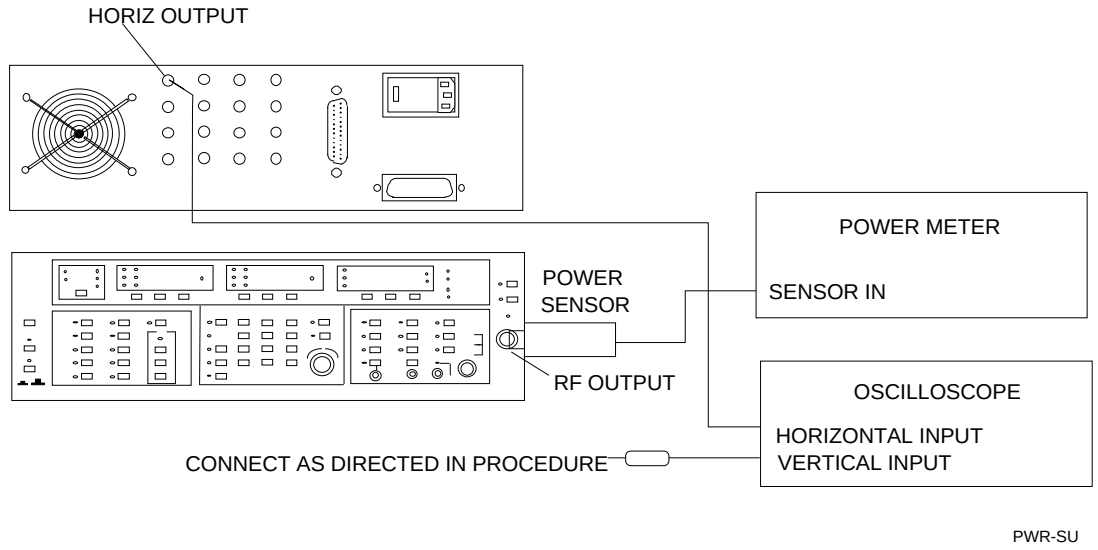
3-28. TROUBLESHOOT POWER LEVELING ERROR, BAND 1

This procedure is used to isolate malfunctions in the Band 1 ALC loop.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-14 and A2-15 provide A1A6 PCB parts-locator and schematic diagrams.
- TTL low logic level is –0.5V to +0.8V; TTL high logic level is +3.5V to +5.5V.
- Reference voltage measurements to A1A14TP3 (A GND).
- Refer to Figure 3-1 for a troubleshooting diagram.

1. Connect test equipment as shown below, and turn it on.



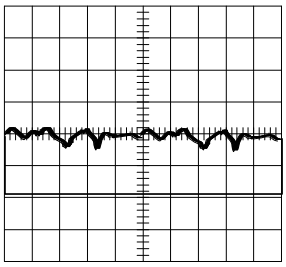
2. Press RESET key.
3. Press F1–F2 key.
4. Press F1 key and set F1 frequency per Table 3-8.
5. Press F2 key and set F2 frequency per Table 3-8.
6. Press MANUAL SWEEP key.
7. Rotate MANUAL SWEEP control fully counterclockwise; then slowly rotate clockwise while observing power meter for correct power indication of –1.5 to +1.5 dBm.
   - If error code 16 is present and power meter indicates correct power, replace ALC Assembly (A1A4 ALC PCB and Directional Coupler).
8. Press POWER key to OFF.
9. Remove A1A6 PCB and install on card extender.
10. Press POWER key to ON.
11. Check voltage at A1A6P1-R.
    - If not +15 ±1 V, replace Band 1 YIG Assembly (constituent parts are shown in Table A1-6).

Table 3-8. Band 1 Power Leveling Frequency Settings

Model	F1 Frequency (GHz)	F2 Frequency (GHz)
6609B **6609B-50**	NA	NA
6610B	1	2
6616B	1.7	4.3
6617B **6617B-40**	2.1	8
6619B **6619B-40**	2	8
6620B	3.6	6.5
6621B **6621B-40**	2	7.9
6622B **6622B-40**	2.1	7.9
6624B	4	8
6627B	NA	NA
6628B **6628B-50**	NA	NA
6629B **6629B-40**	NA	NA
6630B **6630B-50**	NA	NA
6631B	NA	NA
6632B	NA	NA
6635B **6635B-40**	2	7.9
6636B	NA	NA
6637B **6637B-40**	2	7.9
6640B **6640B-10**	NA	NA
6645B **6645B-40**	2.1	7.9
6647B **6647B-40**	2.1	7.9
6653B	2	7.9
6659B	2.1	7.9
6660B	NA	NA
6662B	2.1	7.9
6663B	2.1	7.9
6668B	2.1	7.9
6669B	2.1	7.9
6672B	NA	NA

12. Press POWER key to OFF.
13. Remove A1A6 PCB from card extender and reinstall.
14. Remove A1A4 PCB and install on card extender.
15. Press POWER key to ON.
16. Press AUTO key.
17. Set horizontal time base on oscilloscope for external, and adjust horizontal vernier control so that trace extends full width of screen (10 divisions).
18. Set oscilloscope vertical input coupling for ac, and connect between A1A4P1-S (probe) and A1A4TP2 (shield) (Figure A2-10).
    - If waveform resembles that shown below, replace ALC Assembly (A1A4 ALC PCB and Directional Coupler).

OSCILLOSCOPE SETTINGS:
HORIZONTAL SCALE: EXTERNAL
VERTICAL SCALE: 5 V/DIV

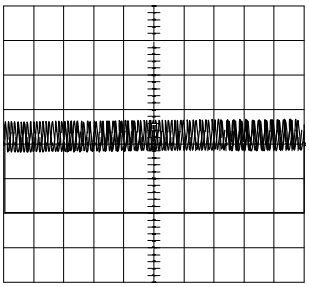


RETRACE LINE

ALC-WF1

    - If waveform is present but shows oscillations like that shown in the following waveform, perform ALC Bandwidth and Low-Level Noise adjustments (Paragraph 6-14).

OSCILLOSCOPE SETTINGS:
HORIZONTAL SCALE: EXTERNAL
VERTICAL SCALE: 5 V/DIV



RETRACE LINE

ALC-WF2

19. Press POWER key to OFF.
20. Remove A1A4 PCB from card extender and reinstall.
21. Remove RF deck assembly cover.

CAUTION

Do not twist, bend, or otherwise damage semirigid cable in the following steps.

22. Remove RF cable from between Match Modulator and PIN switch; connect power sensor to Match Modulator.
23. Press POWER key to ON.
24. Press MANUAL SWEEP key.

25. Rotate MANUAL SWEEP control fully counterclockwise; then slowly rotate clockwise while observing power meter.
    - If power meter does not indicate +13 dBm or greater, replace Band 1 YIG Assembly (constituent parts are shown in Table A1-6).
26. Press POWER key to OFF.
27. Disconnect power sensor from Match Modulator. Reinstall RF cable; torque connectors to 8 inch-pounds.
28. Press POWER key to ON.
29. Press AUTO key.
30. Set oscilloscope vertical input coupling for dc, and check voltage at A1A14P15-3.
    - If –3 ±0.5, replace PIN switch
    - If not –3 ±0.5, troubleshoot A1A14Q6, A1A14Q10, A1A14Q11, and associated components (Figures A2-32 and A2-33); replace defective part(s).

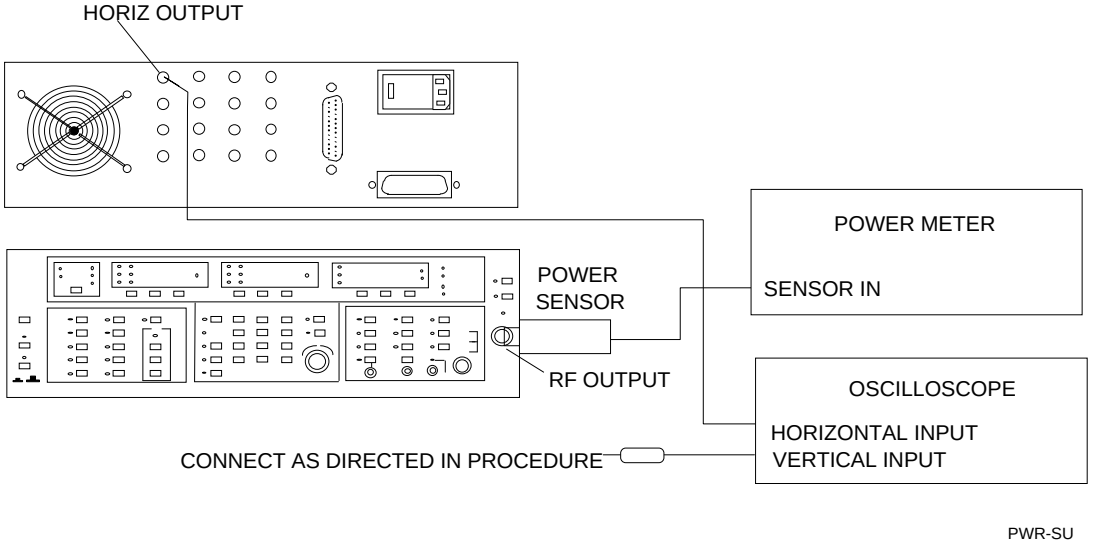
3-29. TROUBLESHOOT POWER LEVELING ERROR, BAND 2

This procedure is used to isolate malfunctions in the Band 2 ALC loop.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-18 and A2-19 provide A1A7 PCB parts-locator and schematic diagrams.
- TTL low logic level is –0.5V to +0.8V; TTL high logic level is +3.5V to +5.5V.
- Reference voltage measurements to A1A14TP3 (A GND).
- Refer to Figure 3-2 for a troubleshooting diagram.

1. Connect test equipment as shown below, and turn it on.



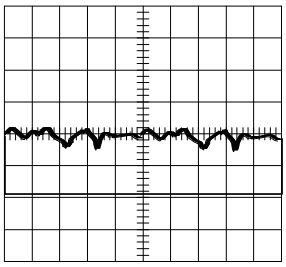
2. Press RESET key.
3. Press F1–F2 key.
4. Press F1 key and set F1 frequency per Table 3-9.
5. Press F2 key and set F2 frequency per Table 3-9.
6. Press MANUAL SWEEP key.
7. Rotate MANUAL SWEEP control fully counterclockwise; then slowly rotate clockwise while observing power meter for correct power indication of –1.5 to +1.5 dBm.
   - If error code 17 is present and power meter indicates correct power, replace ALC Assembly (A1A4 ALC PCB and Directional Coupler).
8. Press POWER key to OFF.
9. Remove A1A7 PCB and install on card extender.
10. Press POWER key to ON.
11. Check voltage at A1A7P1-R.
    - If not +15 ±1V, replace Band 2 YIG Assembly (constituent parts are shown in Table A1-6).

Table 3-9. Band 2 Power Leveling Frequency Settings

Model	F1 Frequency (GHz)	F2 Frequency (GHz)
6609B **6609B-50**	NA	NA
6610B	NA	NA
6616B	NA	NA
6617B **6617B-40**	NA	NA
6619B **6619B-40**	NA	NA
6620B	NA	NA
6621B **6621B-40**	8.1	12.4
6622B **6622B-40**	8.1	12.4
6624B		
6627B	5.9	9.0
6628B **6628B-50**	8	12.4
6629B **6629B-40**	8	12.3
6630B **6630B-50**	NA	NA
6631B	NA	NA
6632B	NA	NA
6635B **6635B-40**	8.1	12.3
6636B	NA	NA
6637B **6637B-40**	8.1	12.3
6640B **6640B-10**	NA	NA
6645B **6645B-40**	8.1	12.3
6647B **6647B-40**	8.1	12.3
6653B	8.1	12.3
6659B	8.1	12.3
6660B	NA	NA
6662B	8.1	12.3
6663B	8.1	12.3
6668B	8.1	12.3
6669B	8.1	12.3
6672B	NA	NA

12. Press POWER key to OFF.
13. Remove A1A7 PCB from card extender and reinstall.
14. Remove A1A4 PCB and install on card extender.
15. Press POWER key to ON.
16. Press AUTO key.
17. Set horizontal time base on oscilloscope for external, and adjust horizontal vernier control so that trace extends full width of screen (10 divisions).
18. Set oscilloscope vertical input coupling for ac, and connect between A1A4P1-S (probe) and A1A4TP2 (shield) (Figure A2-10).
    - If waveform resembles that shown below, replace ALC Assembly (A1A4 ALC PCB and Directional Coupler).

OSCILLOSCOPE SETTINGS:
HORIZONTAL SCALE: EXTERNAL
VERTICAL SCALE: 5 V/DIV

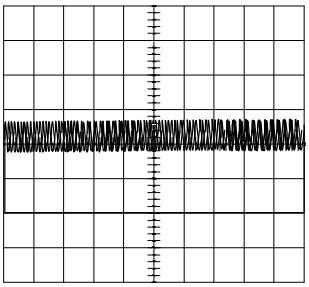


RETRACE LINE

ALC-WF1

    - If waveform is present but shows oscillations like that shown below, perform ALC Bandwidth and Low-Level Noise adjustments (Paragraph 6-14).

OSCILLOSCOPE SETTINGS:
HORIZONTAL SCALE: EXTERNAL
VERTICAL SCALE: 5 V/DIV



RETRACE LINE

ALC-WF2

19. Press POWER key to OFF.
20. Remove RF deck assembly cover.

CAUTION

Do not twist, bend, or otherwise damage semirigid cable in the following steps.

21. Remove RF cable from between Band 2 oscillator attenuator and PIN switch; connect power sensor to attenuator.
22. Press POWER key to ON.
23. Press MANUAL SWEEP key.

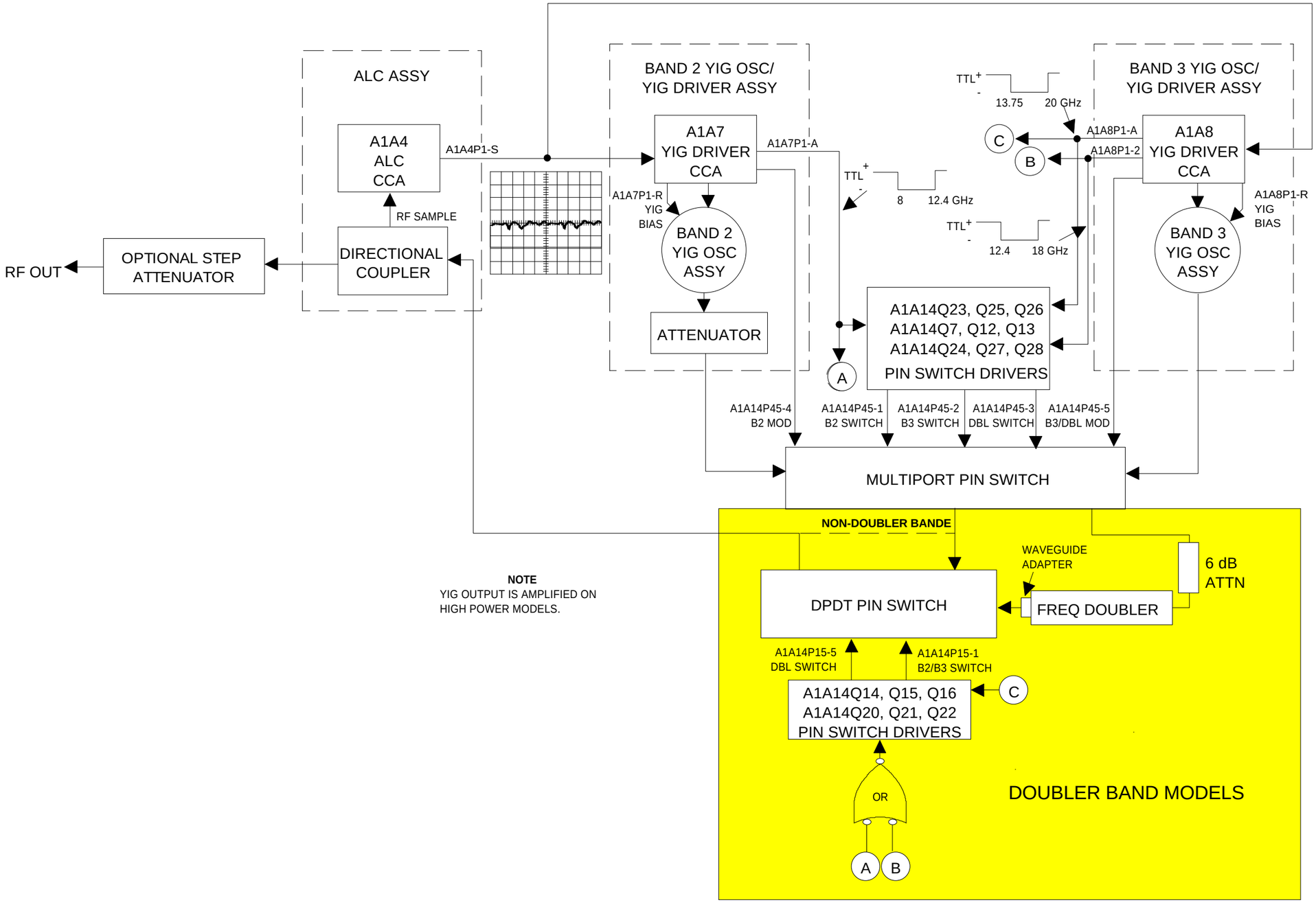


Figure 3-2. YIG Bands 2, 3, and Doubler ALC Troubleshooting Diagram

24. Rotate MANUAL SWEEP control fully counterclockwise; then slowly rotate clockwise while observing power meter.
    - If power meter does not indicate +15 dBm or greater, replace Band 2 YIG Assembly (constituent parts are shown in Table A1-6).
25. Press POWER key to OFF.
26. For models without a doubler band (high-end frequency less than 40 GHz), go to step 35.
27. Disconnect power sensor from attenuator. Reinstall RF cable; torque connectors to 8 inch-pounds.
28. Remove cable from between J4 on multiport PIN switch and J3 on DPDT PIN switch; connect power sensor to J4.
29. Press POWER key to ON.
30. Press MANUAL SWEEP key.
31. Rotate MANUAL SWEEP control fully counterclockwise; then slowly rotate clockwise while observing power meter.
32. If power meter does not indicate +12.5 dBm or greater, go to step 42.
33. Press POWER key to OFF.
34. Disconnect power sensor from J4. Reinstall cable; torque connectors to 8 inch-pounds.
35. Remove A1A4 PCB from card extender and reinstall.
36. Remove A1A7 PCB and install on card extender.
37. Press POWER key to ON.
38. Press AUTO key.
39. Set oscilloscope vertical input coupling for dc, and check voltage at A1A14P15-1.
    - If –3 ±0.5 V, replace PIN switch.
40. Press F1–F2 key.
41. Check voltage at A1A7P1-A.
    - If not TTL low during forward sweep, replace Band 2 YIG Assembly (constituent parts are shown in Table A1-6).
    - If TTL low during forward sweep, troubleshoot A1A14Q20, A1A14Q21, A1A14Q22, and associated components (Figures A2-32, A2-33); replace defective part(s).
42. Press POWER key to OFF.
43. Disconnect power sensor from J4. Reinstall cable; torque connectors to 8 inch-pounds.
44. Press POWER key to ON.
45. Press AUTO key.
46. Set oscilloscope vertical input coupling for dc, and check voltage at A1A14P45-1.
    - If not –3 ±0.5V, go to step 48.
47. Set oscilloscope vertical input for ac coupling, and connect to A1A14P45-4.
    - If output-power waveform like first one shown for step 19 *is not* present across entire screen, replace Band 2 YIG Assembly (constituent parts are shown in Table A1-6).
    - If output power waveform *is* present across entire trace, replace multiport PIN switch.

48. Press F1–F2 key.
49. Check voltage at A1A7P1-A.
    - If not TTL low during forward sweep, replace Band 2 YIG Assembly (constituent parts are shown in Table A1-6).
    - If TTL low during forward sweep, troubleshoot A1A14Q7, A1A14Q12, A1A14Q13, and associated components (Figures A2-32 and A3-33); replace defective part(s).

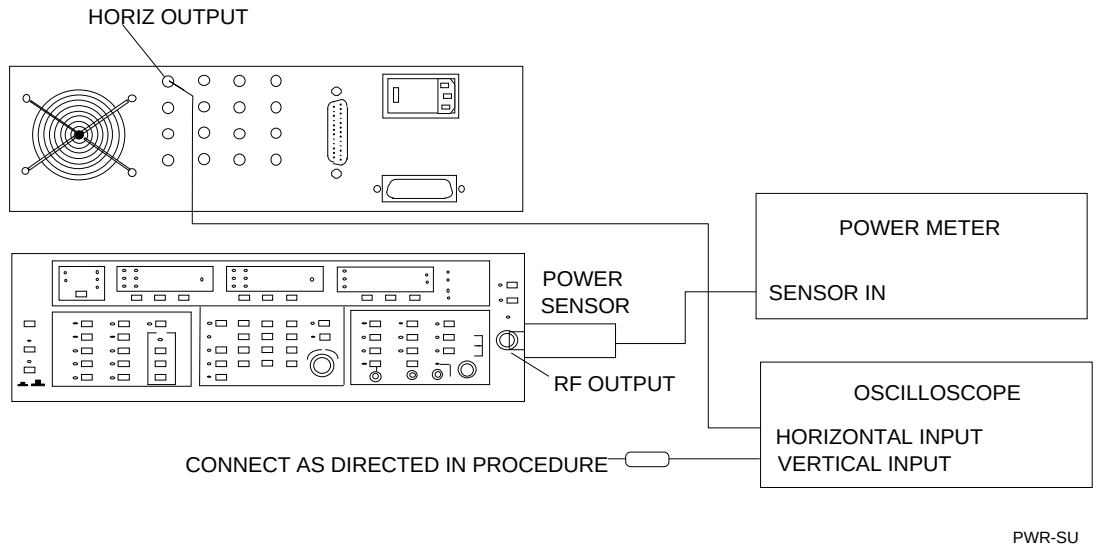
3-30. TROUBLESHOOT POWER LEVELING ERROR, BAND 3

This procedure is used to isolate malfunctions in the Band 3 ALC loop.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-24 and A2-25 provide A1A8 PCB parts-locator and schematic diagrams.
- TTL low logic level is –0.5V to +0.8V; TTL high logic level is +3.5V to +5.5V.
- Reference voltage measurements to A1A14TP3 (A GND).
- Refer to Figure 3-3 for a troubleshooting diagram.

1. Connect test equipment as shown below, and turn it on.



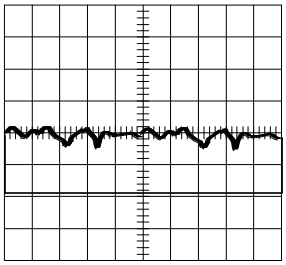
2. Press RESET key.
3. Press F1–F2 key.
4. Press F1 key and set F1 frequency per Table 3-10.
5. Press F2 key and set F2 frequency per Table 3-10.
6. Press MANUAL SWEEP key.

Table 3-10. Band 3 Power Leveling Frequency Set-

Model	F1 Frequency (GHz)	F2 Frequency (GHz)
6609B **6609B-50**	NA	NA
6610B	NA	NA
6616B	NA	NA
6617B **6617B-40**	NA	NA
6619B **6619B-40**	NA	NA
6620B	NA	NA
6621B **6621B-40**	NA	NA
6622B **6622B-40**	NA	NA
6624B	NA	NA
6627B	NA	NA
6628B **6628B-50**	NA	NA
6629B **6629B-40**	12.5	20
6630B **6630B-50**	12.4	20
6631B	10	15.5
6632B	17	22
6635B **6635B-40**	12.5	18
6636B	NA	NA
6637B **6637B-40**	12.5	20
6640B **6640B-10**	13.25	20
6645B **6645B-40**	12.5	18
6647B **6647B-40**	12.5	20
6653B	12.5	17.9
6659B	12.5	17.9
6660B	12.5	17.9
6662B	12.5	17.9
6663B	12.5	17.9
6668B	12.5	17.9
6669B	12.5	17.9
6672B	13.33	20

7. Rotate MANUAL SWEEP control fully counterclockwise; then slowly rotate clockwise while observing power meter for correct power indication of –1.5 to +1.5 dBm.
   - If error code 18 is present and power meter indicates correct power, replace ALC Assembly (A1A4 ALC PCB; and Directional Coupler).
8. Press POWER key to OFF.
9. Remove A1A8 PCB and install on card extender.
10. Press POWER key to ON.
11. Check voltage at A1A8P1-R.
    - If not +12 ±1 V, replace Band 3 YIG Assembly (constituent parts are shown in Table A1-6).
12. Press POWER key to OFF.
13. Remove A1A8 PCB from card extender and reinstall.
14. Remove A1A4 PCB and install on card extender.
15. Press POWER key to ON.
16. Press AUTO key.
17. Set horizontal time base on oscilloscope for external, and adjust horizontal vernier control so that trace extends full width of screen (10 divisions).
18. Set oscilloscope vertical input coupling for ac, and connect between A1A4P1-S (probe) and A1A4TP2 (shield) (Figure A2-10).
    - If waveform resembles that shown below, replace ALC Assembly (A1A4 ALC PCB and Directional Coupler).

OSCILLOSCOPE SETTINGS:
HORIZONTAL SCALE: EXTERNAL
VERTICAL SCALE: 5 V/DIV

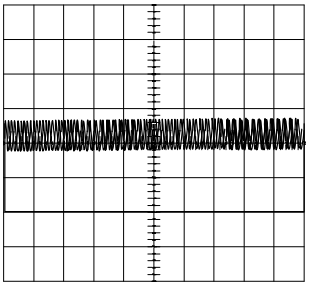


RETRACE LINE

ALC-WF1

- If waveform is present but shows oscillations like that shown below, perform ALC Bandwidth and Low-Level Noise adjustments (Paragraph 6-14).

OSCILLOSCOPE SETTINGS:
HORIZONTAL SCALE: EXTERNAL
VERTICAL SCALE: 5 V/DIV



RETRACE LINE

ALC-WF2

19. Press POWER key to OFF.
20. Remove RF deck assembly cover.

CAUTION

Do not twist, bend, or otherwise damage semirigid cable in the following steps.

21. Remove RF cable from between Band 3 oscillator and multiport PIN switch; connect power sensor to oscillator.
22. Press POWER key to ON.
23. Press MANUAL SWEEP key.
24. Rotate MANUAL SWEEP control fully counterclockwise; then slowly rotate clockwise while observing power meter.
    - If power meter does not indicate +17 dBm or greater, replace Band 3 YIG Assembly (constituent parts are shown in Table A1-6).
25. Press POWER key to OFF.
26. Disconnect power sensor from oscillator. Reinstall RF cable; torque connectors to 8 inch-pounds.
27. Remove A1A4 PCB from card extender and reinstall.
28. Remove A1A8 PCB and install on card extender.
29. Press POWER key to ON.
30. Press AUTO key.
31. Set oscilloscope vertical input coupling for dc, and check voltage at A1A14P15-1.
    - If not –3 ±0.5V, troubleshoot A1A14CR35 and A1A14R103; replace defective part(s).
32. Set oscilloscope vertical input coupling for dc, and check voltage at A1A14P45-2.
    - If not –3 ±0.5V, go to step 35.
33. Press F1–F2 key.
34. Check voltage at A1A8P1-2.
    - If not TTL low during forward sweep, replace Band 3 YIG Assembly (constituent parts are shown in Table A1-6).
    - If TTL low during forward sweep, troubleshoot A1A14Q24, A1A14Q27, A1A14Q28, and associated components (Figures A2-32 and A3-33); replace defective part(s).
35. Set oscilloscope vertical input for ac coupling, and connect to A1A14P45-5.
    - If output-power waveform like first one shown for step 19 *is not* present across entire screen, replace Band 3 YIG Assembly (constituent parts are shown in Table A1-6).
    - If output power waveform *is* present across entire trace, replace multiport PIN switch.

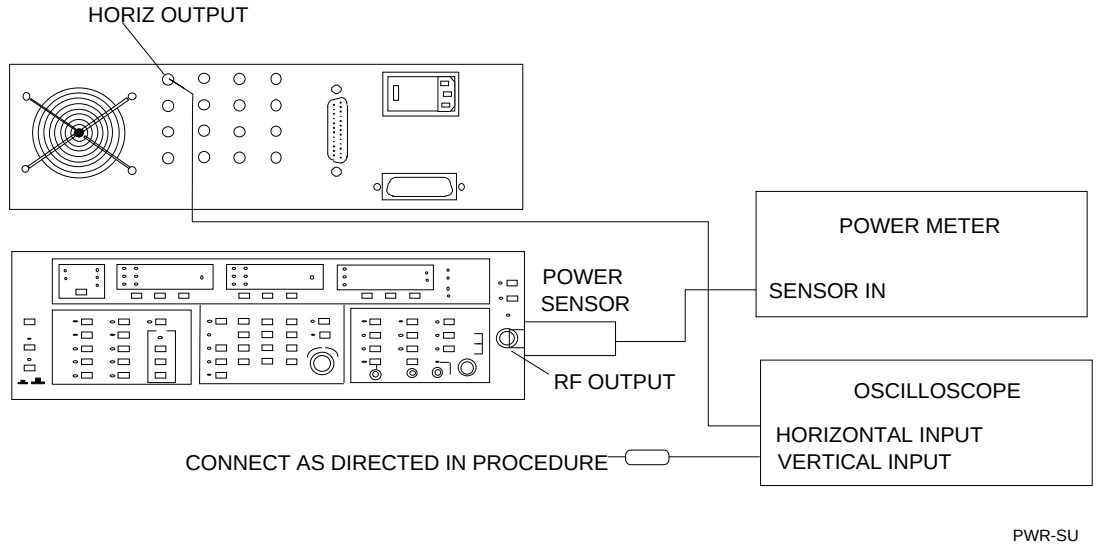
3-31. TROUBLESHOOT POWER LEVELING ERROR, BAND 4

This procedure is used to isolate malfunctions in the Band 4 ALC loop.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-18 and A2-19 provide A1A9 PCB parts-locator and schematic diagrams.
- TTL low logic level is –0.5V to +0.8V; TTL high logic level is +3.5V to +5.5V.
- Reference voltage measurements to A1A14TP3 (A GND).
- Refer to Figure 3-3 for a troubleshooting diagram.

1. Press POWER key to ON.
2. Connect test equipment as shown below, and turn it on.



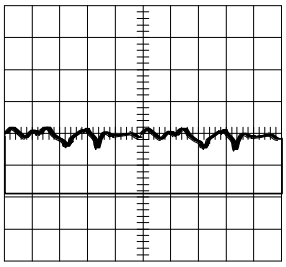
3. Press RESET key.
4. Press F1–F2 key.
5. Press F1 key and set F1 frequency per Table 3-11.
6. Press F2 key and set F2 frequency per Table 3-11.
7. Press MANUAL SWEEP key.
8. Rotate MANUAL SWEEP control fully counterclockwise; then slowly rotate clockwise while observing power meter for correct power indication of –1.5 to +1.5 dBm.
   - If error code 19 is present and power meter indicates correct power, replace ALC Assembly (A1A4 ALC PCB and Directional Coupler).
9. Press POWER key to OFF.
10. Remove A1A9 PCB and install on card extender.
11. Press POWER key to ON.

Table 3-11. Band 4 Power Leveling Frequency Settings

Model	F1 Frequency (GHz)	F2 Frequency (GHz)
6609B **6609B-50**	NA	NA
6610B	NA	NA
6616B	NA	NA
6617B **6617B-40**	NA	NA
6619B **6619B-40**	NA	NA
6620B	NA	NA
6621B **6621B-40**	NA	NA
6622B **6622B-40**	NA	NA
6624B	NA	NA
6627B	NA	NA
6628B **6628B-50**	NA	NA
6629B **6629B-40**	NA	NA
6630B **6630B-50**	NA	NA
6631B	NA	NA
6632B	NA	NA
6635B **6635B-40**	NA	NA
6636B	18	26.5
6637B **6637B-40**	NA	NA
6640B **6640B-10**	NA	NA
6645B **6645B-40**	NA	NA
6647B **6647B-40**	NA	NA
6653B	18.1	26.5
6659B	18.1	26.5
6660B	18.1	26.4
6662B	18.1	26.4
6663B	18.1	26.4
6668B	18.1	26.4
6669B	18.1	26.4
6672B	NA	NA

12. Check voltage at A1A9P1-R.
    - If not +12 ±1 V, replace Band 4 YIG Assembly (constituent parts are shown in Table A1-6).
13. Press POWER key to OFF.
14. Remove A1A9 PCB from card extender and reinstall.
15. Remove A1A4 PCB and install on card extender.
16. Press POWER key to ON.
17. Press AUTO key.
18. Set horizontal time base on oscilloscope for external, and adjust horizontal vernier control so that trace extends full width of screen (10 divisions).
19. Set oscilloscope vertical input coupling for ac, and connect between A1A4P1-S (probe) and A1A4TP2 (shield) (Figure A2-10).
    - If waveform resembles that shown below, replace ALC Assembly (A1A4 ALC PCB and Directional Coupler).

OSCILLOSCOPE SETTINGS:
HORIZONTAL SCALE: EXTERNAL
VERTICAL SCALE: 5 V/DIV

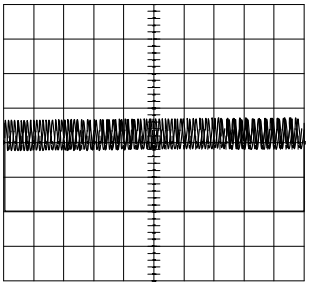


RETRACE LINE

ALC-WF1

    - If waveform is present but shows oscillations like that shown below, perform ALC Bandwidth and Low-Level Noise adjustments (Paragraph 6-14).
20. Press POWER key to OFF.
21. Remove RF deck assembly cover.

OSCILLOSCOPE SETTINGS:
HORIZONTAL SCALE: EXTERNAL
VERTICAL SCALE: 5 V/DIV



RETRACE LINE

ALC-WF2

CAUTION

Do not twist, bend, or otherwise damage semirigid cable in the following steps.

22. Remove RF cable from between Band 4 oscillator and applicable DPDT or multiport PIN switch; connect power sensor to oscillator.
23. Press POWER key to ON.
24. Press MANUAL SWEEP key.

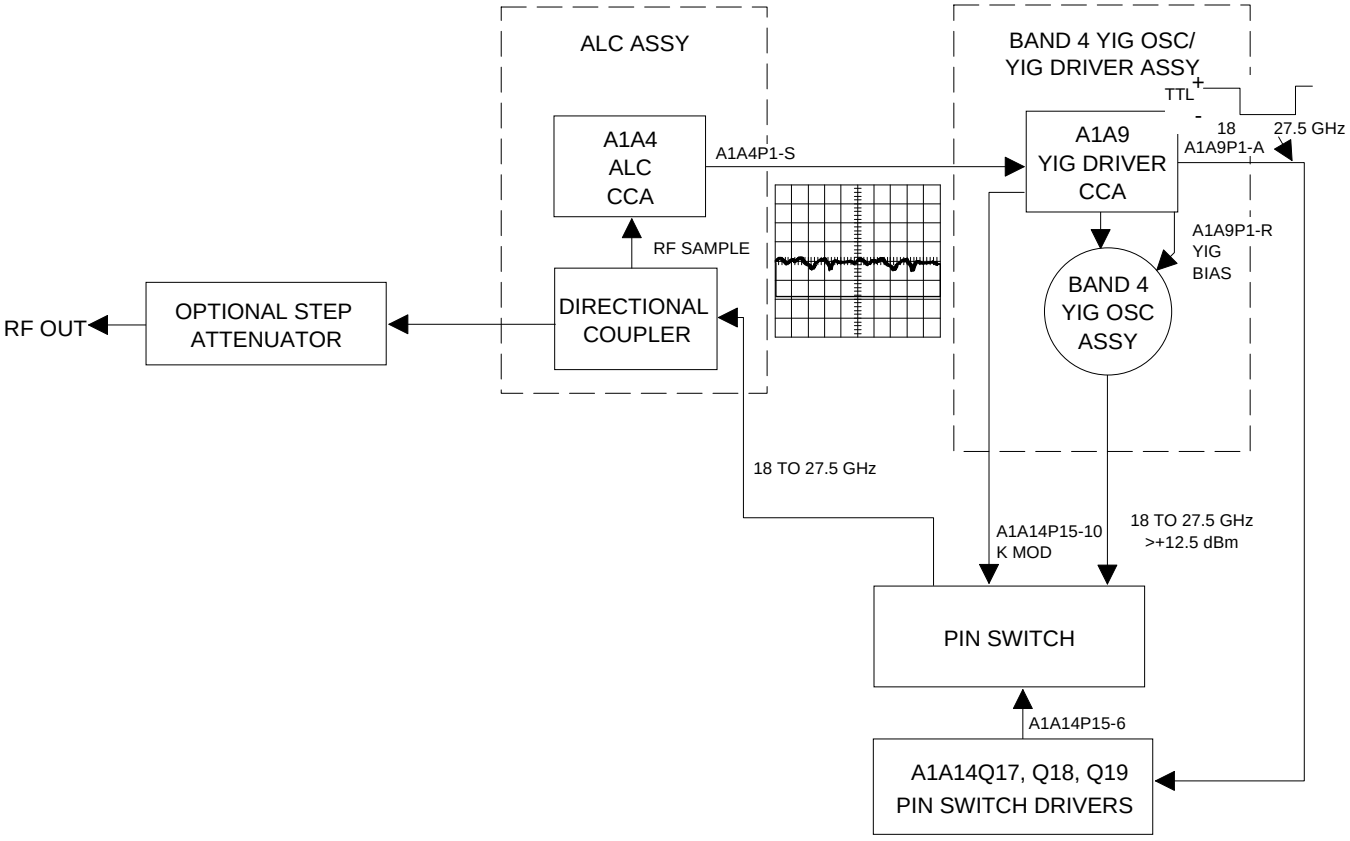


Figure 3-3. Band 4 ALC Troubleshooting Diagram

25. Rotate MANUAL SWEEP control fully counterclockwise; then slowly rotate clockwise while observing power meter.
    - If power meter does not indicate +12.5 dBm or greater, replace Band 4 YIG Assembly (constituent parts are shown in Table A1-6).
26. Press POWER key to OFF.
27. Disconnect power sensor from oscillator. Reinstall RF cable; torque connectors to 8 inch-pounds.
28. Remove A1A4 PCB from card extender and reinstall.
29. Remove A1A9 PCB and install on card extender.
30. Press POWER key to ON.
31. Press AUTO key.
32. Set oscilloscope vertical input coupling for dc, and check voltage at A1A14P15-6.
    - If not –3 ±0.5V signal, go to step 34.
33. Set oscilloscope for ac coupling, and connect vertical input to A1A14P15-10.
    - If output-power waveform like first one shown for step 19 above is not present across the entire screen, replace Band 4 YIG Assembly (constituent parts are shown in Table A1-6).
    - If output power waveform is present across entire trace, replace PIN switch
34. Press F1–F2 key.
35. Check voltage at A1A9P1-A.
    - If not TTL low during forward sweep, replace Band 4 YIG Assembly (constituent parts are shown in Table A1-6).
    - If TTL low during forward sweep, troubleshoot A1A14Q17, A1A14Q18, A1A14Q19, and associated components (Figures A2-32 and A3-33); replace defective part(s).

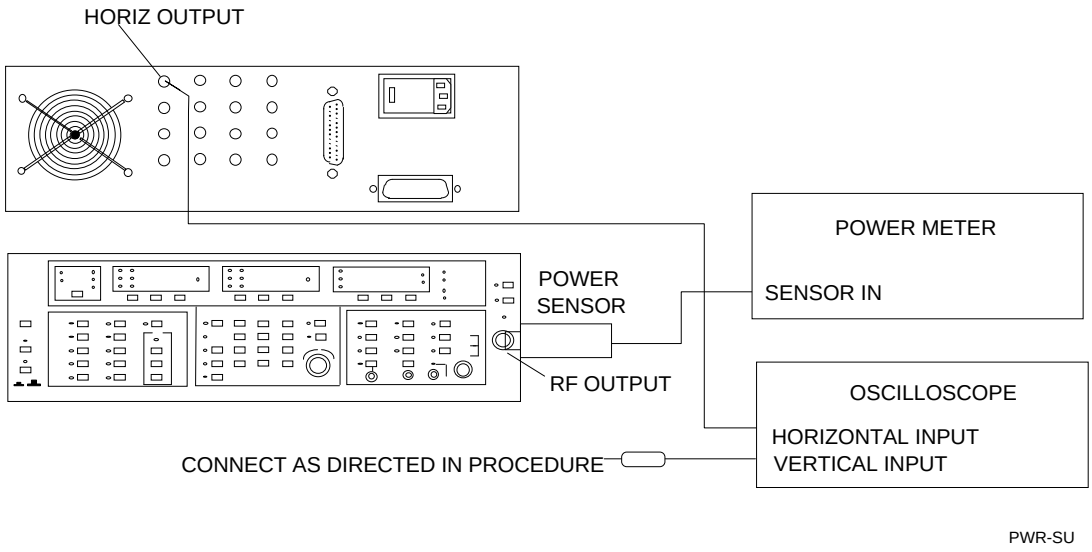
3-32. TROUBLESHOOT POWER LEVELING ERROR, DOUBLER BAND

This procedure is used to isolate malfunctions in the 27.5-to-40 GHz band ALC loop.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-19 and A2-20 provide A1A8 PCB parts-locator and schematic diagrams.
- TTL low logic level is –0.5V to +0.8V; TTL high logic level is +3.5V to +5.5V.
- Reference voltage measurements to A1A14TP3 (A GND).
- Refer to Figure 3-2 for a troubleshooting diagram.

1. Press POWER key to ON.
2. Connect test equipment as shown below, and turn it on.



3. Press POWER key to OFF.
4. Remove RF deck assembly cover.

CAUTION

Do not twist, bend, or otherwise damage semirigid cable in the following steps.

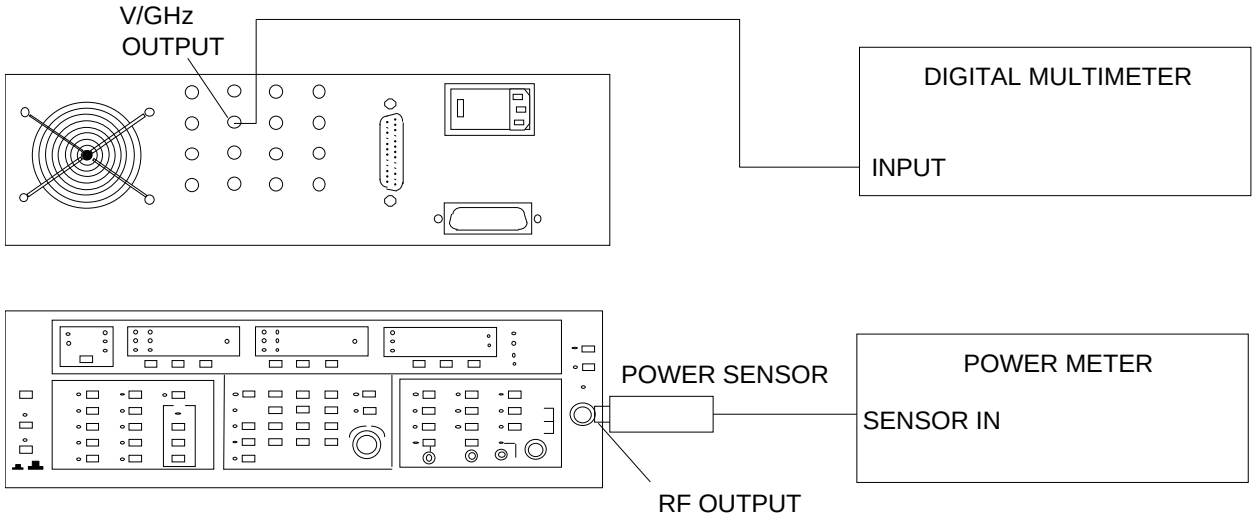
5. Disconnect RF cable from J3 on DPDT PIN switch; connector power meter to J3.
6. Press POWER key to ON.
7. Press RESET key.
8. Press F1–F2 key.
9. Press F1 key and set F1 frequency for 26.500 GHz.
10. Press F2 key and set F2 frequency for 40.000 GHz.
11. Press MANUAL SWEEP key.

12. Rotate MANUAL SWEEP control fully counterclockwise; then slowly rotate clockwise while observing power meter.
    - If power meter does not indicate +10.5 dBm or greater, go to step 22.
13. Press POWER key to OFF.
    - Disconnect power sensor from J3. Reconnect RF cable; torque connectors to 8 inch-pounds.
14. Disconnect waveguide adapter connector from J1 on multiport PIN switch; connect power sensor to waveguide adapter connector.
15. Rotate MANUAL SWEEP control fully counterclockwise; then slowly rotate clockwise while observing power meter.
    - If power meter does not indicate +14 dBm, replace Doubler Amplifier.
16. Press POWER key to OFF.
17. Disconnect power sensor from waveguide adapter connector. Reconnect connector to J1 and torque to 8 inch-pounds.
18. Remove A1A8 PCB and install on card extender.
19. Press POWER key to ON.
20. Press AUTO key.
21. Set oscilloscope vertical input coupling for dc, and check voltage at A1A14P15-5.
    - If –3 ±0.5 V, replace PIN switch.
    - If not –3 ±0.5 V, troubleshoot A1A14Q14, A1A14Q15, A1A14Q16, and associated components (Figures A2-32 and A3-33); replace defective part(s).
22. Press POWER key to OFF.
23. Disconnect power sensor from J3. Reconnect cable; torque connectors to 8 inch-pounds.
24. Remove A1A8 PCB and install on card extender.
25. Press POWER key to ON.
26. Press AUTO key.
27. Set oscilloscope vertical input coupling for dc, and check voltage at A1A14P45-3.
    - If –3 ±0.5 V, replace DPDT PIN switch.
28. Check voltage at A1A8P1-A.
    - If not TTL low during forward sweep, replace Band 4 YIG Assembly (constituent parts are shown in Table A1-6).
    - If TTL low during forward sweep, troubleshoot A1A14Q23, A1A14Q25, A1A14Q26, and associated components (Figures A2-32 and A3-33); replace defective part(s).

3-33. TROUBLESHOOT POWER LEVELING ERROR, OVERALL FREQUENCY RANGE

This procedure is used to isolate power-leveling malfunctions at other than midfrequency in one or more bands.

1. Press POWER key to ON.
2. Press RESET key.
3. Connect test equipment as shown in the following diagram, and turn it on.



4. Press MANUAL SWEEP key.
5. Rotate MANUAL SWEEP control fully counterclockwise.

NOTE

Output frequency in GHz is directly proportional to voltage from rear panel V/GHz connector. (Example: 1V equals 1 GHz for models with high-end frequency 20 GHz or less; 1/2V equals 1 GHz for models with high-end frequency between 20 and 40 GHz; 1/3V equals 1 GHz for Model 6672.)

6. While observing power meter, slowly rotate MANUAL SWEEP control clockwise from low-end frequency to high-end frequency. If power meter indicates less than –1.5 dBm or greater than 1.5 dBm in
   - Down-converter band, perform "Troubleshoot Power Leveling Error, Down Converter Band" procedure (Paragraph 3-27).
   - Band 1, perform "Troubleshoot Power Leveling Error, Band 1" procedure (Paragraph 3-28).
   - Band 2, perform "Troubleshoot Power Leveling Error, Band 2" procedure (Paragraph 3-29).
   - Band 3, perform "Troubleshoot Power Leveling Error, 12.4-to-18 GHz (Ku) Band 3" procedure (Paragraph 3-30).
   - Band 4, perform "Troubleshoot Power Leveling Error, 18-to-27.5 GHz (K) Band 4" procedure (Paragraph 3-31).
   - Between 27.5 and 40 GHz, perform "Troubleshoot Power Leveling Error, Doubler Band" procedure (Paragraph 3-32).
   - Across the entire band, replace ALC Assembly (A1A4 ALC PCB and Directional Coupler).

3-34. TROUBLESHOOT ANALOG SWEEP FAILURE

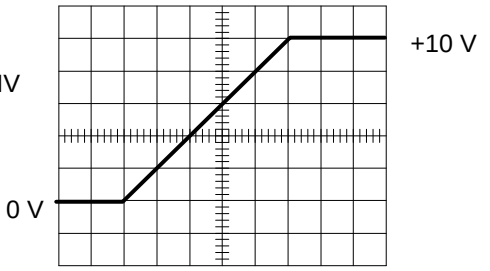
This procedure is used to isolate malfunctions in the analog-sweep-ramp generating circuits on A1A2 PCB; ramp-inhibiting PCBS (A1A1, A1A3, and A1A10); and diagnostics circuit on A1A14 PCB.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-32 and A2-33 provide A1A14 PCB parts-locator and schematic diagrams.
- TTL low logic level is –0.5V to +0.8V; TTL high logic level is +3.5V to +5.5V.

1. Press POWER key to ON.
2. Press RESET key.
3. Press ΔF CF key and set sweep time for 10 ms.
4. Connect oscilloscope vertical input to rear panel HORIZ OUTPUT connector.
5. Adjust oscilloscope controls for waveform like that shown below.

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: 2 ms/DIV
VERTICAL SCALE: 2 V/DIV

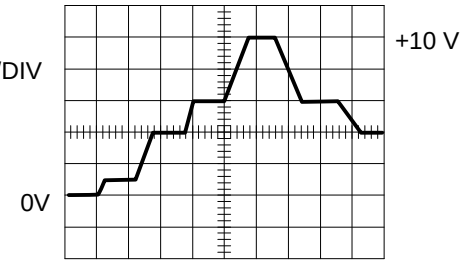


A2RAMP1

- If waveform is not present, go to step 8, below.

6. Press FULL key.
7. Check for waveform like that shown below.

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: 5 ms/DIV
VERTICAL SCALE: 2 V/DIV



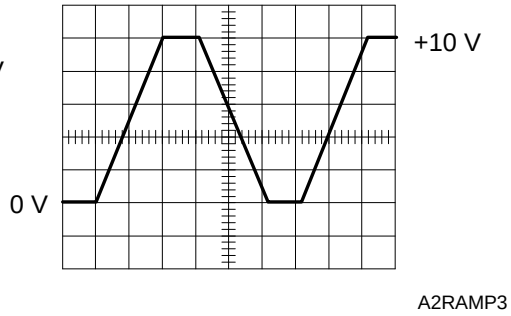
A2RAMP2

- If waveform resembles that shown above, replace A1A14U10.

8. Press POWER key to OFF.
9. Remove A1A2 PCB and install on card extender.
10. Connect oscilloscope vertical input between A1A2TP4 (probe) and A1A2TP5 (shield) (Figure A2-6).

11. Remove A1A1 PCB.
12. Press POWER key to ON.
13. Check for waveform like that shown for step 7, above.
    - If waveform is present, replace A1A1 PCB.
14. Press POWER key to OFF.
15. Reinstall A1A1 PCB.
16. Remove A1A3 PCB.
17. Press POWER key to ON.
18. Check for waveform like that shown for step 7, above.
    - If waveform is present, replace A1A3 PCB.
19. Press POWER key to OFF.
20. Reinstall A1A3 PCB.
21. Remove A1A10 PCB.
22. Press POWER key to ON.
23. Check for waveform like that shown below.

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: 5 ms/DIV
VERTICAL SCALE: 2 V/DIV



A2RAMP3

- If waveform is present, replace A1A10 PCB.
- If waveform is not present, replace A1A2 PCB.

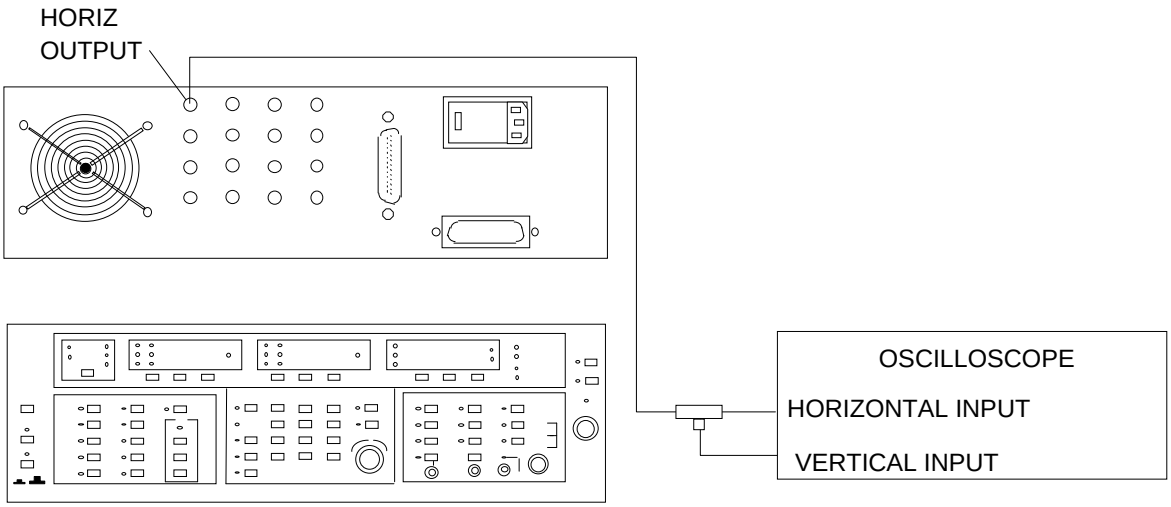
3-35. TROUBLESHOOT FREQUENCY MARKERS FAILURE

This procedure is used to isolate malfunctions in the frequency markers generating circuit on A1A3 PCB, control circuit on A1A5 PCB, and diagnostics circuit on A1A14 PCB.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-8 and A2-9 provide A1A3 PCB parts-locator and schematic diagrams.
- Figures A2-32 and A2-33 provide A1A14 PCB parts-locator and schematic diagrams.
- Reference measurements to A1A3TP2.

1. Connect test equipment as shown below, and turn it on.

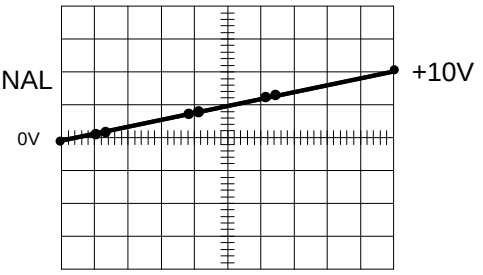


MARK-SU

2. Press RESET key.
3. Press SWEEP TIME key and set sweep time for 10 ms.
4. Set horizontal time base on oscilloscope for external, and adjust horizontal vernier control so that trace extends full width of screen (10 divisions).

5. Adjust oscilloscope vertical controls to display following waveform.

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: EXTERNAL
VERTICAL SCALE: 5 V/DIV

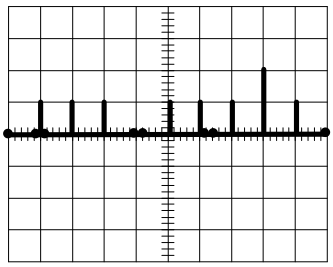


XYRAMP1

- If waveform is present, go to step 12.

6. Press POWER key to OFF.
7. Remove A1A3 PCB and install on card extender.
8. Press POWER key to ON.
9. Connect oscilloscope vertical input to A1A3P1-T.
10. Check for waveform like that shown for step 6, above.
    - If waveform is present, replace A1A3 PCB.
    - If waveform is not present, replace A1A5 PCB.
11. Connect oscilloscope vertical input to MARKER OUTPUT connector.
12. Sequentially press M1 thru M8 keys to on, and turn MARKER AMPL'D control fully clockwise.
13. Adjust oscilloscope controls to display eight markers (below).

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: EXTERNAL
VERTICAL SCALE: 5 V/DIV



NOTE
THE MARKER HAVING AN AMPLITUDE OF 10 V IS THE MARKER THAT WAS SELECTED LAST. IT IS KNOWN AS THE ENHANCED MARKER.

MARK-WF

- If eight markers are present, replace A1A14U8 and A1A14U9.

14. Connect oscilloscope vertical input to A1A3TP7.
    - If eight markers are not present, replace A1A3 PCB.
15. Connect oscilloscope vertical input to A1A3P1-8.
    - If eight markers are not present, replace A1A3 PCB.
    - If eight markers are present, replace A1A14U8 and/or A1A14U9.

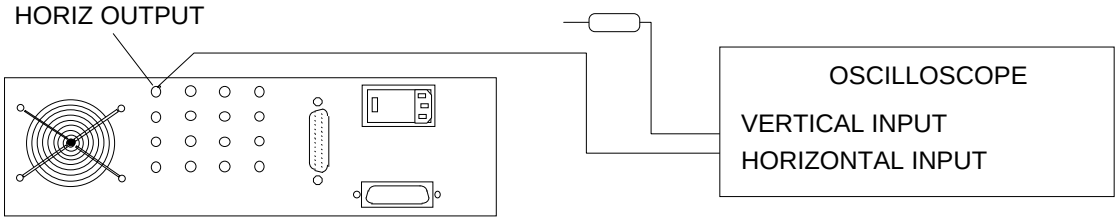
3-36. TROUBLESHOOT INTERNAL FM CIRCUIT

This procedure is used to isolate malfunctions in the internal FM circuit on A1A10 PCB, control circuit on A1A5 PCB, and diagnostics circuit on A1A14 PCB.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-32 and A2-33 provide A1A14 PCB parts-locator and schematic diagrams.
- Figures A2-28 and A2-29 provide A1A10 PCB parts-locator and schematic diagrams.
- Reference measurements to A1A14TP3 (A GND).
- TTL low logic level is –0.5V to +0.8V; TTL high logic level is +3.5V to +5.5V.

1. Press POWER key to ON.
2. Connect test equipment as shown below, and turn it on.

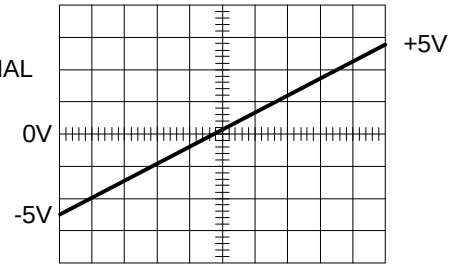


XY-SU

3. Press RESET key.
4. Press ΔF CF key.
5. Press ΔF key and set ΔF frequency for 50 MHz.
6. Check logic level at A1A10TP9.
   - If logic level toggles between TTL low and TTL high, replace A1A14U8.
7. Press POWER key to OFF.
8. Remove A1A10 PCB and install on card extender.
9. Press POWER key to ON.
10. Set horizontal time base on oscilloscope for external, and adjust horizontal vernier control so that trace extends full width of screen (10 divisions).

11. Connect oscilloscope vertical input to A1A10P1-U.
12. Check for waveform like that shown below.

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: EXTERNAL
VERTICAL SCALE: 2 V/DIV



FM-RAMP

- If waveform is present, replace A1A10 PCB.
- If waveform is not present, replace A1A5 PCB.

3-37. TROUBLESHOOT RF OUTPUT CIRCUIT (OPTIONAL STEP ATTENUATOR INSTALLED)

This procedure is used to isolate malfunctions in the Option 2X 70 dB Step Attenuator and RF Output connector assemblies.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-28 and A2-29 provide A1A10 PCB parts-locator and schematic diagrams.
- Reference measurements to A1A14TP3 (A GND).

1. Press POWER key to OFF.
2. Remove RF OUT connector from Directional Coupler and connect power sensor in its place.
3. Press POWER key to ON.
4. Press RESET key.
5. Press CW CF key and set CF frequency for 10 GHz.
6. Press LEVELING INTERNAL key (output goes unleveled).

Table 3-12. RESET Power Levels

Model	RESET Power (dBm)	Model	RESET Power (dBm)	Model	RESET Power (dBm)
6609B	12.5	**6628B**	8.9	**6645B**	8.2
6609B-50	16.5	**6628B-50**	15.7	**6645B-40**	14.2
6610B	12.5	**6629B**	8.2	**6647B**	8.2
		6629B-40	14.2	**6647B-40**	14.2
6616B	9				
		6630B	8.7	**6653B**	7, ≤18 GHz
6617B	9.1	**6630B-50**	15.3		3, >18 GHz
6617B-40	15				
		6631B	8.5	**6659B**	10, ≤18 GHz
6619B	9.1				7, >18 GHz
6619B-40	15	**6632B**	5.1		
				6660B	3
6620B	12	**6635B**	8.2		
		6635B-40	14.2	**6662B**	NA
6621B	8.7				
6621B-40	16	**6636B**	1	**6663B**	2
6622B	8.9	**6637B**	8.2	**6668B**	NA
6622B-40	16	**6637B-40**	14.2		
				6669B	2
6624B	10	**6640B**	NA		
		6640B-10	7.2	**6672B**	NA
6627B	10				

7. Check that power meter is equal to or greater than the RESET power level (Table 3-12).
   - If power level is incorrect, replace ALC Assembly (A1A4 ALC PCB and Directional Coupler).
8. Press POWER key to OFF.
9. Disconnect power sensor, and reconnect RF OUT connector to Step Attenuator.
10. Connect power sensor to Step Attenuator output connector.
11. Press POWER key to ON.
12. Check that power meter indicates RESET power level or greater.
    - If power level is correct, replace RF OUTPUT connector.
13. Press POWER key to OFF.
14. Disconnect power sensor from Step Attenuator output connector.
15. Remove A1A10 PCB and install on card extender.
16. Press POWER key to ON.
17. Connect oscilloscope vertical input to A1A10P1-14.
18. Press LEVELING INTERNAL key.
19. Press LEVEL key.
20. Set to level values as shown below, and check that voltage shifts by required amount.

LEVEL SET VALUE (dBm)	REQUIRED VOLTAGE SHIFT	
	FROM	TO
–10	0 ±1V	+24 ±2V
–20	+24 ±2V	0 ±1V
–30	0 ±1V	+24 ±2V
–40	+24 ±2V	0 ±1V
–50	0 ±1V	+24 ±2V
–60	+24 ±2V	0 ±1V
–70	0 ±1V	+24 ±2V

- If voltage shift is incorrect, replace A1A10 PCB.

21. Connect oscilloscope vertical input to A1A10P1-8.
22. Press LEVEL key and set output power for 0 dBm.
23. Press LEVEL key.
24. Set to applicable level values as shown below, and check that voltage shifts by required amount.

LEVEL SET VALUE (dBm)	REQUIRED VOLTAGE SHIFT	
	FROM	TO
–20	0 ±1V	+24 ±2V
–40	+24 ±2V	0 ±1V
–60	0 ±1V	+24 ±2V

- If voltage shift is incorrect, replace A1A10 PCB.

25. Connect oscilloscope vertical input to A1A10P1-10.
26. Press LEVEL key and set output power for 0 dBm.
27. Press LEVEL key and set output power for –40 dBm.
    - If voltage shift *is not* from 0 ±1V to +24 ±2V, replace A1A10 PCB.
28. Press LEVEL key.
29. Set output power for 0, then –73 dBm, if applicable.
    - If voltage shift *is not* from 0 ±1V to +24 ±2V, replace A1A10 PCB.
    - If voltage shift *is* from 0 ±1V to +24 ±2V , replace Step Attenuator.

3-38. TROUBLESHOOT DECR/INCR CONTROL CIRCUIT

This procedure is used to isolate malfunctions in DECR/INCR control circuit.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.

1. Press POWER key to OFF and disconnect power cable from line.
2. Remove A2 Front Panel Assembly (Paragraph 4-3); do not disconnect ribbon cables.
3. Position assembly so that front panel keys and A2A12 PCB are accessible.
4. Disconnect cable from A2A12P8.
5. Press POWER key to ON.
6. Check voltage between A2A12P8-4 (+) and A2A12P8-2 (–).
   - If not +5 ±0.1V, replace A2A12 Microprocessor PCB (Paragraph 4-4).
7. Press POWER key to OFF.
8. Reconnect cable to A2A12P8.
9. Press POWER key to ON.
10. Connect oscilloscope vertical input between A2A12P8-1 (probe) and A2A12P8-2 (shield).
11. Check for pulses as DECR/INCR control is rotated in one direction, then the other.
    - If pulses are not present, replace DECR/INCR control (Paragraph 4-8).
12. Connect oscilloscope between A2A12P8-3 (probe) and A2A12P8-2 (shield).
13. Check for pulses as DECR/INCR control is rotated in one direction, then the other.
    - If pulses are not present, replace DECR/INCR control.
    - If pulses are present, replace A2A12 Microprocessor PCB.

3-39. TROUBLESHOOT HIGH RESIDUAL FM

This procedure is used to correct for high residual FM.

NOTE

- Figure A2-3 provides connector-location and cable-routing diagrams.
- Figures A2-32 and A2-33 provide A1A14 PCB parts-locator and schematic diagrams.

1. Press POWER key to OFF.
2. Disconnect cable from A1A14P49.
3. Press POWER key to ON.
4. Perform "Residual FM Test" procedure (Paragraph 5-11).
   - If test is within specified tolerances, replace A3B1 fan (Paragraph 4-10).
5. Press POWER key to OFF.
6. Connect cable to A1A14P49.
7. Press POWER key to ON.
8. Press MANUAL SWEEP key and tune associated control to mid-range.
9. Set oscilloscope for ac coupling, and check power supply ripple voltages—"Maximum Ripple (pk-pk)" column in following tabulation.

VOLTAGE SUPPLY	A1A14 PCB MONITOR POINT	A1A14 PCB REFERENCE POINT	MAXIMUM RIPPLE (PK-PK)
+5V	TP1 (+5V)	TP2 (D GND)	150 mV
–15 VHC	P12-3	TP3 (A GND)	150 mV
–15 VLC1	TP5 (–15V)	TP3 (A GND)	150 mV
–15 VLC2	VR4-3	TP3 (A GND)	150 mV
+15 VHC	P12-5	TP3 (A GND)	150 mV
+15 VLC1	TP4 (+15V)	TP3 (A GND)	150 mV
+15 VLC2	VR3-3	TP3 (A GND)	150 mV
–38V	TP6 (–38V)	TP3 (A GND)	150 mV

- If ripple voltage is out of tolerance for +5V supply, replace A1A13 Switching Power Supply PCB.
- If ripple voltage is out of tolerance for –15 VHC supply, troubleshoot A0U2 and associated components; replace defective part(s).
- If ripple voltage is out of tolerance for –15 VLC1 supply, troubleshoot A1A14VR6 and associated components; replace defective part(s).
- If ripple voltage is out of tolerance for –15 VLC2 supply, troubleshoot A1A14VR4 and associated components; replace defective part(s).
- If ripple voltage is out of tolerance for +15 VHC supply, troubleshoot A0U1 and associated components; replace defective part(s).

- If ripple voltage is out of tolerance for +15 VLC1 supply, troubleshoot A1A14VR5 and associated components; replace defective part(s).
- If ripple voltage is out of tolerance for +15 VLC2 supply, troubleshoot A1A14VR3 and associated components; replace defective part(s).
- If ripple voltage is out of tolerance for –38V supply, troubleshoot A0Q1 and A1A14Q1 thru A1A14Q3 and associated components; replace defective part(s).

3-40. TROUBLESHOOT FREQUENCY VERNIER FUNCTION

This procedure is used to isolate malfunctions in the FREQUENCY VERNIER circuits on A2A12 and A1A5 PCBs.

NOTE

- Figures A2-12 and A2-13 provide parts-locator and schematic diagrams for A1A5 PCB.

1. Perform "Frequency Vernier Accuracy Test" procedure and determine whether malfunction is in only one band.
   - If so, replace appropriate YIG Assembly.
2. Press POWER key to OFF.
3. Remove A1A5 PCB and install on card extender.
4. Connect oscilloscope vertical input between A1A5U5-11 (+) and A1A5TP11 (–).
5. Press POWER key to ON.
6. Press RESET and CW CF keys.
7. Press and hold FREQUENCY VERNIER INCREASE key; a very narrow pulse should be displayed on oscilloscope.

NOTE

This pulse is extremely narrow and difficult to discern. Adjust oscilloscope sweep time and delay to take this into account.

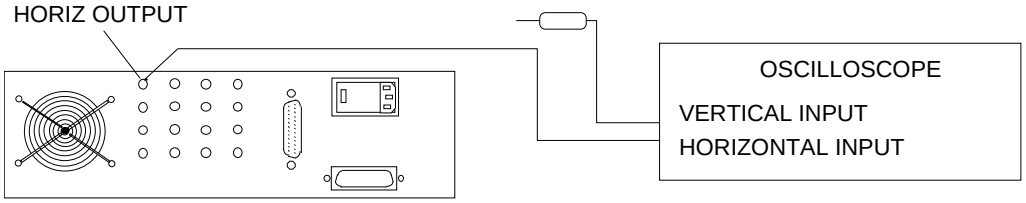
- If pulse is not present, replace A2A12 PCB.
- If pulse is present, replace A1A5 PCB.

3-41. TROUBLESHOOT POWER SWEEP FUNCTION

This procedure is used to isolate malfunctions in the A1A3 PCB power sweep circuit.

- Figures A2-1 and A2-3 provide assembly-location and cable-routing diagrams.
- Figures A2-28 and A2-29 provide parts-locator and schematic diagrams for A1A10 PCB.

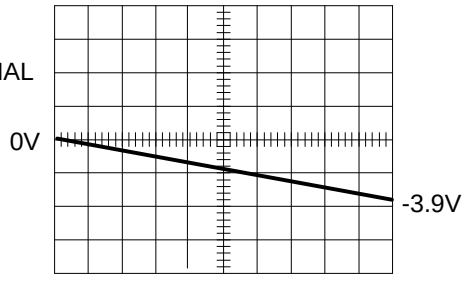
1. Press POWER key to ON.
2. Press RESET key.
3. Connect test equipment as shown below, and turn it on.



XY-SU

4. Press CW CF key.
5. Press LEVEL key and set output power for 10 dBm.
6. Press dB/SWEEP key and set power sweep range for 10 dB.
7. Press **SHIFT** key, then **POWER SWEEP** key.
8. Press POWER key to OFF.
9. Remove A1A3 PCB and install on card extender.
10. Press POWER key to ON.
11. Set horizontal time base on oscilloscope for external, and adjust horizontal vernier control so that trace extends full width of screen (10 divisions).
12. Connect oscilloscope vertical input between A1A3P1-W (probe) and A1A3TP1 (shield).
13. Check for waveform like that shown below.

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: EXTERNAL
VERTICAL SCALE: 2 V/DIV



XYRAMP2

- If correct, replace ALC Assembly (A1A4 ALC PCB and Directional Coupler).
- If waveform is incorrect or missing, replace A1A3 PCB.

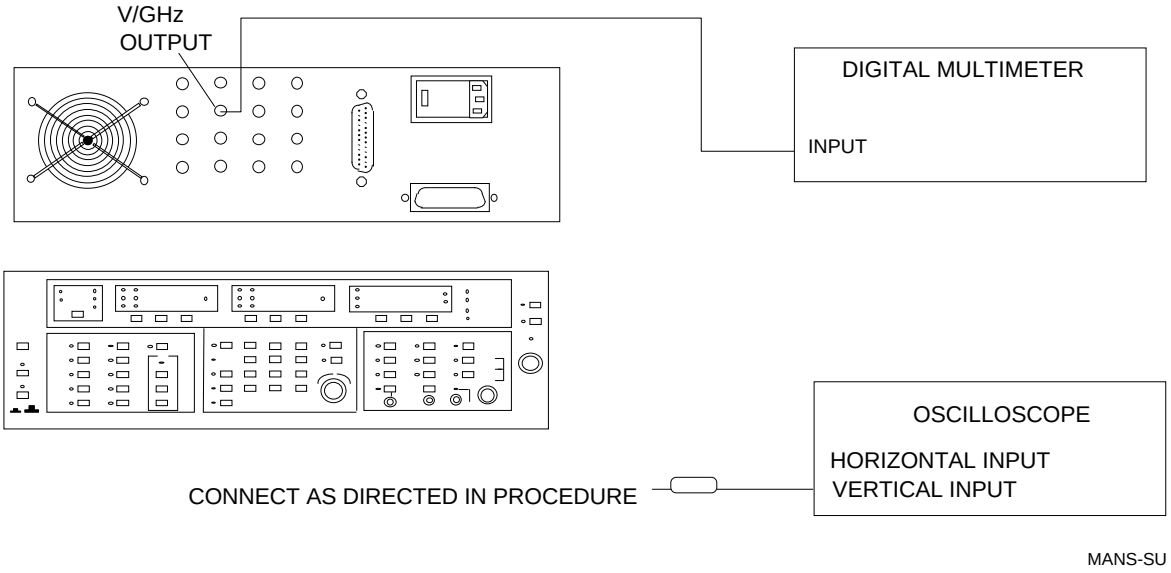
3-42. TROUBLESHOOT MANUAL SWEEP CONTROL

This procedure is used to isolate malfunctions in MANUAL SWEEP control and circuits on A2A11 and A1A5 PCBs.

NOTE

- Figures A2-12 and A2-13 provide parts-locator and schematic diagrams for A1A5 PCB.

1. Connect test equipment as shown below, and turn it on.



2. Press POWER key to OFF.
3. Remove A1A5 PCB and install on card extender.
4. Press POWER key to ON.
5. Press RESET key.
6. Connect oscilloscope vertical input between A1A5P1-17 (probe) and A1A5TP11 (shield).
7. While turning MANUAL SWEEP control clockwise, observe voltage variation on oscilloscope.
   - If 0 to +10V, replace A1A5 PCB.
   - If not 0 to +10V, replace A2A11 PCB (Paragraph 4-7).

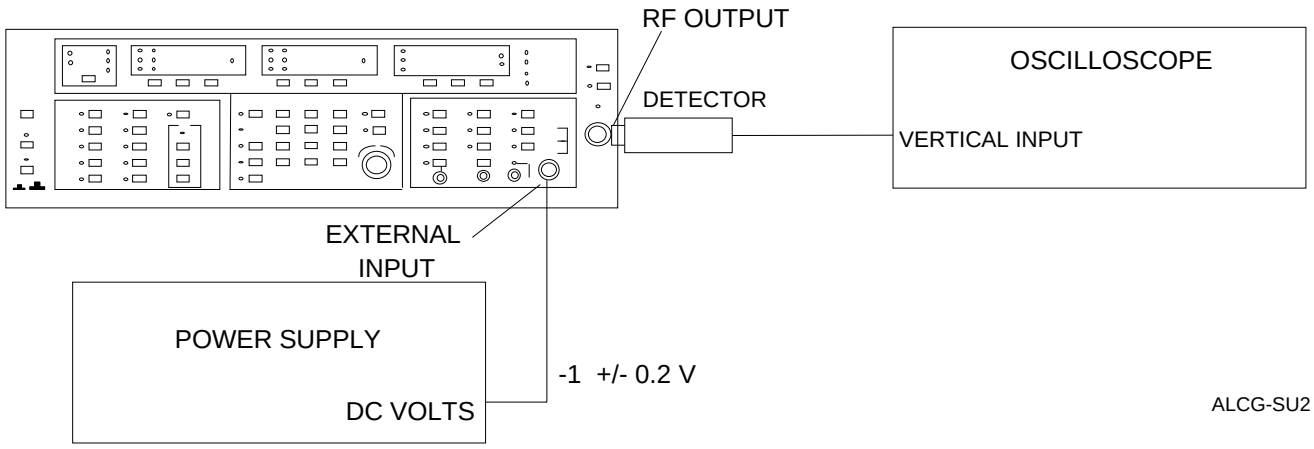
3-43. TROUBLESHOOT EXTERNAL ALC GAIN CONTROL CIRCUIT

This procedure is used to isolate malfunctions in the EXTERNAL ALC GAIN control circuit on A1A4 ALC PCB.

NOTE

- Figures A2-10 and A2-11 provide parts-locator and schematic diagrams for A1A4 PCB.
- Reference measurements to A1A14TP3 (A GND).

1. Connect test equipment as shown below.



2. Press POWER key to OFF.
3. Remove A1A4 PCB and install on card extender.
4. Press POWER key to ON.
5. Press RESET key.
6. Check voltage at A1A4P1-F.
   - If +10V or greater, replace ALC Assembly (A1A4 ALC PCB and Directional Coupler).
7. Connect oscilloscope vertical input to A1A14P39-2 (Figure A2-3).
8. Rotate EXTERNAL ALC GAIN control to full counterclockwise position.
   - If voltage shown on oscilloscope decreases to 0 ±0.5V, replace EXTERNAL ALC GAIN control (Paragraph 4-8).
9. Rotate EXTERNAL ALC GAIN control fully clockwise.
10. Connect oscilloscope vertical input to A1A4P1-H.
11. Check that oscilloscope displays +10V or more.
    - If voltage is correct, replace ALC Assembly (A1A4 ALC PCB and Directional Coupler).
    - If voltage is incorrect, check for poor connections between A1A14P39 and front panel control.

3-44. TROUBLESHOOT HORIZ OUTPUT CIRCUIT

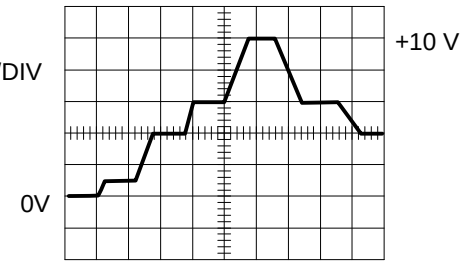
This procedure is used to isolate malfunctions in the HORIZ OUTPUT connector and circuits on A1A2, A1A5, and A1A14 PCBs.

NOTE

- Figures A2-12 and A2-13 provide parts-locator and schematic diagrams for A1A5 PCB.
- Figures A2-32 and A2-33 provide parts-locator and schematic diagrams for A1A14 PCB.
- Reference measurements to A1A5TP1.

1. Press POWER key to ON.
2. Press RESET key.
3. Press SWEEP TIME key and set sweep time for 10 ms.
4. Connect oscilloscope vertical input to rear panel HORIZ OUTPUT connector.
5. Check that waveform resembles that shown below.

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: 5 ms/DIV
VERTICAL SCALE: 2 V/DIV



A2RAMP2

NOTE

If waveform is present, HORIZ OUTPUT connector circuit is functioning properly.

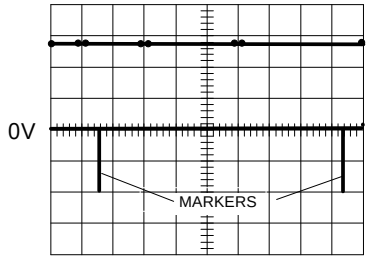
6. Press POWER key to OFF.
7. Remove A1A5 PCB and install on card extender.
8. Press POWER key to ON.
9. Connect oscilloscope vertical input to A1A5P1-15.
10. Check that oscilloscope displays waveform as shown for step 5, above.
    - If waveform is correct, replace A1A14U12.
11. Connect oscilloscope vertical input to A1A5P1-16.
12. Check that oscilloscope displays waveform as shown for step 5, above.
    - If waveform is correct, replace A1A5 PCB.
    - If waveform is incorrect, replace A1A2 PCB.

3-45. TROUBLESHOOT SEQ SYNC CIRCUIT

This procedure is used to isolate malfunctions in the SEQ SYNC connector and circuits on A1A2 and A1A3 PCBs.

1. Press POWER key to OFF.
2. Remove A1A2 PCB and install on card extender.
3. Press POWER key to ON.
4. Connect oscilloscope vertical input between A1A2P1-6 (probe) and A1A2TP5 (shield) (Figure A2-7).
5. Check for SEQ SYNC waveform, shown below, (without markers).

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: EXTERNAL
VERTICAL SCALE: 2 V/DIV



POSZ-WF

- If not present, replace A1A2 PCB.

6. Press POWER key to OFF.
7. Remove A1A2 PCB from card extender and reinstall.
8. Remove A1A3 PCB and install on card extender.
9. Press POWER key to ON.
10. Connect oscilloscope vertical input between A1A3P1-A (probe) and A1A3TP1 (shield) (Figure A2-8).
11. Check for SEQ SYNC (step 5) waveform (without markers).
    - If not present, replace A1A3 PCB.
    - If present, check for poor connections between A1A14XA16 and rear panel connector.

3-46. TROUBLESHOOT PENLIFT OUTPUT CIRCUIT

This procedure is used to isolate malfunctions in the PENLIFT OUTPUT connector and A1A14 PCB circuit.

1. Press POWER key to ON.
2. Press RESET key.
3. Press SWEEP TIME key and set time for 10 second sweep.
4. Press EXT OR SINGLE key.
5. Set multimeter to measure resistance, and connect leads between PENLIFT OUTPUT connector center pin and shield.
6. Press EXT OR SINGLE key to start a single sweep.
   - If multimeter indicates continuity at all times, replace relay A1A14K1.
7. Set multimeter to read dc volts, and connect between A1A14K1-1 (+) and A1A14K1-3 (–).
8. Press EXT OR SINGLE key.
   - If relay does not click but multimeter indicates +5V, replace A1A14K1.
   - If multimeter indicates +0V, replace A1A2 PCB (Paragraph 4-3).

CHAPTER 4
MAINTENANCE PROCEDURES

CONTENTS

CHAPTER 4
MAINTENANCE PROCEDURES

4-1. INTRODUCTION

This chapter provides detailed removal and replacement procedures for major components and assemblies.

WARNING

Hazardous voltages are present when covers are removed. Where maintenance can be performed without having power applied, disconnect power cord from ac source.

4-2. REMOVE EQUIPMENT COVERS

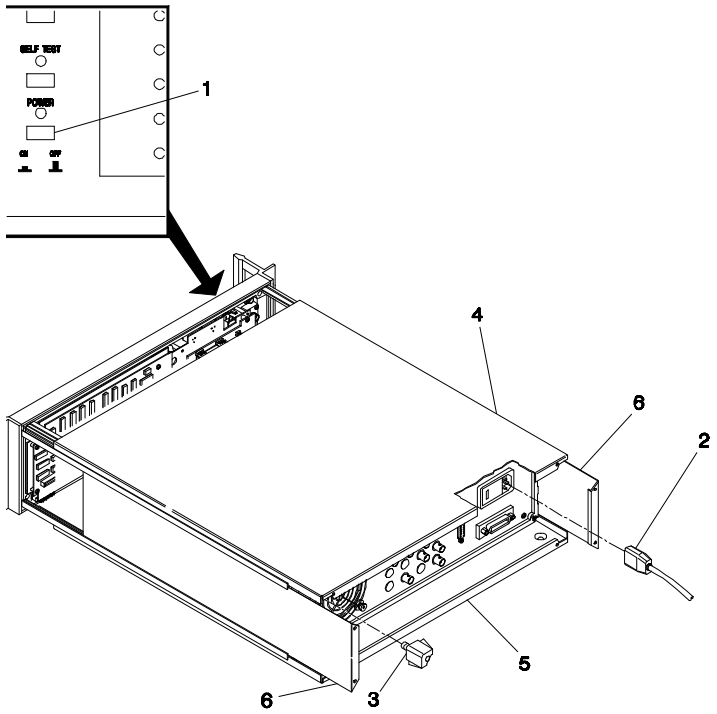
This paragraph provides detailed procedure for removing equipment covers.

a. Remove.

1. Press POWER (1) key to OFF.
2. Remove power cord (2) from line voltage module.
3. Loosen recessed screw in foot (3), and remove feet from four corners.
4. Slide top (4) and bottom (5) covers to rear.
5. Slide side covers (6) to rear.

b. Install.

1. Insert top cover (4) into groove on left or right side.
2. Press cover forward and into groove on front panel casting.
3. Turn sweep generator upside down, and repeat steps 1 and 2 to install bottom cover (5).
4. Install left and right side covers (6).
5. Install four rear feet (3) and secure by tightening recessed screw in each.
6. Connect power cord (2) to line voltage module.
7. Press POWER key (1) to restore power.



4-3. REPLACE A2 FRONT PANEL ASSEMBLY

This paragraph provides detailed procedure for removing and replacing the front panel.

a. Preliminary.

Remove top, bottom, and side covers (Paragraph 4-2).

b. Remove.

CAUTION

Do not twist, bend, or otherwise damage semirigid cable in the following steps.

1. Disconnect cable (1).
2. Disconnect cable(2).
3. Remove cables from cable clamps.
4. Remove six hex-head screws (3) and lockwashers (4).
5. Carefully withdraw A2 Front Panel Assembly (5) from front panel casting (6), and lay it face down on workbench.
6. Disconnect three ribbon cables (7, 8, 9) from A1A14 CCA (10).

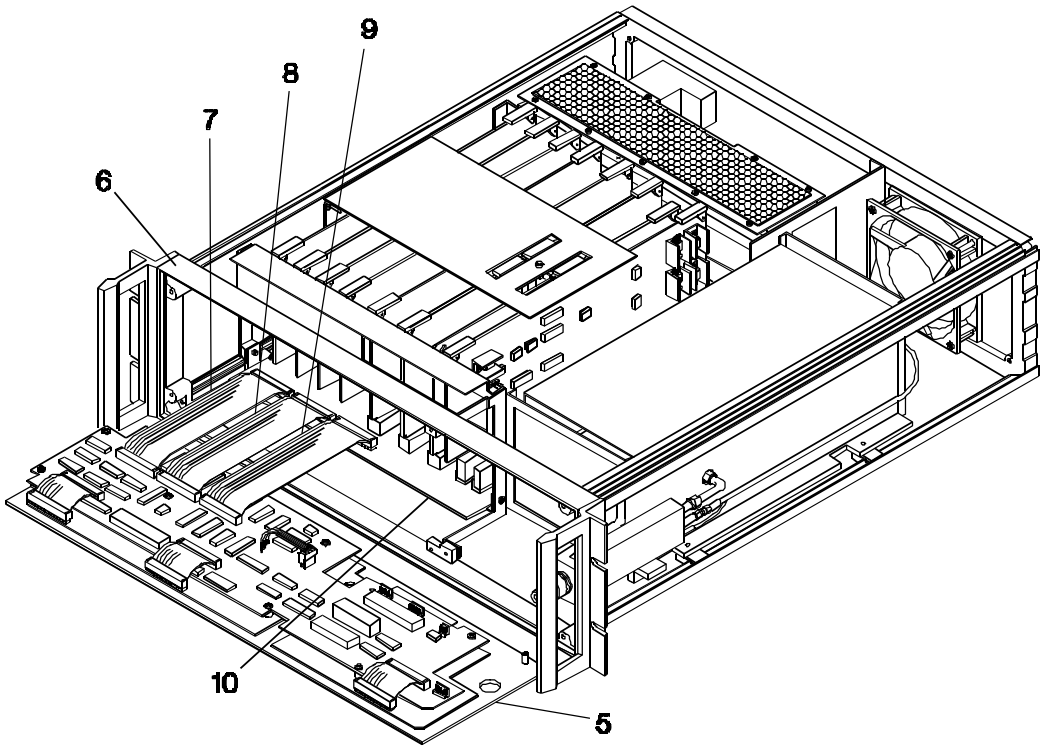
c. Install.

1. Lay A2 Front Panel Assembly (5) on its face in front of front panel casting (6).

NOTE

Orient the assembly so that ribbon cables connecting to A1A14 CCA are next to the casting.

2. Reconnect ribbon cables to A1A14P5 (7), A1A14P6 (8), and A1A14P7 (9).
3. Carefully fit front panel assembly into casting and secure with six hex-head screws (3) and lockwashers (4).
4. Route cables between A1A14 CCA (10) and front casting (left of bracket) and through cable clamps.
5. Reconnect connector (1) to A1A14P37 and connector (2) to A1A14P39.
6. Install top, bottom, and side covers (Paragraph 4-2).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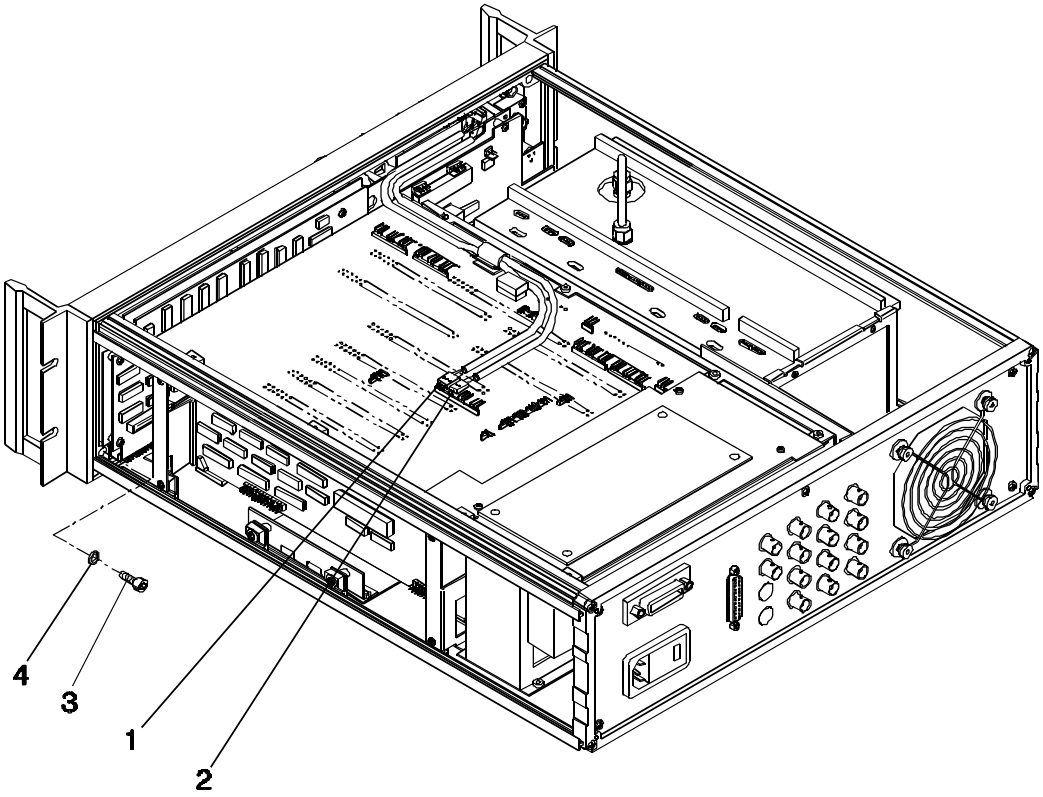

4
3
1
2

4-4. REPLACE A2A12 MICROPROCESSOR CCA

This paragraph provides detailed procedure for removing and replacing the A2A12 CCA.

1. Preliminary.
2. Remove top, bottom, and side covers (Paragraph 4-2).
3. Remove A2 Front Panel Assembly (Paragraph 4-3).

a. Remove.

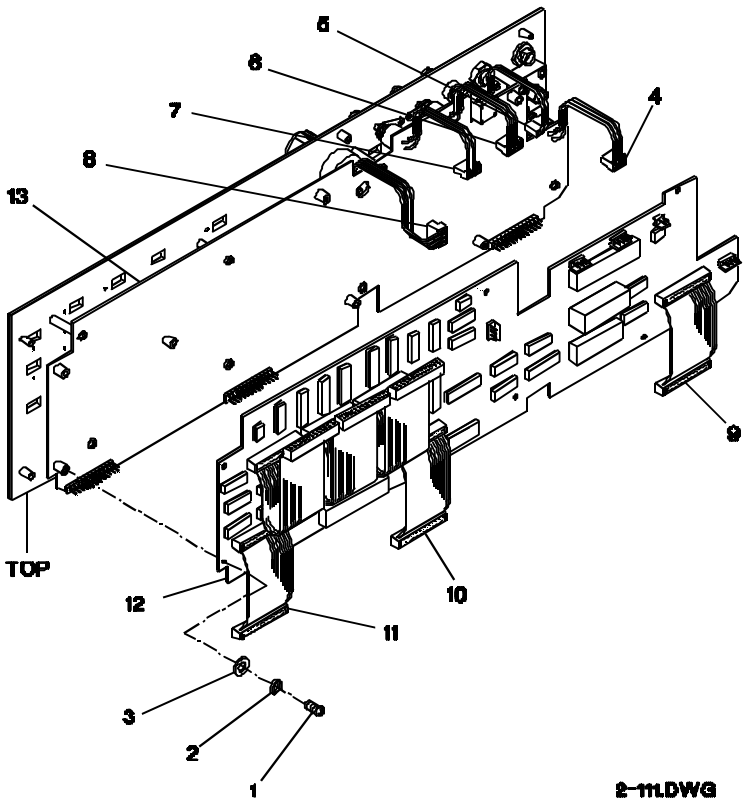
1. Remove seven screws (1), lockwashers (2), and flat washers (3).
2. Disconnect cable connectors from A2A12 CCA connectors as shown below.

Key Number	Connector Number
4	P25
5	P4
6	P24
7	P23
8	P8

3. Disconnect three ribbon cables (9, 10, 11) from A2A11 CCA.
4. Remove A2A12 CCA (12).

b. Install.

1. Position A2A12 CCA on top of A2A11 CCA (13) so that components face away from A2A11 CCA.
2. Connect three ribbon cables (9, 10, 11) to connectors A2A11J3, A2A11J1, and A2A11J2.
3. Connect cable connectors to A2A12 CCA as listed in REMOVE procedure, step 2.
4. Install seven screws (1), lockwashers (2), and flat washers (3).
5. Install A2 Front Panel Assembly (Paragraph 4-5).
6. Install top, bottom, and side covers (Paragraph 4-2).



4-5. REPLACE A2A11 FRONT PANEL CCA

This paragraph provides detailed procedure for removing and replacing the A2A11 CCA.

a. Preliminary.

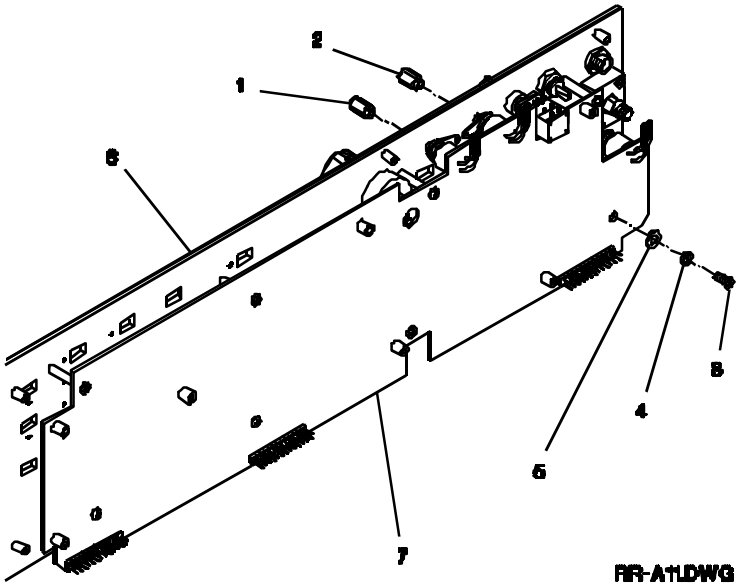
1. Remove top, bottom, and side covers (Paragraph 4-2).
2. Remove A2 Front Panel Assembly (Paragraph 4-3).
3. Remove A2A12 Microprocessor CCA (Paragraph 4-4).

b. Remove.

1. Remove two knobs (1, 2).
2. Remove eight screws (3), lockwashers (4), and flat washers (5).
3. Separate A2A1 Subassembly (6) from A2A11 CCA (7).

c. Install.

1. Position A2A11 Front Panel CCA (7) so that keycaps extend upward.
2. Position A2A1 Front Panel Subassembly (6) onto A2A11 Front Panel CCA (7); align LEDs and keys with their associated cutouts on subassembly.
3. Turn mated A2A1/A2A11 assemblies over, being careful to keep them together.
4. Install eight screws (3), lockwashers (4), and flat washers (5).
5. Install two front panel knobs (1, 2).
6. Install A2A12 Microprocessor (Paragraph 4-4).
7. Install A2 Front Panel Assembly (Paragraph 4-3).
8. Install top, bottom, and side covers (Paragraph 4-2).



4-6. REMOVE A3 REAR PANEL ASSEMBLY

This paragraph provides detailed procedure for removing and replacing the rear panel assembly.

a. Preliminary.

Remove top, bottom, and side covers (Paragraph 4-2).

b. Remove.

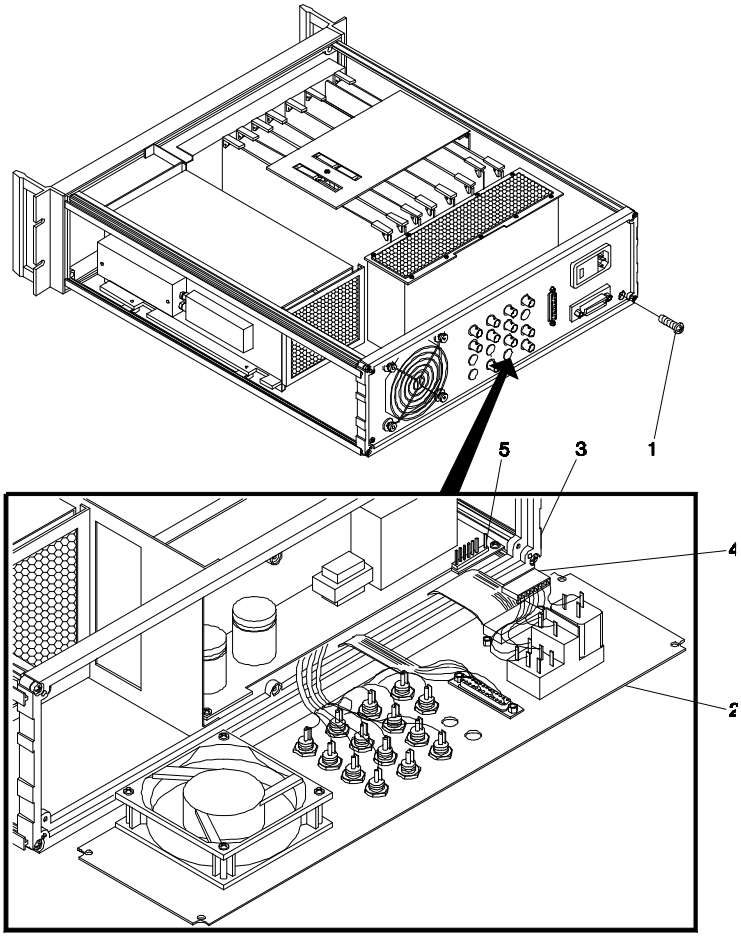
1. Remove six screws (1); tilt assembly (2) an inch or so away from casting (3).
2. Disconnect connector (4).
3. Remove assembly (2) from casting (3); lay face down on workbench.

NOTE

All piece parts are accessible with the rear panel in this position

c. Install.

1. Insert assembly (3) into casting (2).
2. Reconnect connector (4) to A1A14P1 (5).
3. Reinstall six screws (1) and tighten.
4. Reinstall top, bottom, and side covers (Paragraph 4-2).



