

# SERVICE MANUAL

**MODEL PS31**

## Power Supply

***RTS***™

## PROPRIETARY NOTICE

The RTS product information and design disclosed herein were originated by and are the property of Telex Communications, Inc. Telex reserves all patent, proprietary design, manufacturing, reproduction, use and sales rights thereto, and to any article disclosed therein, except to the extent rights are expressly granted to others.

## COPYRIGHT NOTICE

Copyright 1994 by Telex Communications, Inc.. All rights reserved. Reproduction in whole or in part without prior written permission from Telex is prohibited.

## PATENT NOTICE

This equipment contains and uses a design embodied in United States Patent No. 4,358,644: "A Bilateral Current Source for a Multi-terminal Intercom". This design employs a two-wire to four-wire converter.

## UNPACKING AND INSPECTION

Immediately upon receipt of the equipment, inspect the shipping container and the contents carefully for any discrepancies or damage. Should there be any, notify the freight company and the dealer at once.

## WARRANTY INFORMATION

RTS products are warranted by Telex Communications, Inc. to be free from defects in materials and workmanship for a period of three years from the date of sale.

The sole obligation of Telex during the warranty period is to provide, without charge, parts and labor necessary to remedy covered defects appearing in products returned prepaid to Telex. This warranty does not cover any defect, malfunction or failure caused beyond the control of Telex, including unreasonable or negligent operation, abuse, accident, failure to follow instructions in the Service Manual or the User Manual, defective or improper associated equipment, attempts at modification and repair not authorized by Telex, and shipping damage. Products with their serial numbers removed or effaced are not covered by this warranty.

To obtain warranty service, follow the procedures entitled "Procedure For Returns" and "Shipping to Manufacturer for Repair or Adjustment".

This warranty is the sole and exclusive express warranty given with respect to RTS products. It is the responsibility of the user to determine before purchase that this product is suitable for the user's intended purpose.

**ANY AND ALL IMPLIED WARRANTIES, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY ARE LIMITED TO THE DURATION OF THIS EXPRESS LIMITED WARRANTY.**

NEITHER TELEX NOR THE DEALER WHO SELLS RTS PRODUCTS IS LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND.

## CUSTOMER SUPPORT

Technical questions should be directed to:

Customer Service Department  
RTS/Telex,  
2550 Hollywood Way, Suite 207  
Burbank, CA 91505 U.S.A.  
Telephone: (818) 566-6700  
Fax: (818) 843-7953

## RETURN SHIPPING INSTRUCTIONS

### PROCEDURE FOR RETURNS

If a repair is necessary, contact the dealer where this unit was purchased.

If repair through the dealer is not possible, obtain a RETURN AUTHORIZATION from:

Customer Service Department  
Telex Communications, Inc.  
Telephone: (800) 828-6107  
Fax: (800) 323-0498

### DO NOT RETURN ANY EQUIPMENT DIRECTLY TO THE FACTORY WITHOUT FIRST OBTAINING A RETURN AUTHORIZATION.

Be prepared to provide the company name, address, phone number, a person to contact regarding the repair, the type and quantity of equipment, a description of the problem and the serial number(s).

### SHIPPING TO MANUFACTURER FOR REPAIR OR ADJUSTMENT

All shipments of RTS products should be made via United Parcel Service or the best available shipper, prepaid. The equipment should be shipped in the original packing carton; if that is not available, use any suitable container that is rigid and of adequate size. If a substitute container is used, the equipment should be wrapped in paper and surrounded with at least four inches of excelsior or similar shock-absorbing material. All shipments must be sent to the following address and must include the Return Authorization.

Factory Service Department  
Telex Communications, Incorporated  
West 1st Street  
Blue Earth, MN 56013 U.S.A.

Upon completion of any repair the equipment will be returned via United Parcel Service or specified shipper collect.

## TABLE OF CONTENTS

PROPRIETARY NOTICE . . . . .	ii
COPYRIGHT NOTICE . . . . .	ii
PATENT NOTICE . . . . .	ii
UNPACKING AND INSPECTION . . . . .	ii
WARRANTY INFORMATION . . . . .	ii
RETURN SHIPPING INSTRUCTIONS . . . . .	ii
<b>SECTION 1: DESCRIPTION AND SPECIFICATIONS . . . . .</b>	<b>1-1</b>
1.1 DESCRIPTION . . . . .	1-1
1.1.1 GENERAL . . . . .	1-1
1.1.2 FEATURES . . . . .	1-1
Program Input . . . . .	1-1
Status Indicators . . . . .	1-1
Input Power . . . . .	1-1
Intercom Channel Connections . . . . .	1-1
Impedance Selection . . . . .	1-1
1.2 SPECIFICATIONS . . . . .	1-1
<b>SECTION 2: INSTALLATION . . . . .</b>	<b>2-1</b>
2.1 MECHANICAL INSTALLATION . . . . .	2-1
2.2 ELECTRICAL INSTALLATION . . . . .	2-1
2.2.1 CONNECTING INTERCOM STATIONS . . . . .	2-1
2.2.2 USING TWO PS31'S TO EXPAND CAPACITY . . . . .	2-1
2.2.3 PROGRAM INPUTS . . . . .	2-1
2.2.4 AC POWER . . . . .	2-1
<b>SECTION 3: OPERATION . . . . .</b>	<b>3-1</b>
3.1 POWER-UP INDICATIONS . . . . .	3-1
3.2 FAULT INDICATIONS . . . . .	3-1
3.3 THERMAL OVERLOAD . . . . .	3-1
3.4 IMPEDANCE SELECT SWITCHES . . . . .	3-1
3.5 PROGRAM INPUT . . . . .	3-1
<b>SECTION 4: THEORY OF OPERATION . . . . .</b>	<b>4-1</b>
4.1 GENERAL . . . . .	4-1
4.2 AC TO DC CONVERSION . . . . .	4-1