4-7. REPLACE LINE VOLTAGE MODULE

This paragraph provides a detailed procedure for removing and replacing the rear panel line-voltage module.

a. Preliminary.

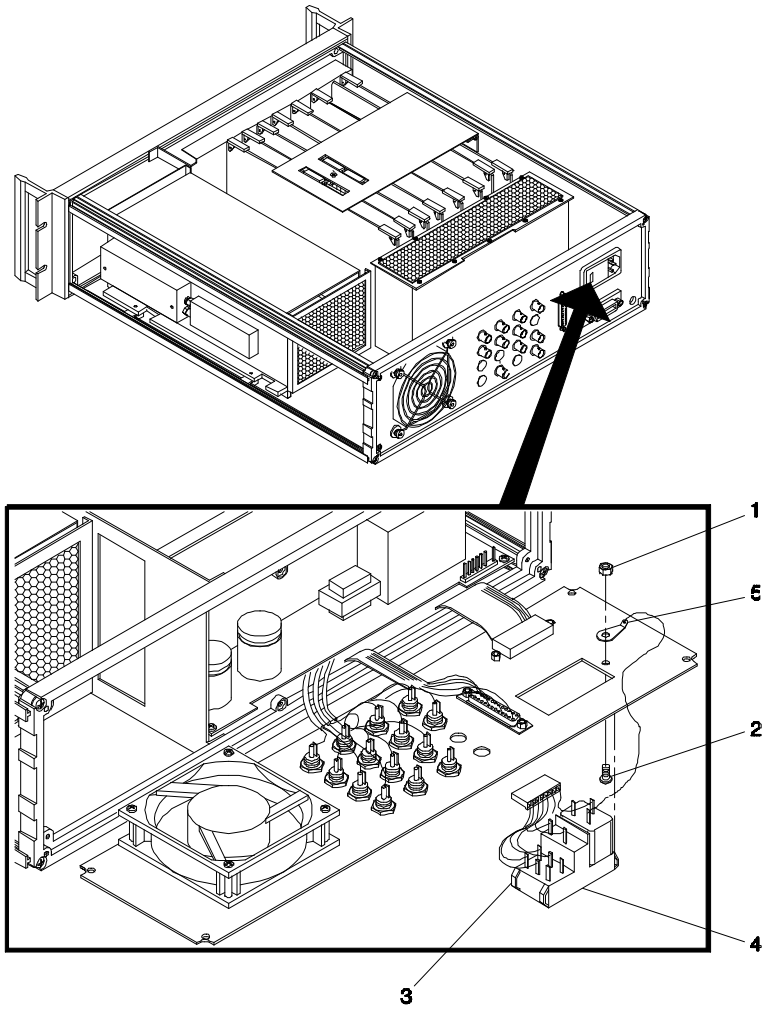
1. Remove top, bottom, and side covers (Paragraph 4-2).
2. Remove A3 Rear Panel Assembly (Paragraph 4-6).

b. Remove.

1. Remove nut (1) and screw (2).
2. Squeeze-in or break-off four snap locks (3), and remove line voltage module (4).
3. Remove wire (5).

c. Install.

1. Push replacement line voltage module through hole in rear panel and snap into place.
2. Install screw (2), wire (5), and nut (1).
3. Install A3 Rear Panel Assembly (Paragraph 4-5).
4. Install top, bottom, and side covers (Paragraph 4-2).



4-8. REPLACE FAN

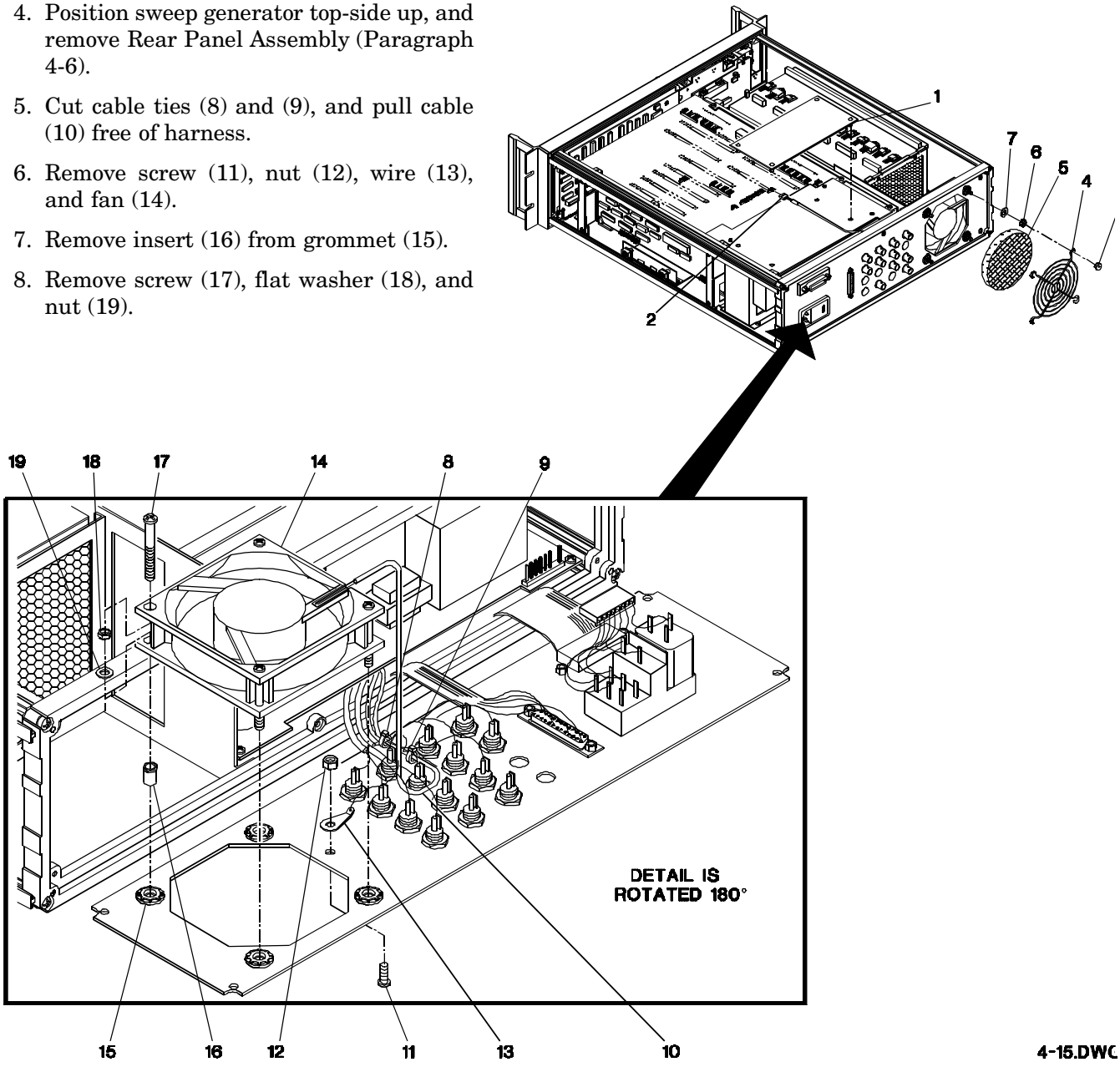
This paragraph provides detailed procedure for removing and replacing the rear panel fan assembly.

a. Preliminary.

Remove top, bottom, and side covers (Paragraph 4-2).

b. Remove.

1. Remove cable cover (1), and disconnect cable (2).
2. Remove four thumbnuts (3), cable guard (4), and air filter (5).
3. Remove four nuts (6) and flat washers (7).
4. Position sweep generator top-side up, and remove Rear Panel Assembly (Paragraph 4-6).
5. Cut cable ties (8) and (9), and pull cable (10) free of harness.
6. Remove screw (11), nut (12), wire (13), and fan (14).
7. Remove insert (16) from grommet (15).
8. Remove screw (17), flat washer (18), and nut (19).



c. Install.

1. Install screw (17), flat washer (18), and nut (19).
2. Install insert (16) in grommet (15).
3. Place fan (14) into position on rear panel; secure using four nuts (6) and four flat washers (7).
4. Route cable in with harness and secure with new cable ties in locations (8 and 9).
5. Install screw (11), nut (12), and wire (13).
6. Install Rear Panel Assembly (Paragraph 4-6).
7. Position sweep generator upside down, and install air filter (5), cable guard (4), and four thumbnuts (3).
8. Connect cable connector (2) to A1A14P49.
9. Install cable cover (1).
10. Install top, bottom, and side covers (Paragraph 4-2).

4-9. REPLACE POWER SWITCH

This paragraph provides a detailed procedure for removing and replacing the front panel POWER switch.

a. Preliminary.

Remove top, bottom, and side covers (Paragraph 4-2).

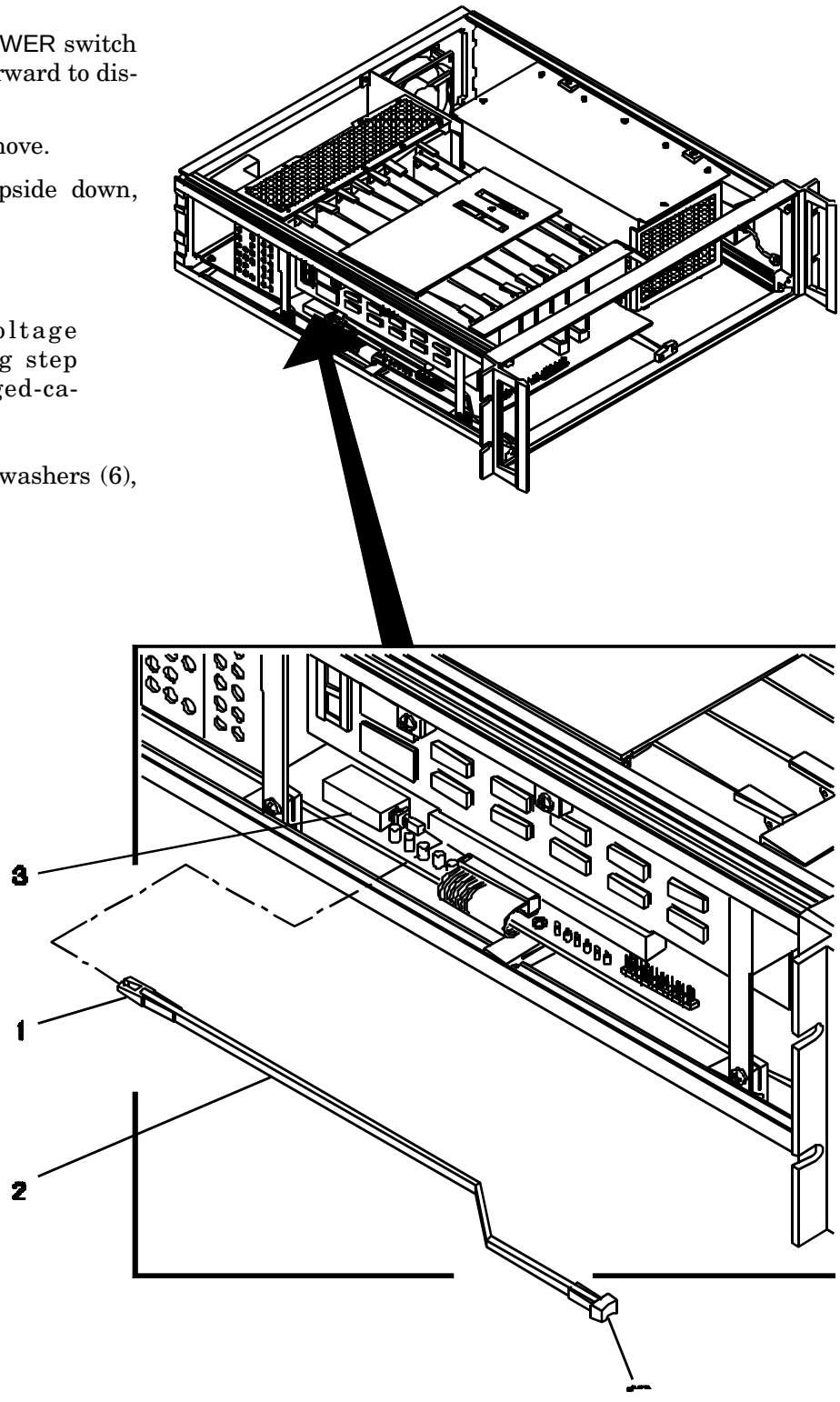
b. Remove

1. Pry gripper fingers (1) on POWER switch shaft (2) apart; push shaft forward to dislodge from switch (3).
2. Pull shaft (2) to rear and remove.
3. Position sweep generator upside down, and remove cable cover (4).

WARNING

Removal of high-voltage cover in the following step exposes lethal, charged-capacitor voltages.

4. Remove four screws (5), lockwashers (6), and high-voltage cover (7).



WARNING

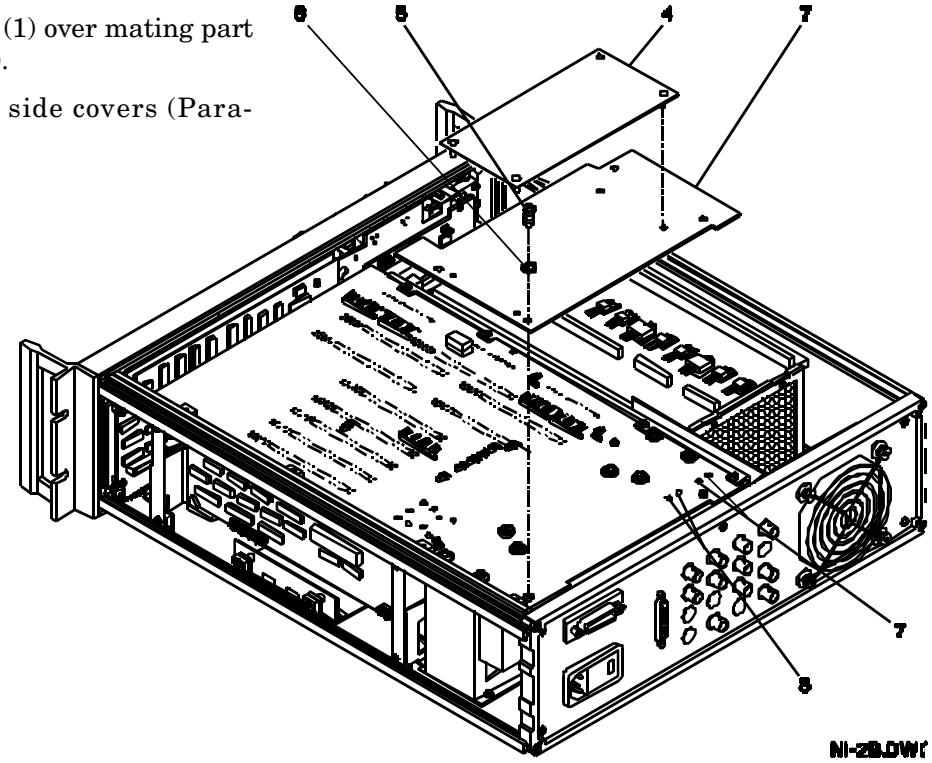
Discharge A1A14C12 (8) and C13 (9) by shorting pins together.

5. Unsolder and remove POWER switch (3).

c. Install.

1. Place new POWER switch into position, and solder in six places.
2. Install high-voltage cover using four screws (5) and lockwashers (6).
3. Install cable cover (4).
4. Position sweep generator right-side up.
5. Insert key cap (10) through hole in rear of front panel.
6. Snap gripper fingers (1) over mating part of POWER switch (3).

Install top, bottom, and side covers (Paragraph 4-2.



4-10. REPLACE DECR/INCR CONTROL AND/OR EXTERNAL ALC GAIN CONTROL

This paragraph provides a detailed procedure for removing and replacing the front panel ALC Gain control/PUSH-TO-CAL switch.

a. Preliminary.

1. Remove top, bottom, and side covers (Paragraph 4-2).
2. Remove A2 Front Panel Assembly (Paragraph 4-3).
3. Remove A2A12 Microprocessor CCA (Paragraph 4-4).
4. Remove A2A11 Front Panel CCA (Paragraph 4-5).

DECR/INCR Control

b. Remove.

1. Remove connector (1).
2. Loosen two set screws in knob (2).
3. Remove knob (2), nut (3), lock washer (4) and control (5).

EXTERNAL ALC GAIN Control/ PUSH-TO-CAL Switch

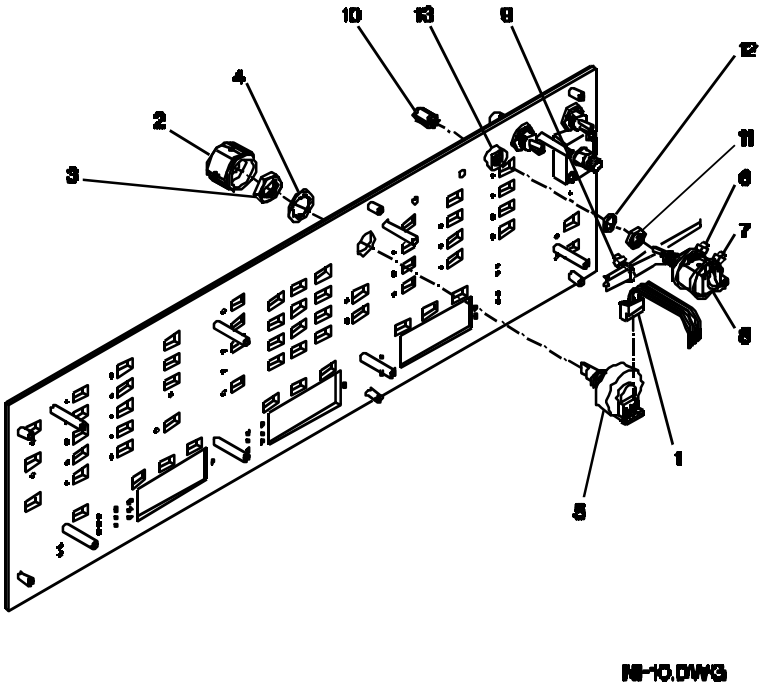
c. Remove.

1. Cut cable ties (6) and (7) and remove.
2. Unsolder seven wires from control switch (8).
3. Cut cable tie (9)

CAUTION

Removing the knob in next step may destroy the control-switch; because the control-switch shaft is likely to come out with the knob.

4. Remove knob (10).
5. Loosen nut (11), unscrew and remove control-switch (8), nut (11), and washer (12).



DECR/INCR Control

d. Install.

1. Place DECR-INCR control (5) into position on front panel.
2. Secure control using lock washer (4), and nut (3).
3. Slide knob (2) onto control shaft and secure with two set screws.
4. Connect cable connector (1).

EXTERNAL ALC GAIN Control/ PUSH-TO-CAL Switch

e. Install.

1. Screw control switch (8) — with washer (12) in place — into threaded insert on front panel (13).
2. Align control switch to position solder lugs as shown; tighten nut (11).
3. Solder wires in seven places.
4. Install cable ties (6, 7, 9).
5. Press knob (10) onto control shaft.
6. Install A2A11 Front Panel CCA (Paragraph 4-5).
7. Install A2A12 Microprocessor CCA (Paragraph 4-4).
8. Install A2 Front Panel Assembly (Paragraph 4-3).
9. Install top, bottom, and side covers (Paragraph 4-2).

CHAPTER 5
PERFORMANCE TEST

CONTENTS

CHAPTER 5
PERFORMANCE TEST

5-1. INTRODUCTION

This chapter provides detailed procedures for verifying that the sweep generator meets key guaranteed performance specifications.

5-2. INITIAL SETUP

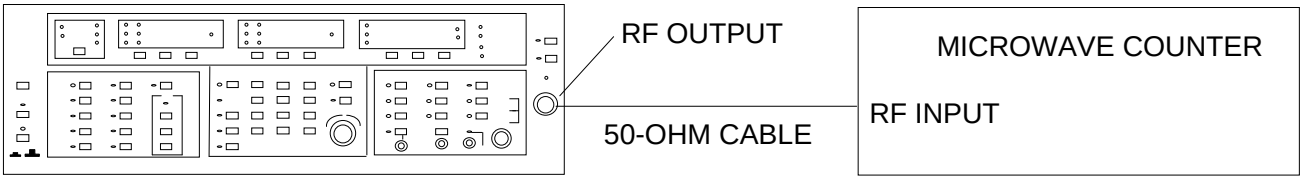
Perform the following steps prior to making a performance test.

1. Verify that rear panel voltage selector module is set for correct line voltage.
2. Allow a one-hour warm up before making any measurements.
3. Press RESET key. Pressing the RESET key set the front panel controls as shown below.

   - FREQUENCY RANGE: FULL
   - TRIGGER: AUTO
   - VIDEO MARKER: On
   - LEVELING: INTERNAL
   - SWEEP TIME: 0.050 sec
   - RF ON: On
   - LEVEL: Model Dependent RESET key value
   - ΔF: 1.000 GHz
   - F1: Low-End Frequency
   - F2: High-End Frequency
   - CF: Mid-Range Frequency
   - M1: Model Dependent
   - M2: Model Dependent
   - M3-M8: Off

5-3. CW FREQUENCY ACCURACY TEST

1. Perform Initial Setup (Paragraph 5-2).
2. Connect test equipment as shown below, and turn it on.



FREQ-SU.DRW

NOTE

- The YIG-tuned oscillators used for frequency generation are tuned by varying the magnetic-field strength around the oscillator YIG sphere. Due to the hysteresis effect inherent in magnetic structures, it is necessary to set hysteresis in each band to achieve optimal frequency accuracy. Thereafter, output frequencies must be approached from a lower frequency to maintain this optimal frequency accuracy.
- This test is performed in each frequency band—from one to six, depending upon model. Frequency bands consist of a down-converter (Het) band, for some models; one or more fundamental-frequency YIG-tuned oscillator (YIG) bands, for most models; a frequency doubler (X2) band, for the 40 GHz models; and a frequency tripler (X3) band, for the 6672B. Table 5-1 correlates model numbers with frequency bands used.

3. Press CW F1 key and set F1 frequency per Table 5-1 for lowest frequency band.
4. Press CW F2 key and set F2 frequency per Table 5-1 for lowest frequency band.
5. Press CW F1 key and wait 3 seconds for frequency to settle.
6. Press CW F2 key and wait 3 seconds for frequency to settle.
7. Repeat steps 5 and 6 two more times to set YIG hysteresis.
8. Press CW F1 key. Wait 1 minute then verify frequency accuracy (below):

6609B **6609B-50,** ±5 MHz **6610B,** ±10 MHz **6616B,** ±10 MHz **6617B** **6617B-40,** ±5 MHz **6619B** **6619B-40,** ±10 MHz **6620B,** ±10 MHz	**6621B** **6621B-40,** ±10 MHz **6622B** **6622B-40,** ±10 MHz **6624B,** ±10 MHz **6627B,** ±10 MHz **6628B** **6628B-50,** ±10 MHz **6629B** **6629B-40,** ±10 MHz	**6630B** **6630B-50,** ±10 MHz **6631B,** ±10 MHz **6632B,** ±15 MHz **6635B** **6635B-40,** ±10 MHz **6636B,** ±15 MHz **6637B** **6637B-40,** ±10 MHz	**6640B** **6640B-10,** ±20 MHz **6645B** **6645B-40,** ±10 MHz **6647B** **6647B-40,** ±10 MHz **6653B,** ±20 MHz **6659B,** ±20 MHz **6660B,** ±20 MHz	**6662B,** ±20 MHz **6663B,** ±20 MHz **6668B,** ±20 MHz **6669B,** ±20 MHz **6672B,** ±30 MHz

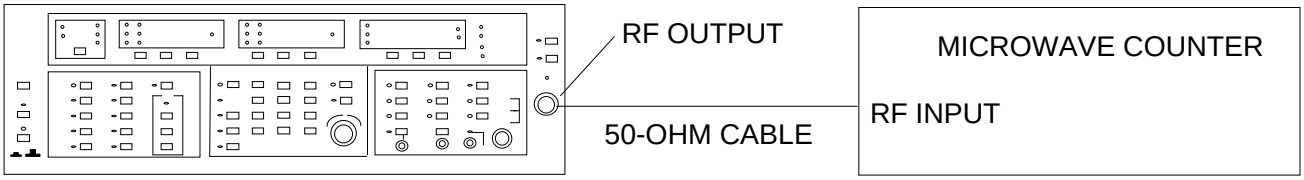
9. Press CW F2 key. Wait 1 minute then verify frequency accuracy (above):
10. As applicable, repeat steps 3 thru 9 for remaining YIG bands.
11. If any tests fail, adjust frequency for applicable band(s) (Paragraph 6-8).

Table 5-1. Correlation of 6600B Models and YIG Bands

MODEL	FREQUENCY BAND					
	1 HET	2 YIG 1	3 YIG 2	4 YIG 3	5 YIG 4	6 X2 (X3)
6609B **6609B-50**	F1 = 0.01 GHz F2 = 2.0 GHz	NA	NA	NA	NA	NA
6610B	NA	F1 = 1.0GHz F2 = 2.0 GHz	NA	NA	NA	NA
6616B	NA	F1 = 1.7 GHz F2 = 4.3 GHz	NA	NA	NA	NA
6617B **6617B-40**	F1 = 0.01 GHz F2 = 1.9 GHz	F1 = 2.1 GHz F2 = 8.0 GHz	NA	NA	NA	NA
6619B **6619B-40**	NA	F1 = 2.0 GHz F2 = 8.0 GHz	NA	NA	NA	NA
6620B	NA	F1 = 3.6 GHz F2 = 6.5 GHz	NA	NA	NA	NA
6621B **6621B-40**	NA	F1 = 2.0 GHz F2 = 7.9 GHz	F1 = 8.1 GHz F2 = 12.4 GHz	NA	NA	NA
6622B **6622B-40**	F1 = 0.01 GHz F2 = 1.9 GHz	F1 = 2.1 GHz F2 = 7.9 GHz	F1 = 8.1 GHz F2 = 12.4 GHz	NA	NA	NA
6624B	NA	F1 = 4.0 GHz F2 = 8.0 GHz	NA	NA	NA	NA
6627B	NA	F1 = 5.9 GHz F2 = 9.0 GHz	NA	NA	NA	NA
6628B **6628B-50**	NA	F1 = 8.0 GHz F2 = 12.4 GHz	NA	NA	NA	NA
6629B **6629B-40**	NA	F1 = 8.0 GHz F2 = 12.3 GHz	F1 = 12.5 GHz F2 = 20.0 GHz	NA	NA	NA
6630B **6630B-50**	NA	F1 = 12.4 GHz F2 = 20.0 GHz	NA	NA	NA	NA
6631B	NA	F1 = 10.0 GHz F2 = 15.5 GHz	NA	NA	NA	NA
6632B	NA	F1 = 17.0 GHz F2 = 22.0 GHz	NA	NA	NA	NA
6635B **6635B-40**	NA	F1 = 2.0 GHz F2 = 7.9 GHz	F1 = 8.1 GHz F2 = 12.3 GHz	F1 = 12.5 GHz F2 = 18.0 GHz	NA	NA
6636B	NA	F1 = 18.0 GHz F2 = 26.5 GHz	NA	NA	NA	NA
6637B **6637B-40**	NA	F1 = 2.0 GHz F2 = 7.9 GHz	F1 = 8.1 GHz F2 = 12.3 GHz	F1 = 12.5 GHz F2 = 20.0 GHz	NA	NA
6640B **6640B-10**	NA	F1 = 26.5 GHz F2 = 40.0 GHz	NA	NA	NA	NA
6645B **6645B-40**	F1 = 0.01 GHz F2 = 1.9 GHz	F1 = 2.1 GHz F2 = 7.9 GHz	F1 = 8.1 GHz F2 = 12.3 GHz	F1 = 12.5 GHz F2 = 18.0 GHz	NA	NA
6647B **6647B-40**	F1 = 0.01 GHz F2 = 1.9 GHz	F1 = 2.1 GHz F2 = 7.9 GHz	F1 = 8.1 GHz F2 = 12.3 GHz	F1 = 12.5 GHz F2 = 20.0 GHz	NA	NA
6653B	NA	F1 = 2.0 GHz F2 = 7.9 GHz	F1 = 8.1 GHz F2 = 12.3 GHz	F1 = 12.5 GHz F2 = 17.9 GHz	F1 = 18.1 GHz F2 = 26.5 GHz	NA
6659B	F1 = 0.01 GHz F2 = 1.9 GHz	F1 = 2.1 GHz F2 = 7.9 GHz	F1 = 8.1 GHz F2 = 12.3 GHz	F1 = 12.5 GHz F2 = 17.9 GHz	F1 = 18.1 GHz F2 = 26.5 GHz	NA
6660B	NA	F1 = 12.4 GHz F2 = 17.9 GHz	F1 = 18.1 GHz F2 = 27.4 GHz	NA	NA	F1 = 27.6 GHz F2 = 40.0 GHz
6662B	NA	F1 = 2.0 GHz F2 = 7.9 GHz	F1 = 8.1 GHz F2 = 12.3 GHz	F1 = 12.5 GHz F2 = 17.9 GHz	F1 = 18.1 GHz F2 = 27.4 GHz	F1 = 27.6 GHz F2 = 40.0 GHz
6663B	NA	F1 = 2.0 GHz F2 = 7.9 GHz	F1 = 8.1 GHz F2 = 12.3 GHz	F1 = 12.5 GHz F2 = 17.9 GHz	F1 = 18.1 GHz F2 = 27.4 GHz	F1 = 27.6 GHz F2 = 40.0 GHz
6668B	F1 = 0.01 GHz F2 = 1.9 GHz	F1 = 2.1 GHz F2 = 7.9 GHz	F1 = 8.1 GHz F2 = 12.3 GHz	F1 = 12.5 GHz F2 = 17.9 GHz	F1 = 18.1 GHz F2 = 27.4 GHz	F1 = 27.6 GHz F2 = 40.0 GHz
6669B	F1 = 0.01 GHz F2 = 1.9 GHz	F1 = 2.1 GHz F2 = 7.9 GHz	F1 = 8.1 GHz F2 = 12.3 GHz	F1 = 12.5 GHz F2 = 17.9 GHz	F1 = 18.1 GHz F2 = 27.4 GHz	F1 = 27.6 GHz F2 = 40.0 GHz
6672B	NA	NA	NA	NA	NA	F1 = 40.0 GHz F2 = 60.0 GHz

5-4. ∆F SWEEP WIDTH ACCURACY TEST

1. Perform Initial Setup (Paragraph 5-2).
2. Connect test equipment as shown below, and turn it on.



FREQ-SU.DRW

3. Press ∆F CF key.
4. Press ∆F key.
5. Set ∆F frequency for 0.050 GHz.
6. Press CF key.
7. Set CF frequency per Table 5-2 for frequency shown in lowest applicable YIG band for your model.

NOTE
For 6609B and 6672B, check will be made in respective Het or X3 band.

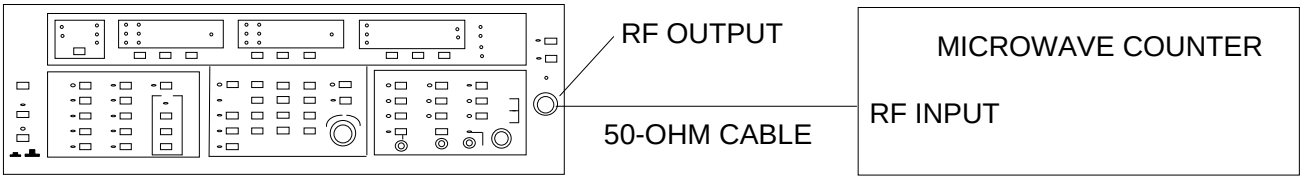
8. Press MANUAL SWEEP key.
9. Rotate MANUAL SWEEP control fully counterclockwise.
10. Record frequency reading from microwave counter.
11. Rotate MANUAL SWEEP control fully clockwise.
12. Record frequency reading from microwave counter.
13. Subtract frequency recorded in step 10 from that recorded in step 12.
14. Verify that difference is 50 ±4 MHz.
15. Repeat steps 7 thru 14, in turn, for remaining frequency bands—from lowest to highest.
16. If test fails in one or more bands, perform applicable band adjustment in Paragraph 6-11

Table 5-2. Mid-Band Frequencies for ΔF Tests

MODEL	FREQUENCY BAND					
	1 HET	2 YIG 1	3 YIG 2	4 YIG 3	5 YIG 4	6 X2 (X3)
6609B 6609B-50	1.0 GHz	NA	NA	NA	NA	NA
6610B	NA	1.5 GHz	NA	NA	NA	NA
6616B	NA	3.0 GHz	NA	NA	NA	NA
6617B 6617B-40	NA	5.0 GHz	NA	NA	NA	NA
6619B 6619B-40	NA	5.0 GHz	NA	NA	NA	NA
6620B	NA	4.5 GHz	NA	NA	NA	NA
6621B 6621B-40	NA	5.0 GHz	10.0 GHz	NA	NA	NA
6622B 6622B-40	NA	5.0 GHz	10.0 GHz	NA	NA	NA
6624B	NA	6.0 GHz	NA	NA	NA	NA
6627B	NA	8.0 GHz	NA	NA	NA	NA
6628B 6628B-50	NA	10.0 GHz	NA	NA	NA	NA
6629B 6629B-40	NA	10.0 GHz	15.0 GHz	NA	NA	NA
6630B 6630B-50	NA	15.0 GHz	NA	NA	NA	NA
6631B	NA	12.5 GHz	NA	NA	NA	NA
6632B	NA	20.0 GHz	NA	NA	NA	NA
6635B 6635B-40	NA	5.0 GHz	10.0 GHz	15.0 GHz	NA	NA
6636B	NA	23.0 GHz	NA	NA	NA	NA
6637B 6637B-40	NA	5.0 GHz	10.0 GHz	15.0 GHz	NA	NA
6640B 6640B-10	NA	NA	NA	NA	NA	33.0 GHz
6645B 6645B-40	NA	5.0 GHz	10.0 GHz	15.0 GHz	NA	NA
6647B 6647B-40	NA	5.0 GHz	10.0 GHz	15.0 GHz	NA	NA
6653B	NA	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	NA
6659B	NA	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	NA
6660B	NA	15.0 GHz	22.0 GHz	NA	NA	
6662B	NA	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	
6663B	NA	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	
6668B	NA	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	
6669B	NA	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	
6672B	NA	NA	NA	NA	NA	50.0 GHz

5-5. FREQUENCY VERNIER ACCURACY TEST

1. Perform Initial Setup (Paragraph 5-2).
2. Connect test equipment as shown below, and turn it on.



FREQ-SU.DRW

3. Press CW CF key.
4. Set CF frequency per Table 5-3 for frequency shown in lowest applicable YIG band for your model.

NOTE
For 6609B and 6672B, check will be made in respective Het or X3 band.

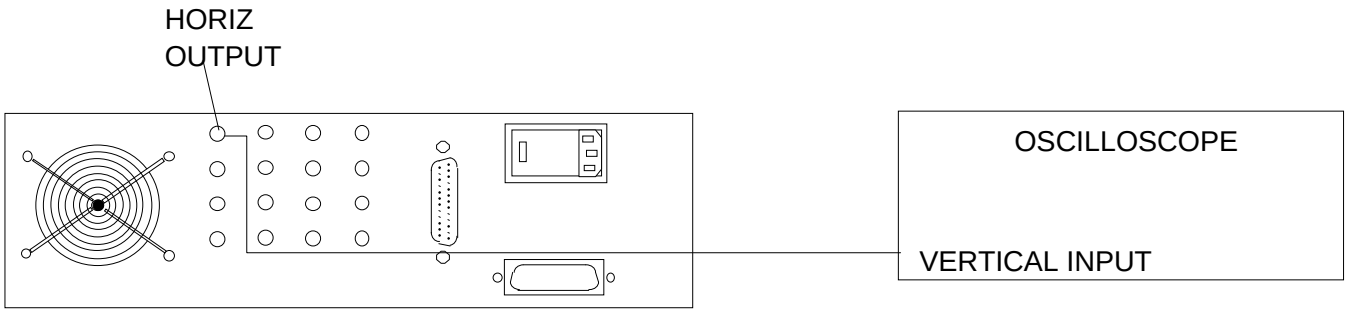
5. Press FREQUENCY VERNIER INCREASE key; hold key depressed until frequency stops increasing (as seen on microwave counter).
6. Record microwave counter frequency reading.
7. Press FREQUENCY VERNIER OFF key.
8. Record microwave counter frequency reading.
9. Verify that difference between microwave counter readings in steps 6 and 8 above is as follows:
   - For CW frequency ≤20 GHz, verify difference is 12.7 ±1.5 MHz.
   - For CW frequency >20 GHz and ≤40 GHz, verify difference is 25.4 ±3 MHz.
   - For CW frequency >40 GHz, verify difference is 38.1 ±3.5 MHz.
10. Press FREQUENCY VERNIER DECREASE key; hold depressed until frequency stops decreasing.
11. Record microwave counter frequency reading.
12. Press FREQUENCY VERNIER OFF key.
13. Record microwave counter frequency reading.
14. Verify that difference between microwave counter readings in steps 11 and 13 above is as follows:
    - For CW frequency ≤20 GHz, verify difference is 12.8 ±1.5 MHz.
    - For CW frequency >20 GHz and ≤40 GHz, verify difference is 25.6 ±3 MHz.
    - For CW frequency >40 GHz, verify difference is 38.4 ±3.5 MHz.
15. Repeat steps 4 thru 14, in turn, for remaining frequency bands—from lowest to highest.
16. If any tests fail, adjust frequency vernier in applicable band (Paragraph 6-10).

Table 5-3. Mid-Band Frequencies for Frequency Vernier Accuracy Tests

MODEL	FREQUENCY BAND					
	1 HET	2 YIG 1	3 YIG 2	4 YIG 3	5 YIG 4	6 X2 (X3)
6609B **6609B-50**	1.0 GHz	NA	NA	NA	NA	NA
6610B	NA	1.5 GHz	NA	NA	NA	NA
6616B	NA	3.0 GHz	NA	NA	NA	NA
6617B **6617B-40**	NA	5.0 GHz	NA	NA	NA	NA
6619B **6619B-40**	NA	5.0 GHz	NA	NA	NA	NA
6620B	NA	4.5 GHz	NA	NA	NA	NA
6621B **6621B-40**	NA	5.0 GHz	10.0 GHz	NA	NA	NA
6622B **6622B-40**	NA	5.0 GHz	10 GHz	NA	NA	NA
6624B	NA	6.0 GHz	NA	NA	NA	NA
6627B	NA	8.0 GHz	NA	NA	NA	NA
6628B **6628B-50**	NA	10.0 GHz	NA	NA	NA	NA
6629B **6629B-40**	NA	10.0 GHz	15.0 GHz	NA	NA	NA
6630B **6630B-50**	NA	15.0 GHz	NA	NA	NA	NA
6631B	NA	12.5 GHz	NA	NA	NA	NA
6632B	NA	20.0 GHz	NA	NA	NA	NA
6635B **6635B-40**	NA	5.0 GHz	10.0 GHz	15.0 GHz	NA	NA
6636B	NA	23.0 GHz	NA	NA	NA	NA
6637B **6637B-40**	NA	5.0 GHz	10.0 GHz	15.0 GHz	NA	NA
6640B **6640B-10**	NA	33.0 GHz	NA	NA	NA	NA
6645B **6645B-40**	NA	5.0 GHz	10.0 GHz	15.0 GHz	NA	NA
6647B **6647B-40**	NA	5.0 GHz	10.0 GHz	15.0 GHz	NA	NA
6653B	NA	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	NA
6659B	NA	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	NA
6660B	NA	15.0 GHz	22.0 GHz	NA	NA	
6662B	NA	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	
6663B	NA	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	
6668B	NA	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	
6669B	NA	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	
6672B	NA	NA	NA	NA	NA	50.0 GHz

5-6. SWEEP RAMP ACCURACY TEST

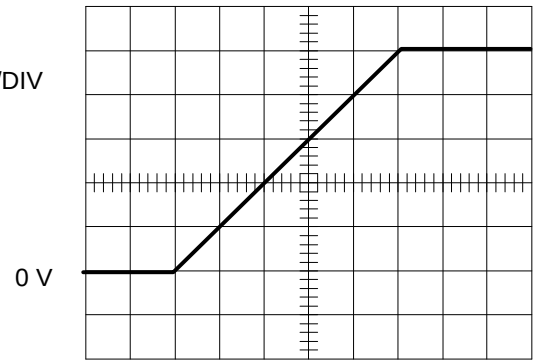
1. Perform Initial Setup (Paragraph 5-2).
2. Connect test equipment as shown below, and turn it on.



RAMP-SU

3. Press ΔF CF key.
4. Press SWEEP TIME key and set sweep time for 0.010 second.
5. Verify that oscilloscope displays a 10 ±2.0 ms ramp, as shown below.

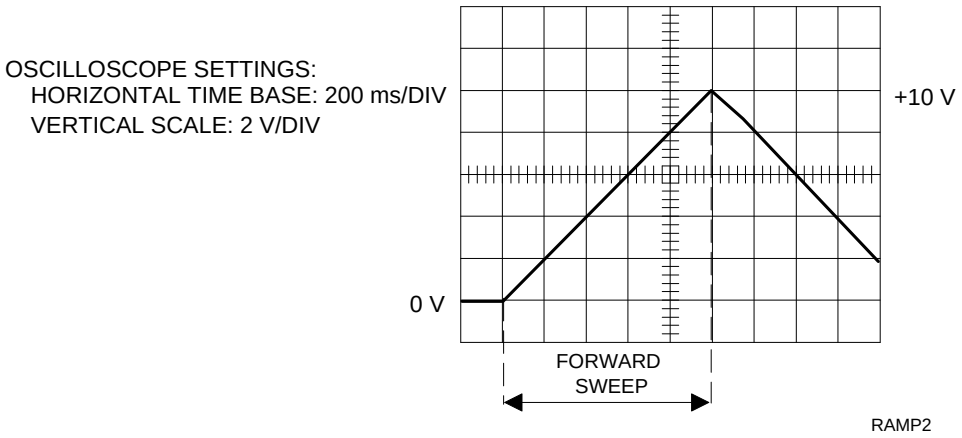
OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: 2 ms/DIV
VERTICAL SCALE: 2 V/DIV



RAMP1.DRW

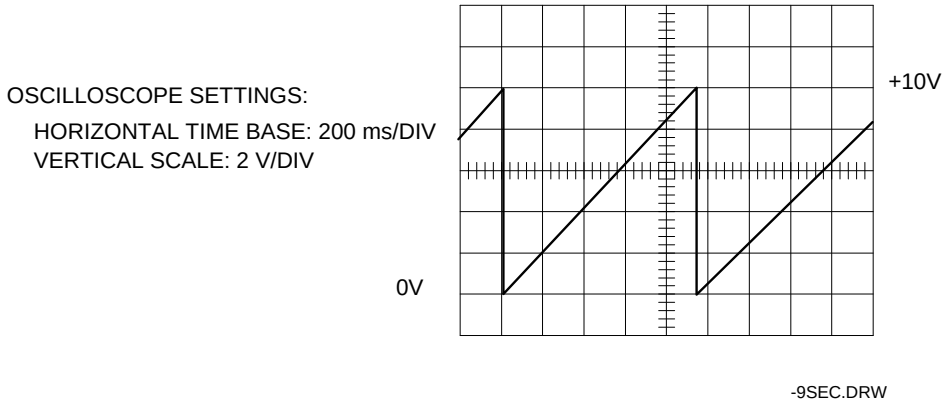
6. Press SWEEP TIME key and set sweep time for 1.000 second.

7. Verify that oscilloscope displays a 1.0 ±0.2 second ramp, as shown in following waveform.



8. Press SWEEP TIME key and set sweep time for 0.900 second.

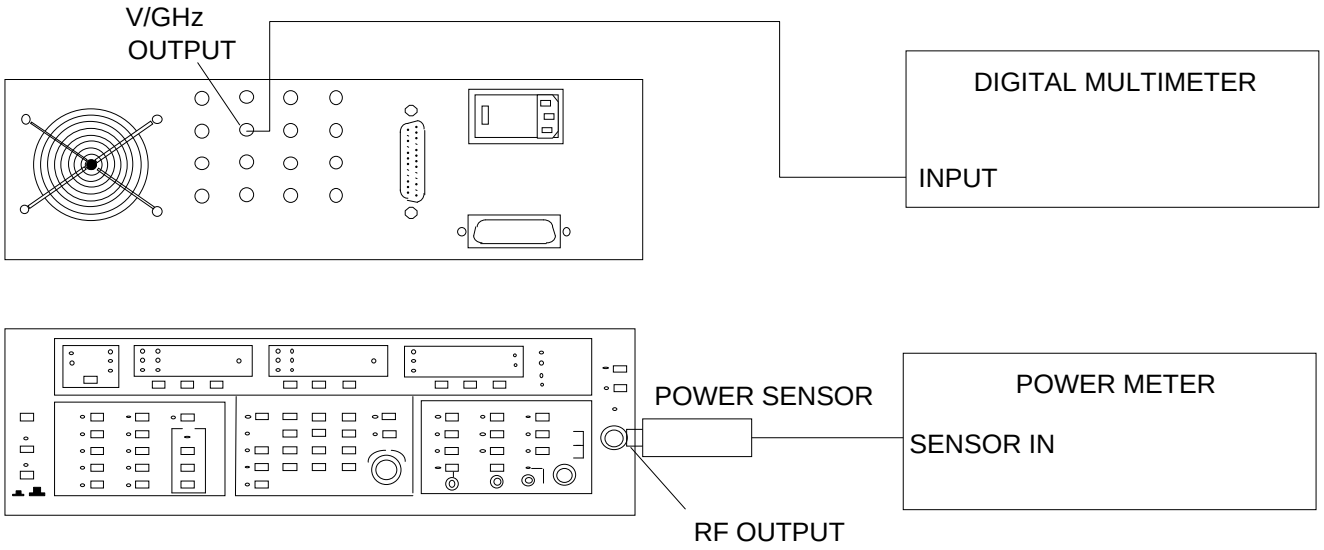
9. Verify that oscilloscope displays a 0.9 ±0.2 second ramp, as shown in following waveform.



10. If test fails, adjust sweep time (Paragraph 6-4).

5-7. LEVELED POWER VARIATION TEST

1. Perform Initial Setup (Paragraph 5-2).
2. Connect test equipment as shown below, and turn it on.



SLOPE.DRW

3. Press FULL key.
4. Verify that RF SLOPE control is OFF.
5. Press SWEEP TIME key and set sweep time for 1.000 second.
6. Verify that UNLEVELED indicator is not on during sweep.
7. Press MANUAL SWEEP key.

NOTE

- Output frequency in GHz is directly proportional to voltage from rear panel V/GHz connector. (Example: 1V equals 1 GHz, for models with high-end frequency ≤20 GHz; 1/2 V equals 1 GHz. for models with high-end frequency >20 GHz.) Front panel displays only the end points of sweep range; discrete frequencies can be determined by using multimeter connected to V/GHz connector.
- Ensure that calibration factor on power sensor is correctly set for frequency of operation.

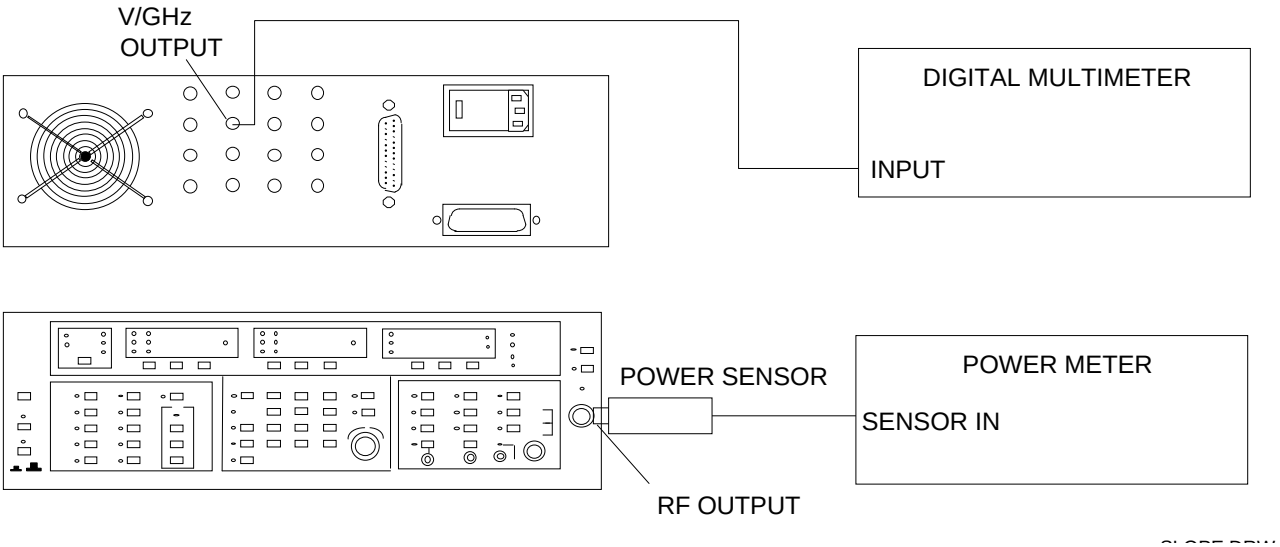
8. Slowly tune frequency-sweep from low- to high-end frequency (frequencies shown when FULL key is pressed). Record highest and lowest power meter readings.
9. Subtract minimum power reading from maximum reading recorded in step 8 above. Verify that difference is as shown in Table 5-4.
10. If test fails, adjust ALC bandwidth (Paragraph 6-14).

Table 5-4. Level Values for Leveled Power Variation Test

Model	Leveled Power Variation (dB) (Standard)	Leveled Power Variation (dB) (Option 2)
6609B	±0.3	±0.8
6609B-50	±0.3	±0.8
6610B	±0.3	±0.5
6616B	±0.4	±0.7
6617B	±0.5	±1.0
6617B-40	±0.5	±1.0
6619B	±0.4	±0.9
6619B-40	±0.4	±0.9
6620B	±0.3	±0.8
6621B	±0.5	±1.4
6621B-40	±0.5	±1.4
6622B	±0.5	±1.4
6622B-40	±0.5	±1.4
6624B	±0.4	±0.9
6627B	±0.3	±0.8
6628B	±0.4	±0.9
6628B-50	±0.4	±0.9
6629B	±0.5	±1.5
6629B-40	±0.5	±1.5
6630B	±0.5	±1.0
6630B-50	±0.5	±1.0
6631B	±0.4	±0.9
6632B	±0.8	±2.3
6635B	±0.5	±1.5
6635B-40	±0.5	±1.5
6636B	±1.0	±2.5
6637B	±0.5	±1.5
6637B-40	±0.5	±1.5
6640B	NA	NA
6640B-10	±1.0	±2.0
6645B	±0.6	±1.5
6645B-40	±0.6	±1.5
6647B	±0.6	±1.5
6647B-40	±0.6	±1.5
6653B	±1.0	±1.5
6659B	±1.0	±1.5
6660B	±1.5	2.0
6662B	±1.0, ≤26.5 GHz NA, >26.5 GHz	NA
6663B	±1.5	±2.0
6668B	±1.0, ≤26.5 GHz NA, >26.5 GHz	NA
6669B	±1.5	±2.0
6672B	NA	NA

5-8. MAXIMUM OUTPUT POWER AND POWER LEVEL ACCURACY TEST

1. Perform Initial Setup (Paragraph 5-2).
2. Connect test equipment as shown below, and turn it on.



3. Verify that RF SLOPE control is OFF.
4. Press SWEEP TIME key and set sweep time for 1.000 second.
5. Press F1-F2 key.
6. Press AUTO key.
7. Press F1 key and set F1 for low-end frequency (Table 5-5).
8. Press F2 key and set F2 for high-end frequency (or high breakpoint frequency for models with two-step specification).
9. Press LEVEL key.
10. Set power level per Table 5-5 for appropriate “LEVEL” value.
11. Using DECR-INCR control, increase output power in 0.1 dB steps until UNLEVELED indicator lights or +15 dBm is reached. (If +15 dBm is reached, go to step 12; otherwise, go to step 13.)
12. Using DECR-INCR control, decrease output power until UNLEVELED indicator *just* goes out.
13. Press MANUAL SWEEP key.

NOTE

Ensure that calibration factor on power sensor is correctly set for frequency of operation.

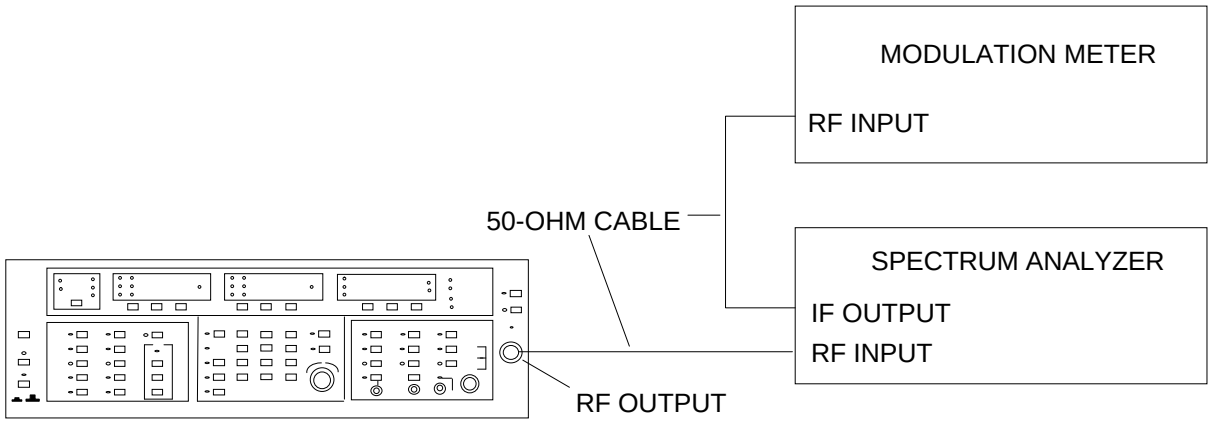
14. While observing power meter, slowly tune frequency-sweep between frequencies F1 and F2.
15. Verify that power meter indicates the correct power level for your model.
16. If test fails, adjust output power (Paragraph 6-16).

Table 5-5. Frequency and Power Level Settings for Output Power and Power Level Accuracy Test

MODEL	F1 FREQUENCY	F2 FREQUENCY	LEVEL (Standard)	LEVEL (Option 2)
6609B	0.01 GHz	2.0 GHz	13 dBm	12.5 dBm
6609B-50	0.01 GHz	2.0 GHz	17 dBm	16.5 dBm
6610B	1.0GHz	2.0. GHz	13 dBm	12.5 dBm
6616B	1.7 GHz	4.3 GHz	10 dBm	9.0 dBm
6617B	0.01 GHz	8.0 GHz	10 dBm	9.0 dBm
6617B-40	0.01 GHz	8.0 GHz	16 dBm	15.0 dBm
6619B	2.0 GHz	8.0 GHz	10 dBm	9.0 dBm
6619B-40	2.0 GHz	8.0 GHz	16 dBm	15.0 dBm
6620B	3.6 GHz	6.5 GHz	13 dBm	11.9 dBm
6621B	2.0 GHz	12.4 GHz	10 dBm	8.7 dBm
6621B-40	2.0 GHz	12.4 GHz	16 dBm	14.7 dBm
6622B	0.01 GHz	12.4 GHz	10 dBm	8.7 dBm
6622B-40	0.01 GHz	12.4 GHz	16 dBm	14.7 dBm
6624B	4.0 GHz	8.0 GHz	10 dBm	8.9 dBm
6627B	5.9 GHz	9.0 GHz	10 dBm	8.9 dBm
6628B	8.0 GHz	12.4 GHz	10 dBm	8.7 dBm
6628B-50	8.0 GHz	2.4 GHz	17 dBm	15.7 dBm
6629B	8.0 GHz	20.0 GHz	10 dBm	8.2 dBm
6629B-40	8.0 GHz	20.0 GHz	16 dBm	14.2 dBm
6630B	12.4 GHz	20.0 GHz	10 dBm	8.2 dBm
6630B-50	12.4 GHz	20.0 GHz	17 dBm	15.3 dBm
6631B	10.0 GHz	15.5 GHz	10 dBm	8.4 dBm
6632B	17.0 GHz	22.0 GHz	7 dBm	5 dBm
6635B	2.0 GHz	18.0 GHz	10 dBm	8.2 dBm
6635B-40	2.0 GHz	18.0 GHz	16 dBm	14.2 dBm
6636B	18.0 GHz	26.5 GHz	5 dBm	0.8 dBm
6637B	2.0 GHz	20.0 GHz	10 dBm	8.2 dBm
6637B-40	2.0 GHz	20.0 GHz	16 dBm	14.2 dBm
6640B	26.5 GHz	40.0 GHz	1 dBm	NA
6640B-10	26.5 GHz	40.0 GHz	10 dBm	7 dBm
6645B	0.01 GHz	18.0 GHz	10 dBm	8.2 dBm
6645B-40	0.01 GHz	18.0 GHz	16 dBm	14.2 dBm
6647B	0.01 GHz	20.0 GHz	10 dBm	8.2 dBm
6647B-40	0.01 GHz	20.0 GHz	16 dBm	14.2 dBm
6653B	2.0 GHz	26.5 GHz	10 dBm, ≤18 GHz 7 dBm, >18 GHz	7 dBm, ≤18 GHz 3 dBm, >18 GHz
6659B	0.01 GHz	26.5 GHz	10 dBm, ≤18 GHz 7 dBm, >18 GHz	7 dBm, ≤18 GHz 3 dBm, >18 GHz
6660B	12.4 GHz	40.0 GHz	6 dBm	3 dBm
6662B	2.0 GHz	40.0 GHz	10 dBm, ≤18 GHz 6 dBm, >18 GHz	NA
6663B	2.0 GHz	40.0 GHz	5 dBm	2 dBm
6668B	0.01 GHz	40.0 GHz	10 dBm, ≤18 GHz 6 dBm, >18 GHz	NA
6669B	0.01 GHz	40.0 GHz	5 dBm	2 dBm
6672B	40.0 GHz	60.0 GHz	1 dBm	NA

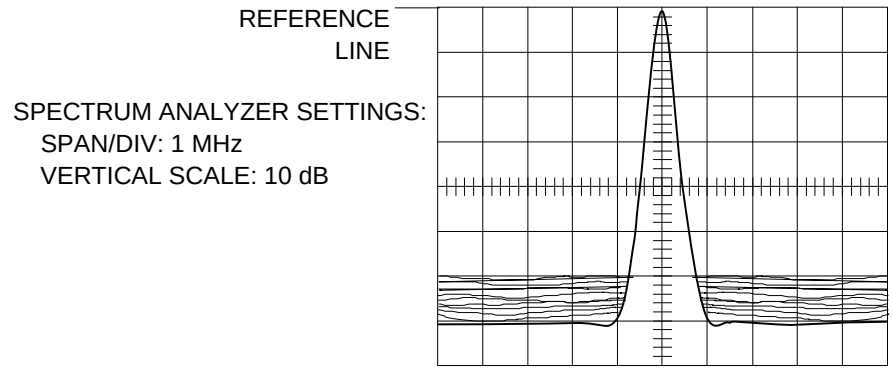
5-9. RESIDUAL FM TEST

1. Perform Initial Setup (Paragraph 5-2).
2. Connect test equipment as shown below, and turn it on.



FM-SU

3. Press CW F1 key and set frequency per Table 5-6 for lowest frequency band.
4. Adjust spectrum analyzer center-frequency control(s) to position sweep generator output signal on center-frequency graticule line, as shown below.



FM-WF

5. Enter zero span mode on spectrum analyzer.
6. Adjust spectrum analyzer frequency-tuning control(s) to position trace on reference line.
7. Set modulation meter control(s) to measure frequency deviation.
8. Verify that frequency deviation shown on modulation meter is as follows:
   - For CW F1 frequencies ≤8 GHz, verify deviation is <7 kHz.
   - For CW F1 frequencies >8 GHz and ≤18 GHz, verify deviation is <10 kHz.
   - For CW F1 frequencies >18 GHz and ≤26.5 GHz, verify deviation is <15 kHz.
   - For CW F1 frequencies >26.5 GHz and ≤40 GHz, verify deviation is <20 kHz.
   - For CW F1 frequencies >40 GHz, verify deviation is <50 kHz.

9. Repeat steps 3 thru 8 for remaining frequency bands.
10. If test fails, troubleshoot high residual FM (Paragraph 3-39).

Table 5-6. CW F1 Frequencies for Residual FM Test

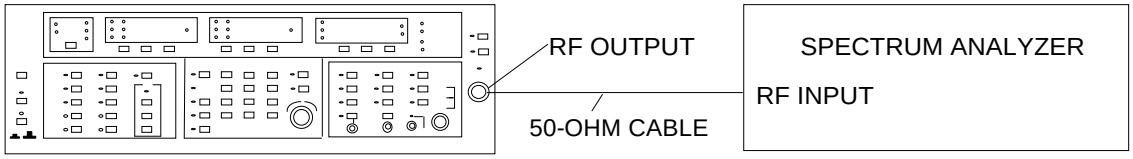
MODEL	FREQUENCY BAND					
	1 HET	2 YIG 1	3 YIG 2	4 YIG 3	5 YIG 4	6 X2 (X3)
6609B 6609B-50	1.0 GHz	NA	NA	NA	NA	NA
6610B	NA	1.5 GHz	NA	NA	NA	NA
6616B	NA	3.0 GHz	NA	NA	NA	NA
6617B 6617B-40	1.0 GHz	5.0 GHz	NA	NA	NA	NA
6619B 6619B-40	NA	5.0 GHz	NA	NA	NA	NA
6620B	NA	4.5 GHz	NA	NA	NA	NA
6621B 6621B-40	NA	5.0 GHz	10.0 GHz	NA	NA	NA
6622B 6622B-40	1.0 GHz	5.0 GHz	10.0 GHz	NA	NA	NA
6624B	NA	6.0 GHz	NA	NA	NA	NA
6627B	NA	8.0 GHz	NA	NA	NA	NA
6628B 6628B-50	NA	10.0 GHz	NA	NA	NA	NA
6629B 6629B-40	NA	10.0 GHz	15.0 GHz	NA	NA	NA
6630B 6630B-50	NA	15.0 GHz	NA	NA	NA	NA
6631B	NA	12.5 GHz	NA	NA	NA	NA
6632B	NA	20.0 GHz	NA	NA	NA	NA
6635B 6635B-40	NA	5.0 GHz	10.0 GHz	15.0 GHz	NA	NA
6636B	NA	23.0 GHz	NA	NA	NA	NA
6637B 6637B-40	NA	5.0 GHz	10.0 GHz	15.0 GHz	NA	NA
6640B 6640B-10	NA	NA	NA	NA	NA	33.0 GHz
6645B 6645B-40	1.0 GHz	5.0 GHz	10.0 GHz	15.0 GHz	NA	NA
6647B 6647B-40	1.0 GHz	5.0 GHz	10.0 GHz	15.0 GHz	NA	NA
6653B	NA	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	NA
6659B	1.0 GHz	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	NA
6660B	NA	15.0 GHz	22.0 GHz	NA	NA	
6662B	NA	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	
6663B	NA	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	
6668B	1.0 GHz	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	
6669B	1.0 GHz	5.0 GHz	10.0 GHz	15.0 GHz	23.0 GHz	
6672B	NA	NA	NA	NA	NA	50.0 GHz

5-10. RF OUTPUT TESTS

These test need to be performed sequentially.

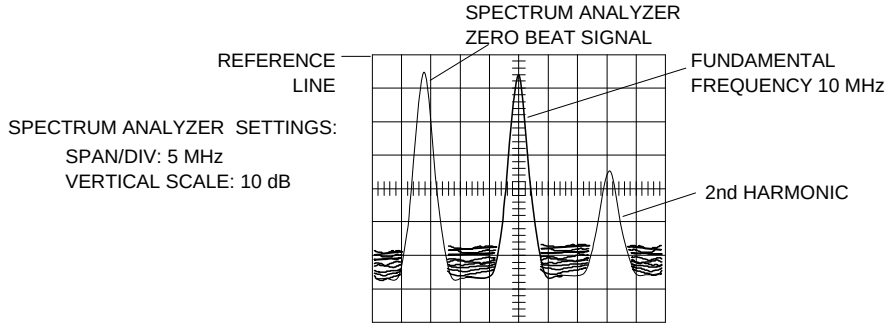
a. Harmonic Attenuation Test, for 2-to-8 GHz and Het Band Models Only

1. Perform Initial Setup (Paragraph 5-2).
2. Connect test equipment as shown below, and turn it on.



RFO-SU

3. Press CW F1 key and set F1 for low-end frequency (0.010 or 2.000 GHz).
4. Press LEVEL key and set output power to +10.0 dBm.
5. On spectrum analyzer, adjust frequency and band controls to position sweep generator fundamental frequency so that it and its 2nd harmonic are positioned near center-frequency graticule line (see waveform below).



RFO-WF1

NOTE

To identify sweep generator frequency and spectrum analyzer zero-beat frequency, momentarily turn sweep generator RF off. Signal that remains on screen is zero-beat frequency.

6. While observing spectrum analyzer display, slowly tune sweep generator output frequency from 0.010 (or 2) GHz to 8.000 GHz using DECR-INCR control.
7. While tuning sweep generator, adjust spectrum analyzer frequency and band controls to keep 2nd harmonic on screen.
8. Verify that any spurious signals present are less than value shown in Table 5-7.
9. If test fails between 0.01 and 2 GHz, replace Down Converter; if test fails above 2 GHz, replace A4A4 Band 1 YIG Assembly.

b. RF Output Subharmonic Signals Test.

1. Press CW F1 key and set F1 frequency for low-end frequency.
2. On spectrum analyzer, adjust frequency and band controls to display sweep generator signal.
3. While observing spectrum analyzer for spurious (non-harmonically related) signals, slowly tune sweep generator output frequency from low- to high-end frequency using DECR-INCR control.

Table 5-7. Harmonics Specification for Harmonic Attenuation Test

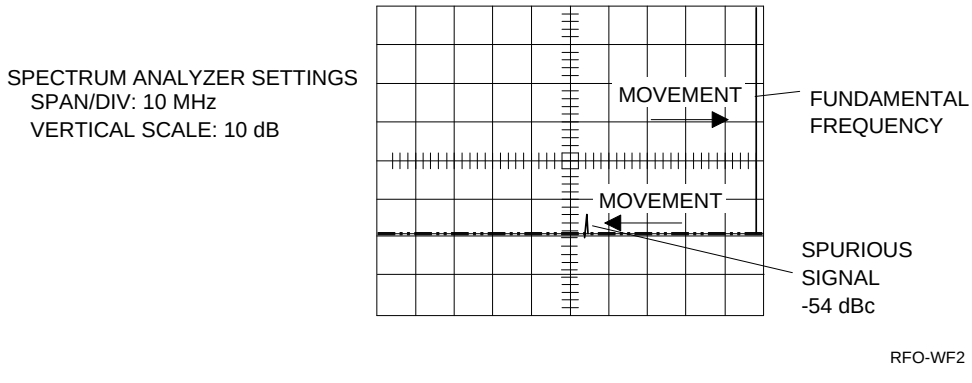
MODEL	HARMONICS (dBc)	NON-HARMONICS (dBc)
6609B **6609B-50**	<–30 <–20	<–40
6610B	<–30 *	<–60
6616B	<–20 (<2.26 GHz) <–30 (≥2.26 GHz)	<–60
6617B **6617B-40**	<–30 (≤2 GHz) <–40 (>2 GHz) <–20 (≤2 GHz) <–25 (>2 GHz)	<–40 (≤2 GHz) <–60 (>2 GHz)
6619B **6619B-40**	<–40 <–25	<–60
6620B	<–40	<–60
6621B **6621B-40**	<–40 <–25	<–60
6622B **6622B-40**	<–30 (≤2 GHz) <–40 (>2 GHz) <–20 (≤2 GHz) <–25 (>2 GHz)	<–40 (≤2 GHz) <–60 (>2 GHz)
6624B	<–30 *	<–60
6627B	<–40	<–60
6628B **6628B-50**	<–40 <–25	<–60
6629B **6629B-40**	<–40 <–25	<–60
6630B **6630B-50**	<–32 <–25	<–60
6631B	<–40	<–60
6632B	<–40	<–60
6635B **6635B-40**	<–40 <–25	<–60
6636B	<–40	<–60
6637B **6637B-40**	<–40 <–25	<–60
6640B **6640B-10**	<–30 *	<–60
6645B **6645B-40**	<–30 (≤2 GHz) <–40 (>2 GHz) <–20 (≤2 GHz) <–25 (>2 GHz)	<–40 (≤2 GHz) <–60 (>2 GHz)
6647B **6647B-40**	<–30 (≤2 GHz) <–40 (>2 GHz) <–20 (≤2 GHz) <–25 (>2 GHz)	<–40 (≤2 GHz) <–60 (>2 GHz)
6653B	<–40	<–60
6659B	<–30 (<2 GHz) <–40 (>26.5 GHz)	<–40 (≤2 GHz) <–60 (>2 GHz)
6660B	<–40 (≤26.5 GHz) <–20 (>26.5 GHz)	<–60
6662B	<–40 (2–26.5 GHz)	<–40 (≤2 GHz)
6663B	<–30 (>26.5 GHz) *	<–60 (>2 GHz)
6668B **6669B**	<–30 (<2 GHz) <–40 (2–26.5 GHz) <–30 (>26.5 GHz) *	<–40 (≤2 GHz) <–60 (>2 GHz)
6672B	<–20 **	<–60

* Excluding 5% band edgeds where specification is >20 dBc

** Subharmonics

NOTE

Spurious signals will be weak in amplitude, will appear and disappear abruptly, and will track opposite to fundamental and harmonic frequencies (see below).



4. Verify that any spurious signals present are less than value shown in Table 5-7.

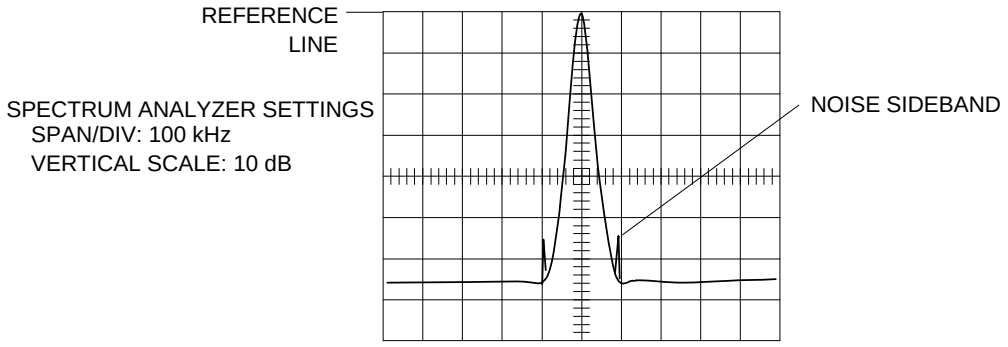
c. RF Output Power Source and Display Signals Test.

1. Set F1 for frequency ① in Table 5-8 for your model's lowest frequency YIG band.

NOTE

For 6609B and 6672B, check will be necessarily made in respective Het or X3 band.

2. Set spectrum analyzer frequency and band controls to position sweep generator output signal on center-frequency graticule line.
3. On spectrum analyzer, verify that noise sidebands located 50 kHz (and multiples thereof) from fundamental frequency are less than –50 dBc, 0.01–2 GHz; or –60 dBc, >2 GHz (see below).



NOTE

When looking for sidebands, maintain a minimum 10 dB sideband-to-noise ratio.

4. Repeat steps 1 thru 3 for frequency ② in Table 5-8 for your model's lowest frequency YIG band.
5. Repeat steps 1 thru 4 for model's remaining frequency bands.
6. If test fails, replace applicable band YIG Assembly.

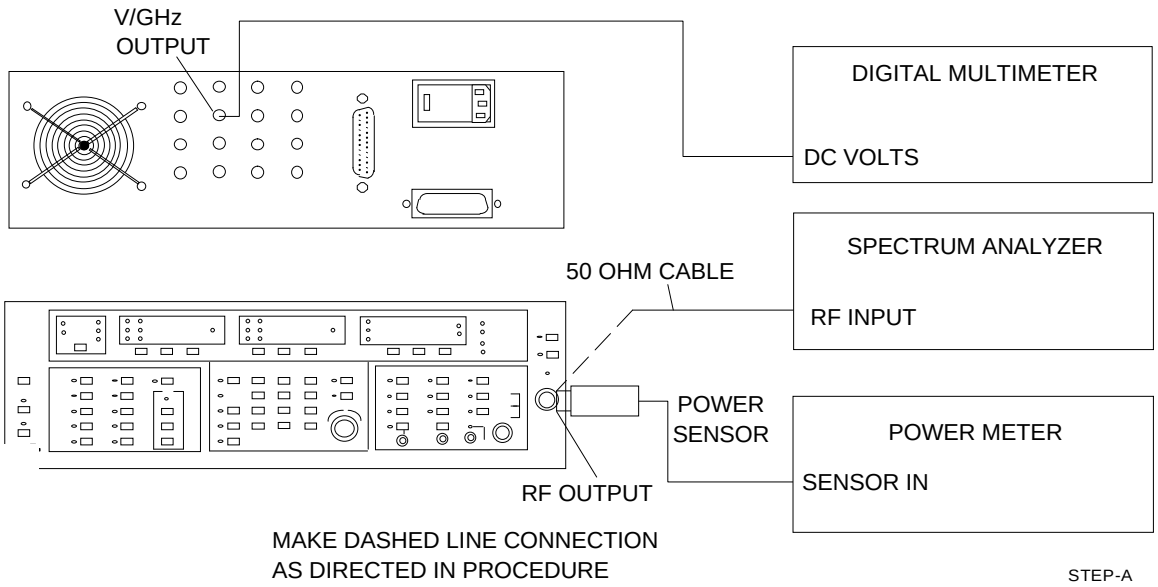
Table 5-8. F1 Frequencies for Power Source and Display Signals Test.

MODEL	FREQUENCY BAND					
	1 HET	2 YIG 1	3 YIG 2	4 YIG 3	5 YIG 4	6 X2 (X3)
6609B **6609B-50**	① 0.01 GHz ② 2.0 GHz	NA	NA	NA	NA	NA
6610B	NA	① 1.0 GHz ② 2.0 GHz	NA	NA	NA	NA
6616B	NA	① 1.7 GHz ② 4.3 GHz	NA	NA	NA	NA
6617B **6617B-40**	① 0.01 GHz ② 2.0 GHz	① 2.1 GHz ② 8.0 GHz	NA	NA	NA	NA
6619B **6619B-40**	NA	① 2.0 GHz ② 8.0 GHz	NA	NA	NA	NA
6620B	NA	① 3.6 GHz ② 6.5 GHz	NA	NA	NA	NA
6621B **6621B-40**	NA	① 2.0 GHz ② 7.9 GHz	① 8.1 GHz ② 12.4 GHz	NA	NA	NA
6622B **6622B-40**	① 0.01 GHz ② 2.0 GHz	① 2.1 GHz ② 7.9 GHz	① 8.1 GHz ② 12.4 GHz	NA	NA	NA
6624B	NA	① 4.0 GHz ② 8.0 GHz	NA	NA	NA	NA
6627B	NA	① 5.9 GHz ② 9.0 GHz	NA	NA	NA	NA
6628B **6628B-50**	NA	① 8.0 GHz ② 12.4 GHz	NA	NA	NA	NA
6629B **6629B-40**	NA	① 8.0 GHz ② 12.3 GHz	① 12.5 GHz ② 20.0 GHz	NA	NA	NA
6630B **6630B-50**	NA	① 12.4 GHz ② 20.0 GHz	NA	NA	NA	NA
6631B	NA	① 10.0 GHz ② 15.5 GHz	NA	NA	NA	NA
6632B	NA	① 17.0 GHz ② 22.0 GHz	NA	NA	NA	NA
6635B **6635B-40**	NA	① 2.0 GHz ② 7.9 GHz	① 8.1 GHz ② 12.3 GHz	① 12.5 GHz ② 18.0 GHz	NA	NA
6636B	NA	① 18.0 GHz ② 26.5 GHz	NA	NA	NA	NA
6637B **6637B-40**	NA	① 2.0 GHz ② 7.9 GHz	① 8.1 GHz ② 12.3 GHz	① 12.5 GHz ② 20.0 GHz	NA	NA
6640B **6640B-10**	NA	NA	NA	NA	NA	① 26.5 GHz ② 40.0 GHz
6645B **6645B-40**	① 0.01 GHz ② 2.0 GHz	① 2.1 GHz ② 7.9 GHz	① 8.1 GHz ② 12.3 GHz	① 12.5 GHz ② 18.0 GHz	NA	NA
6647B **6647B-40**	① 0.01 GHz ② 2.0 GHz	① 2.1 GHz ② 7.9 GHz	① 8.1 GHz ② 12.3 GHz	① 12.5 GHz ② 20.0 GHz	NA	NA
6653B	NA	① 2.1 GHz ② 7.9 GHz	① 8.1 GHz ② 12.3 GHz	① 12.5 GHz ② 17.9 GHz	① 18.1 GHz ② 26.5 GHz	NA
6659B	① 0.01 GHz ② 2.0 GHz	① 2.1 GHz ② 7.9 GHz	① 8.1 GHz ② 12.3 GHz	① 12.5 GHz ② 17.9 GHz	① 18.1 GHz ② 26.5 GHz	NA
6660B	NA	① 12.4 GHz ② 17.9 GHz	① 18.1 GHz ② 27.4 GHz	NA	NA	NA
6662B, **6663B, NA**	① 2.1 GHz ② 7.9 GHz	① 8.1 GHz ② 12.3 GHz	① 12.5 GHz ② 17.9 GHz	① 18.1 GHz ② 27.4 GHz	NA	
6668B, **6669B**	① 0.01 GHz ② 2.0 GHz	① 2.1 GHz ② 7.9 GHz	① 8.1 GHz ② 12.3 GHz	① 12.5 GHz ② 17.9 GHz	① 18.1 GHz ② 27.4 GHz	NA
6672B	NA	NA	NA	NA	NA	① 40.0 GHz ② 60.0 GHz

d. RF Output Step Attenuator Accuracy Test.

NOTE
This test applies only to models fitted with the Option 2 Step Attenuator.

1. Connect test equipment as shown below, and turn equipment on.



2. Press RESET key.
3. Press CW F1 key and set F1 for first test frequency in Table 5-9 for your model.

NOTE
- Output frequency in GHz is directly proportional to voltage from rear panel V/GHz connector. (Example: 1V equals 1 GHz, for models with high-end frequency ≤20 GHz; 1/2 V equals 1 GHz. for models with high-end frequency >20 GHz.) Front panel displays only the end points of sweep range; discrete frequencies can be determined by using multimeter connected to V/GHz connector.
- Ensure that calibration factor on power sensor is correctly set for frequency of operation.

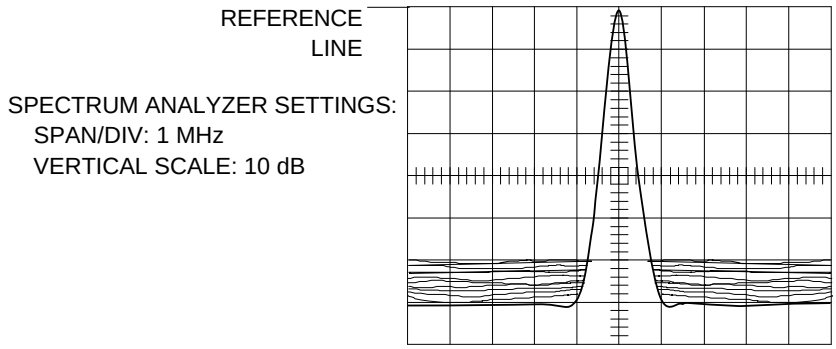
4. Press LEVEL key and note the power level shown. This is the "Reset" power level.
5. Observe that power meter indicates the "Reset" power shown in step 4. If it does not, use keypad or DECR-INCR control to adjust sweep generator power until it does.
6. Disconnect power sensor from RF OUTPUT connector.
7. Connect spectrum analyzer to RF OUTPUT connector.
8. Record the sweep generator output-power level shown on spectrum analyzer.
9. Press LEVEL key; then enter –10 on keypad and press MHz/dB/m key to decrease output power by 10 dB.

NOTE
The deviation between the value shown and 10 dB below "Reset" power level must be included in the tolerances that follow.

Table 5-9. Test Frequencies for Step Attenuator Accuracy Test

MODEL	TEST FREQUENCY 1	TEST FREQUENCY 2	ACCURACY SPECIFICATION
6609B **6609B-50**	1.0 GHz	NA	±0.8 dB, ±0.3 dB/10 dB Step
6610B	1.5 GHz	NA	±1.5 dB, ±0.4 dB/10 dB Step
6616B	2.0 GHz	NA	±1.5 dB, ±0.4 dB/10 dB Step
6617B **6617B-40**	1.0 GHz	4.0 GHz	±1.0 dB, ±0.4 dB/10 dB Step
6619B **6619B-40**	4.0 GHz	NA	±1.5 dB, ±0.4 dB/10 dB Step
6620B	5.0 GHz	NA	±1.5 dB, ±0.4 dB/10 dB Step
6621B **6621B-40**	5.0 GHz	NA	±1.5 dB, ±0.4 dB/10 dB Step
6622B **6622B-40**	1.0 GHz	5.0 GHz	±1.5 dB, ±0.4 dB/10 dB Step
6624B	5.0 GHz	NA	±1.5 dB, ±0.4 dB/10 dB Step
6627B	8.0 GHz	NA	±1.5 dB, ±0.4 dB/10 dB Step
6628B **6628B-50**	10.0 GHz	NA	±1.5 dB, ±0.4 dB/10 dB Step
6629B **6629B-40**	15.0 GHz	NA	±1.5 dB, ±0.4 dB/10 dB Step
6630B **6630B-50**	15.0 GHz	NA	±1.5 dB, ±0.4 dB/10 dB Step
6631B	13.0 GHz	NA	±1.5 dB, ±0.4 dB/10 dB Step
6632B	19.0 GHz	NA	±1.0 dB, ±0.3 dB/10 dB Step
6635B **6635B-40**	10.0 GHz	NA	±1.5 dB, ±0.4 dB/10 dB Step
6636B	22.0 GHz	NA	±3.0 dB, ±0.7 dB/10 dB Step
6637B **6637B-40**	10.0 GHz	NA	±1.5 dB, ±0.4 dB/10 dB Step
6640B	NA	NA	NA
6640B-10	33 GHz	NA	±2.0 dB, ± 1.0 dB/10 dB Step
6645B **6645B-40**	1.0 GHz	10.0 GHz	±1.5 dB, ±0.4 dB/10 dB Step
6647B **6647B-40**	1.0 GHz	10.0 GHz	±1.5 dB, ±0.4 dB/10 dB Step
6653B	10.0 GHz	NA	±2.0 dB, ±0.7 dB/10 dB Step
6659B	1.0 GHz	10.0 GHz	±2.0 dB, ±0.7 dB/10 dB Step
6660B	22.0 GHz	NA	±2.5 dB, ±1.0 dB/10 dB Step
6662B	NA	NA	NA
6663B	22.0 GHz	NA	±2.5 dB, ±1.0 dB/10 dB Step
6668B	NA	NA	NA
6669B	22.0 GHz	NA	±2.5 dB, ±1.0 dB/10 dB Step
6672B	NA	NA	NA

10. Verify that spectrum analyzer indicates –10 dB below “Reset” power level, ± accuracy shown in in Table 5-9 and ± deviation from step 8. (See waveform below.)



FM-WF

11. Press LEVEL key; then enter –10 on keypad and press MHz/dB/m key to decrease output power by an additional 10 dB.
12. Verify that spectrum analyzer indicates –20 dB below “Reset” power level, ± accuracy shown in Table 5-9 and ± deviation from step 8.
13. Press LEVEL key; then enter –20 on keypad and press MHz/dB/m key to decrease output power by an additional 20 dB.
14. Verify that spectrum analyzer indicates –40 dB below “Reset” power level, ± accuracy shown in Table 5-9 and ± deviation from step 8.
15. Press CW CF key.
16. Press CF key and set CF for second test frequency in Table 5-9, if applicable.
17. Press LEVEL key.
18. Set the output-power level to “Reset” power level, as shown on sweep generator.
19. Disconnect spectrum analyzer from RF OUTPUT connector.
20. Connect power sensor to RF OUTPUT connector.
21. Repeat steps 5 through 20.
22. If test fails, troubleshoot RF output circuit (Paragraph 3-37).

CHAPTER 6
ADJUSTMENTS

CONTENTS

CHAPTER 6
ADJUSTMENTS

6-1. INTRODUCTION

This chapter provides detailed adjustment procedures for the sweep generator.

NOTE

The **SHIFT** key provides alternate functions for certain front panel keys. Shift functions are designated by blue lettering on front panel and by boldface type in this manual.

6-2. INITIAL SETUP

1. Remove covers.

WARNING

Hazardous voltages are present when covers are removed. Where maintenance can be performed without having power applied, power should be removed.

2. Press POWER key to ON.
3. Press RESET key.

6-3. CHECK AND ADJUST POWER SUPPLY

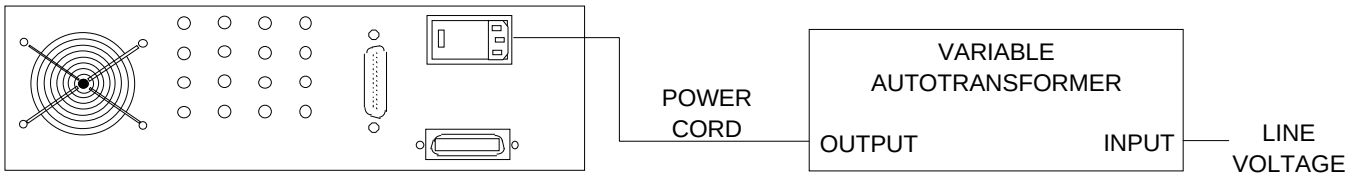
1. Perform “Initial Setup” procedure (Paragraph 6-2).

NOTE
Refer to Figure A2-3 for test point, indicator, and adjustment locations.

2. Connect digital multimeter positive test lead to A1A14TP1 (+5V) and negative lead to A1A14TP2 (D GND).
3. Verify that digital multimeter reads +5V ±100 mV.
4. Connect digital multimeter positive test lead to A1A14TP6 (–38V) and negative lead to A1A14TP3 (A GND).
5. Verify that digital multimeter reads –38 ±1.5V.
6. Remove digital multimeter test leads from both test points.
7. Rotate A1A14R89 clockwise to its limit.

NOTE
Removing A1A2 PCB provides an unobstructed access to A1A14R89.

8. While observing A1A14DS3 (OUT OF REG) indicator, rotate A1A14R89 counterclockwise until indicator just goes out.
9. While counting number of potentiometer turns, rotate A1A14R89 clockwise until indicator just lights.
10. Position A1A14R89 halfway between on and off states of indicator.
11. Press POWER key to OFF.
12. Connect test equipment as shown below, and turn it on.



PS-SU

13. Adjust variable autotransformer for 87V or 176V, as applicable for 115V or 230V line.
14. Press POWER key to ON.
15. Readjust variable autotransformer as required to obtain 87V or 176V.
16. Adjust A1A14R79 (LOW) to its clockwise limit; then readjust counterclockwise until A1A14DS5 (LOW LINE) indicator lights.
17. Readjust variable autotransformer for 115V or 230V; ensure that A1A14DS5 (LOW LINE) indicator is not lit.
18. Adjust variable autotransformer for 135V or 269V, as applicable for 115V or 230V line.

19. Rotate A1A14R80 (HIGH) to its clockwise limit; then rotate counterclockwise until A1A14DS4 (HIGH LINE) indicator lights.
20. Readjust variable autotransformer for 115V or 230V; ensure that A1A14DS4 (HIGH LINE) indicator is off.
21. Press POWER key to OFF.

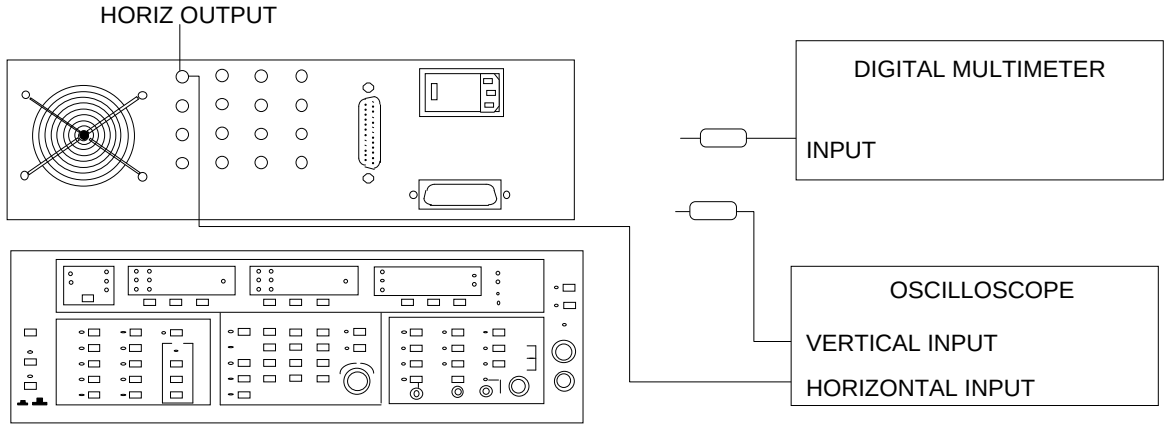
6-4. ADJUST ANALOG SWEEP TIME

1. Perform “Initial Setup” procedure (Paragraph 6-2).

NOTE

- Refer to Figure A2-7 for test point and adjustment locations.
- Reference measurements to A1A2TP5.

2. Connect test equipment as shown below, and turn it on.



ASWP-SU

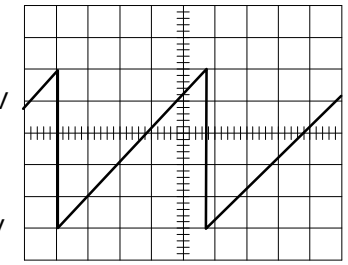
3. Press POWER key to OFF.
4. Remove A1A1 PCB and set it aside. (Removing this PCB provides access to test points in following steps.)
5. Press POWER key to ON.
6. Connect digital multimeter to A1A2U18-1, and check for +12 ±1.0V.
7. Connect digital multimeter to A1A2U18-7, and check for –12 ±1.0V.
8. Set horizontal time base on oscilloscope for external, and adjust horizontal vernier control so that trace extends full width of screen (10 divisions).
9. Press SWEEP TIME key.
10. Set sweep time for 99.00 seconds.
11. Connect digital multimeter to A1A2TP6.
12. While ramp sweeps from left-to-right on oscilloscope, adjust A1A2R31 for digital multimeter reading of +10 ±0.01V.
13. Connect digital multimeter to A1A2TP7.
14. After ramp has swept through its first 10 seconds (1 division), adjust A1A2R39 for 0 ±0.1V.
15. Connect digital multimeter to A1A2TP4.
16. Press SWEEP TIME key and set sweep time for 0.050 second.
17. Press EXT OR SINGLE key twice to trigger single sweep.

NOTE

Before taking voltage reading, allow 15 to 30 seconds for voltage to settle.

18. Adjust A1A2R76 for digital multimeter reading of +10 ±0.05V.
19. Connect oscilloscope vertical input to A1A2TP4.
20. Press ΔF CF key.
21. Press SWEEP TIME key and set sweep time for 0.900 second.
22. Adjust A1A2R10 for forward sweep duration of 0.9 ±0.05 second, as shown below.

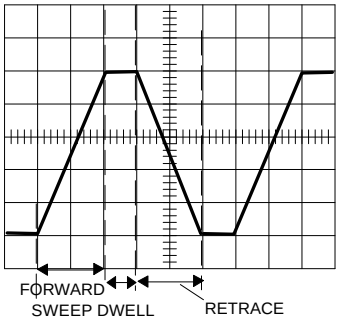
OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: 200 ms/DIV
VERTICAL SCALE: 2 V/DIV



ASWP-WF1

23. Press SWEEP TIME key and set sweep time for 0.010 second.
24. Adjust A1A2R6 for forward sweep duration of 10 ±0.5 ms, as shown below.

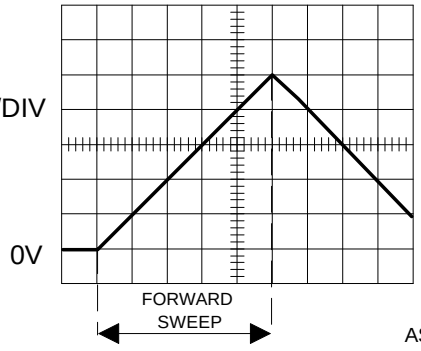
OSCILLOSCOPE SETTINGS
HORIZONTAL TIME BASE: 5 ms/DIV
VERTICAL SCALE: 2 V/DIV



ASWP-WF2

25. Press SWEEP TIME key and set sweep time for 1.000 second.
26. Adjust A1A2R17 for forward sweep duration of 1.0 ±0.05 second, as shown below.

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: 200 ms/DIV
VERTICAL SCALE: 2 V/DIV



ASWP-WF3

27. Verify retrace and dwell times at 10 ms and 1 second (below).

SWEEP TIME	RETRACE TIME	DWELL AT 0 AND 10V
0.010 to 0.999 sec	10 ±1 ms	5 ±0.5 ms
1.000 to 99.00 sec	1 ±0.1 sec	4% of sweep time

28. Press POWER key to OFF.
29. Reinstall A1A1 PCB.

6-5. ADJUST A1A5 FREQUENCY INSTRUCTION PCB

1. Perform "Initial Setup" procedure (Paragraph 6-2).

NOTE
Refer to Figure A2-12 for locations of test points and adjustments.

2. If repair was not performed in F Center circuit (A1A5U9 thru A1A5U12 and associated components) skip to subparagraph *b*.

a. F Center Adjustment.

1. Press POWER key to OFF.
2. Remove A1A5 PCB from basic frame and install on card extender.
3. Remove F Center circuit cover.
4. Press POWER key to ON.
5. Press **SHIFT** key, then **ΔF CF** key.
6. Connect digital multimeter leads between A1A5TP3 (–) and A1A5TP2 (+).
7. Adjust A1A5R23 for 0 ±50 μV.
8. Connect digital multimeter leads between A1A5TP11 (–) and A1A5TP7 (+).
9. Verify that digital multimeter indicates 0 ±2 mV.
10. Press POWER key to OFF.
11. Remove A1A5 from card extender and reinstall F Center circuit cover.
12. Install A1A5 PCB.
13. Press POWER key to ON.

b. V/GHz Adjustment.

1. Press CW F1 key and set F1 frequency for high-end frequency.
2. Connect digital multimeter to V/GHz connector.
3. Adjust A1A5R47 for voltage shown in Table 6-1.

Table 6-1. V/GHz Adjustment Values

Model	A1A5R47 Adjustment Value	Model	A1A5R47 Adjustment Value	Model	A1A5R47 Adjustment Value
6609B **6609B-50**	2V	**6627B**	9V	**6640B** **6640B-10**	20V
6610B	2V	**6628B** **6628B-50**	12.4V	**6645B** **6645B-40**	18V
6616B	4.3V	**6629B** **6629B-40**	20V	**6647B** **6647B-40**	20V
6617B **6617B-40**	8V	**6630B** **6630B-50**	20V	**6653B**	13.5V
6619B **6619B-40**	8V	**6631B**	15.5V	**6659B**	13.5V
6620B	6.5V	**6632B**	11V	**6660B**	20V
6621B **6621B-40**	12.4V	**6635B** **6635B-40**	18V	**6662B** **6663B**	20V 20V
6622B **6622B-40**	12.4V	**6636B** **6637B**	13.25	**6668B**	20V
6624B	8V	**6637B-40**	20V	**6669B** **6672B**	20V 20V

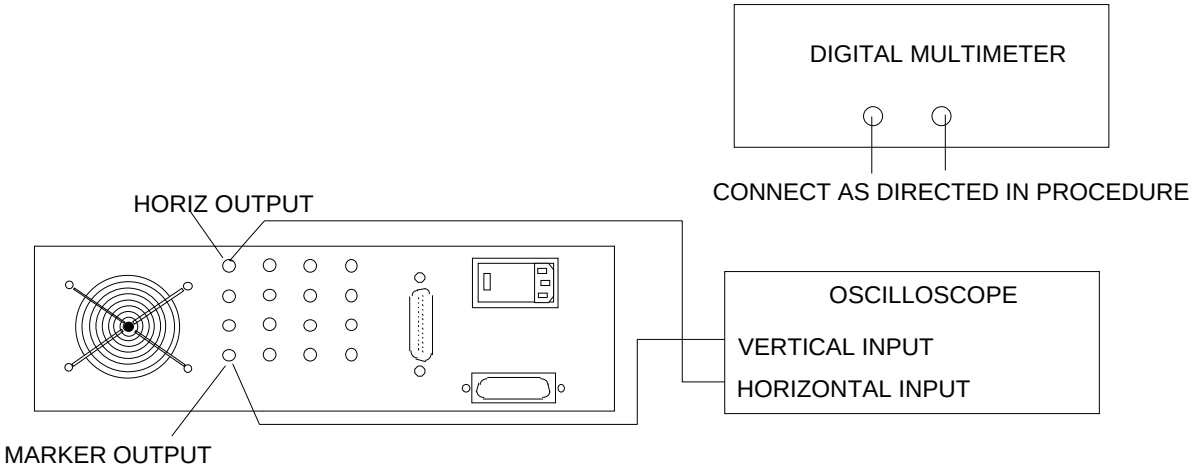
4. Press F1 key and set F1 for low-end frequency.
5. Verify that digital multimeter indicates 0.01 ±0.3V.
6. Press POWER key to OFF.

6-6. ADJUST MARKER FREQUENCIES

1. Perform “Initial Setup” procedure (Paragraph 6-2).

NOTE
Refer to Figure A2-8 for test point and adjustment locations.

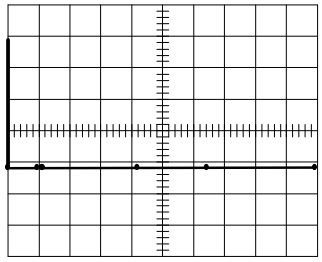
2. Connect test equipment as shown below, and turn test equipment on.