4.3 IMPEDANCE GENERATOR . . . . .	4-1
4.4 PROGRAM INSERTION AMPLIFIER . . . . .	4-1
4.5 DISPLAY AND DIAGNOSTIC CIRCUITRY . . . . .	4-1
4.5.1 CHANNEL STATUS INDICATORS . . . . .	4-1
4.5.2 FAULT INDICATOR . . . . .	4-2
4.5.3 THERMAL OVERLOAD . . . . .	4-2
<b>SECTION 5: MAINTENANCE . . . . .</b>	<b>5-1</b>
5.1 INTRODUCTION . . . . .	5-1
5.2 GENERAL MAINTENANCE . . . . .	5-1
5.2.1 SAFETY CONSIDERATIONS . . . . .	5-1
5.2.2 ACCESS . . . . .	5-1
5.2.3 CLEANING . . . . .	5-1
5.2.4 INPUT POWER SELECTION . . . . .	5-1
5.2.5 CHANNEL DC OUTPUT FUSE REPLACEMENT . . . . .	5-1
5.3 TEST PROCEDURES . . . . .	5-1
5.3.1 TEST EQUIPMENT . . . . .	5-1
5.3.2 INITIAL INSPECTION . . . . .	5-1
5.3.3 POWER-UP TEST . . . . .	5-2
5.3.4 POWERED CHANNEL TEST . . . . .	5-2
5.3.5 FUNCTIONAL TEST OF ALL OUTPUTS . . . . .	5-3
5.4 TROUBLESHOOTING . . . . .	5-4
<b>SECTION 6: REPLACEMENT PARTS . . . . .</b>	<b>6-1</b>
6.1 WHERE TO OBTAIN PARTS . . . . .	6-1
6.2 MECHANICAL PARTS . . . . .	6-1
6.3 ELECTRICAL PARTS . . . . .	6-1
<b>SECTION 7: DIAGRAMS . . . . .</b>	<b>7-1</b>



## SECTION 1: DESCRIPTION AND SPECIFICATIONS

### 1.1 DESCRIPTION

#### 1.1.1 GENERAL

The Model PS31 supplies 32 volts regulated DC power to each of three intercom channels. It has short circuit and thermal overload protection, with automatic recovery when the fault is removed.

#### 1.1.2 FEATURES

##### Program Input

There is a PROGRAM INPUT connector on the rear panel. A CHANNEL ASSIGN switch on the front panel assigns the program to any of the three channels. A LEVEL control adjusts the program level to the intercom channel.

##### Status Indicators

There is an audible alarm and a red FAULT indicator for current overload indication on any of the three channels. An AUDIBLE ALERT switch on the front panel turns the alarm on or off, but the FAULT indicator will continue to flash during current overload conditions. There is also a green status indicator for each channel. Each of these indicators will remain lit during normal operation, but will turn off during a channel current overload condition. Output current is automatically reduced during an overload, and normal operation is restored when the overload is removed.

##### Input Power

The PS31 is available in two versions: one for 115 VAC operation and one for 230 VAC operation. A simple internal modification changes the operating voltage for 100 VAC or 200 VAC. A POWER on/off switch is provided on the front panel.

##### Intercom Channel Connections

Intercom channels are connected to the rear panel of the PS31. A variety of connector pin-outs is provided to accommodate individual system requirements.

##### Impedance Selection

The PS31 provides the required channel terminating impedance for each channel. A 200/400 ohm IMPEDANCE SELECT switch for each channel is located on the rear panel. These switches are set to 200 ohms for normal operation. The 400 ohm setting permits two PS31's to be coupled to double the DC capacity of the system.

## 1.2 SPECIFICATIONS

### Channels

Three

### Connectors

Six XLR-3 type connectors (two channel)

Three XLR-4 type connectors (three channel)

One XLR-3 type connector (program input)

### DC Output Voltage (each channel)

32 volts nominal

### Line Terminating Impedance (each channel)

200 ohms, switchable to 400 ohms when operating two supplies in parallel

### Output Current Ratings (per channel)

(see also, Figure 1-1)

Max before fault indication: 1.5 amps

Sustained overload 50 °C ambient: 2.0 amps

Max before foldback limiting: 2.5 amps

Short circuit current: 0.5 amps

Startup current: 0.5 amps

### Max Total Sustained Current (50°C ambient)

2.0 amps

### Intercom Audio

Level: 2 volts pp nominal

Head Room: 6 dB minimum

Frequency Response: 75 Hz to 20 kHz (-3 dB) unloaded

### Signal To Noise And Hum Ratio (Ref to 2 V pp)

-60 dB

### Program Input

Balanced or unbalanced, transformer isolated, program assignable to channels 1-3

### Program Input Sensitivity

28 dBm to +14 dBm (Ref. 600 ohm) for 2 volts pp on RTS line

### Program Input Impedance

10,000 ohms

### Program Frequency Response (-3dB)

100 Hz to 20 kHz input to RTS line.

### Indicators

Channel STATUS: three green LEDs

Channel FAULT: one red LED and one audible alarm

THERMAL OVERLOAD: one red NEON type

### Switches

One PROGRAM CHANNEL ASSIGN switch; one AUDIBLE ALERT on/off switch; one POWER switch; three 200/400-ohm IMPEDANCE SELECT switches

### Temperature

0 to 50 °C operating; 0 to 75 °C storage

### Power Requirements

Voltage: 100, 120, 200, or 240 VAC, 50/60 Hz

Power: 100 volt-amps

### Fuses

AC panel fuse: 100/120 volts - 3A slow blow;

200, 240 volts - 1.5A slow blow

Internal DC fuses (each channel): 6A fast blow

### Dimensions

Height: 3.5 inches (8.9 centimeters)

Width: 19 inches (48.3 centimeters)

Depth: 10.5 inches (26.7 centimeters)

### Weight

14.5 pounds (6.6 kg)

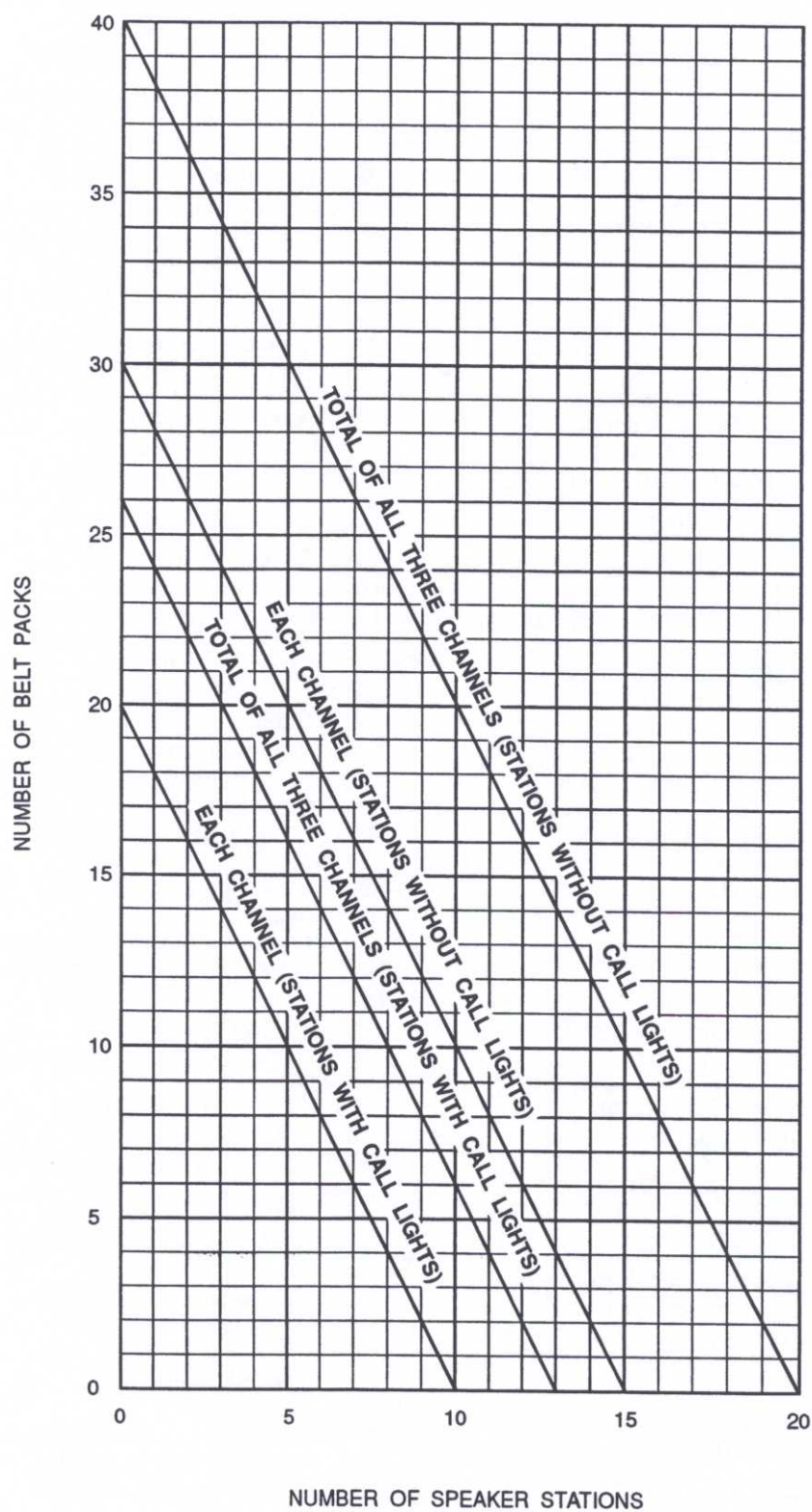


Figure 1-1  
PS31 Capacity



## SECTION 2: INSTALLATION

### 2.1 MECHANICAL INSTALLATION

The Model PS31 can be rack mounted or used free standing. The rack mount is a standard 19-inches wide by 3.5-inches high. Allow room for cable connections.

### 2.2 ELECTRICAL INSTALLATION

#### 2.2.1 CONNECTING INTERCOM STATIONS

##### NOTE

---

When connecting intercom stations, do not exceed the power supply capacity, either for one channel or for all three channels. Power supply capacity is graphically illustrated in Figure 1-1. If more capacity is required, refer to paragraph 2.2.2.