AMARK-SU

3. Press M2 key.
4. Press SELECTED MARKER OFF key.
5. Connect digital multimeter leads between A1A3TP1 (–) and A1A3TP3 (+).
6. Verify that voltage is –10 ±0.5V.
7. Rotate MARKER AMPLITUDE control fully clockwise.
8. Press M1 key and set M1 frequency for 0.010 GHz.
9. Set horizontal time base on oscilloscope for external, and adjust horizontal vernier control so that trace extends full width of screen (10 divisions).
10. Adjust A1A3R13 until M1 marker is just visible at left edge of oscilloscope display, as shown below.

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: EXTERNAL
VERTICAL SCALE: 2 V/DIV

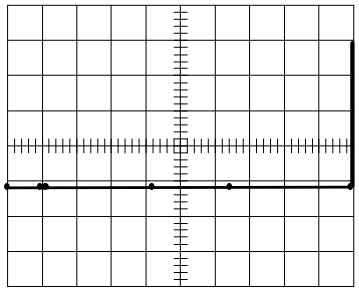


AMRK-WF1

11. Set M1 frequency for high-end frequency.

12. Adjust A1A3R9 until M1 marker is just visible at right edge of oscilloscope display, as shown below.

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: EXTERNAL
VERTICAL SCALE: 2 V/DIV



AMRK-WF2

13. Press SELECTED MARKER OFF key.
14. Press M2 and set M2 frequency for low-end frequency.
15. Adjust A1A3R21 until M2 marker is just visible at left edge of oscilloscope display, as shown for step 10.
16. Set M2 frequency for high-end frequency.
17. Adjust A1A3R18 until M2 marker is just visible at right edge of oscilloscope display, as shown for step 12.
18. Press SELECTED MARKER OFF key.
19. Repeat steps 14 thru 18 by first pressing SHIFT key, then **M3** thru **M8** keys. Adjust potentiometers in step 15 (low end) and step 17 (high end) as shown below.

MARKER	LOW-END ADJUST	HIGH-END ADJUST
M3	R30	R28
M4	R41	R38
M5	R49	R47
M6	R58	R56
M7	R68	R65
M8	R77	R74

6-7. ADJUST A1A6, A1A7, A1A8, A1A9 YIG DRIVER PCB'S

This heading provides YIG Driver adjustment procedures for A1A6 thru A1A9 PCB. Perform procedures as applicable for your model. That is, if your model has an A1A6 YIG Driver PCB installed, perform that adjustment. If a PCB is not installed, skip the adjustment.

NOTE

- TTL low logic level is –0.5V to +0.8V; TTL high logic level is +3.5V to +5.5V.

1. Perform "Initial Setup" procedure (Paragraph 6-2).
2. Press CW F1 key and set F1 frequency per Table 6-2 for A1A6R67 adjustment.
3. Connect digital multimeter between A1A6TP1 (–) and A1A6TP5 (+) (Figure A2-14 or -16).
4. Rotate A1A6R67 counterclockwise until digital multimeter indicates TTL low.
5. Rotate A1A6R67 clockwise until digital multimeter just changes to TTL high.
6. Press CW F1 and set F1 frequency per Table 6-2 for A1A6R49 adjustment.
7. Connect digital multimeter between to A1A6TP1 (–) and A1A6TP3 (+).
8. Rotate A1A6R49 counterclockwise until digital multimeter indicates TTL low.
9. Rotate A1A6R49 clockwise until digital multimeter just changes to a TTL high.
10. Press CW F1 key and set F1 frequency per Table 6-2 for A1A7R49 Adjustment.
11. Connect digital multimeter between A1A7TP1 (–) and A1A7TP3 (+) (Figure A2-18, -20, or -22).
12. Rotate A1A7R49 counterclockwise until digital multimeter just changes to TTL low.
13. Rotate A1A7R49 clockwise until digital multimeter just changes to TTL high.
14. Press CW F1 key and set F1 frequency per Table 6-2 for A1A8R49 Adjustment.
15. Connect digital multimeter between A1A8TP1 (–) and A1A8TP3 (+) (Figure A2-18, -24, or -26).
16. Rotate A1A8R49 counterclockwise until digital multimeter just changes to TTL low.
17. Rotate A1A8R49 clockwise until digital multimeter just changes to TTL high.
18. Press CW F1 key and set F1 frequency per Table 6-2 for A1A9R49 Adjustment.
19. Connect digital multimeter between A1A9TP1 (–) and A1A9TP3 (+) (Figure A2-18).
20. Rotate A1A9R49 counterclockwise until digital multimeter just changes to TTL low.
21. Rotate A1A9R49 clockwise until digital multimeter just changes to TTL high.
22. If PCB installed, connect digital multimeter between A1A6TP1 (–) and A1A6TP4 (+).
23. Verify that digital multimeter indicates +15 ±0.75V.
24. If PCB installed, connect digital multimeter between A1A6TP1 (–) and A1A14P14-15 (+).
25. Verify that –5 ±0.5V is present.
26. If PCB installed, connect digital multimeter between A1A7TP1 (–) and A1A7TP4 (+).
27. Verify that digital multimeter indicates +15 ±0.75V.
28. If PCB installed, connect digital multimeter between A1A8TP1 (–) and A1A8TP4 (+).
29. Verify that digital multimeter indicates +12 ±0.75V.
30. If PCB installed, connect digital multimeter between A1A9TP1 (–) and A1A9TP4 (+).
31. Verify that digital multimeter indicates +12 ±0.75V.

Table 6-2. Adjustment Values for YIG Driver PCBs

Model	A1A6R67 Adjustment	A1A6R49 Adjustment	A1A7R49 Adjustment	A1A8R49 Adjustment	A1A9R49 Adjustment
6609B **6609B-50**	Fully CW	Fully CW			
6610B	Fully CW	Fully CW			
6616B	Fully CW	Fully CW			
6617B **6617B-40**	2 GHz	Fully CW			
6619B **6619B-40**	Fully CW	Fully CW			
6620B	Fully CW	Fully CW			
6621B **6621B-40**	Fully CW	Fully CW			
6622B **6622B-40**	2 GHz	Fully CW			
6624B	Fully CW	Fully CW			
6627B	Fully CW	Fully CW			
6628B **6628B-50**	Fully CW	Fully CW			
6629B **6629B-40**			12.4 GHz	Fully CW	
6630B **6630B-50**				Fully CW	
6631B	Fully CW	Fully CW			
6632B	Fully CW	Fully CW			
6635B **6635B-40**	Fully CW	8.0 GHz	12.4 GHz	Fully CW	
6636B					Fully CW
6637B **6637B-40**	Fully CW	8.0 GHz	12.4 GHz	Fully CW	
6640B **6640B-10**				Fully CW	
6645B **6645B-40**	2 GHz	8.0 GHz	12.4 GHz	Fully CW	
6647B **6647B-40**	2 GHz	8.0GHz	12.4 GHz	Fully CW	
6653B	Fully CW	8.0 GHz	12.4 GHz	18.0 GHz	Fully CW
6659B	2 GHz	8.0 GHz	12.4 GHz	18.0 GHz	Fully CW
6660B	Fully CW			18.0 GHz	26.5 GHz
6662B	Fully CW	8.0 GHz	12.4 GHz	18.0 GHz	26.5 GHz
6663B	Fully CW	8.0 GHz	12.4 GHz	18.0 GHz	26.5 GHz
6668B	2 GHz	8.0 GHz	12.4 GHz	18.0 GHz	26.5 GHz
6669B	2 GHz	8.0 GHz	12.4 GHz	18.0 GHz	26.5 GHz
6672B	Fully CW				

6-8. ADJUST FREQUENCY

a. General. This heading provides frequency adjustment procedures for A1A6 thru A1A9 PCBs, Down-Converter, and Doubler Band. Perform procedures as applicable for your model. That is, if your model has a 0.01 to 2 GHz down converter, perform subparagraph c. If it has a 26.5 to 40 GHz doubler, perform subparagraph g. If it has an A1A6 YIG Driver PCB installed, perform subparagraph b, etc. If a PCB or band is not installed, skip the subparagraph.

1. Perform "Initial Setup" procedure (Paragraph 6-2).

NOTE

To ensure accurate frequency adjustments, sweep generator temperature must remain constant. Therefore, when performing this procedure: (1) leave equipment covers in place, (2) remove top to make an adjustment, (3) relace top cover after the adjustment has been completed, then (4) remove top cover to make next adjustment.

2. Connect microwave counter to RF OUTPUT connector.

NOTE

Allow a 1-hour warm-up before making frequency adjustments.

b. A1A6 PCB Frequency Adjustments.

1. Press CW F1 key and set F1 frequency per Table 6-3.
2. Press CW F2 key and set F2 frequency per Table 6-3.
3. Press CW F1 key and wait 3 seconds for frequency to settle.
4. Press CW F2 key and wait 3 seconds for frequency to settle.
5. Repeat steps 3 and 4 two more times to set YIG hysteresis.
6. Press CW F1 key and wait 10 seconds for frequency to settle.
7. Adjust A1A6R12 (Figure A2-14 or -16) until microwave counter indicates frequency set in step 1, above (–0.0 GHz, +0.002 GHz).
8. Press CW F2 key and wait 10 seconds for frequency to settle.
9. Adjust A1A6R6 until microwave counter indicates frequency set in step 2, above (–0.002, +0.0 GHz).
10. Repeat steps 6 through 9 as necessary until F1 and F2 frequencies are within tolerances stated above.

c. Down-Converter Band Frequency Adjustment.

1. Press CW F1 key and set F1 frequency for 1.000 GHz.
2. Adjust A1A6R83 (Figure A2-14 or -16) for microwave counter indication of 1.0 ±0.001 GHz.
3. Press F1 key and set F1 frequency for 0.010 GHz, then 1.900 GHz (2 GHz for 6609B/6609B-50).
4. Verify that microwave counter indicates 0.01 GHz (–0.001, + 0.004 GHz) at low end of band, and 1.900 ±0.005 GHz (2 GHz for 6609B/6609B-50) at high end of band. If it does not, readjust A6R83 as necessary to achieve this frequency tolerance.

Table 6-3. A1A6 PCB Adjustment Settings for F1 and F2 Parameters

Model	F1 Frequency Setting	F2 Frequency Setting
6609B **6609B-50**	0.01 GHz	2 GHz
6610B	1 GHz	2 GHz
6616B	1.7 GHz	4.3 GHz
6617B **6617B-40**	2.1 GHz	8 GHz
6619B **6619B-40**	2 GHz	8 GHz
6620B	3.6 GHz	6.5 GHz
6621B **6621B-40**	2 GHz	7.9 GHz
6622B **6622B-40**	2.1 GHz	7.9 GHz
6624B	4 GHz	8 GHz
6627B		
6628B **6628B-50**		
6629B **6629B-40**		
6630B **6630B-50**		
6631B		
6632B		
6635B **6635B-40**	2 GHz	7.9 GHz
6636B		
6637B **6637B-40**	2 GHz	7.9 GHz
6640B **6640B-10**		
6645B **6645B-40**	2.1 GHz	7.9 GHz
6647B **6647B-40**	2.1 GHz	7.9 GHz
6653B	2 GHz	7.9 GHz
6659B	2.1 GHz	7.9 GHz
6660B		
6662B	2.1 GHz	7.9 GHz
6663B	2.1 GHz	7.9 GHz
6668B	2.1 GHz	7.9 GHz
6669B	2.1 GHz	7.9 GHz
6672B		

d. A1A7 PCB Frequency Adjustments.

1. Press CW F1 key and set F1 frequency per Table 6-4 for A1A7 PCB.
2. Press CW F2 key and set F2 frequency per Table 6-4 for A1A7 PCB.
3. Press CW F1 key and wait 3 seconds for frequency to settle.
4. Press CW F2 key and wait 3 seconds for frequency to settle.
5. Repeat steps 3 and 4 two more times to set YIG hysteresis.
6. Press CW F1 key and wait 10 seconds for frequency to settle.
7. Adjust A1A7R12 (Figure A2-18, -20, or -22). until microwave counter indicates step 1 frequency (–0.0 GHz, +0.002 GHz).
8. Press CW F2 key and wait 10 seconds for frequency to settle.
9. Adjust A1A7R6 until microwave counter indicates frequency step 2 frequency (–0.002, +0.0 GHz).
10. Repeat steps 6 thru 9 as necessary until F1 and F2 frequencies are within tolerances stated above.

e. A1A8 PCB Frequency Adjustments.

1. Perform steps 1 thru 6 of the A1A7 PCB Frequency Adjustments procedure. Use the frequency settings shown for the A1A8 PCB in Table 6-4.
2. Adjust A1A8R12 (Figure A2-18, -24, or -26) until microwave counter indicates F1 frequency (–0.0 GHz, +0.002 GHz).
3. Press CW F2 key and wait 10 seconds for frequency to settle.
4. Adjust A1A8R6 until microwave counter indicates F2 frequency (–0.002, +0.0 GHz).
5. Repeat steps 2 thru 4 as necessary until F1 and F2 frequencies are within tolerances stated above.

f. A1A9 Frequency Adjustments.

1. Perform steps 1 thru 6 of the A1A7 PCB Frequency Adjustments procedure. Use the frequency settings shown for the A1A9 PCB in Table 6-4.
2. Adjust A1A9R12 (Figure A2-18) until microwave counter indicates F1 frequency (–0.0 GHz, +0.002 GHz).
3. Press CW F2 key and wait 10 seconds for frequency to settle.
4. Adjust A1A9R6 until microwave counter indicates F2 frequency (–0.002, +0.0 GHz).
5. Repeat steps 2 thru 4 as necessary until F1 and F2 frequencies are within tolerances stated above.

g. Doubler Band Frequency Adjustments.

1. Repeat steps 1 thru 6 of the A1A7 PCB Frequency Adjustments procedure. Use 26.6 GHz for F1 and 40 GHz for F2.
2. Adjust A1A8R68 (Figure A2-18) for microwave counter indication of 26.600 GHz (–0.0 GHz, +0.002 GHz).
3. Press CW F2 key and wait 10 seconds for frequency to settle.
4. Adjust A1A8R65 for microwave counter indication of 40.0 GHz (–0.002, +0.0 GHz).
5. Repeat steps 2 thru 4 as necessary until F1 and F2 frequencies are within tolerances stated above.

Table 6-4. A1A7–A1A9 PCB Adjustment Settings for F1 and F2 Pa-

Model	A1A7 PCB		A1A8 PCB		A1A9 PCB	
	F1 Setting	F2 Setting	F1 Setting	F2 Setting	F1 Setting	F2 Setting
6609B **6609B-50**						
6610B						
6616B						
6617B **6617B-40**						
6619B **6619B-40**						
6620B						
6621B **6621B-40**	8.1 GHz	12.4 GHz				
6622B **6622B-40**	8.1 GHz	12.4 GHz				
6624B						
6627B	5.9 GHz	9.0 GHz				
6628B **6628B-50**	8 GHz	12.4 GHz				
6629B **6629B-40**	8 GHz	12.3 GHz	12.5 GHz	20 GHz		
6630B **6630B-50**			12.4 GHz	20 GHz		
6631B			10 GHz	15.5 GHz		
6632B			17 GHz	22 GHz		
6635B **6635B-40**	8.1 GHz	12.3 GHz	12.5 GHz	18 GHz		
6636B					18 GHz	26.5 GHz
6637B **6637B-40**	8.1 GHz	12.3 GHz	12.5 GHz	20 GHz		
6640B **6640B-10**			26.5 GHz	40 GHz		
6645B **6645B-40**	8.1 GHz	12.3 GHz	12.5 GHz	18 GHz		
6647B **6647B-40**	8.1 GHz	12.3 GHz	12.5 GHz	20 GHz		
6653B	8.1 GHz	12.3 GHz	12.5 GHz	17.9 GHz	18.1 GHz	26.5 GHz
6659B	8.1 GHz	12.3 GHz	12.5 GHz	17.9 GHz	18.1 GHz	26.5 GHz
6660B			12.4 GHz	17.9 GHz	18.1 GHz	26.4 GHz
6662B	8.1 GHz	12.3 GHz	12.5 GHz	17.9 GHz	18.1 GHz	26.4 GHz
6663B	8.1 GHz	12.3 GHz	12.5 GHz	17.9 GHz	18.1 GHz	26.4 GHz
6668B	8.1 GHz	12.3 GHz	12.5 GHz	17.9 GHz	18.1 GHz	26.4 GHz
6669B	8.1 GHz	12.3 GHz	12.5 GHz	17.9 GHz	18.1 GHz	26.4 GHz
6672B			40 GHz	60 GHz		

6-9. ADJUST MANUAL SWEEP

a. General. This heading provides manual sweep adjustment procedures for A1A6 thru A1A9 PCBs. Perform procedures as applicable for your model. That is, if your model has an A1A6 YIG Driver PCB installed, perform subparagraph b. If it has an A1A7 YIG Driver PCB installed, perform subparagraph c, etc. If a PCB is not installed, skip the subparagraph.

1. Perform "Initial Setup" procedure (Paragraph 6-2).
2. Connect microwave counter to RF OUTPUT connector.

NOTE

- Allow a 1-hour warm-up before making frequency adjustments.
- Band edge frequencies must be within stated tolerances before making these adjustments.

b. A1A6 PCB Manual Sweep Adjustment.

1. Press F1–F2 key.
2. Press F1 key and set F1 frequency per Table 6-3.
3. Press F2 key and set F2 frequency per Table 6-3.
4. Press POWER key to OFF.
5. Remove A1A5 PCB and install on card extender.
6. Connect jumper between A1A5TP13 and A1A5TP14 (Figure A2-12).
7. Press POWER key to ON.
8. Press MANUAL SWEEP key and rotate associated control fully counterclockwise.
9. Adjust A1A6R3 (Figure A2-14 or -16) for microwave counter indication for F1 frequency.
10. Rotate MANUAL SWEEP control fully clockwise.
11. Observe whether or not microwave counter indicates F2 frequency shown in Table 6-3. If it *does*, go to step 17. If it *does not* but is within ±0.025 GHz, readjust A1A6R3 so that frequency excursions are equal at F1 and F2 frequencies. A method for doing this is described in steps 12 thru 14.
12. With MANUAL SWEEP control rotated fully clockwise, record the microwave counter indication. This is the measured frequency. Add or subtract this frequency, as necessary, to or from high band-end frequency, and note the deviation.

    - Example for measured frequency of 7.924 GHz: Subtract 7.900 from 7.924 and note deviation is 24 MHz (7.924 – 7.900 = 24).

13. Divide above deviation in half and add to or subtract from F1 frequency. The resultant frequency is the revised setting for A1A6R3.

NOTE

If measured frequency is above F2 frequency, add one-half of deviation to F2 frequency. Conversely, if measured frequency is below F2 frequency, subtract one-half of deviation.

14. Return MANUAL SWEEP control to low band-end frequency, and readjust A1A6R3 for revised setting calculated in step 15 above.
15. Press POWER key to OFF.
16. Remove A1A5 PCB from card extender, disconnect jumper from between A1A5TP13 and A1A5TP14, and reinstall PCB.

c. *A1A7 PCB Manual Sweep Adjustment.* Perform steps 1 thru 16 in A1A6 PCB Adjustment procedure. Use A1A7 PCB frequencies shown in Table 6-4. Make required adjustment using A1A7R3 (Figure A2-18, -20, or -22).

d. *A1A8 PCB Manual Sweep Adjustment.* Perform steps 1 thru 16 in A1A6 PCB Adjustment procedure. Use A1A8 PCB frequencies shown in Table 6-4. Make required adjustment using A1A8R3 (Figure A2-18, -24, or -26).

e. *A1A9 PCB Manual Sweep Adjustment.* Perform steps 1 thru 16 in A1A6 PCB Adjustment procedure. Use A1A9 PCB frequencies shown in Table 6-4. Make required adjustment using A1A9R3 (Figure A2-18).

6-10. ADJUST FREQUENCY VERNIER

a. General. This heading provides frequency vernier adjustment procedures for A1A6 thru A1A9 PCBs. Perform procedures as applicable for your model. That is, if your model has an A1A6 YIG Driver PCB installed, perform subparagraph b. If it has an A1A7 YIG Driver PCB installed, perform subparagraph b, etc. If a PCB is not installed, skip the subparagraph.

1. Perform "Initial Setup" procedure (Paragraph 6-2).
2. Connect microwave counter to RF OUTPUT connector.

NOTE

- Allow a 1-hour warm-up before making frequency adjustments.
- Band edge frequencies must be within stated tolerances before making these adjustments.

b. A1A6 PCB Frequency Vernier Adjustment.

1. Press CW CF key and set CF frequency for value shown in Table 6-5.
2. After frequency settles, observe and record microwave counter indication.
3. Press FREQUENCY VERNIER INCREASE key, and hold key depressed until frequency stops increasing.
4. Adjust A1A6R9 (Figure A2-14 or -16) until microwave counter indicates the value above CW CF frequency that is shown for Vernier Increase Frequency in Table 6-5. Example for 6647B: 2.1127 GHz (2.100 + 0.0127 GHz).
5. Press FREQUENCY VERNIER OFF key; note that microwave counter indicates CW CF frequency shown in Table 6-5.
6. Press FREQUENCY VERNIER DECREASE key, and hold depressed until frequency stops decreasing.
7. Verify that microwave counter indicates the value below CW CF frequency that is shown for Vernier Decrease Frequency in Table 6-5. Example for 6647B: 2.0872 GHz (2.100 – 0.0127 GHz).
8. Press FREQUENCY VERNIER OFF key.

c. A1A7 PCB Frequency Vernier Adjustment. Perform procedure shown in steps 1 thru 8 for A1A6 Frequency Vernier Adjustment. Make required adjustment using A1A7R9 (Figure A2-18, -20, or -22).

d. A1A8 PCB Frequency Vernier Adjustment. Perform procedure shown in steps 1 thru 8 for A1A6 Frequency Vernier Adjustment. Make required adjustment using A1A8R9 (Figure A2-18, -24, or -26).

e. A1A9 PCB Frequency Vernier Adjustment. Perform procedure shown in steps 1 thru 8 for A1A6 Frequency Vernier Adjustment. Make required adjustment using A1A9R9 (Figure A2-18).

Table 6-5. Frequency Vernier Adjustment Frequency Values

Model	CW CF Setting	Vernier Increase Frequency	Vernier Decrease Frequency
6609B **6609B-50**	3.6 GHz	12.7 MHz	12.8 MHz
6610B	1 GHz	12.7 MHz	12.8 MHz
6616B	1.7 GHz	12.7 MHz	12.8 MHz
6617B **6617B-40**	2.1 GHz	12.7 MHz	12.8 MHz
6619B **6619B-40**	2 GHz	12.7 MHz	12.8 MHz
6620B	3.6 GHz	12.7 MHz	12.8 MHz
6621B **6621B-40**	2 GHz	12.7 MHz	12.8 MHz
6622B **6622B-40**	2.1 GHz	12.7 MHz	12.8 MHz
6624B	4 GHz	12.7 MHz	12.8 MHz
6627B	5.9 GHz	12.7 MHz	12.8 MHz
6628B **6628B-50**	8 GHz	12.7 MHz	12.8 MHz
6629B **6629B-40**	8 GHz	12.7 MHz	12.8 MHz
6630B **6630B-50**	12.4 GHz	12.7 MHz	12.8 MHz
6631B	10 GHz	12.7 MHz	12.8 MHz
6632B	17 GHz	12.7 MHz	12.8 MHz
6635B **6635B-40**	2 GHz	12.7 MHz	12.8 MHz
6636B	18 GHz	25.4 MHz	25.6 MHz
6637B **6637B-40**	2 GHz	12.7 MHz	12.8 MHz
6640B **6640B-10**	26.5 GHz	25.4 MHz	25.6 MHz
6645B **6645B-40**	2.1 GHz	12.7 MHz	12.8 MHz
6647B **6647B-40**	2.1 GHz	12.7 MHz	12.8 MHz
6653B	2 GHz	25.4 MHz	25.6 MHz
6659B	2.1 GHz	25.4 MHz	25.6 MHz
6660B	12.4 GHz	25.4 MHz	25.6 MHz
6662B	2.1 GHz	25.4 MHz	25.6 MHz
6663B	2.1 GHz	25.4 MHz	25.6 MHz
6668B	2.1 GHz	25.4 MHz	25.6 MHz
6669B	2.1 GHz	25.4 MHz	25.6 MHz
6672B	40 GHz	38.1 MHz	38.4 MHz

6-11. ADJUST ΔF≤50 MHz CIRCUIT

a. General. This heading provides ΔF≤50 MHz Circuit adjustment procedures for A1A6 thru A1A9 PCBs. Perform procedures as applicable for your model. That is, if your model has an A1A6 YIG Driver PCB installed, perform subparagraph b. If it has an A1A7 YIG Driver PCB installed, perform subparagraph c, etc. If a PCB is not installed, skip the subparagraph.

1. Perform "Initial Setup" procedure (Paragraph 6-2).
2. Connect microwave counter to RF OUTPUT connector.

NOTE

- Allow a 1-hour warm-up before making frequency adjustments.
- Band edge frequencies must be within stated tolerances before making these adjustments.

b. A1A6 PCB ΔF≤50 MHz Adjustment.

1. Press ΔF CF key.
2. Press CF key and set CF frequency for center of band. (Example: If you have 2-to-8 GHz band, set frequency to 5 GHz.)
3. Press ΔF key and set ΔF frequency for 0 MHz.
4. Press MANUAL SWEEP key.
5. Using FREQUENCY VERNIER keys, set CF frequency until counter indicates frequency set in step 2, above ±0.001 GHz.
6. Press ΔF key and set ΔF frequency for 0.050 GHz.
7. Rotate MANUAL SWEEP control between its clockwise and counterclockwise ends; note frequency deviation at each end.
8. Adjust A1A10R10 (Figure A2-28) so that frequency excursions on either side of center frequency are equal (25 ±5 MHz) at each end of MANUAL SWEEP control range.

c. *A1A7 PCB ΔF≤50 MHz Adjustment.* Perform procedure in steps 1 thru 8 for A1A6 PCB Adjustment. Make A1A7 PCB adjustment using A1A10R11.

d. *A1A8 PCB ΔF≤50 MHz Adjustment.* Perform procedure in steps 1 thru 8 for A1A6 PCB Adjustment. Make A1A8 PCB adjustment using A1A10R12.

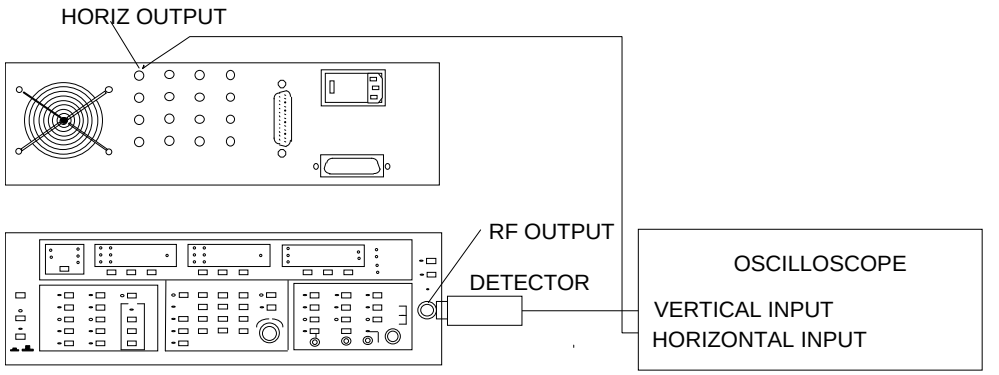
e. *A1A9 PCB ΔF≤50 MHz Adjustment.* Perform procedure in steps 1 thru 8 for A1A6 PCB Adjustment. Make A1A9 PCB adjustment using A1A10R13.

6-12. ADJUST TRACKING FILTER FOR 2–8 GHz BAND ONLY

a. General. This heading provides 2–8 GHz band Tracking Filter adjustment procedure. Perform procedures only if your model is equipped with this band. Otherwise, skip to next procedure.

b. Procedure.

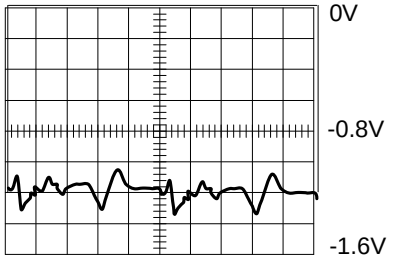
1. Perform "Initial Setup" procedure (Paragraph 6-2).
2. Connect test equipment as shown below and turn on.



TF-SU

3. Press F1–F2 key.
4. Press F1 key and set F1 frequency for 2.000 GHz.
5. Press F2 key and set F2 frequency for 8.000 GHz.
6. Calibrate oscilloscope to display 10 dBm power level, as follows:
   - Set horizontal time base for external, and adjust horizontal vernier control so that trace extends full width of screen (10 divisions).
   - Adjust vertical control(s) for a convenient deflection (four or five divisions).
7. Press INTERNAL key to turn leveling off.
8. Adjust vertical control(s) on oscilloscope to obtain a waveform similar to that shown below.

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: EXTERNAL
VERTICAL SCALE: 0.2 V/DIV
(UNCAL)



TF-WF

9. Alternately adjust A1A6R93 and A1A6R95 (Figure A2-14 or -16) for maximum output (most negative voltage) across the frequency band.

NOTE

A1A6R95 adjusts power at low end of band, and A1A6R93 adjusts power at high end of band.

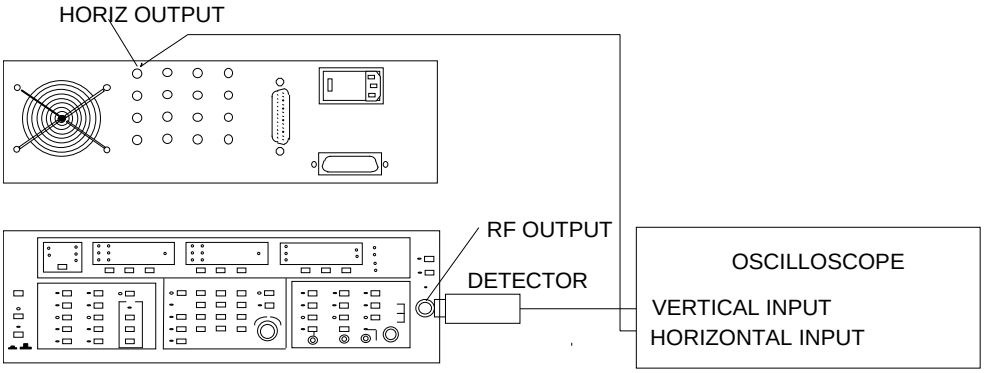
10. Press INTERNAL key.
11. Press ΔF CF key.
12. Press ΔF key and set ΔF sweep width for 0.050 GHz.
13. Press CF key and set CF frequency for 2.000 GHz.
14. Ensure that UNLEVELED indicator is not lit.
15. While observing UNLEVELED indicator, use DECR-INCR control to slowly tune CF frequency to 8.000 GHz. UNLEVELED indicator should not light.

6-13. ADJUST SWEEP RATE COMPENSATION

a. General. This heading provides Sweep Rate Compensation adjustment procedures for A1A6 thru A1A9 PCBs. Perform procedures as applicable for your model. That is, if your model has an A1A6 YIG Driver PCB installed, perform subparagraph b. If it has an A1A7 YIG Driver PCB installed, perform adjustment. If a PCB is not installed, skip the adjustment.

b. Procedure.

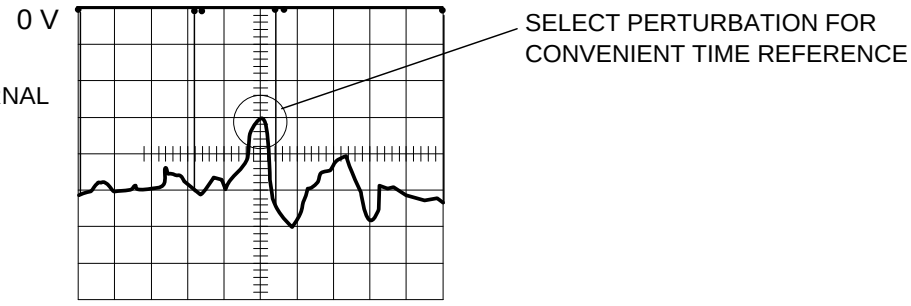
1. Perform "Initial Setup" procedure (Paragraph 6-2).
2. Connect test equipment as shown below, and turn it on.



TF-SU

3. Set horizontal time base on oscilloscope for external, and adjust horizontal vernier control so that trace extends full width of screen (10 divisions).
4. Press INTERNAL key on sweep generator to turn internal leveling off.
5. Press F1 key and set F1 frequency for A1A6 PCB F1 Setting in Table 6-6.
6. Press F2 key and set F2 frequency for A1A6 PCB F1 Setting in Table 6-6.
7. Press SWEEP TIME key and set sweep time for 0.010 second.
8. Press **SHIFT** key, **SAVE** key, then 1 key on keypad.
9. Press SWEEP TIME key and set sweep time for 0.300 second.
10. Press **SHIFT** key, **SAVE** key, then 2 key on keypad.
11. Adjust oscilloscope vertical control(s) to obtain a waveform similar to that shown below.

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: EXTERNAL
VERTICAL SCALE: 0.5 V/DIV



SR-WF

Table 6-6. Sweep Rate Compensation Adjustment Frequency Values

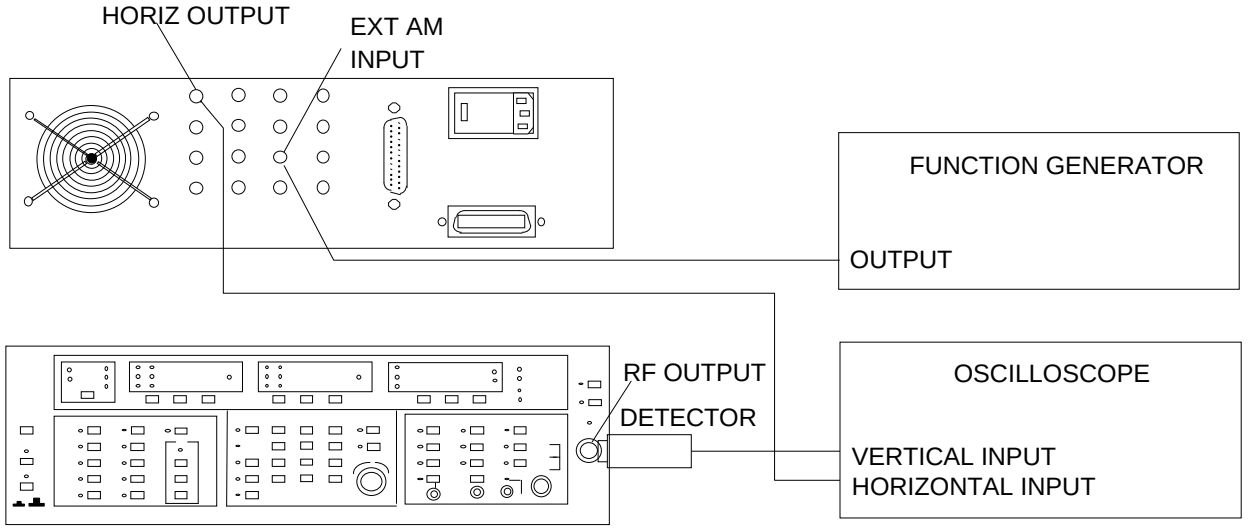
Model	A1A6 PCB		A1A7 PCB		A1A8 PCB		A1A9 PCB	
	F1 Setting	F2 Setting	F1 Setting	F2 Setting	F1 Setting	F2 Setting	F1 Setting	F2 Setting
6609B **6609B-50**	0.01 GHz	2 GHz						
6610B	1 GHz	2 GHz						
6616B	1.7 GHz	4.3 GHz						
6617B **6617B-40**	2.1 GHz	8 GHz						
6619B **6619B-40**	2 GHz	8 GHz						
6620B	3.6 GHz	6.5 GHz						
6621B **6621B-40**	2 GHz	7.9 GHz	8.1 GHz	12.4 GHz				
6622B **6622B-40**	2.1 GHz	7.9 GHz	8.1 GHz	12.4 GHz				
6624B	4 GHz	8 GHz						
6627B			5.9 GHz	9.0 GHz				
6628B **6628B-50**			8 GHz	12.4 GHz				
6629B **6629B-40**			8 GHz	12.3 GHz	12.5 GHz	20 GHz		
6630B **6630B-50**					12.4 GHz	20 GHz		
6631B					10 GHz	15.5 GHz		
6632B					17 GHz	22 GHz		
6635B **6635B-40**	2 GHz	7.9 GHz	8.1 GHz	12.3 GHz	12.5 GHz	18 GHz		
6636B							18 GHz	26.5 GHz
6637B **6637B-40**	2 GHz	7.9 GHz	8.1 GHz	12.3 GHz	12.5 GHz	20 GHz		
6640B **6640B-10**					26.5 GHz	40 GHz		
6645B **6645B-40**	2.1 GHz	7.9 GHz	8.1 GHz	12.3 GHz	12.5 GHz	18 GHz		
6647B **6647B-40**	2.1 GHz	7.9 GHz	8.1 GHz	12.3 GHz	12.5 GHz	20 GHz		
6653B	2 GHz	7.9 GHz	8.1 GHz	12.3 GHz	12.5 GHz	17.9 GHz	18.1 GHz	26.5 GHz
6659B	2.1 GHz	7.9 GHz	8.1 GHz	12.3 GHz	12.5 GHz	17.9 GHz	18.1 GHz	26.5 GHz
6660B					12.4 GHz	17.9 GHz	18.1 GHz	26.4 GHz
6662B	2 GHz	7.9 GHz	8.1 GHz	12.3 GHz	12.5 GHz	17.9 GHz	18.1 GHz	26.4 GHz
6663B	2 GHz	7.9 GHz	8.1 GHz	12.3 GHz	12.5 GHz	17.9 GHz	18.1 GHz	26.4 GHz
6668B	2.1 GHz	7.9 GHz	8.1 GHz	12.3 GHz	12.5 GHz	17.9 GHz	18.1 GHz	26.4 GHz
6669B	2.1 GHz	7.9 GHz	8.1 GHz	12.3 GHz	12.5 GHz	17.9 GHz	18.1 GHz	26.4 GHz
6672B					40GHz	60 GHz		

12. Alternately press RECALL key then “1” and RECALL key then “2.”
13. While observing oscilloscope, adjust A1A6R1 (Figure A2-14 or -16) for minimum frequency shift (horizontal displacement) between reference perturbation of each setup.
14. Repeat steps 5 thru 12 for F1 and F2 Settings shown for A1A7 PCB in Table 6-6.
15. Repeat step 13; adjust A1A7R1 (Figure A2-18, -20, or -22) .
16. Repeat steps 5 thru 12 for F1 and F2 Settings shown for A1A8 PCB in Table 6-6.
17. Repeat step 13; adjust A1A8R1 (Figure A2-18, -24, or -26) .
18. Repeat steps 5 thru 12 for F1 and F2 Settings shown for A1A9 PCB in Table 6-6.
19. Repeat step 13; adjust A1A9R1 (Figure A2-18) .

6-14. ADJUST ALC BANDWIDTH AND LOW-LEVEL NOISE

a. General. This heading provides ALC Bandwidth and Low-level Noise adjustment procedures for A1A6 thru A1A9 PCBs. Perform procedures as applicable for your model. That is, if your model has an A1A9 YIG Driver PCB installed, perform applicable adjustment. If a PCB is not installed, skip the adjustment.

1. Perform “Initial Setup” procedure (Paragraph 6-2).
2. Connect test equipment as shown below, and turn it on.



AM-BW

b. ALC Bandwidth Adjustment

1. Press CW F1 key and set F1 per Table 6-7 for A1A9 PCB.

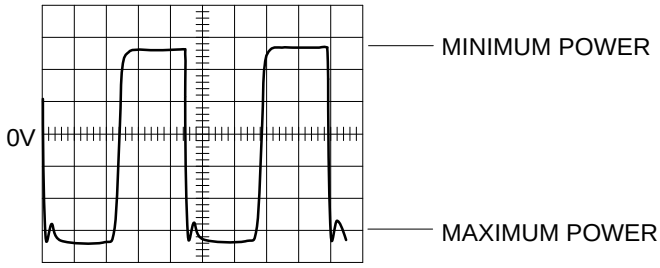
Table 6-7. ALC Loop Adjustment Frequency Values

Model	A1A9 PCB CW F1 Setting	A1A8 PCB CW F1 Setting	A1A7 PCB CW F1 Setting	A1A6 PCB CW F1 Setting	Down Converter CW F1 Setting
6609B **6609B-50**				5 GHz	1 GHz
6610B				1.5 GHz	
6616B				3 GHz	
6617B **6617B-40**				5 GHz	1 GHz
6619B **6619B-40**				5 GHz	
6620B				5 GHz	
6621B **6621B-40**			8 GHz	5 GHz	
6622B **6622B-40**			8 GHz	5 GHz	1 GHz
6624B				5 GHz	
6627B				6 GHz	
6628B **6628B-50**			10 GHz		
6629B **6629B-40**		15 GHz	10 GHz		
6630B **6630B-50**		15 GHz			
6631B			10 GHz		
6632B		19 GHz			
6635B **6635B-40**		15 GHz	10 GHz	5 GHz	
6636B	22 GHz				
6637B **6637B-40**		15 GHz	10 GHz	5 GHz	
6640B **6640B-10**		30 GHz			
6645B **6645B-40**		15 GHz	10 GHz	5 GHz	1 GHz
6647B **6647B-40**		15 GHz	10 GHz	5 GHz	1 GHz
6653B	22 GHz	15 GHz	10 GHz	5 GHz	
6659B	22 GHz	15 GHz	10 GHz	5 GHz	1 GHz
6660B	22 GHz	15 GHz			
6662B	22 GHz	15 GHz	10 GHz	5 GHz	
6663B	22 GHz	15 GHz	10 GHz	5 GHz	
6668B	22 GHz	15 GHz	10 GHz	5 GHz	1 GHz
6669B	22 GHz	15 GHz	10 GHz	5 GHz	1 GHz
6672B		45 GHz			

2. Calibrate test equipment to measure model-dependent RESET power level, as follows:

   - Turn function generator off.
   - Set oscilloscope vertical attenuator for 0.05V/division.
   - Set oscilloscope horizontal time base for internal and 20 µs/division.
   - Ground oscilloscope vertical input.
   - Position oscilloscope trace to top graticule line using vertical position control.
   - Unground oscilloscope vertical input.
   - Position oscilloscope trace to next-to-bottom graticule line using vertical vernier control. This establishes maximum-power reference line.
   - Press RESET key.
   - Press LEVEL key; then enter –9.9 on keypad and press MHz/dB/mS key.
   - Note oscilloscope graticule line on which trace now rests. This is the minimum-power reference line.
   - Press LEVEL and set output power for 0.0 dBm.
   - Turn on function generator, and set it for 10 kHz square-wave output.
   - On function generator, adjust offset and output-level controls to provide square wave that fills the area between the minimum and maximum power-reference lines on oscilloscope. See waveform below.

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: 20µ s/DIV
VERTICAL SCALE: 0.05 V/DIV (UNCAL)

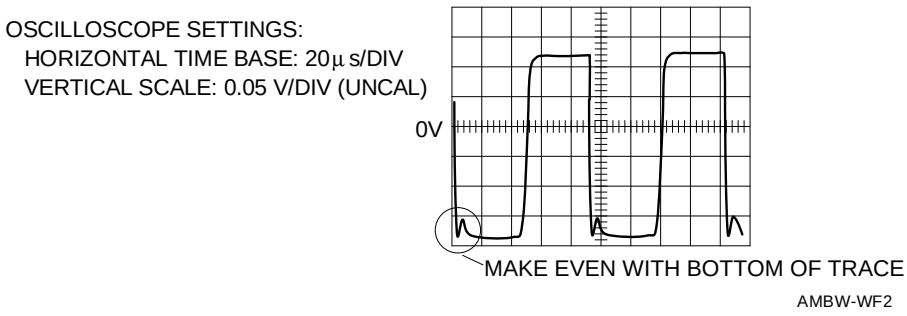


AMBW-WF1

NOTE

It may be easier to achieve a proper adjustment in the following step if A1A4R123 and A1A9R33 are initially positioned so that adjustment of A1A9R33 causes waveform to be damped and adjustment of A1A4R123 causes waveform to ring.

3. On sweep generator, adjust A1A9R33 (Figure A2-16) and A1A4R123 (Figure A2-10) so that bottom of square wave has one cycle of ringing and bottom of ringing wave is level with bottom of square wave. See following waveform.

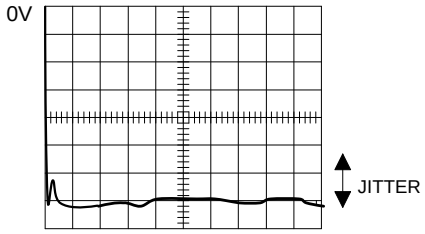


4. Perform step b2.
5. Press CW F1 key and set F1 per Table 6-7 for A1A8 PCB.
6. On sweep generator, adjust A1A8R33 (Figure A2-18, -24, or -26) and A1A4R123 (Figure A2-10) so that bottom of square wave has one cycle of ringing and bottom of ringing wave is level with bottom of square wave, as shown for step 3.
7. Perform step b2.
8. On sweep generator, press CW F1 key and set F1 frequency per Table 6-7 for A1A7 PCB.
9. On sweep generator, adjust A1A7R33 (Figure A2-18, -20, or -22) so that bottom of square wave has one cycle of ringing and bottom of ringing wave is level with bottom of square wave.
10. Perform step b2.
11. On sweep generator, press CW F1 key and set F1 frequency per Table 6-7 for A1A6 PCB.
12. On sweep generator, adjust A1A6R33 (Figure A2-14 or -16), so that bottom of square wave has one cycle of ringing and bottom of ringing wave is level with bottom of square wave. See waveform for step 3.
13. Perform step b2.
14. On sweep generator, press CW F1 key and set F1 frequency per Table 6-7 for Down Converter.
15. On sweep generator, adjust A1A4R124 (Figure A2-10) and readjust A1A6R33 so that bottom of square wave has one cycle of ringing and bottom of ringing wave is level with bottom of square wave. See waveform for step 3.
16. On sweep generator, press CW F1 key and set F1 per Table 6-7 for A1A6 PCB.
17. Repeat step *b*4, as applicable, to ensure that test equipment is still calibrated to measure RESET power level.
18. Turn off function generator.

c. Low-Level-Noise Adjustment.

1. Press RESET key.
2. Press F1–F2 key.
3. If Down Converter installed, press F1 key and set F1 frequency for 0.01 GHz
4. If Down Converter installed, press F2 key and set F2 frequency 2 GHz.
5. Press LEVEL key; then enter –9.9 on keypad and press MHz/dB/mS key.
6. Set horizontal time base on oscilloscope for external, and adjust horizontal vernier control so that trace extends full width of screen (10 divisions).
7. Adjust oscilloscope vertical controls to display a waveform like that shown below.

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: EXTERNAL
VERTICAL SCALE: 0.02 V/DIV (UNCAL)



AMBW-WF4

NOTE

In following step, use insulated screwdriver to adjust A1A4R6. Do not place A1A4 PCB on card extender.

8. Adjust A1A4R6 (Figure A2-10) to quiet trace jitter.
9. Press F1 key and set F1 frequency for low-end frequency of lowest YIG-band.
10. Press F2 key and set F2 frequency for high-end frequency.
11. Adjust A1A4R12 to quiet trace jitter.

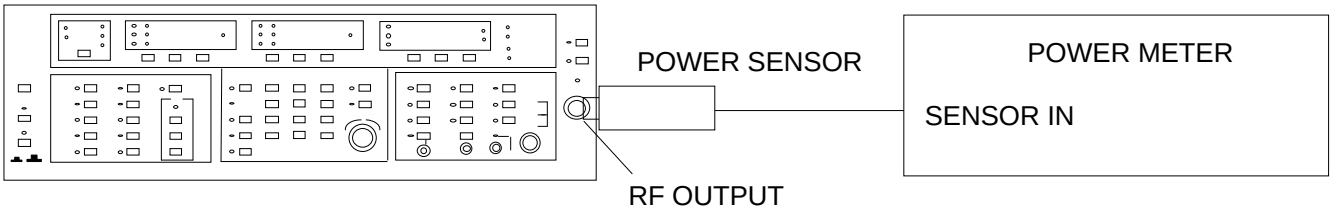
6-15. ADJUST RF SLOPE

1. Perform “Initial Setup” procedure (Paragraph 6-2).

NOTE

Adjust ALC bandwidth (Paragraph 6-14) or ensure that the ALC loop is within specified tolerances (Paragraph 5-8) before adjusting RF slope.

2. Connect test equipment as shown below, and turn it on.



RFSLPE-SU

3. Ensure that the RF SLOPE control is OFF.
4. Press CW F1 key and set F1 frequency for low-end frequency of lowest YIG-band.

NOTE

Ensure that calibration factor on power sensor is set correctly for frequency of operation.

5. Record power meter indication.
6. Press CW F2 key.
7. Record the power meter indication.
8. While alternately pressing CW F1 and CW F2 keys, adjust A1A4R115 (Figure A2-10) for equal power at each CW frequency.

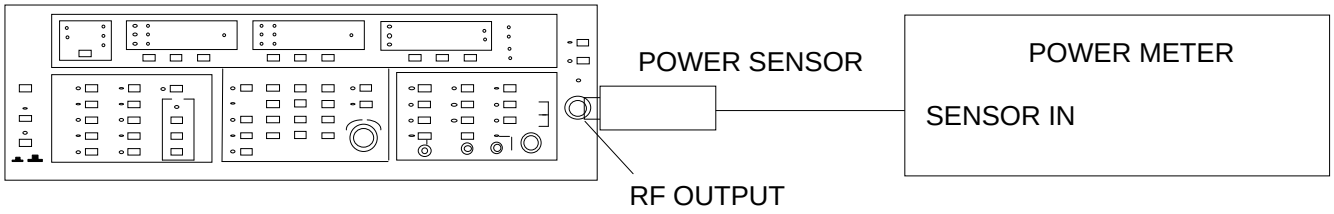
6-16. ADJUST OUTPUT POWER LEVEL

1. Perform “Initial Setup” procedure (Paragraph 6-2).

NOTE

Adjust ALC bandwidth (Paragraph 6-14) and RF Slope (Paragraph 6-15) or ensure that the ALC loop is within specified tolerances (Paragraphs 5-8) before adjusting output power.

2. Connect test equipment as shown below, and turn it on.



RFSLPE-SU

3. Press CW F1 key and set F1 frequency for low-end frequency or lowest YIG band.

NOTE

- Ensure that calibration factor on power sensor is set correctly for frequency of operation.

4. Adjust A1A4R66 (Figure A2-10) for power meter indication of power level shown on 66XXB front panel.
5. Press LEVEL key.
6. Enter –9.9 on keypad and press MHz/dB/mS key.
7. Adjust A1A4R72 for value shown on front panel LEVEL display (9.9 dBm below RESET power).
8. Repeat steps 3 thru 6 as necessary until power levels are correct to within 0.1 dB.

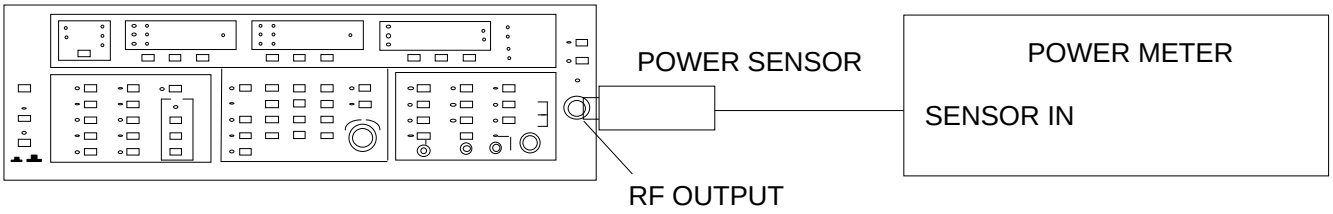
6-17. ADJUST POWER SWEEP

1. Perform “Initial Setup” procedure (Paragraph 6-2).

NOTE

Adjust ALC bandwidth (Paragraph 6-14) or ensure that the ALC loop is within specified tolerances (Paragraphs 5-8) before adjusting power sweep.

2. Connect test equipment setup as shown below, and turn it on.



RFSLPE-SU

3. Press LEVEL key.
4. Enter –9.9 on keypad and press MHz/dB/mS key.
5. Press MANUAL SWEEP key and set associated control to its full counterclockwise position.
6. Press CW CF key and set CF frequency for low-end frequency.
7. Press dB/SWEEP key and set sweep value for 10.0 dB.
8. Press **SHIFT** key, then **POWER SWEEP** key.
9. Record power meter indication.
10. Rotate MANUAL SWEEP control fully clockwise.
11. Adjust A1A3R88 (Figure A2-8) for power level that is 10 dB above level recorded in step 9.

6-18. ADJUST COUPLER-DETECTOR AND DOWN-CONVERTER-DETECTOR TRACKING

a. General. This heading provides Coupler-Detector and Down-Converter-Detector Tracking adjustment procedure for models having a down converter. Perform procedures only if your model is so equipped.

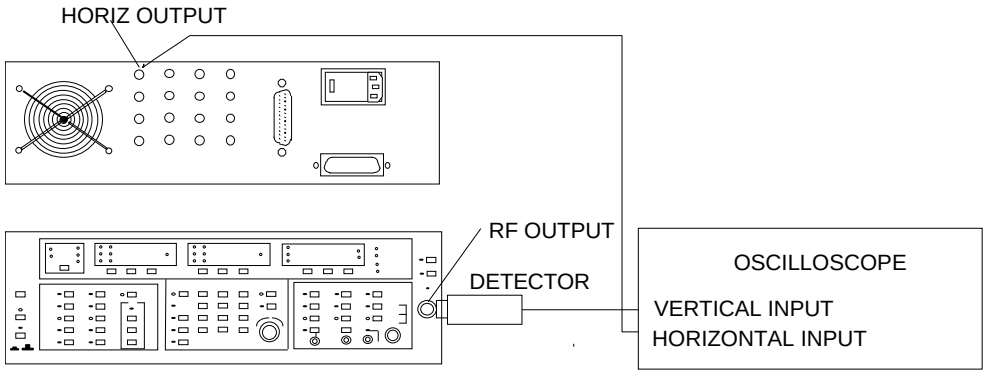
b. Procedure.

1. Perform "Initial Setup" procedure (Paragraph 6-2).

NOTE

- Check that leveled-power variation and RF slope function are within acceptable limits before doing this procedure.
- Refer to Figure A2-10 for test point and adjustment locations.

2. Connect test equipment as shown below, and turn it on.



TF-SU

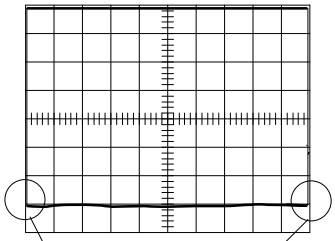
3. Press ΔF CF key.
4. Press CF key and set CF frequency for 1.000 GHz.
5. Set oscilloscope horizontal time base for external and vertical attenuator for 0.050V/division.
6. Set horizontal time base on oscilloscope for external, and adjust horizontal-vernier control so that trace extends full width of screen (10 divisions).
7. Adjust oscilloscope vertical-vernier an vertical-position controls for a deflection of seven large divisions.

NOTE

Oscilloscope is now calibrated such that 1 division is approximately equal to 1 dB.

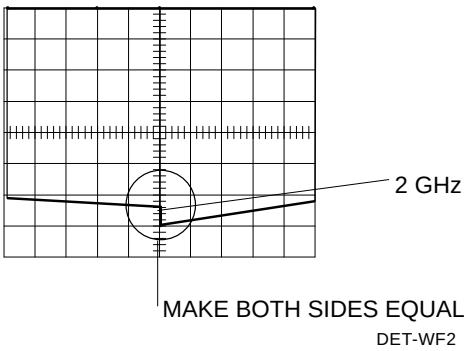
8. Adjust A1A4R142 so that both ends of oscilloscope trace have equal deflection, as shown below.

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: EXTERNAL
VERTICAL SCALE: 0.05 V/DIV(UNCAL)



9. Press CF key and set CF frequency for 2.000 GHz.
10. Adjust A1A4R68 for equal-deflection power levels on each side of 2 GHz center frequency, as shown below.

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: EXTERNAL
VERTICAL SCALE: 0.05 V/DIV (UNCAL)



11. Press LEVEL key; then enter –9.9 on keypad and press MHz/dB/mS key.
12. Readjust oscilloscope vertical vernier control to obtain a deflection of seven large divisions.
13. Adjust A1A4R70 for equal-deflection power levels on each side of 2 GHz center frequency.

NOTE

If equal power levels were obtained, go to step 16. If not, perform steps 14 and 15.

14. Adjust A1A4R5 to move the trace slightly past where power levels have equal deflection.
15. Readjust A1A4R70 to obtain equal-deflection power levels on each side of 2 GHz center frequency.
16. While tracking power level from –9.9 dB below RESET power to RESET power level use following subprocedure to verify that power levels on each side of 2 GHz center frequency are equal, ±0.5 dB.

- Press LEVEL key.
- Press 1 key on keypad then MHz/dB/mS key.
- On oscilloscope, obtain a vertical deflection of seven divisions, using attenuator and vernier controls.
- Verify that trace discontinuity is no more than 2.5 minor divisions.
- Repeat the last three steps nine more times.

APPENDIX 1
PARTS LISTS

A1-1. INTRODUCTION

This appendix provides parts lists for the sweep generator. The parts lists are divided into two groups: major assembly parts and circuit-card assembly (CCA) parts. The major assembly parts are illustrated and appear in Figures A1-1 thru A1-4. The CCA parts are tabulated and appear in Tables A1-2 thru A1-14.

A1-2. PARTS ORDERING INFORMATION

Replaceable parts may be ordered either from your local WILTRON Representative or directly from the factory. The factory address is shown below:

WILTRON Company
490 Jarvis Drive
Morgan Hill, CA 95037-2809

Telephone: 408-778-2000
TWX: 285227 WILTRON MH
FAX: 408-778-0239

When ordering, give complete information including the *model and serial number* of the instrument, the full part description, the WILTRON part number (WPN), and the quantity required. The serial number of the instrument is located on the front panel.

A1-3. VENDOR INFORMATION

True vendor names are supplied with CCA and assembly parts. Vendor names are cross-referenced to their CAGE code in Table A1-1.

Table A1-1. Vendor CAGE Codes (1 of 2)

Vendor	CAGE	Vendor	CAGE
ADI	60430	CANNON	12649
ALLEN BRADLEY	01121	CENTRALAB	5A111
AMERICAN ZETTLER	N/L	CENTRE ENGINEERING	51642
AMP	00779	CHICAGO SWITCHBOARD	98830
AMPHENOL	02660	CORCOM	07793
ANALOG DEVICES	24355	CORNELL-DUBILIER	93790
ARCO	23565	CORNING	1P278
AUGAT	62770	CRYSTEK CRYSTAL	1W476
AVANTEK	24539	DALE	56845
BECKMAN	60771	DELEVAN	4K417
BELDEN CABLE	55494	DUPONT	1FT90
BERG (DUPONT)	1U797	EATON	27338
BISHOP	58518	ELECTROCUBE	14752
BOURNS	08116	ELMENCO	04062
BURNDY	09922	FAIRCHILD	31718
CAL-R	29546	GENERAL ELECTRIC	6K278

Table A1-1. Vendor CAGE Codes (2 of 2)

Vendor	CAGE	Vendor	CAGE
GREYHILL	N/L	NIC	0EHX1
HITACHI	0BYV8	NICHICON	55680
IMB	27556	PANASONIC	61058
IMS EQUIPMENT	6W528	PHILIPS COMPONENTS	67349
INTEL	34649	QUALITY TECHNOLOGIES	1ED26
INTERFAN	N/L	RAYTHEON	49956
ITT	07005	RCA SOLID STATE	18723
ITT SCHADOW	31918	RIEDON	N/L
J.W. MILLER	N/L	RMC	1GC41
KINGS	96918	SAE	0HA92
KEMET (KMET)	31433	SCHAFFNER EMC, INC.	0GV52
KRL	18235	SEMTECH	8R505
LENOX-FUGLE	N/L	SGS SEMICONDUCTOR	7X328
LINEAR TECHNOLOGY	64155	SIGNETICS	6U313
LITE-ON CORP.	0APZ0	SILICONIX	17865
LITTLEFUSE, INC	7E222	SMITH	0E3R2
LUMEX	66504	SPRAGUE	24165
MALLORY/WESTLAKE	N/L	STACKPOLE	29604
MICRO POWER SYS.	54186	TAMURA CORP.	0JB05
MOLEX	27264	TEXAS INSTRUMENTS	01295
MONSANTO	26483	THOMAS & BETTS	6J138
MOTOROLA	50012	TUSONIX	59660
MURATA/ERIE	72982	ULTEX	0JND3
MWPCO	N/L	UNITED CHEMI-CON	1W344
NATIONAL SEMICONDUCTOR	27014	WEST COAST MAGNETICS	12042
NEC	33291		

A1-4. ABBREVIATIONS

Abbreviations used in the tables and figures are shown in Table A1-2.

Table A1-2. Abbreviations

Term	Description	Term	Description
A	Ampere, Assembly	N	Not Assigned
B	Fan	P	Pin, Plug
C	Capacitor	PCB	Printed Circuit Board
CC	Carbon Composition	Q	Transistor
CER	Ceramic	R	Resistor
CR	Diode	RN	Resistor Network
DS	Display Indicator	S	Switch
E	Miscellaneous Electrical Part	SI	Silicon
F	Female	SW	Switch
FF	Flip Flop	T	Transformer
FXD	Fixed	TANT	Tantalum
HDR	Header	TP	Test Point
J	Jack	U	Integrated Circuit
K	Kilo (10^3), Relay	UF	Micro Farad (µF)
L	Inductor	UH	Micro Henry (µH)
LCD	Liquid Crystal Display	V	Volt
LED	Light Emitting Diode	WW	Wire Wound
M	Male, Meg- (10^6)	VR	Voltage Regulator
MF	Metal Film	W	Watt, Wire Jumper
MH	Milli Henry (mH)		

A1-5. PARTS LISTS ORGANIZATION

The parts lists are organized as shown in Table A1-3.

Table A1-3. Parts Lists Organization

Table/Figure No.	Description	Assembly No.	Page
Table A1-5	Replaceable Assemblies		A1-6
Figure A1-1	A1 Basic Frame Assembly Parts	D32200	A1-8
Figure A1-2	A2 Front Panel Assembly Parts	D35675	A1-12
Figure A1-3	A3 Rear Panel Assembly Parts	D32116	A1-14
Figure A1-5	RF Deck Components		A1-16
Figure A1-4	A4 RF Deck Assembly Parts	Table A1-4	A1-19
Table A1-7	A1A1 GPIB PCB Parts	D32101-3	A1-21
Table A1-8	A1A2 Ramp Generator PCB Parts	D8002-3	A1-23
Table A1-9	A1A3 Markers Generator PCB Parts	D32103-3	A1-27
Table A1-10	A1A4 ALC PCB Parts	Note 1	A1-34
Table A1-11	A1A5 Frequency Instruction PCB Parts	D32105-3	A1-39
Table A1-12	A1A6 YIG Driver PCB Parts	Note 2	A1-43
Table A1-13	A1A7 YIG Driver PCB Parts	Note 2	A1-47
Table A1-14	A1A8 YIG Driver PCB Parts (Assy D8008)	Note 2	A1-50
Table A1-15	A1A8 YIG Driver PCB Parts (Assy D32108)	Note 2	A1-54
Table A1-16	A1A9 YIG Driver PCB Parts	Note 2	A1-57
Table A1-17	A1A10 FM/Attenuator PCB Parts	D34710-7	A1-61
Table A1-18	A1A13 Switching Power Supply PCB Parts	D37920-3	A1-66
Table A1-19	A1A14 Motherboard PCB Parts	D34714-7	A1-70
Table A1-20	A2A11 Front Panel PCB Parts	D35671-3	A1-77
Table A1-21	A2A12 Microprocessor PCB Parts	D35672-3	A1-83

Note 1: The A1A14 ALC CCA is married with the A4DC1 Directional Coupler and replaced as a married set. Refer to Table A1-5 for replaceable assembly part numbers.

Note 2: The A1A6, A1A7, A1A8, and A1A9 YIG Driver CCAs are married with their respective oscillator assemblie and heat sink transistors. These assemblies are replaced as a matched set (Table A1-5).

Table A1-4. RF Assembly and YIG Driver PCB Parts Numbers

Model	YIG Driver PCB			
	A1A6	A1A7	A1A8	A1A9
6609B	D8008-8			
6609B-50	D8008-8			
6610B	D32107-4			
6616B	D8009-39			
6617B	D32106-3			
6617B-40	D32106-3			
6619B	D32106-3			
6619B-40	D32106-3			
6620B	D8008-12			
6621B	D32106-3	D32107-4		
6621B-40	D32106-3	D32107-4		
6622B	D32106-3	D32107-4		
6622B-40	D32106-3	D32107-4		
6624B	D8008-13			
6627B	D32107-4			
6628B	D32107-4			
6628B-50	D32107-4			
6629B	D32107-5			
6629B-40	D32107-5			
6630B	D32107-5			
6630B-50	D32107-5			
6631B	D32107-5			
6632B	D8009-15			
6635B	D32106-3	D32107-4	D32107-5	
6635B-40	D32106-3	D32107-4	D32107-5	
6636B	D32107-5			
6637B	D32106-3	D32107-4	D32107-5	
6637B-40	D32106-3	D32107-4	D32107-5	
6640B	D32107-5	D32107-4	D32107-5	
6640B-10				
6645B	D32106-3	D32107-4	D32107-5	
6645B-40	D32106-3	D32107-4	D32107-5	
6647B	D32106-3	D32107-4	D32107-5	
6647B-40	D32106-3	D32107-4	D32107-5	
6653B	D32106-3	D32107-4	D32107-5	D32107-5
6659B	D32106-3	D32107-4	D32107-5	D32107-5
6660B	D32107-5	D32108-3		
6662B	D32106-3	D32107-4	D32108-3	D32107-5
6663B	D32106-3	D32107-4	D32108-3	D32107-5
6668B	D32106-3	D32107-4	D32108-3	D32107-5
6669B	D32106-3	D32107-4	D32108-3	D32107-5
6672B	D32107-5			

A1-6. EXCHANGEABLE ASSEMBLIES

WILTRON provides an module exchange program that includes the parts and assemblies listed in Table A1-5. In most cases, the replaceable assembly is a CCA or RF module. In other case, the replaceable assembly is a uniquely configured assembly, such as the ALC or YIG assemblies.

Table A1-5. Exchangeable Assembly Part Numbers

Reference Designator	Description	WILTRON Part Number
A1A1	GPIB CCA	D32101-3
A1A2	Ramp Generator CCA	D8002-3
A1A3	Markers Generator CCA	D32103-3
A1A4	ALC CCA (Married with A4DC1 and replaced as a set)	ND35633 (High End ≤20 GHz) ND35634 (High End >20 GHz)
A4DC1		
A1A5	Frequency Instruction CCA	D32105-3
A1A10	FM/Attenuator CCA	D34710-7
A1A13	Switching Power Supply CCA	D32113-3
A2	Front Panel Assembly	D36943
A4A1	Down Converter	C8090-4, High-Power Models C8090-5, Standard Power Models
	YIG Oscillator Assemblies (Married with appropriate YIG Driver CCA)	Table A1-6
	Frequency Doubler	B13749
	Frequency Doubler/Amplifier (6662B thru 6669B)	60-49
A4S1	PIN Switch	Table A1-6
A4S2	DPDT PIN Switch	D13611
	Level Detector, 0.01–2 GHz	D7906
	Output Connector Assembly Standard, Option 2A, 18.6 GHz 6609B, 6609B-50 High-End 26.5 GHz Dual (6662B, 6668B) High-End 20 GHz High-End 40 GHz	 C8094-1 C8094-2 D9371-4 D9371-5 C17890 C20812
	RF Take Off, 26.5 GHz	D9970
	Frequency Tripler, 6672B	1040-15
	RF Amplifier 2–8 GHz 8–12.4 GHz 12.4–18.6 GHz 12.4–20 GHz 12.25–20 GHz 18–26.5 GHz	 B17432 B18675 ND34468 A32029 ND31355 ND19075

Table A1-6. YIG Oscillator, PIN Switch, and Step Attenuator Parts Numbers

Model	YIG Oscillator Assembly					PIN Switch	Step Attenuator
	2–8 GHz	8–12.4 GHz	12.4–18 GHz	12.4–20 GHz	18–26.5 GHz		
6609B	*						
6609B-50	*						
6610B	*						
6616B	*						
6617B	ND35902						
6617B-40	ND35904						
6619B	*						
6619B-40	*						
6620B	*						
6621B	*						
6621B-40	*						
6622B	*						
6622B-40	*						
6624B	*						
6627B	*						
6628B	*						
6628B-50	*						
6629B	*						
6629B-40	*						
6630B	*						
6630B-50	*						
6631B	*						
6632B	*						
6635B	ND35905	ND35921	ND35937			D18696	ND35875
6635B-40	ND35906	ND35922	ND35938			D18696	ND35875
6636B	*						
6637B	ND35908	ND35924		ND35940		D18696	ND35875
6637B-40	ND35910	ND35926		ND35942		D18696	ND35875
6640B	*						
6640B-10	*						
6645B	ND35905	ND35921	ND35937			D18696	ND35875
6645B-40	ND35906	ND35922	ND35938			D18696	ND35875
6647B	ND35908	ND35924		ND35940		D18696	ND35875
6647B-40	ND35910	ND35926		ND35942		D18696	ND35875
6653B	ND35914	ND35930	ND35946		ND35955	D19611	ND35876
6659B	ND35914	ND35930	ND35946		ND35955	D19611	ND35876
6660B						D13404	ND35878
6662B						D22185	
6663B	ND35916	ND35932	ND35948		ND35957	D22185	ND35878
6668B						D22185	
6669B	ND35916	ND35932	ND35948		ND35957	D22185	ND35878
6672B						D22185	

** Call WILTRON Customer Service for part number.*

INDEX NO	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
1	D34713-3	A1A13 SWITCHING POWER SUPPLY CCA	D32113-3	WILTRON
	B15247-13	PC EJECTOR, LOCKING, A13	B15247-13	WILTRON
2	B8068	CARD CAGE, TOP COVER	B8068	WILTRON
	900-142	SCREW, PAN HD, 4-40, 9EA	COMMON	
	900-391	WASHER, #4, SPLIT LOCK, 9EA	COMMON	
3	Table A2-4	A4 RF DECK ASSEMBLY (Figure A2-4)	Table A2-4	WILTRON
	C37512	RF DECK COVER ASSY	C37512	WILTRON
	900-142	SCREW, PAN HD, 4-40, 7EA	COMMON	
	900-391	WASHER, #4, SPLIT LOCK, 7EA	COMMON	
	900-144	SCREW, PAN HD, 4-40, 0.312, PHIL, 7EA	COMMON	
	900-345	WASHER, #4, FLT, 7EA	COMMON	
	900-391	WASHER, #4, SPLIT LK, 7EA	COMMON	
4	D32116	A3 REAR PANEL ASSEMBLY (Figure A2-3)	D32116	WILTRON
5		A1A7 YIG DRIVER CCA		WILTRON
	B15247-7	PC EJECTOR, LOCKING, A7	B15247-7	WILTRON
6		A1A6 YIG DRIVER CCA		WILTRON
	B15247-6	PC EJECTOR, LOCKING, A6	B15247-6	WILTRON
7	D34710-7	A1A10 FM/ATTENUATOR CCA	D34710-3	WILTRON
	B15247-10	PC EJECTOR, LOCKING, A10	B15247-10	WILTRON
8		A1A9 YIG DRIVER CCA		WILTRON
	B15247-9	PC EJECTOR, LOCKING, A9	B15247-9	WILTRON
9		A1A8 YIG DRIVER CCA		WILTRON
	B15247-8	PC EJECTOR, LOCKING, A8	B15247-8	WILTRON
10	D32105-3	A1A5 FREQUENCY INSTRUCTION CCA	D32105-3	WILTRON
	B15247-5	PC EJECTOR, LOCKING, A5	B15247-5	WILTRON
11		A1A4 ALC CCA		WILTRON
	B15247-4	PC EJECTOR, LOCKING, A4	B15247-4	WILTRON
12	D32103-3	A1A3 MARKERS GENERATOR CCA	D32103-3	WILTRON
	B15247-3	PC EJECTOR, LOCKING, A3	B15247-3	WILTRON
13	D8002-3	A1A2 RAMP GENERATOR CCA	D8002-3	WILTRON
	B15247-2	PC EJECTOR, LOCKING, A2	B15247-2	WILTRON
14	D35675	A2 FRONT PANEL ASSEMBLY (Figure A2-2)	D35675	WILTRON
15	D32101-3	A1A1 GPIB CCA	D32101-3	WILTRON
	B15247-1	PC EJECTOR, LOCKING, A1	B15247-1	WILTRON

Figure A1-1. A1 Basic Frame Assembly Parts (1 of 4)

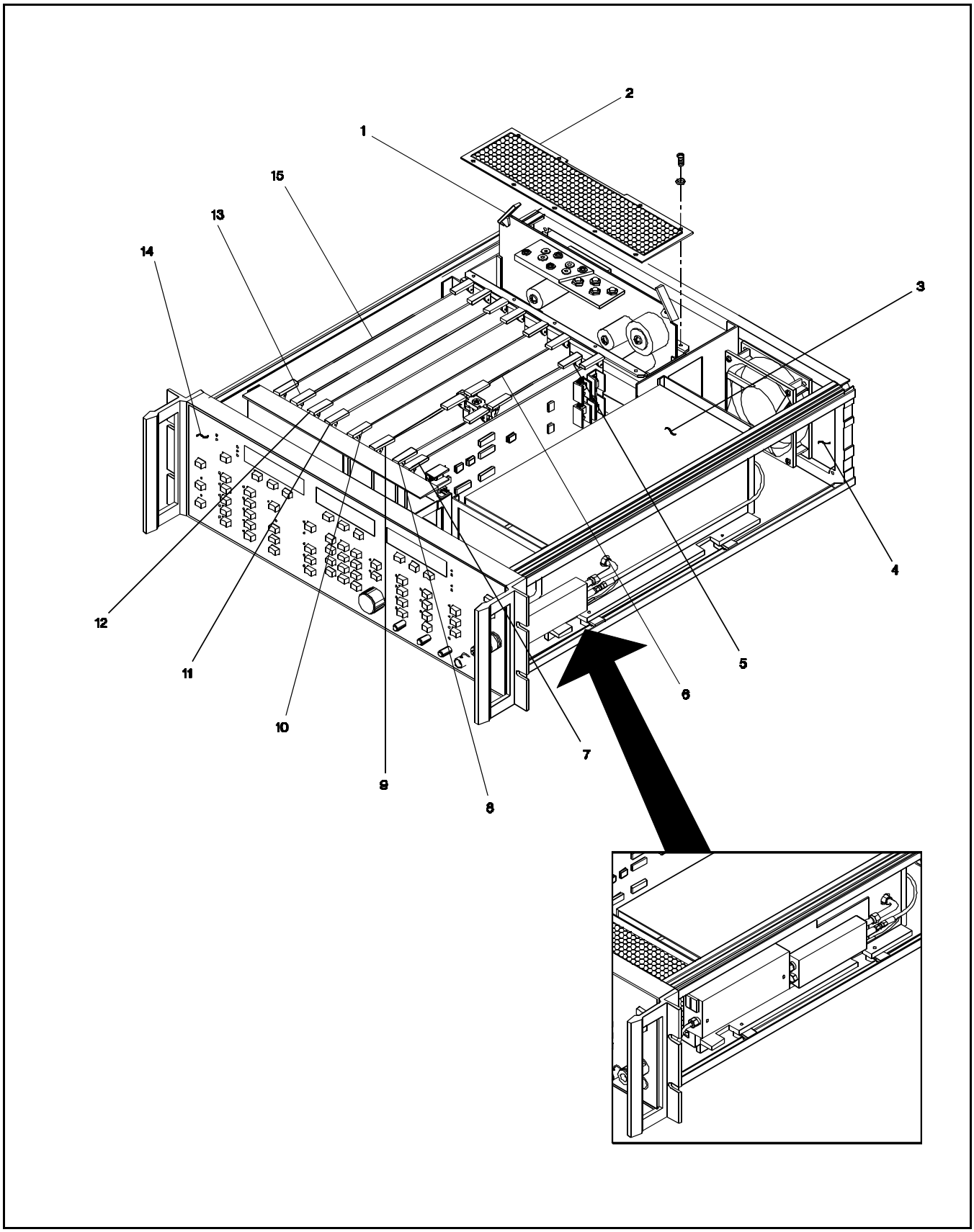


Figure A1-1. A1 Basic Frame Assembly Parts (2 of 4)

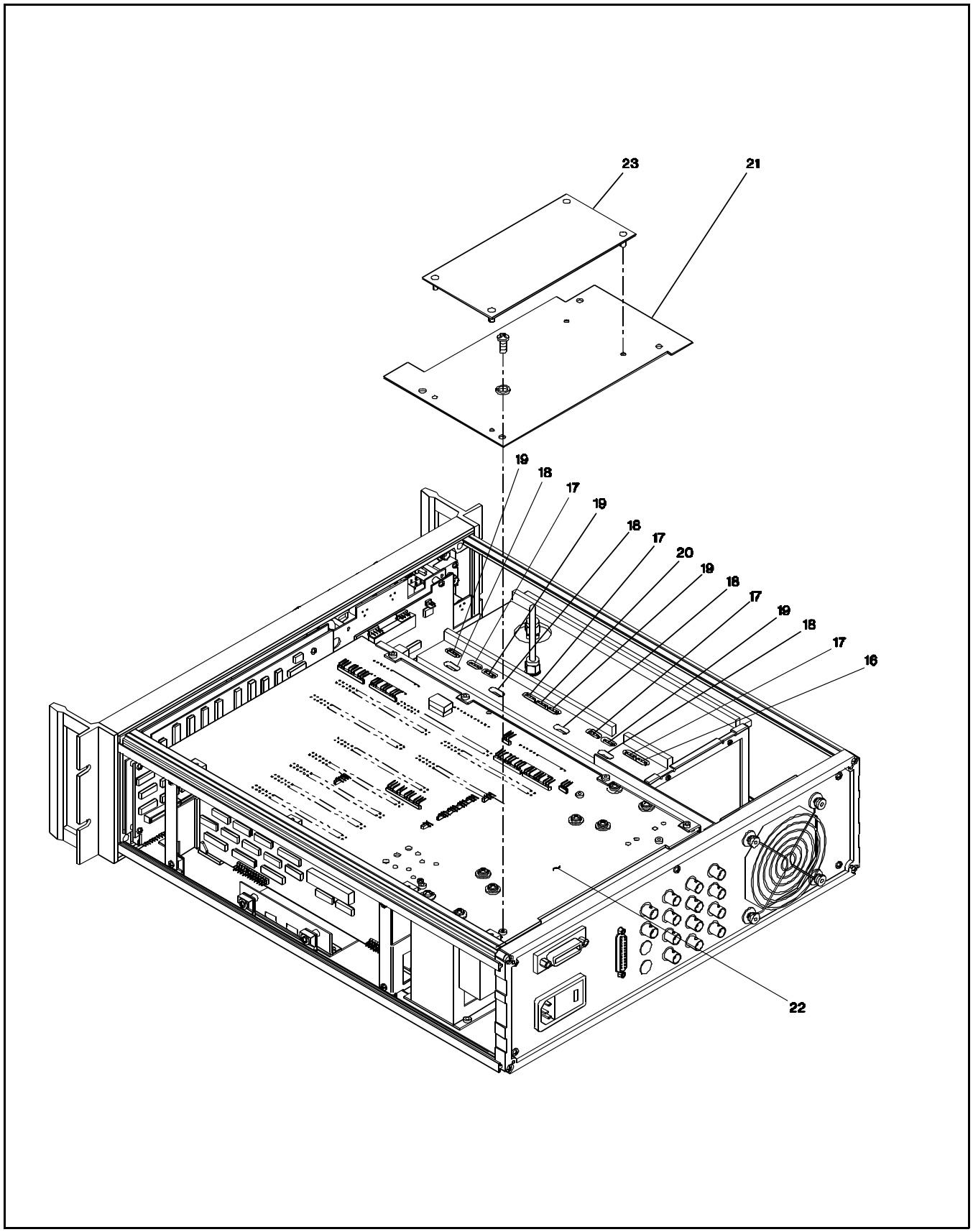
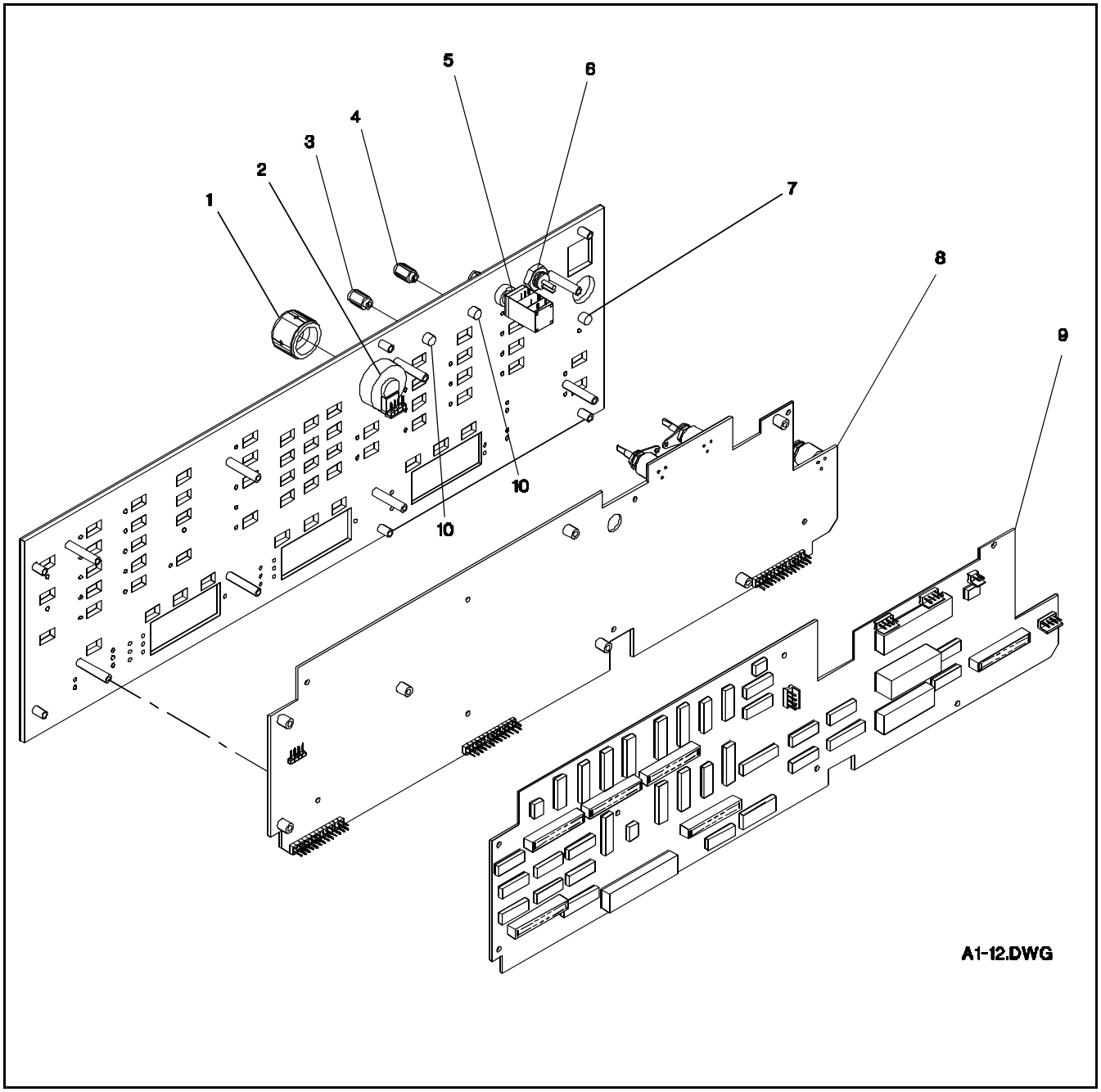


Figure A1-1. A1 Basic Frame Assembly Parts (3 of 4)

INDEX NO	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
16	20-5	A0Q1 TRANSISTOR, NPN, TIP117, SI,PWR	TIP117	MOTOROLA
17	* P/O YIG ASSY (See Table A1-5)			
18				
19				
20	54-184	A0U5 IC, VOLTAGE REG, 7905, –5V	UA7905KCT	FAIRCHILD
21	B34860	HIGH VOLTAGE SHIELD	B34860	WILTRON
22	D34714-7	A1A14 MOTHERBOARD CCA	D34714-7	WILTRON
23	B32119	VOLTAGE PROTECTION SHIELD	B32119	WILTRON
—	D31044	COVER, TOP	D31044	WILTRON
—	D31045	COVER, BOTTOM	D31045	WILTRON
—	D31061	COVER, RIGHT SIDE	D31047	WILTRON
—	D31062	COVER, LEFT SIDE	D31046	WILTRON
		HANDLE ASSEMBLY FOR SIDE COVERS STRAP CAP BRACKET	 783-100 783-11 783-12	
—	D13655	FOOT, BOTTOM, 4 EA	D13655	WILTRON
	2000-10	SCREW, THREAD FORMING	COMMON	
	C13654	TILT BAIL, 2EA	C13654	WILTRON
—	631-16	FUSE, 4A, 3AG, SLOW BLOW	313004	LITTLE FUSE
—	800-119	WIRE, PWRCORD, 3COND, 18AWG	17251B	BELDEN
—	D13656	FOOT, REAR	D13656	WILTRON
	900-444	SCREW, PHIL HD, 8-32, THD FORM	COMMON	
—	900-444	SCREW, FIL HD, 8-32, THD FORM (REAR PANEL HOLDING)	COMMON	

Figure A1-1. A1 Basic Frame Assembly Parts (4 of 4)

* Figure A1-1 shows four IC sets, as would be installed on the 6653B thru 6669B models. Your model may differ, depending upon the number of YIG bands that are installed.



INDEX NO	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
1	A34236	KNOB, INCR-DECR		WILTRON
	900-278	SET SCREW, HEX SKT	COMMON	
2	410-98	SHAFT, ENCODER, ROTARY SHAFT (INCR-DECR)	161BY15023	GREYHILL
3	A33157	KNOB, (MAN SWEEP & MKR AMP)	A33157	WILTRON
	710-56	KNOB RETAINER	C55580-010-27	EATON

Figure A1-2. A2 Front Panel Assembly Parts (1 of 2)

INDEX NO	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
4	A8064	KNOB, (ALC)		WILTRON
	710-56	KNOB RETAINER	C55580-010-27	EATON
5	A8024	EXTERNAL ALC GAIN POTENTIOMETER ASSY	A8024	WILTRON
6	510-31	CONNECTOR, BULKHD, BNCF, 50 OHM (EXT IN)	31-010	AMPHENOL
7	146-9	RESISTOR, VAR, CC, 20K, 10%, 1T (RF SLOPE)	GA4G047F203UA	ALLEN-BRADLEY
8	D32111-3	A2A11 FRONT PANEL CCA	D32111-3	WILTRON
9	D34712-3	A2A12 MICROPROCESSOR CCA	D34726	WILTRON
10	146-8	RESISTOR, VAR, CC, 20K, 10%, 1T (MAN SWEEP & MKR AMP)	WA4G031S203UA	ALLEN-BRADLEY
—	430-422	PUSHBUTTON SET (“1” KEY)	DWG B37605-X	OMPTEC INT’L
—	430-408	PUSHBUTTON SET (“2” KEY)	DWG B37605-X	OMPTEC INT’L
—	430-409	PUSHBUTTON SET (“3” KEY)	DWG B37605-X	OMPTEC INT’L
—	430-410	PUSHBUTTON SET (“4” KEY)	DWG B37605-X	OMPTEC INT’L
—	430-411	PUSHBUTTON SET (“5” KEY)	DWG B37605-X	OMPTEC INT’L
—	430-412	PUSHBUTTON SET (“6” KEY)	DWG B37605-X	OMPTEC INT’L
—	430-413	PUSHBUTTON SET (“7” KEY)	DWG B37605-X	OMPTEC INT’L
—	430-414	PUSHBUTTON SET (“8” KEY)	DWG B37604-X	OMPTEC INT’L
—	430-414	PUSHBUTTON SET (“9” KEY)	DWG B37604-X	OMPTEC INT’L
—	430-419	PUSHBUTTON SET (“–” KEY)	DWG B37604-X	OMPTEC INT’L
—	430-424	PUSHBUTTON SET (“.” KEY)	DWG B37604-X	OMPTEC INT’L
—	430-415	PUSHBUTTON SET, (“dB SWEEP” KEY)	DWG B37604-X	OMPTEC INT’L
—	430-416	PUSHBUTTON SET, LOW PROFILE (“M1” KEY)	DWG B37604-X	OMPTEC INT’L
—	430-417	PUSHBUTTON SET, LOW PROFILE (“F2” KEY)	DWG B37604-X	OMPTEC INT’L
—	430-418	PUSHBUTTON SET, LOW PROFILE (“ΔF” KEY)	DWG B37604-X	OMPTEC INT’L
—	430-420	PUSHBUTTON SET, (“F1” KEY)	DWG B37604-X	OMPTEC INT’L
—	430-421	PUSHBUTTON SET, (“CF” KEY)	DWG B37604-X	OMPTEC INT’L
—	430-425	PUSHBUTTON SET, (“M2” KEY)	DWG B37604-X	OMPTEC INT’L
—	430-426	PUSHBUTTON SET, (“LEVEL” KEY)	DWG B37604-X	OMPTEC INT’L
—	430-315	KEY CAP SET, PLAIN , GREYKEYS (36 EA)	540-00001	TANGENT TECH.
—	430-317	KEY CAP, RESET KEY (RED)	540-00001	TANGENT TECH.
—	430-318	KEY CAP, SHIFT KEY (BLUE	540-00001	TANGENT TECH.

Figure A1-2. A2 Front Panel Assembly Parts (2 of 2)

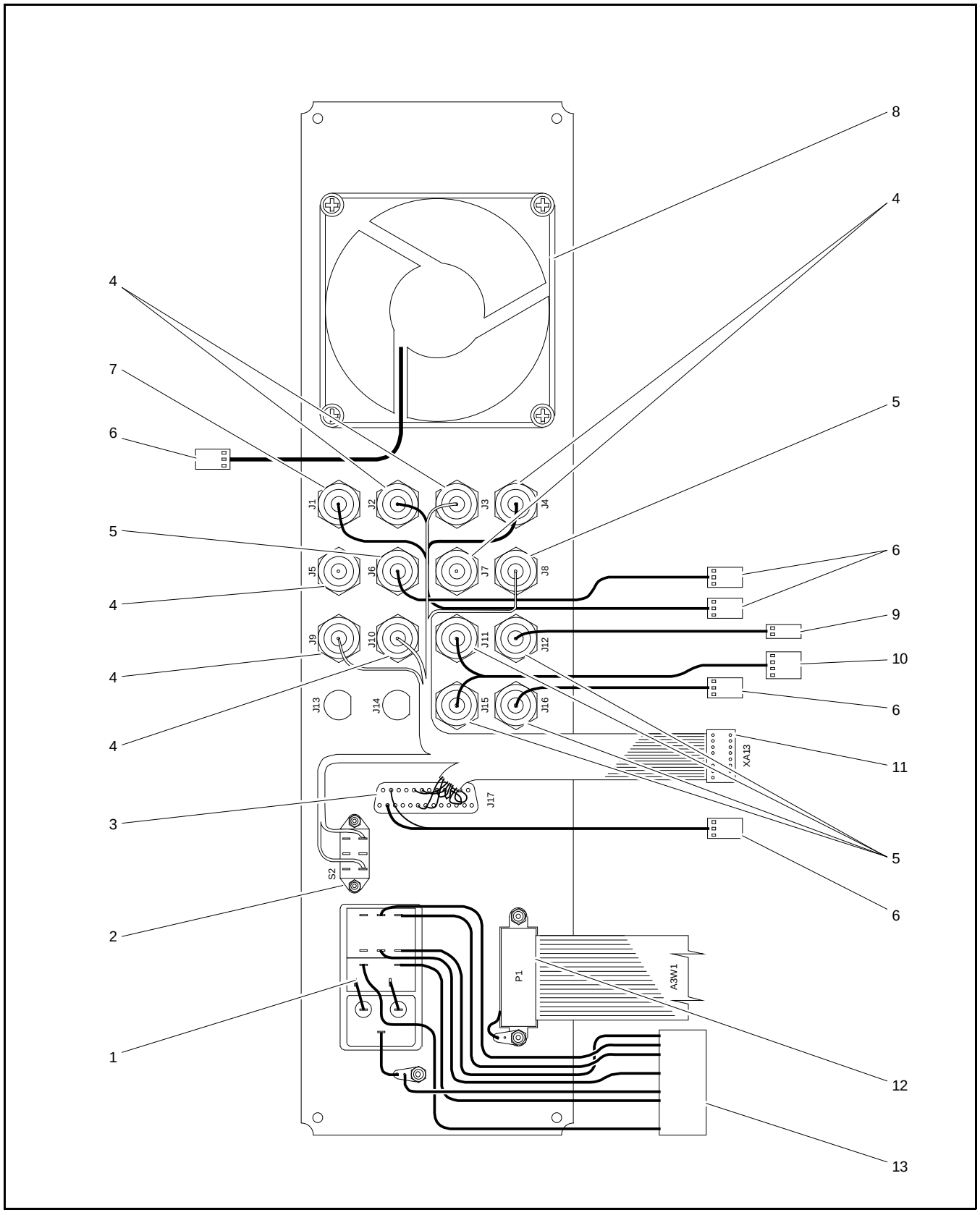


Figure A1-3. A3 Rear Panel Assembly Parts (1 of 2)

INDEX NO	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
1	260-17	LINE VOLTAGE MODULE	FN372-4/32	SCHAFFNER EMC, INC.
2	430-334	SWITCH, SLIDE, DPDT, PNL MT VERT	L202-01-1-SS-01-G-E	C & K
	900-126	SCREW, PAN HD, 2-56	COMMON	
	900-389	WASHER, #2, SPLIT LOCK	COMMON	
	900-514	WASHER, #2, FLAT	COMMON	
	785-871	STANDOFF, PLAIN, 2-56	COMMON	
3	551-294	CONNECTOR, R&P, DSUB, RECP (AUX I/O)	DBU25SFO	CANNON
	551-313	CONNECTOR PIN , 25EA	D110238-436	ITT
4	510-5	CONNECTOR, BULKHEAD, BNCF, 50 OHM (J2, J3, J4, J5, J7, J9, J10)	31-221	AMPHENOL
5	510-31	CONNECTOR, BULKHEAD, BNCF, 50 OHM (J6, J8, J11, J12, J15, J16	31-010	AMPHENOL
6	551-205	CONNECTOR, HDR, HSNG (P/O ITEM 8)	65039-034	BERG INDUSTRIES
	551-250	CONNECTOR, PIN, 3EA	47564	BERG INDUSTRIES
7	510-31	CONNECTOR, BULKHEAD, BNCF, 50 OHM (HORIZ OUT)	31-010	AMPHENOL
	510-48	CONNECTOR, RF, BULKHEAD, BNC F	KC19-139	KINGS
	551-233	CONNECTOR, PIN, CABLE MNT	RSK-101	THOMAS & BETTS
	800-5	WIRE, COAX, RG174, 3.3 FT	8216	BELDEN
8	B34729	FAN ASSY	B34729	WILTRON
	790-193	NUT, THUMB, 6-32 IN.	1313	SMITH
	790-243	GUARD, FINGER,STEEL	08134	IMS EQUIPMENT
	B34858	FILTER, FAN, 4.0 IN. DIA, 30 PPI	B34858	WILTRON
9	551-230	CONNECTOR, HDR, HSNG	65039-035	BERG INDUSTRIES
	551-250	CONNECTOR, PIN, 2EA	47564	BERG INDUSTRIES
10	551-229	CONNECTOR, HDR, HSNG	65039-033	BERG INDUSTRIES
	551-250	CONNECTOR, PIN, 3EA	47564	BERG INDUSTRIES
11	802-16B-23.4	WIRE, RIBBON ASSY, DIP-DIP		
12	B34718	GPIB CONNECTOR ASSY	B34718	WILTRON
13	551-831	CONNECTOR, CONTACT HOUSING, 7PIN	10-22-1072	MOLEX
	551-599	CONNECTOR, CONTACT, CRIMP-ON	08-70-1030	MOLEX

Figure A1-3. A3 Rear Panel Assembly Parts (2 of 2)

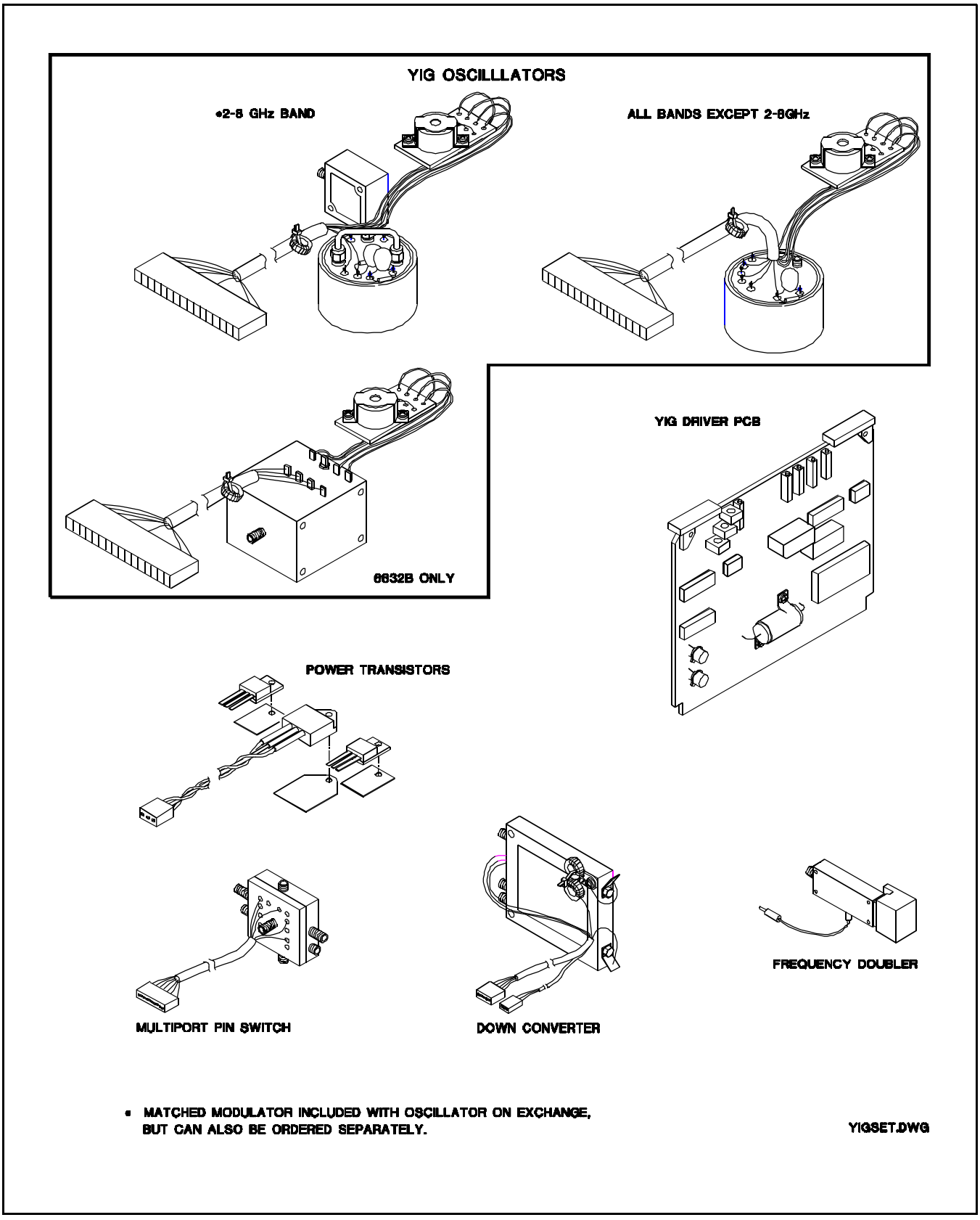


Figure A1-4. A4 RF Deck Assembly Components (1 of 3)

WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
ND35902 /ND35904 ND35905 /ND35906 ND35908 /ND35910 ND35914 ND35916 ND35921 /ND35922 ND35924 /ND35926 ND35930 ND35932 ND35937 /ND35938 ND35940 /ND35942 ND35946 ND35948	YIG OSCILLATOR ASSEMBLY	NA	WILTRON
C8090-4 C8090-5	DOWN CONVERTER ASSY, 40 mW DOWN CONVERTER ASSY		WILTRON
C18696	PIN SWITCH, 4 PORT, FILTERED, 20 GHz		WILTRON
C13404	SPST PIN SWITCH, 12.4–40 GHz		WILTRON
C13562	SPST PIN SWITCH, 1–26.5 GHz		WILTRON
D22185	PIN SWITCH, 6 PORT, 40 GHz		WILTRON
D19611	PIN SWITCH, 5 PORT, 26.5 GHz		WILTRON
D13611	DPDT PIN SWITCH, 8–26.5 GHz		WILTRON
B13498 A38846	ADAPTER ASSEMBLY, MALE WG		WILTRON
ND35875 ND35876 ND46878	STEP ATTENUATOR, 70 dB		WILTRON
60-49	DOUBLER/AMP, 13–20 GHz		
1040-15	FREQUENCY TRIPLER, 40–60 GHz	U-3X	SPACEK LABS
43KB-6	FIXED ATTENUATOR, 6dB		
1010-28 1010-29 1010-40	FIXED ATTENUATOR, DC–8 GHz FIXED ATTENUATOR, DC–8 GHz, 20 dB FIXED ATTENUATOR, DC–8 GHz, 15 dB	18B-10 18B-10 18B-15	INMET INMET INMET
1000-26 1000-21 1000-24 1000-29 1000-31 1000-32 1000-33 1000-37	ISOLATOR, 1.7–4.3 GHz, 15 dB ISOLATOR, 7–14.4 GHz ISOLATOR, LP,0.01–4.3 GHz ISOLATORFILTER, LP, 7.9–13 GHz ISOLATORFILTER, LP, 2–18.7 GHz ISOLATORFILTER, LP, 12.4–20 GHz ISOLATOR, 18–26.4 GHz ISOLATOR, 40–60 GHz, 25 dB	AER 1640 AER 1286 PMI12280 AER 1289 AER 1291 127-1810 IBS1826-3 45113H-1000	NARDA NARDA WESTERN MICRO. NARDA NARDA TRAK MICROWAVE NARDA HUGHES
1030-26 1030-21 B22941	FILTER, LP, 2–8 GHz FILTER, LP. 0.05–2 GHz FILTER, IN-LINE LOW PASS, 16 GHz	F37778 F-3772A	RCL RCL WILTRON
D9343	MATCH MODULATOR, 2–8 GHz		WILTRON
516-32	RF ADAPTER, SMA M–M	2993-6001	SOLITRON

Figure A1-4. A4 RF Deck Assembly (2 of 3)

WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C7907	LEVELING DETECTOR		WILTRON
	COUPLER/DETECTOR (P/O ALC ASSEMBLY)		WILTRON
54-184	IC, VOLTAGE REG, 7905, 5V	UA7950UC	FAIRCHILD
20-5	TRANSISTOR, PNP, TIP117, Si, PWR	TIP 117	MOTOROLA
C20812	CONNECTOR ASSEMBLY, K-KF (6632B, 6636B, 6640B-10, 6653B, 6659B, 6660B, 6663B, 6669B)	C20812	WILTRON
C17890	CONNECTOR ASSEMBLY, K-NF (6616B, 6617B, 6617B-40, 6619B, 6619B-40, 6620B, 6621B, 6621B-40, 6622B, 6622B-40, 6627B, 6628B, 6628B-50, 6629B, 6629B-40, 6630B, 6630B-50, 6631B, 6635B, 6635B-40, 6637B, 6637B-40, 6645B, 6645B-40, 6647B, 6647B-40)	C17890	WILTRON
D9371-5	CONNECTOR ASSEMBLY, 2 OUTPUT (6640B, 6662B, 6668B, 6672B)	D9371-5	WILTRON
ND34208	CONNECTOR ASSEMBLY (6609B, 6609B-50, 6610B)	ND34208	WILTRON

Figure A1-4. A4 RF Deck Assembly (3 of 3)

NOTE

Refer to Figure A1-5 for a matrix showing RF Deck Assembly loading for each model.