---

Connect intercom channels to the OUTPUTS connectors on the rear panel. Pin assignments are printed above the connectors. These connectors provide three alternatives for intercom channel connection:

- Connectors J101 through J106 can be used to connect various combinations of two channels.
- Connectors J107 and J108 can be used to connect all three channels.
- Connector J109 can also be used to connect three channels, but unlike all the other connectors, no power is supplied at this connector. This connector can be used to interconnect the audio channels when using two PS31 power supplies (see paragraph 2.2.2)

#### 2.2.2 USING TWO PS31'S TO EXPAND CAPACITY

If there are more stations on one or more channels than the power supply capacity will allow, two PS31 power supplies may be used to double capacity. For each channel that requires added capacity:

1. Use the J109 connectors on both power supplies to interconnect the audio and ground pins of the desired channel.
2. Divide the stations that you wish to connect into two groups. Connect one group to the first power supply. Connect the other group to the second power supply. For each group, do not exceed the capacity (either total or per channel) of the power supply.
3. On both power supplies, set the IMPEDANCE SELECT switches for the channel to the 400Ω

DUAL position. (Leave all impedance switches for channels that are not interconnected in the 200Ω NORM position.

#### 2.2.3 PROGRAM INPUTS

A program source may be connected to the PROGRAM INPUT connector on the rear panel. Pin assignments are printed above the connector.

To connect an unbalanced program source, connect pin 2 to pin 1. Then connect program ground to pin 1 and program HI to pin 3.

If two PS31's are interconnected, a separate program source may be connected to each.

#### 2.2.4 AC POWER

Plug the AC power cord into the PS31 and into an AC mains outlet.

##### NOTE

---

The PS31 is factory-set for either 110-120-volt operation or 220-240-volt operation. The operating voltage is indicated on the back of the unit. Operation at 100-110 volts or 200-220 volts requires an internal modification. Refer to Section 5.

---



## **SECTION 3: OPERATION**

### **3.1 POWER-UP INDICATIONS**

Turn on the POWER switch. During normal operation the three CHANNEL STATUS indicators should be lit and the FAULT and THERMAL OVERLOAD indicators should be off.

### **3.2 FAULT INDICATIONS**

If there is a fault on a channel, the CHANNEL STATUS indicator for that channel will turn off and the red FAULT indicator will flash. If the AUDIBLE ALERT is set to "ON", the alarm will beep. Possible causes of a fault include: overvoltage, overcurrent, short circuit to ground or severe brown-outs.

### **3.3 THERMAL OVERLOAD**

If the PS31 overheats, the THERMAL OVERLOAD indicator will turn on and AC power to the PS31 will be shut off. Normal operation will resume when the PS31 cools. Possible causes of a thermal shut-down include overloading the output channels or improper internal mains voltage selection.

### **3.4 IMPEDANCE SELECT SWITCHES**

The IMPEDANCE SELECT switches on the rear panel allow each channel to be set for 200 ohm or 400 ohm operation. Select 200Ω NORM for each channel operated independently. Select 400Ω DUAL for each channel connected to another channel through the AUDIO ONLY connector (J109).

### **3.5 PROGRAM INPUT**

If a program source is connected to the PROGRAM INPUT connector on the back of the PS31, it may be routed to any one of the intercom channels using the CHANNEL ASSIGN switch. Use the LEVEL control to adjust the program level on the selected channel.

## SECTION 4: THEORY OF OPERATION

### 4.1 GENERAL

The PS31 electronic circuits include an AC to DC converter, an impedance generator for each channel, a program insertion amplifier, and display and diagnostics circuits (see Figure 4-1). The following paragraphs describe these circuits. For schematic reference, see drawing SD3225 in Section 7.

### 4.2 AC TO DC CONVERSION

Transformer T101 steps down the AC mains voltage to 33 volts rms. Diodes D101-D104 rectify this voltage and capacitor C117 filters out the AC component, leaving about 45-50 volts unregulated DC. This raw DC voltage feeds the impedance generators (through fuses F201, F301, and F401), and regulator U101.

U101 provides regulated 30 volts DC. This voltage is supplied to the impedance generators, to the program insertion amplifier, and to U102. Diodes D109 and D110 protect U101. Resistors R107 and R108 establish the output voltage reference of 30 volts DC. Capacitor C121 reduces the amount of ripple on the 30 volts DC, and C122 provides decoupling.

U102 provides regulated 7.5 volts DC. This voltage is used as a reference level by the program insertion amplifier. It also powers the display circuits. Diodes D111 and D112 protect U102. Resistors R109 and R110 establish the output voltage reference of 7.5 volts. Capacitor C123 reduces the amount of ripple on the 7.5 volts DC and C124 filters the output.

### 4.3 IMPEDANCE GENERATOR

There is a separate impedance generator for each channel. The impedance generator supplies regulated 32 volts DC to the channel and also provides the channel terminating impedance. The following paragraphs describe the impedance generator for channel 1. Other channels are identical.

Diodes D202 and D201 and resistors R202 and R201 divide the raw DC for the variable DC reference. This variable DC reference allows the quiescent output voltage of the regulators to follow the rms value of the AC mains voltage. Capacitors C202, C203 and C204 and resistors R203 and R206 are a low pass filter for the variable DC reference and provide fast start up response time. Integrated circuit U202B, resistors R214, R215 and R217 and capacitors C210 and C207 amplify and buffer the variable DC reference. Resistor R213 and capacitor C209 decouple the supply voltage for integrated circuit U202. Resistors R211 and R208 set the amount by which the output voltage of the regulator exceeds the variable DC reference. R205 sinks the quiescent current from R208. Diode D203 clamps excessive output voltage of the regulator due to

transients while diodes D204 and D206 protect the regulator from reversed voltages due to shorts on the output line.

Resistors R219 and R221 sense the output current from the regulators into the RTS line. Integrated circuit U202A, together with capacitors C212 and C214 and resistors R220, R225, R223, and R216 differentially amplify this output current and feed it back to the adjust terminal of the regulators to create the audio impedance. Diodes D207, D208, D211, D212, D209, and D210 clamp the audio output voltage to avoid over-driving the RTS line and allow fast recovery from large transients.

Diode D214 protects the impedance generator from an over voltage on the RTS line. Capacitor C215 is an RF bypass and resistor R227 biases diode D214 on with 10 mA of current for "dry line" operation. Toggle switch S201, located on the rear panel selects an output impedance of 200 or 400 ohms. Since the impedance generator operates at 400 ohms, toggle switch S201 shunts the output with 390 ohms for a 200 ohm output.

### 4.4 PROGRAM INSERTION AMPLIFIER

The program-insertion amplifier circuitry accepts balanced or unbalanced input from any source and injects this input, via a bilateral current source, onto the RTS line.

Program audio, present at connector J110, rear panel, is applied via input isolation transformer T103 to PROGRAM LEVEL potentiometer R111. Resistor R606 and capacitor C601 provide RF suppression. Integrated circuit U601a, capacitor C602 and resistors R603 and R602 amplify the input and provide a low impedance drive for the following stage. Integrated circuit U601b, capacitor C606 and resistors R604, R607, R609, R605, and R608 form the bilateral current source which turns the input voltage into an output current. Capacitors C604, C605 and resistor R610 blocks any DC potential on the RTS line. Diodes D601 and D602 protect integrated circuit U601 from transients and resistor R601 and capacitor C603 decouple the power to integrated circuit U601.

### 4.5 DISPLAY AND DIAGNOSTIC CIRCUITRY

The display and diagnostic circuits detect fault conditions and warn the user with front panel lights and an audio indicator.

#### 4.5.1 CHANNEL STATUS INDICATORS

(The channel status indicator for channel is described. The channel status indicators for channels 2 and 3 are identical.)



As long as the output voltage on channel 1 is above approximately 21 VDC, diode D205 will conduct causing transistor Q201 to be on, which turns on DS201, the CHANNEL 1 STATUS LED on the front panel. If the channel 1 voltage drops below approximately 21 volts, transistor Q201 shuts off, LED DS201 goes dark, and the fault indicator circuitry is notified through diode D215.

#### 4.5.2 FAULT INDICATOR

If pin 5 of integrated circuit U103 is driven high by an under-voltage condition on any channel, the flasher circuit, which consists of half of integrated circuit U103, capacitor C126 and resistors R116 and R117, will flash the FAULT indicator LED, DS101, and pulse the audible alarm circuit. The audible

alarm oscillator consists of the other half of integrated circuit U103, capacitor C127 and resistors R120 and R121.

#### 4.5.3 THERMAL OVERLOAD

Switch S101 is a thermal sensing switch connected in series with the power switch. It is attached to the power transformer, T101. The front panel THERMAL OVERLOAD indicator, DS5, is connected across S101. If the transformer temperature remains below approximately 75 C, S101 will remain closed, and there will be no voltage drop across DS5. If the transformer temperature rises above 75 C, S101 will open and remove AC primary power to T101. The AC voltage will be developed across DS5 and it will light.