MODEL	Fxd Attenuator	Isolator	Filter	Match Mod	Down Converter	RF Adap/Conn	L. Det	PIN Switch		Frequency Doubler	WG Adapter	Frequency Tripler	YIG Oscillator (Includes YIG Driver PCB				Step Attenuator	*ALC Assembly	MODEL
								1	2				1	2	3	4			^
6609B	1010-28		1030-26	D9342	C8090-5			D18696									ND35875		**6609B**
6609B-50	1010-28		1030-26	D9342	C8090-4												ND35875		**6609B-50**
6610B			1030-21			516-32	C7907										ND35875		**6610B**
6616B		1000-26	1030-24														ND35875	ND35633	**6616B**
6617B	1010-28				C8090-5			D18696					ND35902				ND35875	ND35633	**6617B**
6617B-40					C8090-4			D18696					ND35904				ND35875	ND35633	**6617B-40**
6619B			1030-26														ND35875	ND35633	**6619B**
6619B-40			1030-26														ND35875	ND35633	**6619B-40**
6620B																	ND35875	ND35633	**6620B**
6621B								D18696									ND35875	ND35633	**6621B**
6621B-40								D18696									ND35875	ND35633	**6621B-40**
6622B																	ND35875	ND35633	**6622B**
6622B-40																	ND35875	ND35633	**6622B-40**
6624B	1000-29		1030-26														ND35875	ND35633	**6624B**
6627B																	ND35875	ND35633	**6627B**
6628B		1000-21	1030-29			516-32											ND35875	ND35633	**6628B**
6628B-50		1000-21				516-32											ND35875	ND35633	**6628B-50**
6629B								D18696									ND35875	ND35633	**6629B**
6629B-40								D18696									ND35875	ND35633	**6629B-40**
6630B			1030-31			516-32											ND35875	ND35633	**6630B**
6630B-50																	ND35875	ND35633	**6630B-50**
6631B		1000-31	B22941														ND35875	ND35633	**6631B**
6632B		1000-33	B22941					D15606									ND35875	ND35633	**6632B**
6635B		1000-21	1030-26										ND35905	ND35921	ND35937		ND35875	ND35633	**6635B**
6635B-40		1000-21											ND35906	ND35922	ND35938		ND35875	ND35633	**6635B-40**
6636B		1000-33															ND35875	ND35633	**6636B**
6637B								D18696					ND35908	ND35924	ND35940		ND35875	ND35633	**6637B**
6637B-40								D18696					ND35910	ND35926	ND35942		ND35875	ND35633	**6637B-40**
6640B																			**6640B**
6640B-10																	ND35875		**6640B-10**
6645B	1010-28	1000-21	1030-26		C8090-5								ND35905	ND35921	ND35937		ND35875	ND35633	**6645B**
6645B-40	1010-28	1000-21			C8090-4								ND35906	ND35922	ND35938		ND35875	ND35633	**6645B-40**
6647B	1010-28				C8090-5			D18696					ND35908	ND35924	ND35940		ND35875	ND35633	**6647B**
6647B-40	1010-29	1000-21			C8090-5			D18696					ND35910	ND35926	ND35942		ND35875	ND35633	**6647B-40**
6653B		1000-21 1000-33	1030-26					C19611					ND35914	ND35930	ND35946	ND35955	ND35876	ND35634	**6653B**
6659B	1010-28	1000-21 1000-33	1030-26		C8090-5			C19611					ND35914	ND35930	ND35946	ND35955	ND35876	ND35634	**6659B**
6660B	43KB-6		1030-31					D13355	D13611	A34323	B13498						ND35878	ND35634	**6660B**
6662B			1030-31					B17620	B13404	B13749								ND35634	**6662B**
6663B	43KB-6		1030-31					D22185	D13611	A34323	B13498		ND35916	ND35932	ND35948	ND35957	ND35878	ND35634	**6663B**
6668B	1010-28		1030-31		C8090-5			B17620	B13404	B13749								ND35634	**6668B**
6669B	1010-40 43KB-6	1000-21 1000-33	1030-26 1030-29 1030-31 1030-32		C8090-5			D22185	D13611	60-49	B13498		ND35916	ND35932	ND35948	ND35957	ND35878	ND35634	**6669B**
6672B		1000-37	1030-32								A38846	1040-15							**6672B**

MODEL	Transistors					Power Supply ICs		MODEL
	2N6044	20-43	2N6041	7815	LM340T	54-184	20-5	
6609B	2	1				1	1	**6609B**
6609B-50						1	1	**6609B-50**
6610B	1	1		1		1	1	**6610B**
6616B	1	1	1		1	1	1	**6616B**
6617B						1	1	**6617B**
6617B-40						1	1	**6617B-40**
6619B	1	1			1	1	1	**6619B**
6619B-40	1	1			1	1	1	**6619B-40**
6620B						1	1	**6620B**
6621B						1	1	**6621B**
6621B-40	2	1	2			1	1	**6621B-40**
6622B								**6622B**
6622B-40								**6622B-40**
6624B	1	1		1		1	1	**6624B**
6627B						1	1	**6627B**
6628B	1	1		1		1	1	**6628B**
6628B-50	1	1		1		1	1	**6628B-50**
6629B						1	1	**6629B**
6629B-40	2	1	2			1	1	**6629B-40**
6630B	1	1		1		1	1	**6630B**
6630B-50								**6630B-50**
6631B	1	1		1		1	1	**6631B**
6632B	2	1				1	1	**6632B**
6635B								**6635B**
6635B-40								**6635B-40**
6636B								**6636B**
6637B	3	3	3			1	1	**6637B**
6637B-40	3	3	3			1	1	**6637B-40**
6640B								**6640B**
6640B-10								**6640B-10**
6645B								**6645B**
6645B-40								**6645B-40**
6647B	3	3	3			1	1	**6647B**
6647B-40	3	3	3			1	1	**6647B-40**
6653B	4	4	4			1	1	**6653B**
6659B	4	4	4			1	1	**6659B**
6660B	2		1			1	1	**6660B**
6662B						1	1	**6662B**
6663B						1	1	**6663B**
6668B	4		1	2		1	1	**6668B**
6669B	4	4		2	2	1	1	**6669B**
6672B	2		1			1	1	**6672B**

Table A1-7. A1A1 PCB Parts List (1 of 2)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C1	250-19	CAPACITOR,FXD,TANT,1µF,10%,35V	199D105X9035HE3	SPRAGUE
C3	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C4	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C5	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C6	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C7	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C8	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C9	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C10	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C11	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C12	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C13	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C14	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
P2	551-216	CONNECTOR,HDR,PC MNT,26-PIN DUAL	65611-126	BERG
P3	551-216	CONNECTOR,HDR,PC MNT,26-PIN DUAL	65611-126	BERG
P4	551-207	CONNECTOR,HDR,PC MNT,3-PIN	65507-103	BERG
P6	551-422	CONNECTOR,HEADER,PCB MNT	65610-110	BERG
P8	551-207	CONNECTOR,HDR,PC MNT,3 PIN	65507-103	BERG
Q1	20-2N4249	TRANSISTOR,PNP,2N4249,Si,LOW N	MPS4249-18	MOTOROLA
R1	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R2	110-150K-1	RESISTOR,FXD,MF,150KΩ,1%,0.25W		
R3	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R5	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R6	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R7	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,.025W	RN 1/4-T1-1K-1%	STACKPOLE
R9	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,.025W	RN 1/4-T1-1K-1%	STACKPOLE
R10	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,.025W	RN 1/4-T1-1K-1%	STACKPOLE
R11	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
RN2	123-9	RESISTOR,NETWORK,MF,9X10KΩ,2%,0	4310R-101-103	BOURNS
U2	54-74LS138	IC,TTL,74LS138,3-TO-8 DECODE	SN74LS138N	TEXAS INSTRUMENTS
U3	54-74LS138	IC,TTL,74LS138,3-TO-8 DECODE	SN74LS138N	TEXAS INSTRUMENTS
U4	54-74LS138	IC,TTL,74LS138,3-TO-8 DECODE	SN74LS138N	TEXAS INSTRUMENTS
U5		CALL FACTORY		
U7	54-74LS138	IC,TTL,74LS138,3-TO-8 DECODE	SN74LS138N	TEXAS INSTRUMENTS
U8	54-103	IC,TTL,74LS373,OCTAL,TRANSPARE	DM74LS373N	NATIONAL SEMICON.
U9	54-492	IC,TTL,74F538,SINGLE	74F538PC	FAIRCHILD
U10	54-74LS04	IC,TTL,74LS04,HEX,INVERTERS	74LS04PC	FAIRCHILD
U11	54-74LS01	IC,TTL,74LS01,QUAD	N74LS01N	SIGNETICS
U12	54-93	IC,MICROPROCESSOR,8085A	P8085A	INTEL
U13	54-143	IC,TTL,74LS244,OCTAL,BUFFER	DM74LS244N	NATIONAL SEMICOND.
U14	54-492	IC,TTL,74F538,SINGLE	74F538PC	FAIRCHILD
U15	54-74LS32	IC,TTL,74LS32,QUAD	DM74LS32N	NATIONAL SEMICOND.
U16	54-316	IC,MICROPROCESSOR,8259A	P8259A	INTEL
U17	54-143	IC,TTL,74LS244,OCTAL	DM74LS244N	NATIONAL SEMICOND.
U18	54-143	IC,TTL,74LS244,OCTAL	DM74LS244N	NATIONAL SEMICOND.

Table A1-7. A1A1 PCB Parts List (2 of 2)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
U19	54-41	IC,TTL,74LS374,OCTAL	DM74LS374N	NATIONAL SEMICOND.
U20	54-103	IC,TTL,74LS373,OCTAL	DM74LS373N	NATIONAL SEMICOND.
U21	54-124	IC,MICROPROCESSOR,8291A	P8291A	INTEL
U22	54-332	IC,TTL,75161A,8 CHANNELS,GPIB	DN75161AN	NATIONAL SEMICOND.
U23	54-331	IC,TTL,75160A,8 CHANNELS,GPIB	DS75160AN	NATIONAL SEMICOND.
U24	54-44	IC,TTL,74LS74,DUAL	DM74LS74AN	NATIONAL SEMICOND.
U25	54-44	IC,TTL,74LS74,DUAL	DM74LS74AN	NATIONAL SEMICOND.
U26	54-41	IC,TTL,74LS374,OCTAL	DM74LS374N	NATIONAL SEMICOND.
U27	54-41	IC,TTL,74LS374,OCTAL	DM74LS374N	NATIONAL SEMICOND.
U28	54-74LS112	IC,TTL,74LS112	74LS112PC	FAIRCHILD
U29	54-42	IC,TTL,74LS10,TRIPLE	DM74LS10N	NATIONAL SEMICOND.
U30	54-120	IC,TTL,74LS191	N74LS191N	SIGNETICS
Y1	630-17	CRYSTAL,6.000MHZ,±0.005%	6.000MHZ	CRYSTEK CRYSTAL

Table A1-8. A1A2 PCB Parts List (1 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C1	250-58	CAPACITOR,FXD,TANT,68µF,10%,6V	199D686X9006KE3	SPRAGUE
C2	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C3	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C4	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C5	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C6	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C7	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C8	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C9	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C10	223-270	CAPACITOR,FXD,MICA,270pF,5%,100V	DM10D271JO100WV	ELMENCO
C11	250-77	CAPACITOR,FXD,CER,0.01µF,10%,100V	CK05BX103K	SPRAGUE
C12	250-77	CAPACITOR,FXD,CER,0.01µF,10%,100V	CK05BX103K	SPRAGUE
C13	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C14	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C15	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C16	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C17	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C18	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C19	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C20	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C21	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C22	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C23	210-59	CAPACITOR,FXD,PEST,1.0uF,10%,250V	NRM105K250V	NIC
C24	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C25	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C26	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C27	210-32	CAPACITOR,FXD,PEST,0.47µF,10%	ECQ-E2474KZS	PANASONIC
CR1	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR2	10-1N823	DIODE,ZENER,1N823,6.2V,5%	1N823	MOTOROLA
CR3	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR4	10-1N751A	DIODE,ZENER,1N751A,5.1V,5%	1N751A	MOTOROLA
CR5	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR6	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR7	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR8	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR9	10-1N751A	DIODE,ZENER,1N751A,5.1V,5%	1N751A	MOTOROLA
CR10	10-4	DIODE,SCHOTTKY MIXER,MBD501	MBD501	MOTOROLA
CR11	10-1N758A	DIODE,ZENER,1N758A,10V,5%	1N758A	MOTOROLA
CR12	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR13	10-1N751A	DIODE,ZENER,1N751A,5.1V,5%	1N751A	MOTOROLA
CR14	10-1N746A	DIODE,ZENER,1N746,3.3V,10%	1N746	MOTOROLA
CR15	10-1N751A	DIODE,ZENER,1N751A,5.1V,5%	1N751A	MOTOROLA
CR16	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446 T+R	NATIONAL SEMICOND.
K1	690-28	RELAY,CRADLE,2C,5V	MR62-5SR	NEC
Q1	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694-18	MOTOROLA

Table A1-8. A1A2 PCB Parts List (2 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
Q2	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249-18	MOTOROLA
Q3	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694-18	MOTOROLA
Q4	20-2N3904	TRANSISTOR,NPN,2N3904,Si	2N3904	MOTOROLA
Q5	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694-18	MOTOROLA
Q6	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249-18	MOTOROLA
Q7	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694-18	MOTOROLA
Q8	20-17	TRANSISTOR,FET,J112,SI	J-112-18	SILICONIX
Q9	20-17	TRANSISTOR,FET,J112,SI	J-112-18	SILICONIX
Q10	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694-18	MOTOROLA
Q11	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249-18	MOTOROLA
Q12	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694-18	MOTOROLA
Q13	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249-18	MOTOROLA
R1	110-1.15K-1	RESISTOR,FXD,MF,1.15KΩ,1%,0.25W	RN 1/4-T1-1K15-1%	STACKPOLE
R2	110-17.4K-1	RESISTOR,FXD,MF,17.4KΩ,1%,0.25W		
R3	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R4	110-9.76K-1	RESISTOR,FXD,MF,9.76KΩ,1%,0.25W		
R5	110-56.2-1	RESISTOR,FXD,MF,56.2,1%,0.25W	RN 1/4-TI-56E2-1%	STACKPOLE
R6	156-200K	RESISTOR,TRIM,CER,200KΩ,10%,1T	72XWR200K	BECKMAN
R7	110-1M-1	RESISTOR,FXD,MF,1MΩ,1%,0.25W	RN 1/4-T1-1M-1%	STACKPOLE
R8	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R9	110-2.74K-1	RESISTOR,FXD,MF,2.74KΩ,1%,0.25W		
R10	156-10K	RESISTOR,TRIM,CER,10KΩ,10%,1T	72XWR-10K	BECKMAN
R11	110-10.2K-1	RESISTOR,FXD,MF,10.2KΩ,1%,0.25W		
R12	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R13	110-1.07K-1	RESISTOR,FXD,MF,1.07KΩ,1%,0.25W	RN 1/4-T1-1K07-1%	STACKPOLE
R14	110-19.6K-1	RESISTOR,FXD,MF,19.6KΩ,1%,0.25W	RN 1/4-T1-19K6-1%	STACKPOLE
R15	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R16	110-392K-1	RESISTOR,FXD,MF,392KΩ,1%,0.25W		
R17	156-500K	RESISTOR,TRIM,CER,500KΩ,10%,1T	72XWR500K	BECKMAN
R18	110-3.48K-1	RESISTOR,FXD,MF,3.48KΩ,1%,0.25W	RN 1/4-TI-3K48-1%	STACKPOLE
R19	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R20	110-100-1	RESISTOR,FXD,MF,100,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R21	110-2.43K-1	RESISTOR,FXD,MF,2.43KΩ,1%,0.25W		
R22	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R23	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R24	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R25	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R26	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R27	110-511-1	RESISTOR,FXD,MF,511,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R28	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R29	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R30	110-1.1K-1	RESISTOR,FXD,MF,1.10KΩ,1%,0.25W	RN 1/4-T1-1K1-1%	STACKPOLE
R31	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R32	110-9.53K-1	RESISTOR,FXD,MF,9.53KΩ,1%,0.25W		
R33	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE

Table A1-8. A1A2 PCB Parts List (3 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R34	110-49.9K-1	RESISTOR,FXD,MF,49.9KΩ,1%,0.25W	RN 1/4-TI-49K9-1%	STACKPOLE
R35	110-100-1	RESISTOR,FXD,MF,100,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R36	110-14.7K-1	RESISTOR,FXD,MF,14.7KΩ,1%,0.25W	RN 1/4-T1-14K7-1%	STACKPOLE
R37	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R38	110-14.7K-1	RESISTOR,FXD,MF,14.7KΩ,1%,0.25W	RN 1/4-T1-14K7-1%	STACKPOLE
R39	156-1K	RESISTOR,TRIM,CER,1KΩ,10%,1T	72XWR1K	BECKMAN
R40	110-14.7K-1	RESISTOR,FXD,MF,14.7KΩ,1%,0.25W	RN 1/4-T1-14K7-1%	STACKPOLE
R41	101-2.2M-5	RESISTOR,FXD,CC,, 2.2MΩ,5%,0.25W	RC07GF225J	ALLEN BRADLEY
R42	110-49.9K-1	RESISTOR,FXD,MF,49.9KΩ,1%,0.25W	RN 1/4-TI-49K9-1%	STACKPOLE
R43	110-14.7K-1	RESISTOR,FXD,MF,14.7KΩ,1%,0.25W	RN 1/4-T1-14K7-1%	STACKPOLE
R44	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R45	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R46	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R47	110-1.21K-1	RESISTOR,FXD,MF,1.21KΩ,1%,0.25W	RN 1/4-T1-1K21-1%	STACKPOLE
R48	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R49	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R50	110-140K-1	RESISTOR,FXD,MF,140KΩ,1%,0.25W		
R51	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R52	110-511-1	RESISTOR,FXD,MF,511,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R53	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R54	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R55	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R56	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R57	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,.025	RN 1/4-T1-1K-1%	STACKPOLE
R58	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R59	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R61	110-3.48K-1	RESISTOR,FXD,MF,3.48KΩ,1%,0.25W	RN 1/4-TI-3K48-1%	STACKPOLE
R63	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R64	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R65	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R66	110-140K-1	RESISTOR,FXD,MF,140KΩ,1%,0.25W		
R67	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R69	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,.025W	RN 1/4-T1-1K-1%	STACKPOLE
R70	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R71	110-3.48K-1	RESISTOR,FXD,MF,3.48KΩ,1%,0.25W	RN 1/4-TI-3K48-1%	STACKPOLE
R73	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R74	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R75	110-1.21M-1	RESISTOR,FXD,MF,1.21MΩ,1%,0.25W	RN1/4-(T1)M21-1%	STACKPOLE
R76	156-200K	RESISTOR,TRIM,CER,200KΩ,10%,1T	72XWR200K	BECKMAN
R77	110-1M-1	RESISTOR,FXD,MF,1MΩ,1%,0.25W	RN 1/4-T1-1M-1%	STACKPOLE
R78	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R79	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R80	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,.025W	RN 1/4-T1-1K-1%	STACKPOLE
S1	420-14	SWITCH,SLIDE,2PDT,PC MT VERT	124-441-020	CHICAGO SWITCH
U1	54-44	IC,TTL,74LS74,DUAL,D FLIP FLOP	DM74LS74AN	NATIONAL SEMICOND.

Table A1-8. A1A2 PCB Parts List (4 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
U2	54-74LS08	IC,TTL,74LS08,QUAD,2-INPUT AND	SN74LS08P	MOTOROLA
U3	54-555	IC,OP AMP,NE555,SINGLE	LM555CN	RCA SOLID STATE
U4	54-60	IC,TTL,74LS161,SYNCH BINARY	DM74LS161AN	NATIONAL SEMICOND.
U5	54-74LS04	IC,TTL,74LS04,HEX,INVERTERS	74LS04PC	FAIRCHILD
U6	54-74LS138	IC,TTL,74LS138,3 TO 8 DECODER	SN74LS138N	TEXAS INSTRUMENTS
U7	54-41	IC,TTL,74LS374,OCTAL,D FLIP FLOP	DM74LS374N	NATIONAL SEMICOND.
U8	54-59	IC,TTL,74LS157,QUAD,2 TO 1 MUX	74LS157B1	SGS SEMICOND.
U9	54-120	IC,TTL,74LS191,SYNCH BINARY COUNTER	N74LS191N	SIGNETICS
U10	54-105	IC,TTL,74LS05,HEX,OC INVERTERS	DM74LS05N	NATIONAL SEMICOND.
U11	54-44	IC,TTL,74LS74,DUAL,D FLIP FLOP	DM74LS74AN	NATIONAL SEMICOND.
U12	54-59	IC,TTL,74LS157,QUAD,2 TO 1 MUX	74LS157B1	SGS SEMICOND.
U13	54-120	IC,TTL,74LS191,SYNCH BIN COU	N74LS191N	SIGNETICS
U14	54-41	IC,TTL,74LS374,OCTAL,D FLIP FLOP	DM74LS374N	NATIONAL SEMICOND.
U15	54-129	IC,D/A,AD7524,8BITS	AD7524JN	ANALOG DEVICES
U16	54-44	IC,TTL,74LS74,DUAL,D FLIP FLOP	DM74LS74AN	NATIONAL SEMICOND.
U17	54-74LS00	IC,TTL,74LS00,QUAD,2 INPUT NAND	SN74LS00P	MOTOROLA
U18	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS
U19	54-119	IC,TTL,74LS151,1 OF 8 MUX	SN74LS151P	MOTOROLA
U20	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS
U21	54-24	IC,ANALOG SWITCH,DG201,QUAD	DG201ACJ	SILICONIX
U22	54-44	IC,TTL,74LS74,DUAL,D FLIP FLOP	DM74LS74AN	NATIONAL SEMICOND.
U23	54-74LS20	IC,TTL,74LS20,DUAL,4 INPUT NAND	DM74LS20N	NATIONAL SEMICOND.
U24	54-44	IC,TTL,74LS74,DUAL,D FLIP FLOP	DM74LS74AN	NATIONAL SEMICOND.
U25	54-45	IC,COMPARATOR,LM339,QUAD	LM339N	NATIONAL SEMICOND.
U26	54-44	IC,TTL,74LS74,DUAL,D FLIP FLOP	DM74LS74AN	NATIONAL SEMICOND.
U27	54-57	IC,TTL,74LS02,QUAD,2 INPUT NOR	DM74LS02N	NATIONAL SEMICOND.
U28	50-DG200BA	IC,ANALOG SWITCH,DG200,DUAL	DG200ABA	SILICONIX

Table A1-9. A1A3 PCB Parts List (1 of 7)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C1	250-58	CAPACITOR,FXD,TANT,68µF,10%,6V	199D686X9006KE3	SPRAGUE
C2	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C3	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C4	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C5	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS ,KMET	
C8	250-40	CAPACITOR,FXD,TANT,2.2µF,20%,25V	199D225X002HE3	SPRAGUE
C11	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C12	220-20	CAPACITOR,FXD,MICA,20pF,5%,500V	CM05ED200J03	ARCO
C13	220-20	CAPACITOR,FXD,MICA,20pF,5%,500V	CM05ED200J03	ARCO
C14	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C15	220-20	CAPACITOR,FXD,MICA,20pF,5%,500V		
C16	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C17	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C18	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C19	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C20	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C21	220-20	CAPACITOR,FXD,MICA,20pF,5%,500V		
C22	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C23	220-20	CAPACITOR,FXD,MICA,20pF,5%,500V		
C24	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C25	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C26	220-20	CAPACITOR,FXD,MICA,20pF,5%,500V		
C27	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C28	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C29	220-20	CAPACITOR,FXD,MICA,20pF,5%,500V		
C30	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C31	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C32	220-20	CAPACITOR,FXD,MICA,20pF,5%,500VV		
C33	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C34	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C35	220-20	CAPACITOR,FXD,MICA,20pF,5%,500		
C36	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C37	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C38	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C39	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C40	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C41	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C42	223-3	CAPACITOR,FXD,MICA,3pF,0.5pF,500V	CD10CD030D03	CORNELL DUBILIER
C43	223-3	CAPACITOR,FXD,MICA,3pF,0.5pF,500V	CD10CD030D03	CORNELL DUBILIER
C44	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
CR1	10-1N4744A	DIODE,ZENER,1N4744A,15V,5%	1N4744A	MOTOROLA
CR2	10-4	DIODE,SCHOTTKY MIXER,MBD501	MBD501	MOTOROLA
CR3	10-4	DIODE,SCHOTTKY MIXER,MBD501	MBD501	MOTOROLA
CR4	10-4	DIODE,SCHOTTKY MIXER,MBD501	MBD501	MOTOROLA

Table A1-9. A1A3 PCB Parts List (2 of 7)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
CR5	10-1N4751	DIODE,ZENER,1N4751A,30V,5%	1N4751A	MOTOROLA
CR6	10-4	DIODE,SCHOTTKY MIXER,MBD501	MBD501	MOTOROLA
CR7	10-4	DIODE,SCHOTTKY MIXER,MBD501	MBD501	MOTOROLA
CR8	10-4	DIODE,SCHOTTKY MIXER,MBD501	MBD501	MOTOROLA
CR9	10-4	DIODE,SCHOTTKY MIXER,MBD501	MBD501	MOTOROLA
CR10	10-4	DIODE,SCHOTTKY MIXER,MBD501	MBD501	MOTOROLA
CR11	10-4	DIODE,SCHOTTKY MIXER,MBD501	MBD501	MOTOROLA
CR12	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR13	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR14	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR15	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR16	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR17	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR18	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR19	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR20	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR21	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR22	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR23	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR24	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR25	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR26	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR27	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR28	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR29	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR30	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR31	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR32	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR33	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR34	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR35	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR36	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR37	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR38	10-1N4751	DIODE,ZENER,1N4751A,30V,5%	1N4751A	MOTOROLA
Q1	20-2N2907A	TRANSISTOR,PNP,2N2907A,Si	2N2907A	MOTOROLA
Q3	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694	MOTOROLA
R1	110-4.75K-1	RESISTOR,FXD,MF,4.75KΩ,1%,0.25W	RN 1/4-TI-4K75-1%	STACKPOLE
R2	110-4.75K-1	RESISTOR,FXD,MF,4.75KΩ,1%,0.25W	RN 1/4-TI-4K75-1%	STACKPOLE
R9	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R10	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R11	110-511K-1	RESISTOR,FXD,MF,511KΩ,1%,0.25W	RN 1/4-TI-511K-1%	STACKPOLE
R12	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R13	156-50K	RESISTOR,TRIM,CER,50KΩ,10%,1T	72XWR50K	BECKMAN
R14	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE

Table A1-9. A1A3 PCB Parts List (3 of 7)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R15	110-5.11-1	RESISTOR,FXD,MF,5.11,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R16	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R17	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R18	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R19	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R20	110-511K-1	RESISTOR,FXD,MF,511KΩ,1%,0.25W	RN 1/4-TI-511K-1%	STACKPOLE
R21	156-50K	RESISTOR,TRIM,CER,50KΩ,10%,1T	72XWR50K	BECKMAN
R22	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R23	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R24	110-5.11-1	RESISTOR,FXD,MF,5.11,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R25	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R26	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R27	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R28	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R29	110-511K-1	RESISTOR,FXD,MF,511KΩ,1%,0.25W	RN 1/4-TI-511K-1%	STACKPOLE
R30	156-50K	RESISTOR,TRIM,CER,50KΩ,10%,1T	72XWR50K	BECKMAN
R31	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R32	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R33	110-5.11-1	RESISTOR,FXD,MF,5.11,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R34	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R35	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R36	110-5.11-1	RESISTOR,FXD,MF,5.11,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R38	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R39	110-511K-1	RESISTOR,FXD,MF,511KΩ,1%,0.25W	RN 1/4-TI-511K-1%	STACKPOLE
R40	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R41	156-50K	RESISTOR,TRIM,CER,50KΩ,10%,1T	72XWR50K	BECKMAN
R42	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R43	110-5.11-1	RESISTOR,FXD,MF,5.11,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R44	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R45	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R47	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R48	110-511K-1	RESISTOR,FXD,MF,511KΩ,1%,0.25W	RN 1/4-TI-511K-1%	STACKPOLE
R49	156-50K	RESISTOR,TRIM,CER,50KΩ,10%,1T	72XWR50K	BECKMAN
R50	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R51	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R52	110-5.11-1	RESISTOR,FXD,MF,5.11,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R53	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R54	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R56	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R57	110-511K-1	RESISTOR,FXD,MF,511KΩ,1%,0.25W	RN 1/4-TI-511K-1%	STACKPOLE
R58	156-50K	RESISTOR,TRIM,CER,50KΩ,10%,1T	72XWR50K	BECKMAN
R59	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R60	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R61	110-5.11-1	RESISTOR,FXD,MF,5.11,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE

Table A1-9. A1A3 PCB Parts List (4 of 7)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R62	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R63	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R65	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R66	110-511K-1	RESISTOR,FXD,MF,511KΩ,1%,0.25W	RN 1/4-TI-511K-1%	STACKPOLE
R67	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R68	156-50K	RESISTOR,TRIM,CER,50KΩ,10%,1T	72XWR50K	BECKMAN
R69	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R70	110-5.11-1	RESISTOR,FXD,MF,5.11,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R71	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R72	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R74	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R75	110-511K-1	RESISTOR,FXD,MF,511KΩ,1%,0.25W	RN 1/4-TI-511K-1%	STACKPOLE
R76	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R77	156-50K	RESISTOR,TRIM,CER,50KΩ,10%,1T	72XWR50K	BECKMAN
R78	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R79	110-5.11-1	RESISTOR,FXD,MF,5.11,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R80	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R81	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R82	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R83	110-205K-1	RESISTOR,FXD,MF,205KΩ,1%,0.25W		
R84	110-205K-1	RESISTOR,FXD,MF,205KΩ,1%,0.25W		
R85	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R86	156-50K	RESISTOR,TRIM,CER,50KΩ,10%,1T	72XWR50K	BECKMAN
R87	110-24.9K-1	RESISTOR,FXD,MF,24.9KΩ,1%,0.25W		
R88	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R89	110-4.64K-1	RESISTOR,FXD,MF,4.64KΩ,1%,0.25W	RN 1/4-TI-4K64-1%	STACKPOLE
R90	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R91	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R92	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R93	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R94	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R96	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R97	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R98	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R99	110-4.64K-1	RESISTOR,FXD,MF,4.64KΩ,1%,0.25W	RN 1/4-TI-4K64-1%	STACKPOLE
R100	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R101	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R102	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R104	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R105	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R106	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R107	110-4.64K-1	RESISTOR,FXD,MF,4.64KΩ,1%,0.25W	RN 1/4-TI-4K64-1%	STACKPOLE
R108	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R109	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE

Table A1-9. A1A3 PCB Parts List (5 of 7)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R110	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R112	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R114	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R115	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R116	110-4.64K-1	RESISTOR,FXD,MF,4.64KΩ,1%,0.25W	RN 1/4-TI-4K64-1%	STACKPOLE
R117	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R118	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R119	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R121	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R122	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R123	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R124	110-4.64K-1	RESISTOR,FXD,MF,4.64KΩ,1%,0.25W	RN 1/4-TI-4K64-1%	STACKPOLE
R125	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R126	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R127	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R129	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R130	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R131	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R132	110-4.64K-1	RESISTOR,FXD,MF,4.64KΩ,1%,0.25W	RN 1/4-TI-4K64-1%	STACKPOLE
R133	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R134	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R135	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R137	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R138	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R139	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R140	110-4.64K-1	RESISTOR,FXD,MF,4.64KΩ,1%,0.25W	RN 1/4-TI-4K64-1%	STACKPOLE
R141	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R142	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R143	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R145	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R146	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R147	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R148	110-4.64K-1	RESISTOR,FXD,MF,4.64KΩ,1%,0.25W	RN 1/4-TI-4K64-1%	STACKPOLE
R149	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R150	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R151	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R153	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R154	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R155	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R156	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R157	110-49.9K-1	RESISTOR,FXD,MF,49.9KΩ,1%,0.25W	RN 1/4-TI-49K9-1%	STACKPOLE
R158	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R159	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R160	110-133K-1	RESISTOR,FXD,MF,133KΩ,1%,0.25W	MR25133K 1%	MWPCO

Table A1-9. A1A3 PCB Parts List (6 of 7)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R161	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R162	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R163	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R164	110-133K-1	RESISTOR,FXD,MF,133KΩ,1%,0.25W	MR25133K 1%	MWPCO
R165	110-12.4K-1	RESISTOR,FXD,MF,12.4KΩ,1%,0.25W		
R166	110-2.49K-1	RESISTOR,FXD,MF,2.49KΩ,1%,0.25W		
R168	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R169	110-8.06K-1	RESISTOR,FXD,MF,8.06KΩ,1%,0.25W		
R170	110-8.06K-1	RESISTOR,FXD,MF,8.06KΩ,1%,0.25W		
R171	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R172	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R174	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R175	110-196-1	RESISTOR,FXD,MF,196,1%,0.25W	RN 1/4-T1-196E-1%	STACKPOLE
R176	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R177	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R178	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R179	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R180	110-12.4K-1	RESISTOR,FXD,MF,12.4KΩ,1%,0.25W		
R181	110-2.49K-1	RESISTOR,FXD,MF,2.49KΩ,1%,0.25W		
R182	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R183	110-23.7K-1	RESISTOR,FXD,MF,23.7KΩ,1%,0.25W	RN 1/4-T1-23K7-1%	STACKPOLE
R184	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R185	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R186	110-4.75K-1	RESISTOR,FXD,MF,4.75KΩ,1%,0.25W	RN 1/4-TI-4K75-1%	STACKPOLE
U1	54-534	IC,CMOS,74HCT374,OCTAL,3-STATE	MC74HCT374N	MOTOROLA
U2	54-528	IC,CMOS,74HCT138,SINGLE,1-8	SN74HCT138N	TEXAS INSTRUMENTS
U3	54-502	IC,VOLTAGE REG,LT1031,10V	LT1031CCH	LINEAR TECHNOLOGY
U4	54-129	IC,D/A,AD7524,8BITS	AD7524JN	ANALOG DEVICES
U5	54-129	IC,D/A,AD7524,8BITS	AD7524JN	ANALOG DEVICES
U6	54-129	IC,D/A,AD7524,8BITS	AD7524JN	ANALOG DEVICES
U7	54-534	IC,CMOS,74HCT374,OCTAL,3-STATE	MC74HCT374N	MOTOROLA
U8	54-494	IC,TTL,74AS757,OCTAL,BUFFER	SN74AS757N	TEXAS INSTRUMENTS
U9	54-132	IC,OP AMP,TL074CN3,QUAD	TL074CN3	TEXAS INSTRUMENTS
U10	54-132	IC,OP AMP,TL074CN3,QUAD	TL074CN3	TEXAS INSTRUMENTS
U13	54-129	IC,D/A,AD7524,8BITS	AD7524JN	ANALOG DEVICES
U14	54-129	IC,D/A,AD7524,8BITS	AD7524JN	ANALOG DEVICES
U15	54-129	IC,D/A,AD7524,8BITS	AD7524JN	ANALOG DEVICES
U16	54-534	IC,CMOS,74HCT374,OCTAL,3-STATE	MC74HCT374N	MOTOROLA
U17	54-132	IC,OP AMP,TL074CN3,QUAD	TL074CN3	TEXAS INSTRUMENTS
U18	54-132	IC,OP AMP,TL074CN3,QUAD	TL074CN3	TEXAS INSTRUMENTS
U19	54-494	IC,TTL,74AS757,OCTAL,BUFFER	SN74AS757N	TEXAS INSTRUMENTS
U21	54-129	IC,D/A,AD7524,8BITS	AD7524JN	ANALOG DEVICES
U22	54-129	IC,D/A,AD7524,8BITS	AD7524JN	ANALOG DEVICES
U23	54-129	IC,D/A,AD7524,8BITS	AD7524JN	ANALOG DEVICES

Table A1-9. A1A3 PCB Parts List (7 of 7)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
U24	54-132	IC,OP AMP,TL074CN3,QUAD	TL074CN3	TEXAS INSTRUMENTS
U25	54-132	IC,OP AMP,TL074CN3,QUAD	TL074CN3	TEXAS INSTRUMENTS
U26	54-132	IC,OP AMP,TL074CN3,QUAD	TL074CN3	TEXAS INSTRUMENTS
U27	54-96	IC,TTL,74LS09,QUAD,2 INPUT AND	DM74LS09N	NATIONAL SEMICOND.
U28	54-158	IC,COMPARATOR,LM393,DUAL	LM393N	SIGNETICS
U29	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS

Table A1-10. A1A4 PCB Parts List (1 of 5)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C1	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C2	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C3	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C4	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C5	250-58	CAPACITOR,FXD,TANT,68µF,10%,6V	199D686X9006KE3	SPRAGUE
C6	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C7	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C8	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C9	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C10	220-27	CAPACITOR,FXD,MICA,27pF,5%,500V	CD15ED270J03	CORNELL DUBILIER
C11	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C12	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C13	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C14	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C15	230-11	CAPACITOR,FXD,CER,0.01µF,100V	TGS10	SPRAGUE
C16	230-11	CAPACITOR,FXD,CER,0.01µF,100V	TGS10	SPRAGUE
C17	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C18	230-11	CAPACITOR,FXD,CER,0.01µF,100V	TGS10	SPRAGUE
C19	230-36	CAPACITOR,FXD,CER,4700pF,20%,2	GPK-472MC	MURATA/ERIE
C20	230-27	CAPACITOR,FXD,CER,0.02µF	.02 UF +80-20	RMC
C21	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C22	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C23	250-51	CAPACITOR,FXD,ALUM,47µF,63V	T3073FE470T063JPT	PHILIPS COMPONENTS
C25	230-11	CAPACITOR,FXD,CER,0.01µF,100V	TGS10	SPRAGUE
C26	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
CR1	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR2	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR3	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR4	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR5	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR6	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR7	10-1N823	DIODE,ZENER,1N823,6.2V,5%	1N823	MOTOROLA
CR8	10-1N751A	DIODE,ZENER,1N751A,5.1V,5%	1N751A	MOTOROLA
CR9	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR10	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR11	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CF12	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR13	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR14	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR15	10-4	DIODE,SCHOTTKY MIXER,MBD501	MBD501	MOTOROLA
CR16	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR17	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR19	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR20	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
Q1	20-2N2222A	TRANSISTOR,NPN,2N2222A,Si	2N2222A	MOTOROLA

Table A1-10. A1A4 PCB Parts List (2 of 5)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
Q2	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249-18	MOTOROLA
Q3	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249-18	MOTOROLA
Q4	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694-18	MOTOROLA
Q5	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694-18	MOTOROLA
R1	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R2	110-8.25K-1	RESISTOR,FXD,MF,8.25KΩ,1%,0.25W	RN 1/4-T1-8K25-1%	STACKPOLE
R3	156-10K	RESISTOR,TRIM,CER,10KΩ,10%,1T	72XWR-10K	BECKMAN
R4	110-3.01K-1	RESISTOR,FXD,MF,3.01KΩ,1%,0.25W	RN 1/4-TI-3K01-1%	STACKPOLE
R5	157-20K	RESISTOR,TRIM,CER,20KΩ,10%,20T	89PR20K	BECKMAN
R6	156-10K	RESISTOR,TRIM,CER,10KΩ,10%,1T	72XWR-10K	BECKMAN
R7	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R8	110-54.9K-1	RESISTOR,FXD,MF,54.9KΩ,1%,0.25W		
R9	156-20K	RESISTOR,TRIM,CER,20KΩ,10%,1T	72XWR-20K	BECKMAN
R10	110-5.49K-1	RESISTOR,FXD,MF,5.49KΩ,1%,0.25W		
R11	157-20K	RESISTOR,TRIM,CER,20KΩ,10%,20T	89PR20K	BECKMAN
R12	156-10K	RESISTOR,TRIM,CER,10KΩ,10%,1T	72XWR-10K	BECKMAN
R13	110-64.9K-1	RESISTOR,FXD,MF,64.9KΩ,1%,0.25W		
R14	110-316K-1	RESISTOR,FXD,MF,316KΩ,1%,0.25W	RN 1/4-TI-316K-1%	STACKPOLE
R15	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R16	110-115K-1	RESISTOR,FXD,MF	115KΩ,1%,0.25W	
R17	110-5.49K-1	RESISTOR,FXD,MF,5.49KΩ,1%,0.25W		
R18	110-5.49K-1	RESISTOR,FXD,MF,5.49KΩ,1%,0.25W		
R19	157-20K	RESISTOR,TRIM,CER,20KΩ,10%,20T	89PR20K	BECKMAN
R20	110-64.9K-1	RESISTOR,FXD,MF,64.9KΩ,1%,0.25W		
R21	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R22	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R23	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R24	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R25	110-1.07K-1	RESISTOR,FXD,MF,1.07KΩ,1%,0.25W	RN 1/4-T1-1K07-1%	STACKPOLE
R26	110-19.6K-1	RESISTOR,FXD,MF,19.6KΩ,1%,0.25W	RN 1/4-T1-19K6-1%	STACKPOLE
R27	110-12.1K-1	RESISTOR,FXD,MF,12.1KΩ,1%,0.25W	RN 1/4-T1-12K1-1%	STACKPOLE
R28	110-10.2K-1	RESISTOR,FXD,MF,10.2KΩ,1%,0.25W		
R29	110-16.5K-1	RESISTOR,FXD,MF,16.5KΩ,1%,0.25W		
R31	110-51.1-1	RESISTOR,FXD,MF,51.1Ω,1%,0.25W	RN 1/4-TI-51E1-1%	STACKPOLE
R32	110-51.1-1	RESISTOR,FXD,MF,51.1Ω,1%,0.25W	RN 1/4-TI-51E1-1%	STACKPOLE
R34	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R35	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R36	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R37	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R38	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R39	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R40	113-900-0.1	RESISTOR,FXD,MF,900Ω,0.1%,0.125W	RN55C	
R41	113-900-0.1	RESISTOR,FXD,MF,900Ω,0.1%,0.125W	RN55C	
R42	110-12.4K-1	RESISTOR,FXD,MF,12.4KΩ,1%,0.25W		
R43	110-261-1	RESISTOR,FXD,MF,261Ω,1%,0.25W	RN 1/4-TI-261E-1%	STACKPOLE

Table A1-10. A1A4 PCB Parts List (3 of 5)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R44	110-261-1	RESISTOR,FXD,MF,261Ω,1%,0.25W	RN 1/4-TI-261E-1%	STACKPOLE
R45	110-12.4K-1	RESISTOR,FXD,MF,12.4KΩ,1%,0.25W		
R46	110-604-1	RESISTOR,FXD,MF,604Ω,1%,0.25W	RN 1/4-TI-604E-1%	STACKPOLE
R47	110-576-1	RESISTOR,FXD,MF,576Ω,1%,0.25W		
R48	110-12.4K-1	RESISTOR,FXD,MF,12.4KΩ,1%,0.25W		
R49	110-1.82K-1	RESISTOR,FXD,MF,1.82KΩ,1%,0.25W		
R50	110-953-1	RESISTOR,FXD,MF,953Ω,1%,0.25W		
R51	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R52	110-54.9K-1	RESISTOR,FXD,MF,54.9KΩ,1%,0.25W		
R53	110-15K-1	RESISTOR,FXD,MF,15.0KΩ,1%,0.25W		
R54	110-12.4K-1	RESISTOR,FXD,MF,12.4KΩ,1%,0.25W		
R55	110-487-1	RESISTOR,FXD,MF,487Ω,1%,0.25W	RN 1/4-TI-487E-1%	STACKPOLE
R56	110-464-1	RESISTOR,FXD,MF,464Ω,1%,0.25W	RN 1/4-TI-464E-1%	STACKPOLE
R57	110-12.4K-1	RESISTOR,FXD,MF,12.4KΩ,1%,0.25W		
R58	110-2.43K-1	RESISTOR,FXD,MF,2.43KΩ,1%,0.25		
R59	110-2.05K-1	RESISTOR,FXD,MF,2.05KΩ,1%,0.25W		
R60	110-12.4K-1	RESISTOR,FXD,MF,12.4KΩ,1%,0.25W		
R61	110-12.4K-1	RESISTOR,FXD,MF,12.4KΩ,1%,0.25W		
R62	113-20K-0.1	RESISTOR,FXD,MF,20.0KΩ,0.1%,0.25W		
R63	113-20K-0.1	RESISTOR,FXD,MF,20.0KΩ,0.1%,0.25W		
R64	113-20K-0.1	RESISTOR,FXD,MF,20.0KΩ,0.1%,0.25W		
R65	113-20K-0.1	RESISTOR,FXD,MF,20.0KΩ,0.1%,0.25W		
R66	157-2K	RESISTOR,TRIM,CER,2KΩ,10%,20T	3006P-1-202	BOURNS
R67	110-2.37K-1	RESISTOR,FXD,MF,2.37KΩ,1%,0.25W	RN 1/4-T1-2K37-1%	STACKPOLE
R68	157-2K	RESISTOR,TRIM,CER,2KΩ,10%,20T	3006P-1-202	BOURNS
R69	110-1.47K-1	RESISTOR,FXD,MF,1.47KΩ,1%,0.25W	RN 1/4-T1-1K47-1%	STACKPOLE
R70	157-2K	RESISTOR,TRIM,CER,2KΩ,10%,20T	3006P-1-202	BOURNS
R71	110-8.25K-1	RESISTOR,FXD,MF,8.25KΩ,1%,0.25W	RN 1/4-T1-8K25-1%	STACKPOLE
R72	157-2K	RESISTOR,TRIM,CER,2KΩ,10%,20T	3006P-1-202	BOURNS
R73	110-7.87K-1	RESISTOR,FXD,MF,7.87KΩ,1%,0.25W		
R74	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R75	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R76	101-10M-5	RESISTOR,FXD,CC,10MΩ,5%,0.25W	RC07GF106J	ALLEN BRADLEY
R77	110-133K-1	RESISTOR,FXD,MF,133KΩ,1%,0.25W	MR25133K 1%	MWPCO
R78	110-2.49K-1	RESISTOR,FXD,MF,2.49KΩ,1%,0.25W		
R79	110-8.66K-1	RESISTOR,FXD,MF,8.66KΩ,1%,0.25W		
R80	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R81	110-6.49K-1	RESISTOR,FXD,MF,6.49KΩ,1%,0.25W		
R82	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R83	110-11.3K-1	RESISTOR,FXD,MF,11.3KΩ,1%,0.25W		
R84	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R85	110-8.25K-1	RESISTOR,FXD,MF,8.25KΩ,1%,0.25W	RN 1/4-T1-8K25-1%	STACKPOLE
R86	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R87	110-8.66K-1	RESISTOR,FXD,MF,8.66KΩ,1%,0.25W		
R88	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN

Table A1-10. A1A4 PCB Parts List (4 of 5)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R89	110-11K-1	RESISTOR,FXD,MF,11KΩ,1%,0.25W		
R90	156-5K	RESISTOR,TRIM,CER,5KΩ,10%,1T	72XWR-5K	BECKMAN
R91	110-1M-1	RESISTOR,FXD,MF,1MΩ,1%,0.25W	RN 1/4-T1-1M-1%	STACKPOLE
R92	110-1M-1	RESISTOR,FXD,MF,1MΩ,1%,0.25W	RN 1/4-T1-1M-1%	STACKPOLE
R93	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R94	110-1M-1	RESISTOR,FXD,MF,1MΩ,1%,0.25W	RN 1/4-T1-1M-1%	STACKPOLE
R95	110-1M-1	RESISTOR,FXD,MF,1MΩ,1%,0.25W	RN 1/4-T1-1M-1%	STACKPOLE
R96	110-1M-1	RESISTOR,FXD,MF,1MΩ,1%,0.25W	RN 1/4-T1-1M-1%	STACKPOLE
R97	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R98	110-1M-1	RESISTOR,FXD,MF,1MΩ,1%,0.25W	RN 1/4-T1-1M-1%	STACKPOLE
R99	110-26.7K-1	RESISTOR,FXD,MF,26.7KΩ,1%,0.25W		
R100	110-42.2K-1	RESISTOR,FXD,MF,42.2KΩ,1%,0.25W	RN 1/4-TI-42K2-1%	STACKPOLE
R101	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R102	110-30.1K-1	RESISTOR,FXD,MF,30.1KΩ,1%,0.25W	RN 1/4-TI-30K1-1%	STACKPOLE
R103	157-5K	RESISTOR,TRIM,CER,5KΩ,10%,20T	89PR5K	BECKMAN
R104	110-301K-1	RESISTOR,FXD,MF,301KΩ,1%,0.25W		
R105	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R106	110-9.76K-1	RESISTOR,FXD,MF,9.76KΩ,1%,0.25W		
R107	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R108	110-511K-1	RESISTOR,FXD,MF,511KΩ,1%,0.25W	RN 1/4-TI-511K-1%	STACKPOLE
R109	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R110	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R111	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R112	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R113	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R114	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R115	156-20K	RESISTOR,TRIM,CER,20KΩ,10%,1T	72XWR-20K	BECKMAN
R116	110-8.25K-1	RESISTOR,FXD,MF,8.25KΩ,1%,0.25W	RN 1/4-T1-8K25-1%	STACKPOLE
R117	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R118	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R119	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R120	110-15K-1	RESISTOR,FXD,MF,15.0KΩ,1%,0.25W		
R121	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R122	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R123	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R124	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R125	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R126	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R127	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R128	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R129	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R130	110-4.02K-1	RESISTOR,FXD,MF,4.02KΩ,1%,0.25W		
R131	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R132	110-4.02K-1	RESISTOR,FXD,MF,4.02KΩ,1%,0.25W		
R133	110-4.02K-1	RESISTOR,FXD,MF,4.02KΩ,1%,0.25W		

Table A1-10. A1A4 PCB Parts List (5 of 5)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R134	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R135	110-4.02K-1	RESISTOR,FXD,MF,4.02KΩ,1%,0.25W		
R136	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R137	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R138	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R139	110-649-1	RESISTOR,FXD,MF,649Ω,1%,0.25W		
R140	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R141	110-887-1	RESISTOR,FXD,MF,887Ω,1%,0.25W		
R142	156-20K	RESISTOR,TRIM,CER,20KΩ,10%,1T	72XWR-20K	BECKMAN
R143	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R144	110-15K-1	RESISTOR,FXD,MF,15.0KΩ,1%,0.25W		
R145	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R146	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R147	110-3.01K-1	RESISTOR,FXD,MF,3.01KΩ,1%,0.25W	RN 1/4-TI-3K01-1%	STACKPOLE
R148	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R149	110-8.25K-1	RESISTOR,FXD,MF,8.25KΩ,1%,0.25W	RN 1/4-T1-8K25-1%	STACKPOLE
R150	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
RP1	123-1	RESISTOR,NETWORK,MF,7X1KΩ,2%,0.	784-1-R1K	BECKMAN
U1	54-74LS00	IC,TTL,74LS00,QUAD,2 INPUT NAN	SN74LS00P	MOTOROLA
U2	54-74LS04	IC,TTL,74LS04,HEX,INVERTERS	74LS04PC	FAIRCHILD
U3	54-42	IC,TTL,74LS10,TRIPLE,3-INPUT NAND	DM74LS10N	NATIONAL SEMICOND.
U4	54-503	IC,OP-AMP,LT1007,SINGLE	LT1007CN8	LINEAR TECHNOLOGY
U5	54-24	IC,ANALOG SWITCH,DG201,QUAD	DG201ACJ	SILICONIX
U6	54-503	IC,OP-AMP,LT1007,SINGLE	LT1007CN8	LINEAR TECHNOLOGY
U7	54-503	IC,OP-AMP,LT1007,SINGLE	LT1007CN8	LINEAR TECHNOLOGY
U8	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS
U9	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS
U10	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS
U11	54-MC3302P	IC,COMPARATOR,LM3302,QUAD	MC3302	MOTOROLA
U12	54-6	IC,OP AMP,CA3054	LM3054N	NATIONAL SEMICOND.
U13	54-6	IC,OP AMP,CA3054	LM3054N	NATIONAL SEMICOND.
U14	50-9	IC,OP AMP,LF356,SINGLE	LF356N	NATIONAL SEMICOND.
U15	54-6	IC,OP AMP,CA3054	LM3054N	NATIONAL SEMICOND.
U16	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS
U17	54-24	IC,ANALOG SWITCH,DG201,QUAD	DG201ACJ	SILICONIX
U18	54-132	IC,OP AMP,TL074CN3,QUAD	TL074CN3	TEXAS INSTRUMENTS
U19	54-132	IC,OP AMP,TL074CN3,QUAD	TL074CN3	TEXAS INSTRUMENTS
U20	54-24	IC,ANALOG SWITCH,DG201,QUAD	DG201ACJ	SILICONIX
U21	50-9	IC,OP AMP,LF356,SINGLE	LF356N	NATIONAL SEMICOND.
U22	54-129	IC,D/A,AD7524,8BITS	AD7524JN	ANALOG DEVICES
U23	54-74LS132	IC,TTL,74LS132,QUAD,NAND SCHMI	DM74LS132N	NATIONAL SEMICOND.
U24	54-41	IC,TTL,74LS374,OCTAL,D FLIP FL	DM74LS374N	NATIONAL SEMICOND.
U25	54-74LS75	IC,TTL,74LS75,4 BIT,LATCH	SN74LS75N	TEXAS INSTRUMENTS

Table A1-11. A1A5 PCB Parts List (1 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C1	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035ASC	KMET
C2	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C3	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C4	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C5	223-100	CAPACITOR,FXD,MICA,100pF,5%,50	CD10FD101J03	CORNELL DUBILIER
C9	223-100	CAPACITOR,FXD,MICA,100pF,5%,50	CD10FD101J03	CORNELL DUBILIER
C6	223-560	CAPACITOR,FXD,CER,560pF,10%,100V	1C10COG561K050B	SPRAGUE
C8	223-560	CAPACITOR,FXD,CER,560pF,10%,100V	1C10COG561K050B	SPRAGUE
C10	223-560	CAPACITOR,FXD,CER,560pF,10%,100V	1C10COG561K050B	SPRAGUE
C12	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C13	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C14	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C15	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C16	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C17	250-40	CAPACITOR,FXD,TANT,2.2µF,20%,25V	199D225X002HE3	SPRAGUE
C18	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C19	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C20	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C21	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C22	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C23	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C24	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C25	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C26	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C27	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C28	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C29	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C30	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C31	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C32	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C33	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C34	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C35	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C36	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C39	250-40	CAPACITOR,FXD,TANT,2.2µF,20%,25V	199D225X002HE3	SPRAGUE
C40	223-560	CAPACITOR,FXD,CER,560pF,10%,100V	1C10COG561K050B	SPRAGUE
C42	223-100	CAPACITOR,FXD,MICA,100pF,5%,500V	CD10FD101J03	CORNELL DUBILIER
C43	223-100	CAPACITOR,FXD,MICA,100pF,5%,500V	CD10FD101J03	CORNELL DUBILIER
C44	223-100	CAPACITOR,FXD,MICA,100pF,5%,500V	CD10FD101J03	CORNELL DUBILIER
C45	223-100	CAPACITOR,FXD,MICA,100pF,5%,500V	CD10FD101J03	CORNELL DUBILIER
C46	223-100	CAPACITOR,FXD,MICA,100pF,5%,500V	CD10FD101J03	CORNELL DUBILIER
C47	223-100	CAPACITOR,FXD,MICA,100pF,5%,500V	CD10FD101J03	CORNELL DUBILIER
C48	220-300	CAPACITOR,FXD,MICA,300pF,5%,500V	CM05FD301J03	ARCO
C49	220-300	CAPACITOR,FXD,MICA,300pF,5%,500V	CM05FD301J03	ARCO

Table A1-11. A1A5 PCB Parts List (2 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
CR1	10-1N4744A	DIODE,ZENER,1N4744A,15V,5%	1N4744A	MOTOROLA
L1	310-53	INDUCTOR,FXD,47.0UH,5%	1537-60	DELEVAN
L2	310-53	INDUCTOR,FXD,47.0UH,5%	1537-60	DELEVAN
L3	310-53	INDUCTOR,FXD,47.0UH,5%	1537-60	DELEVAN
P2	551-207	CONNECTOR,HDR,PC MNT,3 PIN	65507-103	BERG
P3	551-207	CONNECTOR,HDR,PC MNT,3 PIN	65507-103	BERG
Q1	20-2N2907A	TRANSISTOR,PNP,2N2907A,Si,MED-	2N2907A	MOTOROLA
Q2	20-2N6041	TRANSISTOR,PNP,2N6041,Si,DARLI	2N6041	MOTOROLA
Q3	20-2N2907A	TRANSISTOR,PNP,2N2907A,Si,MED-	2N2907A	MOTOROLA
R1	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R3	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R4	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R6	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R8	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R9	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R10	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R12	113-30K-0.1	RESISTOR,FXD,30.0KΩ,0.1%,0.125W		
R13	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R14	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R15	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R16	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R19	110-4.75K-1	RESISTOR,FXD,MF,4.75KΩ,1%,0.25W	RN 1/4-TI-4K75-1%	STACKPOLE
R20	110-4.75K-1	RESISTOR,FXD,MF,4.75KΩ,1%,0.25W	RN 1/4-TI-4K75-1%	STACKPOLE
R21	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R22	110-5.11-1	RESISTOR,FXD,MF,5.11,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R23	158-8	RESISTOR,TRIM,CER,10KΩ,10%,1T	A2B103	ALLEN BRADLEY
R24	110-3.92K-1	RESISTOR,FXD,MF,3.92KΩ,1%,0.25W		
R25	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R35	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R36	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R37	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R38	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R42	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R43	113-30K-0.1	RESISTOR,FXD,30.0KΩ,0.1%,0.125W		
R44	113-30K-0.1	RESISTOR,FXD,30.0KΩ,0.1%,0.125W		
R45	113-30K-0.1	RESISTOR,FXD,30.0KΩ,0.1%,0.125W		
R46	110-9.09K-1	RESISTOR,FXD,MF,9.09KΩ,1%,0.25W	RN 1/4-T1-9K09-1%	STACKPOLE
R47	156-2K	RESISTOR,TRIM,CER,2KΩ,10%,1T	72XWR2K	BECKMAN
R48	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R50	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R51	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R52	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R54	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R55	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE

Table A1-11. A1A5 PCB Parts List (3 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R56	110-2.37K-1	RESISTOR,FXD,MF,2.37KΩ,1%,0.25W	RN 1/4-T1-2K37-1%	STACKPOLE
R57	110-2.37K-1	RESISTOR,FXD,MF,2.37KΩ,1%,0.25W	RN 1/4-T1-2K37-1%	STACKPOLE
R58	110-3.92K-1	RESISTOR,FXD,MF,3.92KΩ,1%,0.25W		
R59	110-392-1	RESISTOR,FXD,MF,392,1%,0.25W		
R60	110-49.9K-1	RESISTOR,FXD,MF,49.9KΩ,1%,0.25W	RN 1/4-TI-49K9-1%	STACKPOLE
R61	110-90.9K-1	RESISTOR,FXD,MF,90.9KΩ,1%,0.25W	RN 1/4-TI-90K9-1%	STACKPOLE
R64	110-6.04K-1	RESISTOR,FXD,MF,6.04KΩ,1%,0.25W		
R67	110-49.9K-1	RESISTOR,FXD,MF,49.9KΩ,1%,0.25W	RN 1/4-TI-49K9-1%	STACKPOLE
R68	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R69	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R73	110-221-1	RESISTOR,FXD,MF,221,1%,0.25W		
RN1	123-6	RESISTOR,NETWORK,MF,7X10KΩ,2%	108A103	ALLEN-BRADLEY
RN2	123-1	RESISTOR,NETWORK,MF,7X1KΩ,2%	784-1-R1K	BECKMAN
U1	54-565	IC,DAC,AD7548,12 BIT	AD7548KN	ANALOG DEVICES
U2	54-503	IC,OP-AMP,LT1007,SINGLE	LT1007CN8	LINEAR TECHNOLOGY
U3	54-74LS175	IC,TTL,74LS175,QUAD,D FLIP FLOP	DM74LS175N	NATIONAL SEMICOND.
U4	54-148	IC,D/A,1408,8 BIT	AD1408-8	ANALOG DEVICES
U5	54-41	IC,TTL,74LS374,OCTAL,D FLIP FLOP	DM74LS374N	NATIONAL SEMICOND.
U6	54-503	IC,OP-AMP,LT1007,SINGLE	LT1007CN8	LINEAR TECHNOLOGY
U7	54-502	IC,VOLTAGE REG,LT1031,10V	LT1031CCH	LINEAR TECHNOLOGY
U8	54-74LS139	IC,TTL,74LS139,DUAL,2 TO 4 DEC	DM74LS139N	NATIONAL SEMICOND.
U9	54-460	IC,D/A,9331,16 BIT	MP9331-16-4	MICRO POWER SYS.
U10	54-503	IC,OP-AMP,LT1007,SINGLE	LT1007CN8	LINEAR TECHNOLOGY
U11	54-566	IC,TTL,74ALS534,OCTAL,INV D	DM74ALS534N	NATIONAL SEMICOND.
U12	54-566	IC,TTL,74ALS534,OCTAL,INV D	DM74ALS534N	NATIONAL SEMICOND.
U13	54-24	IC,ANALOG SWITCH,DG201,QUAD	DG201ACJ	SILICONIX
U14	54-503	IC,OP-AMP,LT1007,SINGLE	LT1007CN8	LINEAR TECHNOLOGY
U15	54-503	IC,OP-AMP,LT1007,SINGLE	LT1007CN8	LINEAR TECHNOLOGY
U16	54-565	IC,DAC,AD7548,12 BIT	AD7548KN	ANALOG DEVICES
U17	54-503	IC,OP-AMP,LT1007,SINGLE	LT1007CN8	LINEAR TECHNOLOGY
U18	54-74LS175	IC,TTL,74LS175,QUAD,D FLIP FLO	DM74LS175N	NATIONAL SEMICOND.
U19	54-24	IC,ANALOG SWITCH,DG201,QUAD	DG201ACJ	SILICONIX
U20	54-42	IC,TTL,74LS10,TRIPLE,3 INPUT N	DM74LS10N	NATIONAL SEMICOND.
U21	54-503	IC,OP-AMP,LT1007,SINGLE	LT1007CN8	LINEAR TECHNOLOGY
U22	54-503	IC,OP-AMP,LT1007,SINGLE	LT1007CN8	LINEAR TECHNOLOGY
U23	54-503	IC,OP-AMP,LT1007,SINGLE	LT1007CN8	LINEAR TECHNOLOGY
U24	54-503	IC,OP-AMP,LT1007,SINGLE	LT1007CN8	LINEAR TECHNOLOGY
U25	50-33	IC,OP AMP,LT1056,SINGLE	LT1056CN8	LINEAR TECHNOLOGY
U26	54-24	IC,ANALOG SWITCH,DG201,QUAD	DG201ACJ	SILICONIX
U27	54-148	IC,D/A,1408,8 BIT	AD1408-8	ANALOG DEVICES
U28	50-33	IC,OP AMP,LT1056,SINGLE	LT1056CN8	LINEAR TECHNOLOGY
U29	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS
U30	54-502	IC,VOLTAGE REG,LT1031,10V	LT1031CCH	LINEAR TECHNOLOGY
U31	54-24	IC,ANALOG SWITCH,DG201,QUAD	DG201ACJ	SILICONIX

Table A1-11. A1A5 PCB Parts List (4 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
U32	50-33	IC,OP AMP,LT1056,SINGLE	LT1056CN8	LINEAR TECHNOLOGY
U34	54-74LS00	IC,TTL,74LS00,QUAD,2 INPUT NAN	SN74LS00P	MOTOROLA
U35	54-503	IC,OP-AMP,LT1007,SINGLE	LT1007CN8	LINEAR TECHNOLOGY

Table A1-12. A1A6 PCB Parts List (1 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C1	250-39	CAPACITOR,FXD,TANT,4.7µF,20%,3	199D475X9035CA1	SPRAGUE
C2	250-39	CAPACITOR,FXD,TANT,4.7µF,20%,3	199D475X9035CA1	SPRAGUE
C3	250-39	CAPACITOR,FXD,TANT,4.7µF,20%,3	199D475X9035CA1	SPRAGUE
C4	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,2	ZA2C103G	IMB
C5	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,2	ZA2C103G	IMB
C6	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,2	ZA2C103G	IMB
C7	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,2	ZA2C103G	IMB
C8	230-30	CAPACITOR,FXD,CER,1000pF,500V	BGP.001,500V,+80-20	RMC
C9	250-41	CAPACITOR,FXD,TANT,6.8µF,10%,35V	199D685X9035DE3	SPRAGUE
C10	250-19	CAPACITOR,FXD,TANT,1µF,10%,35V	199D105X9035HE3	SPRAGUE
C11	250-19	CAPACITOR,FXD,TANT,1µF,10%,35V	199D105X9035HE3	SPRAGUE
C12	230-41	CAPACITOR,FXD,CER,1.0µF,20%,100V	400-100-601-105M	CENTRE ENGINEERING
C13	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C14	220-300	CAPACITOR,FXD,MICA,300pF,5%,500V	CM05FD301J03	ARCO
C15	220-5	CAPACITOR,FXD,MICA,5pF,0.5pF,500V	CD15CD050D03	CORNELL DUBILIER
C16	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C19	230-30	CAPACITOR,FXD,CER,1000pF,500V	BGP.001,500V,+80-20	RMC
C20	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C21	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V		
CR1	10-FD300	DIODE,RECTIFIER,IN3595	1N3595	SOLID STATE DEVICES
CR2	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR3	10-FD300	DIODE,RECTIFIER,IN3595	1N3595	SOLID STATE DEVICES
CR4	10-1N5359A	DIODE,ZENER,1N5359,24V,20%	1N5359A	MOTOROLA
CR5	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR6	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR7	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR8	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR9	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
J1	551-569	CONNECTOR,HEADER	M20-9990305	HARWIN ENG.
J2	551-569	CONNECTOR,HEADER	M20-9990305	HARWIN ENG.
K1	690-28	RELAY,CRADLE,2C,5V	MR62-5SR	NEC
Q1	20-MPSA92	TRANSISTOR,PNP,MPSA92,Si	MPSA92	MOTOROLA
Q2	20-MPSA92	TRANSISTOR,PNP,MPSA92,Si	MPSA92	MOTOROLA
Q3	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694-18	MOTOROLA
Q4	20-2N2222A	TRANSISTOR,NPN,2N2222A,Si	2N2222A	MOTOROLA
Q5	20-103	TRANSISTOR,PNP,2N4029,Si	2N4029	MOTOROLA
Q6	20-2N2222A	TRANSISTOR,NPN,2N2222A,Si	2N2222A	MOTOROLA
R1	156-20K	RESISTOR,TRIM,CER,20KΩ,10%,1T	72XWR-20K	BECKMAN
R2	110-61.9K-1	RESISTOR,FXD,MF,61.9KΩ,1%,0.25W	RN 1/4-TI-61K9-1%	STACKPOLE
R3	157-1K	RESISTOR,TRIM,CER,1KΩ,10%,20T	89PRIK	BECKMAN
R4	110-11K-1	RESISTOR,FXD,MF,11KΩ,1%,0.25W		
R5	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R6	157-1K	RESISTOR,TRIM,CER,1KΩ,10%,20T	89PRIK	BECKMAN
R7	113-11K-0.1	RESISTOR,FXD,MF,11KΩ,0.1%,0.125		
R8	113-10K-0.1A	RESISTOR,FXD,MF,10KΩ,0.1%		

Table A1-12. A1A6 PCB Parts List (2 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R9	157-200K	RESISTOR,TRIM,CER,200KΩ,10%,20T	89PR200K	BECKMAN
R12	157-50K	RESISTOR,TRIM,CER,50KΩ,10%,20T	89PR50K	BECKMAN
R13	110-3.57M-1	RESISTOR,FXD,3.57MΩ,1%	RN 1/4 T1 3.57M 1%	STACK POLE
R15	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R16	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R17	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R18	131-39	RESISTOR,FIXED,WW,5±3%	R3401	KRL
R18	131-41	RESISTOR,FXD,WW,5Ω,±3%	R3401A	KRL
R19	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R20	110-23.7K-1	RESISTOR,FXD,MF,23.7KΩ,1%,0.25W	RN 1/4-T1-23K7-1%	STACKPOLE
R21	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R22	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R23	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R24	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R25	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R26	110-7.5K-1	RESISTOR,FXD,MF,7.50KΩ,1%,0.25W	RN 1/4-TI-7K5-1%	STACKPOLE
R27	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R28	110-121-1	RESISTOR,FXD,MF,121Ω,1%,0.25W	RN 1/4-T1-121E-1%	STACKPOLE
R29	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R30	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R31	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R32	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R33	156-200K	RESISTOR,TRIM,CER,200KΩ,10%,1T	72XWR200K	BECKMAN
R34	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R35	156-20	RESISTOR,TRIM,CER,20Ω,20%,1T	72XWR20	BECKMAN
R36	110-15K-1	RESISTOR,FXD,MF,15.0KΩ,1%,0.25W		
R37	110-1.3K-1	RESISTOR,FXD,MF,1.30KΩ,1%,0.25W		
R38	110-8.87K-1	RESISTOR,FXD,MF,8.87KΩ,1%,0.25W		
R39	110-3.40K-1	RESISTOR,FXD,MF,3.40KΩ,1%,0.25W		
R40	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R41	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R42	110-17.8K-1	RESISTOR,FXD,MF,17.8KΩ,1%,0.25W	RN 1/4-T1-17K8-1%	STACKPOLE
R43	110-1.21K-1	RESISTOR,FXD,MF,1.21KΩ,1%,0.25W	RN 1/4-T1-1K21-1%	STACKPOLE
R44	110-15K-1	RESISTOR,FXD,MF,15.0KΩ,1%,0.25W		
R45	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R46	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R47	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R48	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R49	157-500	RESISTOR,TRIM,CER,500Ω,10%,2	89PR500	BECKMAN
R50	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R51	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R53	110-301-1	RESISTOR,FXD,MF,301Ω,1%,0.25W		
R54	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R55	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE

Table A1-12. A1A6 PCB Parts List (3 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R56	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R57	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R58	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R59	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R60	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R61	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R62	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R63	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R64	110-499-1	RESISTOR,FXD,MF,499Ω,1%,0.25W	RN 1/4-TI-499E-1%	STACKPOLE
R65	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R66	110-2M-1	RESISTOR,FXD,MF,2MΩ,1%,0.25W		
R67	157-500	RESISTOR,TRIM,CER,500Ω,10%,2	89PR500	BECKMAN
R68	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R69	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R70	110-2M-1	RESISTOR,FXD,MF,2MΩ,1%,0.25W		
R71	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R72	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R73	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R77	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R78	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R79	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R80	156-100K	RESISTOR,TRIM,CER,100KΩ,10%,1T	72XWR100K	BECKMAN
R81	110-1M-1	RESISTOR,FXD,MF,1MΩ,1%,0.25W	RN 1/4-T1-1M-1%	STACKPOLE
R83	157-10K	RESISTOR,TRIM,CER,10KΩ,10%,20T	89PR-10K	BECKMAN
R84	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R85	110-18.7K-1	RESISTOR,FXD,MF,18.7KΩ,1%,0.25W		
R86	110-536K-1	RESISTOR,FXD,MF,536KΩ,1%,0.25W		
R87	110-18.7K-1	RESISTOR,FXD,MF,18.7KΩ,1%,0.25W		
R88	110-536K-1	RESISTOR,FXD,MF,536KΩ,1%,0.25W		
R89	110-18.7K-1	RESISTOR,FXD,MF,18.7KΩ,1%,0.25W		
R90	110-18.7K-1	RESISTOR,FXD,MF,18.7KΩ,1%,0.25W		
R91	110-18.7K-1	RESISTOR,FXD,MF,18.7KΩ,1%,0.25W		
R92	110-18.7K-1	RESISTOR,FXD,MF,18.7KΩ,1%,0.25W		
R93	157-2K	RESISTOR,TRIM,CER,2KΩ,10%,20T	3006P-1-202	BOURNS
R94	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R95	157-50K	RESISTOR,TRIM,CER,50KΩ,10%,20T	89PR50K	BECKMAN
R96	110-205K-1	RESISTOR,FXD,MF,205KΩ,1%,0.25W		
R97	110-75K-1	RESISTOR,FXD,MF,75.0KΩ,1%,0.25W	RN 1/4-TI-75K-1%	STACKPOLE
U1	54-24	IC,ANALOG SWITCH,DG201,QUAD	DG201ACJ	SILICONIX
U2	54-61	IC,OP AMP,UA714,SINGLE	RC714CNB	RAYTHEON
U3	54-42	IC,TTL,74LS10,TRIPLE,3-INPUT NAND	DM74LS10N	NATIONAL SEMICOND.
U4	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS
U5		CALL FACTORY		
U6	54-MC3302P	IC,COMPARATOR,LM3302,QUAD	MC3302	MOTOROLA
U7	54-125	IC,TTL,74LS86,QUAD	DM74LS86N	NATIONAL SEMICOND.

Table A1-12. A1A6 PCB Parts List (4 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
U9	54-132	IC,OP AMP,TL074CN3,QUAD	TL074CN3	TEXAS INSTRUMENTS
U10	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS
VR1	54-502	IC,VOLTAGE REG,LT1031,10V	LT1031CCH	LINEAR TECHNOLOGY

Table A1-13. A1A7 PCB Parts List (1 of 3)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C1	250-39	CAPACITOR,FXD,TANT,4.7µF,20%,35V	199D475X9035CA1	SPRAGUE
C2	250-39	CAPACITOR,FXD,TANT,4.7µF,20%,35V	199D475X9035CA1	SPRAGUE
C3	250-39	CAPACITOR,FXD,TANT,4.7µF,20%,35V	199D475X9035CA1	SPRAGUE
C4	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C5	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C6	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C7	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C8	230-30	CAPACITOR,FXD,CER,1000pF	BGP.001,500V,+80-20	RMC
C9	250-41	CAPACITOR,FXD,TANT,6.8µF,10%,35V	199D685X9035DE3	SPRAGUE
C10	250-19	CAPACITOR,FXD,TANT,1µF,10%,35V	199D105X9035HE3	SPRAGUE
C11	250-19	CAPACITOR,FXD,TANT,1µF,10%,35V	199D105X9035HE3	SPRAGUE
C12	230-41	CAPACITOR,FXD,CER,1.0µF,20%,100V	400-100-601-105M	CENTRE ENGINEERING
C13	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C14	220-300	CAPACITOR,FXD,MICA,300pF,5%,50V	CM05FD301J03	ARCO
C15	220-5	CAPACITOR,FXD,MICA,5pF,0.5pF,5	CD15CD050D03	CORNELL DUBILIER
C16	230-37	CAPACITOR,FXD,CER,0.1µF,20%,10	RPE122901Z5U104M100V	MURATA/ERIE
C17	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
CR1	10-FD300	DIODE,RECTIFIER,IN3595	1N3595	SOLID STATE DEVICES
CR2	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR3	10-FD300	DIODE,RECTIFIER,IN3595	1N3595	SOLID STATE DEVICES
CR4	10-1N5359A	DIODE,ZENER,1N5359,24V,20%	1N5359A	MOTOROLA
CR5	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR6	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR7	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR8	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR9	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
J1	551-569	CONNECTOR,HEADER	M20-9990305	HARWIN ENG.
J2	551-569	CONNECTOR,HEADER	M20-9990305	HARWIN ENG.
K1	690-28	RELAY,CRADLE,2C,5V	MR62-5SR	NEC
Q1	20-MPSA92	TRANSISTOR,PNP,MPSA92,Si	MPSA92	MOTOROLA
Q2	20-MPSA92	TRANSISTOR,PNP,MPSA92,Si	MPSA92	MOTOROLA
Q3	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694-18	MOTOROLA
Q4	20-2N2222A	TRANSISTOR,NPN,2N2222A,Si	2N2222A	MOTOROLA
Q5	20-103	TRANSISTOR,PNP,2N4029,Si	2N4029	MOTOROLA
Q6	20-2N2222A	TRANSISTOR,NPN,2N2222A,Si	2N2222A	MOTOROLA
R1	156-20K	RESISTOR,TRIM,CER,20KΩ,10%,1T	72XWR-20K	BECKMAN
R2	110-61.9K-1	RESISTOR,FXD,MF,61.9KΩ,1%,0.25W	RN 1/4-TI-61K9-1%	STACKPOLE
R3	157-1K	RESISTOR,TRIM,CER,1KΩ,10%,20T	89PRIK	BECKMAN
R4	110-11K-1	RESISTOR,FXD,MF,11KΩ,1%,0.25W		
R5	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R6	157-1K	RESISTOR,TRIM,CER,1KΩ,10%,20T	89PRIK	BECKMAN
R7	113-11K-0.1	RESISTOR,FXD,MF,11KΩ,0.1%,0.125W		
R8	113-10K-0.1A	RESISTOR,FXD,MF,10KΩ,0.1%,0.125W		
R9	157-200K	RESISTOR,TRIM,CER,200KΩ,10%,20T	89PR200K	BECKMAN
R11	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE

Table A1-13. A1A7 PCB Parts List (2 of 3)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R12	157-50K	RESISTOR,TRIM,CER,50KΩ,10%,20T	89PR50K	BECKMAN
R13	110-3.57M-1	RESISTOR,FXD,3.57MΩ,1%,0.25W	RN 1/4 T1 3.57M 1%	STACK POLE
R14	110-3.32M-1	RESISTOR,FXD,3.32MΩ,1%,0.25W	RN 1/4 T1 3.32M 1%	STACK POLE
R15	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R16	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R17	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R18	131-39	RESISTOR,FIXED,WW,5Ω±3% **(-4)**	R3401	KRL
R18	131-41	RESISTOR,FXD,WW,5Ω,±3% **(-4)**	R3401A	KRL
R18	131-38	RESISTOR,FIXED,WW,2Ω,±3% **(-5)**	R3399	KRL
R18	131-40	RESISTOR FIXED,WW,2Ω,±3% **(-5)**	R3399A	KRL
R19	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R20	110-23.7K-1	RESISTOR,FXD,MF,23.7KΩ,1%,0.25W	RN 1/4-T1-23K7-1%	STACKPOLE
R21	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R22	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R23	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R24	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R25	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R26	110-7.5K-1	RESISTOR,FXD,MF,7.50KΩ,1%,0.25W	RN 1/4-TI-7K5-1%	STACKPOLE
R27	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R28	110-121-1	RESISTOR,FXD,MF,121Ω,1%,0.25W	RN 1/4-T1-121E-1%	STACKPOLE
R29	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R30	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R31	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R32	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R33	156-200K	RESISTOR,TRIM,CER,200KΩ,10%,1T	72XWR200K	BECKMAN
R34	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R35	156-20	RESISTOR,TRIM,CER,20Ω,20%,1T	72XWR20	BECKMAN
R36	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R37	110-750-1	RESISTOR,FXD,MF,750Ω,1%,0.25W	RN 1/4-TI-750-1%	STACKPOLE
R38	110-5.49K-1	RESISTOR,FXD,MF,5.49KΩ,1%,0.25W		
R39	110-1.78K-1	RESISTOR,FXD,MF,1.78KΩ,1%,0.25W	RN 1/4-T1-1K78-1%	STACKPOLE
R40	110-2.15K-1	RESISTOR,FXD,MF,2.15KΩ,1%,0.25W	RN 1/4-T1-2K15-1%	STACKPOLE
R41	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R42	110-17.8K-1	RESISTOR,FXD,MF,17.8KΩ,1%,0.25W	RN 1/4-T1-17K8-1%	STACKPOLE
R43	110-1.21K-1	RESISTOR,FXD,MF,1.21KΩ,1%,0.25W	RN 1/4-T1-1K21-1%	STACKPOLE
R44	110-15K-1	RESISTOR,FXD,MF,15.0KΩ,1%,0.25W		
R45	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R46	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R47	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R48	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R49	157-500	RESISTOR,TRIM,CER,500Ω,10%,2	89PR500	BECKMAN
R50	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE

Note: The "-4" and "-5" numbers that appear in boldface type are the assembly dash numbers. That is, the parts are on assembly D32107-4 or D32107-5. Parts not marked otherwise, are part of assembly D32107-3.

Table A1-13. A1A7 PCB Parts List (3 of 3)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R51	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R53	110-301-1	RESISTOR,FXD,MF,301Ω,1%,0.25W		
R54	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R55	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R56	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R57	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R58	110-511K-1	RESISTOR,FXD,MF,511KΩ,1%,0.25W	RN 1/4-TI-511K-1%	STACKPOLE
R59	110-511K-1	RESISTOR,FXD,MF,511KΩ,1%,0.25W	RN 1/4-TI-511K-1%	STACKPOLE
R60	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R61	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R62	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R63	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R64	110-499-1	RESISTOR,FXD,MF,499Ω,1%,0.25W	RN 1/4-TI-499E-1%	STACKPOLE
U1	54-24	IC,ANALOG SWITCH,DG201,QUAD	DG201ACJ	SILICONIX
U2	54-61	IC,OP AMP,UA714,SINGLE	RC714CNB	RAYTHEON
U3	54-7410	IC,TTL,7410,TRIPLE,3-INPUT NAND	DM7410N	NATIONAL SEMICOND.
U4	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS
U5		CALL FACTORY		
U6	54-158	IC,COMPARATOR,LM393,DUAL	LM393N	SIGNETICS
U7	54-125	IC,TTL,74LS86,QUAD	DM74LS86N	NATIONAL SEMICOND.
U10	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS
VR1	54-502	IC,VOLTAGE REG,LT1031,10V	LT1031CCH	LINEAR TECHNOLOGY

Table A1-14. A1A8 PCB (D8008) Parts List (1 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C1	250-39	CAPACITOR,FXD,TANT,4.7µF,20%,35V	199D475X9035CA1	SPRAGUE
C2	250-39	CAPACITOR,FXD,TANT,4.7µF,20%,35V	199D475X9035CA1	SPRAGUE
C3	250-39	CAPACITOR,FXD,TANT,4.7µF,20%,35V	199D475X9035CA1	SPRAGUE
C4	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C5	230-30	CAPACITOR,FXD,CER,1000pF,500V	BGP.001,500V	RMC (-4
C5	230-36	CAPACITOR,FXD,CER,4700pF,20%,200V	GPK-472MC	MURATA/ERIE (-8)
C6	250-19	CAPACITOR,FXD,TANT,1µF,10%,35V	199D105X9035HE3	SPRAGUE
C7	250-19	CAPACITOR,FXD,TANT,1µF,10%,35V	199D105X9035HE3	SPRAGUE
C8	230-41	CAPACITOR,FXD,CER,1.0µF,20%,100V	400-100-601-105M	CENTRE ENGINEERING
C9	220-300	CAPACITOR,FXD,MICA,300pF,5%,500V	CM05FD301J03	ARCO
C10	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C11	250-41	CAPACITOR,FXD,TANT,6.8µF,10%,35V	199D685X9035DE3	SPRAGUE
C12	220-5	CAPACITOR,FXD,MICA,5pF,0.5pF,500V	CD15CD050D03	CORNELL DUBILIER
C13	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C14	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C16	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C17	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C18	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C19	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C20	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
CR1	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR2	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR3	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR4	10-1N4749A	DIODE,ZENER,1N4749,24V,10%	1N4749A	MOTOROLA
CR5	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR6	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR7	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR8	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR9	10-1N758A	DIODE,ZENER,1N758A,10V,5%	1N758A	MOTOROLA
CR10	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR11	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR12	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
K1	690-28	RELAY,CRADLE,2C,5V	MR62-5SR	NEC
Q1	20-MPSA92	TRANSISTOR,PNP,MPSA92,Si	MPSA92	MOTOROLA
Q2	20-MPSA92	TRANSISTOR,PNP,MPSA92,Si	MPSA92	MOTOROLA
Q3	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694-18	MOTOROLA
Q4	20-2N2222A	TRANSISTOR,NPN,2N2222A,Si	2N2222A	MOTOROLA
Q5	20-2N2907A	TRANSISTOR,PNP,2N2907A,Si	2N2907A	MOTOROLA
Q6	20-2N2222A	TRANSISTOR,NPN,2N2222A,Si	2N2222A	MOTOROLA
Q7	20-2N2907A	TRANSISTOR,PNP,2N2907A,Si	2N2907A	MOTOROLA
R1	101-3.3M-5	RESISTOR,FXD,CC	3.3MΩ,5%,0.25W	RC07GF335J
R2	157-50K	RESISTOR,TRIM,CER,50KΩ,10%,20T	89PR50K	BECKMAN
R3	101-3.6M-5	RESISTOR,FXD,CC	3.6MΩ,5%,0.25W	RC07GF365J
R4	110-61.9K-1	RESISTOR,FXD,MF,61.9KΩ,1%,0.25W	RN 1/4-TI-61K9-1%	STACKPOLE
R5	157-1K	RESISTOR,TRIM,CER,1KΩ,10%,20T	89PRIK	BECKMAN

Table A1-14. A1A8 PCB (D8008) Parts List (2 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R6	110-11K-1	RESISTOR,FXD,MF,11KΩ,1%,0.25W		
R7	157-1K	RESISTOR,TRIM,CER,1KΩ,10%,20T	89PRIK	BECKMAN
R8	110-11K-1	RESISTOR,FXD,MF,11KΩ,1%,0.25W		
R9	157-200K	RESISTOR,TRIM,CER,200KΩ,10%,20T **(-4)**	89PR200K	BECKMAN
R9	157-50K	RESISTOR,TRIM,CER,50KΩ,10%,20T	89PR50K	BECKMAN
R10	110-210K-1	RESISTOR,FXD,MF,210KΩ,1%,0.25W **(-4)**		
R10	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W **(-8)**	RN 1/4-T1-20K-1%	STACKPOLE
R10	110-78.7K-1	RESISTOR,FXD,MF,78.7KΩ,1%,0.25W **(-12)**		
R10	110-86.6K-1	RESISTOR,FXD,MF,86.6KΩ,1%,0.25W **(-13)**		
R11	110-1.07K-1	RESISTOR,FXD,MF,1.07KΩ,1%,0.25W	RN 1/4-T1-1K07-1%	STACKPOLE
R11	110-3.48K-1	RESISTOR,FXD,MF,3.48KΩ,1%,0.25W **(-12)**	RN 1/4-TI-3K48-1%	STACKPOLE
R11	110-4.32K-1	RESISTOR,FXD,MF,4.32KΩ,1%,0.25W **(-13)**		
R12	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R13	156-20K	RESISTOR,TRIM,CER,20KΩ,10%,1T	72XWR-20K	BECKMAN
R14	110-1.87K-1	RESISTOR,FXD,MF,1.87KΩ,1%,0.25W **(-4)**		
R14	110-1.54K-1	RESISTOR,FXD,MF,1.54KΩ,1%,0.25W **(-8)**		
R14	110-1.21K-1	RESISTOR,FXD,MF,1.21KΩ,1%,0.25W **(-12)**	RN 1/4-T1-1K21-1%	STACKPOLE
R14	110-1.33K-1	RESISTOR,FXD,MF,1.33KΩ,1%,0.25W **(-13)**		
R15	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R16	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R17	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R18	110-23.7K-1	RESISTOR,FXD,MF,23.7KΩ,1%,0.25W **(-4**	RN 1/4-T1-23K7-1%	STACKPOLE
R18	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W **(-8)**	RN 1/4-TI-2K-1%	STACKPOLE
R19	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R20	110-121-1	RESISTOR,FXD,MF,121Ω,1%,0.25W	RN 1/4-T1-121E-1%	STACKPOLE
R21	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R22	110-7.5K-1	RESISTOR,FXD,MF,7.50KΩ,1%,0.25W	RN 1/4-TI-7K5-1%	STACKPOLE
R23	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R24	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R25	131-2	RESISTOR,FXD,WW,3Ω,3%,5W **(-4)**		
R25	131-3	RESISTOR,FXD,WW,5Ω,3%,5W **(-8**		
R26	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R27	110-750-1	RESISTOR,FXD,MF,750Ω,1%,0.25W	RN 1/4-TI-750-1%	STACKPOLE
R28	110-5.49K-1	RESISTOR,FXD,MF,5.49KΩ,1%,0.25W		
R29	110-1.78K-1	RESISTOR,FXD,MF,1.78KΩ,1%,0.25W	RN 1/4-T1-1K78-1%	STACKPOLE
R30	110-2.15K-1	RESISTOR,FXD,MF,2.15KΩ,1%,0.25W	RN 1/4-T1-2K15-1%	STACKPOLE
R31	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R32	110-1.21K-1	RESISTOR,FXD,MF,1.21KΩ,1%,0.25W	RN 1/4-T1-1K21-1%	STACKPOLE
R33	110-17.8K-1	RESISTOR,FXD,MF,17.8KΩ,1%,0.25W	RN 1/4-T1-17K8-1%	STACKPOLE
R34	156-200K	RESISTOR,TRIM,CER,200KΩ,10%,1T	72XWR200K	BECKMAN
R35	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R38	110-18.7K-1	RESISTOR,FXD,MF,18.7KΩ,1%,0.25W		

Note: The "-4," "-8," "-12," etc. numbers that appear in boldface type are the assembly dash numbers. That is, the parts are on assembly D8008-4, D8008-8, D8008-12, etc. Parts not marked otherwise, are part of assembly D8008-3.

Table A1-14. A1A8 PCB (D8008) Parts List (3 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R39	110-18.7K-1	RESISTOR,FXD,MF,18.7KΩ,1%,0.25W		
R40	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R41	110-110K-1	RESISTOR,FXD,MF,110KΩ,1%,0.25W **(-4)**	RN 1/4-T1-11OK-1%	STACKPOLE
R42	157-50K	RESISTOR,TRIM,CER,50KΩ,10%,20T	89PR50K	BECKMAN
R43	110-18.7K-1	RESISTOR,FXD,MF,18.7KΩ,1%,0.25W		
R44	110-18.7K-1	RESISTOR,FXD,MF,18.7KΩ,1%,0.25W		
R45	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W **(-4)**	RN 1/4-T1-10K-1%	STACKPOLE
R46	110-8.45K-1	RESISTOR,FXD,MF,8.45KΩ,1%,0.25W **(-4)**		
R46	110-24.9K-1	RESISTOR,FXD,MF,24.9KΩ,1%,0.25W **(-8)**		
R46	110-27.4K-1	RESISTOR,FXD,MF,27.4KΩ,1%,0.25W **(-12)**		
R47	157-10K	RESISTOR,TRIM,CER,10KΩ,10%,20T	89PR-10K	BECKMAN
R47	157-10K	RESISTOR,TRIM,CER,10KΩ,10%,20T	89PR-10K	BECKMAN
R47	157-5K	RESISTOR,TRIM,CER,5KΩ,10%,20T **(-12)**	89PR5K	BECKMAN
R48	110-11K-1	RESISTOR,FXD,MF,11KΩ,1%,0.25W		
R49	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R50	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R51	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R52	110-3.83K-1	RESISTOR,FXD,MF,3.83KΩ,1%,0.25W	RN 1/4-TI-3K83-1%	STACKPOLE
R53	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R54	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R55	110-8.06-1	RESISTOR,FXD,MF,8.06Ω,1%,0.25W **(-4)**		
R55	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W **(-8)**	RN 1/4-TI-5E11-1%	STACKPOLE
R56	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W **(-8)**	RN 1/4-TI-5E11-1%	STACKPOLE
R56	110-8.06-1	RESISTOR,FXD,MF,8.06Ω,1%,0.25W **(-4)**		
R57	110-8.06-1	RESISTOR,FXD,MF,8.06Ω,1%,0.25W **(-4)**		
R57	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE (-12
R58	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE (-13)
R58	110-8.06-1	RESISTOR,FXD,MF,8.06Ω,1%,0.25W **(-4)**		
R59	102-.5-5	RESISTOR,FXD,CC,0.5Ω,5%,0.5W	UT-1/2 0.5ohm 5%	RIEDON
R60	110-2.15K-1	RESISTOR,FXD,MF,2.15KΩ,1%,0.25W	RN 1/4-T1-2K15-1%	STACKPOLE
R61	110-110K-1	RESISTOR,FXD,MF,110KΩ,1%,0.25W **(-4**)	RN 1/4-T1-11OK-1%	STACKPOLE
R63	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R65	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R66	110-14.7K-1	RESISTOR,FXD,MF,14.7KΩ,1%,0.25W	RN 1/4-T1-14K7-1%	STACKPOLE
R67	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W **(-4**)	RN 1/4-TI-5E11-1%	STACKPOLE
R68	157-500	RESISTOR,TRIM,CER,500Ω,10%,2	89PR500	BECKMAN
R69	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R70	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R71	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R72	110-14.7K-1	RESISTOR,FXD,MF,14.7KΩ,1%,0.25W	RN 1/4-T1-14K7-1%	STACKPOLE
R73	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R74	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE

Note: The "-4," "-8," "-12," etc. numbers that appear in boldface type are the assembly dash numbers. That is, the parts are on assembly D8008-4, D8008-8, D8008-12, etc. Parts not marked otherwise, are part of assembly D8008-3.

Table A1-14. A1A8 PCB (D8008) Parts List (4 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R75	110-205K-1	RESISTOR,FXD,MF,205KΩ,1%,0.25W **(-4)**		
R75	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE (-8)
R75	110-78.7K-1	RESISTOR,FXD,MF,78.7KΩ,1%,0.25W **(-12)**		
R75	110-86.6K-1	RESISTOR,FXD,MF,86.6KΩ,1%,0.25W **(-13)**		
R76	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R77	156-20	RESISTOR,TRIM,CER,20Ω,20%,1T	72XWR20	BECKMAN
R78	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R79	110-15K-1	RESISTOR,FXD,MF,15.0KΩ,1%,0.25W		
R80	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R81	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R82	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R83	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R84	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R85	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R86	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R87	110-9.53K-1	RESISTOR,FXD,MF,9.53KΩ,1%,0.25W **(-8)**		
R88	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
U1	54-20	IC,ANALOG SWITCH,13201,QUAD	LF13201N	NATIONAL SEMICOND.
U2	54-42	IC,TTL,74LS10,TRIPLE,3-INPUT NAND	DM74LS10N	NATIONAL SEMICOND.
U3	54-87	IC,OP AMP,OPO5,SINGLE	0D-05 EJ	MONOLITHIC MEM.
U4	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS
U5		CALL FACTORY		
U7	54-132	IC,OP AMP,TL074CN3,QUAD	TL074CN3	TEXAS INSTRUMENTS
U8	54-125	IC,TTL,74LS86,QUAD	DM74LS86N	NATIONAL SEMICOND.
U9	54-158	IC,COMPARATOR,LM393,DUAL	LM393N	SIGNETICS

Table A1-15. A1A8 PCB (D32108) Parts List (1 of 3)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C1	250-39	CAPACITOR,FXD,TANT,4.7µF,20%,35V	199D475X9035CA1	SPRAGUE
C2	250-39	CAPACITOR,FXD,TANT,4.7µF,20%,35V	199D475X9035CA1	SPRAGUE
C3	250-39	CAPACITOR,FXD,TANT,4.7µF,20%,35V	199D475X9035CA1	SPRAGUE
C4	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C5	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C6	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C7	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C8	230-30	CAPACITOR,FXD,CER,1000pF,500V	BGP.001,500V,+80-20	RMC
C9	250-41	CAPACITOR,FXD,TANT,6.8µF,10%,35V	199D685X9035DE3	SPRAGUE
C10	250-19	CAPACITOR,FXD,TANT,1µF,10%,35V	199D105X9035HE3	SPRAGUE
C11	250-19	CAPACITOR,FXD,TANT,1µF,10%,35V	199D105X9035HE3	SPRAGUE
C12	230-41	CAPACITOR,FXD,CER,1.0µF,20%,100V	400-100-601-1050.25	CENTRE ENGINEERING
C13	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C14	220-300	CAPACITOR,FXD,MICA,300pF,5%,50V	CM05FD301J03	ARCO
C15	220-5	CAPACITOR,FXD,MICA,5pF,0.5pF,500V	CD15CD050D03	CORNELL DUBILIER
C16	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C17	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V		
CR1	10-FD300	DIODE,RECTIFIER,IN3595	1N3595	SOLID STATE DEVICES
CR2	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR3	10-FD300	DIODE,RECTIFIER,IN3595	1N3595	SOLID STATE DEVICES
CR4	10-1N5359A	DIODE,ZENER,1N5359,24V,20%	1N5359A	MOTOROLA
CR5	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR6	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR7	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR8	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR9	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
J5	551-569	CONNECTOR,HEADER	M20-9990305	HARWIN ENG.
J6	551-569	CONNECTOR,HEADER	M20-9990305	HARWIN ENG
K1	690-28	RELAY,CRADLE,2C,5V	MR62-5SR	NEC
Q1	20-MPSA92	TRANSISTOR,PNP,MPSA92,Si	MPSA92	MOTOROLA
Q2	20-MPSA92	TRANSISTOR,PNP,MPSA92,Si	MPSA92	MOTOROLA
Q3	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694-18	MOTOROLA
Q4	20-2N2222A	TRANSISTOR,NPN,2N2222A,Si	2N2222A	MOTOROLA
Q5	20-103	TRANSISTOR,PNP,2N4029,Si	2N4029	MOTOROLA
Q6	20-2N2222A	TRANSISTOR,NPN,2N2222A,Si	2N2222A	MOTOROLA
R1	156-20K	RESISTOR,TRIM,CER,20KΩ,10%,1T	72XWR-20K	BECKMAN
R2	110-61.9K-1	RESISTOR,FXD,MF,61.9KΩ,1%,0.25W	RN 1/4-TI-61K9-1%	STACKPOLE
R3	157-1K	RESISTOR,TRIM,CER,1KΩ,10%,20T	89PRIK	BECKMAN
R4	110-11K-1	RESISTOR,FXD,MF,11KΩ,1%,0.25W		
R5	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R6	157-1K	RESISTOR,TRIM,CER,1KΩ,10%,20T	89PRIK	BECKMAN
R7	113-11K-0.1	RESISTOR,FXD,MF,11KΩ,0.1%,0.125		
R8	113-10K-0.1A	RESISTOR,FXD,MF,10KΩ,0.1%		WILTRON VENDORS
R9	157-200K	RESISTOR,TRIM,CER,200KΩ,10%,20T	89PR200K	BECKMAN
R11	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE

Table A1-15. A1A8 PCB (D32108) Parts List (2 of 3)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R12	157-50K	RESISTOR,TRIM,CER,50KΩ,10%,20T	89PR50K	BECKMAN
R13	110-3.57M-1	RESISTOR,FXD,3.57MΩ,1%	RN 1/4 T1 3.57M 1%	STACK POLE
R14	110-3.32M-1	RESISTOR,FXD,3.32MΩ,1%	RN 1/4 T1 3.32M 1%	STACK POLE
R15	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R16	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R17	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R18	131-38	RESISTOR,FIXED,WW,2Ω,±3%,?	R3399	KRL
R18	131-40	RESISTOR FIXED,WW,2Ω,±3%	R3399A	KRL
R19	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R20	110-23.7K-1	RESISTOR,FXD,MF,23.7KΩ,1%,0.25W	RN 1/4-T1-23K7-1%	STACKPOLE
R21	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R22	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W **(-4)**	RN 1/4-T1-1K-1%	STACKPOLE
R23	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R24	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R25	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R26	110-7.5K-1	RESISTOR,FXD,MF,7.50KΩ,1%,0.25W	RN 1/4-TI-7K5-1%	STACKPOLE
R27	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R28	110-121-1	RESISTOR,FXD,MF,121Ω,1%,0.25W	RN 1/4-T1-121E-1%	STACKPOLE
R29	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R30	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R31	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R32	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R33	156-200K	RESISTOR,TRIM,CER,200KΩ,10%,1T	72XWR200K	BECKMAN
R34	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R35	156-20	RESISTOR,TRIM,CER,20Ω,20%,1T	72XWR20	BECKMAN
R36	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R37	110-750-1	RESISTOR,FXD,MF,750Ω,1%,0.25W	RN 1/4-TI-750-1%	STACKPOLE
R38	110-5.49K-1	RESISTOR,FXD,MF,5.49KΩ,1%,0.25W		
R39	110-1.78K-1	RESISTOR,FXD,MF,1.78KΩ,1%,0.25W	RN 1/4-T1-1K78-1%	STACKPOLE
R40	110-2.15K-1	RESISTOR,FXD,MF,2.15KΩ,1%,0.25W	RN 1/4-T1-2K15-1%	STACKPOLE
R41	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R42	110-17.8K-1	RESISTOR,FXD,MF,17.8KΩ,1%,0.25W	RN 1/4-T1-17K8-1%	STACKPOLE
R43	110-1.21K-1	RESISTOR,FXD,MF,1.21KΩ,1%,0.25W	RN 1/4-T1-1K21-1%	STACKPOLE
R44	110-15K-1	RESISTOR,FXD,MF,15.0KΩ,1%,0.25W		
R45	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R46	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R47	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R48	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R49	157-500	RESISTOR,TRIM,CER,500Ω,10%,2	89PR500	BECKMAN
R50	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R51	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE

Note: The "-4," number that appears in boldface type is the assembly dash number. That is, the parts are on assembly D32108-4. Parts not marked otherwise, are part of assembly D32108-3.

Table A1-15. A1A8 PCB (D32108) Parts List (3 of 3)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R53	110-301-1	RESISTOR,FXD,MF,301Ω,1%,0.25W		
R54	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R55	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R56	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R57	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R58	110-511K-1	RESISTOR,FXD,MF,511KΩ,1%,0.25W	RN 1/4-TI-511K-1%	STACKPOLE
R59	110-511K-1	RESISTOR,FXD,MF,511KΩ,1%,0.25W	RN 1/4-TI-511K-1%	STACKPOLE
R60	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R61	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R62	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R63	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R64	110-499-1	RESISTOR,FXD,MF,499Ω,1%,0.25W	RN 1/4-TI-499E-1%	STACKPOLE
R65	157-500	RESISTOR,TRIM,CER,500Ω,10%,2	89PR500	BECKMAN
R66	113-9.53K-1	RESISTOR,FXD,MF,9.53KΩ,1%,0.125W		
R67	110-3.16M-1	RESISTOR,FXD,MF,3.16MΩ,1%	RN 1/4 T1 3.16M 1%	STACK POLE
R68	157-200K	RESISTOR,TRIM,CER,200KΩ,10%,20T	89PR200K	BECKMAN
U1	54-24	IC,ANALOG SWITCH,DG201,QUAD	DG201ACJ	SILICONIX
U2	54-61	IC,OP AMP,UA714,SINGLE	RC714CNB	RAYTHEON
U3	54-7410	IC,TTL,7410,TRIPLE,3-INPUT NAND	DM7410N	NATIONAL SEMICOND.
U4	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS
U5		CALL FACTORY		
U6	54-158	IC,COMPARATOR,LM393,DUAL	LM393N	SIGNETICS
U7	54-125	IC,TTL,74LS86,QUAD	DM74LS86N	NATIONAL SEMICOND.
U8	54-74LS04	IC,TTL,74LS04,HEX,INVERTERS	74LS04PC	FAIRCHILD
U10	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS
VR1	54-502	IC,VOLTAGE REG,LT1031,10V	LT1031CCH	LINEAR TECHNOLOGY

Note: The "-4," number that appears in boldface type is the assembly dash number. That is, the parts are on assembly D32108-4. Parts not marked otherwise, are part of assembly D32108-3.

Table A1-16. A1A9 PCB Parts List (1 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C1	250-39	CAPACITOR,FXD,TANT,4.7µF,20%,35V	199D475X9035CA1	SPRAGUE
C2	250-39	CAPACITOR,FXD,TANT,4.7µF,20%,35V	199D475X9035CA1	SPRAGUE
C3	250-39	CAPACITOR,FXD,TANT,4.7µF,20%,35V	199D475X9035CA1	SPRAGUE
C4	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C5	230-30	CAPACITOR,FXD,CER,1000pF	BGP.001,500V	RMC
C6	250-19	CAPACITOR,FXD,TANT,1µF,10%,35V	199D105X9035HE3	SPRAGUE
C7	250-19	CAPACITOR,FXD,TANT,1µF,10%,35V	199D105X9035HE3	SPRAGUE
C8	230-41	CAPACITOR,FXD,CER,1.0µF,20%,100V	400-100-601-105M	CENTRE ENGINEERING
C9	220-300	CAPACITOR,FXD,MICA,300pF,5%,50V	CM05FD301J03	ARCO
C10	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C11	250-41	CAPACITOR,FXD,TANT,6.8µF,10%,35V	199D685X9035DE3	SPRAGUE
C12	220-5	CAPACITOR,FXD,MICA,5pF,0.5pF,5	CD15CD050D03	CORNELL DUBILIER
C13	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C14	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C16	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C17	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C18	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C19	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
C21	227-50	CAPACITOR,FXD,PEST,0.01µF,2%,200V	ZA2C103G	IMB
CR1	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR2	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR3	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR4	10-1N4749A	DIODE,ZENER,1N4749,24V,10%	1N4749A	MOTOROLA
CR5	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR6	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR7	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR8	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR9	10-1N758A	DIODE,ZENER,1N758A,10V,5%	1N758A	MOTOROLA
CR10	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR11	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR12	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
K1	690-28	RELAY,CRADLE,2C,5V	MR62-5SR	NEC
Q1	20-MPSA92	TRANSISTOR,PNP,MPSA92,Si	MPSA92	MOTOROLA
Q2	20-MPSA92	TRANSISTOR,PNP,MPSA92,Si	MPSA92	MOTOROLA
Q3	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694-18	MOTOROLA
Q4	20-2N2222A	TRANSISTOR,NPN,2N2222A,Si	2N2222A	MOTOROLA
Q5	20-2N2222A	TRANSISTOR,NPN,2N2222A,Si	2N2222A	MOTOROLA
Q6	20-2N2907A	TRANSISTOR,PNP,2N2907A,Si	2N2907A	MOTOROLA
Q7	20-2N2222A	TRANSISTOR,NPN,2N2222A,Si	2N2222A	MOTOROLA
R1	101-3.3M-5	RESISTOR,FXD,CC	3.3MΩ,5%,0.25W	RC07GF335J
R2	157-50K	RESISTOR,TRIM,CER,50KΩ,10%,20T	89PR50K	BECKMAN
R3	101-3.6M-5	RESISTOR,FXD,CC	3.6MΩ,5%,0.25W	RC07GF365J
R4	110-61.9K-1	RESISTOR,FXD,MF,61.9KΩ,1%,0.25W	RN 1/4-TI-61K9-1%	STACKPOLE
R5	157-1K	RESISTOR,TRIM,CER,1KΩ,10%,20T	89PRIK	BECKMAN
R6	110-11K-1	RESISTOR,FXD,MF,11KΩ,1%,0.25W		

Table A1-16. A1A9 PCB Parts List (2 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R7	157-1K	RESISTOR,TRIM,CER,1KΩ,10%,20T	89PRIK	BECKMAN
R8	110-11K-1	RESISTOR,FXD,MF,11KΩ,1%,0.25W		
R9	157-200K	RESISTOR,TRIM,CER,200KΩ,10%,20T	89PR200K	BECKMAN
R10	110-205K-1	RESISTOR,FXD,MF,205KΩ,1%,0.25W **(-15)**		
R10	110-47.5K-1	RESISTOR,FXD,MF,47.5KΩ,1%,0.25W		
R11	110-2.32K-1	RESISTOR,FXD,MF,2.32KΩ,1%,0.25W		
R12	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R13	156-20K	RESISTOR,TRIM,CER,20KΩ,10%,1T	72XWR-20K	BECKMAN
R14	110-1.91K-1	RESISTOR,FXD,MF,1.91KΩ,1%,0.25W **(-15)**		
R14	110-562-1	RESISTOR,FXD,MF,562,1%,0.25W	RN 1/4-TI-562E-1%	STACKPOLE
R15	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R16	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R17	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R18	110-23.7K-1	RESISTOR,FXD,MF,23.7KΩ,1%,0.25W	RN 1/4-T1-23K7-1%	STACKPOLE
R19	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R20	110-121-1	RESISTOR,FXD,MF,121Ω,1%,0.25W	RN 1/4-T1-121E-1%	STACKPOLE
R21	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R22	110-7.5K-1	RESISTOR,FXD,MF,7.50KΩ,1%,0.25W	RN 1/4-TI-7K5-1%	STACKPOLE
R23	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R24	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R25	131-1	RESISTOR,FXD,WW,2Ω,±3%,5W **(-15)**		
R25	131-3	RESISTOR,FXD,WW,5Ω,±3%,5W		
R26	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R27	110-750-1	RESISTOR,FXD,MF,750Ω,1%,0.25W	RN 1/4-TI-750-1%	STACKPOLE
R28	110-5.49K-1	RESISTOR,FXD,MF,5.49KΩ,1%,0.25W		
R29	110-1.78K-1	RESISTOR,FXD,MF,1.78KΩ,1%,0.25W	RN 1/4-T1-1K78-1%	STACKPOLE
R30	110-2.15K-1	RESISTOR,FXD,MF,2.15KΩ,1%,0.25W	RN 1/4-T1-2K15-1%	STACKPOLE
R31	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R32	110-1.21K-1	RESISTOR,FXD,MF,1.21KΩ,1%,0.25W	RN 1/4-T1-1K21-1%	STACKPOLE
R33	110-17.8K-1	RESISTOR,FXD,MF,17.8KΩ,1%,0.25W	RN 1/4-T1-17K8-1%	STACKPOLE
R34	156-200K	RESISTOR,TRIM,CER,200KΩ,10%,1T	72XWR200K	BECKMAN
R35	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R38	110-18.7K-1	RESISTOR,FXD,MF,18.7KΩ,1%,0.25W		
R38	110-18.7K-1	RESISTOR,FXD,MF,18.7KΩ,1%,0.25W		
R39	110-18.7K-1	RESISTOR,FXD,MF,18.7KΩ,1%,0.25W		
R40	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R41	110-140K-1	RESISTOR,FXD,MF,140KΩ,1%,0.25W		
R42	157-50K	RESISTOR,TRIM,CER,50KΩ,10%,20T	89PR50K	BECKMAN
R43	110-18.7K-1	RESISTOR,FXD,MF,18.7KΩ,1%,0.25W		
R43	110-18.7K-1	RESISTOR,FXD,MF,18.7KΩ,1%,0.25W **(-39)**		
R44	110-18.7K-1	RESISTOR,FXD,MF,18.7KΩ,1%,0.25W		
R45	110-3.92K-1	RESISTOR,FXD,MF,3.92KΩ,1%,0.25W **(-39)**		

Note: The "-15" and "-15" numbers that appear in boldface type are assembly dash numbers. That is, the parts are on assembly D8009-15 or D8009-39. Parts not marked otherwise, are part of assembly D8009-3.

Table A1-16. A1A9 PCB Parts List (3 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R46	110-9.53K-1	RESISTOR,FXD,MF,9.53KΩ,1%,0.25W **(-15)**		
R46	110-9.09K-1	RESISTOR,FXD,MF,9.09KΩ,1%,0.25W	RN1/4-T1-9K09-1%	STACKPOLE
R47	157-20K	RESISTOR,TRIM,CER,20KΩ,10%,20T	89PR20K	BECKMAN
R47	157-2K	RESISTOR,TRIM,CER,2KΩ,10%,20T	3006P-1-202	BOURNS
R48	110-11K-1	RESISTOR,FXD,MF,11KΩ,1%,0.25W		
R49	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R50	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R51	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R52	110-3.83K-1	RESISTOR,FXD,MF,3.83KΩ,1%,0.25W	RN 1/4-TI-3K83-1%	STACKPOLE
R53	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R54	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R55	110-80.25-1	RESISTOR,FXD,MF,80.25Ω,1%,0.25W **(-15)**		
R55	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R56	110-80.25-1	RESISTOR,FXD,MF,80.25Ω,1%,0.25W **(-15)**		
R56	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R57	110-80.25-1	RESISTOR,FXD,MF,80.25Ω,1%,0.25W **(-15)**		
R57	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R58	110-80.25-1	RESISTOR,FXD,MF,80.25Ω,1%,0.25W **(-15)**		
R58	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R59	110-80.25-1	RESISTOR,FXD,MF,80.25Ω,1%,0.25W **(-15)**		
R60	110-2.15K-1	RESISTOR,FXD,MF,2.15KΩ,1%,0.25W	RN 1/4-T1-2K15-1%	STACKPOLE
R61	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W **(-15)**	RN 1/4-T1-100K-1%	STACKPOLE
R61	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R63	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R65	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W **(-15)**	RN 1/4-TI-750K-1%	STACKPOLE
R65	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R66	110-14.7K-1	RESISTOR,FXD,MF,14.7KΩ,1%,0.25W	RN 1/4-T1-14K7-1%	STACKPOLE
R67	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W **(-15)**	RN 1/4-TI-5E11-1%	STACKPOLE
R67	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R68	157-500	RESISTOR,TRIM,CER,500Ω,10%,2	89PR500	BECKMAN
R69	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R70	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R71	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W **(-15)**	RN 1/4-TI-750K-1%	STACKPOLE
R71	110-750K-1	RESISTOR,FXD,MF,750KΩ,1%,0.25W	RN 1/4-TI-750K-1%	STACKPOLE
R72	110-14.7K-1	RESISTOR,FXD,MF,14.7KΩ,1%,0.25W	RN 1/4-T1-14K7-1%	STACKPOLE
R73	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R74	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R75	110-205K-1	RESISTOR,FXD,MF,205KΩ,1%,0.25W		(-15)
R75	110-47.5K-1	RESISTOR,FXD,MF,47.5KΩ,1%,0.25W		
R76	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R77	156-20	RESISTOR,TRIM,CER,20Ω,20%,1T	72XWR20	BECKMAN

Note: The "-15" and "-15" numbers that appear in boldface type are assembly dash numbers. That is, the parts are on assembly D8009-15 or D8009-39. Parts not marked otherwise, are part of assembly D8009-3.

Table A1-16. A1A9 PCB Parts List (4 of 4)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R78	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R79	110-15K-1	RESISTOR,FXD,MF,15.0KΩ,1%,0.25W		
R80	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R81	110-511-1	RESISTOR,FXD,MF,511Ω,1%,0.25W	RN 1/4-TI-511E-1%	STACKPOLE
R82	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R83	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R84	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R85	110-5.11K-1	RESISTOR,FXD,MF,5.11KΩ,1%,0.25W	RN 1/4-TI-5K11-1%	STACKPOLE
R86	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R88	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
U2	54-42	IC,TTL,74LS10,TRIPLE,3-INPUT NAND	DM74LS10N	NATIONAL SEMICOND.
U3	54-87	IC,OP AMP,OPO5,SINGLE	0D-05 EJ	MONOLITHIC MEM.
U4	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS
U5		CALL FACTORY		
U7	54-132	IC,OP AMP,TL074CN3,QUAD	TL074CN3	TEXAS INSTRUMENTS
U8	54-125	IC,TTL,74LS86,QUAD	DM74LS86N	NATIONAL SEMICOND.
U9	54-158	IC,COMPARATOR,LM393,DUAL	LM393N	SIGNETICS

Table A1-17. A1A10 PCB Parts List (1 of 5)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C1	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C2	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C3	250-19	CAPACITOR,FXD,TANT,1µF,10%,35V	199D105X9035HE3	SPRAGUE
C4	220-130	CAPACITOR,FXD,MICA,130pF,5%,500V	CD15FD131JO3	CORNELL DUBILIER
C5	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C6	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C7	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C8	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C9	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C10	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C11	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C12	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C13	220-8	CAPACITOR,FXD,MICA,8pF,0.5pF,500V	CD15CD080D03	CORNELL DUBILIER
C14	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C15	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C16	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C17	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C18	220-8	CAPACITOR,FXD,MICA,8pF,0.5pF,500V	CD15CD080D03	CORNELL DUBILIER
C19	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C20	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C21	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C22	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C23	220-8	CAPACITOR,FXD,MICA,8pF,0.5pF,500V	CD15CD080D03	CORNELL DUBILIER
C24	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C25	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C26	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C27	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C28	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C29	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C30	230-36	CAPACITOR,FXD,CER,4700pF,20%,24V	GPK-472MC	MURATA/ERIE
C32	230-11	CAPACITOR,FXD,CER,0.01µF,100V	TGS-10	SPRAGUE
C33	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C34	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C35	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C36	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C37	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C38	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C39	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C40	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C41	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C42	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C43	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C44	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C45	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C46	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE

Table A1-17. A1A10 PCB Parts List (2 of 2)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C47	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C48	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
CR1	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR2	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR3	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR4	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR5	10-1N746A	DIODE,ZENER,1N746,3.3V,10%	1N746	MOTOROLA
CR6	10-1N746A	DIODE,ZENER,1N746,3.3V,10%	1N746	MOTOROLA
CR10	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR11	10-1N746A	DIODE,ZENER,1N746,3.3V,10%	1N746	MOTOROLA
CR12	10-1N746A	DIODE,ZENER,1N746,3.3V,10%	1N746	MOTOROLA
CR13	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR14	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR15	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR16	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR17	10-1N751A	DIODE,ZENER,1N751A,5.1V,5%	1N751A	MOTOROLA
CR18	10-1N751A	DIODE,ZENER,1N751A,5.1V,5%	1N751A	MOTOROLA
CR19	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR20	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR21	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR22	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR23	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR24	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR25	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR26	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR27	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR28	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR29	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR30	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR31	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR32	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR33	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR34	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
P2	551-207	CONNECTOR,HDR,PC MNT	65507-103	BERG
P3	551-207	CONNECTOR,HDR,PC MNT	65507-103	BERG
P4	551-207	CONNECTOR,HDR,PC MNT	65507-103	BERG
Q1	20-22	TRANSISTOR,NPN,TIP110,Si	TIP110	MOTOROLA
Q2	20-23	TRANSISTOR,PNP,TIP115,Si	TIP115	TEXAS INSTRUMENTS
Q3	20-22	TRANSISTOR,NPN,TIP110,Si	TIP110	MOTOROLA
Q4	20-23	TRANSISTOR,PNP,TIP115,Si	TIP115	TEXAS INSTRUMENTS
Q5	20-22	TRANSISTOR,NPN,TIP110,Si	TIP110	MOTOROLA
Q6	20-23	TRANSISTOR,PNP,TIP115,Si	TIP115	TEXAS INSTRUMENTS
R1	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R2	110-14.3K-1	RESISTOR,FXD,MF,14.3KΩ,1%,0.25W		
R3	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE

Table A1-17. A1A10 PCB Parts List (3 of 5)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R4	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R5	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R6	110-14.3K-1	RESISTOR,FXD,MF,14.3KΩ,1%,0.25W		
R7	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R8	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R9	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R10	156-20K	RESISTOR,TRIM,CER,20KΩ,10%,1T	72XWR-20K	BECKMAN
R11	156-20K	RESISTOR,TRIM,CER,20KΩ,10%,1T	72XWR-20K	BECKMAN
R12	156-20K	RESISTOR,TRIM,CER,20KΩ,10%,1T	72XWR-20K	BECKMAN
R13	156-20K	RESISTOR,TRIM,CER,20KΩ,10%,1T	72XWR-20K	BECKMAN
R14	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R16	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R17	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R19	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R20	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R21	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R22	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R23	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R24	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R25	110-2.49K-1	RESISTOR,FXD,MF,2.49KΩ,1%,0.25W		
R26	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R27	110-6.04K-1	RESISTOR,FXD,MF,6.04KΩ,1%,0.25W		
R28	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R29	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R30	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R31	110-6.04K-1	RESISTOR,FXD,MF,6.04KΩ,1%,0.25W		
R32	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R33	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R34	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R35	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R36	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R37	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R38	110-4.02K-1	RESISTOR,FXD,MF,4.02KΩ,1%,0.25W		
R39	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R40	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R41	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R42	110-402-1	RESISTOR,FXD,MF,402Ω,1%,0.25W		
R43	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R44	110-3.65K-1	RESISTOR,FXD,MF,3.65KΩ,1%,0.25W		
R45	110-3.65K-1	RESISTOR,FXD,MF,3.65KΩ,1%,0.25W		
R46	110-26.1-1	RESISTOR,FXD,MF,26.1Ω,1%,0.25W	RN 1/4-TI-26E1-1%	STACKPOLE
R47	110-26.1-1	RESISTOR,FXD,MF,26.1Ω,1%,0.25W	RN 1/4-TI-26E1-1%	STACKPOLE
R48	110-26.1-1	RESISTOR,FXD,MF,26.1Ω,1%,0.25W	RN 1/4-TI-26E1-1%	STACKPOLE
R49	110-26.1-1	RESISTOR,FXD,MF,26.1Ω,1%,0.25W	RN 1/4-TI-26E1-1%	STACKPOLE
R50	110-150-1	RESISTOR,FXD,MF,150Ω,1%,0.25W		

Table A1-17. A1A10 PCB Parts List (4 of 5)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R51	110-150-1	RESISTOR,FXD,MF,150Ω,1%,0.25W		
R52	110-150-1	RESISTOR,FXD,MF,150Ω,1%,0.25W		
R53	110-150-1	RESISTOR,FXD,MF,150Ω,1%,0.25W		
R54	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R55	110-2.80K-1	RESISTOR,FXD,MF,2.80KΩ,1%,0.25W		
R56	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R57	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R58	110-1.02K-1	RESISTOR,FXD,MF,1.02KΩ,1%,0.25W	RN 1/4-T1-1K02-1%	STACKPOLE
R59	110-287-1	RESISTOR,FXD,MF,287Ω,1%,0.25W	RN 1/4-T1-287E-1%	STACKPOLE
R60	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R61	110-3.65K-1	RESISTOR,FXD,MF,3.65KΩ,1%,0.25W		
R62	110-3.65K-1	RESISTOR,FXD,MF,3.65KΩ,1%,0.25W		
R63	110-26.1-1	RESISTOR,FXD,MF,26.1Ω,1%,0.25W	RN 1/4-TI-26E1-1%	STACKPOLE
R64	110-26.1-1	RESISTOR,FXD,MF,26.1Ω,1%,0.25W	RN 1/4-TI-26E1-1%	STACKPOLE
R65	110-26.1-1	RESISTOR,FXD,MF,26.1Ω,1%,0.25W	RN 1/4-TI-26E1-1%	STACKPOLE
R66	110-26.1-1	RESISTOR,FXD,MF,26.1Ω,1%,0.25W	RN 1/4-TI-26E1-1%	STACKPOLE
R67	110-150-1	RESISTOR,FXD,MF,150Ω,1%,0.25W		
R68	110-150-1	RESISTOR,FXD,MF,150Ω,1%,0.25W		
R69	110-150-1	RESISTOR,FXD,MF,150Ω,1%,0.25W		
R70	110-150-1	RESISTOR,FXD,MF,150Ω,1%,0.25W		
R71	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R72	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R73	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R74	110-154K-1	RESISTOR,FXD,MF,154KΩ,1%,0.25W		
R75	110-8.25K-1	RESISTOR,FXD,MF,8.25KΩ,1%,0.25W	RN 1/4-T1-8K25-1%	STACKPOLE
R76	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R77	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R78	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R79	110-464-1	RESISTOR,FXD,MF,464Ω,1%,0.25W	RN 1/4-TI-464E-1%	STACKPOLE
R80	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R81	110-3.65K-1	RESISTOR,FXD,MF,3.65KΩ,1%,0.25W		
R82	110-3.65K-1	RESISTOR,FXD,MF,3.65KΩ,1%,0.25W		
R83	130-5-3	RESISTOR,FXD,WW,5Ω,5%,3W		
R84	130-5-3	RESISTOR,FXD,WW,5Ω,5%,3W		
R85	130-5-3	RESISTOR,FXD,WW,5Ω,5%,3W		
R86	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R87	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R88	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R89	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R90	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R91	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
U1	54-74LS75	IC,TTL,74LS75,4-BIT,LATCH	SN74LS75N	TEXAS INSTRUMENTS
U2	54-74LS75	IC,TTL,74LS75,4-BIT,LATCH	SN74LS75N	TEXAS INSTRUMENTS
U3	54-125	IC,TTL,74LS86,QUAD	DM74LS86N	NATIONAL SEMICOND.
U4	54-30	IC,COMPARATOR,LM311,SINGLE	LM311N	RCA SOLID STATE

Table A1-17. A1A10 PCB Parts List (5 of 5)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
U5	54-74LS75	IC,TTL,74LS75,4-BIT LATCH	SN74LS75N	TEXAS INSTRUMENTS
U6	54-57	IC,TTL,74LS02,QUAD	DM74LS02N	NATIONAL SEMICOND.
U7	54-74LS75	IC,TTL,74LS75,4-BIT LATCH	SN74LS75N	TEXAS INSTRUMENTS
U8	50-9	IC,OP AMP,LF356,SINGLE	LF356N	NATIONAL SEMICOND.
U9	54-24	IC,ANALOG SWITCH,DG201,QUAD	DG201ACJ	SILICONIX
U10	50-9	IC,OP AMP,LF356,SINGLE	LF356N	NATIONAL SEMICOND.
U11	54-24	IC,ANALOG SWITCH,DG201,QUAD	DG201ACJ	SILICONIX
U12	54-24	IC,ANALOG SWITCH,DG201,QUAD	DG201ACJ	SILICONIX
U13	50-9	IC,OP AMP,LF356,SINGLE	LF356N	NATIONAL SEMICOND.
U14	50-9	IC,OP AMP,LF356,SINGLE	LF356N	NATIONAL SEMICOND.
U15	50-9	IC,OP AMP,LF356,SINGLE	LF356N	NATIONAL SEMICOND.
U16	50-9	IC,OP AMP,LF356,SINGLE	LF356N	NATIONAL SEMICOND.
U17	54-30	IC,COMPARATOR,LM311,SINGLE	LM311N	RCA SOLID STATE
U18	54-144	IC,TTL,75451,DUAL	SN75451BP	TEXAS INSTRUMENTS
U19	54-144	IC,TTL,75451,DUAL	SN75451BP	TEXAS INSTRUMENTS
U20	54-144	IC,TTL,75451,DUAL	SN75451BP	TEXAS INSTRUMENTS
U21	54-144	IC,TTL,75451,DUAL	SN75451BP	TEXAS INSTRUMENTS
VR1	54-MC7805CP	IC,VOLTAGE REGULATOR,7805,5V	340T-5	NATIONAL SEMICOND.

Table A1-18. A1A13 PCB Parts List (1 of 5)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C1	250-121	CAPACITOR,FIXED,CER,0.01µF±20%	30GAS10	SPRAGUE
C2	250-121	CAPACITOR,FIXED,CER,0.01µF±20%	30GAS10	SPRAGUE
C3	230-8	CAPACITOR,FIXED,CER,0.02µF,±20%	5DD14454Y5U203M1KV	MURATA ERIE
C4	230-8	CAPACITOR,FIXED,CER,0.02µF,±20%	5DD14454Y5U203M1KV	MURATA ERIE
C5	250-192	CAPACITOR,FIXED,ALUM,22µF,±20%	UPR2G220MRH	NICHICON
C6	250-192	CAPACITOR,FIXED,ALUM,22µF,±20%	UPR2G220MRH	NICHICON
C7	220-470	CAPACITOR,FIXED,MICA,470pF,5%,50V		
C8	230-52	CAPACITOR,FIXED,CER,15pF	150-100-NPO-150J	CENTRE ENGINEERING
C9	230-37	CAPACITOR,FIXED,CER,0.1µF,20%,10V	RPE122901Z5U104M100	MURATA ERIE
C10	220-240	CAPACITOR,FIXED,MICA,240pF,5%,50V	DM15FD241J03	SAHA
C11	250-40	CAPACITOR,FIXED,TANT,2.2µF,20%	199D225X0025AE3	SPRAGUE
C12	250-42	CAPACITOR,FIXED,TANT,10µF,10%		
C13	227-13	CAPACITOR,FIXED,MICA,1000pF,2%		
C14	227-50	CAPACITOR,FIXED,PEST,0.01µF,2%	ZA7894	IMB
C16	230-37	CAPACITOR,FIXED,CER,0.1µF,20%	RPE122901Z5U104M100	MURATA ERIE
C18	250-42	CAPACITOR,FIXED,TANT,10µF,10%		
C23	223-130	CAPACITOR,FIXED,MICA,130pF,5%,50V	CM04ED131J03	ARCO
C24	230-46	CAPACITOR,FIXED,2200pF,±10%	200-100-X7R-222K	CENTRE ENGINEERING
C25	230-37	CAPACITOR,FIXED,CER,0.1µF,20%	RPE122901Z5U104M100	MURATA ERIE
C26	250-39	CAPACITOR,FIXED,TANT,4.7µF,20%	199D475X9035CE3	SPRAGUE
C27	250-40	CAPACITOR,FIXED,TANT,2.2µF,20%	199D225X0025AE3	SPRAGUE
C28	250-74	CAPACITOR,FIXED,TANT,47µF,10%,35V	199D476X9035FE4	SPRAGUE
C29	230-47	CAPACITOR,FIXED,CER,0.01µF	200-100-X7R-103K	CENTRE ENGINEERING
C30	230-47	CAPACITOR,FIXED,CER,0.01µF	200-100-X7R-103K	CENTRE ENGINEERING
C31	250-133	CAPACITOR,FIXED,ALUM,220µF	UPA-1E221M	NICHICON
C32	250-133	CAPACITOR,FIXED,ALUM,220µF	UPA-1E221M	NICHICON
C33	230-37	CAPACITOR,FIXED,CER,0.1µF,20%	RPE122901Z5U104M100	MURATA ERIE
C34	250-19A	CAPACITOR,FIXED,TANT,1µF,10%,35V	199D105X9035AA2	SPRAGUE
C35	220-240	CAPACITOR,FIXED,MICA,240pF,5%	DM15FD241J03	SAHA
C36	220-240	CAPACITOR,FIXED,MICA,240pF,5%	DM15FD241J03	SAHA
C37	210-30	CAPACITOR,FIXED,PEST,0.10µF,10%	ECQ-E2104KZS	PANASONIC
C38	230-62	CAPACITOR,FIXED,680pF,±5%	200-100-NPO-681J	CENTRE ENGINEERING
C39	230-62	CAPACITOR,FIXED,680pF,±5%	200-100-NPO-681J	CENTRE ENGINEERING
C40	250-134	CAPACITOR,FIXED,ALUM,47µF	UPAIH470MRH	NICHICON
C41	250-135	CAPACITOR,FIXED,ALUM,10µF	UPG1H100MPHXX	NICHICON
C42	230-37	CAPACITOR,FIXED,CER,0.1µF,20%	RPE122901Z5U104M100	MURATA ERIE
C43	230-60	CAPACITOR,FIXED,CER,470pF,±5%	200-100-NPO-471J	CENTRE ENGINEERING
C44	250-134	CAPACITOR,FIXED,ALUM,47µF	UPAIH470MRH	NICHICON
C45	250-134	CAPACITOR,FIXED,ALUM,47µF	UPAIH470MRH	NICHICON
C46	250-135	CAPACITOR,FIXED,ALUM,10µF	UPG1H100MPHXX	NICHICON
C47	230-37	CAPACITOR,FIXED,CER,0.1µF,20%	RPE122901Z5U104M100	MURATA ERIE
C48	230-37	CAPACITOR,FIXED,CER,0.1µF,20%	RPE122901Z5U104M100	MURATA ERIE
C49	230-62	CAPACITOR,FIXED,680pF,±5%	200-100-NPO-681J	CENTRE ENGINEERING
C50	230-62	CAPACITOR,FIXED,680pF,±5%,?	200-100-NPO-681J	CENTRE ENGINEERING
C51	250-162	CAPACITOR,FIXED,ALUM,22µF,20%	UPA2C220M	NICHICON

Table A1-18. A1A13 PCB Parts List (2 of 5)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C52	250-162	CAPACITOR,FIXED,ALUM,22µF,20%	UPA2C220M	NICHICON
C53	210-30	CAPACITOR,FIXED,PEST,0.10µF,10%	ECQ-E2104KZS	PANASONIC
C54	230-54	CAPACITOR,FIXED,82pF,±10%	150-100-NPO-820J	CENTRE ENGINEERING
C55	230-54	CAPACITOR,FIXED,82pF,±10%	150-100-NPO-820J	CENTRE ENGINEERING
C56	230-64	CAPACITOR,FIXED,CER,1000pF,±5%	200-100-NPO-102J	CENTRE ENGINEERING
C57	230-37	CAPACITOR,FIXED,CER,0.1µF,20%	RPE122901Z5U104M100	MURATA ERIE
CR3	10-1N4446	DIODE,SWITCHING,1N4446,75V,4nS	1N4446	NATIONAL SEMICOND.
CR4	10-10	DIODE,RECTIFIER,IN270,100V,0.5A	IN270	ITX XT
CR4	10-109	DIODE,RECTIFIER,MBR1545,45V	MBR1545CT	MOTOROLA
CR5	10-10	DIODE,RECTIFIER,IN270,100V,0.5A	IN270	ITX XT
CR5	10-109	DIODE,RECTIFIER,MBR1545,45V	MBR1545CT	MOTOROLA
CR6	10-1N4446	DIODE,SWITCHING,1N4446,75V,4nS	1N4446	NATIONAL SEMICOND.
CR7	10-1N4446	DIODE,SWITCHING,1N4446,75V,4nS	1N4446	NATIONAL SEMICOND.
CR8	10-1N4446	DIODE,SWITCHING,1N4446,75V,4nS	1N4446	NATIONAL SEMICOND.
CR9	10-24	DIODE ZENER,IN5360A,25V,10%	1N5360A	MOTOROLA
CR10	10-1N4446	DIODE,SWITCHING,1N4446,75V,4nS	1N4446	NATIONAL SEMICOND.
CR11	10-1N4446	DIODE,SWITCHING,1N4446,75V,4nS	1N4446	NATIONAL SEMICOND.
CR12	10-1N4446	DIODE,SWITCHING,1N4446,75V,4nS	1N4446	NATIONAL SEMICOND.
CR13	10-1N4446	DIODE,SWITCHING,1N4446,75V,4nS	1N4446	NATIONAL SEMICOND.
CR14	10-120	DIODE,RECTIFIER,MUR110,100V	MUR110	MOTOROLA
CR15	10-120	DIODE,RECTIFIER,MUR110,100V	MUR110	MOTOROLA
CR16	10-24	DIODE ZENER,IN5360A,25V,10%	1N5360A	MOTOROLA
CR17	10-109	DIODE,RECTIFIER,MBR1545,45V	MBR1545CT	MOTOROLA
CR18	10-118	DIODE,RECTIFIER ULTRA-FAST	10JTF40	INTERN'L RECTIFIER
CR19	10-110	DIODE,RECTIFIER,MUR1640CT	MUR1640CT	MOTOROLA
CR20	10-110	DIODE,RECTIFIER,MUR1640CT	MUR1640CT	MOTOROLA
CR20	10-110	DIODE,RECTIFIER,MUR1640CT	MUR1640CT	MOTOROLA
CR20	10-118	DIODE,RECTIFIER ULTRA-FAST	10JTF40	INTERN'L RECTIFIER
CR21	10-110	DIODE,RECTIFIER,MUR1640CT	MUR1640CT	MOTOROLA
CR21	10-110	DIODE,RECTIFIER,MUR1640CT	MUR1640CT	MOTOROLA
CR21	10-118	DIODE,RECTIFIER ULTRA-FAST	10JTF40	INTERN'L RECTIFIER
CR22	10-1N4446	DIODE,SWITCHING,1N4446,75V,4nS	1N4446	NATIONAL SEMICOND.
CR23	10-1N4446	DIODE,SWITCHING,1N4446,75V,4nS	1N4446	NATIONAL SEMICOND.
CR24	10-1N4446	DIODE,SWITCHING,1N4446,75V,4nS	1N4446	NATIONAL SEMICOND.
CR25	10-1N4446	DIODE,SWITCHING,1N4446,75V,4nS	1N4446	NATIONAL SEMICOND.
L1	310-181	INDUCTOR ASSY, 17.6µH	PER DWG B36319	WEST COAST MAGNETICS
L3	310-182	INDUCTOR ASSY, 740µH/282µH	PER DWG B36320	WEST COAST MAGNETICS
L4	310-183	INDUCTOR ASSY,17.6µH/353µH	PER DWG B36321	WEST COAST MAGNETICS
L5	310-184	INDUCTOR ASSY,180µH/740µH	PER DWG B36322	WEST COAST MAGNETICS
L6	310-186	INDUCTOR ASSY,19.6µH/62µH/	PER DWG B36324	WEST COAST MAGNETICS
L7	310-98	INDUCTOR,FIXED,1mH,10%	1641-105	DELEVAN

Table A1-18. A1A13 PCB Parts List (3 of 5)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
L8	310-123	INDUCTOR,FIXED,10mH,10%	MR10000	LENOX-FUGLE
L13	A32372	INDUCTOR FILTER,SWITCHER	SPEC-A-32372	WEST COAST MAGNETICS
L13	A39649	DOCUMENT,TEST PROCEDURE		
L14	A32372	INDUCTOR FILTER,SWITCHER	SPEC-A-32372	WEST COAST MAGNETICS
L14	A39649	DOCUMENT,TEST PROCEDURE		
MP1	B8116-13	PCB EJECTOR	CP-36	BIVAR
MP2	553-96	EJECTOR,PCB	CP-36	BIVAR
MP2	680-703	LABEL,0.65W,0.20H,POLYESTER	TAG-11-400	TYTON
MP3	553-318	HEATSINK,PCB&COMPONENT MT	288 1 AB	EG&G WAKEFIELD
MP4	553-318	HEATSINK,PCB&COMPONENT MT	288 1 AB	EG&G WAKEFIELD
MP6	553-25	MOUNTING,PAD,TO-5	7717-15-DAP	THERMALLOY
MP7	553-25	MOUNTING,PAD,TO-5	7717-15-DAP	THERMALLOY
MP8	553-25	MOUNTING,PAD,TO-5	7717-15-DAP	THERMALLOY
MP9	B35624	HEATSINK,6600B POWER SUPPLY		
MP9	B37985	HEATSINK,POWER SUPPLY,6600		
Q1	20-39	TRANSISTOR,FET,IRF330,Si,PWR S	IRF330	INTERN'L RECTIFIER
Q2	20-39	TRANSISTOR,FET,IRF330,Si,PWR S	IRF330	INTERN'L RECTIFIER
Q3	20-2N2222A	TRANSISTOR,NPN,2N2222A,Si	2N2222A	MOTOROLA
Q4	20-2N2905	TRANSISTOR,PNP,2N2905,Si	2N2905	MOTOROLA
Q5	20-2N2222A	TRANSISTOR,NPN,2N2222A,Si	2N2222A	MOTOROLA
Q6	20-2N2905	TRANSISTOR,PNP,2N2905,Si	2N2905	MOTOROLA
Q7	20-2N2222A	TRANSISTOR,NPN,2N2222A,Si	2N2222A	MOTOROLA
Q8	20-2N2907A	TRANSISTOR,PNP,2N2907A,Si	2N2907A	MOTOROLA
Q8	20-39	TRANSISTOR,FET,IRF330,Si,PWR S	IRF330	INTERN'L RECTIFIER
R1	110-6191-140	RESISTOR,FIXED,MF, 6.19KΩ1%,0.25W	RN 1/4-T1-6K19-1%	STACKPOLE
R2	110-6191-140	RESISTOR,FIXED,MF, 6.19KΩ1%,0.25W	RN 1/4-T1-6K19-1%	STACKPOLE
R3	110-365R-140	RESISTOR,FIXED,MF,, 365,1%,0.25W	RN 1/4-T1-365E-1%	STACKPOLE
R4	102-100K-5	RESISTOR,FIXED,CC,, 100KΩ,5%,0.5W	RC20GF104J	ALLEN BRADLEY
R5	102-100K-5	RESISTOR,FIXED,CC,, 100KΩ,5%,0.5W	RC20GF104J	ALLEN BRADLEY
R6	110-365R-140	RESISTOR,FIXED,MF,, 365Ω,,1%,0.25W	RN 1/4-T1-365E-1%	STACKPOLE
R7	130-0.5-5	RESISTOR,FIXED,WW,0.5Ω,,5%,2W	G3-80Z.5ohm1455%	DALE
R8	130-0.5-5	RESISTOR,FIXED,WW,0.5Ω,,5%,2W	G3-80Z.5ohm1455%	DALE
R9	104-750-5	RESISTOR,FIXED,CC, 750Ω,,5%,2W	RC42GF751J	ALLEN BRADLEY
R10	104-750-5	RESISTOR,FIXED,CC, 750Ω,5%,2W	RC42GF751J	ALLEN BRADLEY
R11	110-28R7-140	RESISTOR,FIXED,MF, 28.7Ω,1%,0.25W	RN 1/4-T1-28E7-1%	STACKPOLE
R12	110-28R7-140	RESISTOR,FIXED,MF, 28.7Ω,1%,0.25W	RN 1/4-T1-28E7-1%	STACKPOLE
R13	110-261R-140	RESISTOR,FIXED,MF, 261Ω,1%,0.25W	RN 1/4-T1-261E-1%	STACKPOLE
R14	110-261R-140	RESISTOR,FIXED,MF, 261Ω,1%,0.25W	RN 1/4-T1-261E-1%	STACKPOLE
R15	110-10R0-140	RESISTOR,FIXED,MF,10.0Ω,1%	RN 1/4-T1-10E-1%	STACKPOLE
R16	113-4.84K-0.1	RESISTOR,FIXED,MF,4.84KΩ,0.1%,0.1W	K004.84M3CB	CODECO VPR
R17	113-4.99K-0.1	RESISTOR,FIXED,MF,4.99KΩ,0.1%,0.1W	K004.99M3CB	CODECO VPR
R18	110-2212-140	RESISTOR,FIXED,MF, 22.1KΩ,,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R19	110-2212-140	RESISTOR,FIXED,MF, 22.1KΩ,,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE

Table A1-18. A1A13 PCB Parts List (4 of 5)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R20	110-100R-140	RESISTOR,FIXED,MF,100Ω,,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R21	110-3161-140	RESISTOR,FIXED,MF, 3.16KΩ,,1%,0.25W	RN 1/4-T1-3K16-1%	STACKPOLE
R22	110-1871-140	RESISTOR,FIXED,MF, 1.87KΩ,1%,0.25W	RN 1/4-T1-1K87-1%	STACKPOLE
R23	110-1002-140	RESISTOR,FIXED,MF,10.0KΩ,,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R24	110-2872-140	RESISTOR,FIXED,MF, 28.7KΩ,,1%,0.25W	RN 1/4-T1-28K7-1%	STACKPOLE
R25	110-15R0-140	RESISTOR,FIXED,MF, 15.0Ω,,1%,0.25W	RN 1/4-T1-15E0-1%	STACKPOLE
R26	110-1471-140	RESISTOR,FIXED,MF, 1.47KΩ,,1%,0.25W	RN 1/4-T1-1K47-1%	STACKPOLE
R27	110-1472-140	RESISTOR,FIXED,MF, 14.7KΩ,,1%,0.25W	RN 1/4-T1-14K7-1%	STACKPOLE
R28	110-1003-140	RESISTOR,FIXED,MF, 100KΩ,,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R29	110-499R-140	RESISTOR,FIXED,MF, 499Ω,,1%,0.25W	RN 1/4-T1-499E-1%	STACKPOLE
R30	110-499R-140	RESISTOR,FIXED,MF, 499Ω,,1%,0.25W	RN 1/4-T1-499E-1%	STACKPOLE
R31	110-1002-140	RESISTOR,FIXED,MF,10.0KΩ,,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R32	110-1002-140	RESISTOR,FIXED,MF,10.0KΩ,,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R33	110-1002-140	RESISTOR,FIXED,MF,10.0KΩ,,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R34	110-1002-140	RESISTOR,FIXED,MF,10.0KΩ,,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R35	110-4992-140	RESISTOR,FIXED,MF, 49.9KΩ,,1%,0.25W	RN 1/4-T1-49K9-1%	STACKPOLE
R38	110-147R-140	RESISTOR,FIXED,MF,147Ω,1%,0.25W	RN 1/4-T1-147E-1%	STACKPOLE
R39	110-7503-140	RESISTOR,FIXED,MF, 750KΩ,1%,0.25W	RN 1/4-T1-750K-1%	STACKPOLE
R40	110-2492-140	RESISTOR,FIXED,MF, 24.9KΩ,1%,0.25W	RN 1/4-T1-24K9-1%	STACKPOLE
R41	102-27-5	RESISTOR,FIXED,CC,27Ω,5%,0.5W, RC20GF270J	ALLEN BRADLEY	
R42	102-27-5	RESISTOR,FIXED,CC,27Ω,5%,0.5W	RC20GF270J	ALLEN BRADLEY
R43	156-5K	RESISTOR,TRIM,CER,5KΩ,10%,1T	72XWR-5K	BECKMAN
R44	110-8451-140	RESISTOR,FIXED,MF, 8.45KΩ,1%,0.25W	RN 1/4-T1-8K45-1%	STACKPOLE
R45	110-1001-140	RESISTOR,FIXED,MF,1.0K,1%,0.025W	RN 1/4-T1-1K-1%	STACKPOLE
R46	110-100R-140	RESISTOR,FIXED,MF, 100Ω,,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R47	110-1001-140	RESISTOR,FIXED,MF,1.0KΩ,1%,.0025W	RN 1/4-T1-1K-1%	STACKPOLE
R48	110-100R-140	RESISTOR,FIXED,MF, 100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R49	110-10R0-140	RESISTOR,FIXED,MF,10.0Ω,1%	RN 1/4-T1-10E-1%	STACKPOLE
R50	110-402R-140	RESISTOR,FIXED,MF, 402Ω,1%,0.25W	RN 1/4-T1-402E-1%	STACKPOLE
R51	102-470-5	RESISTOR,FIXED,CC, 470Ω,5%,0.5W	RC20GF471J	ALLEN BRADLEY
R52	102-470-5	RESISTOR,FIXED,CC, 470Ω,5%,0.5W	RC20GF471J	ALLEN BRADLEY
R53	110-3162-140	RESISTOR,FIXED,MF, 31.6KΩ,1%,0.25W	RN 1/4-T1-31K6-1%	STACKPOLE
R54	102-620-5	RESISTOR,FIXED,CC, 620Ω,5%,0.5W	RC20GF621J	ALLEN BRADLEY
R55	110-2002-140	RESISTOR,FIXED,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R56	102-470-5	RESISTOR,FIXED,CC,470Ω,5%,0.5W	RC20GF471J	ALLEN BRADLEY
R57	102-470-5	RESISTOR,FIXED,CC, 470Ω,5%,0.5W	RC20GF471J	ALLEN BRADLEY
R58	110-2213-140	RESISTOR,FIXED,MF, 221KΩ,1%,0.25W	RN 1/4-T1-221K-1%	STACKPOLE
R59	110-2002-140	RESISTOR,FIXED,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R60	110-2002-140	RESISTOR,FIXED,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R61	110-4991-140	RESISTOR,FIXED,MF, 4.99KΩ,1%,0.25W	RN 1/4-T1-4K99-1%	STACKPOLE
R62	110-4991-140	RESISTOR,FIXED,MF, 4.99KΩ,1%,0.25W	RN 1/4-T1-4K99-1%	STACKPOLE
R63	110-6492-140	RESISTOR,FIXED,MF, 64.9KΩ,1%,0.25W	RN 1/4-T1-64K9-1%	STACKPOLE
R64	110-499R-140	RESISTOR,FIXED,MF, 499Ω,1%,0.25W	RN 1/4-T1-499E-1%	STACKPOLE
S1	430-447	SWITCH,THERMOSTAT,CLOSES	3BTF3-45	TEXAS INSTRUMENTS

Table A1-18. A1A13 PCB Parts List (5 of 5)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
T1	A32371	XFORMER,PWR SUPPLY,A25,6700	SPEC-A-32371	WEST COAST MAGNETICS
T3	320-145	TRANSFORMER,POWER,50kHz	PER DWG B37987	WEST COAST MAGNETICS
T3	430-447	SWITCH,THERMOSTAT,CLOSES	3BTF3-45	TEXAS INSTRUMENTS
TP1	702-17	TERMINAL,EYELET	20-2137D	VEROSPEED
TP1	706-2	TERM LUG,PLAIN,SCREW	1488-4	HH SMITH
TP2	702-17	TERMINAL,EYELET	20-2137D	VEROSPEED
TP2	706-2	TERM LUG,PLAIN,SCREW	1488-4	HH SMITH
TP4	702-17	TERMINAL,EYELET	20-2137D	VEROSPEED
TP5	702-17	TERMINAL,EYELET	20-2137D	VEROSPEED
TP6	702-17	TERMINAL,EYELET	20-2137D	VEROSPEED
TP7	702-17	TERMINAL,EYELET	20-2137D	VEROSPEED
U1	20-820	OPTOCOUPLER,GEN PURPOSE,NPN	MCT-2E	MONSANTO
U2	20-820	OPTOCOUPLER,GEN PURPOSE,NPN	MCT-2E	MONSANTO
U6	54-765	IC,PWM,TL494,SINGLE	TL494CN	MOTOROLA
U7	54-555	IC,OP AMP,NE555,SINGLE	LM555CN	RCA SOLID STATE
U8	50-34	IC,OP-AMP,LT1056ACH,SINGLE	LT1056ACH	LINEAR TECHNOLOGY
VR1	54-502	IC,VOLTAGE REG,LT1031,10V	LT1031CCH	LINEAR TECHNOLOGY
VR2	54-LM340T	IC,VOLTAGE REGULATOR,LM340T-12	LM340T-12	NATIONAL SEMICOND.

Table A1-19. A1A14 PCB Parts List (1 of 7)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C1	230-3	CAPACITOR,FXD,CER,1000pF,10%,1kV	DD-102	PHILIPS COMPONENTS
C2	230-3	CAPACITOR,FXD,CER,1000pF,10%,1kV	DD-102	PHILIPS COMPONENTS
C3	230-3	CAPACITOR,FXD,CER,1000pF,10%,1kV	DD-102	PHILIPS COMPONENTS
C4	250-53	CAPACITOR,FXD,ALUM,220µF,25V	ET221X025A00	PHILIPS COMPONENTS
C5	230-40	CAPACITOR,FXD,CER,0.01µF,20%,1kV	5GA-S10	SPRAGUE
C6	230-40	CAPACITOR,FXD,CER,0.01µF,20%,1kV	5GA-S10	SPRAGUE
C7	230-40	CAPACITOR,FXD,CER,0.01µF,20%,1kV	5GA-S10	SPRAGUE
C11	230-40	CAPACITOR,FXD,CER,0.01µF,20%1kV	5GA-S10	SPRAGUE
C12	250-168	CAPACITOR,FXD,ALUM,820uF,200V	LP8215200H9P3	MALLORY/WESTLAKE
C13	250-168	CAPACITOR,FXD,ALUM,820uF,200V	LP8215200H9P3	MALLORY/WESTLAKE
C15	250-41	CAPACITOR,FXD,TANT,6.8µF,10%,35V	199D685X9035DE3	SPRAGUE
C16	250-41	CAPACITOR,FXD,TANT,6.8µF,10%,35V	199D685X9035DE3	SPRAGUE
C17	250-41	CAPACITOR,FXD,TANT,6.8µF,10%,35V	199D685X9035DE3	SPRAGUE
C18	250-34	CAPACITOR,FXD,ALUM,10µF,-10/+50V	3073DA100T063JPT	PHILIPS COMPONENTS
C19	250-41	CAPACITOR,FXD,TANT,6.8µF,10%,35V	199D685X9035DE3	SPRAGUE
C20	250-41	CAPACITOR,FXD,TANT,6.8µF,10%,35V	199D685X9035DE3	SPRAGUE
C21	250-51	CAPACITOR,FXD,ALUM,47µF,-10/+50V	T3073FE470T063JPT	PHILIPS COMPONENTS
C22	250-50	CAPACITOR,FXD,ALUM,100µF,200V	ECE-B1EU101	PANASONIC
C23	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C24	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C25	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C26	250-19	CAPACITOR,FXD,TANT,1µF,10%,35V	199D105X9035HE3	SPRAGUE
C27	210-30	CAPACITOR,FXD,PEST,0.10µF,10%	ECQ-E2104KZS	PANASONIC
C28	223-560	CAPACITOR,FXD,CER,560pF,10%,100V	1C10COG561K050B	SPRAGUE
C29	223-560	CAPACITOR,FXD,CER,560pF,10%,100V	1C10COG561K050B	SPRAGUE
C30	223-560	CAPACITOR,FXD,CER,560pF,10%,100V	1C10COG561K050B	SPRAGUE
C31	223-560	CAPACITOR,FXD,CER,560pF,10%,100V	1C10COG561K050B	SPRAGUE
C32	230-20	CAPACITOR,FXD,CER,0.02µF,25V	5835-000-Y5UO-203Z	TUSONIX
C33	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C34	250-41	CAPACITOR,FXD,TANT,6.8µF,10%,35V	199D685X9035DE3	SPRAGUE
C35	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C36	250-34	CAPACITOR,FXD,ALUM,10µF,100V	3073DA100T063JPT	PHILIPS COMPONENTS
C37	230-3	CAPACITOR,FXD,CER,1000pF,10%,1kV	DD-102	PHILIPS COMPONENTS
C39	250-19	CAPACITOR,FXD,TANT,1µF,10%,35V	199D105X9035HE3	SPRAGUE
C40	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C41	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C43	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V		
C44	250-41	CAPACITOR,FXD,TANT,6.8µF,10%,35V	199D685X9035DE3	SPRAGUE
C45	250-41	CAPACITOR,FXD,TANT,6.8µF,10%,35V	199D685X9035DE3	SPRAGUE
C46	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V		
C47	250-53	CAPACITOR,FXD,ALUM,220µF,25V	ET221X025A00	PHILIPS COMPONENTS
CR2	10-1N752A	DIODE,ZENER,1N752A,5.6V,5%	1N752A	MOTOROLA
CR3	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR4	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR5	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH

Table A1-19. A1A14 PCB Parts List (2 of 7)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
CR6	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR7	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR8	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR9	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR11	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR13	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR14	10-11	DIODE,ZENER,1N750A,4.7V,5%	IN750A	NATIONAL SEMICOND.
CR15	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR16	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR17	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR18	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR19	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR20	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR21	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR22	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR23	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR24	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR25	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR26	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR27	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR28	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR29	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR30	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR31	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR32	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR33	10-SI2	DIODE,RECTIFIER,IN4003,200V	SS6253	SEMTECH
CR38	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446	NATIONAL SEMICOND.
CR39	10-73	DIODE,RECTIFIER,MR824	MR824	MOTOROLA
CR40	10-73	DIODE,RECTIFIER,MR824	MR824	MOTOROLA
CR41	10-73	DIODE,RECTIFIER,MR824	MR824	MOTOROLA
CR42	10-73	DIODE,RECTIFIER,MR824	MR824	MOTOROLA
CR43	10-SI2	DIODE,RECTIFIER,IN4003,200	SS6253	SEMTECH
CR44	10-SI2	DIODE,RECTIFIER,IN4003,200	SS6253	SEMTECH
DS1	15-6	INDICATOR,LED,GRN	MV5474C	CHICAGO MINIATURE
DS2	15-5	INDICATOR,LED,RED	MV5774C	QUALITY TECH.
DS3	15-5	INDICATOR,LED,RED	MV5774C	QUALITY TECH.
DS4	15-5	INDICATOR,LED,RED	MV5774C	QUALITY TECH.
DS5	15-5	INDICATOR,LED,RED	MV5774C	QUALITY TECH.
K1	690-19	RELAY,CRADLE,1C,5V	AZ2530-12-1	AMERICAN ZETTLER
L1	A32372	INDUCTOR FILTER,SWITCHER	SPEC-A-32372	WEST COAST MAG.
L2	A32372	INDUCTOR FILTER,SWITCHER	SPEC-A-32372	WEST COAST MAG.
L3	310-52	INDUCTOR,FXD,100MICROHY,20%	5250-100uh	JW MILLER
P1	551-830	CONNECTOR,HEADER,PCB MNT,7,.20	10-63-1073	MOLEX
P2	551-725	CONNECTOR,HEADER,1 ROW-0.100IN	69167-104	DU PONT
P3	551-216	CONNECTOR,HDR,PC MNT,26-PIN DUAL	65611-126	BERG

Table A1-19. A1A14 PCB Parts List (3 of 7)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
P1	551-830	CONNECTOR,HEADER,PCB MNT,7,.20	10-63-1073	MOLEX
P2	551-725	CONNECTOR,HEADER,1 ROW-0.100IN	69167-104	DU PONT
P3	551-216	CONNECTOR,HDR,PC MNT,26-PIN DUAL	65611-126	BERG
P4	551-216	CONNECTOR,HDR,PC MNT,26-PIN DUAL	65611-126	BERG
P5	551-216	CONNECTOR,HDR,PC MNT,26-PIN DUAL	65611-126	BERG
P6	551-216	CONNECTOR,HDR,PC MNT,26-PIN DUAL	65611-126	BERG
P7	551-216	CONNECTOR,HDR,PC MNT,26-PIN DUAL	65611-126	BERG
P10	551-240	CONNECTOR,HDR,PCB MNT RT ANGL	22-05-2041	MOLEX
P12	551-245	CONNECTOR,HDR,PC MNT,5 POS	19PIN 09-60-1055	MOLEX
P13	551-1080	CONNECTOR,EDGE CARD,PNL MNT,56PIN	C2D28DS29C2	HOLMBERG
P14	551-242	CONNECTOR,HDR,PC MNT,16 SNGL	09-61-1165	MOLEX
P15	551-234	CONNECTOR,HDR,PC MNT,10 SNGL	09-60-1101	MOLEX
P16	551-242	CONNECTOR,HDR,PC MNT,16 SNGL	09-61-1165	MOLEX
P17	551-242	CONNECTOR,HDR,PC MNT,16 SNGL	09-61-1165	MOLEX
P24	551-238	CONNECTOR,HDR, PC MNT RT ANGL	22-12-2031	MOLEX
P31	553-63	SOCKET,IC,14DIP	D1LB141-110	BURNDY
P33	551-241	CONNECTOR,HDR,PC MNT RT ANGL,2PIN	22-05-2021	MOLEX
P34	551-241	CONNECTOR,HDR,PC MNT RT ANGL,2PIN	22-05-2021	MOLEX
P44	551-238	CONNECTOR,HDR, PC MNT RT ANGL	22-12-2031	MOLEX
P45	551-245	CONNECTOR,HDR,PC MNT,5 POS,.15PIN	09-60-1055	MOLEX
P46	551-725	CONNECTOR,HEADER,1 ROW-0.100IN	69167-104	DU PONT
P47	551-241	CONNECTOR,HDR,PC MNT RT ANGL,2PIN	22-05-2021	MOLEX
P48	551-151	CONNECTOR,HDR,PCB MNT,5 PIN,.1PIN	65507-105	BERG
P49	551-238	CONNECTOR,HDR, PC MNT RT ANGL	22-12-2031	MOLEX
Q1	20-MPSA42	TRANSISTOR,NPN,MPSA42,Si	MPSA42	MOTOROLA
Q2	20-MPSA92	TRANSISTOR,PNP,MPSA92,Si	MPSA92	MOTOROLA
Q3	20-MPSA92	TRANSISTOR,PNP,MPSA92,Si	MPSA92	MOTOROLA
Q4	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694	MOTOROLA
Q5	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249	MOTOROLA
Q6	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249	MOTOROLA
Q7	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249	MOTOROLA
Q8	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694	MOTOROLA
Q9	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249	MOTOROLA
Q10	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694	MOTOROLA
Q11	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249-18	MOTOROLA
Q12	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694	MOTOROLA
Q13	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249	MOTOROLA
Q14	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249	MOTOROLA
Q15	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694	MOTOROLA
Q16	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249	MOTOROLA
Q17	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249	MOTOROLA
Q18	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694	MOTOROLA
Q19	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249	MOTOROLA
Q20	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249	MOTOROLA

Table A1-19. A1A14 PCB Parts List (4 of 7)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
Q21	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249	MOTOROLA
Q22	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694	MOTOROLA
Q23	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694-18	MOTOROLA
Q24	20-2N3694	TRANSISTOR,NPN,2N3694,Si	MPS3694	MOTOROLA
Q25	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249	MOTOROLA
Q26	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249-18	MOTOROLA
Q27	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249	MOTOROLA
Q28	20-2N4249	TRANSISTOR,PNP,2N4249,Si	MPS4249	MOTOROLA
R1	110-16.9K-1	RESISTOR,FXD,MF,16.9KΩ,1%,0.25W		
R2	110-3.32K-1	RESISTOR,FXD,MF,3.32KΩ,1%,0.25W		
R3	110-196-1	RESISTOR,FXD,MF,196Ω,1%,0.25W	RN 1/4-T1-196E-1%	STACKPOLE
R4	110-1.78K-1	RESISTOR,FXD,MF,1.78KΩ,1%,0.25W	RN 1/4-T1-1K78-1%	STACKPOLE
R5	110-1.27K-1	RESISTOR,FXD,MF,1.27KΩ,1%,0.25W		
R6	110-6.49K-1	RESISTOR,FXD,MF,6.49KΩ,1%,0.25W		
R8	130-1-3	RESISTOR,FXD,WW,1Ω,5%,3.25W	UT-2C-20	ULTEX
R9	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R10	102-5.6K-5	RESISTOR,FXD,CC,5.6KΩ,5%,0.5W	RC20GF562J	ALLEN BRADLEY
R11	110-12.7K-1	RESISTOR,FXD,MF,12.7KΩ,1%,0.25W		
R12	110-2.21K-1	RESISTOR,FXD,MF,2.21KΩ,1%,0.25W	RN 1/4-T1-2K21-1%	STACKPOLE
R13	110-10-1	RESISTOR,FXD,MF,10.0Ω,1%,0.125W	RN 1/4-T1-10E-1%	STACKPOLE
R14	102-100K-5	RESISTOR,FXD,CC,100KΩ,5%,0.5W	RC20GF104J	ALLEN BRADLEY
R15	102-100K-5	RESISTOR,FXD,CC,100KΩ,5%,0.5W	RC20GF104J	ALLEN BRADLEY
R19	110-3.32K-1	RESISTOR,FXD,MF,3.32KΩ,1%,0.25W		
R20	110-19.1-1	RESISTOR,FXD,MF,19.1Ω,1%,0.25W	SMA-4 OR C4	CORNING
R21	110-42.2-1	RESISTOR,FXD,MF,42.2Ω,1%,0.25W	RN 1/4-TI-42E2-1%	STACKPOLE
R22	110-61.9K-1	RESISTOR,FXD,MF,61.9KΩ,1%,0.25W	RN 1/4-TI-61K9-1%	STACKPOLE
R23	110-88.7K-1	RESISTOR,FXD,MF,88.7KΩ,1%,0.25W		
R24	110-88.7K-1	RESISTOR,FXD,MF,88.7KΩ,1%,0.25W		
R25	110-215K-1	RESISTOR,FXD,MF,215KΩ,1%,0.25W	RN 1/4-T1-215K-1%	STACKPOLE
R26	110-61.9K-1	RESISTOR,FXD,MF,61.9KΩ,1%,0.25W	RN 1/4-TI-61K9-1%	STACKPOLE
R27	110-107K-1	RESISTOR,FXD,MF,107KΩ,1%,0.25W		
R28	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R29	110-6.81K-1	RESISTOR,FXD,MF,6.81KΩ,1%,0.25W	RN 1/4-TI-6K81-1%	STACKPOLE
R30	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R31	110-6.81K-1	RESISTOR,FXD,MF,6.81KΩ,1%,0.25W	RN 1/4-TI-6K81-1%	STACKPOLE
R32	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R33	110-6.81K-1	RESISTOR,FXD,MF,6.81KΩ,1%,0.25W	RN 1/4-TI-6K81-1%	STACKPOLE
R34	130-120-3	RESISTOR,FXD,WW,120Ω,5%,3.25W		
R35	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R36	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R37	104-270-5	RESISTOR,FXD,CC,270Ω,5%,2W	RC42GF271J	ALLEN BRADLEY
R38	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R39	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE

Table A1-19. A1A14 PCB Parts List (5 of 7)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R40	110-61.9-1	RESISTOR,FXD,MF,61.9Ω,1%,0.25W	RN 1/4-TI-61E9-1%	STACKPOLE
R41	110-115-1	RESISTOR,FXD,MF,115Ω,1%,0.25W	SMA-4 OR C4	CORNING
R42	110-115-1	RESISTOR,FXD,MF,115Ω,1%,0.25W	SMA-4 OR C4	CORNING
R43	110-115-1	RESISTOR,FXD,MF,115Ω,1%,0.25W	SMA-4 OR C4	CORNING
R44	110-6.81K-1	RESISTOR,FXD,MF,6.81KΩ,1%,0.25W	RN 1/4-TI-6K81-1%	STACKPOLE
R45	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R46	110-6.81K-1	RESISTOR,FXD,MF,6.81KΩ,1%,0.25W	RN 1/4-TI-6K81-1%	STACKPOLE
R47	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R48	110-115-1	RESISTOR,FXD,MF,115Ω,1%,0.25W	SMA-4 OR C4	CORNING
R50	104-270-5	RESISTOR,FXD,CC,270Ω,5%,2W	RC42GF271J	ALLEN BRADLEY
R61	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R65	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R68	104-270-5	RESISTOR,FXD,CC,270Ω,5%,2W	RC42GF271J	ALLEN BRADLEY
R69	110-11.8K-1	RESISTOR,FXD,MF,11.8KΩ,1%,0.25W		
R70	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R71	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R72	110-10.5K-1	RESISTOR,FXD,MF,10.5KΩ,1%,0.25W		
R73	110-12.7K-1	RESISTOR,FXD,MF,12.7KΩ,1%,0.25W		
R74	110-1.33K-1	RESISTOR,FXD,MF,1.33KΩ,1%,0.25W		
R75	110-16.5K-1	RESISTOR,FXD,MF,16.5KΩ,1%,0.25W		
R76	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R77	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R78	110-287-1	RESISTOR,FXD,MF,287Ω,1%,0.25W	RN 1/4-T1-287E-1%	STACKPOLE
R79	156-5K-A	RESISTOR,TRIM,CER,5KΩ,10%,1T	72PMR-5K	BECKMAN
R80	156-5K-A	RESISTOR,TRIM,CER,5KΩ,10%,1T	72PMR-5K	BECKMAN
R81	110-200K-1	RESISTOR,FXD,MF,200KΩ,1%,0.25W		
R82	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R83	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R84	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R85	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R86	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R87	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R88	110-12.1K-1	RESISTOR,FXD,MF,12.1KΩ,1%,0.25W	RN 1/4-T1-12K1-1%	STACKPOLE
R89	157-100K-A	RESISTOR,TRIM,CER,100KΩ,10%,18T	68WR-100K	BECKMAN
R90	110-287-1	RESISTOR,FXD,MF,287Ω,1%,0.25W	RN 1/4-T1-287E-1%	STACKPOLE
R91	110-287-1	RESISTOR,FXD,MF,287Ω,1%,0.25W	RN 1/4-T1-287E-1%	STACKPOLE
R92	110-287-1	RESISTOR,FXD,MF,287Ω,1%,0.25W	RN 1/4-T1-287E-1%	STACKPOLE
R93	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R94	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R95	110-22.1K-1	RESISTOR,FXD,MF,22.1KΩ,1%,0.25W	RN 1/4-T1-22K1-1%	STACKPOLE
R96	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R97	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R98	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE

Table A1-19. A1A14 PCB Parts List (6 of 7)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
R99	102-.5-5	RESISTOR,FXD,CC,0.5Ω,5%,0.5W	UT-1/2 0.5ohm 5%	RIEDON
R100	102-.5-5	RESISTOR,FXD,CC,0.5Ω,5%,0.5W	UT-1/2 0.5ohm 5%	RIEDON
R101	102-.5-5	RESISTOR,FXD,CC,0.5Ω,5%,0.5W	UT-1/2 0.5ohm 5%	RIEDON
R102	110-4.99K-1	RESISTOR,FXD,MF,4.99KΩ,1%,0.25W	RN 1/4-TI-4K99-1%	STACKPOLE
R103	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R104	110-6.81K-1	RESISTOR,FXD,MF,6.81KΩ,1%,0.25W	RN 1/4-TI-6K81-1%	STACKPOLE
R105	110-86.6-1	RESISTOR,FXD,MF,86.6Ω,1%,0.25W	SMA-4 OR C4	CORNING
R106	110-115-1	RESISTOR,FXD,MF,115Ω,1%,0.25W	SMA-4 OR C4	CORNING
R107	110-20.0-1	RESISTOR,FXD,MF,20Ω,1%,0.25W		
R108	110-5.11-1	RESISTOR,FXD,MF,5.11Ω,1%,0.25W	RN 1/4-TI-5E11-1%	STACKPOLE
R109	110-20.0-1	RESISTOR,FXD,MF,20Ω,1%,0.25W		
R110	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R111	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R112	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R113	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R114	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R115	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R116	113-10K-0.1	RESISTOR,FXD,MF,10.0KΩ,0.1%,0.125W		
R117	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R118	110-2K-1	RESISTOR,FXD,MF,2.00KΩ,1%,0.25W	RN 1/4-TI-2K-1%	STACKPOLE
R119	110-68.1-1	RESISTOR,FXD,MF,68.1Ω,1%,0.25W	RN 1/4-TI-68E1-1%	STACKPOLE
R120	110-68.1-1	RESISTOR,FXD,MF,68.1Ω,1%,0.25W	RN 1/4-TI-68E1-1%	STACKPOLE
R121	110-68.1-1	RESISTOR,FXD,MF,68.1Ω,1%,0.25W	RN 1/4-TI-68E1-1%	STACKPOLE
R122	110-68.1-1	RESISTOR,FXD,MF,68.1Ω,1%,0.25W	RN 1/4-TI-68E1-1%	STACKPOLE
R123	110-6.81K-1	RESISTOR,FXD,MF,6.81KΩ,1%,0.25W	RN 1/4-TI-6K81-1%	STACKPOLE
R124	110-6.81K-1	RESISTOR,FXD,MF,6.81KΩ,1%,0.25W	RN 1/4-TI-6K81-1%	STACKPOLE
R125	104-270-5	RESISTOR,FXD,CC,270Ω,5%,2W	RC42GF271J	ALLEN BRADLEY
R126	110-86.6-1	RESISTOR,FXD,MF,86.6Ω,1%,0.25W	SMA-4 OR C4	CORNING
R127	110-86.6-1	RESISTOR,FXD,MF,86.6Ω,1%,0.25W	SMA-4 OR C4	CORNING
R128	110-86.6-1	RESISTOR,FXD,MF,86.6Ω,1%,0.25W	SMA-4 OR C4	CORNING
R129	110-100-1	RESISTOR,FXD,MF,100Ω,1%,0.25W	RN 1/4-T1-100E-1%	STACKPOLE
R130	110-1.1K-1	RESISTOR,FXD,MF,1.10KΩ,1%,0.25W	RN 1/4-T1-1K1-1%	STACKPOLE
R137	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R138	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R139	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R140	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R141	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R142	110-61.9K-1	RESISTOR,FXD,MF,61.9KΩ,1%,0.25W	RN 1/4-TI-61K9-1%	STACKPOLE
R143	110-61.9K-1	RESISTOR,FXD,MF,61.9KΩ,1%,0.25W	RN 1/4-TI-61K9-1%	STACKPOLE
RN1	123-6	RESISTOR,NETWORK,MF,7X10KΩ,2%	108A103	ALLEN-BRADLEY
RN2	123-6	RESISTOR,NETWORK,MF,7X10KΩ,2%	108A103	ALLEN-BRADLEY
RN4	123-6	RESISTOR,NETWORK,MF,7X10KΩ,2%	108A103	ALLEN-BRADLEY
RN7	123-37	RESISTOR,NETWORK,MF,6.2K/3KΩ	710E302622	ALLEN BRADLEY

Table A1-19. A1A14 PCB Parts List (7 of 7)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
RN8	123-37	RESISTOR,NETWORK,MF,6.2K/3KΩ	710E302622	ALLEN BRADLEY
RN9	123-37	RESISTOR,NETWORK,MF,6.2K/3KΩ	710E302622	ALLEN BRADLEY
RN10	123-37	RESISTOR,NETWORK,MF,6.2K/3KΩ	710E302622	ALLEN BRADLEY
RN11	123-37	RESISTOR,NETWORK,MF,6.2K/3KΩ	710E302622	ALLEN BRADLEY
RN12	123-37	RESISTOR,NETWORK,MF,6.2K/3KΩ	710E302622	ALLEN BRADLEY
RT1	35-7	THERMISTOR,NTC,5.00,10%,2.0W	50B5R00K	CAL-R
RT2	35-7	THERMISTOR,NTC,5.00,10%,2.0W	50B5R00K	CAL-R
RV1	35-6	VARISTOR,130VRMS,0.24W	V130-LA1	GENERAL ELECTRIC
RV2	35-6	VARISTOR,130VRMS,0.24W	V130-LA1	GENERAL ELECTRIC
SW1	430-332	SWITCH,PUSHBUTTON,PP,PC	NE18-2UEESP	ITT SCHADOW
T1	320-114	TRANSFORMER,POWER,50.60Hz	SFD-328	TAMURA CORP.
U4	50-16	IC,OP AMP,LM10,SNGL	LM10CLH	NATIONAL SEMICOND.
U5	54-MC3302P	IC,COMPARATOR,LM3302,QUAD	MC3302	MOTOROLA
U6	54-41	IC,TTL,74LS374,OCTAL	DM74LS374N	NATIONAL SEMICOND.
U7	54-103	IC,TTL,74LS373,OCTAL,TRANSPARE	DM74LS373N	NATIONAL SEMICOND.
U8	54-103	IC,TTL,74LS373,OCTAL,TRANSPARE	DM74LS373N	NATIONAL SEMICOND.
U9	54-44	IC,TTL,74LS74,DUAL	DM74LS74AN	NATIONAL SEMICOND.
U10	54-103	IC,TTL,74LS373,OCTAL	DM74LS373N	NATIONAL SEMICOND.
U11	50-9	IC,OP AMP,LF356,SINGLE	LF356N	NATIONAL SEMICOND.
U12	50-9	IC,OP AMP,LF356,SINGLE	LF356N	NATIONAL SEMICOND.
VR1	54-152	IC,VOLTAGE REGULATOR,LM340	MC7824CT	MOTOROLA
VR2	54-152	IC,VOLTAGE REGULATOR,LM340	MC7824CT	MOTOROLA
VR3	54-MC7815CP	IC,VOLTAGE REGULATOR,7815,15V	LM340T-15	NATIONAL SEMICOND.
VR4	54-MC7915CP	IC,VOLTAGE REGULATOR,7915,–15V	MC7915CT	MOTOROLA
VR5	54-MC7815CP	IC,VOLTAGE REGULATOR,7815,15V	LM340T-15	NATIONAL SEMICOND.
VR6	54-MC7915CP	IC,VOLTAGE REGULATOR,7915,–15V	MC7915CT	MOTOROLA
XA1	551-1080	CONNECTOR,EDGE CARD,PNL MNT,56PIN	C2D28DS29C2	HOLMBERG
XA2	551-1080	CONNECTOR,EDGE CARD,PNL MNT,56PIN	C2D28DS29C2	HOLMBERG
XA3	551-1080	CONNECTOR,EDGE CARD,PNL MNT,56PIN	C2D28DS29C2	HOLMBERG
XA4	551-1080	CONNECTOR,EDGE CARD,PNL MNT,56PIN	C2D28DS29C2	HOLMBERG
XA5	551-1080	CONNECTOR,EDGE CARD,PNL MNT,56PIN	C2D28DS29C2	HOLMBERG
XA6	551-1080	CONNECTOR,EDGE CARD,PNL MNT,56PIN	C2D28DS29C2	HOLMBERG
XA7	551-1080	CONNECTOR,EDGE CARD,PNL MNT,56PIN	C2D28DS29C2	HOLMBERG
XA8	551-1080	CONNECTOR,EDGE CARD,PNL MNT,56PIN	C2D28DS29C2	HOLMBERG
XA9	551-1080	CONNECTOR,EDGE CARD,PNL MNT,56PIN	C2D28DS29C2	HOLMBERG
XA10	551-1080	CONNECTOR,EDGE CARD,PNL MNT,56PIN	C2D28DS29C2	HOLMBERG
XA16	553-48	SOCKET,IC,16DIP	C841602	T.I.

Table A1-20. A2A11 PCB Parts List (1 of 6)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C2	230-125	CAPACITOR,FXD,CER,0.1uF,10%	CW20C104K	PHILIPS COMPONENTS
C3	230-125	CAPACITOR,FXD,CER,0.1uF,10%	CW20C104K	PHILIPS COMPONENTS
C4	230-125	CAPACITOR,FXD,CER,0.1uF,10%	CW20C104K	PHILIPS COMPONENTS
C5	230-125	CAPACITOR,FXD,CER,0.1uF,10%	CW20C104K	PHILIPS COMPONENTS
C6	230-125	CAPACITOR,FXD,CER,0.1uF,10%	CW20C104K	PHILIPS COMPONENTS
C7	230-125	CAPACITOR,FXD,CER,0.1uF,10%	CW20C104K	PHILIPS COMPONENTS
C8	230-125	CAPACITOR,FXD,CER,0.1uF,10%	CW20C104K	PHILIPS COMPONENTS
C9	230-125	CAPACITOR,FXD,CER,0.1uF,10%	CW20C104K	PHILIPS COMPONENTS
C10	230-125	CAPACITOR,FXD,CER,0.1uF,10%	CW20C104K	PHILIPS COMPONENTS
DS1	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS2	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS3	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS4	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS5	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS6	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS7	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS8	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS9	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS10	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS11	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS12	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS13	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS14	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS15	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS16	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS17	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS18	15-27	INDICATOR,LED,RED,PANEL DOT	LTL-1224A	LITE-ON CORP
DS19	15-58	INDICATOR,LED,GREEN	LTL-1234A	LITE-ON CORP
DS20	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS21	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS22	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS23	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS24	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS25	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS26	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS27	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS28	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS29	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS30	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS31	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS32	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS33	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS34	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS35	15-27	INDICATOR,LED,RED,PANEL DOT	LTL-1224A	LITE-ON CORP
DS36	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP

Table A1-20. A2A11 PCB Parts List (2 of 6)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
DS37	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS38	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS39	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS40	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS41	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS42	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS43	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS44	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS45	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS46	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS47	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS48	15-15	DISPLAY,LED,ORG,7 SEGMENT	MAN3610A	QUALITY TECH.
DS49	15-15	DISPLAY,LED,ORG,7 SEGMENT	MAN3610A	QUALITY TECH.
DS50	15-15	DISPLAY,LED,ORG,7 SEGMENT	MAN3610A	QUALITY TECH.
DS51	15-15	DISPLAY,LED,ORG,7 SEGMENT	MAN3610A	QUALITY TECH.
DS52	15-15	DISPLAY,LED,ORG,7 SEGMENT	MAN3610A	QUALITY TECH.
DS53	15-15	DISPLAY,LED,ORG,7 SEGMENT	MAN3610A	QUALITY TECH.
DS54	15-15	DISPLAY,LED,ORG,7 SEGMENT	MAN3610A	QUALITY TECH.
DS55	15-15	DISPLAY,LED,ORG,7 SEGMENT	MAN3610A	QUALITY TECH.
DS56	15-15	DISPLAY,LED,ORG,7 SEGMENT	MAN3610A	QUALITY TECH.
DS57	15-15	DISPLAY,LED,ORG,7 SEGMENT	MAN3610A	QUALITY TECH.
DS58	15-14	DISPLAY,LED,ORG	MAN3630A	QUALITY TECH.
DS59	15-15	DISPLAY,LED,ORG,7 SEGMENT	MAN3610A	QUALITY TECH.
DS60	15-15	DISPLAY,LED,ORG,7 SEGMENT	MAN3610A	QUALITY TECH.
DS61	15-15	DISPLAY,LED,ORG,7 SEGMENT	MAN3610A	QUALITY TECH.
DS62	15-15	DISPLAY,LED,ORG,7 SEGMENT	MAN3610A	QUALITY TECH.
DS63	15-27	INDICATOR,LED,RED,PANEL DOT	LTL-1224A	LITE-ON CORP
DS64	15-27	INDICATOR,LED,RED,PANEL DOT	LTL-1224A	LITE-ON CORP
DS65	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS66	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS67	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS68	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS69	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS70	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS71	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS72	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS73	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS74	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS75	15-31	INDICATOR,LED,RED	SSL-LX20465RD	LUMEX
DS76	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
DS77	15-57	INDICATOR,LED,YELLOW	LTL-1254A	LITE-ON CORP
G1	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G2	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G3	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G4	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.