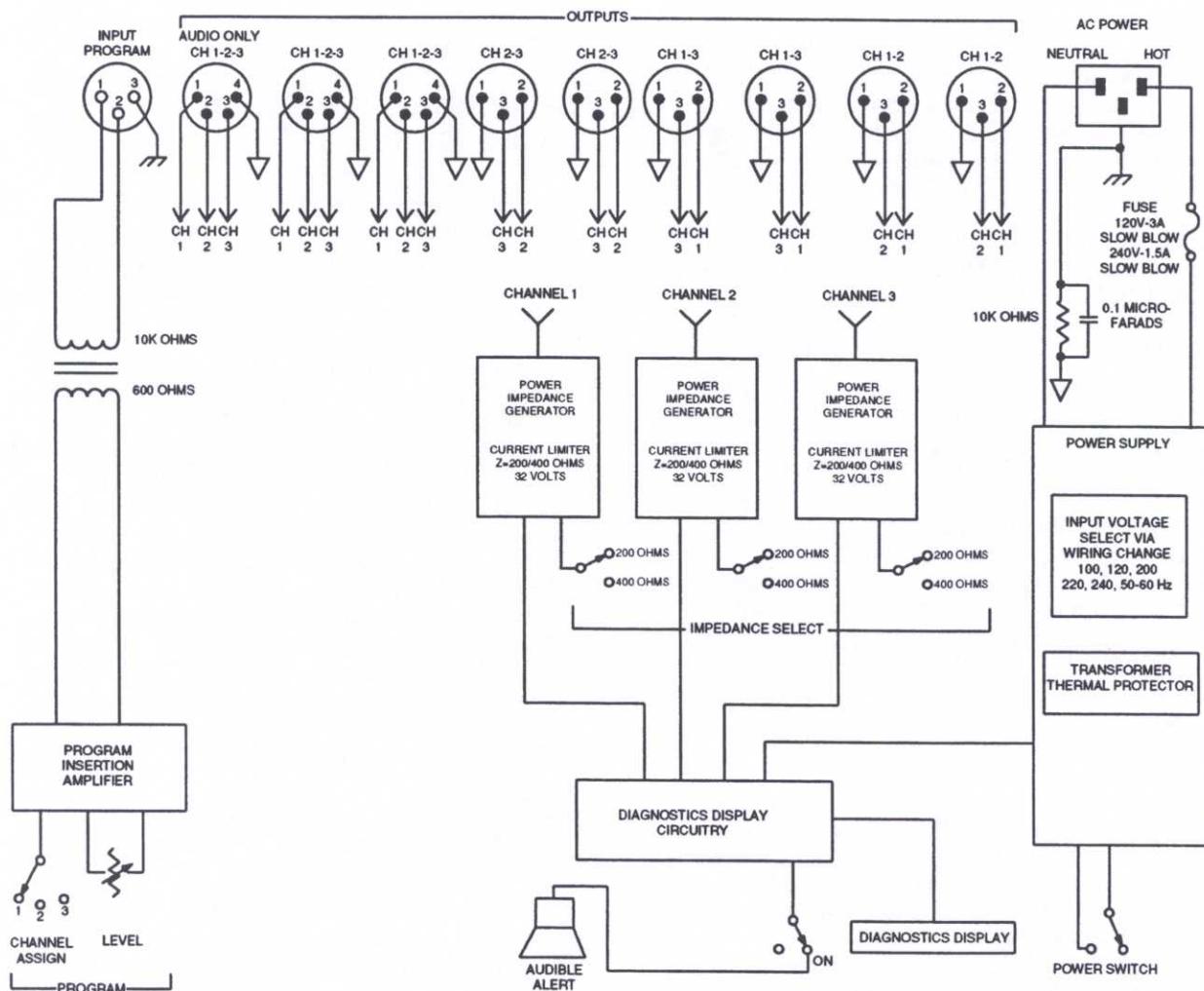


Figure 4-1  
Block Diagram



## SECTION 5: MAINTENANCE

### 5.1 INTRODUCTION

This section provides service information for normal maintenance, factory performance tests and troubleshooting tips.

### 5.2 GENERAL MAINTENANCE

#### 5.2.1 SAFETY CONSIDERATIONS

Service and adjustments should be performed only by qualified service personnel.

Any adjustment, maintenance, and repair of the opened equipment while any power or voltage is applied should be avoided as much as possible, and should be carried out only by a skilled person who is aware of the hazard involved.

It is possible for capacitors inside the equipment to still be charged even if the equipment has been disconnected from its power source.

Be certain that only fuses with the required current rating and of the specified type (fast blow, time delay, slow blow, etc.) are used for replacement. The use of repaired fuses and the short-circuiting of fuse holders must be avoided.

#### 5.2.2 ACCESS

To get inside the Model PS31, remove the screws on the top and bottom covers. Slide covers off toward the back of the unit.

#### 5.2.3 CLEANING

Clean the outside of the Model PS31 with denatured alcohol or a mild solution of detergent and water. Clean the interior with dry, low pressure air. The circuit boards can be cleaned with 1,1,1 trichloroethane or Freon TF. Do not allow these or any solvents to get into any potentiometers.

#### 5.2.4 INPUT POWER SELECTION

##### CAUTION

These maintenance instructions are for qualified personnel only. To avoid electric shock, do not perform any servicing unless qualified to do so. Disconnect AC power before servicing.

The Model PS31 operates on 100, 120, 200, or 240 volts AC at 50/60 hertz, depending on the internal power settings. To convert from one mains voltage to another, remove the covers and set the internal switch, jumpers and use the proper rear panel fuse as specified in Table 5-1. (The switch and jumpers are located on the circuit board next to the power transformer connector.)

Table 5-1  
Voltage Selection

AC SOURCE	S107 SETTING	JUMPERS		REAR PANEL FUSE
		ADD	REMOVE	
100 VAC	115	W2, W3	W1, W4	3A
120 VAC	115	W1, W4	W2, W3	3A
200 VAC	230	W2, W3	W1, W4	1.5A
240 VAC	230	W1, W4	W2, W3	1.5A

#### 5.2.5 CHANNEL DC OUTPUT FUSE REPLACEMENT

To replace channel fuses (F201, F301, F401), remove covers. These fuses are located on the circuit board.

### 5.3 TEST PROCEDURES

#### 5.3.1 TEST EQUIPMENT

- An isolated, variable voltage power transformer with voltage and current metering ("VARIAC", "POWERSTAT", or equivalent)
- A sine wave oscillator
- An oscilloscope, 15 megahertz minimum bandwidth
- A distortion analyzer (HP331 through HP334, HP339, or equivalent)
- An AC voltmeter capable of reading volts, dBm and dBu
- Two DC voltmeters
- A test load (see Figure 5-1)
- A capacitive load box (see Figure 5-2)
- A program input cable (see Figure 5-3)
- Two channel output cables (see Figure 5-4)

#### 5.3.2 INITIAL INSPECTION

Verify electrical orientation of power supply capacitors. Verify proper wiring of transformer primary for local mains voltage. Verify that the proper fuses are installed in the back panel fuse holder and on the printed circuit board. Check that the transformer is securely mounted and that it is electrically isolated from the chassis (resistance from chassis to transformer core should be greater than 10 kohms). Check that the power supply capacitor is securely fastened. Using an ohmmeter, verify that the chassis is electrically connected to the grounding pin on the power connector (less than 0.2 ohm).