Table A1-20. A2A11 PCB Parts List (3 of 6)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
G5	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G6	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G7	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G8	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G9	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G10	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G11	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G12	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G13	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G14	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G15	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G16	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G17	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G18	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G19	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G20	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G21	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G22	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G23	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G24	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G25	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G26	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G27	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G28	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G29	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G30	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G31	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G32	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G33	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G34	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G35	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G36	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G37	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G38	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G39	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G40	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G42	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G43	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G44	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G45	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G46	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G47	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
G48	430-328	SWITCH,GUIDE MOUNT	510-00003	TANGENT TECH.
P1	551-216	CONNECTOR,HDR,PC MNT,26 DUAL	65611-126	BERG
P2	551-216	CONNECTOR,HDR,PC MNT,26 DUAL	65611-126	BERG

Table A1-20. A2A11 PCB Parts List (4 of 6)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
P3	551-216	CONNECTOR,HDR,PC MNT,26 DUAL	65611-126	BERG
Q1	20-101	TRANSISTOR,PNP,MPSA55,Si	MPSA55	MOTOROLA,
Q2	20-101	TRANSISTOR,PNP,MPSA55,Si	MPSA55	MOTOROLA,
Q3	20-101	TRANSISTOR,PNP,MPSA55,Si	MPSA55	MOTOROLA,
Q4	20-101	TRANSISTOR,PNP,MPSA55,Si	MPSA55	MOTOROLA,
Q5	20-101	TRANSISTOR,PNP,MPSA55,Si	MPSA55	MOTOROLA,
Q6	20-101	TRANSISTOR,PNP,MPSA55,Si	MPSA55	MOTOROLA,
Q7	20-101	TRANSISTOR,PNP,MPSA55,Si	MPSA55	MOTOROLA,
Q8	20-101	TRANSISTOR,PNP,MPSA55,Si	MPSA55	MOTOROLA,
Q9	20-101	TRANSISTOR,PNP,MPSA55,Si	MPSA55	MOTOROLA,
Q10	20-101	TRANSISTOR,PNP,MPSA55,Si	MPSA55	MOTOROLA,
Q11	20-101	TRANSISTOR,PNP,MPSA55,Si	MPSA55	MOTOROLA,
Q12	20-101	TRANSISTOR,PNP,MPSA55,Si	MPSA55	MOTOROLA,
Q13	20-101	TRANSISTOR,PNP,MPSA55,Si	MPSA55	MOTOROLA,
Q14	20-101	TRANSISTOR,PNP,MPSA55,Si	MPSA55	MOTOROLA,
Q15	20-101	TRANSISTOR,PNP,MPSA55,Si	MPSA55	MOTOROLA,
R19	110-215-1	RESISTOR,FXD,MF,215Ω,1%,0.25W	RN 1/4-T1-215E-1%	STACKPOLE
R20	110-215-1	RESISTOR,FXD,MF,215Ω,1%,0.25W	RN 1/4-T1-215E-1%	STACKPOLE
R21	110-215-1	RESISTOR,FXD,MF,215Ω,1%,0.25W	RN 1/4-T1-215E-1%	STACKPOLE
R22	110-215-1	RESISTOR,FXD,MF,215Ω,1%,0.25W	RN 1/4-T1-215E-1%	STACKPOLE
R23	110-215-1	RESISTOR,FXD,MF,215Ω,1%,0.25W	RN 1/4-T1-215E-1%	STACKPOLE
R24	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R25	110-4.64K-1	RESISTOR,FXD,MF,4.64KΩ,1%,0.25W	RN 1/4-TI-4K64-1%	STACKPOLE
R26	110-4.64K-1	RESISTOR,FXD,MF, 4.64KΩ,1%,0.25W	RN 1/4-TI-4K64-1%	STACKPOLE
R27	110-215-1	RESISTOR,FXD,MF,215Ω,1%,0.25W	RN 1/4-T1-215E-1%	STACKPOLE
R28	110-215-1	RESISTOR,FXD,MF,215Ω,1%,0.25W	RN 1/4-T1-215E-1%	STACKPOLE
R29	110-215-1	RESISTOR,FXD,MF,215Ω,1%,0.25W	RN 1/4-T1-215E-1%	STACKPOLE
R30	110-215-1	RESISTOR,FXD,MF,215Ω,1%,0.25W	RN 1/4-T1-215E-1%	STACKPOLE
R31	110-215-1	RESISTOR,FXD,MF,215Ω,1%,0.25W	RN 1/4-T1-215E-1%	STACKPOLE
R32	110-215-1	RESISTOR,FXD,MF,215Ω,1%,0.25W	RN 1/4-T1-215E-1%	STACKPOLE
R33	110-150-1	RESISTOR,FXD,MF,150Ω,1%,0.25W		
R34	110-150-1	RESISTOR,FXD,MF,150Ω,1%,0.25W		
R35	110-215-1	RESISTOR,FXD,MF,215Ω,1%,0.25W	RN 1/4-T1-215E-1%	STACKPOLE
R36	110-150-1	RESISTOR,FXD,MF,150Ω,1%,0.25W		
R37	110-215-1	RESISTOR,FXD,MF,215Ω,1%,0.25W	RN 1/4-T1-215E-1%	STACKPOLE
R38	110-215-1	RESISTOR,FXD,MF,215Ω,1%,0.25W	RN 1/4-T1-215E-1%	STACKPOLE
R39	110-215-1	RESISTOR,FXD,MF,215Ω,1%,0.25W	RN 1/4-T1-215E-1%	STACKPOLE
R42	430-327	SWITCH,ELASTOMERIC	510-00004	TANGENT TECH.
RN1	123-39	RESISTOR,NETWORK,MF,7X1KΩ,2%	MDP1403-102G	DALE
RN2	123-32	RESISTOR,NETWORK,MF,8X1KΩ,2%	316B102	ALLEN BRADLEY
RN3	123-40	RESISTOR,NETWORK,MF,7X4.7KΩ	MSP08A01-472G	DALE
RN4	123-40	RESISTOR,NETWORK,MF,7X4.7KΩ	MSP08A01-472G	DALE
RN5	123-42	RESISTOR,NETWORK,MF,7X220Ω	MSP08A01-221G	DALE
RN6	123-42	RESISTOR,NETWORK,MF,7X220Ω	MSP08A01-221G	DALE
RN7	123-13	RESISTOR,NETWORK,MF,15X220Ω,2%	661-1-R220	BECKMAN

Table A1-20. A2A11 PCB Parts List (5 of 6)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
RN8	123-42	RESISTOR,NETWORK,MF,7X220Ω	MSP08A01-221G	DALE
RN9	123-13	RESISTOR,NETWORK,MF,15X220Ω,2%	661-1-R220	BECKMAN
RN10	123-11	RESISTOR,NETWORK,MF,8X56Ω,2%	316B560	ALLEN BRADLEY
RN11	123-38	RESISTOR,NETWORK,MF,9X68Ω,2%	MSP10A01-680G	DALE
S1	430-395	SWITCH,ELASTOMERIC		WILTRON
S2	430-395	SWITCH,ELASTOMERIC		WILTRON
S3	430-395	SWITCH,ELASTOMERIC		WILTRON
S4	430-395	SWITCH,ELASTOMERIC		WILTRON
S5	430-395	SWITCH,ELASTOMERIC		WILTRON
S6	430-395	SWITCH,ELASTOMERIC		WILTRON
S7	430-395	SWITCH,ELASTOMERIC		WILTRON
S8	430-395	SWITCH,ELASTOMERIC		WILTRON
S9	430-395	SWITCH,ELASTOMERIC		WILTRON
S10	430-395	SWITCH,ELASTOMERIC		WILTRON
S11	430-395	SWITCH,ELASTOMERIC		WILTRON
S12	430-395	SWITCH,ELASTOMERIC		WILTRON
S13	430-395	SWITCH,ELASTOMERIC		WILTRON
S14	430-395	SWITCH,ELASTOMERIC		WILTRON
S15	430-395	SWITCH,ELASTOMERIC		WILTRON
S16	430-395	SWITCH,ELASTOMERIC		WILTRON
S17	430-395	SWITCH,ELASTOMERIC		WILTRON
S18	430-395	SWITCH,ELASTOMERIC		WILTRON
S19	430-395	SWITCH,ELASTOMERIC		WILTRON
S20	430-395	SWITCH,ELASTOMERIC		WILTRON
S21	430-395	SWITCH,ELASTOMERIC		WILTRON
S22	430-395	SWITCH,ELASTOMERIC		WILTRON
S23	430-395	SWITCH,ELASTOMERIC		WILTRON
S24	430-395	SWITCH,ELASTOMERIC		WILTRON
S25	430-395	SWITCH,ELASTOMERIC		WILTRON
S26	430-395	SWITCH,ELASTOMERIC		WILTRON
S27	430-395	SWITCH,ELASTOMERIC		WILTRON
S28	430-395	SWITCH,ELASTOMERIC		WILTRON
S29	430-395	SWITCH,ELASTOMERIC		WILTRON
S30	430-395	SWITCH,ELASTOMERIC		WILTRON
S31	430-395	SWITCH,ELASTOMERIC		WILTRON
S32	430-395	SWITCH,ELASTOMERIC		WILTRON
S33	430-395	SWITCH,ELASTOMERIC		WILTRON
S34	430-395	SWITCH,ELASTOMERIC		WILTRON
S35	430-395	SWITCH,ELASTOMERIC		WILTRON
S36	430-395	SWITCH,ELASTOMERIC		WILTRON
S37	430-395	SWITCH,ELASTOMERIC		WILTRON
S38	430-395	SWITCH,ELASTOMERIC		WILTRON
S39	430-395	SWITCH,ELASTOMERIC		WILTRON
S40	430-395	SWITCH,ELASTOMERIC		WILTRON
S43	430-395	SWITCH,ELASTOMERIC		WILTRON

Table A1-20. A2A11 PCB Parts List (6 of 6)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
S44	430-395	SWITCH,ELASTOMERIC		WILTRON
S45	430-395	SWITCH,ELASTOMERIC		WILTRON
S46	430-395	SWITCH,ELASTOMERIC		WILTRON
S47	430-395	SWITCH,ELASTOMERIC		WILTRON
S48	430-395	SWITCH,ELASTOMERIC		WILTRON
S49	430-395	SWITCH,ELASTOMERIC		WILTRON
S50	430-395	SWITCH,ELASTOMERIC		WILTRON
S51	430-395	SWITCH,ELASTOMERIC		WILTRON
S52	430-395	SWITCH,ELASTOMERIC		WILTRON
S53	430-395	SWITCH,ELASTOMERIC		WILTRON
S54	430-395	SWITCH,ELASTOMERIC		WILTRON
S55	430-395	SWITCH,ELASTOMERIC		WILTRON
S56	430-395	SWITCH,ELASTOMERIC		WILTRON
S57	430-395	SWITCH,ELASTOMERIC		WILTRON
S58	430-395	SWITCH,ELASTOMERIC		WILTRON
U1	54-41	IC,TTL,74LS374,OCTAL	DM74LS374N	NATIONAL SEMICOND.
U2	54-41	IC,TTL,74LS374,OCTAL	DM74LS374N	NATIONAL SEMICOND.
U3	54-41	IC,TTL,74LS374,OCTAL	DM74LS374N	NATIONAL SEMICOND.
U4	54-41	IC,TTL,74LS374,OCTAL	DM74LS374N	NATIONAL SEMICOND.
U5	54-41	IC,TTL,74LS374,OCTAL	DM74LS374N	NATIONAL SEMICOND.
U6	54-41	IC,TTL,74LS374,OCTAL	DM74LS374N	NATIONAL SEMICOND.
U7	54-74LS138	IC,TTL,74LS138	SN74LS138N	TEXAS INSTRUMENTS
U8	54-494	IC,TTL,74AS757,OCTAL	SN74AS757N	TEXAS INSTRUMENTS
U11	54-147	IC,TTL,74154	DM74154N	NATIONAL SEMICOND.
U12	54-125	IC,TTL,74LS86,QUAD	DM74LS86N	NATIONAL SEMICOND.
U13	54-805	IC,TTL,74AS756,OCTAL	SN74AS756N-00	TEXAS INSTRUMENTS

Table A1-21. A2A12 PCB Parts List (1 of 3)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C1	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C2	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C3	250-42	CAPACITOR,FXD,TANT,10µF,10%,35V	T354G106K035AS	KMET
C5	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C6	230-11	CAPACITOR,FXD,CER,0.01µF,100V, TGS-10	SPRAGUE	
C7	250-19	CAPACITOR,FXD,TANT,1µF,10%,35V	199D105X9035HE3	SPRAGUE
C8	230-11	CAPACITOR,FXD,CER,0.01µF,100V, TGS-10	SPRAGUE	
C9	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C10	230-11	CAPACITOR,FXD,CER,0.01µF,100V	TGS-10	SRAGUE
C11	230-11	CAPACITOR,FXD,CER,0.01µF,100V	TGS-10	SRAGUE
C12	250-19	CAPACITOR,FXD,TANT,1µF,10%,35V	199D105X9035HE3	SPRAGUE
C13	230-11	CAPACITOR,FXD,CER,0.01µF,100V, TGS-10	SPRAGUE	
C15	220-5	CAPACITOR,FXD,MICA,5pF,0.5pF,500V	CD15CD050D03	CORNELL DUBILIER
C16	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C17	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C18	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C19	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C20	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C21	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C22	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C23	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C24	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C25	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C26	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C27	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C28	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C29	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C30	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C31	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C32	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C33	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C34	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C35	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C36	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C37	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C38	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C39	250-53	CAPACITOR,FXD,ALUM,220µF,25V	ET221X025A00	PHILIPS COMPONENTS
C40	230-189	CAPACITOR,FXD,CER,2200pF,20%,500V	BGP.002+-20%,500VY5U	RMC
C41	223-560	CAPACITOR,FXD,CER,560pF,10%,100V	1C10COG561K050B	SPRAGUE
C42	223-470	CAPACITOR,FXD,CER,470pF,10%,100V	1C10C0G471K050B	SPRAGUE
C43	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C44	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C45	230-189	CAPACITOR,FXD,CER,2200pF,20%,500V	BGP.002+-20%500VY5U	RMC
C46	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE
C47	230-37	CAPACITOR,FXD,CER,0.1µF,20%,100V	RPE122901Z5U104M100V	MURATA/ERIE

Table A1-21. A2A12 PCB Parts List (2 of 3)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
C48	230-3	CAPACITOR,FXD,CER,1000pF,10%,1KV	DD-102	PHILIPS COMPONENTS
C60	250-53	CAPACITOR,FXD,ALUM,220µF,25V	ET221X025A00	PHILIPS COMPONENTS
CR1	10-1N4446	DIODE,SWITCHING,1N4446,75V,4ns	1N4446 T+R	NATIONAL SEMICOND.
P1	551-216	CONNECTOR,HDR,PC MNT,26 DUAL	65611-126	BERG
P2	551-216	CONNECTOR,HDR,PC MNT,26 DUAL	65611-126	BERG
P3	551-216	CONNECTOR,HDR,PC MNT,26 DUAL	65611-126	BERG
P4	551-122	CONNECTOR,HDR,PCB MNT,2 PIN	640454-2	AMP
P5	551-216	CONNECTOR,HDR,PC MNT,26 DUAL	65611-126	BERG
P6	551-216	CONNECTOR,HDR,PC MNT,26 DUAL	65611-126	BERG
P7	551-216	CONNECTOR,HDR,PC MNT,26 DUAL	65611-126	BERG
P8	551-120	CONNECTOR,HDR,PCB MNT,4 PIN	640454-4	AMP
P9	551-236	CONNECTOR,DIP SCKT,PC MNT,18	8136-475G9	AUGAT
P23	551-120	CONNECTOR,HDR,PCB MNT,4 PIN	640454-4	AMP
P24	551-120	CONNECTOR,HDR,PCB MNT,4 PIN	640454-4	AMP
P25	551-120	CONNECTOR,HDR,PCB MNT,4 PIN	640454-4	AMP
Q1	20-2N2907A	TRANSISTOR,PNP,2N2907A,Si,MED-	2N2907A	MOTOROLA
R1	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R2	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R3	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R4	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R5	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R6	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R7	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R8	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R9	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R10	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R11	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25W	RN 1/4-T1-10K-1%	STACKPOLE
R12	110-100K-1	RESISTOR,FXD,MF,100KΩ,1%,0.25W	RN 1/4-T1-100K-1%	STACKPOLE
R13	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,.025	RN 1/4-T1-1K-1%	STACKPOLE
R14	110-10K-1	RESISTOR,FXD,MF,10.0KΩ,1%,0.25	RN 1/4-T1-10K-1%	STACKPOLE
R15	110-402K-1	RESISTOR,FXD,MF,402KΩ,1%,0.25W		
R16	110-1M-1	RESISTOR,FXD,MF,1MΩ,1%,0.25W	RN 1/4-T1-1M-1%	STACKPOLE
R18	110-80.6K-1	RESISTOR,FXD,MF,80.6KΩ,1%,0.25W		
R19	110-1K-1	RESISTOR,FXD,MF,1.0KΩ,1%,.025	RN 1/4-T1-1K-1%	STACKPOLE
R20	110-301-1	RESISTOR,FXD,MF,301,1%,0.25W		
R21	110-301-1	RESISTOR,FXD,MF,301,1%,0.25W		
R22	110-301-1	RESISTOR,FXD,MF,301,1%,0.25W		
R23	110-301-1	RESISTOR,FXD,MF,301,1%,0.25W		
R24	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R25	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
R26	110-20K-1	RESISTOR,FXD,MF,20.0KΩ,1%,0.25W	RN 1/4-T1-20K-1%	STACKPOLE
RN1	123-9	RESISTOR,NETWORK,MF,9X10KΩ,2%	4310R-101-103	BOURNS
RN2	123-1	RESISTOR,NETWORK,MF,7X1KΩ,2%	784-1-R1K	BECKMAN
RN3	123-6	RESISTOR,NETWORK,MF,7X10KΩ,2%	108A103	ALLEN-BRADLEY
S1	420-14	SWITCH,SLIDE,2PDT,PC MT VERT	124-441-020	CHICAGO SWITCH

Table A1-21. A2A12 PCB Parts List (3 of 3)

REF DES	WPN	DESCRIPTION	VENDOR PART NUMBER	VENDOR NAME
U1	54-493	IC,VOLTAGE COMPARATOR,TL7705A	TL7705ACP	TEXAS INSTRUMENTS
U2	54-93	IC,MICROPROCESSOR,8085A	P8085A	INTEL
U3	54-103	IC,TTL,74LS373,OCTAL,TRANSPARE	DM74LS373N	NATIONAL SEMICOND.
U4	54-74LS32	IC,TTL,74LS32,QUAD,2 INPUT OR	DM74LS32N	NATIONAL SEMICOND.
U5	54-74LS04	IC,TTL,74LS04,HEX,INVERTERS	74LS04PC	FAIRCHILD
U6	54-74LS01	IC,TTL,74LS01,QUAD,2 INPUT NAN	N74LS01N	SIGNETICS
U7	54-402	IC,MEMORY,DS1225/MK48Z08,220NS	DS1225Y	DALLAS SEMICOND.
U8	56-20	CALL FACTORY		
U9	54-344	IC,TTL,74LS245,OCTAL BIDIREC	SN74LS245N	TEXAS INSTRUMENTS
U10	54-344	IC,TTL,74LS245,OCTAL BIDIREC	SN74LS245N	TEXAS INSTRUMENTS
U11	54-492	IC,TTL,74F538,SINGLE,3-8	74F538PC	FAIRCHILD
U12	54-74LS138	IC,TTL,74LS138,3 TO 8 DECODE	SN74LS138N	TEXAS INSTRUMENTS
U13	54-492	IC,TTL,74F538,SINGLE,3-8	74F538PC	FAIRCHILD
U14	54-492	IC,TTL,74F538,SINGLE,3-8	74F538PC	FAIRCHILD
U15	54-492	IC,TTL,74F538,SINGLE,3-8	74F538PC	FAIRCHILD
U16	54-74LS138	IC,TTL,74LS138,3 TO 8 DECODE	SN74LS138N	TEXAS INSTRUMENTS
U17	54-385	IC,TTL,74LS11,TRIPLE,3 INPUT	SN74LS11N	TEXAS INSTRUMENTS
U18	54-74LS138	IC,TTL,74LS138,3 TO 8 DECODE	SN74LS138N	TEXAS INSTRUMENTS
U19	54-7430	IC,TTL,7430,SNGL,8 INPUT NAND	DM7430N	NATIONAL SEMICOND.
U20	54-96L02	IC,TTL,96L02,DUAL,RETRIG ONE S	96L02PC	FAIRCHILD
U21	54-911	IC,MICROPROCESSOR,8279-5	uPD8279C-5	NEC ELECTRONICS
U22	54-143	IC,TTL,74LS244,OCTAL,BUFFER	DM74LS244N	NATIONAL SEMICOND.
U23	54-41	IC,TTL,74LS374,OCTAL,D FLIP FL	DM74LS374N	NATIONAL SEMICOND.
U24	54-41	IC,TTL,74LS374,OCTAL,D FLIP FL	DM74LS374N	NATIONAL SEMICOND.
U25	54-41	IC,TTL,74LS374,OCTAL,D FLIP FL	DM74LS374N	NATIONAL SEMICOND.
U26	54-74LS08	IC,TTL,74LS08,QUAD,2 INPUT AND	SN74LS08P	MOTOROLA
U27	54-104	IC,TTL,7406,HEX,INVERTER BUFFE	DM7406N	NATIONAL SEMICOND.
U28	54-251	IC,TTL,7407,HEX,BUFFERS	DM7407N	NATIONAL SEMICOND.
U29	54-555	IC,OP AMP,NE555	LM555CN	RCA SOLID STATE
U30	54-555	IC,OP AMP,NE555	LM555CN	RCA SOLID STATE
U31	54-44	IC,TTL,74LS74,DUAL,D FLIP FLOP	DM74LS74AN	NATIONAL SEMICOND.
U32	54-153	IC,TTL,74LS14,HEX,SCHMITT TRIG	SN74LS14N	TEXAS INSTRUMENTS
U33	54-125	IC,TTL,74LS86,QUAD,2 INPUT XOR	DM74LS86N	NATIONAL SEMICOND.
U34	54-74LS175	IC,TTL,74LS175,QUAD,D FLIP FLO	DM74LS175N	NATIONAL SEMICOND.
U35	54-53	IC,OP AMP,TLO72,DUAL	TL072CP3	TEXAS INSTRUMENTS
U36	54-74LS00	IC,TTL,74LS00,QUAD,2 INPUT NAN	SN74LS00P	MOTOROLA
U37	54-74193	IC,TTL,74193,SYNCHRONOUS BIN	DM74193N	NATIONAL SEMICOND.
U38	54-74193	IC,TTL,74193,SYNCHRONOUS BIN	DM74193N	NATIONAL SEMICOND.
U39	54-41	IC,TTL,74LS374,OCTAL,D FLIP FL	DM74LS374N	NATIONAL SEMICOND.
Y1	630-17	CRYSTAL,6.000MHZ,+/-0.005%	6.000MHZ	CRYSTEK CRYSTAL

APPENDIX 2
SERVICE DRAWINGS

A2-1. INTRODUCTION

This appendix provides assembly-locator, connector-locator, and cable-routing diagrams for the overall sweep generator. Additionally, it provides parts-locator and schematic diagrams for PCBs.

A2-2. ORGANIZATION OF DRAWINGS

Table A2-1 lists the organization of drawings.

Table A2-1. Appendix Organization

Table A2-1. Appendix Organization (Continued)

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Table A2-1. Appendix Organization (Continued)

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A2-31	A1A13 PCB Schematic, REV D (2 of 2)	A2-70
A2-32	A1A14 PCB Parts Locator, Assy D34714-3	A2-71/A2-72
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A2-33	A1A14 PCB Schematic, REV E (5 of 5)	A2-77
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A2-37	A2A12 PCB Schematic, REV B (3 of 3)	A2-85
A2-38	A3 Rear Panel Wiring Diagram	A2-86

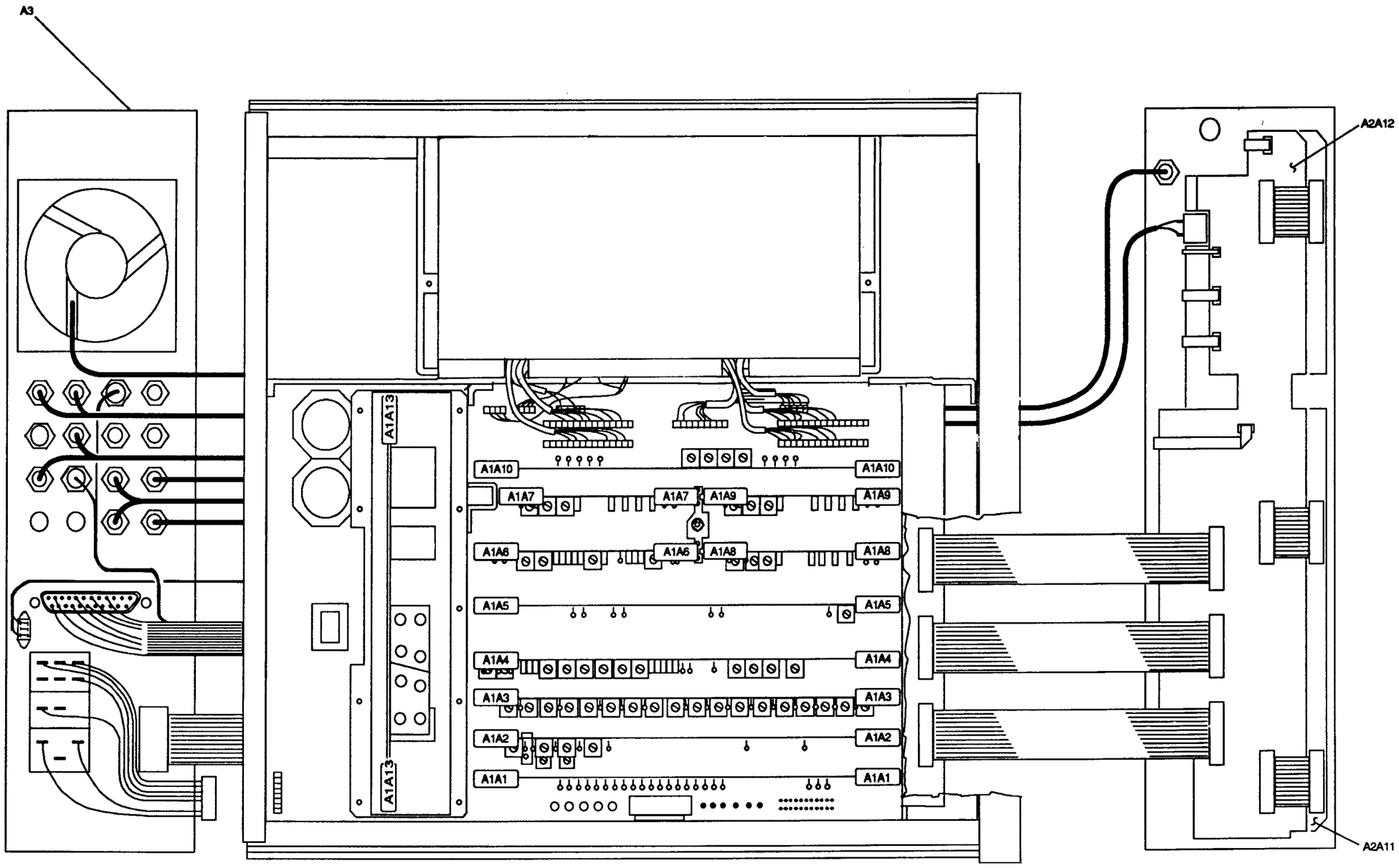


Figure A2-1. Assembly Locator Diagram

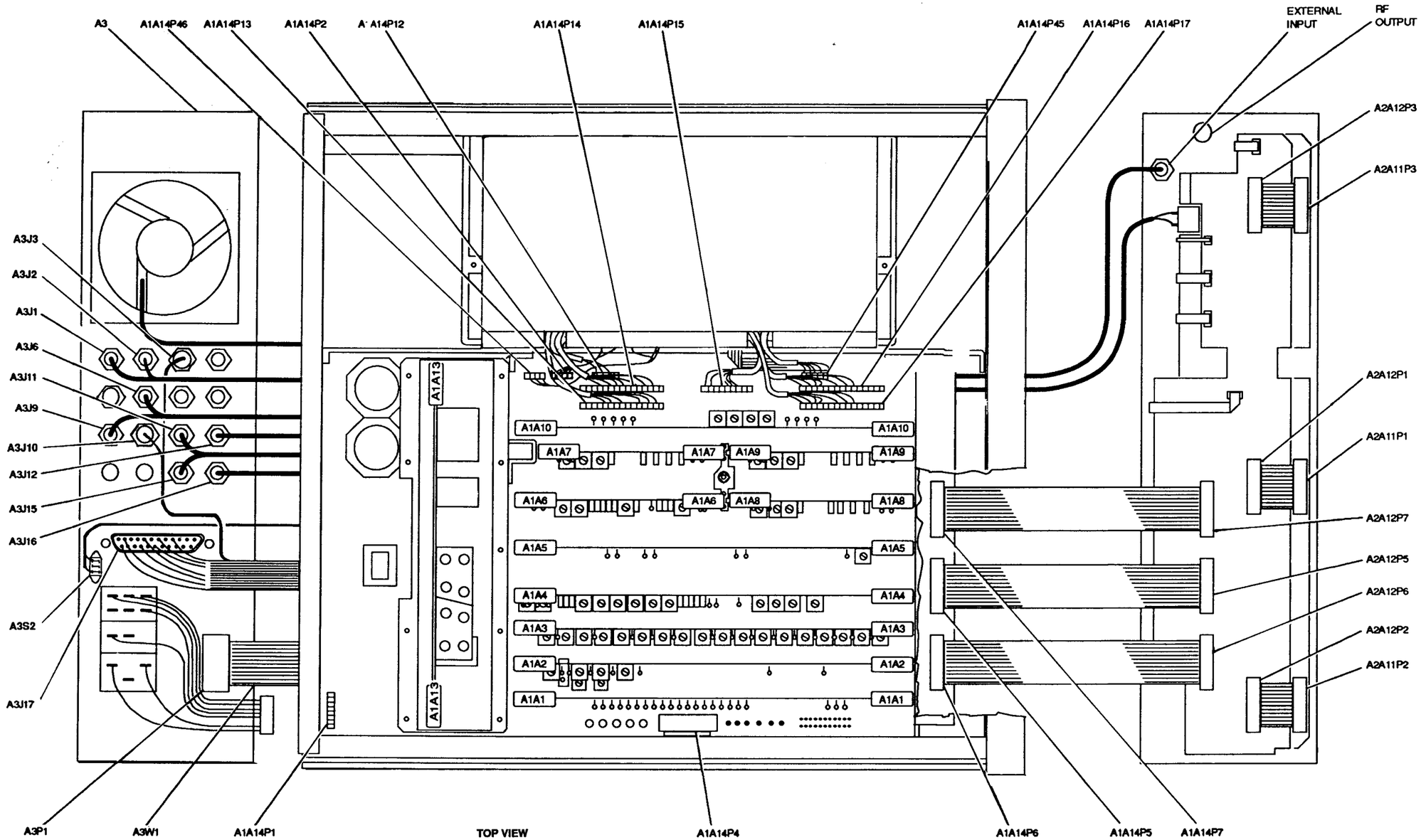


Figure A2-2. Connector-Location and Cable-Routing Diagram, Top View (1 of 2)

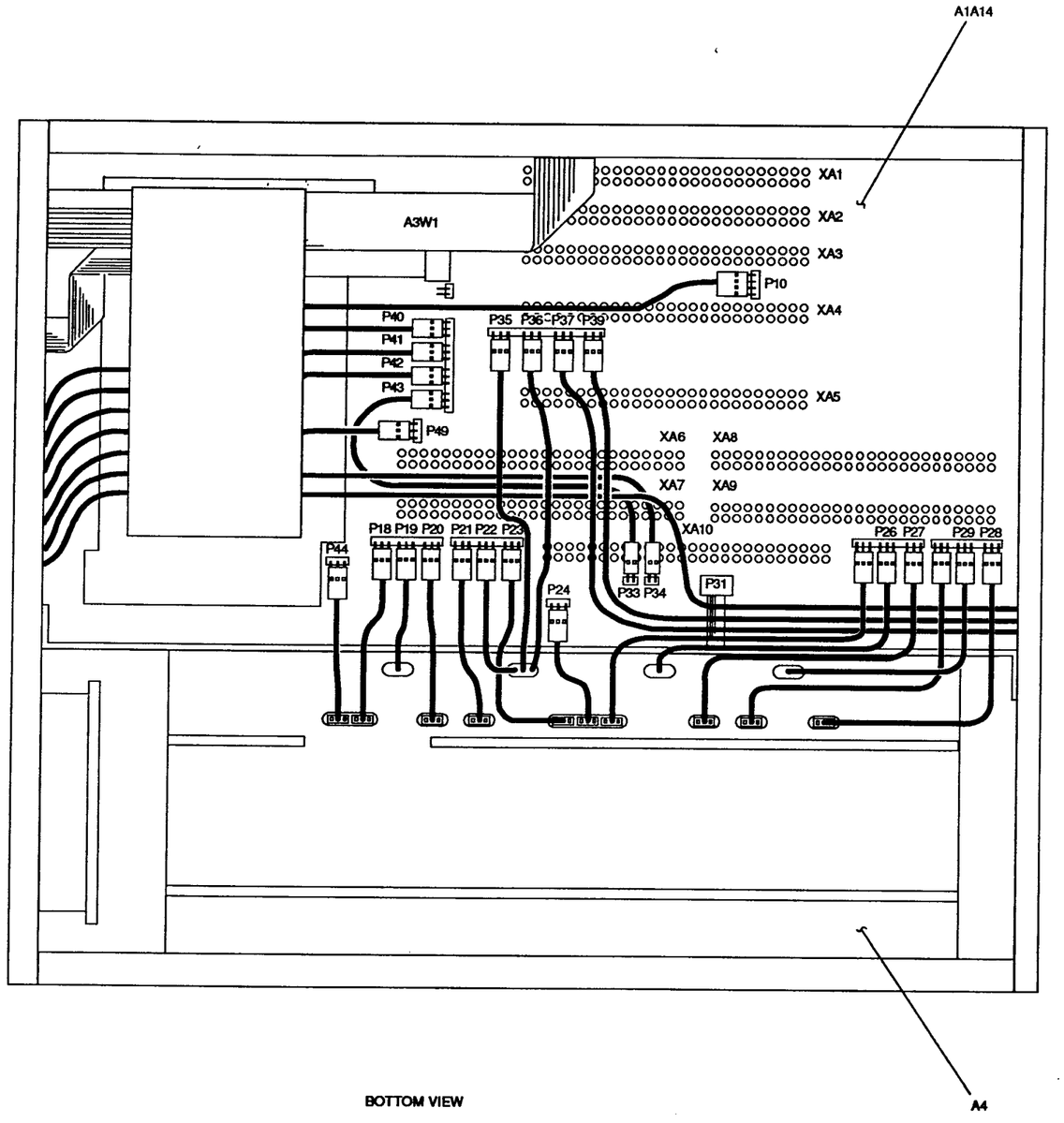


Figure A2-2. Connector-Location and Cable-Routing Diagram, Bottom View (2 of 2)

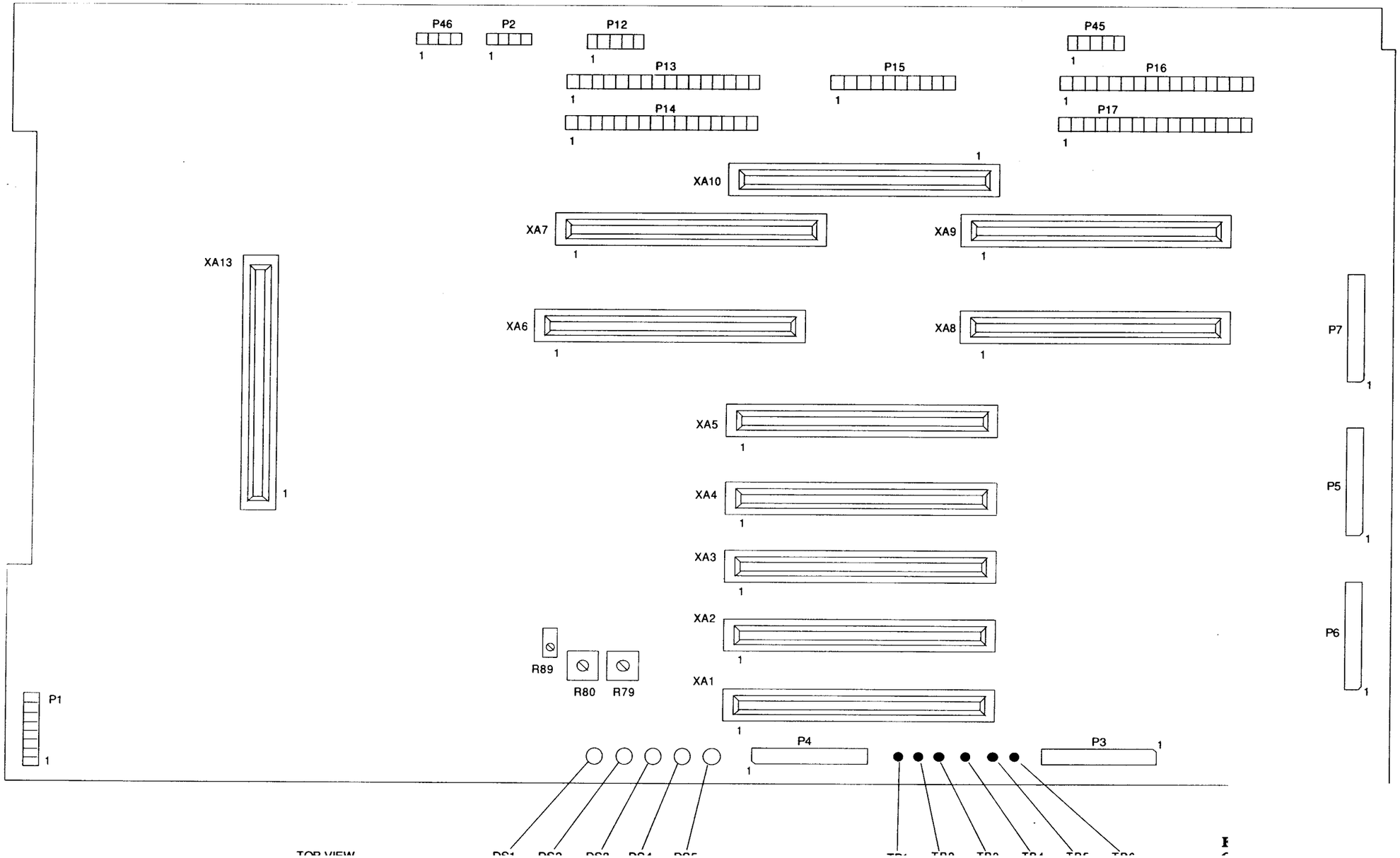


Figure A2-3. A1A14 Test Points and Component Testing Points (1 of 2)

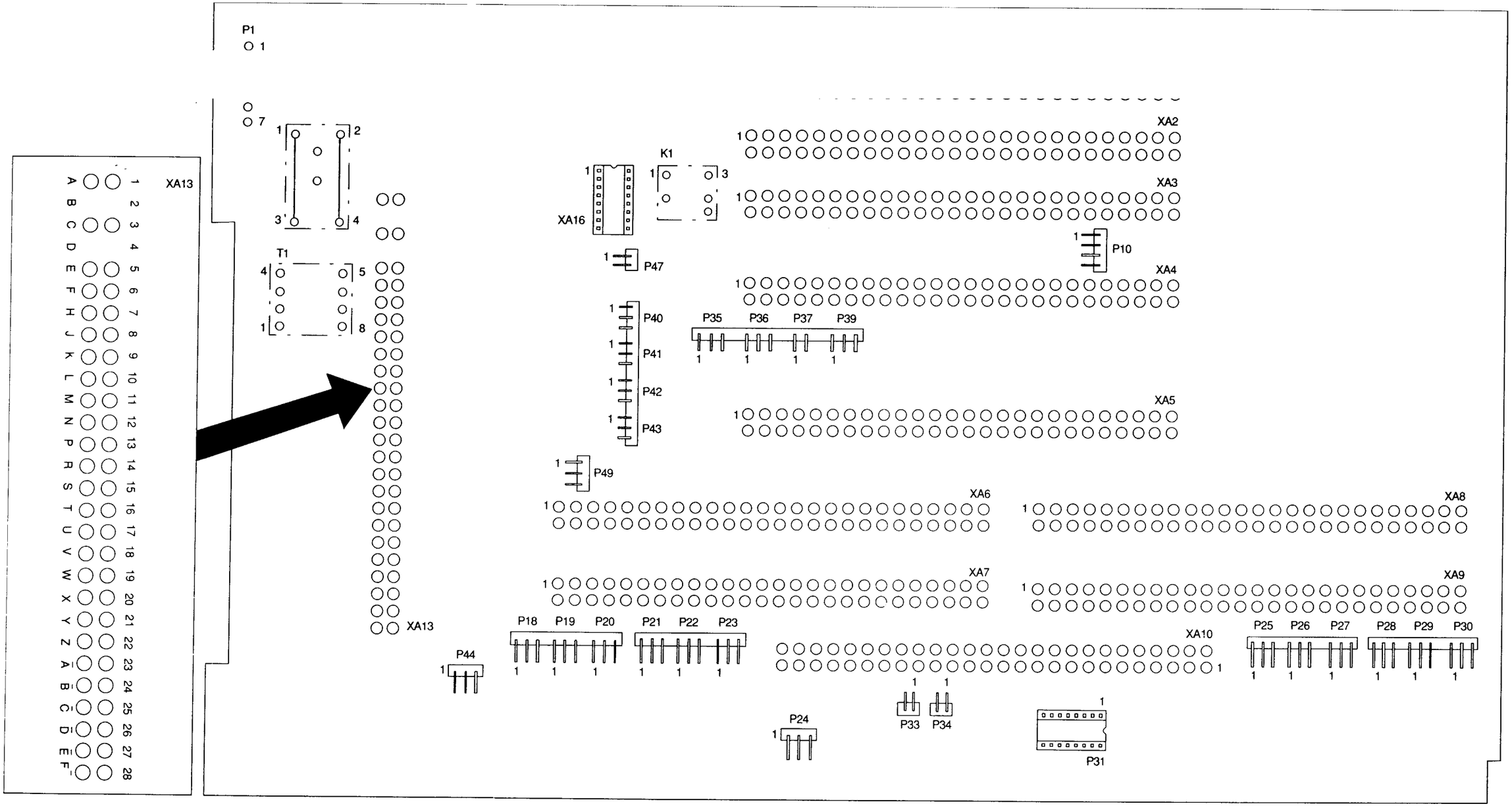


Figure A2-3. A1A14 Test Points and Component Testing Points (2 of 2)

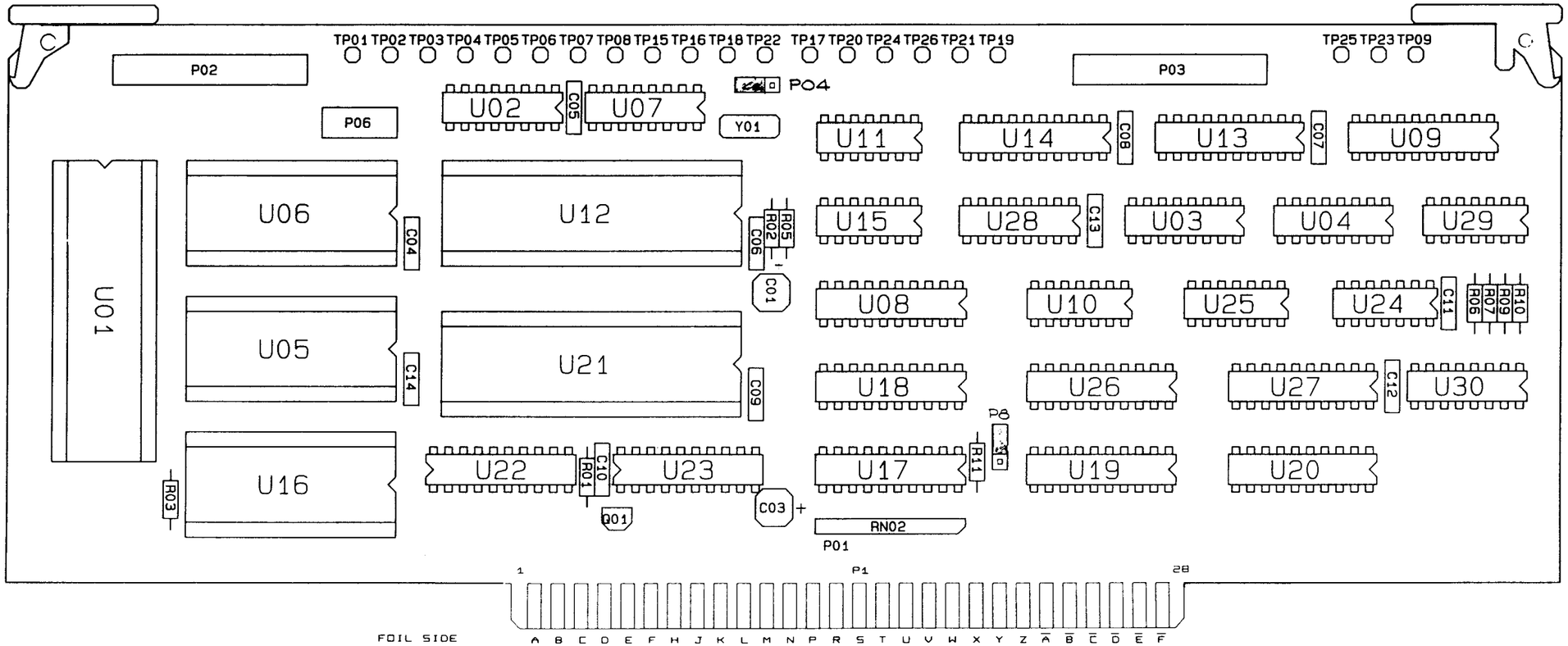
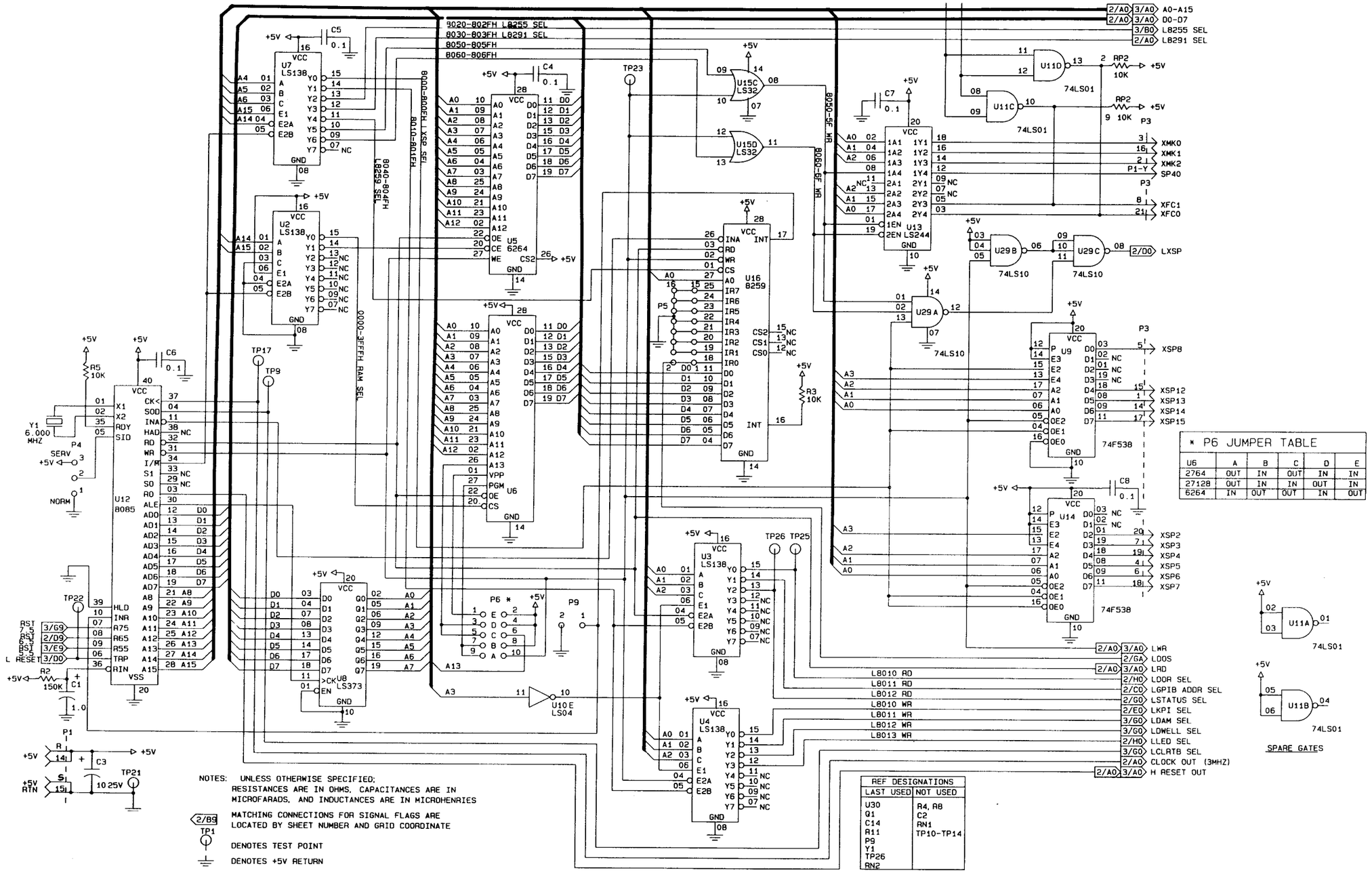


Figure A2-4. A1A1 GPIB PCB Parts Locator, Assy D32101-3



* P6 JUMPER TABLE

U6	A	B	C	D	E
2764	OUT	IN	OUT	IN	IN
27128	OUT	IN	IN	OUT	IN
6264	IN	OUT	OUT	IN	OUT

NOTES: UNLESS OTHERWISE SPECIFIED:
RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROFARADS, AND INDUCTANCES ARE IN MICROHENRIES

2/B9 MATCHING CONNECTIONS FOR SIGNAL FLAGS ARE LOCATED BY SHEET NUMBER AND GRID COORDINATE

TP1 DENOTES TEST POINT

DENOTES +5V RETURN

REF DESIGNATIONS

LAST USED	NOT USED
U30	R4, R8
Q1	C2
C14	RN1
R11	TP10-TP14
P9	
Y1	
TP26	
RN2	

Figure A2-5. A1A1 GPIB PCB Schematic, REV C (1 of 3)

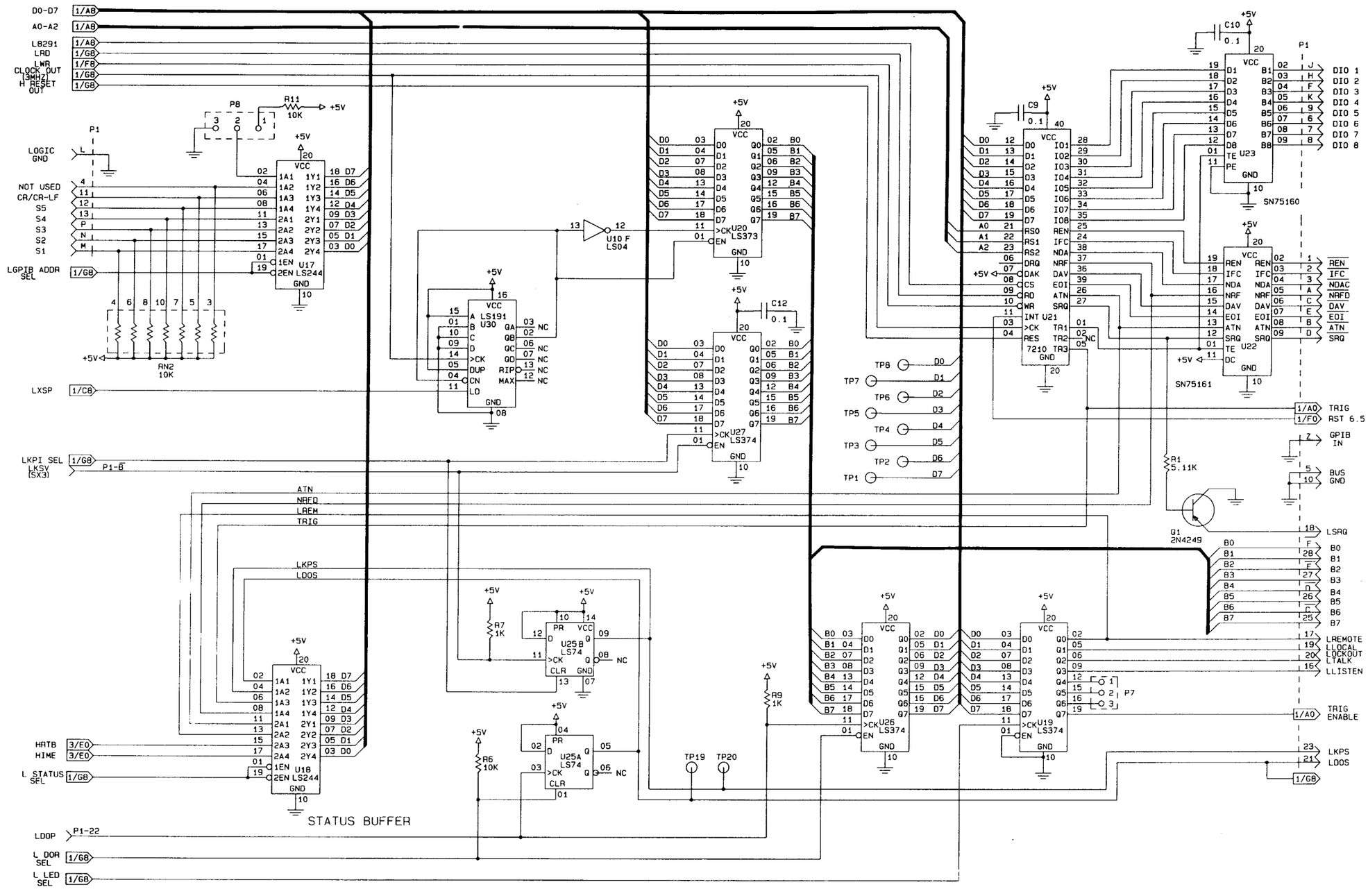


Figure A2-5. A1A1 GPIB PCB Schematic, REV C (2 of 3)

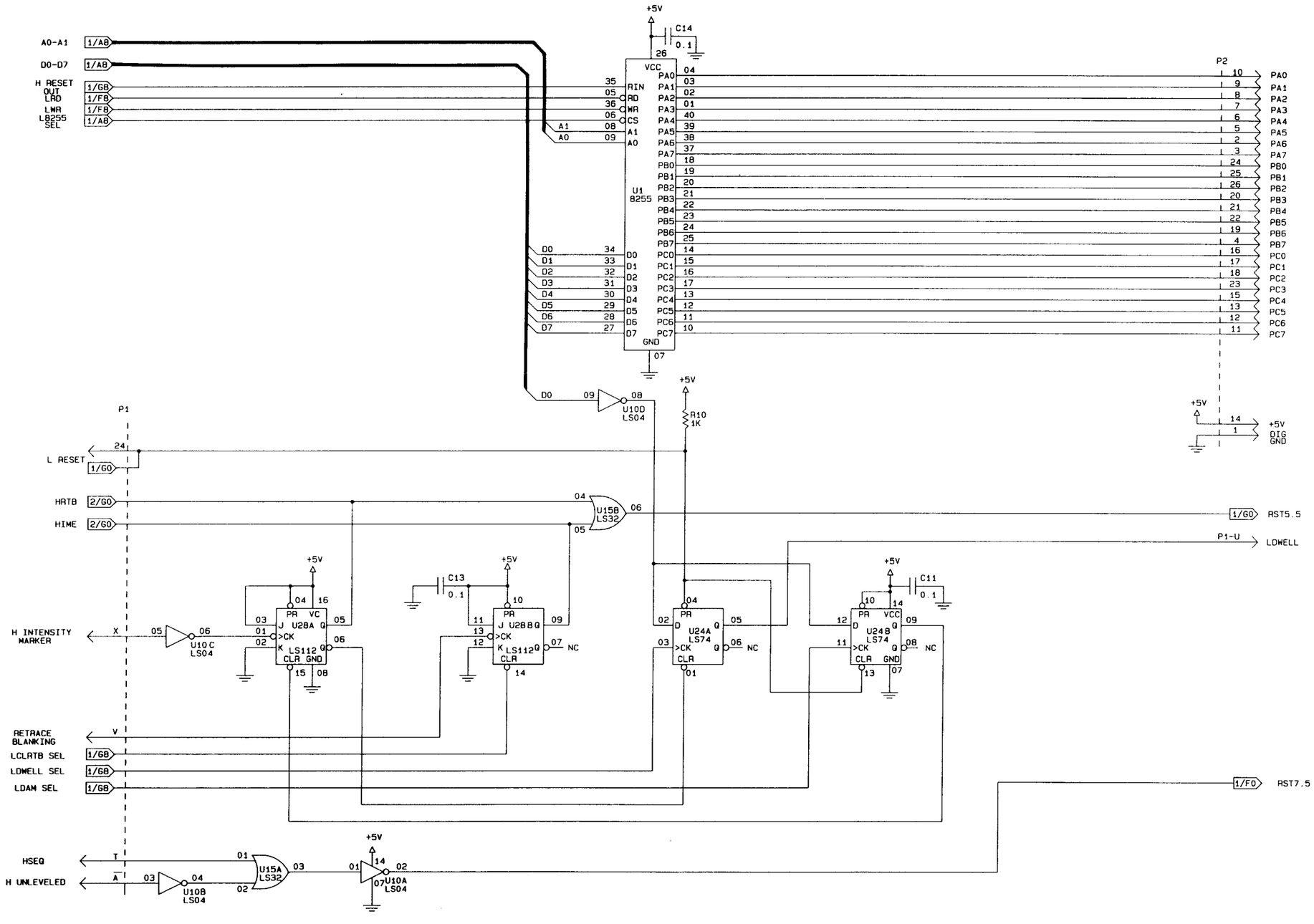


Figure A2-5. A1A1 GPIB PCB Schematic, REV C (3 of 3)

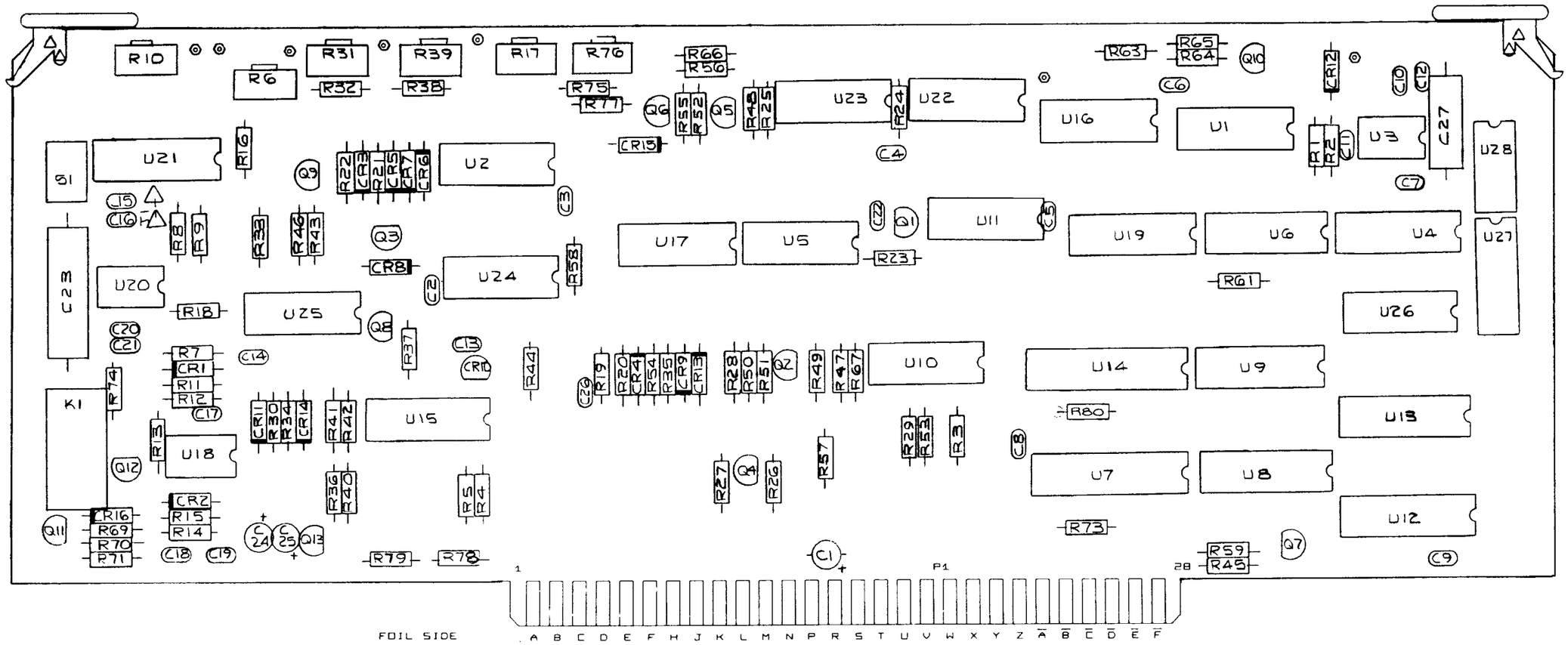
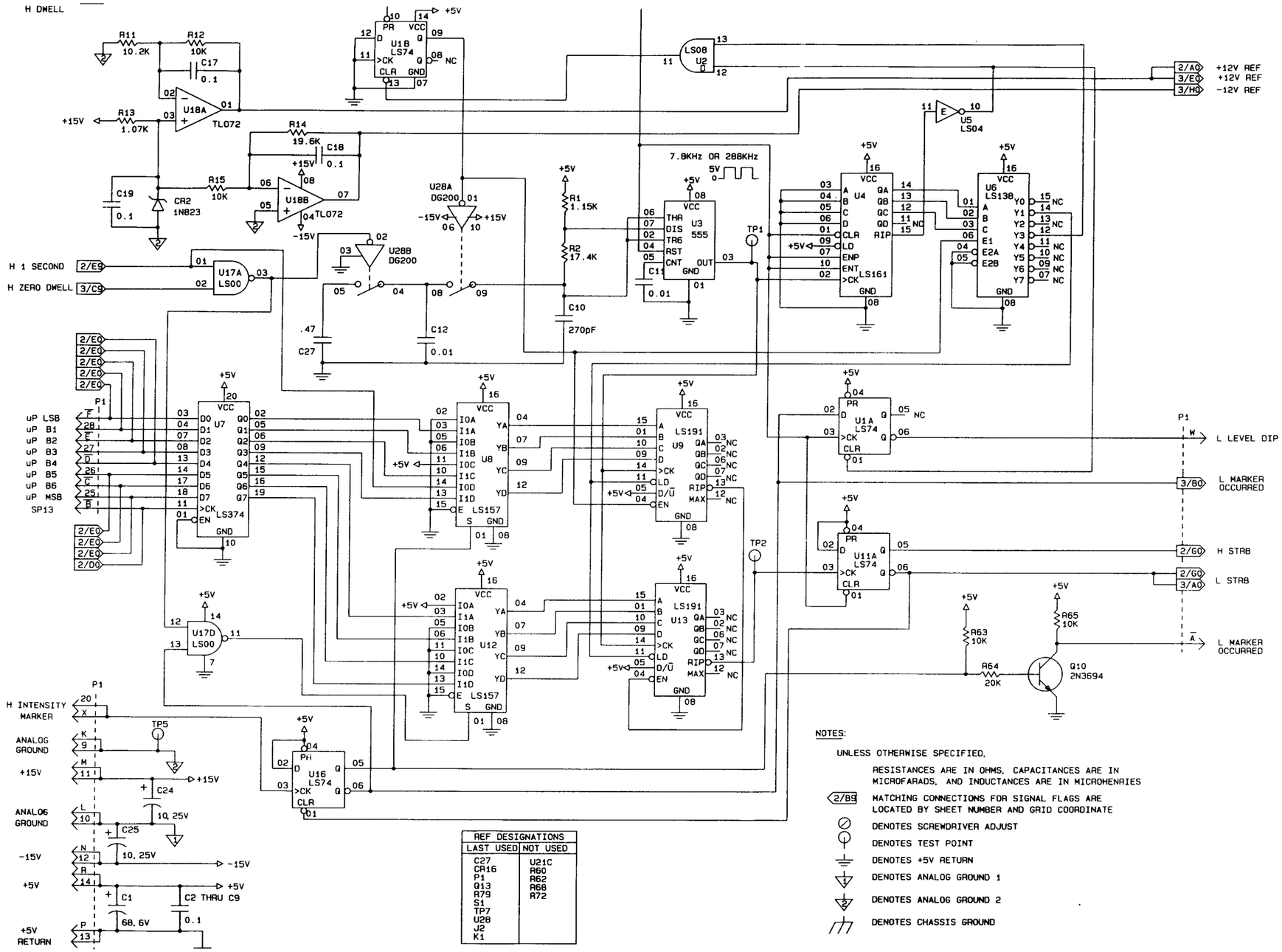


Figure A2-6. A1A2 Ramp Generator PCB Parts Locator, Assy D8002-3



REF DESIGNATIONS	
LAST USED	NOT USED
C27	U21C
CR16	R60
P1	R62
Q13	R68
R79	R72
S1	
TP7	
U28	
J2	
K1	

NOTES:

UNLESS OTHERWISE SPECIFIED,

RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROFARADS, AND INDUCTANCES ARE IN MICROHENRIES

2/B8 MATCHING CONNECTIONS FOR SIGNAL FLAGS ARE LOCATED BY SHEET NUMBER AND GRID COORDINATE

DENOTES SCREWDRIVER ADJUST

DENOTES TEST POINT

DENOTES +5V RETURN

DENOTES ANALOG GROUND 1

DENOTES ANALOG GROUND 2

DENOTES CHASSIS GROUND

Figure A2-7. A1A2 Ramp Generator PCB Schematic, REV N (1 of 3)

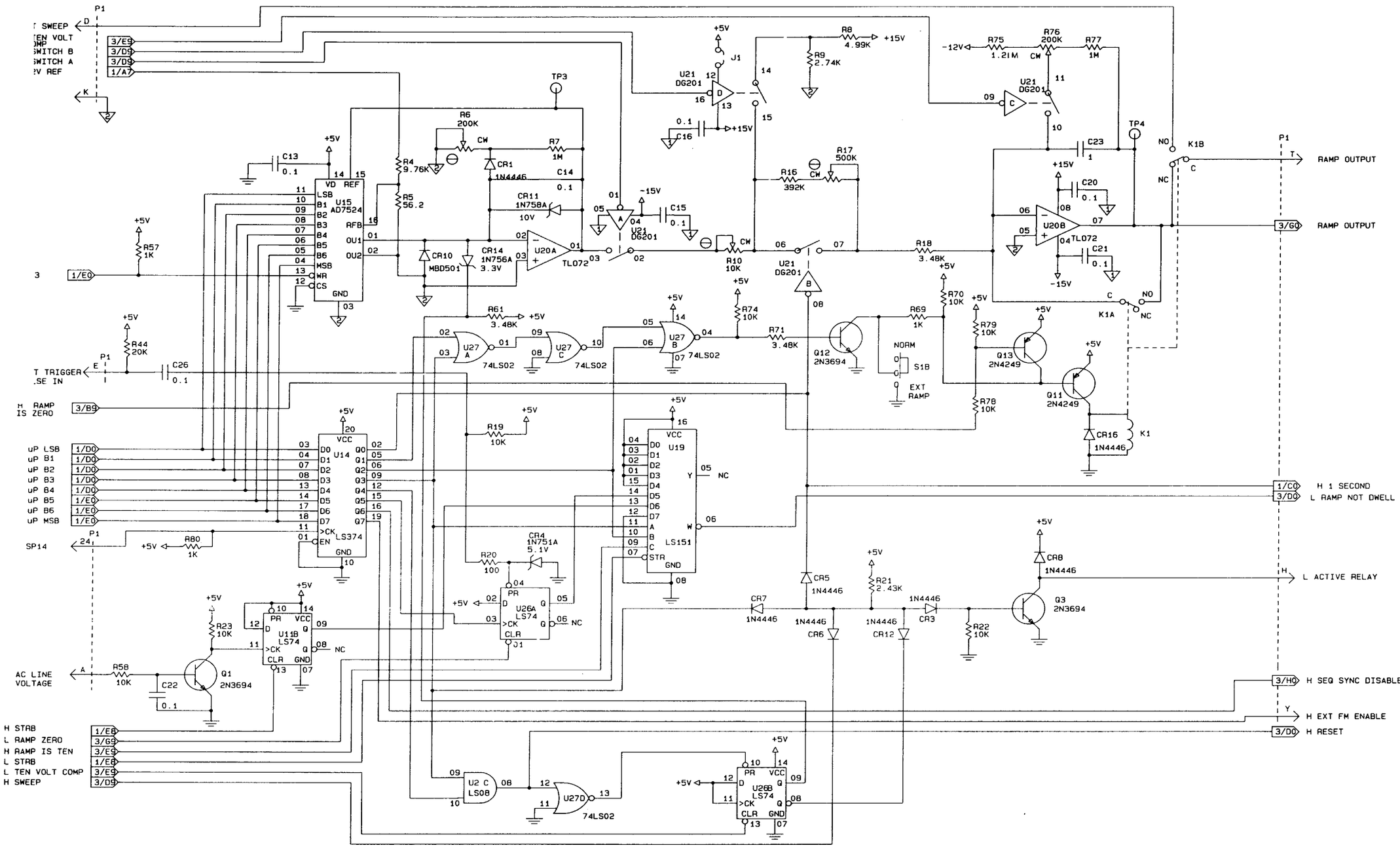


Figure A2-7. A1A2 Ramp Generator PCB Schematic, REV N (2 of 3)

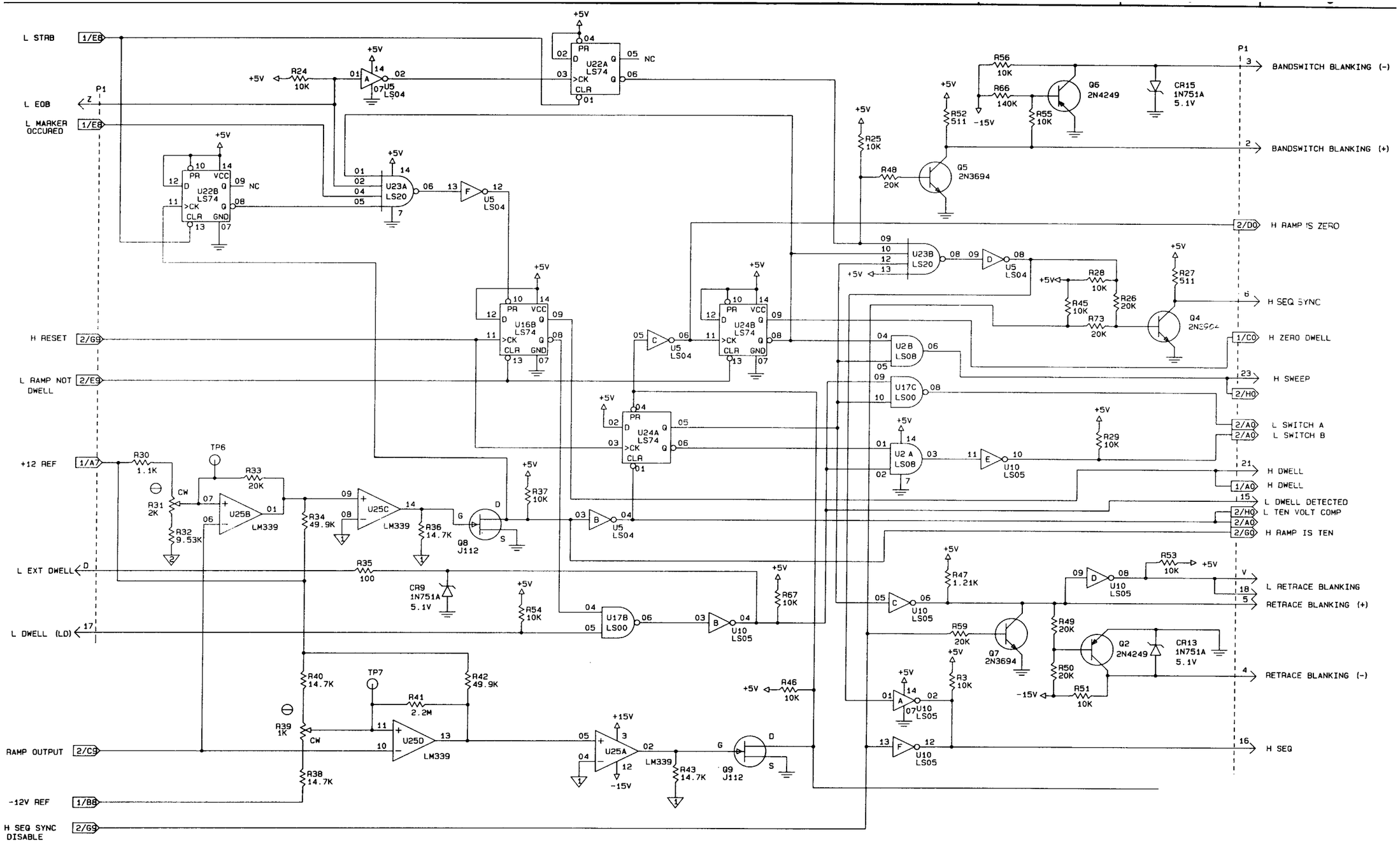


Figure A2-7. A1A2 Ramp Generator PCB Schematic, REV N (3 of 3)

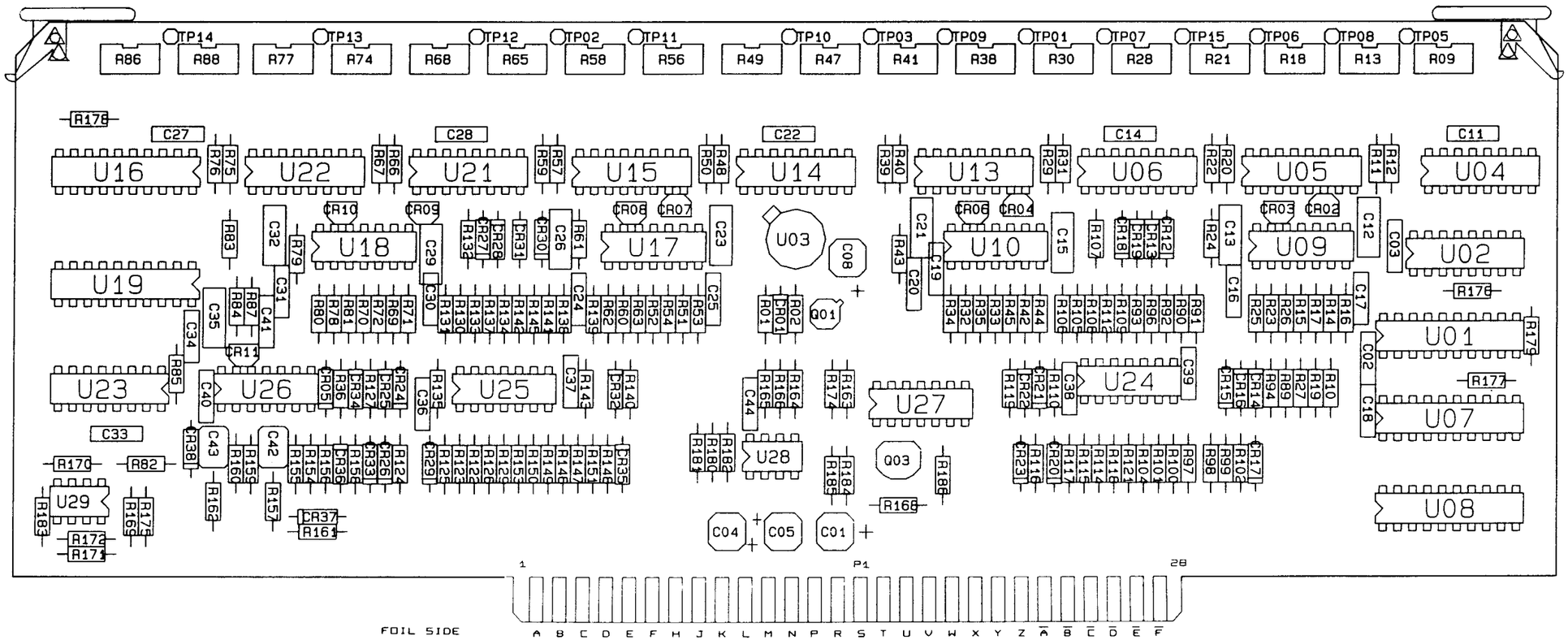


Figure A2-8. A1A3 Markers Generator PCB Parts Locator, Assy D32103-3

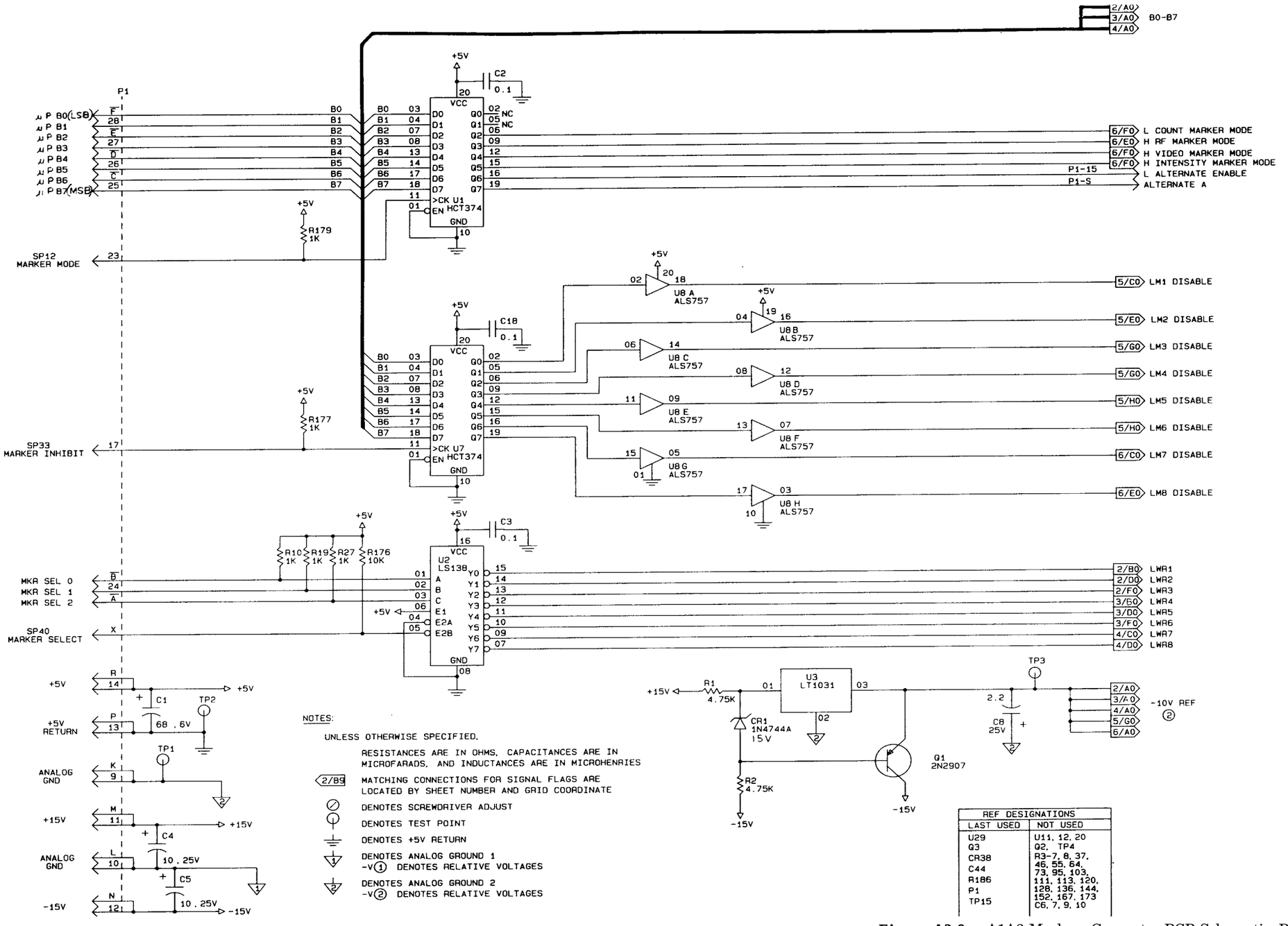


Figure A2-9. A1A3 Markers Generator PCB Schematic, REV H (1 of 6)

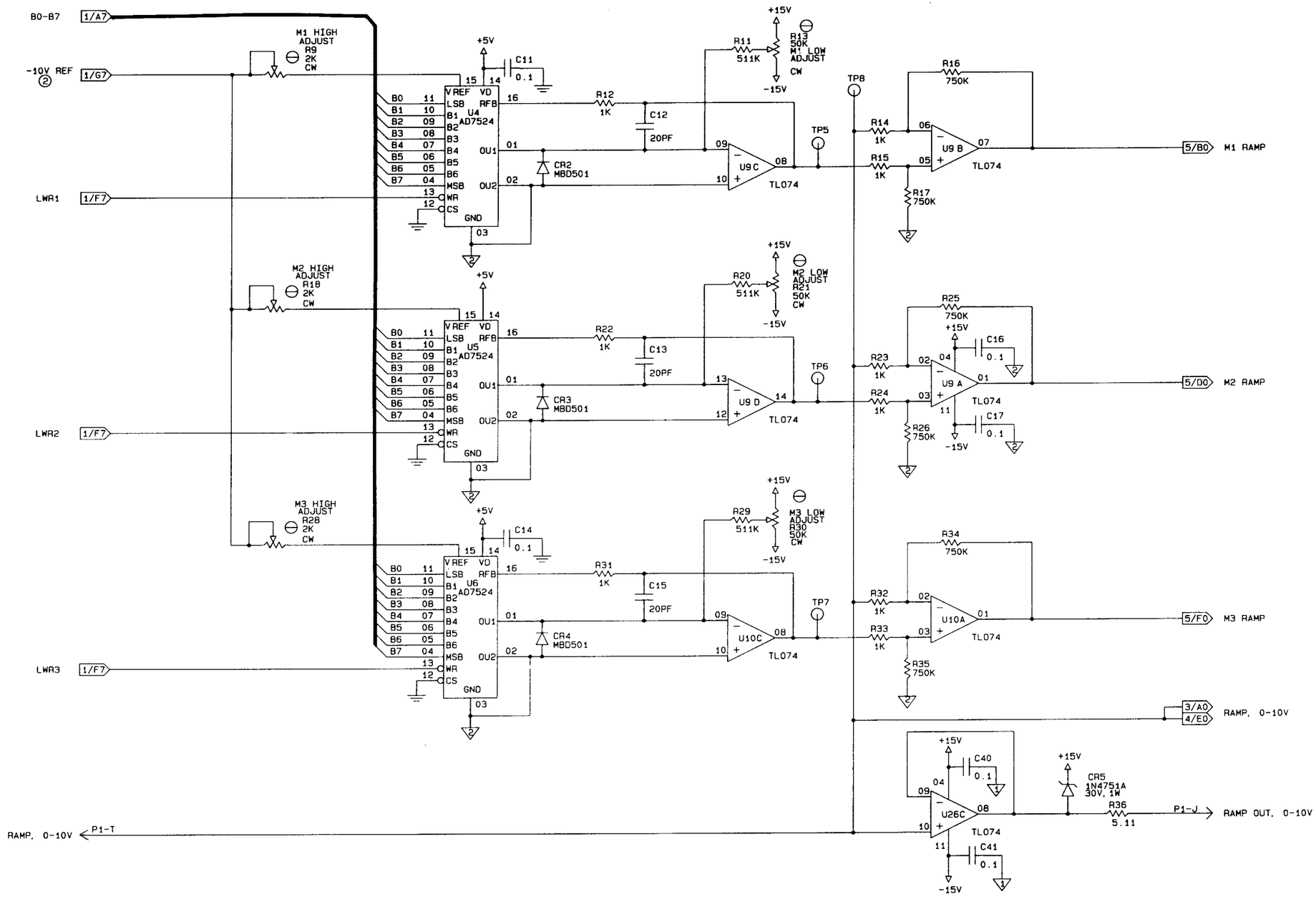


Figure A2-9. A1A3 Markers Generator PCB Schematic, REV H (2 of 6)

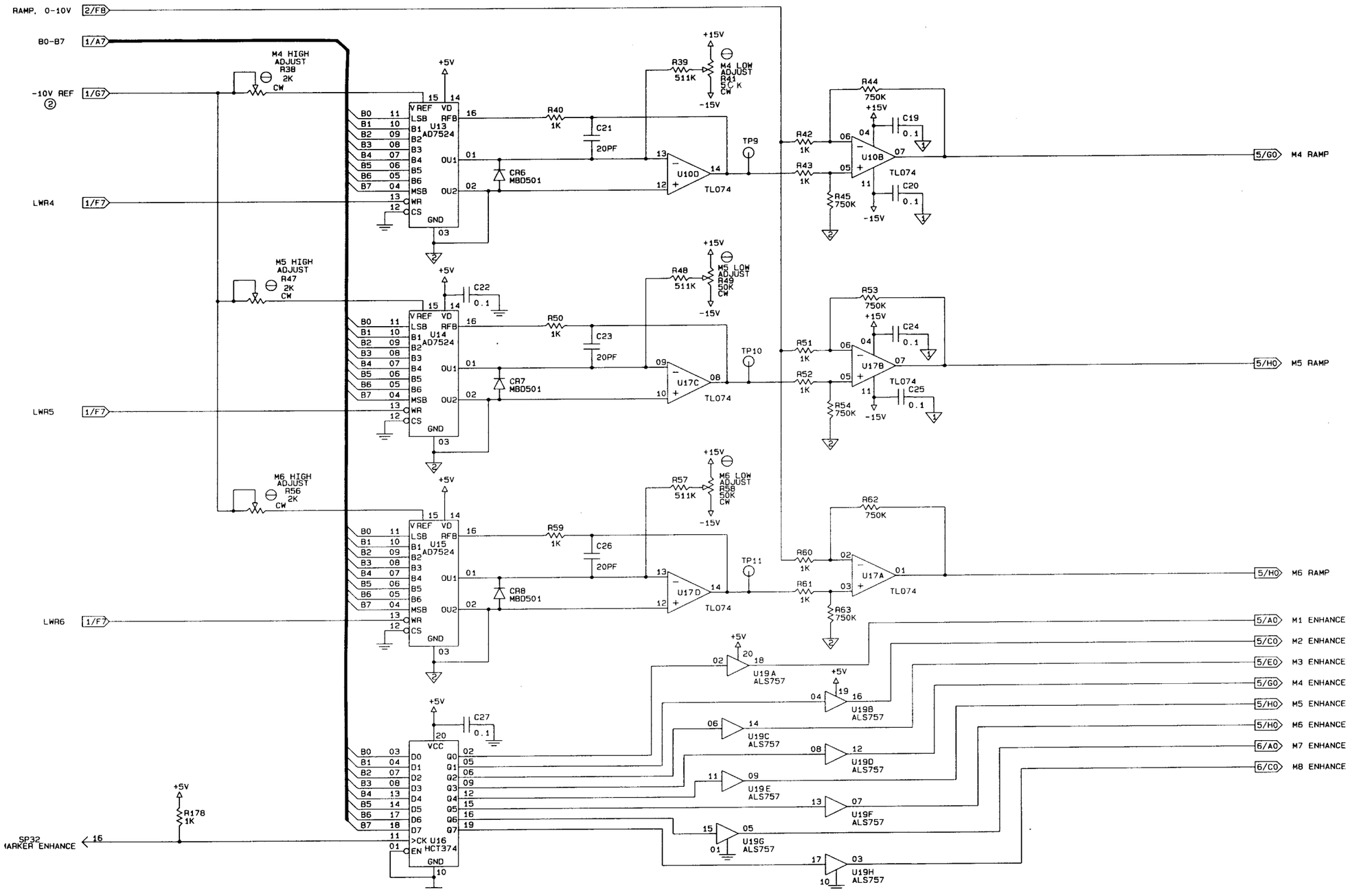


Figure A2-9. A1A3 Markers Generator PCB Schematic, REV H (3 of 6)

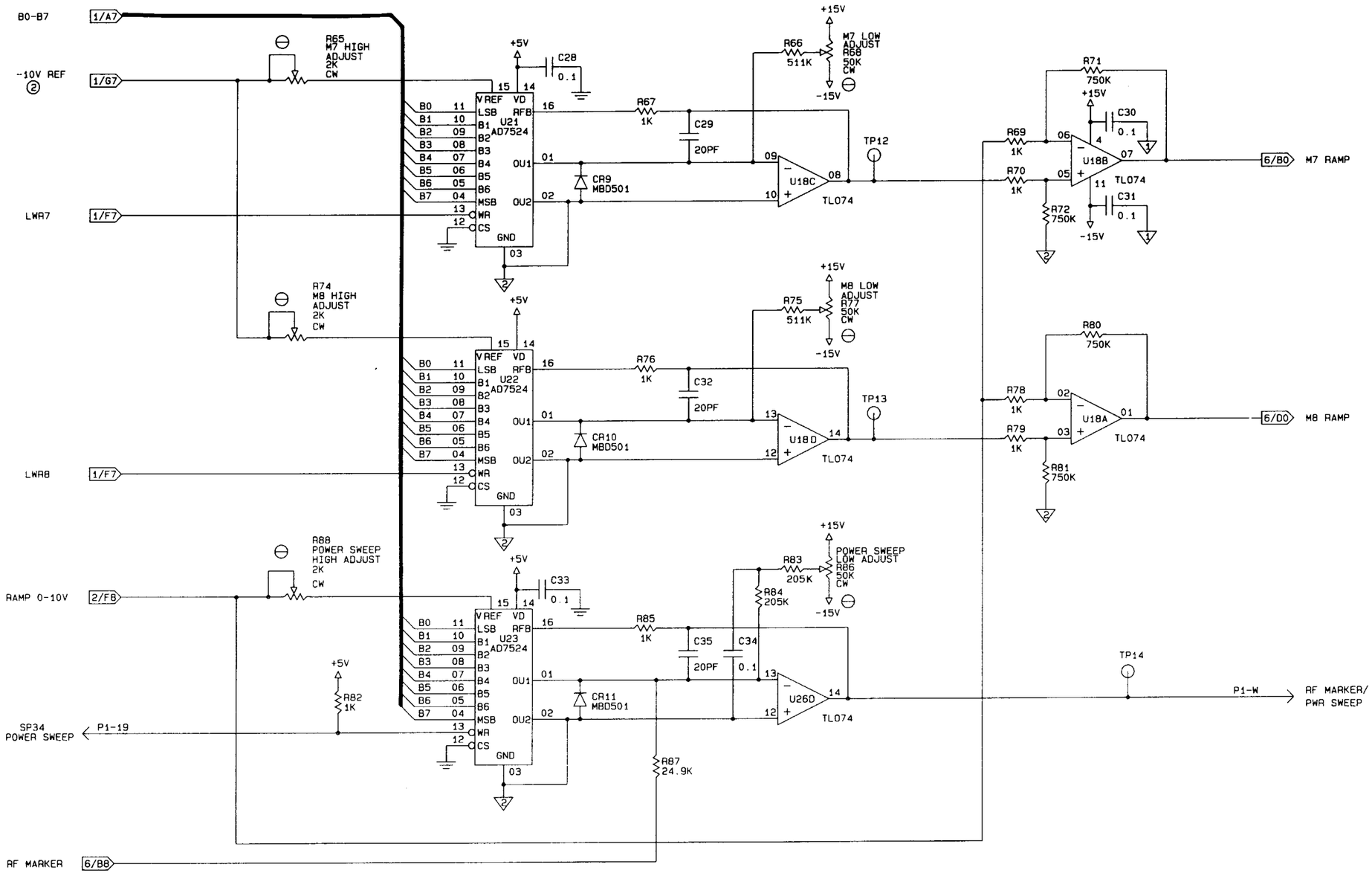


Figure A2-9. A1A3 Markers Generator PCB Schematic, REV H (4 of 6)

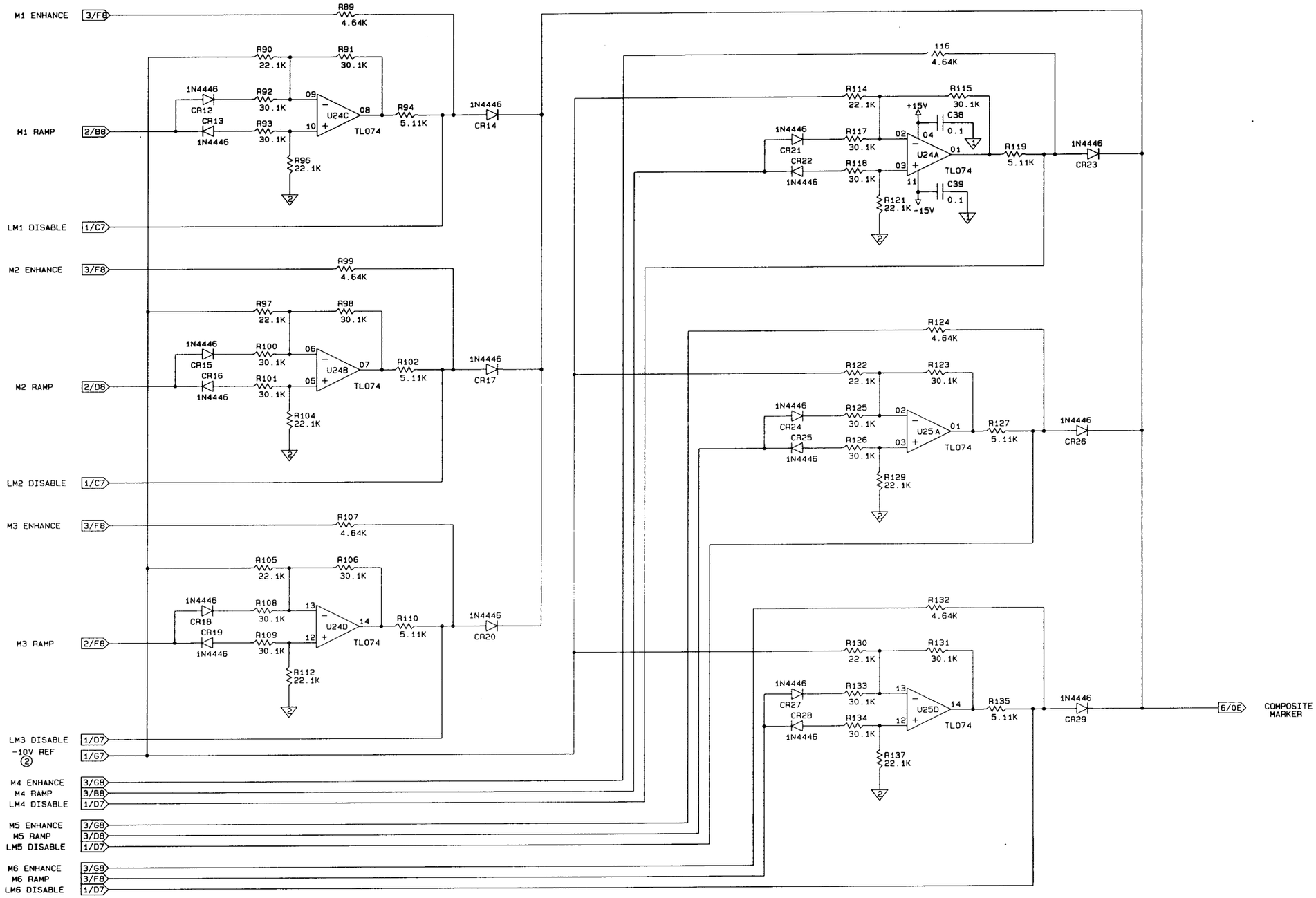


Figure A2-9. A1A3 Markers Generator PCB Schematic, REV H (5 of 6)

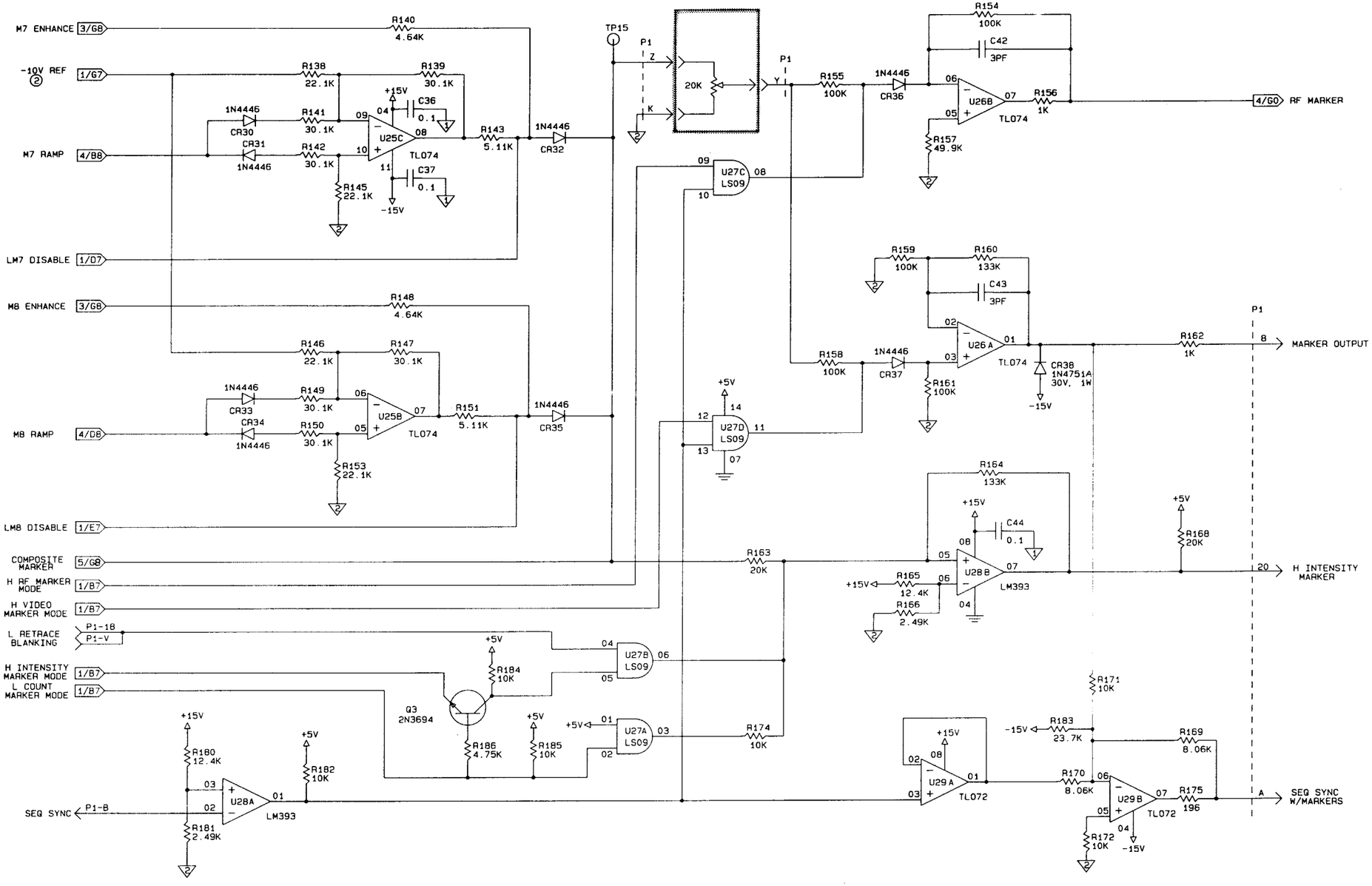


Figure A2-9. A1A3 Markers Generator PCB Schematic, REV H (6 of 6)

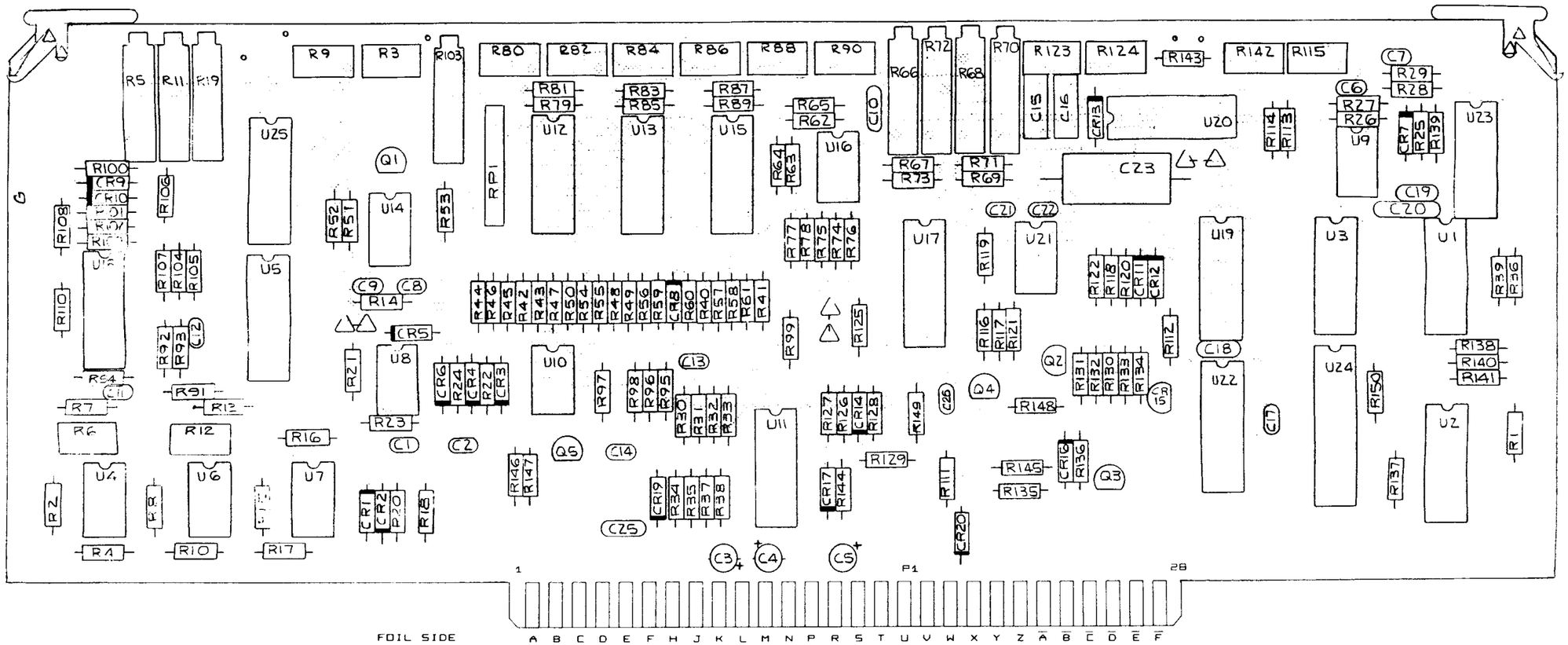


Figure A2-10. A1A4 ALC PCB Parts Locator, Assy D8004-3

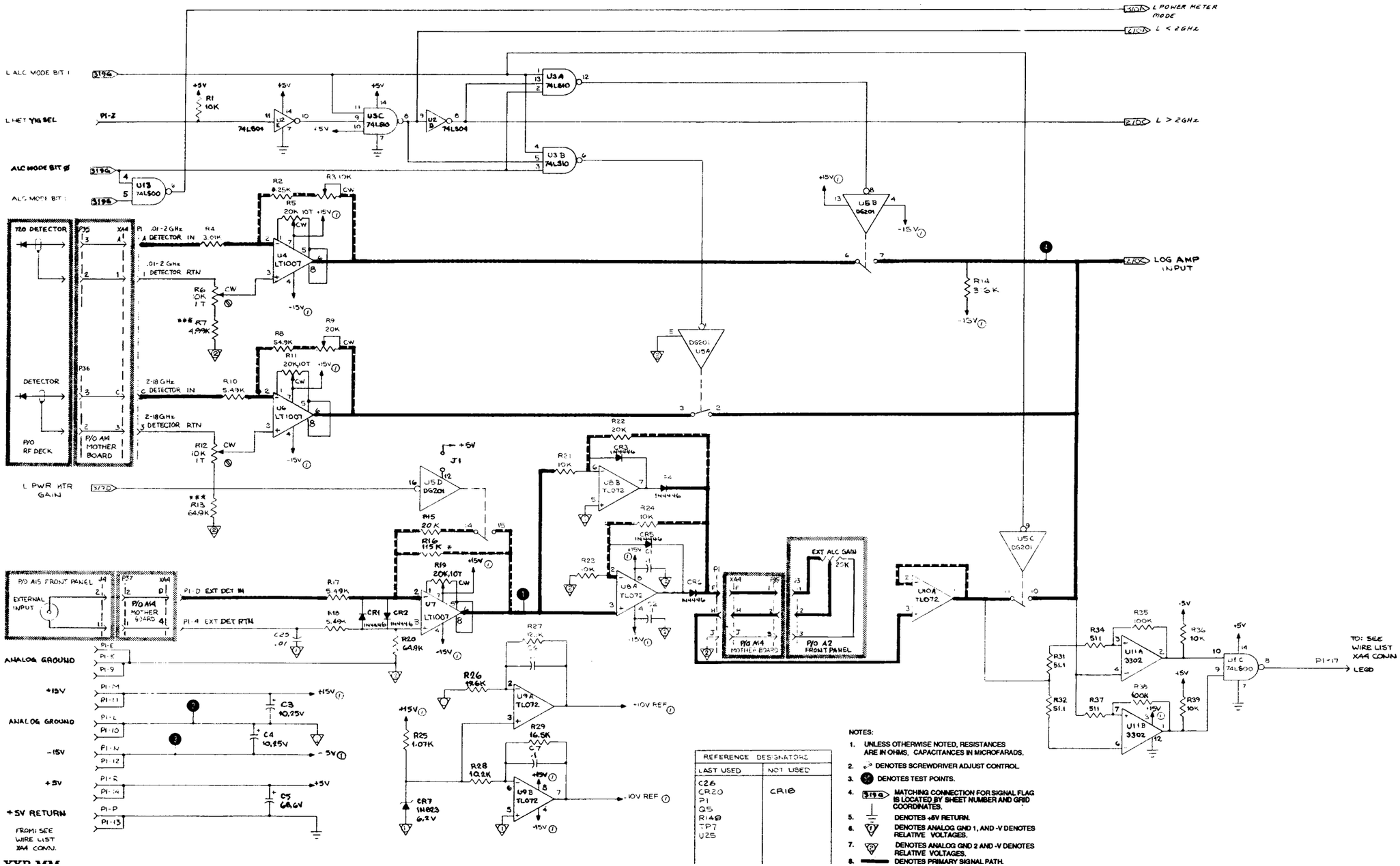


Figure A2-11. A1A4 ALC PCB Schematic, REV O (1 of 4)