### 5.3.3 POWER-UP TEST

1. Set the variable voltage power transformer to off, and set the voltage to zero.
2. Plug the PS31 into the variable voltage power transformer.
3. Set the PS31 POWER switch to ON.
4. Set the PS31 AUDIBLE ALERT switch to ON.
5. Turn on the variable voltage power transformer.
6. Slowly turn up the voltage. Watch for excessive sustained current consumption above 1 ampere. While the voltage is being increased, the audible alert indicator should sound and the FAULT light should flash. Stop increasing the voltage when the standard operating voltage level is reached.
7. Set the AUDIBLE ALERT switch to off.
8. Turn the PS31 POWER switch off: the STATUS lights should fade, and finally, the FAULT light should blink. The audible alert should not sound.
9. Turn the POWER switch back on.
10. Turn the AUDIBLE ALERT switch on.
10. On the PS31, set the PROGRAM CHANNEL ASSIGN switch to channel 1. Turn the PS31 PROGRAM LEVEL control fully CCW (minimum level).
11. Set the sine wave oscillator for 1 kilohertz, 0.10 volt rms at the PROGRAM INPUT of the PS31.
12. Observe the DC output voltage on DC voltmeter 1. It should be between 31.0 and 32.5 volts DC.
13. Set the output current adjustment control on the test load so that the output current is 0.50 amperes (0.5 volts at DC voltmeter 2). The output voltage at voltmeter 1 should drop by 0.5 volts or less.
14. Adjust the PS31 PROGRAM LEVEL control fully CW (maximum level). The AC voltage should be 1.8 volts rms.
15. Adjust the PROGRAM LEVEL control until the AC voltmeter reads 1.0 volt rms. The waveform on the scope should be a sine wave with no hum or distortion.
16. Set the capacitive load box switch to 100 pF. The waveform on the scope should remain unaffected. Repeat this step for all the positions of the switch. The only noticeable effect should be waveform attenuation with the higher capacitance values.
17. Set the capacitive load to OFF.

### 5.3.4 POWERED CHANNEL TEST

The following procedure tests channel 1. Repeat for channels 2 and 3.

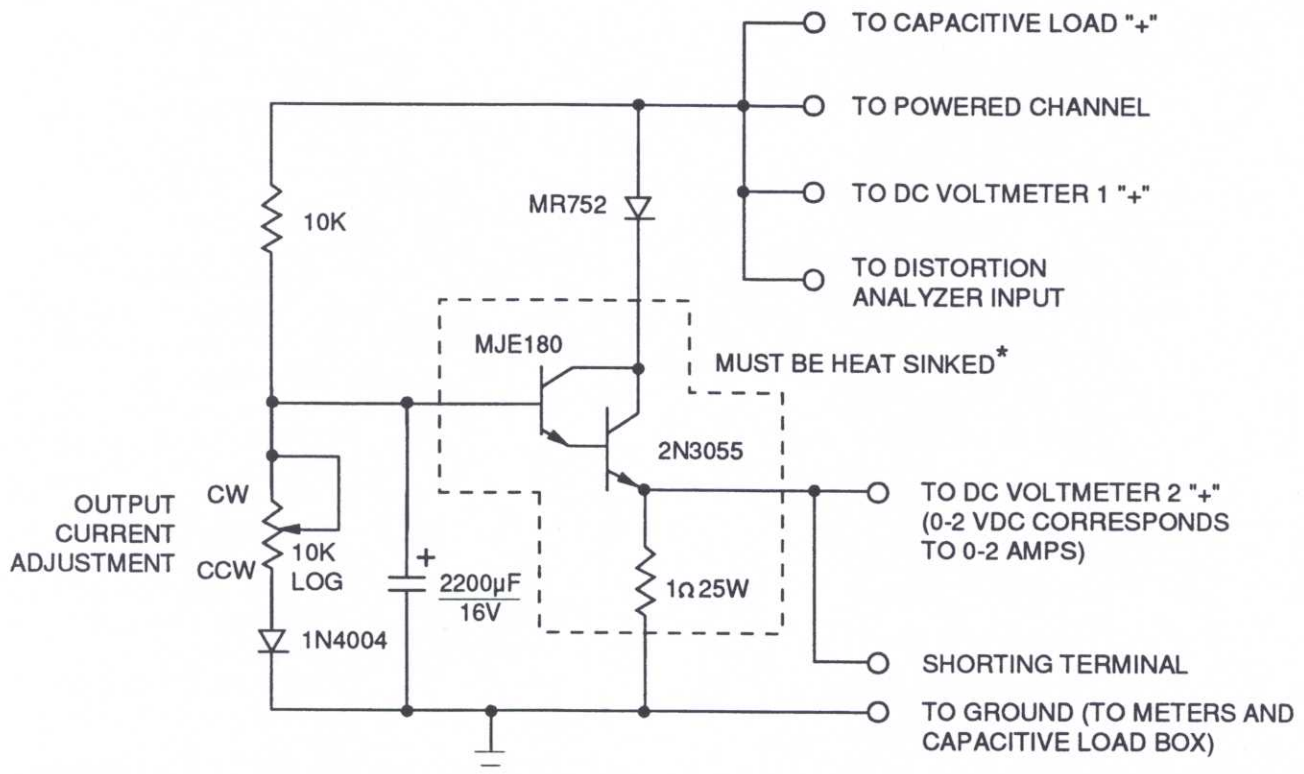
1. Connect the DC meters and capacitive load to the test load as shown in Figure 5-1.
2. Set the capacitive load to OFF.
3. On the test load, set the output current potentiometer in the fully CCW position (minimum output load).
4. Plug one of the four-wire channel output cables into J108 on the PS31. This will be the powered output cable
5. Connect the ground lead of the powered output cable to the test load ground terminal.
6. Connect channel 1 of the powered output cable to the powered channel terminal of the test load.
7. Connect the second four-wire output cable to J109 on the PS31. This will be the AUDIO ONLY output cable.
8. Connect channel 1 and ground of the audio only output cable to the distortion analyzer input and to the AC voltmeter.
9. Connect the program input cable to the PS31 PROGRAM INPUT (J110) and to the sine wave oscillator.
18. Set the oscillator frequency to 10 kilohertz (the oscillator level should remain constant). The AC voltage should read between 0.79 and 1.0 volts rms.
19. Set the oscillator frequency to 100 hertz (the oscillator level should remain constant). The AC voltage should read between 0.71 and 0.89 volts rms. Return the oscillator frequency to 1 kilohertz.
20. Place a 200-ohm resistor across the distortion analyzer input. The AC voltmeter should read from 0.45 to 0.55 volts rms. Remove the 200-ohm resistor.
21. Short the POWERED CHANNEL terminal of the test load to the SHORTING TERMINAL on the test load. The output short circuit current should be 0.5 amp (0.5 volts at DC voltmeter 2), 30%. The channel 1 STATUS light should be extinguished, the FAULT light should be flashing, and the audible alert should sound. Remove the short. The FAULT light should go out and the channel 1 STATUS light should turn on.
22. On the test load, slowly turn the output current adjustment control CW. The output current (as measured at DC voltmeter 2) should slowly increase. The FAULT light and audible alert should again come on as the output voltage drops below approximately 21 volts (measured at DC voltmeter 1). The current will reach a maximum fold-back value of 2.0 amps (2.0 volts on voltmeter 2), 30% before falling very suddenly back to the short circuit value of 0.5 amps.