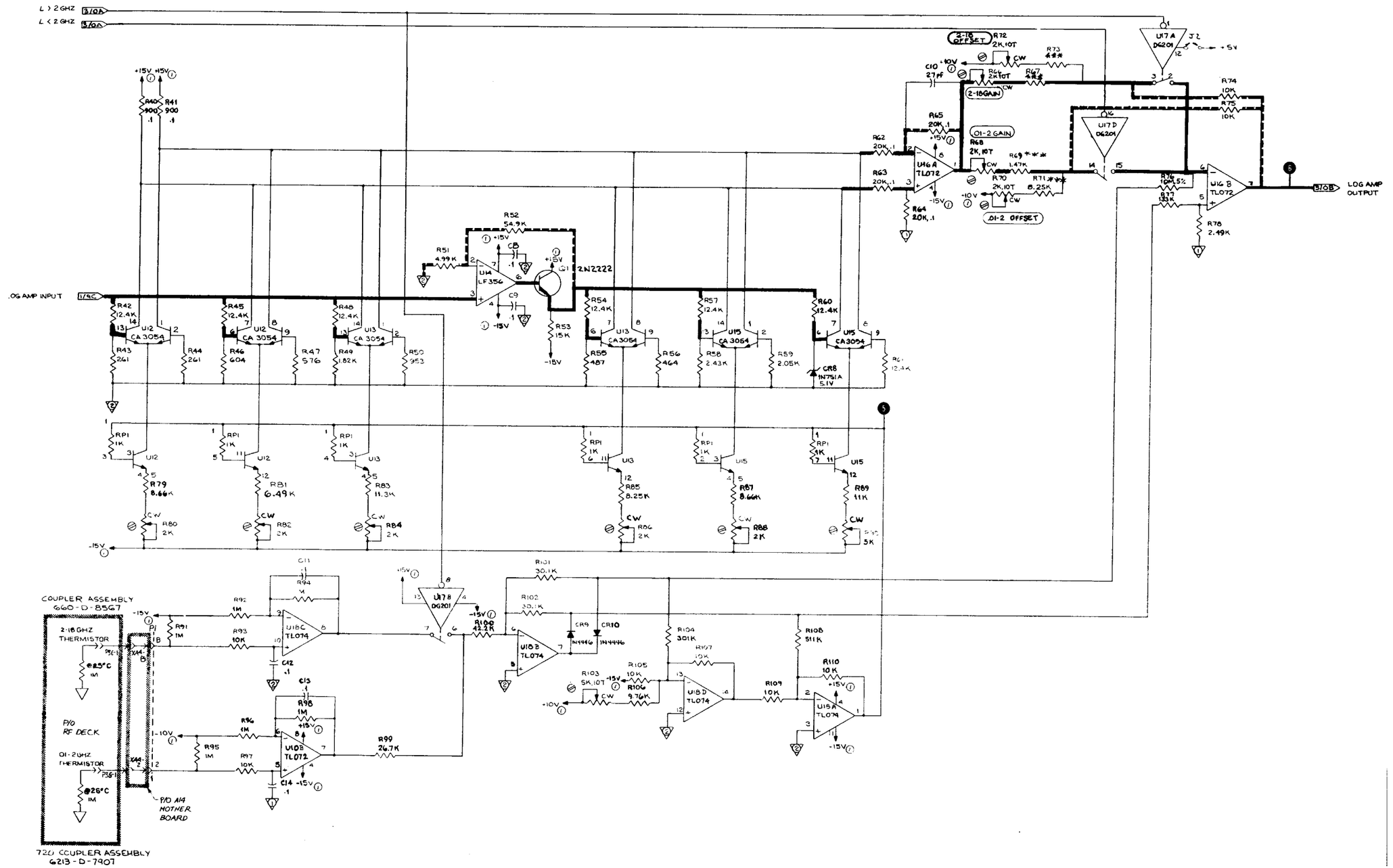


Figure A2-11. A1A4 ALC PCB Schematic, REV O (2 of 4)

Figure A2-11. A1A4 ALC PCB Schematic, REV O (3 of 4)

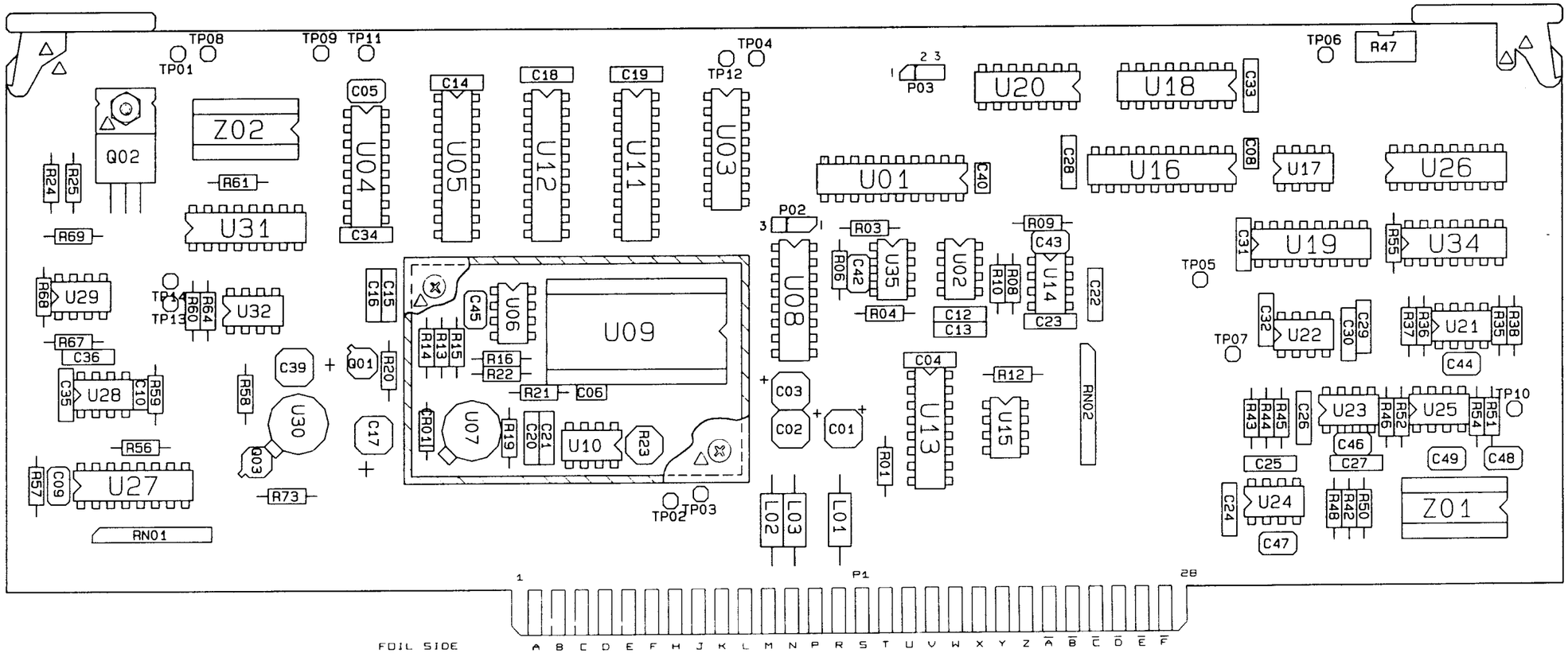


Figure A2-12. A1A5 Frequency Instruction PCB Parts Locator Diagram, Assy

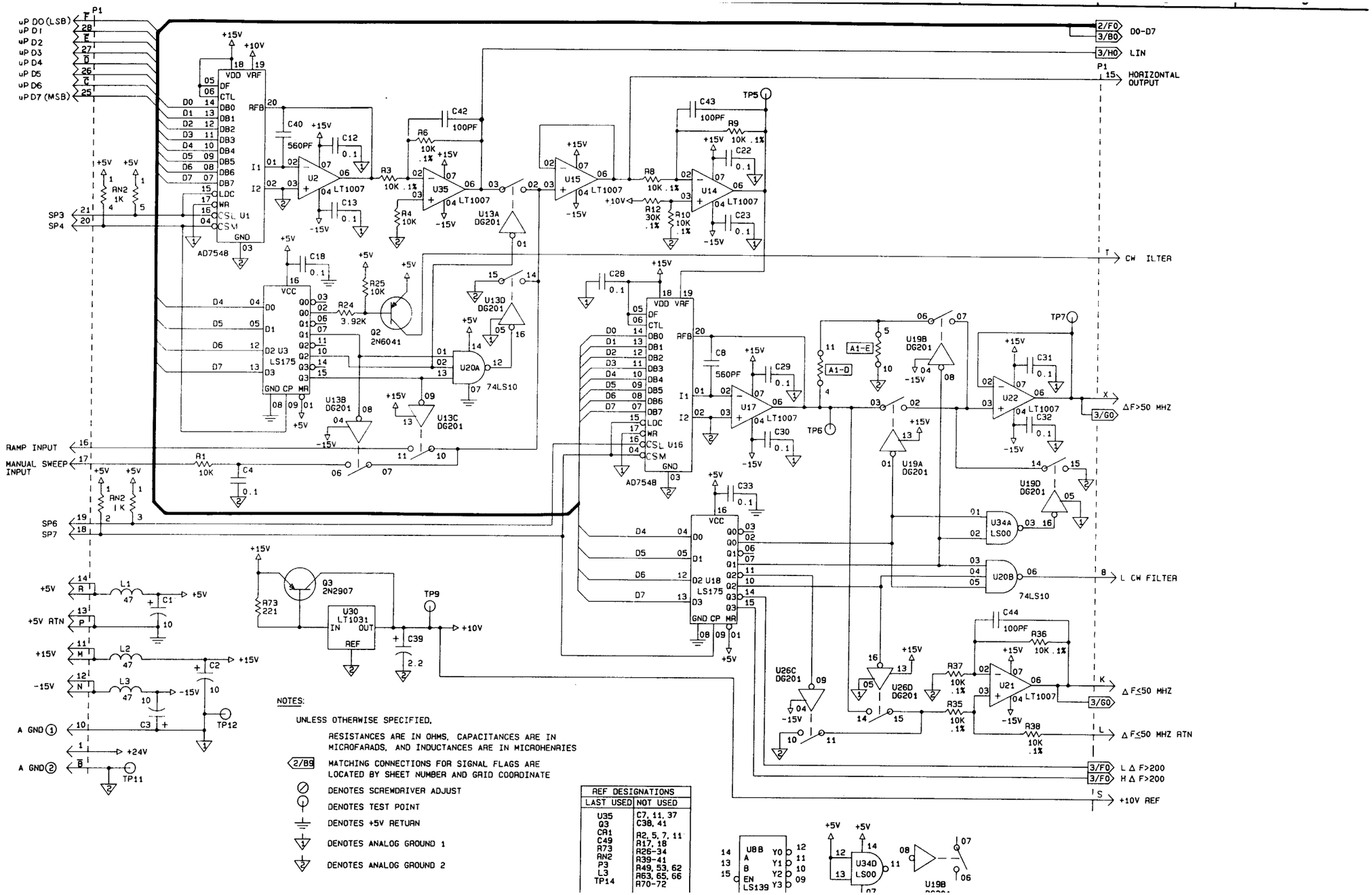


Figure A2-13. A1A5 Frequency Instruction PCB Schematic, REV G (1 of 3)

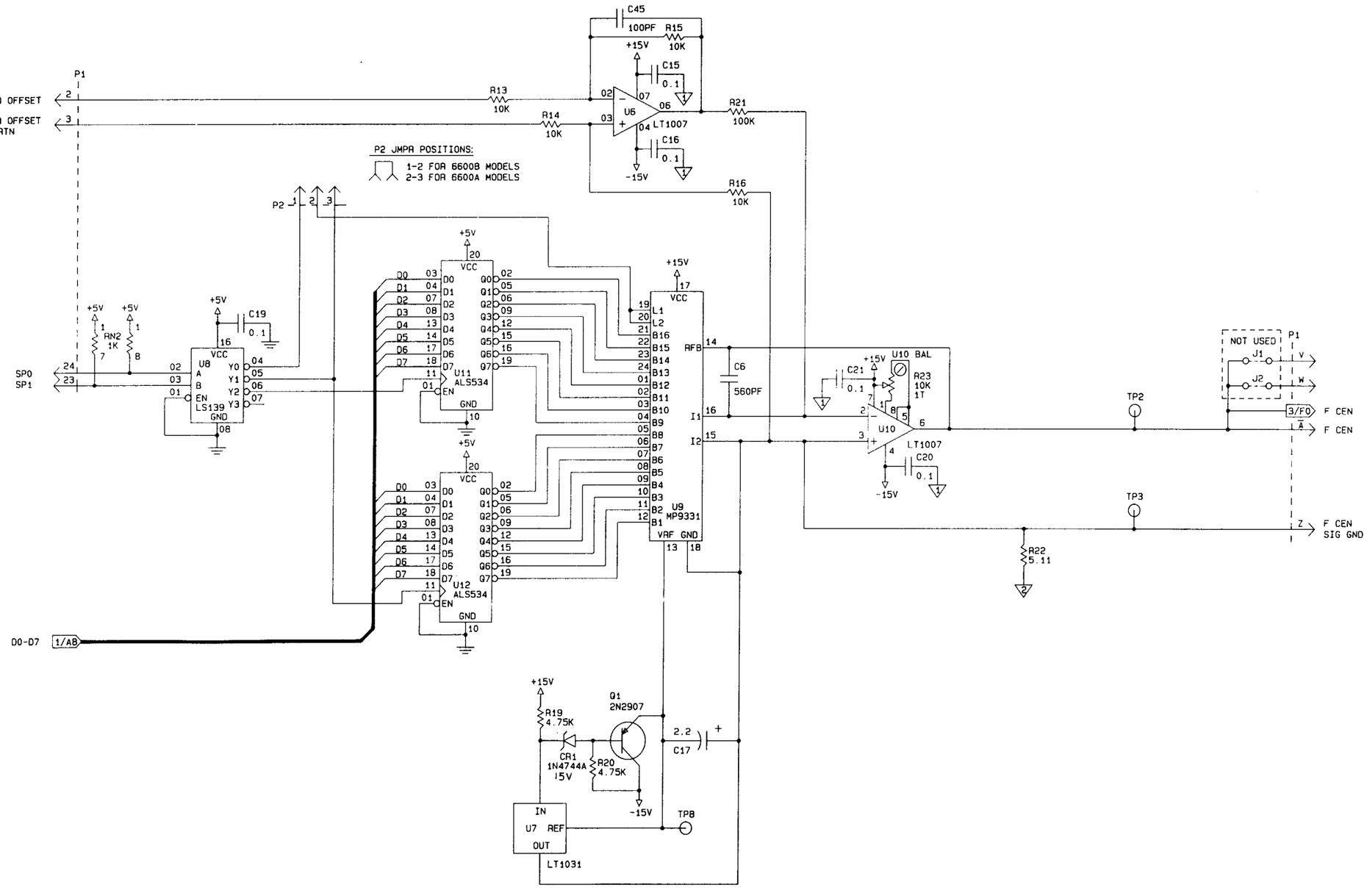


Figure A2-13. A1A5 Frequency Instruction PCB Schematic, REV G (2 of 3)

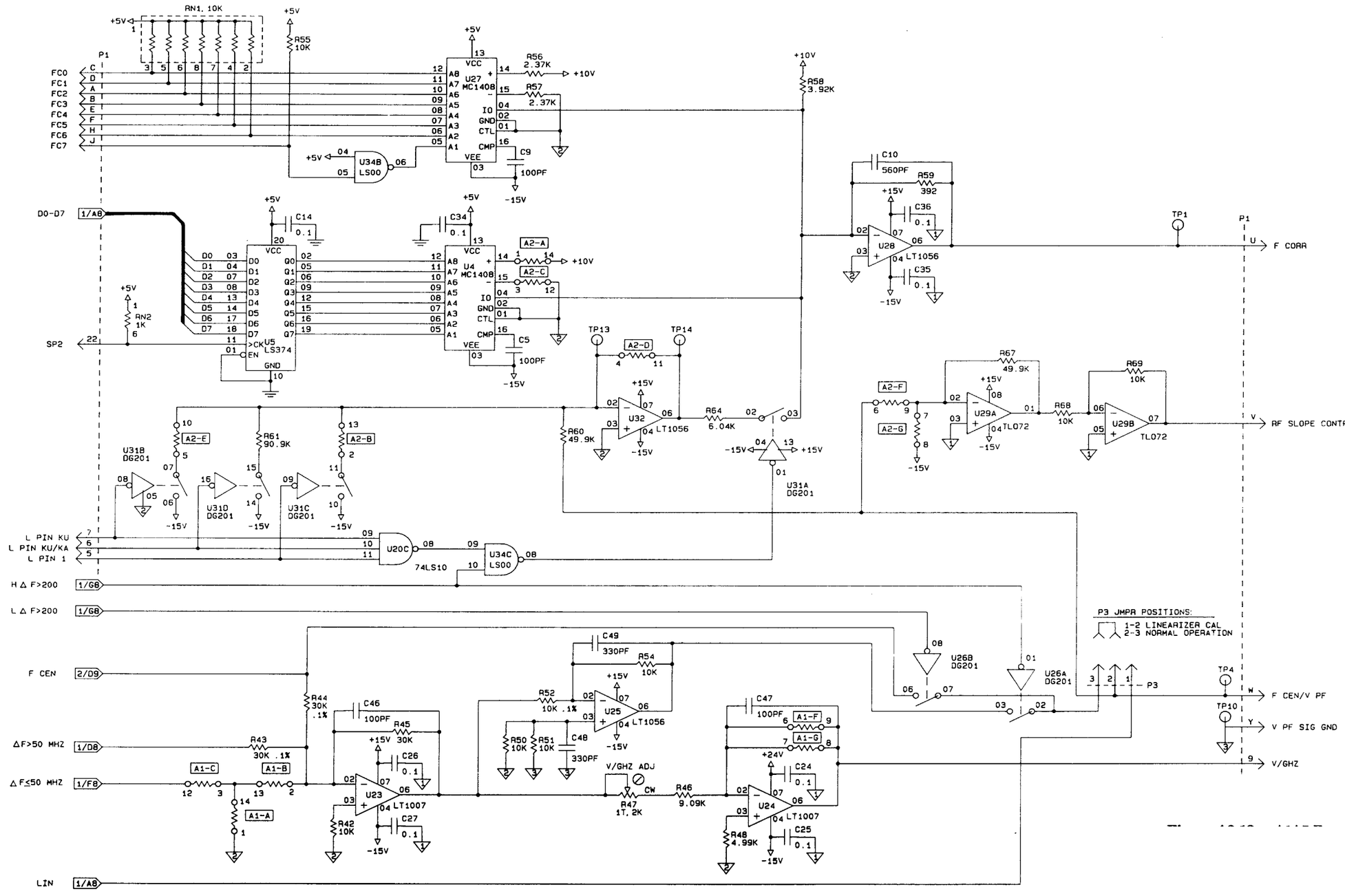


Figure A2-13. A1A5 Frequency Instruction PCB Schematic, REV G (3 of 3)

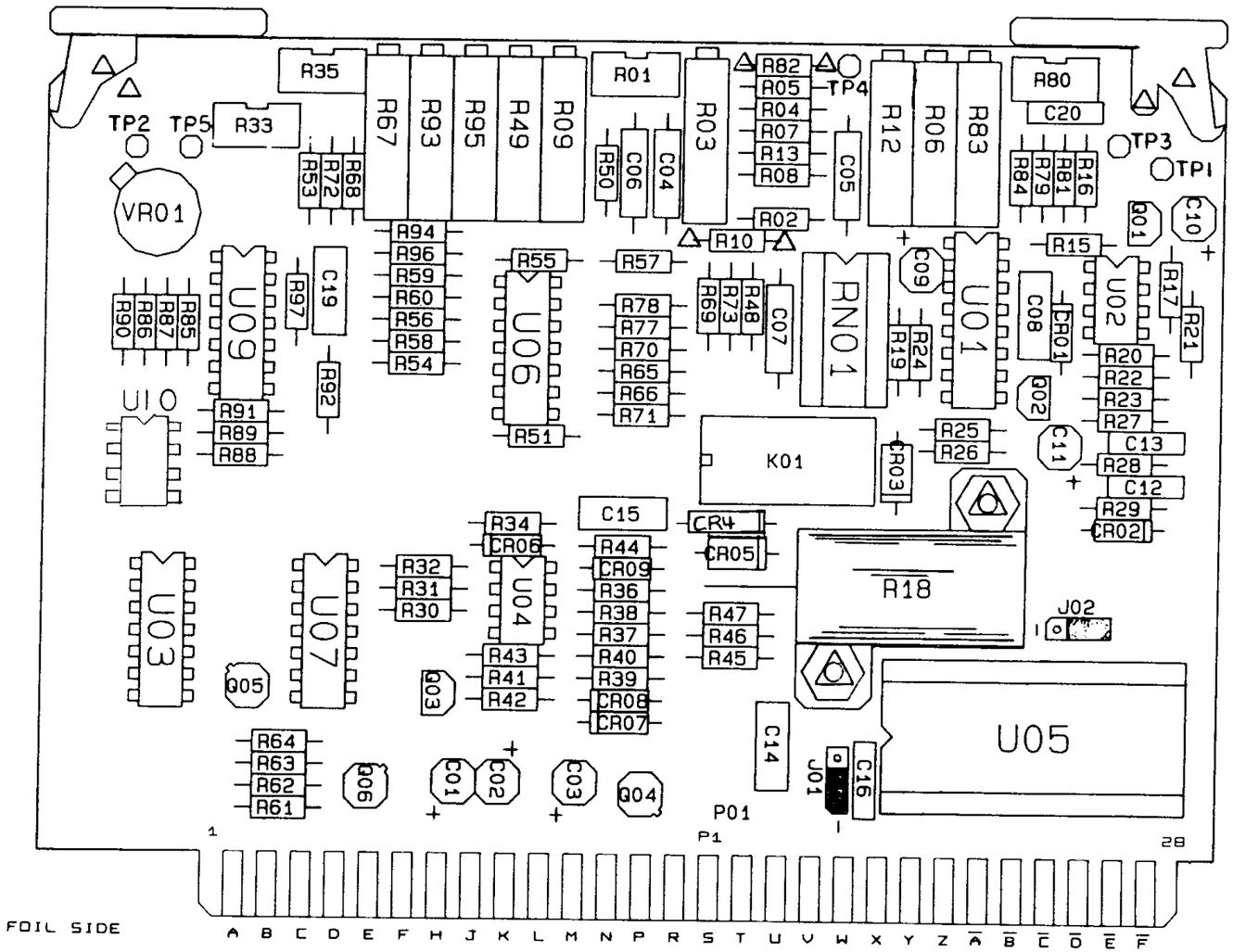


Figure A2-14. A1A6 YIG Driver PCB Parts Locator Diagram, Assy D32106-3

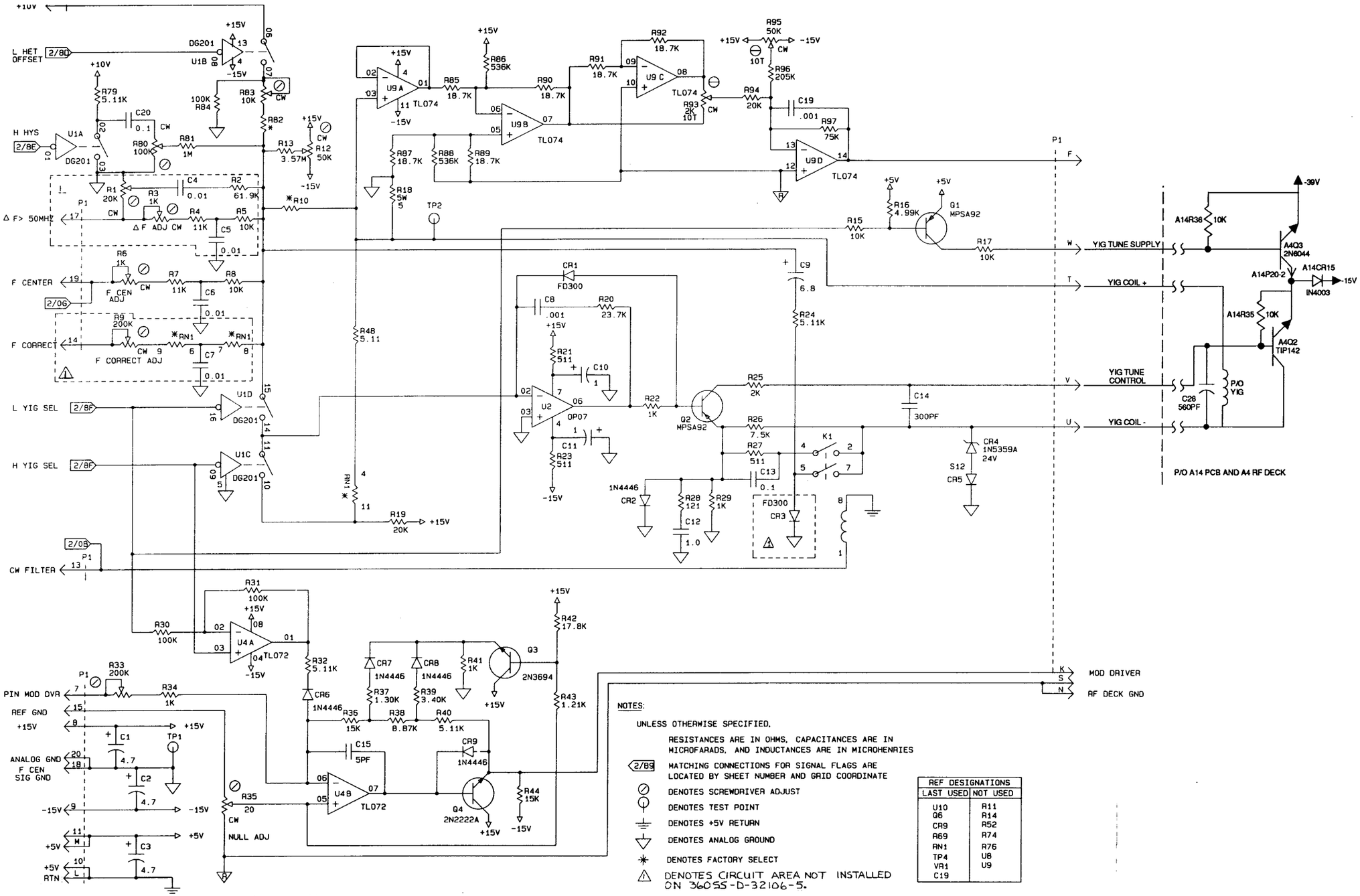
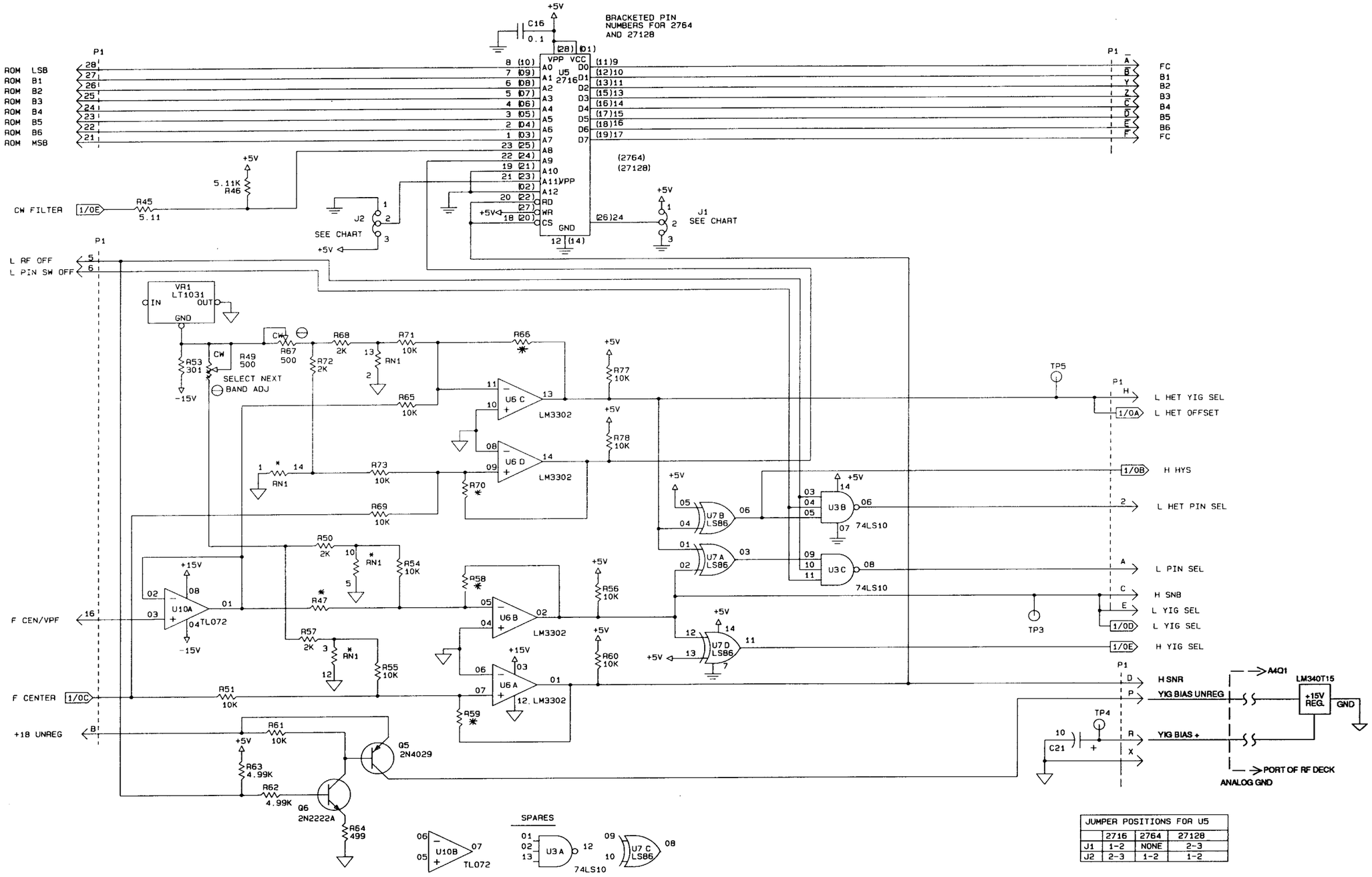


Figure A2-15. A1A6 YIG Driver PCB Schematic, REV J (1 of 2)



JUMPER POSITIONS FOR U5			
	2716	2764	27128
J1	1-2	NONE	2-3
J2	2-3	1-2	1-2

Figure A2-15. A1A6 YIG Driver PCB Schematic, REV J (2 of 2)

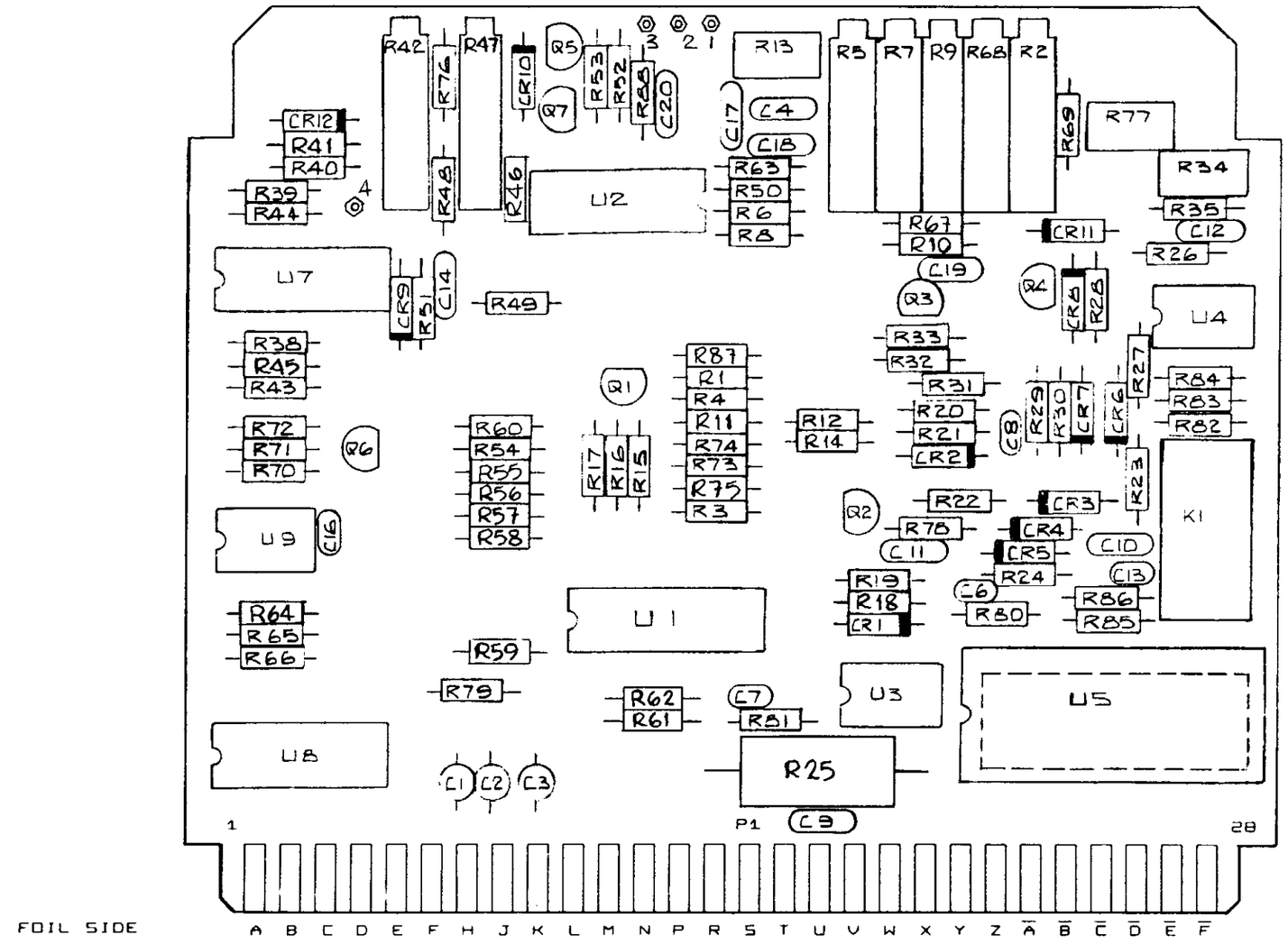
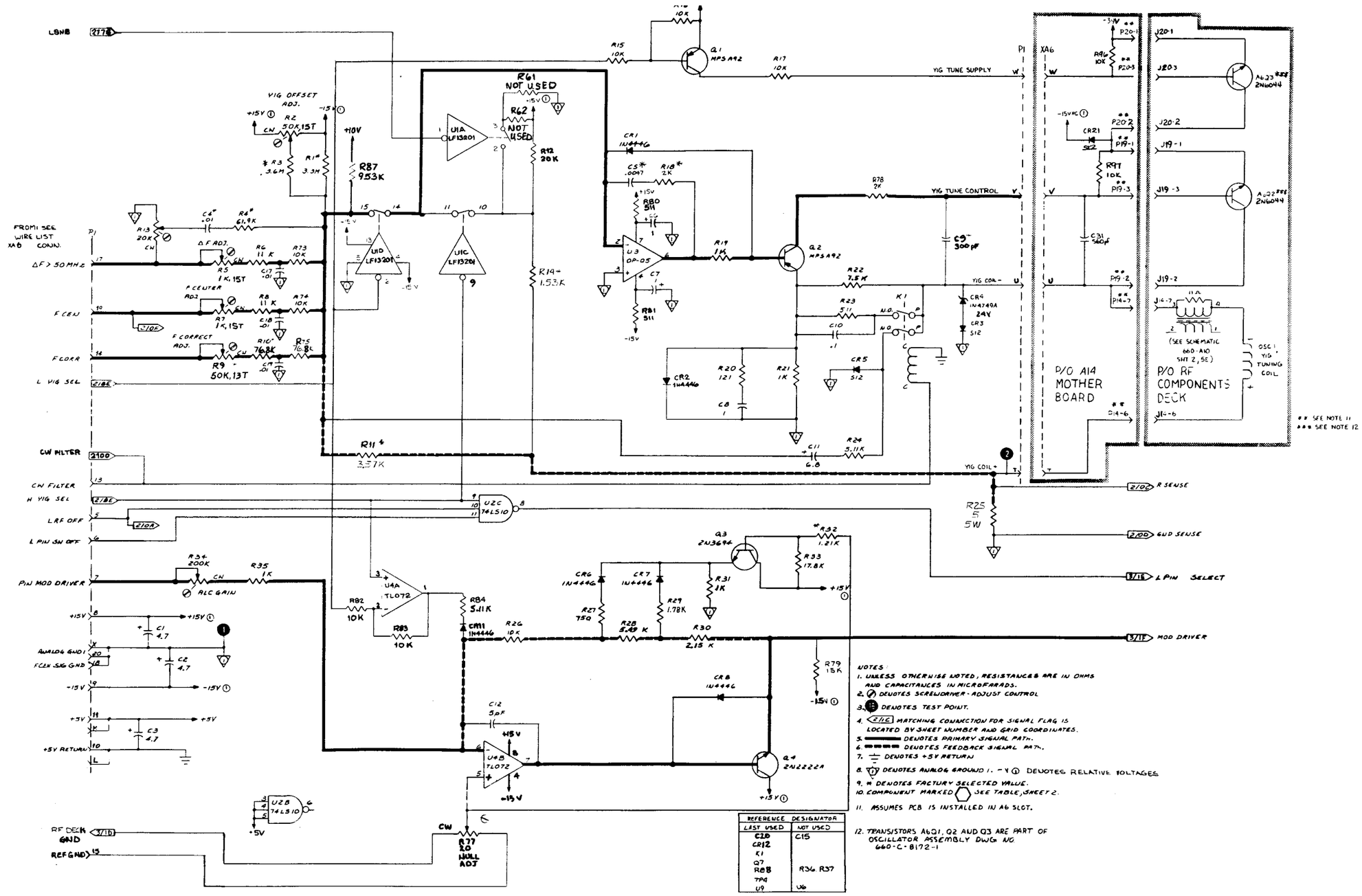


Figure A2-16. A1A6 YIG Driver PCB Parts Locator Diagram, Assy D8008-8



NOTES:
1. UNLESS OTHERWISE NOTED, RESISTANCES ARE IN OHMS AND CAPACITANCES IN MICROFARADS.
2. ⊘ DENOTES SCREWDRIVER-ADJUST CONTROL
3. ● DENOTES TEST POINT.
4. 2|C MATCHING CONNECTION FOR SIGNAL FLAG IS LOCATED BY SHEET NUMBER AND GRID COORDINATES.
5. ▬▬ DENOTES PRIMARY SIGNAL PATH.
6. ▬ ▬ ▬ DENOTES FEEDBACK SIGNAL PATH.
7. ⏚ DENOTES +5V RETURN
8. ▽ DENOTES ANALOG GROUND 1. -V ① DENOTES RELATIVE VOLTAGES
9. * DENOTES FACTORY SELECTED VALUE.
10. COMPONENT MARKED ⬡ SEE TABLE, SHEET 2.
11. ASSUMES PCB IS INSTALLED IN A6 SLOT.
12. TRANSISTORS A6Q1, Q2 AUD Q3 ARE PART OF OSCILLATOR ASSEMBLY DWG NO 660-C-8172-1

REFERENCE DESIGNATOR	
LAST USED	NOT USED
C20	C15
CR12	
K1	
Q7	
R88	R36, R37
TP9	
U9	U6

Figure A2-17. A1A6 YIG Driver PCB Schematic, REV C (1 of 3)

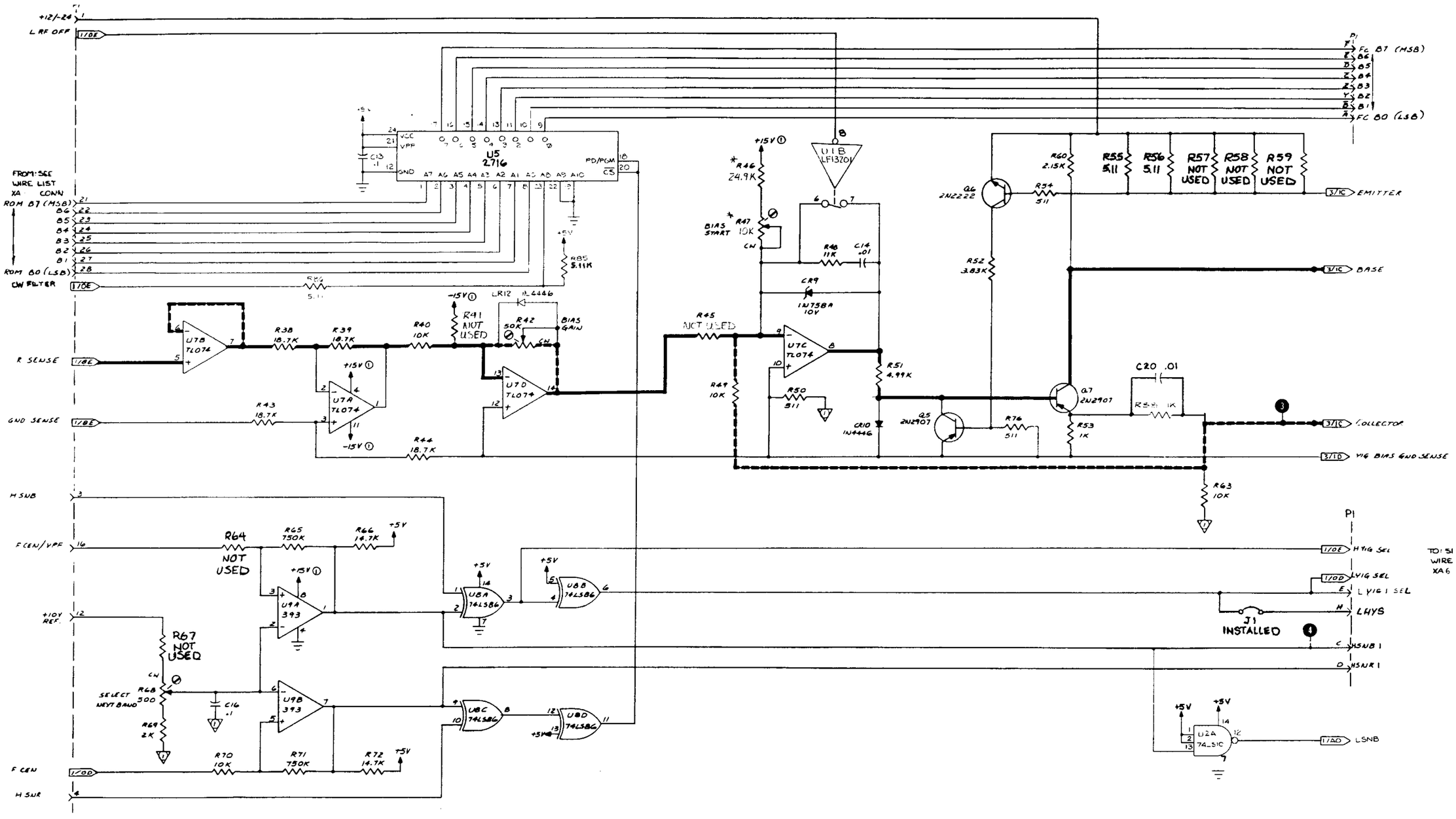


Figure A2-17. A1A6 YIG Driver PCB Schematic, REV C (2 of 3)

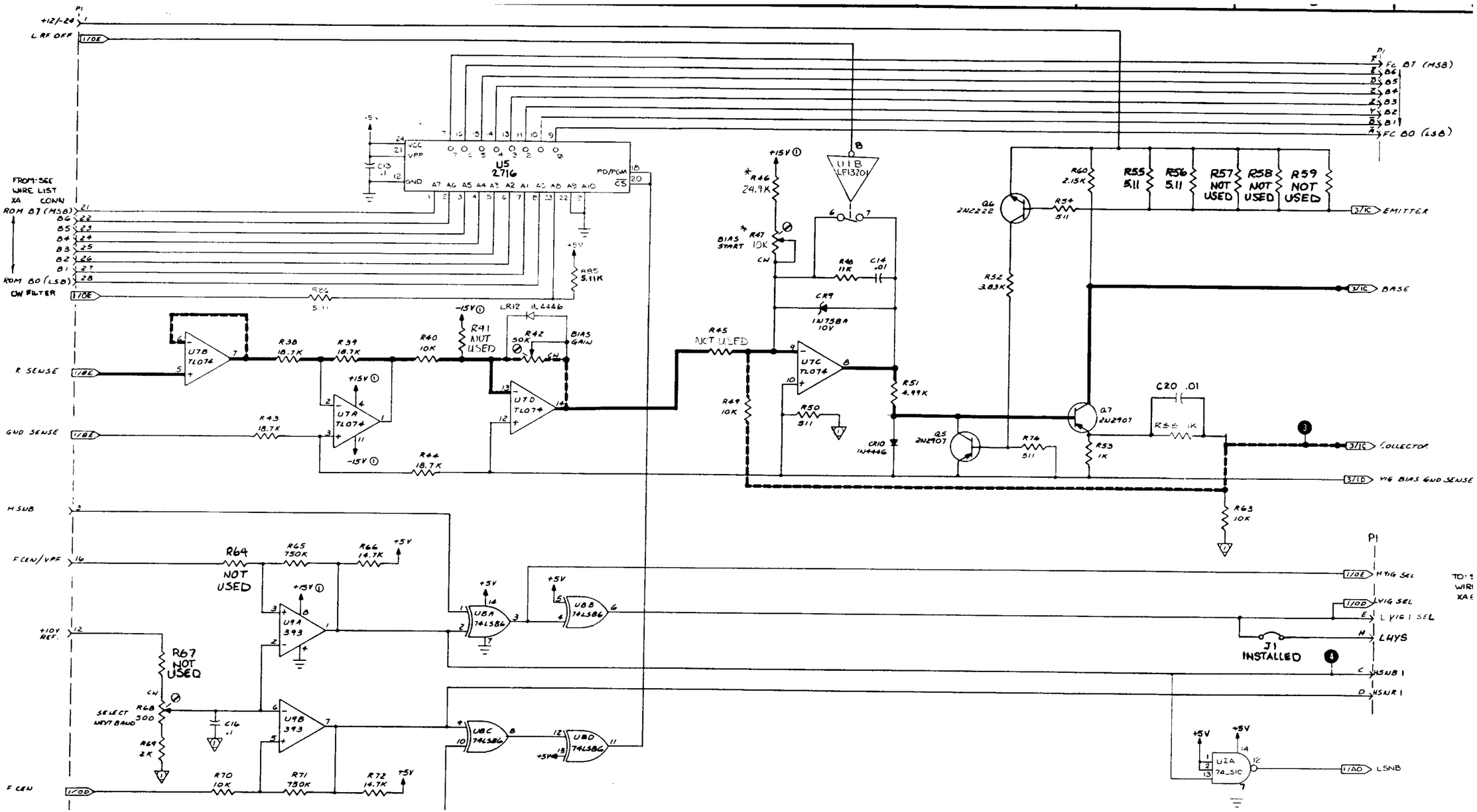


Figure A2-17. A1A6 YIG Driver PCB Schematic, REV C (3 of 3)

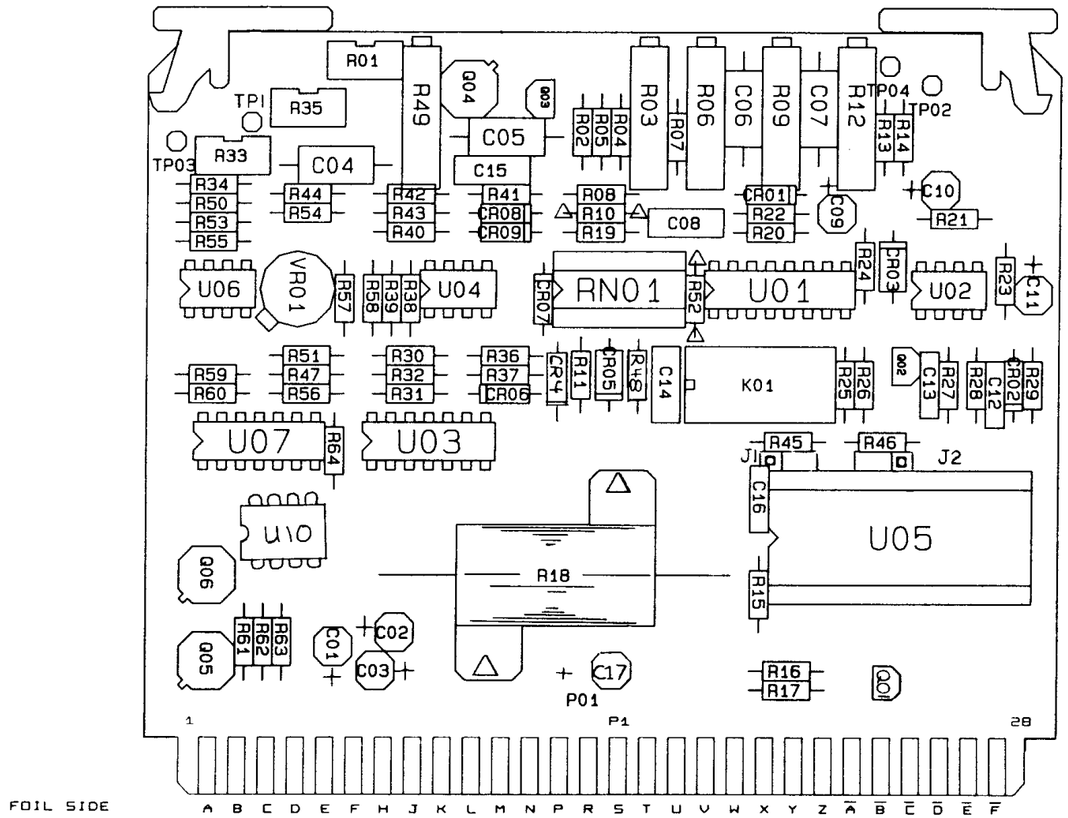


Figure A2-18. A1A7–A1A9 YIG Driver PCB Parts Locator, Assy D32107-4, -5, -8

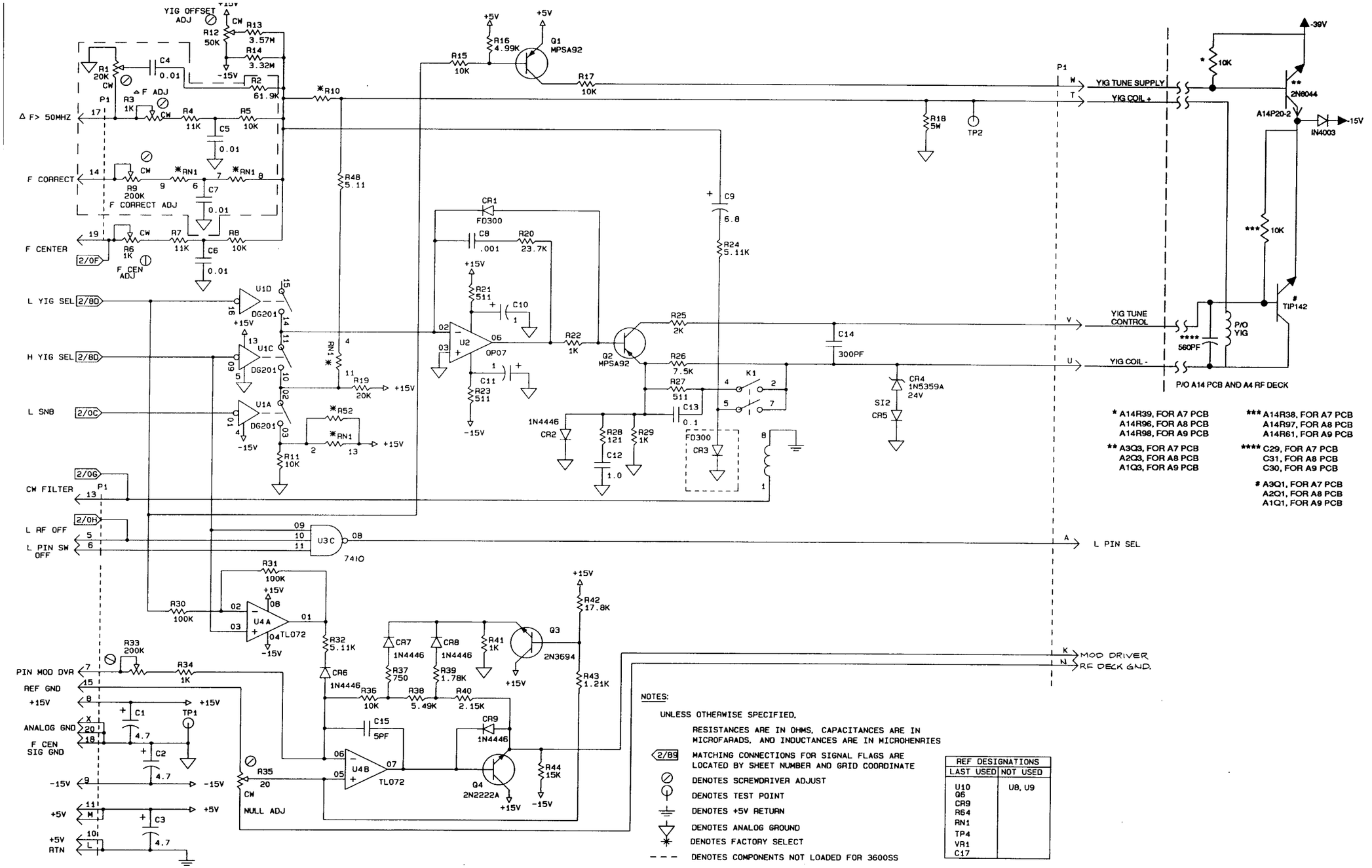
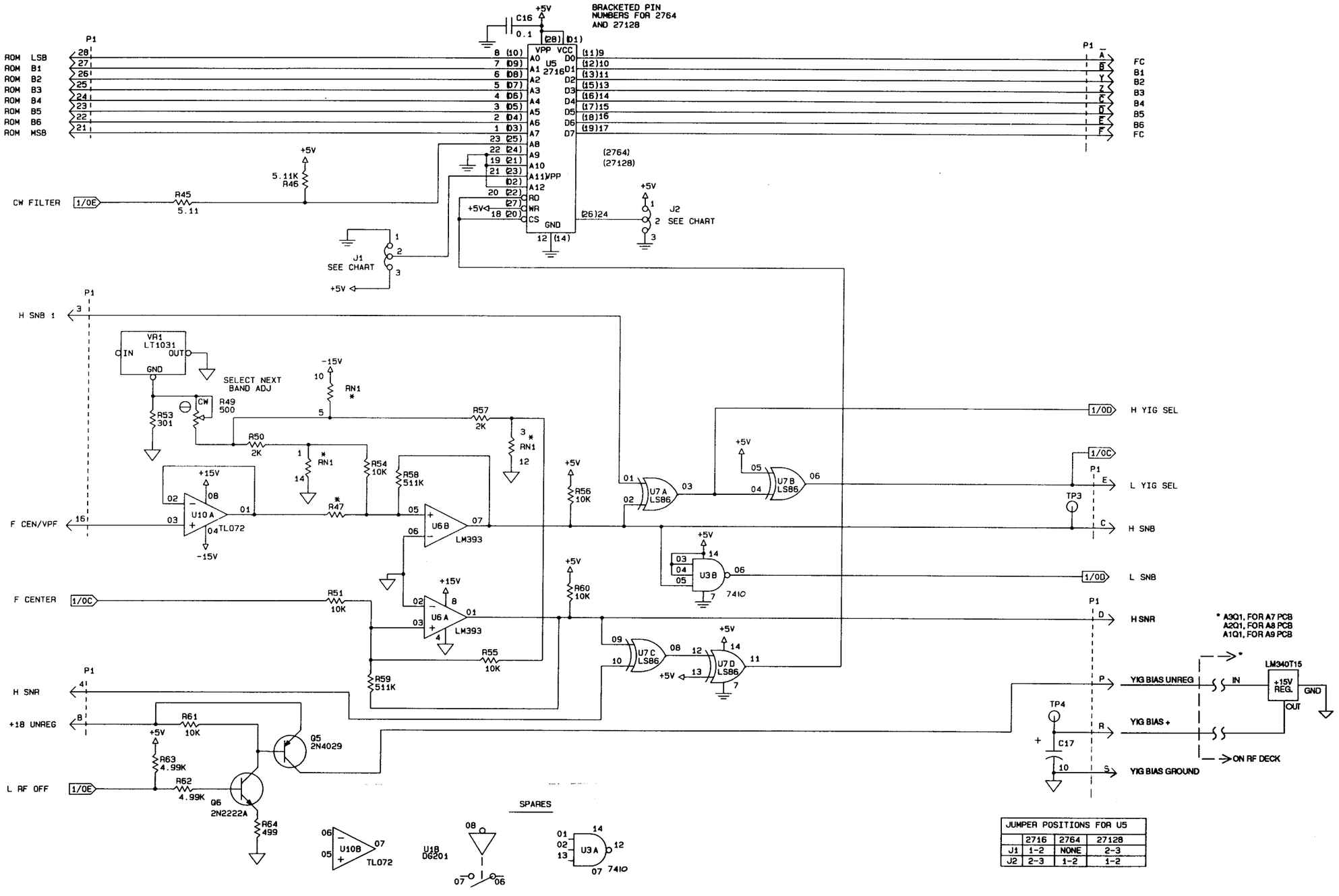


Figure A2-19. A1A7–A1A9 YIG Driver PCB Schematic, REV L (1 of 2)



JUMPER POSITIONS FOR U5			
	2716	2764	27128
J1	1-2	NONE	2-3
J2	2-3	1-2	1-2

Figure A2-19. A1A7–A1A9 YIG Driver PCBs Schematic, REV L (2 of 2)

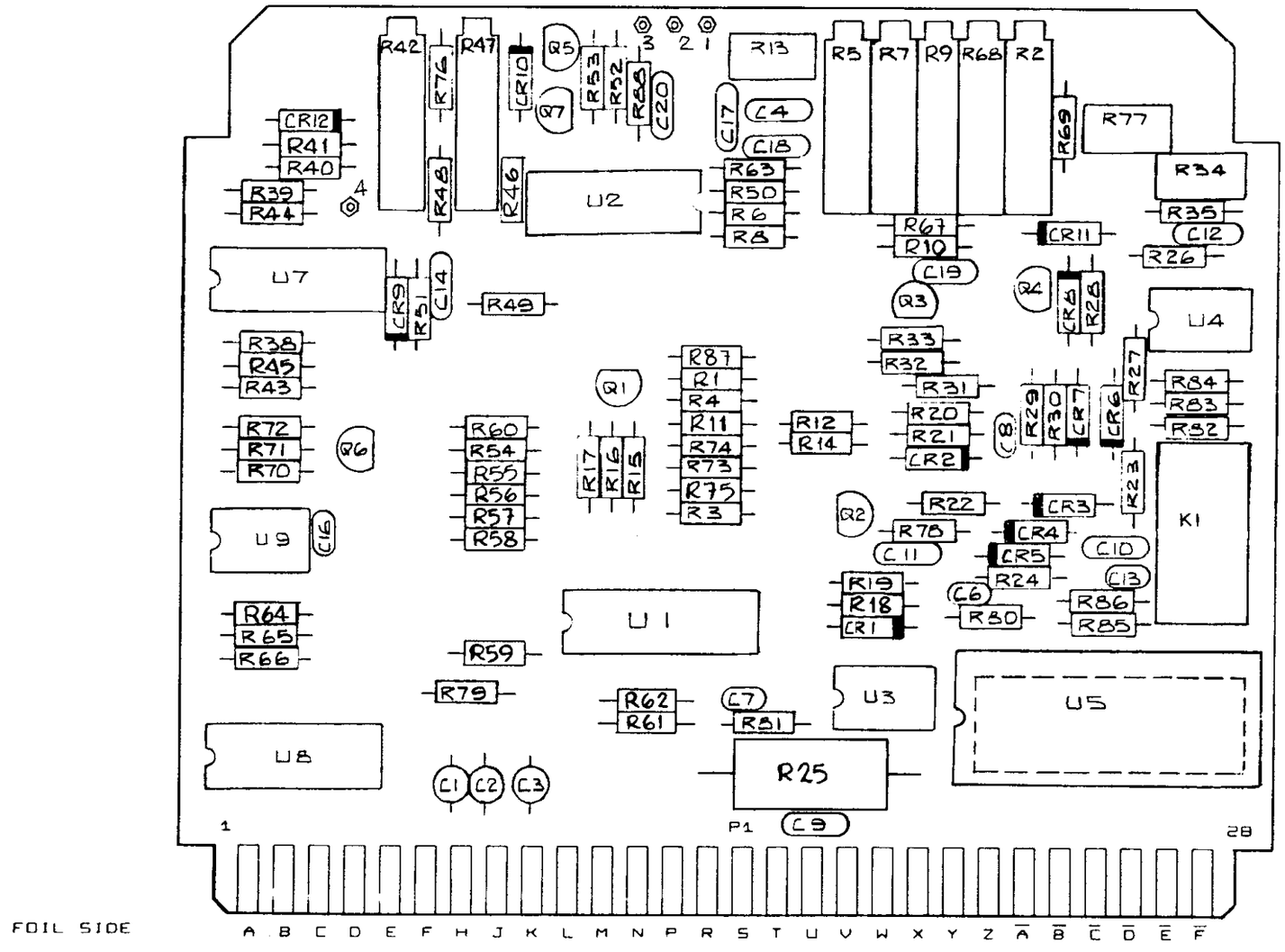
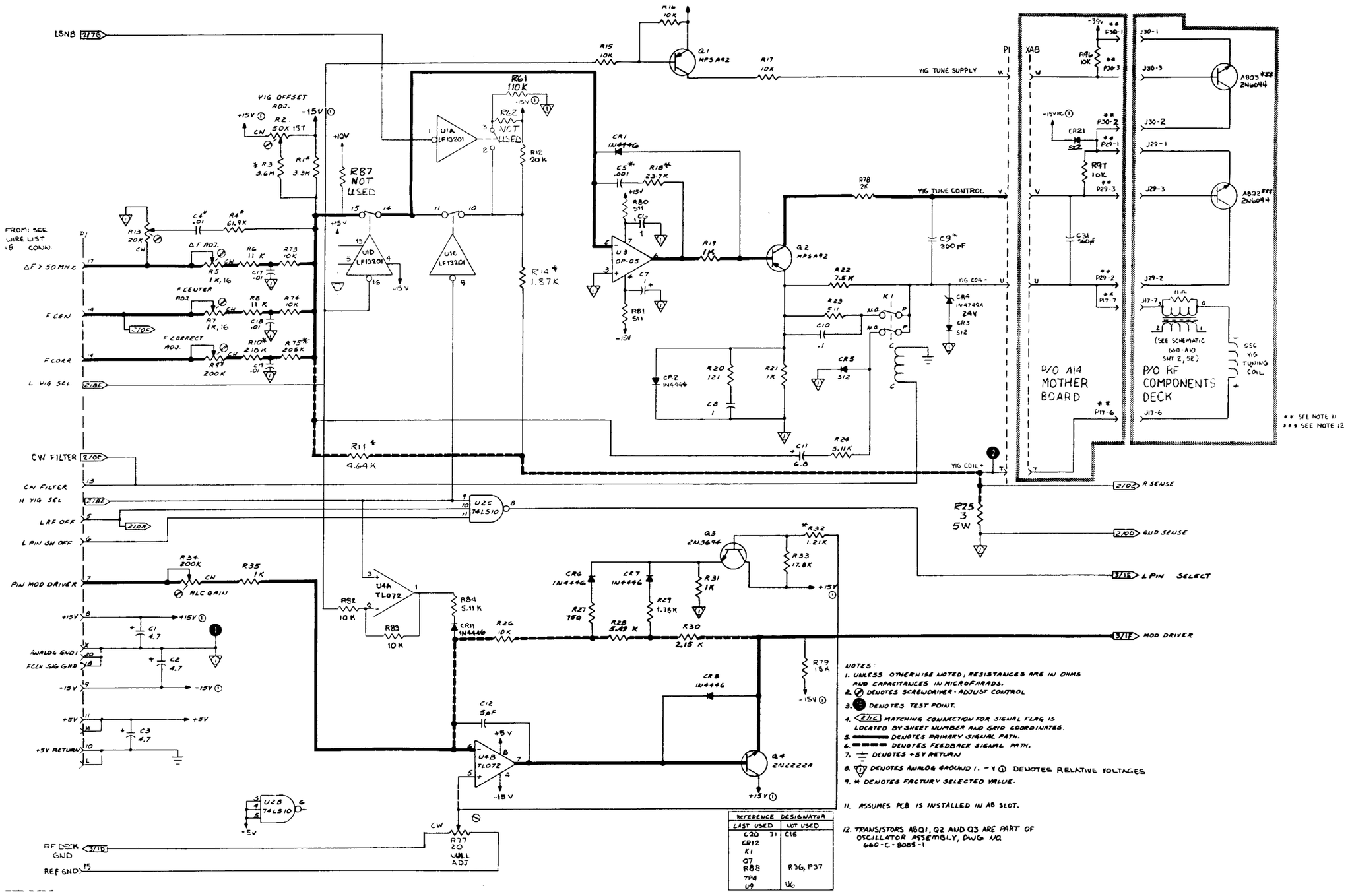


Figure A2-20. A1A7–A1A9 YIG Driver PCB Parts Locator, Assy D8008-12, -13



NOTES:
1. UNLESS OTHERWISE NOTED, RESISTANCES ARE IN OHMS AND CAPACITANCES IN MICROFARADS.
2. ⊘ DENOTES SCREWDRIVER-ADJUST CONTROL
3. ● DENOTES TEST POINT.
4. 2/1C MATCHING CONNECTION FOR SIGNAL FLAG IS LOCATED BY SHEET NUMBER AND GRID COORDINATES.
5. ▬▬ DENOTES PRIMARY SIGNAL PATH.
6. ▬ ▬ ▬ DENOTES FEEDBACK SIGNAL PATH.
7. ⏚ DENOTES +5V RETURN
8. ▽ DENOTES ANALOG GROUND 1. -Y ① DENOTES RELATIVE VOLTAGES
9. * DENOTES FACTORY SELECTED VALUE.
11. ASSUMES PCB IS INSTALLED IN A8 SLOT.
12. TRANSISTORS AB01, Q2 AND Q3 ARE PART OF OSCILLATOR ASSEMBLY, DWG NO. 660-C-B085-1

REFERENCE DESIGNATOR	
LAST USED	NOT USED
C20	31 C16
CR12	
K1	
Q7	
R88	R36, P37
TP9	
U9	U6

Figure A2-21. A1A7 YIG Driver PCB Schematic, REV ? (1 of 2)

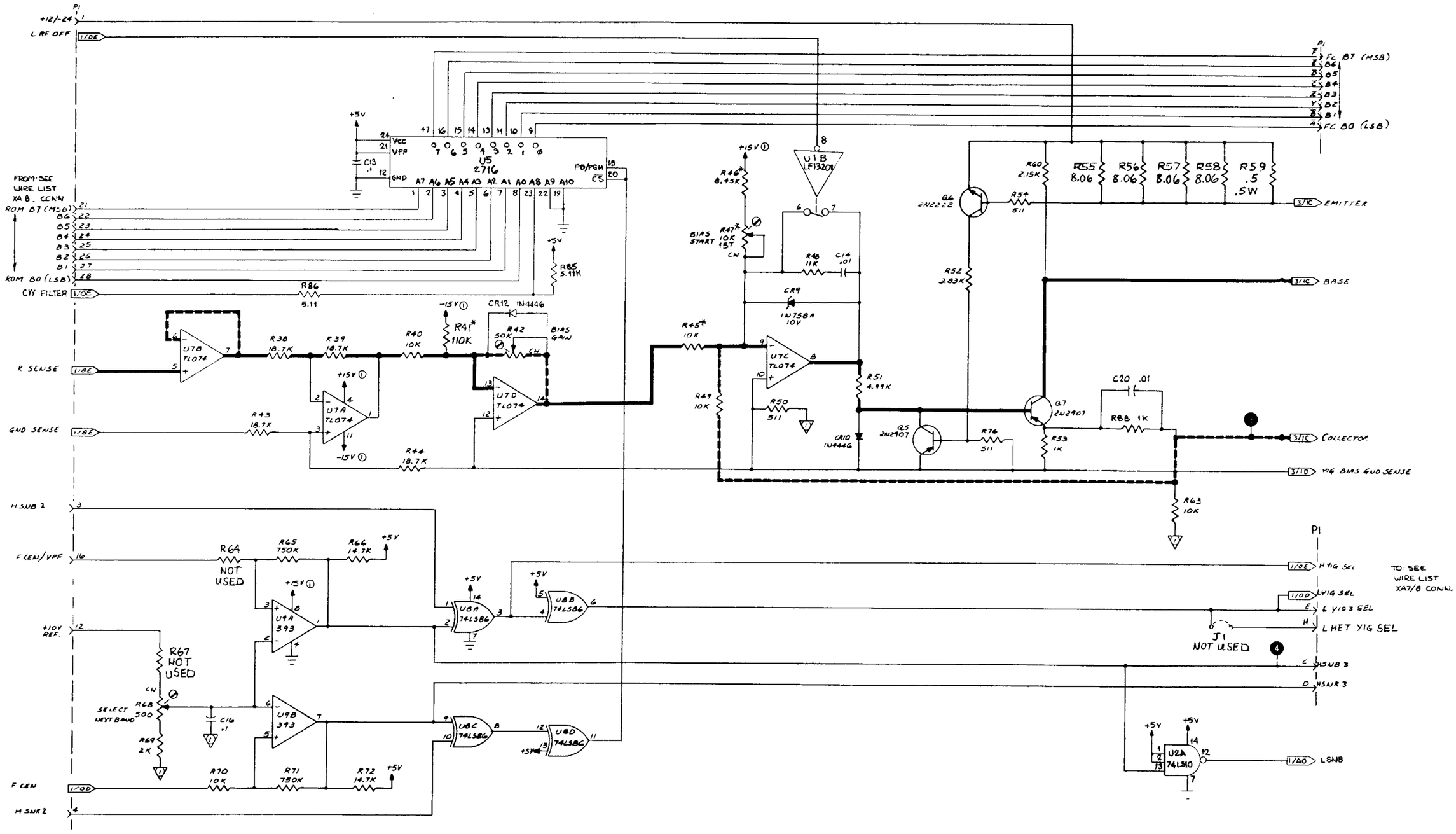


Figure A2-21. A1A7 YIG Driver PCBs Schematic, REV ? (2 of 2)

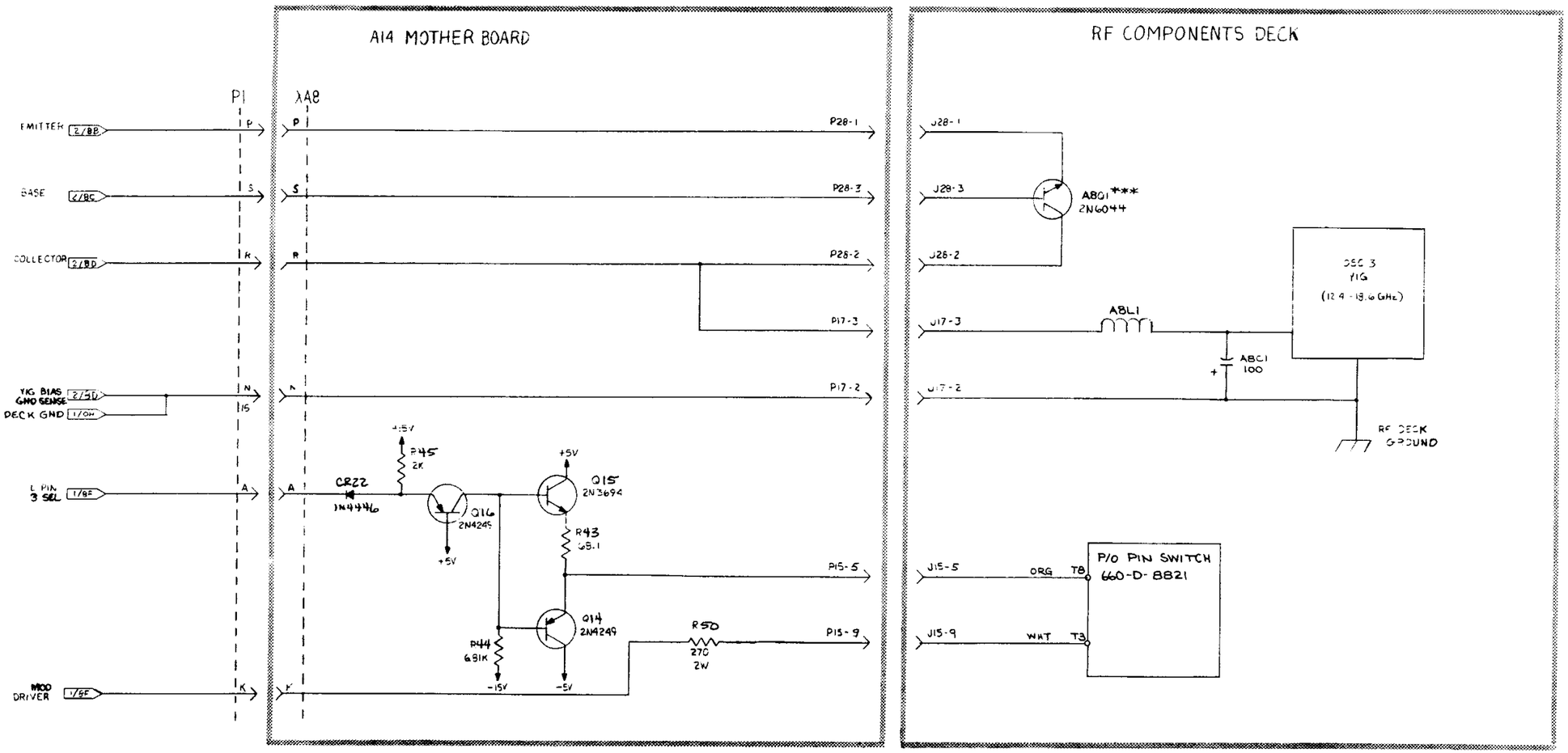


Figure A2-21. A1A7 YIG Driver PCB Parts Locator, Assy D8009-15, -39

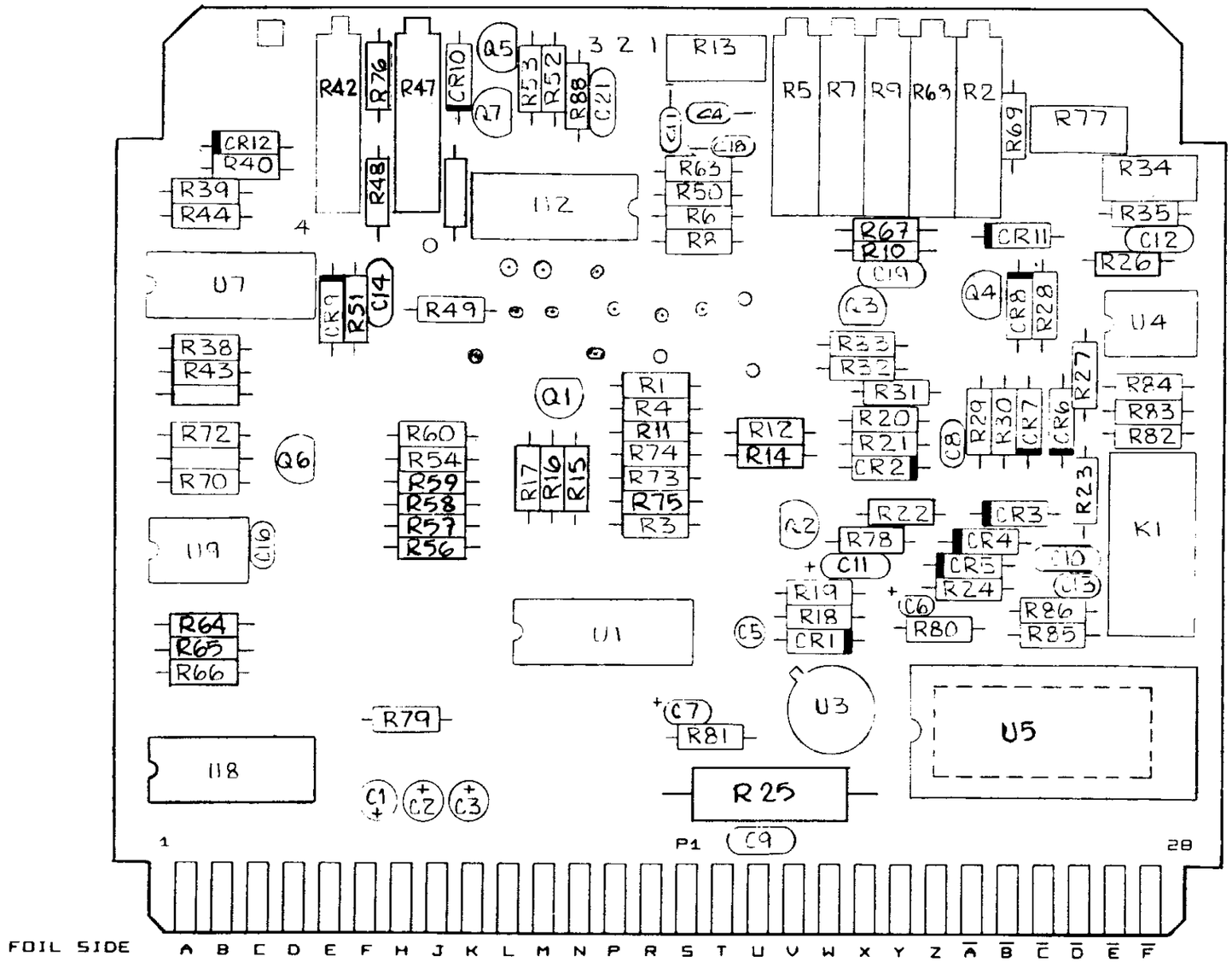


Figure A2-22. A1A7 YIG Driver PCB Parts Locator, Assy D8009-15, 39

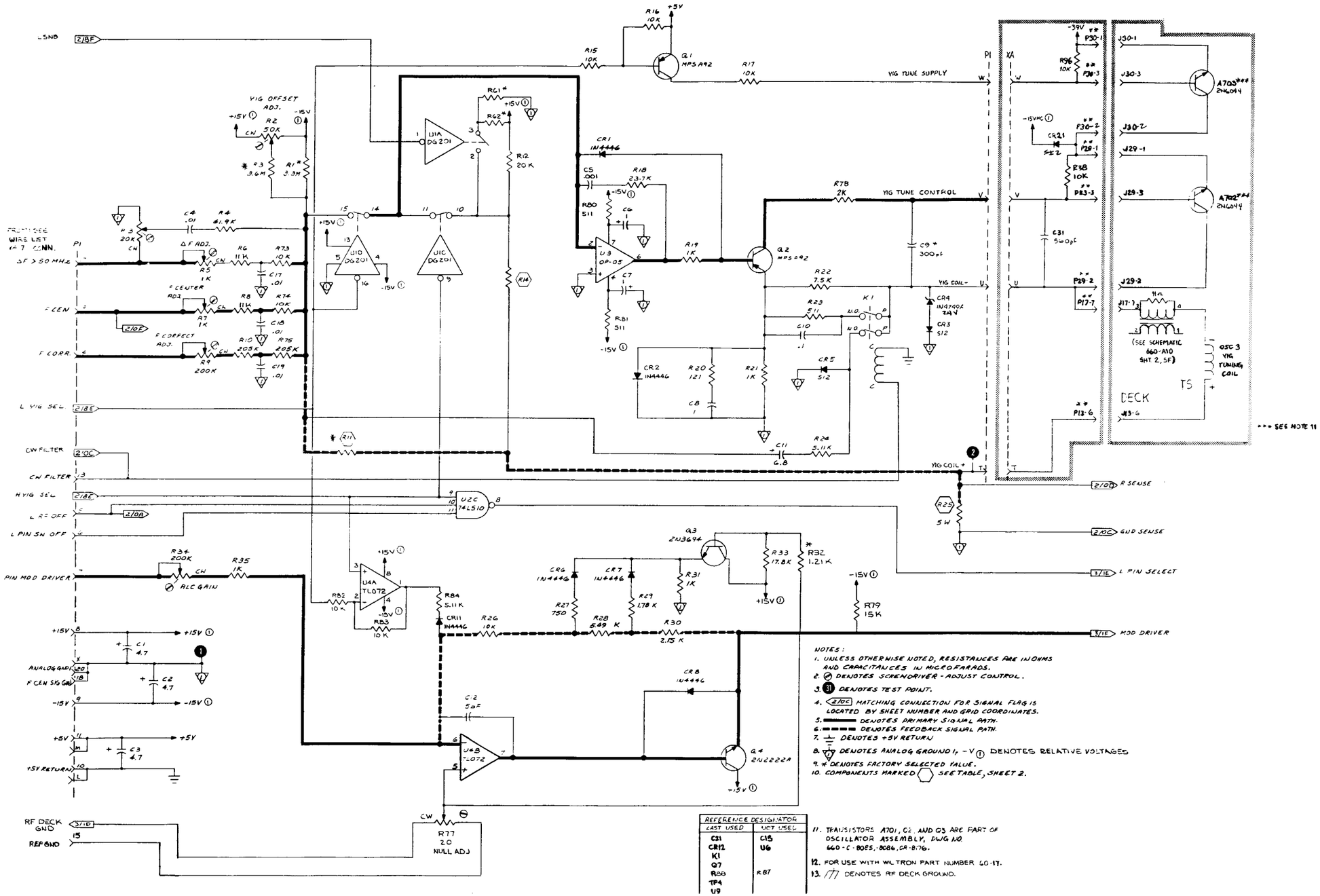
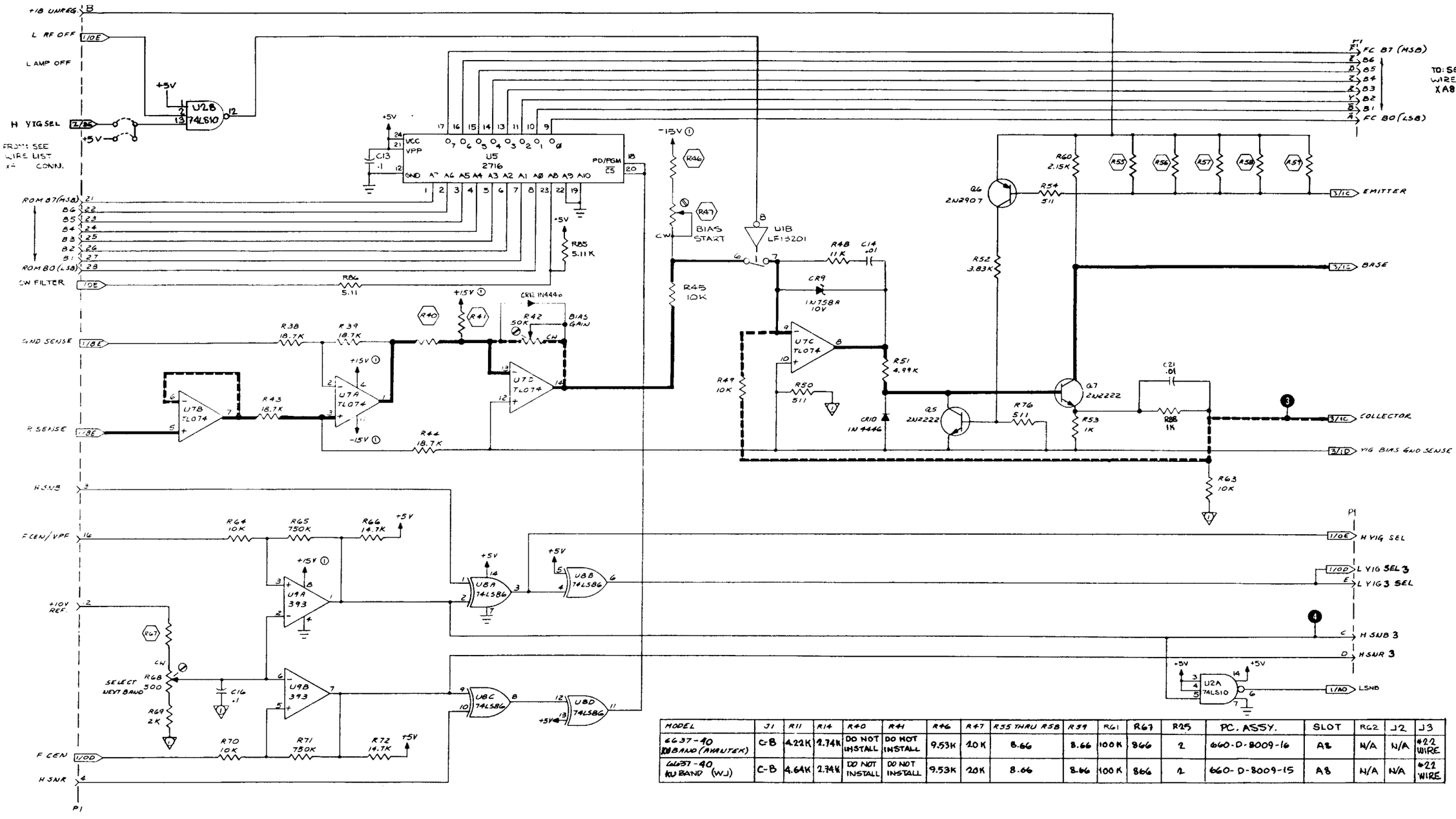


Figure A2-23. A1A7 YIG Driver PCB Schematic, REV D (1 of 3)



MODEL	J1	R11	R14	R40	R41	R46	R47	R35 THRU R58	R59	R61	R62	R25	PC. ASSY.	SLOT	RG2	J2	J3
6637-40 [redacted] BAND (AMATEK)	C-B	4.22K	2.74K	DO NOT INSTALL	DO NOT INSTALL	9.53K	20K	8.66	8.66	100K	866	2	660-D-8009-16	A2	N/A	N/A	#22 WIRE
6637-40 KU BAND (WJ)	C-B	4.64K	2.74K	DO NOT INSTALL	DO NOT INSTALL	9.53K	20K	8.66	8.66	100K	866	2	660-D-8009-15	A8	N/A	N/A	#22 WIRE

Figure A2-23. A1A7 YIG Driver PCBs Schematic, REV D (2 of 3)

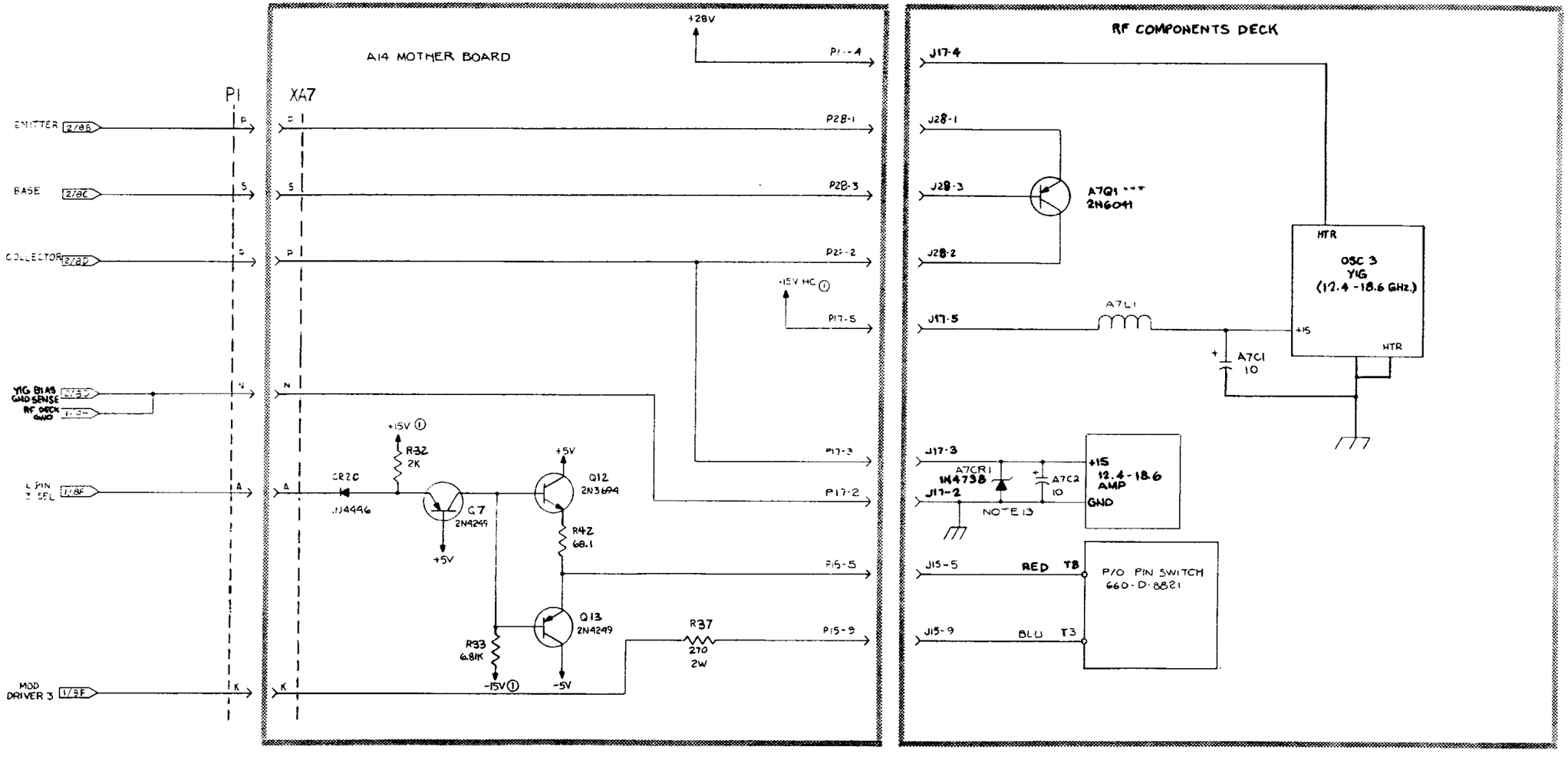


Figure A2-23. A1A7 YIG Driver PCB Schematic, REV D (3 of 3)

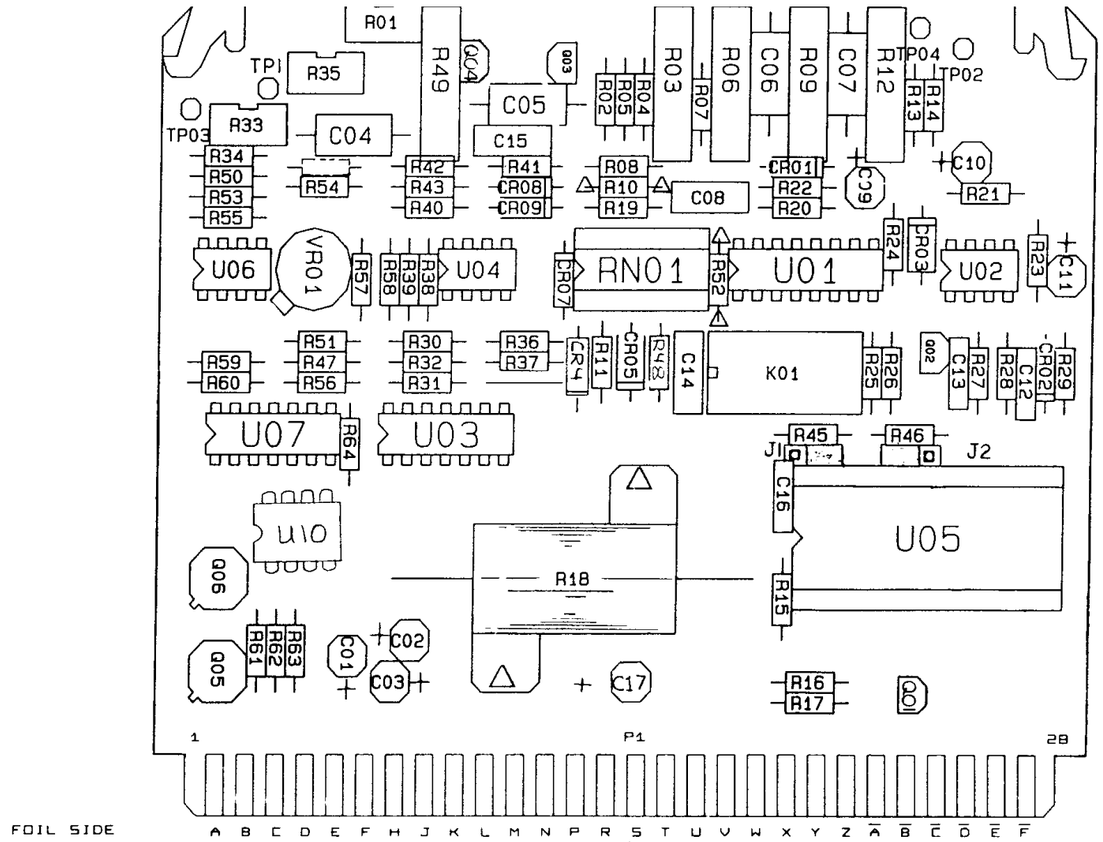


Figure A2-24. A1A8 YIG Driver PCB Parts Locator, Assy D32107-10

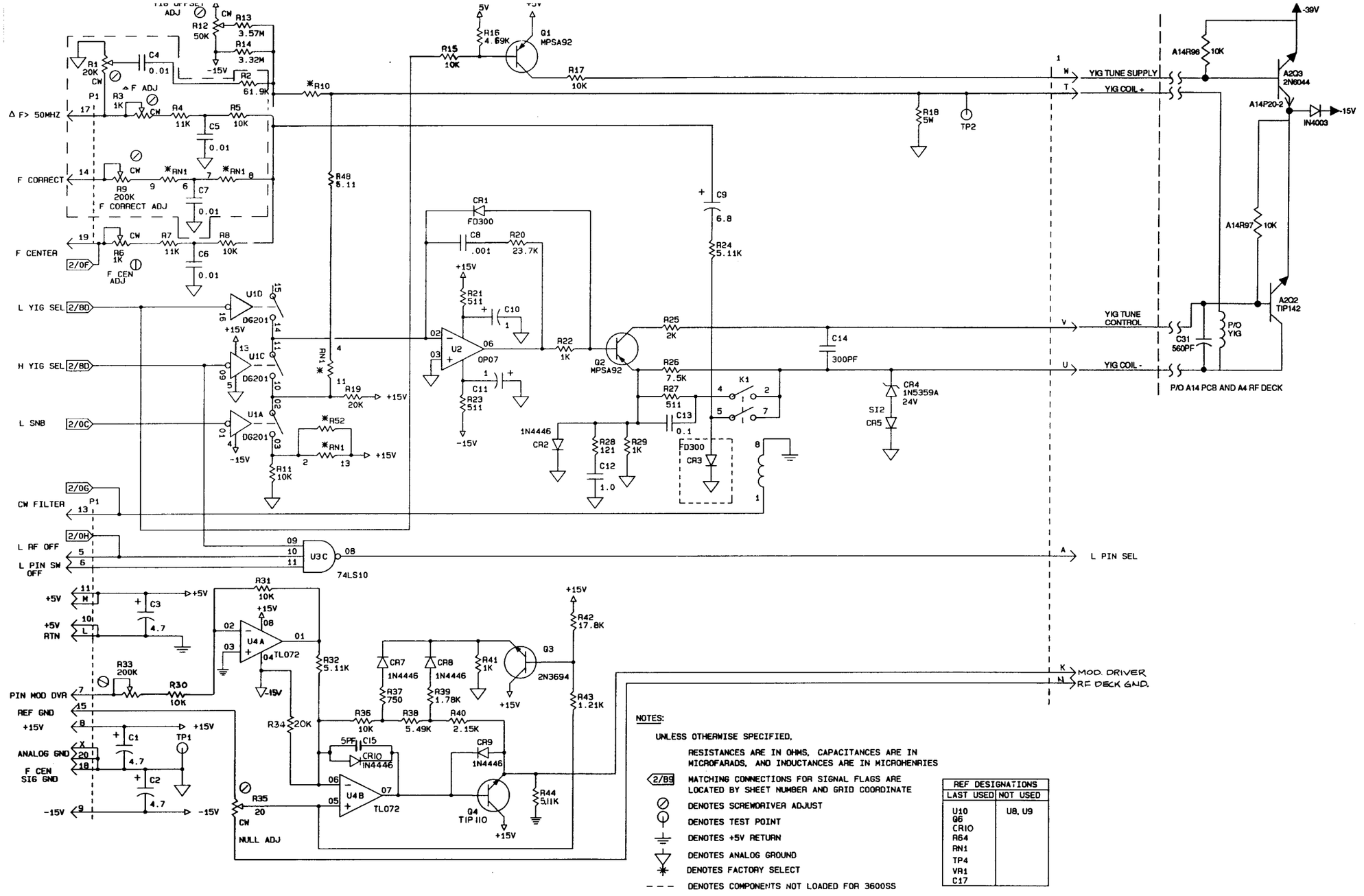


Figure A2-25. A1A8 YIG Driver PCB Schematic, REV A (1 of 2)

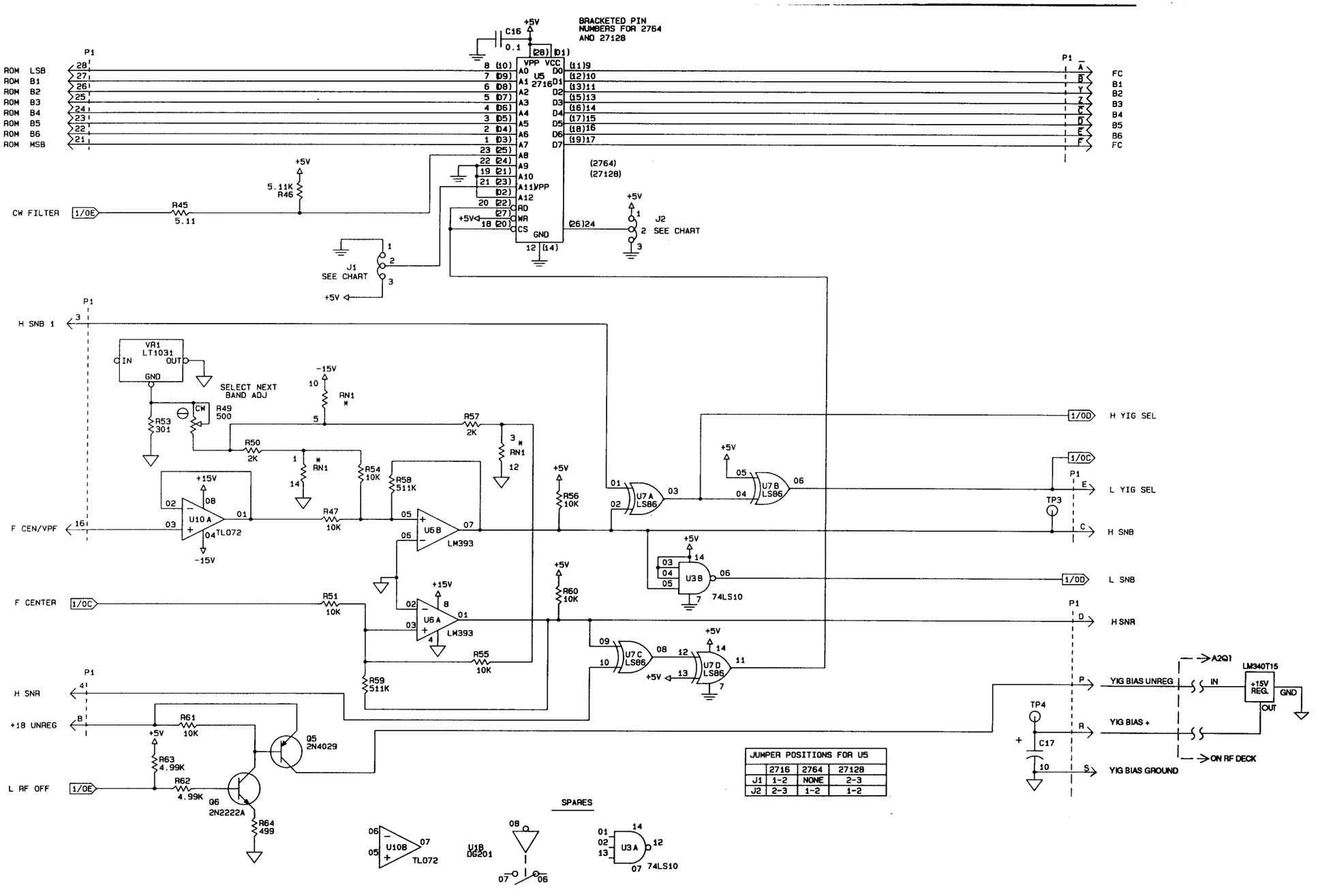


Figure A2-25. A1A8 YIG Driver PCB Schematic, REV A (2 of 2)

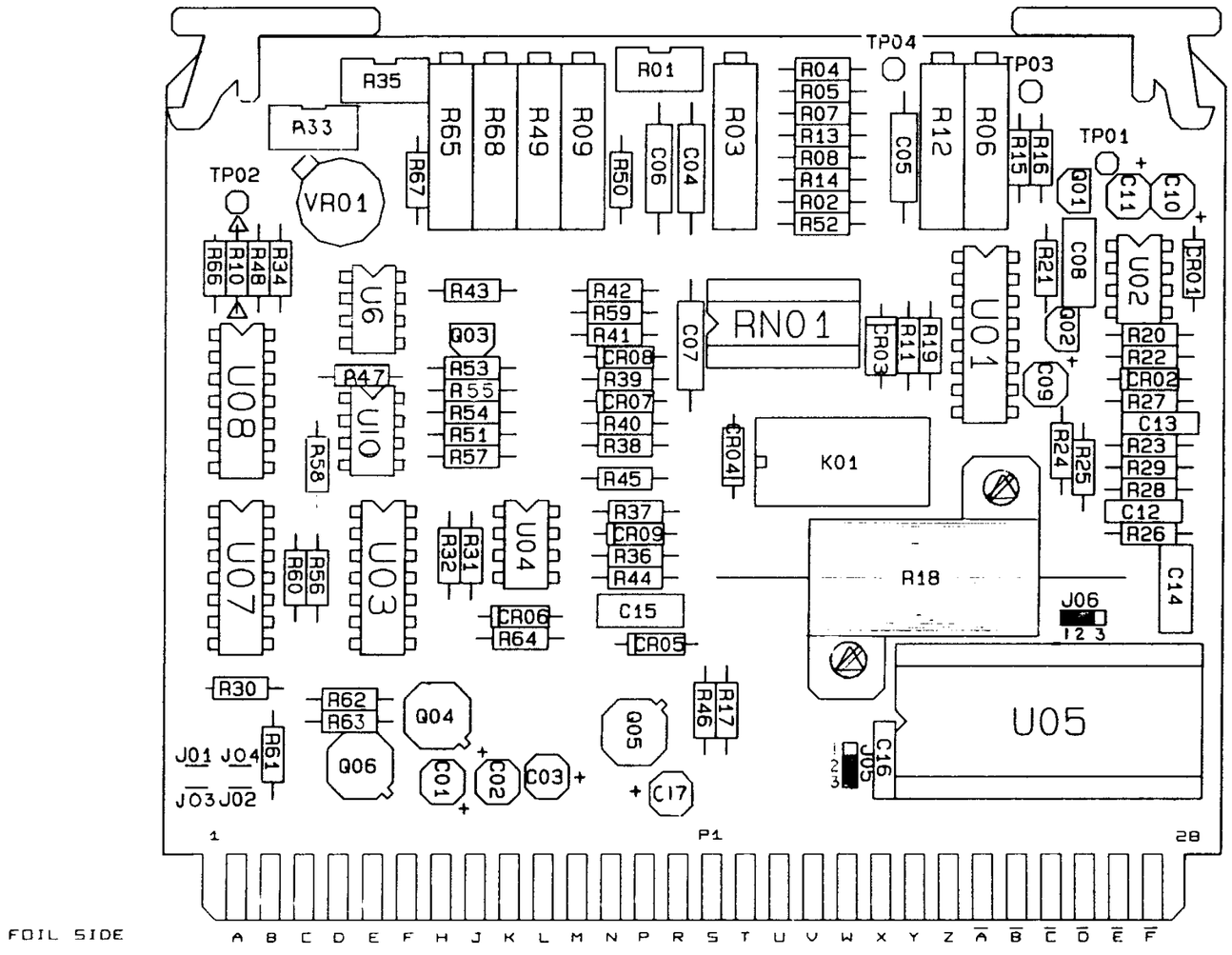
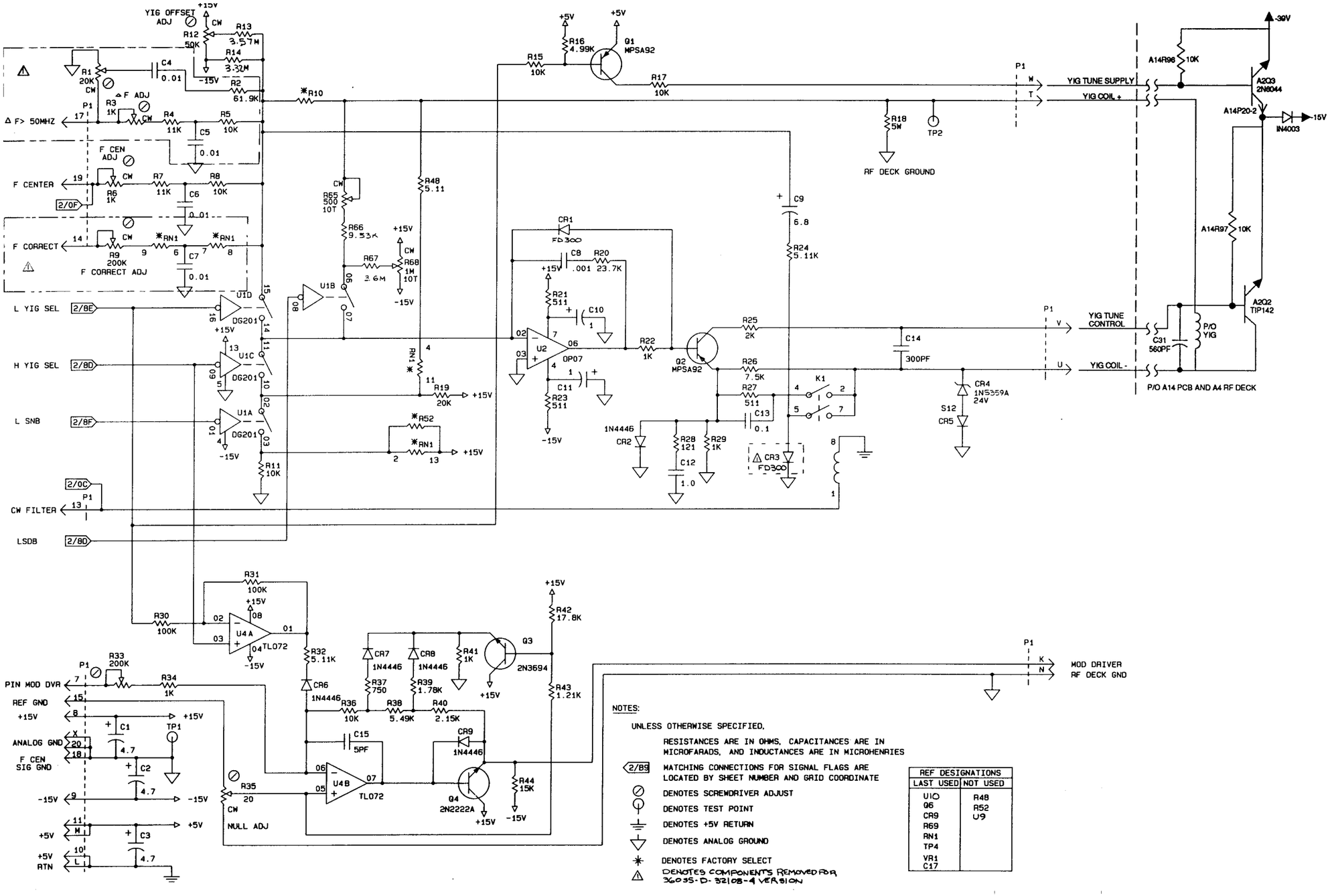


Figure A2-26. A1A8 YIG Driver PCB Parts Locator, Assy D32108-3



NOTES:

UNLESS OTHERWISE SPECIFIED,

RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROFARADS, AND INDUCTANCES ARE IN MICROHENRIES

2/89 MATCHING CONNECTIONS FOR SIGNAL FLAGS ARE LOCATED BY SHEET NUMBER AND GRID COORDINATE

DENOTES SCREWDRIVER ADJUST

DENOTES TEST POINT

DENOTES +5V RETURN

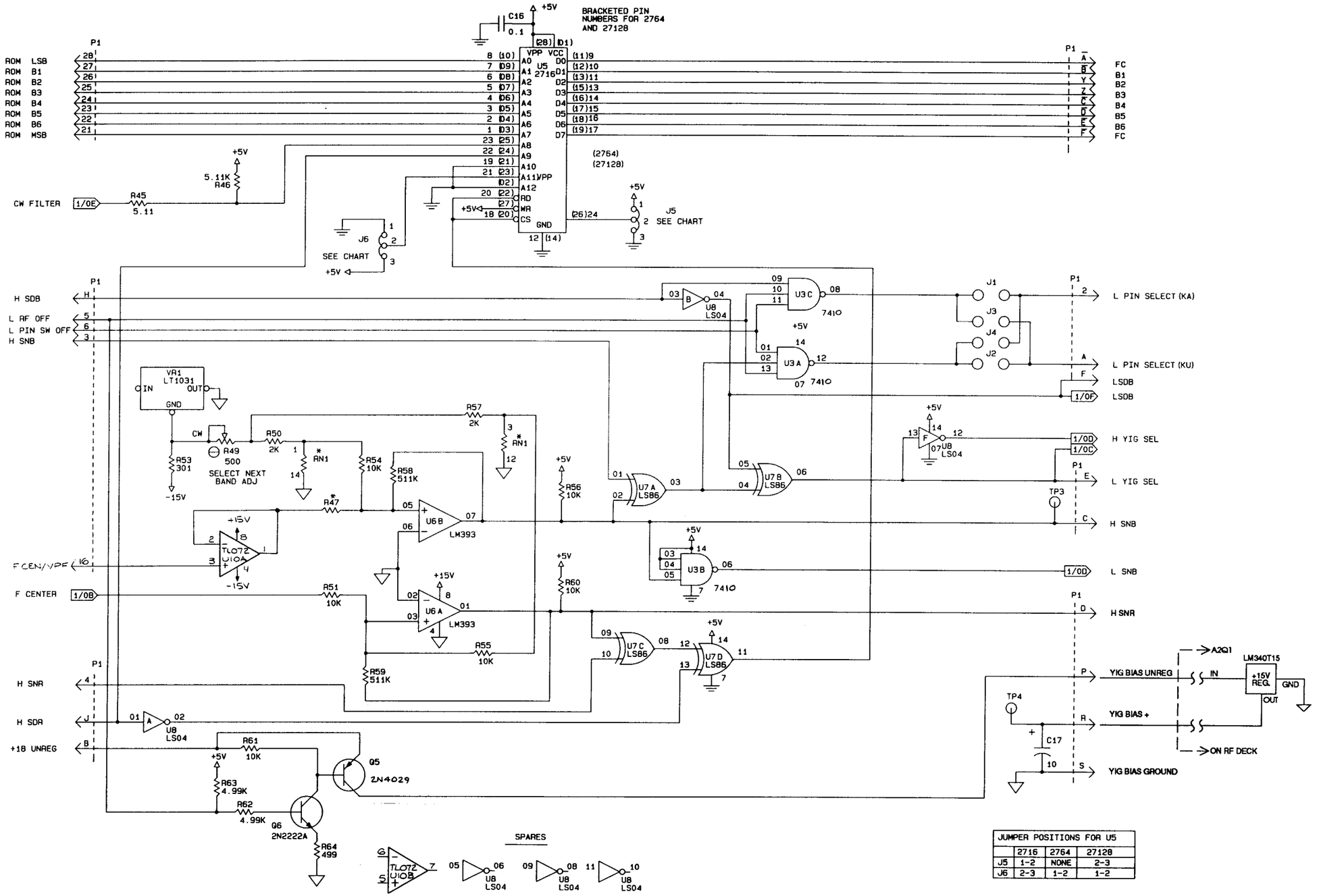
DENOTES ANALOG GROUND

DENOTES FACTORY SELECT

DENOTES COMPONENTS REMOVED FOR 36095-D-32108-4 VERSION

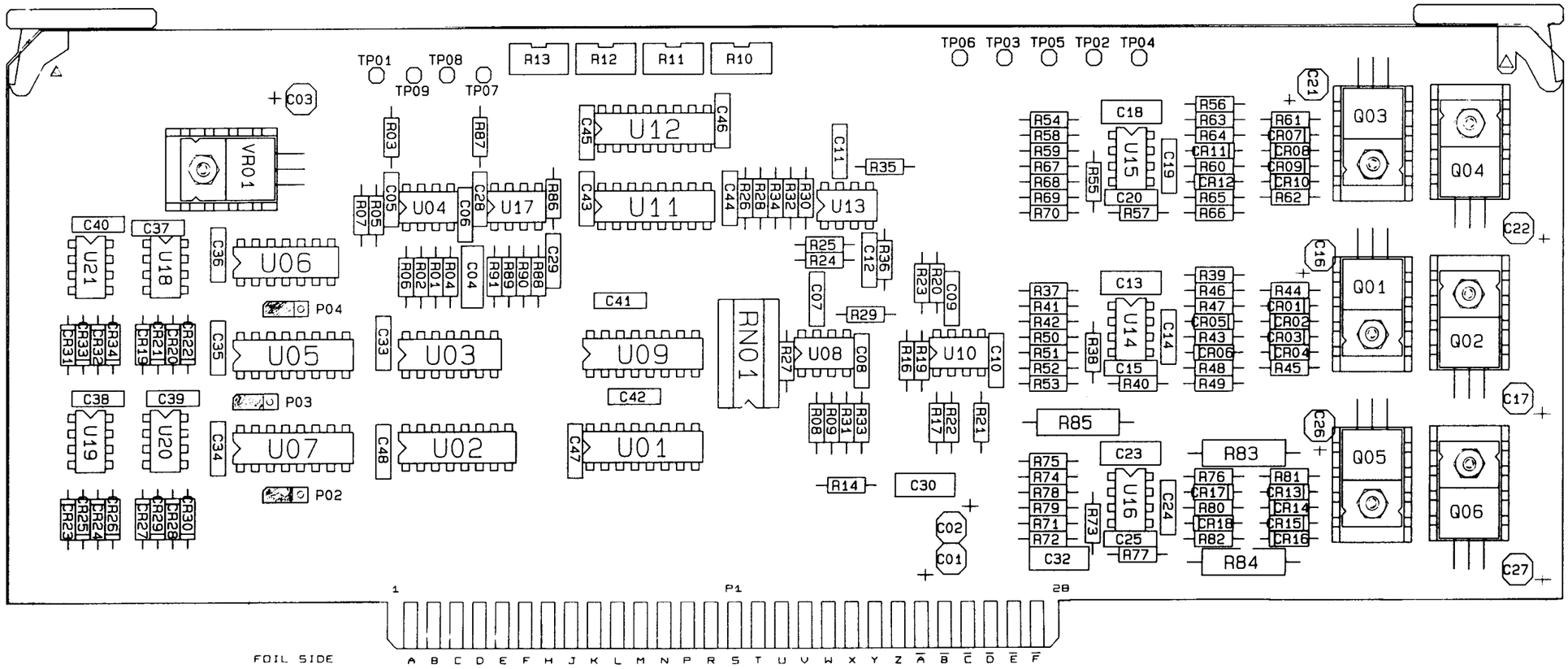
REF DESIGNATIONS	
LAST USED	NOT USED
U10	R48
Q6	R52
CR9	U9
R69	
RN1	
TP4	
VR1	
C17	

Figure A2-27. A1A8 YIG Driver PCB Schematic, REV H (1 of 2)



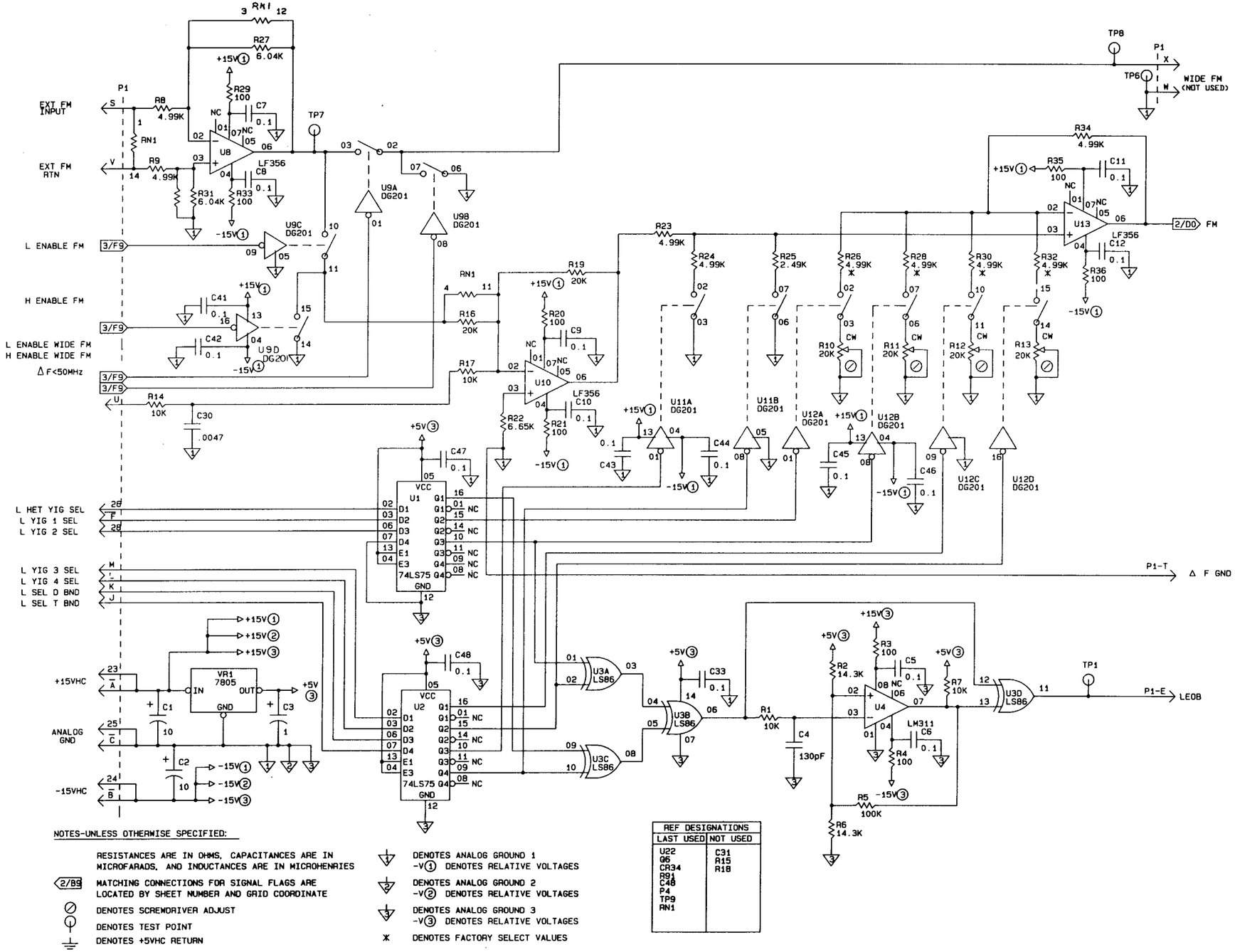
JUMPER POSITIONS FOR U5			
	2716	2764	27128
J5	1-2	NONE	2-3
J6	2-3	1-2	1-2

Figure A2-27. A1A8 YIG Driver PCB Schematic, REV H (2 of 2)



JUMPER TABLE			
VARIATION	P2	P3	P4
- 7	2/3	2/3	2/3
- 11	1/2	1/2	1/2

Figure A2-28. A1A10 FM/Attenuator PCB Parts Locator, Assy 34710-7/11



NOTES-UNLESS OTHERWISE SPECIFIED:

RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROFARADS, AND INDUCTANCES ARE IN MICROHENRIES

2/B9 MATCHING CONNECTIONS FOR SIGNAL FLAGS ARE LOCATED BY SHEET NUMBER AND GRID COORDINATE

DENOTES SCREWDRIVER ADJUST

DENOTES TEST POINT

DENOTES +5VHC RETURN

DENOTES ANALOG GROUND 1 -V(1) DENOTES RELATIVE VOLTAGES

DENOTES ANALOG GROUND 2 -V(2) DENOTES RELATIVE VOLTAGES

DENOTES ANALOG GROUND 3 -V(3) DENOTES RELATIVE VOLTAGES

* DENOTES FACTORY SELECT VALUES

Figure A2-29. A1A10 FM/Attenuator PCB Schematic (1 of 3)

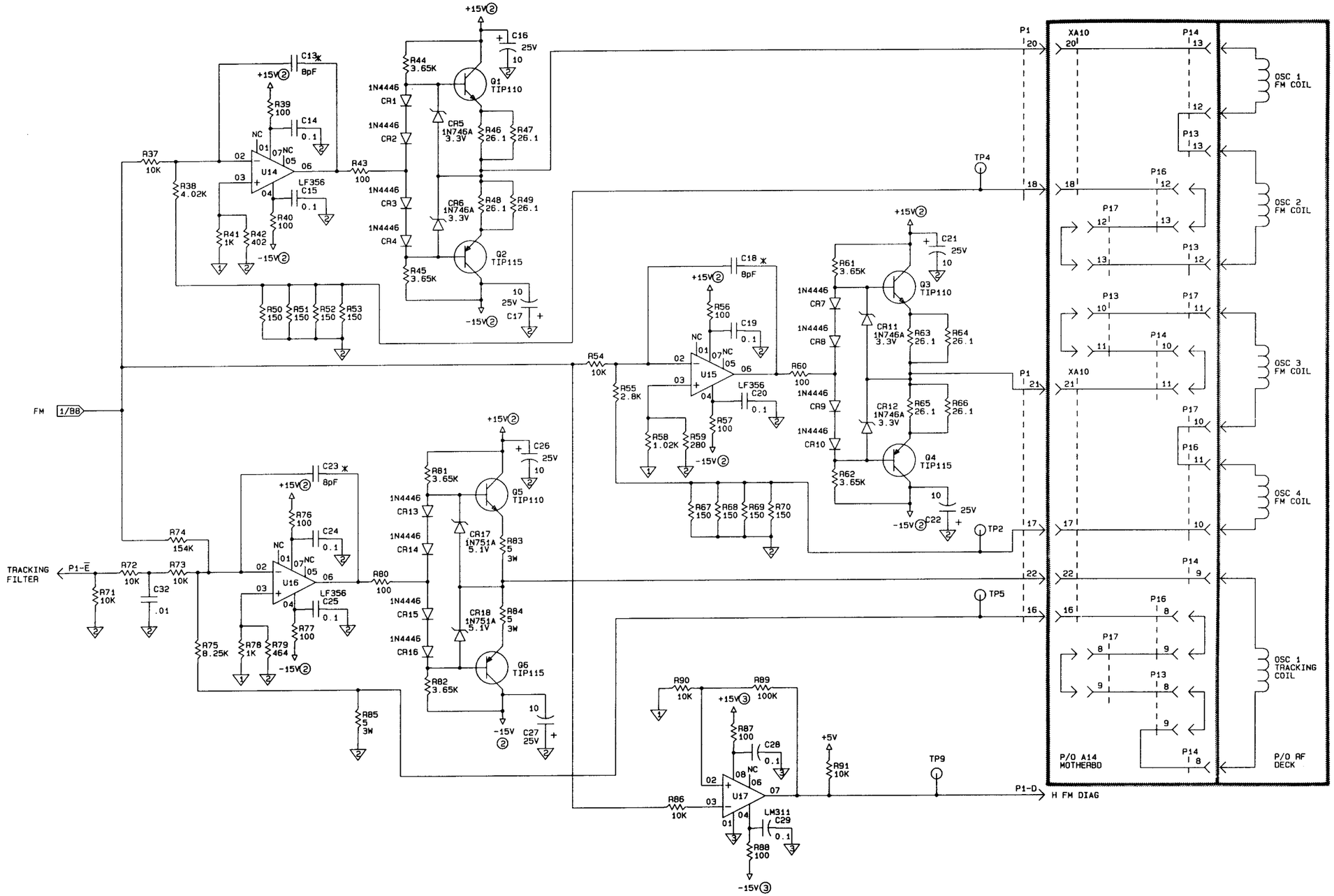
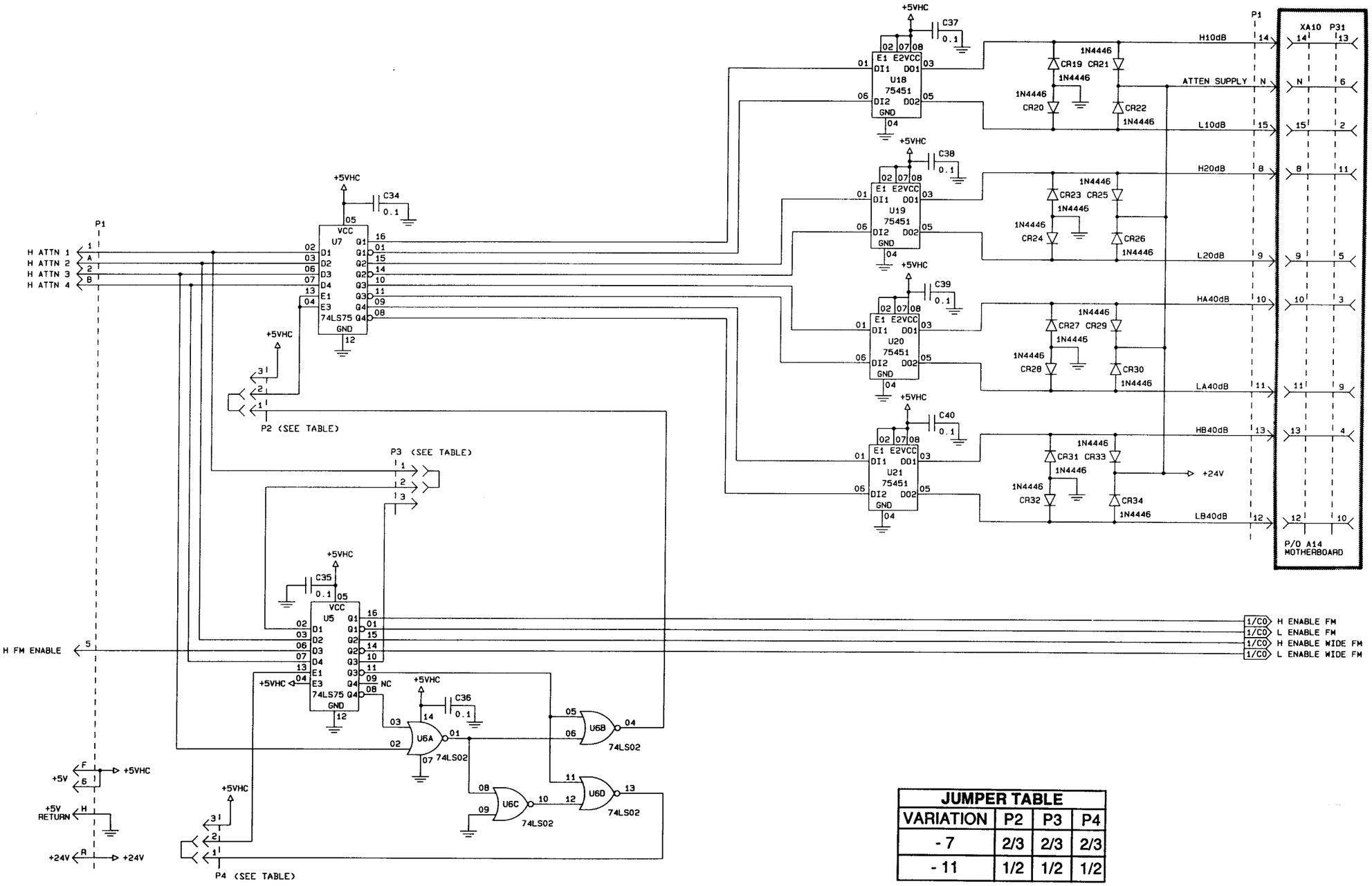


Figure A2-29. A1A10 FM/Attenuator PCB Schematic (2 of 3)



JUMPER TABLE			
VARIATION	P2	P3	P4
- 7	2/3	2/3	2/3
- 11	1/2	1/2	1/2

Figure A2-29. A1A10 FM/Attenuator PCB Schematic (3 of 3)

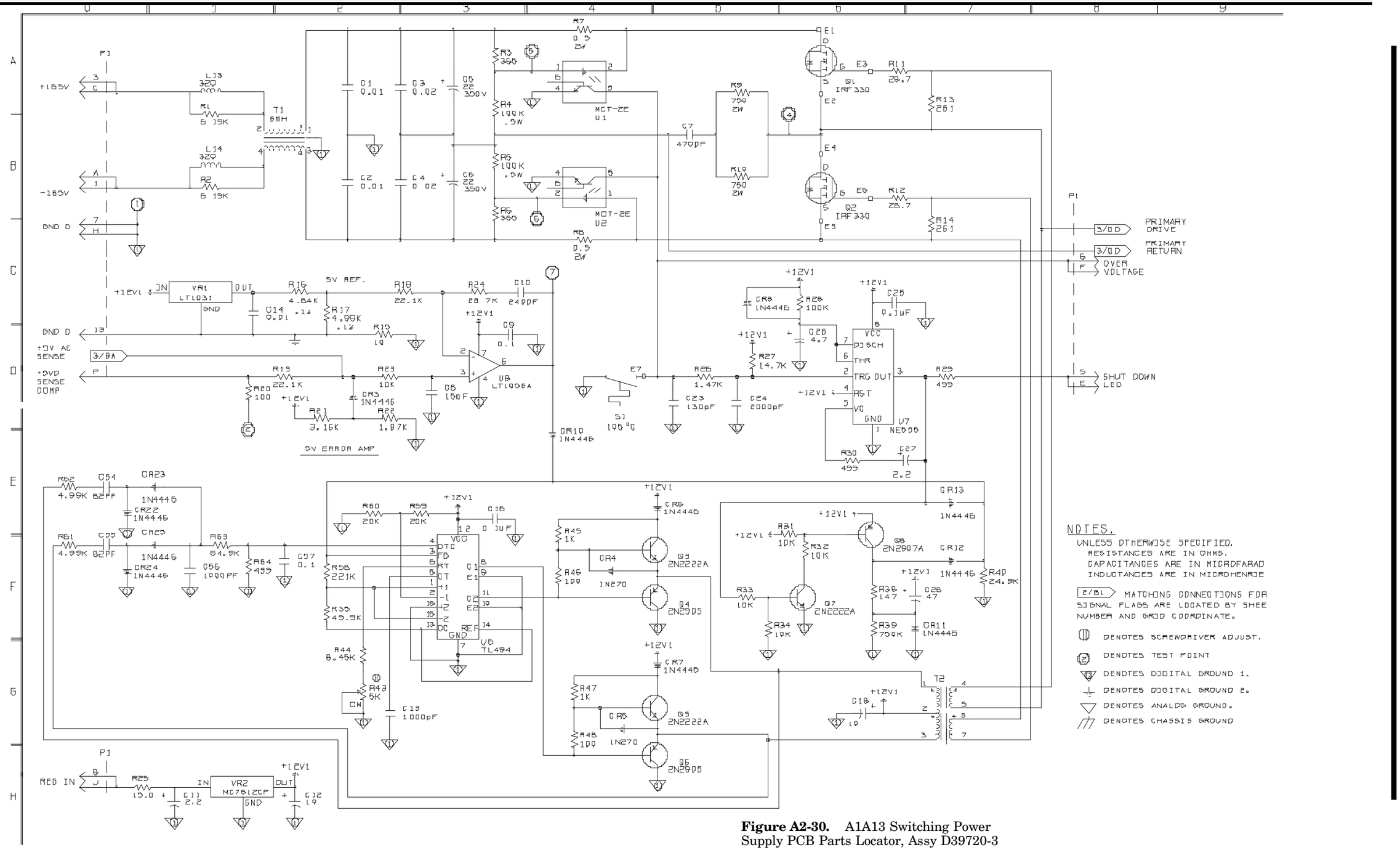
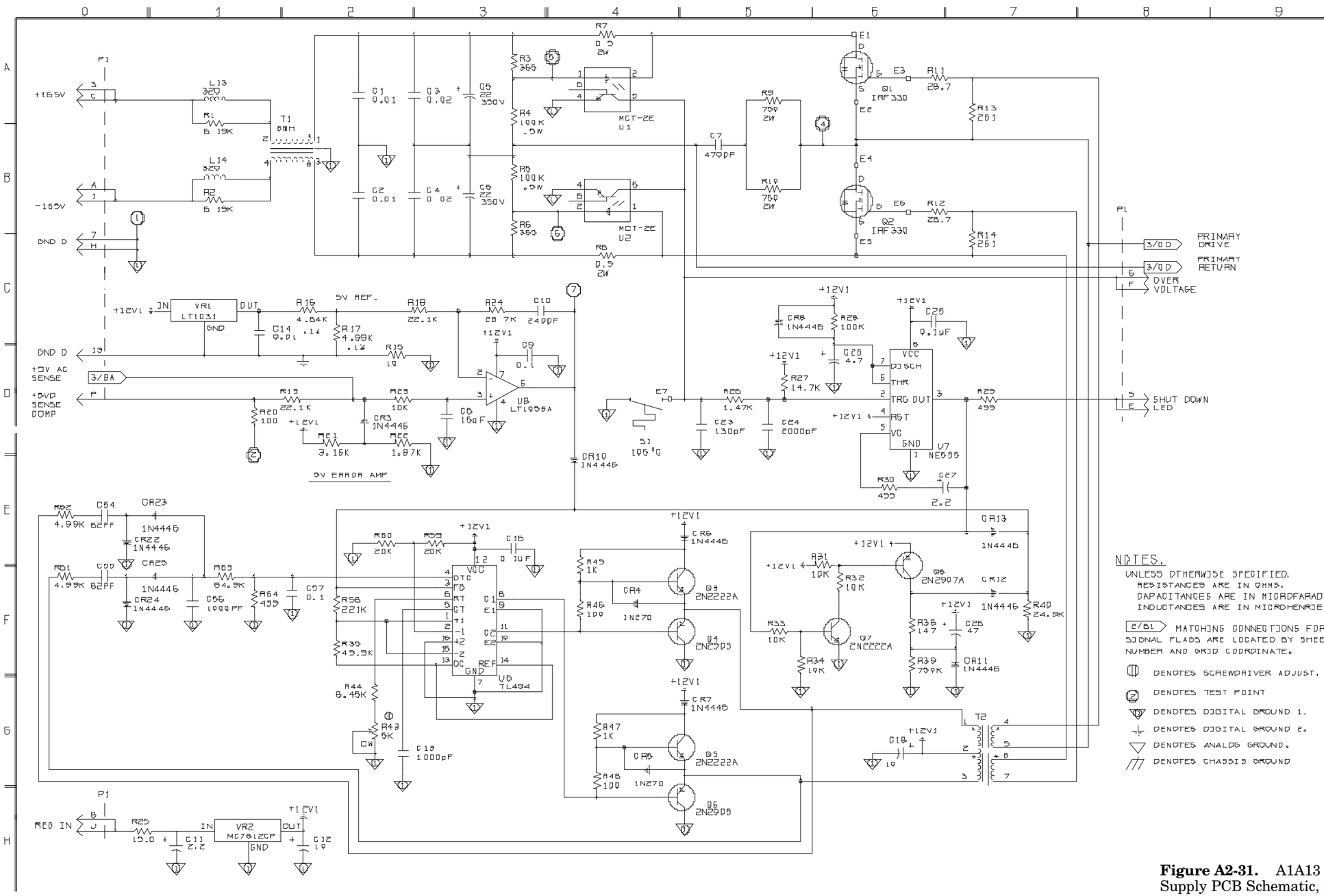


Figure A2-30. A1A13 Switching Power Supply PCB Parts Locator, Assy D39720-3



NOTES.

UNLESS OTHERWISE SPECIFIED.
RESISTANCES ARE IN OHMS.
CAPACITANCES ARE IN MICROFARAD
INDUCTANCES ARE IN MICROHENRIE

MATCHING CONNECTIONS FOR SIGNAL FLAGS ARE LOCATED BY SHEET NUMBER AND GRID COORDINATE.

DENOTES SCREWDRIVER ADJUST.

DENOTES TEST POINT

DENOTES DIGITAL GROUND 1.

DENOTES DIGITAL GROUND 2.

DENOTES ANALOG GROUND.

DENOTES CHASSIS GROUND

Figure A2-31. A1A13 Switching Power Supply PCB Schematic, REV A (1 of 2)

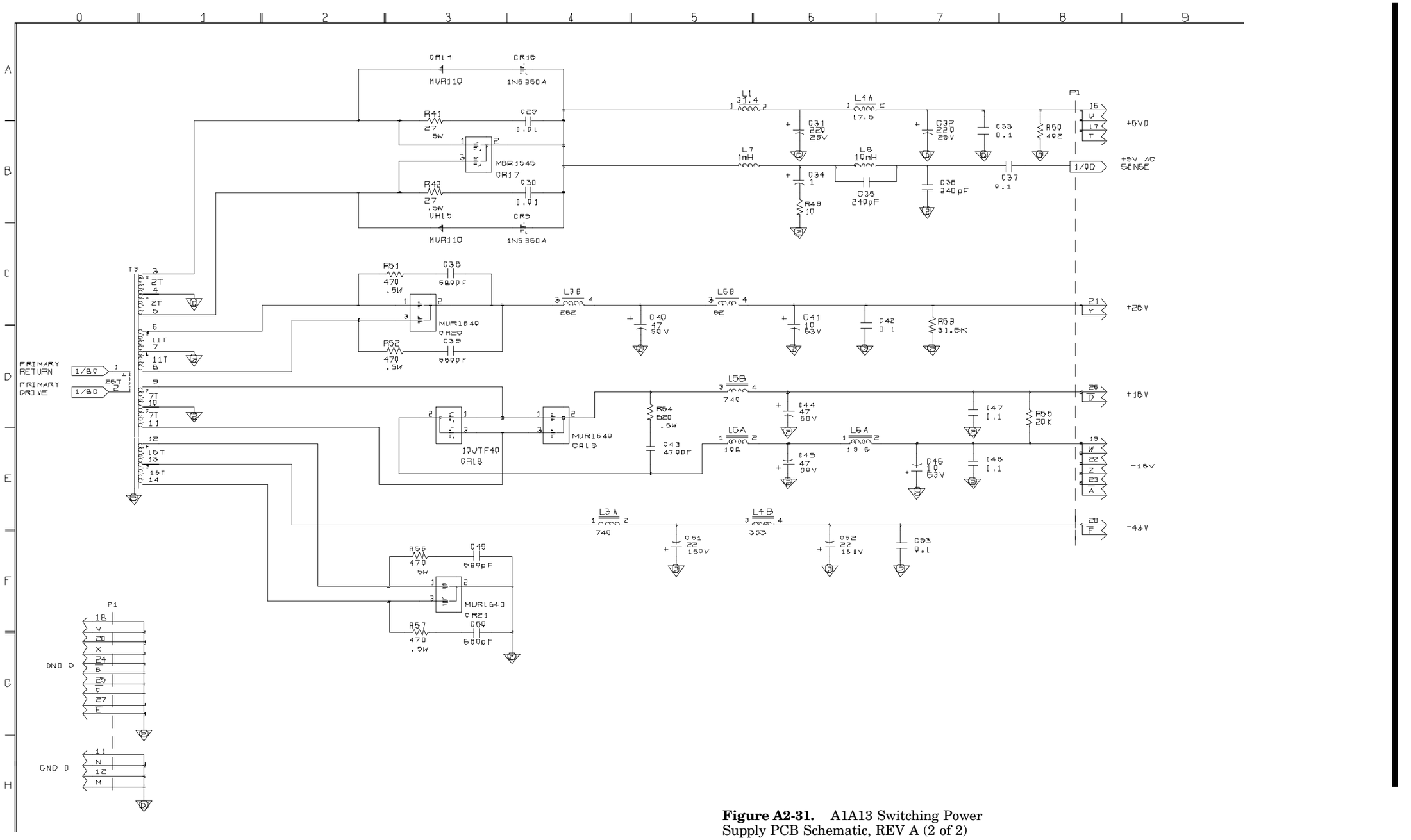


Figure A2-31. A1A13 Switching Power Supply PCB Schematic, REV A (2 of 2)

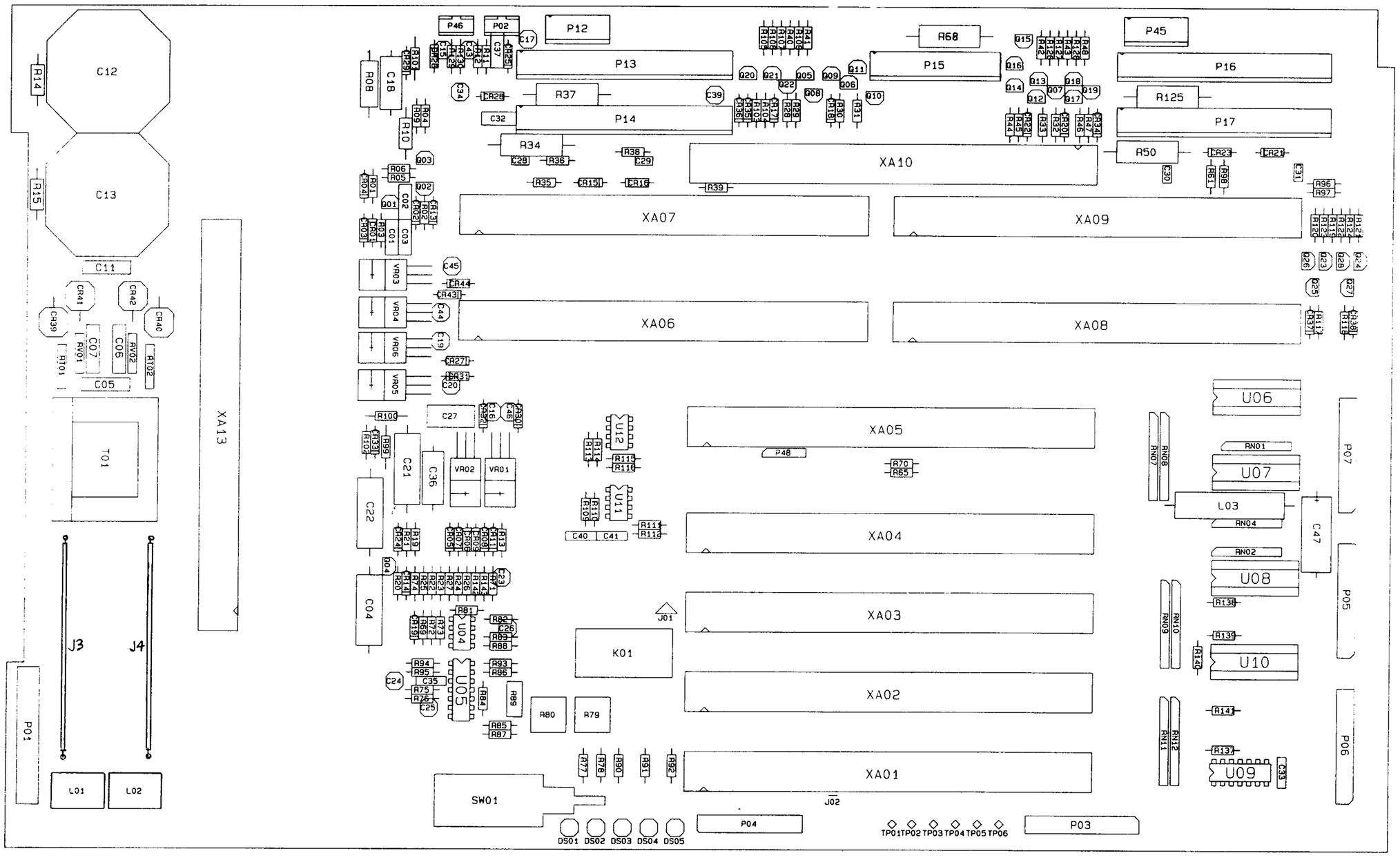
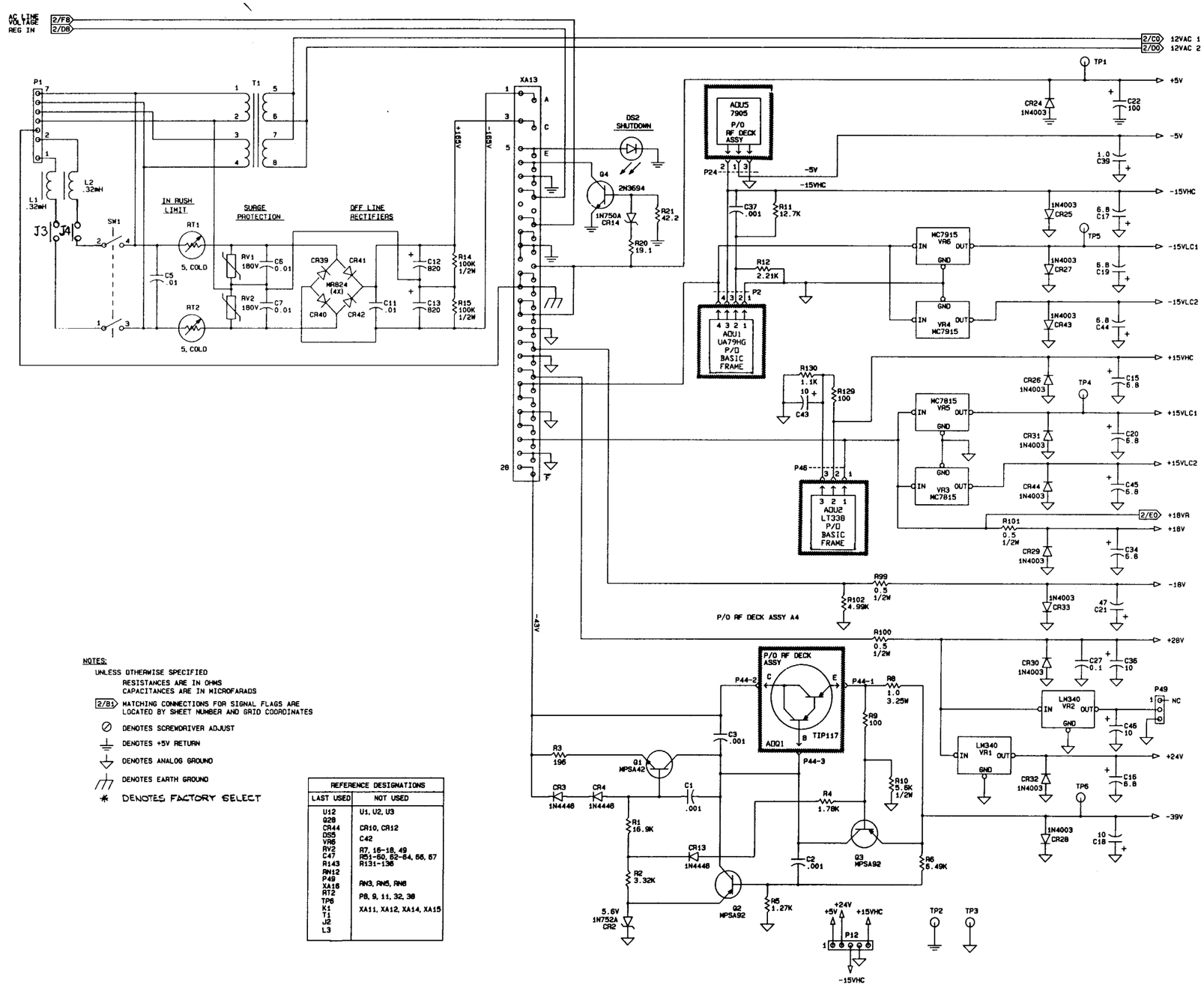


Figure A2-32. A1A14 Motherboard PCB Parts Locator, Assy D34714-3



NOTES:

UNLESS OTHERWISE SPECIFIED
RESISTANCES ARE IN OHMS
CAPACITANCES ARE IN MICROFARADS

2/B1 MATCHING CONNECTIONS FOR SIGNAL FLAGS ARE LOCATED BY SHEET NUMBER AND GRID COORDINATES

DENOTES SCREWDRIVER ADJUST

DENOTES +5V RETURN

DENOTES ANALOG GROUND

DENOTES EARTH GROUND

* DENOTES FACTORY SELECT

REFERENCE DESIGNATIONS	
LAST USED	NOT USED
U12	U1, U2, U3
Q28	
CR44	CR10, CR12
DS5	C42
VR6	
RV2	R7, 16-18, 49
C47	R51-60, 62-64, 66, 67
R143	R131-136
RN12	
P49	
XA16	RN3, RN5, RN8
RT2	
TP6	P8, 9, 11, 32, 38
K1	
T1	XA11, XA12, XA14, XA15
J2	
L3	

Figure A2-33. A1A14 Motherboard PCB Schematic, REV E (1 of 5)

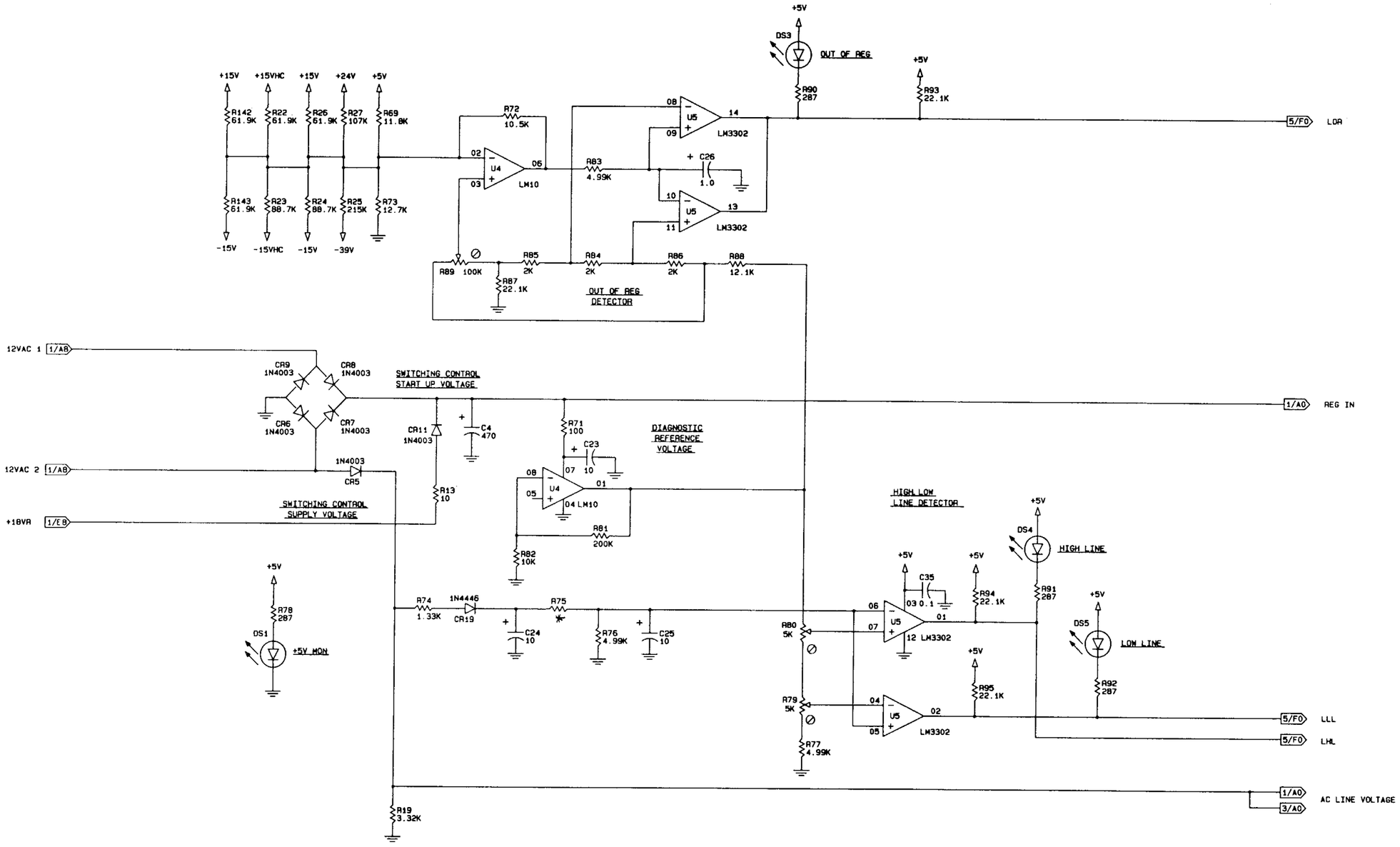


Figure A2-33. A1A14 Motherboard PCB Schematic, REV E (2 of 5)

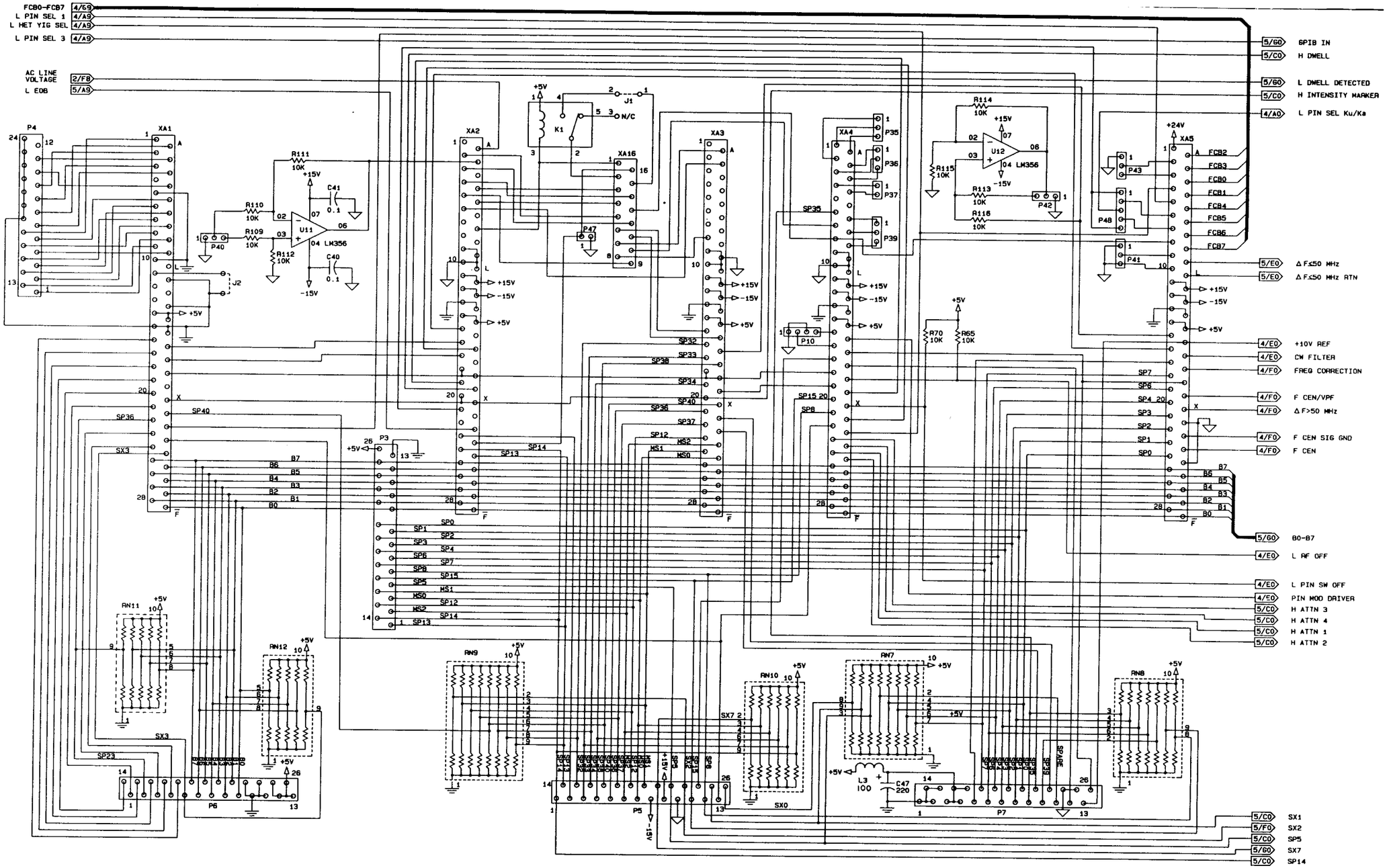


Figure A2-33. A1A14 Motherboard PCB Schematic, REV E (3 of 5)

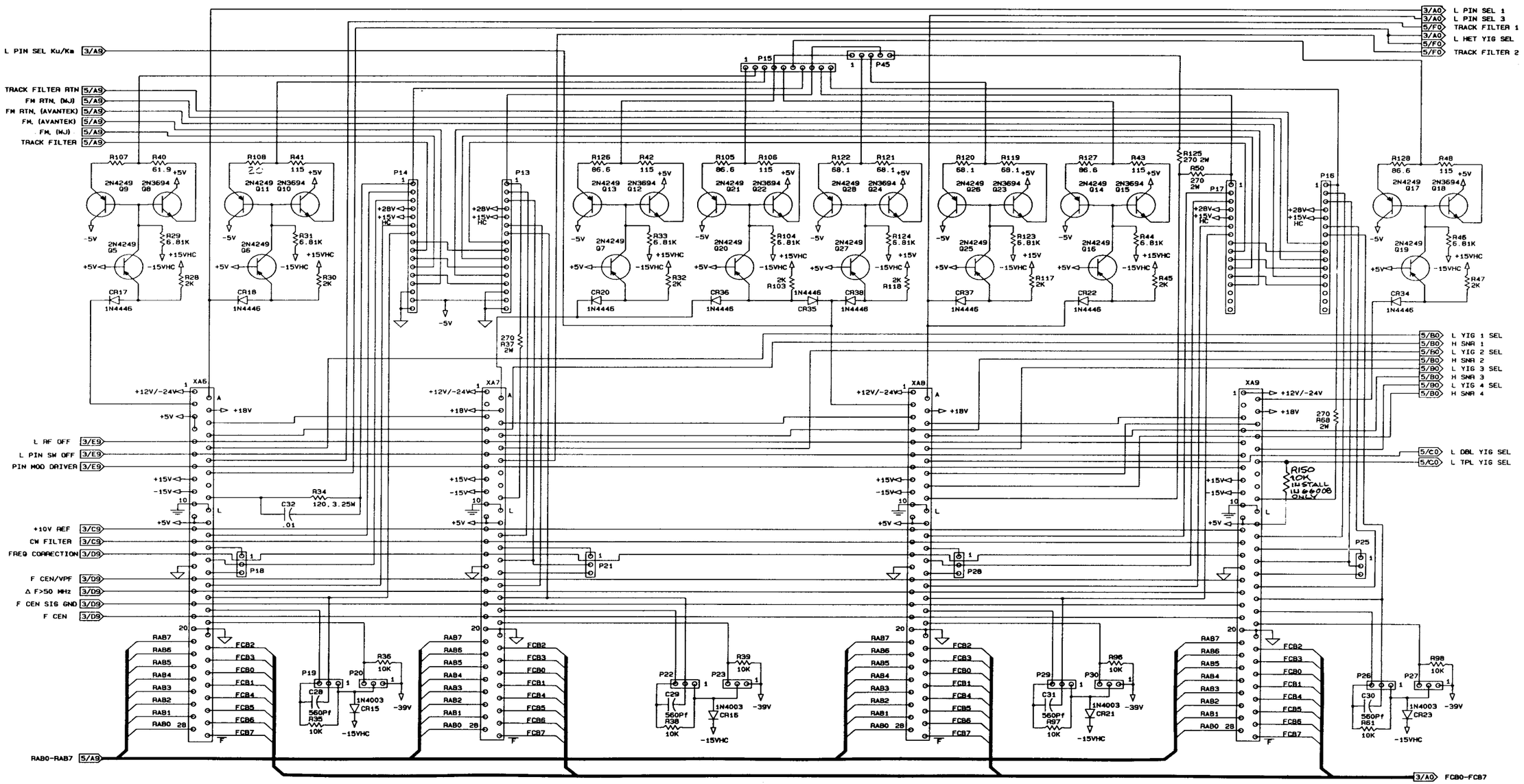


Figure A2-33. A1A14 Motherboard PCB Schematic, REV E (4 of 5)

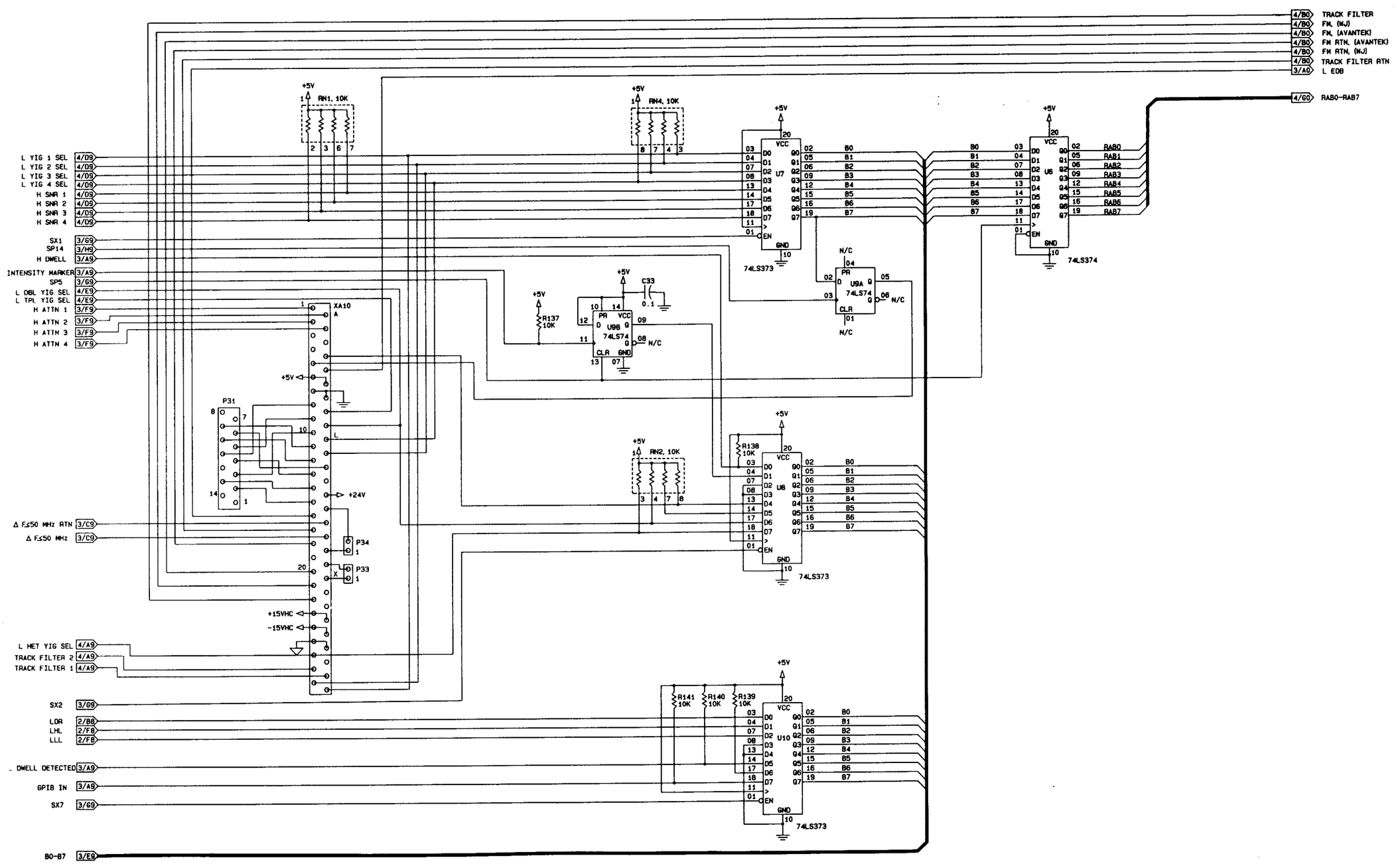


Figure A2-33. A1A14 Motherboard PCB Schematic, REV E (5 of 5)

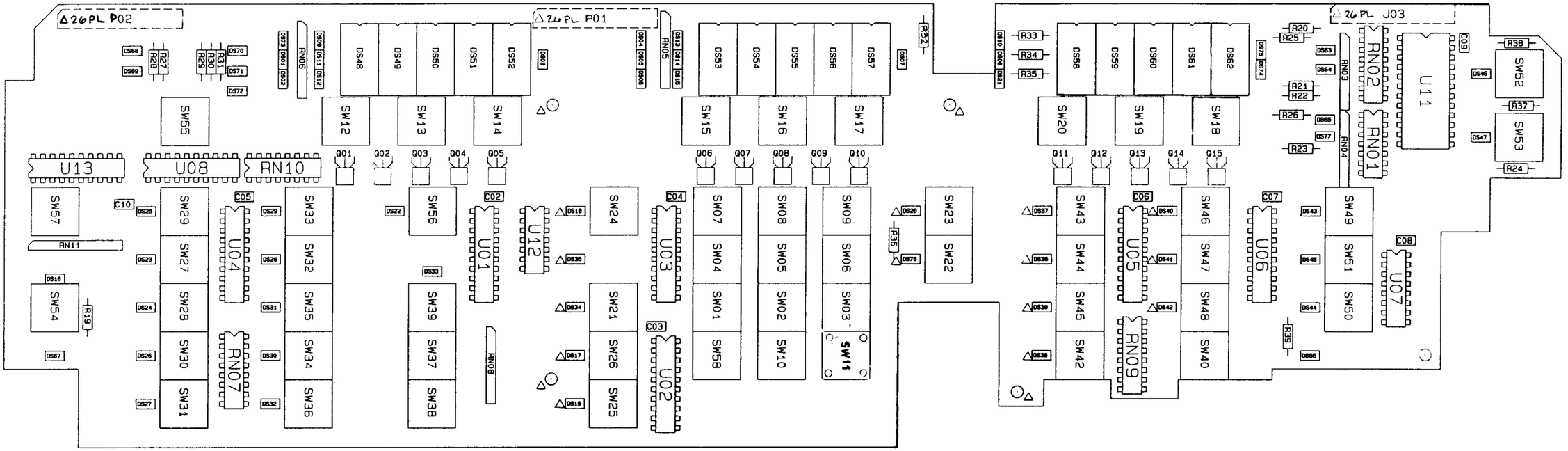
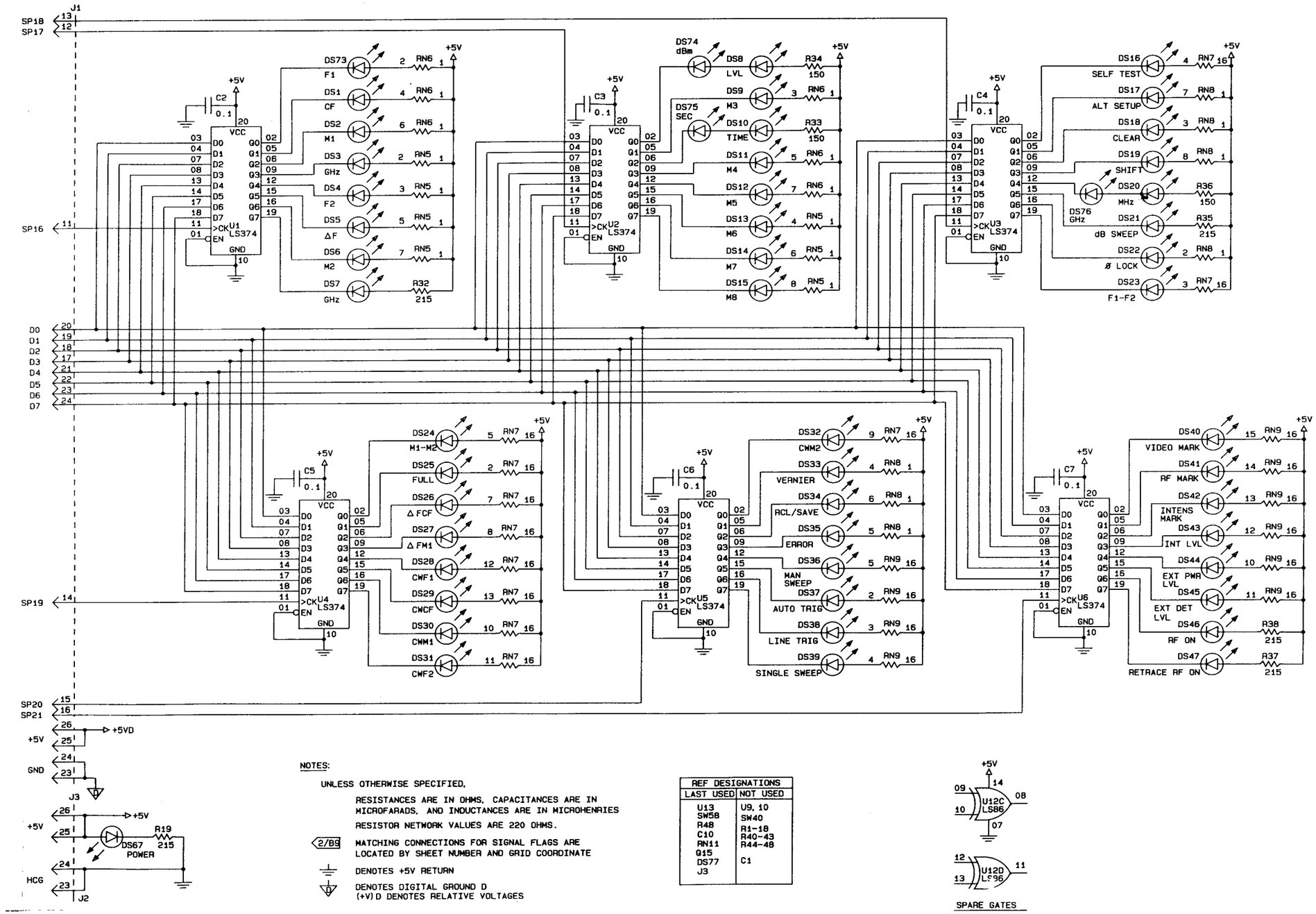


Figure A2-34. A2A11 Front Panel PCB Parts Locator, Assy D35671-3



NOTES:

UNLESS OTHERWISE SPECIFIED,

RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROFARADS, AND INDUCTANCES ARE IN MICROHENRIES

RESISTOR NETWORK VALUES ARE 220 OHMS.

2/B9 MATCHING CONNECTIONS FOR SIGNAL FLAGS ARE LOCATED BY SHEET NUMBER AND GRID COORDINATE

DENOTES +5V RETURN

DENOTES DIGITAL GROUND D
(+V) D DENOTES RELATIVE VOLTAGES

REF DESIGNATIONS	
LAST USED	NOT USED
U13	U9, 10
SW5B	SW40
R48	R1-18
C10	R40-43
RN11	R44-48
Q15	
DS77	C1
J3	

Figure A2-35. A2A11 Front Panel PCB Schematic, REV B (1 of 3)

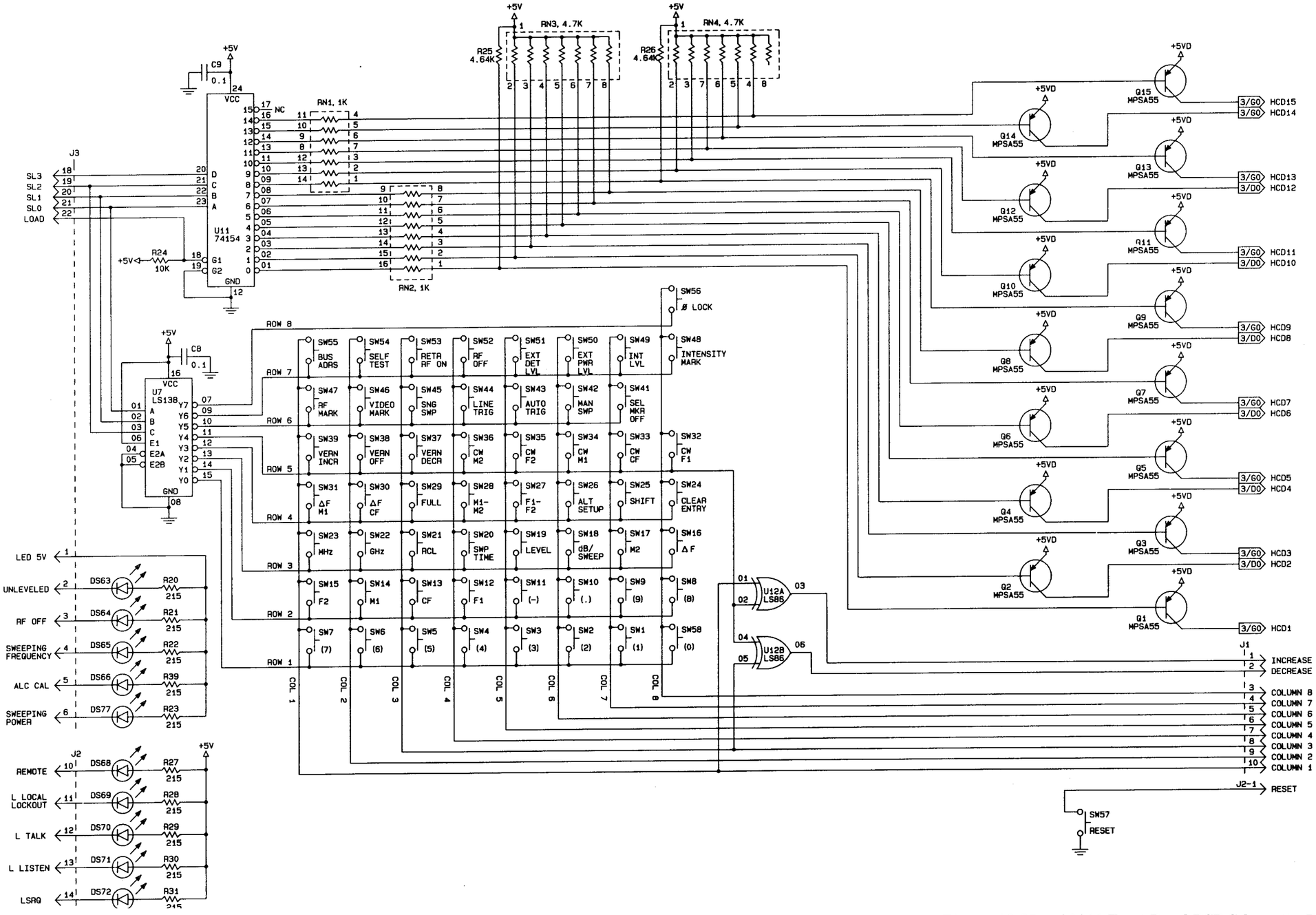


Figure A2-35. A2A11 Front Panel PCB Schematic, REV B (2 of 3)

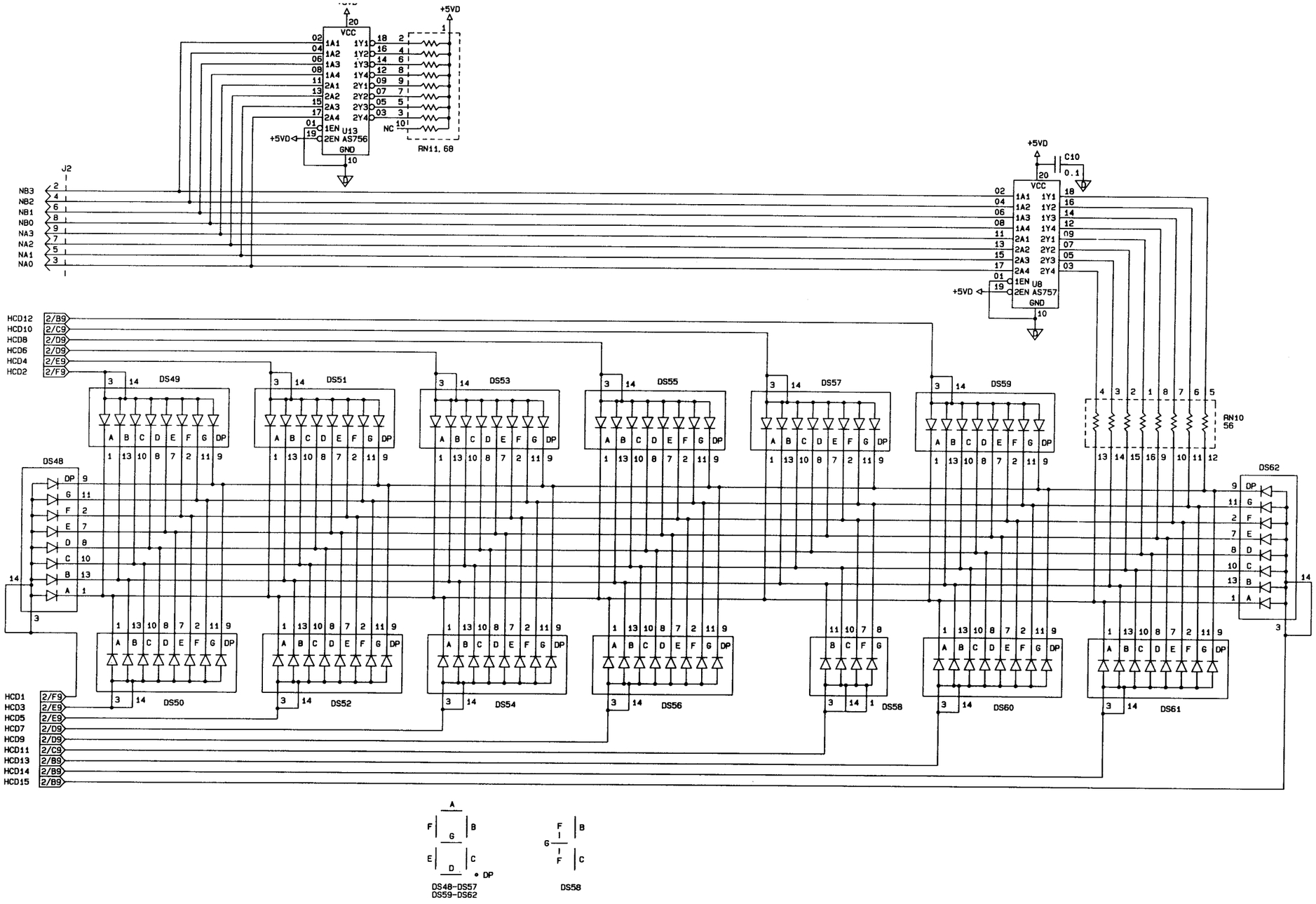


Figure A2-35. A2A11 Front Panel PCB Schematic, REV B (3 of 3)

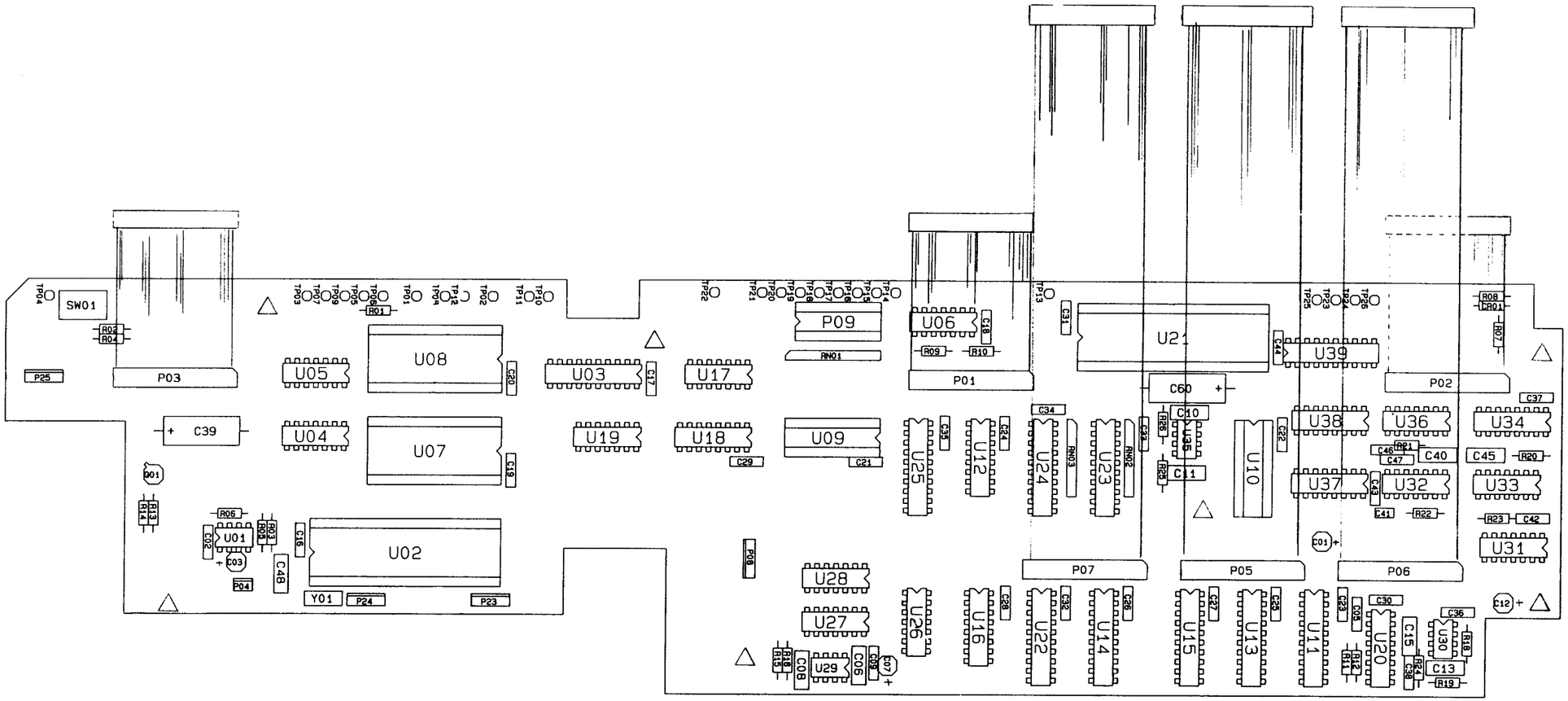


Figure A2-36. A2A12 Microprocessor PCB Parts Locator, Assy D35672-3

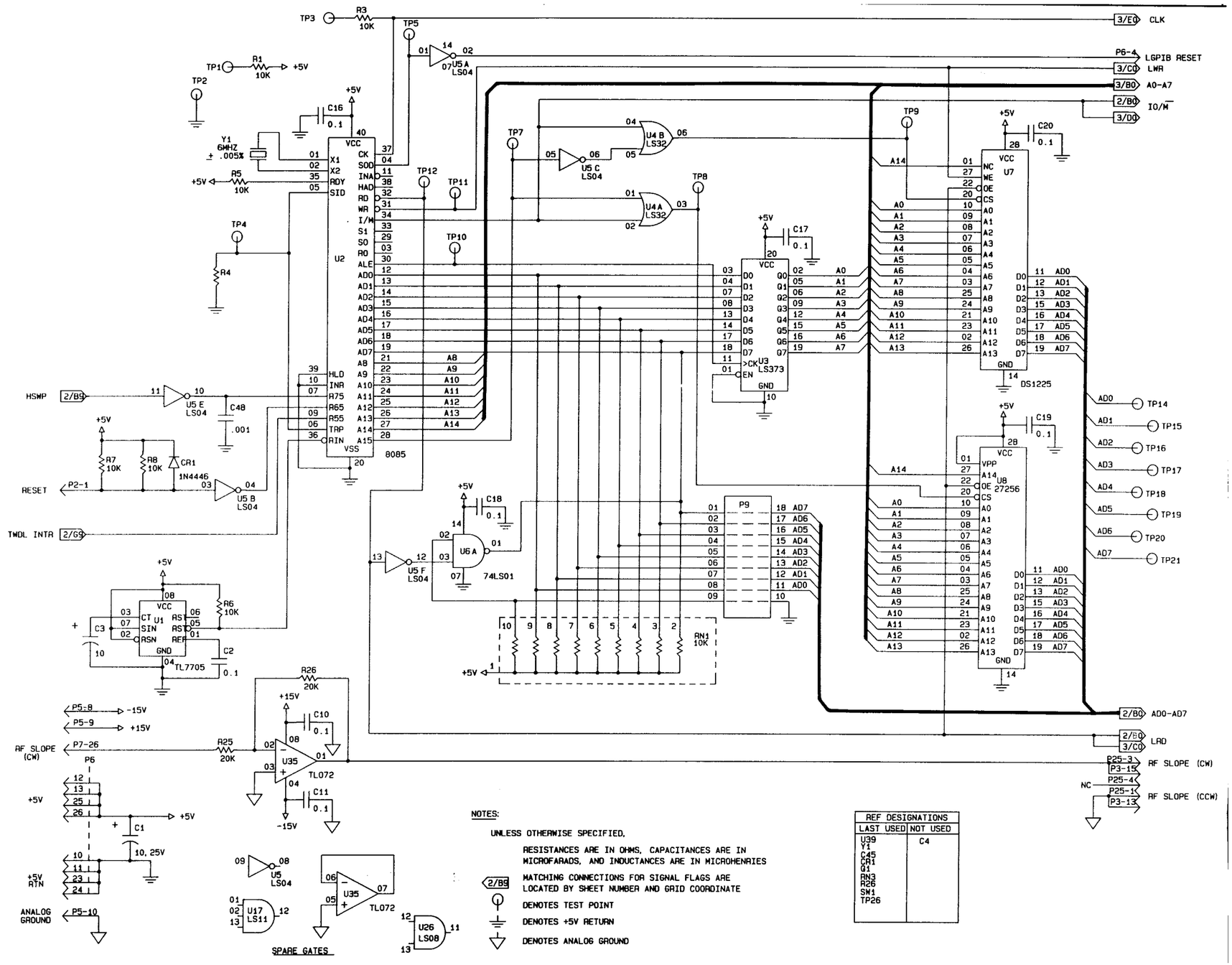


Figure A2-37. A2A12 Microprocessor PCB Schematic, REV B (1 of 3)

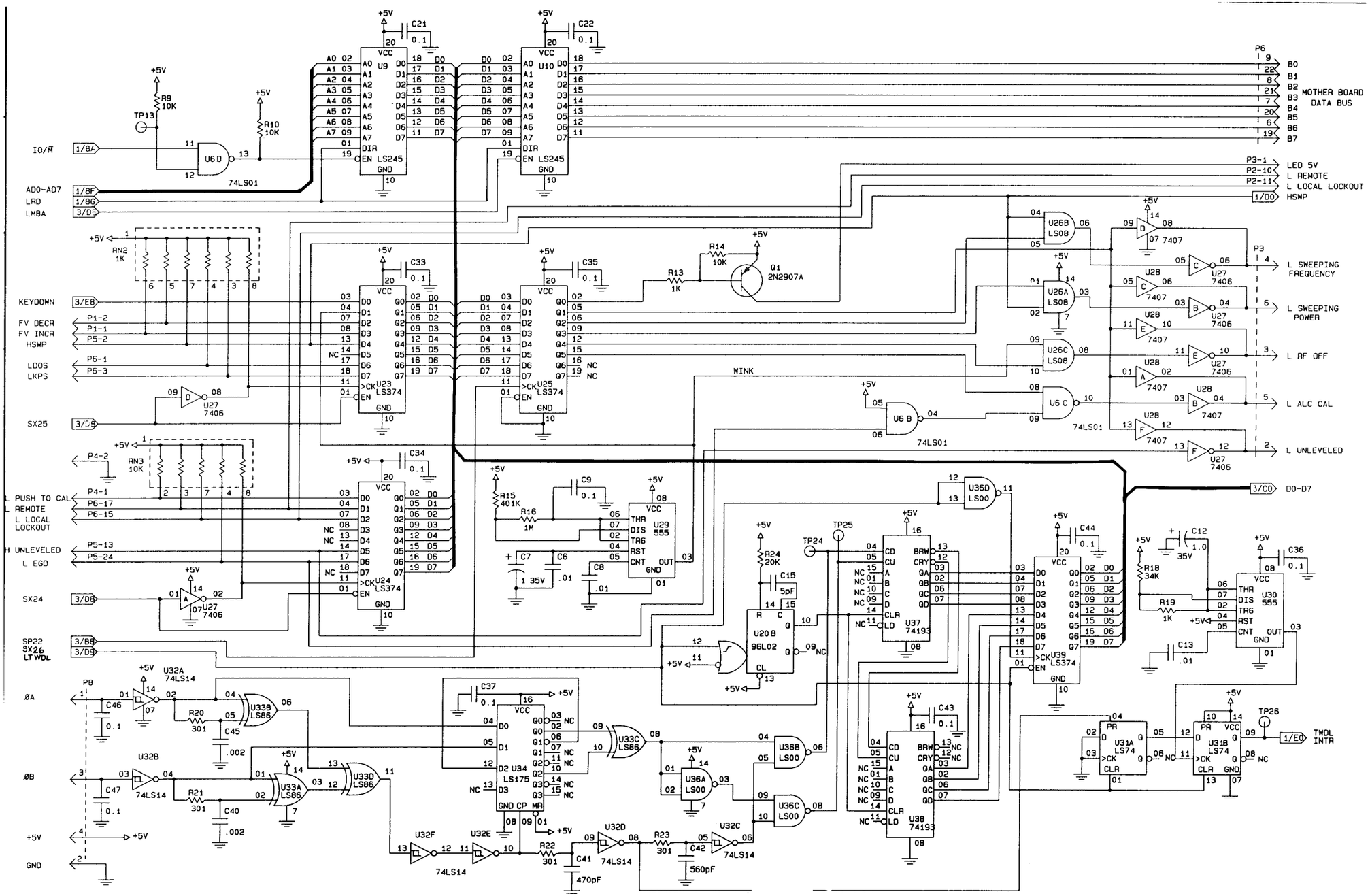


Figure A2-37. A2A12 Microprocessor PCB Schematic, REV B (2 of 3)

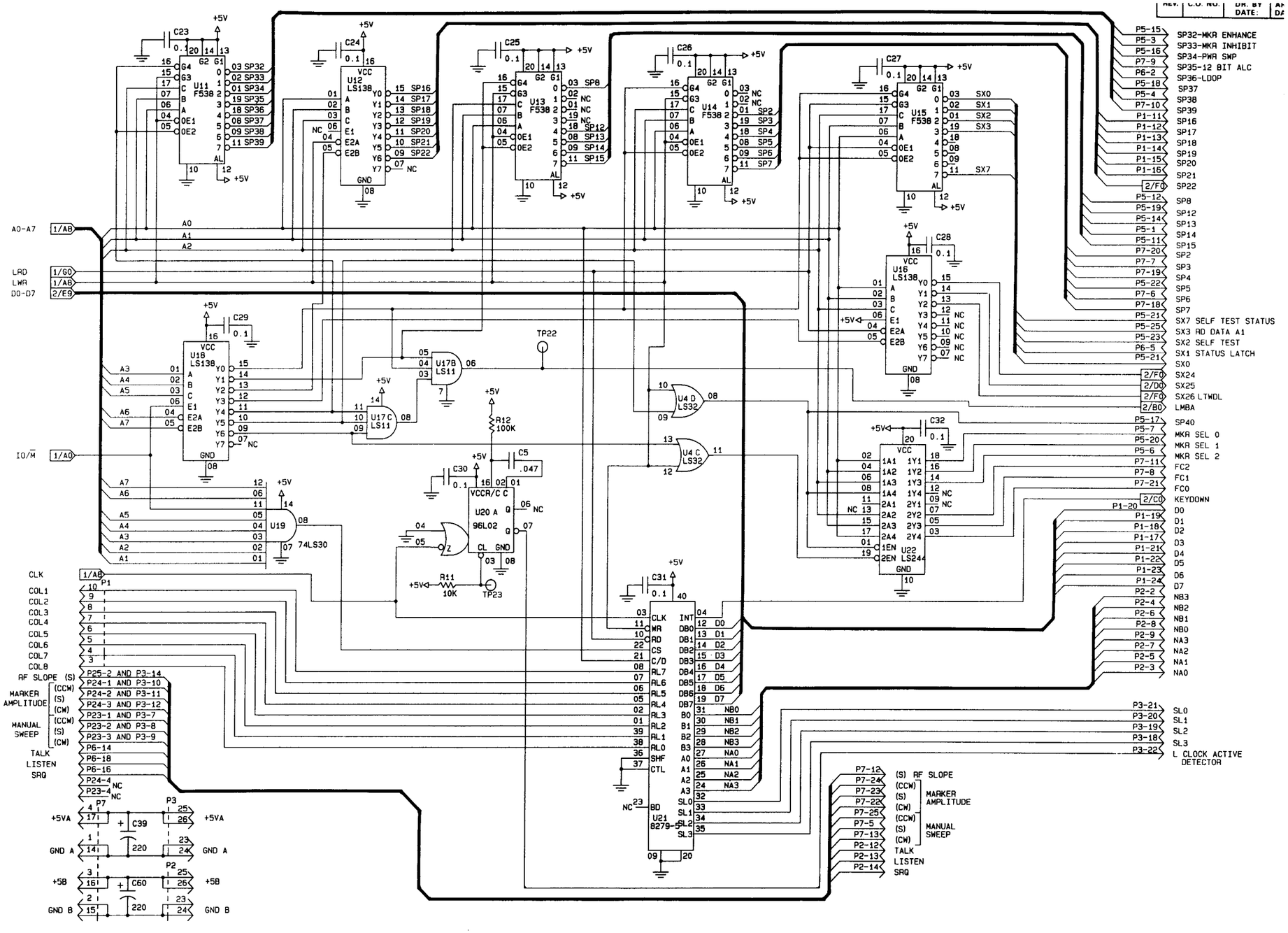


Figure A2-37. A2A12 Microprocessor PCB Schematic, REV B (3 of 3)

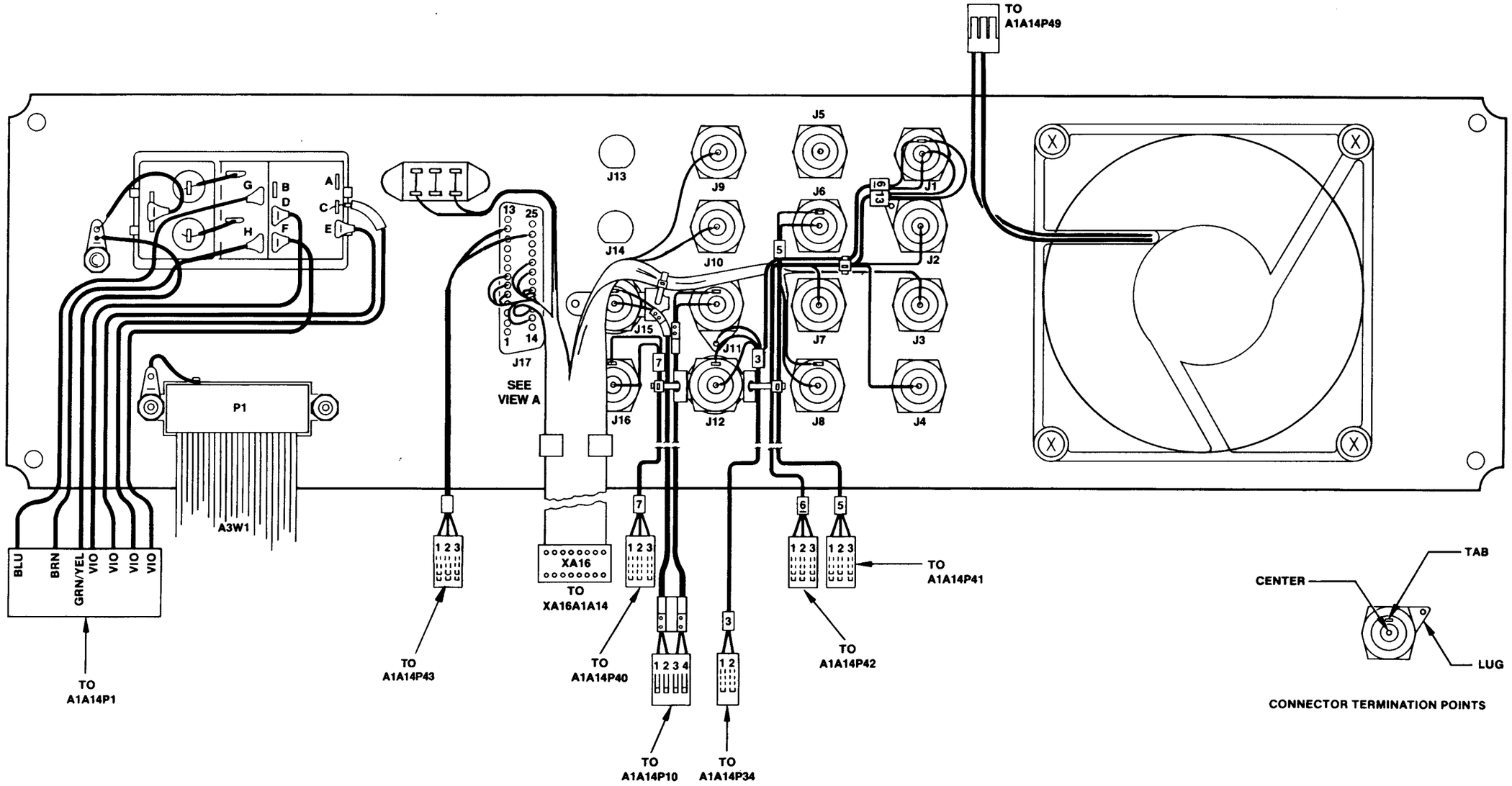


Figure A2-38. A3 Rear Panel Wiring Diagram