23. Turn the output current adjustment control on the test load fully CCW. The AC voltmeter should still read 1.0 to 1.1 volts rms and the waveform on the oscilloscope should be a sine wave free from distortion.
24. Turn the PROGRAM LEVEL control fully CCW. Read the hum and noise on the distortion analyzer meter using a low pass filter on the analyzer (approximately 30 kilohertz). The hum and noise should be less than 1.0 millivolt rms.

25. Repeat tests for PS31 output channels 2 and 3.

### 5.3.5 FUNCTIONAL TEST OF ALL OUTPUTS

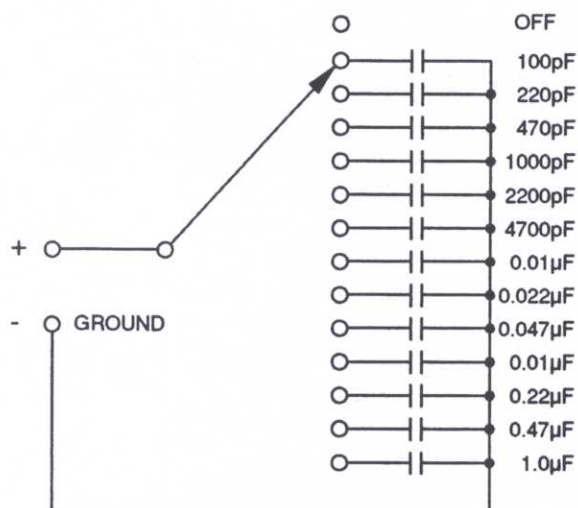
Plug a user station into each output connector. Verify that each station works.



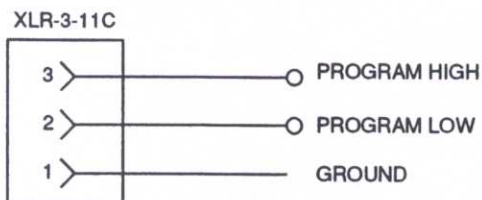
\* The heatsink thermal resistance must be less than 0.5°C/watt. Prolonged testing will create dangerously hot temperatures. Care must be taken to build a safe test jig to avoid burns.

**Figure 5-1**  
**Test Load**

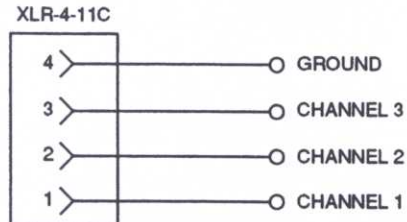




**Figure 5-2**  
**Capacitive Load Box**



**Figure 5-3**  
**Program Input Cable**



**Figure 5-4**  
**Channel Output Cable**

## 5.4 TROUBLESHOOTING

Problem:	Check:
No Output & No Lights	Plug, power Fuse, back panel (F105) Voltage selection Excessive transformer temperature (thermal cut-out will self reset after a cooling period) Raw DC supply voltage (should be 45-50 volts)
No Program	Input connections Input LEVEL control CHANNEL ASSIGN switch
Hum	Input connections Intercom cable routing (too close to AC, lights, etc.) User station too close to a power transformer PS31 common lead connected to a "humming" chassis ground someplace Mains voltage wiring incorrect
Fault Indicator ON:	Short on intercom channel Channel overloaded "Brown-out" on mains Voltage selection is set wrong Blown fuse on PCB (F201, F301, F401) DC voltage output (32 volts nominal)
Status OK, Yet NO Output:	Check for ac on RTS line due to faulty power line wiring
Distorted Sound	Input connections PROGRAM LEVEL control Termination DC line voltage

## SECTION 6: REPLACEMENT PARTS

### 6.1 WHERE TO OBTAIN PARTS

Parts may be obtained directly from RTS at:

Telex/RTS Systems  
9600 Aldrich Ave. So.  
Minneapolis, MN 55420  
1-800-828-6107  
Fax 1-800-323-0498

### 6.2 MECHANICAL PARTS

(Reference AS3233 Drawing)

MECHANICAL PARTS			
Item No.	Qty	Description	RTS Part No.
1	1	Front Panel/Chassis	9090-3232-00
2	1	Rear Panel (120V version)	9080-3229-01
	1	Rear Panel (220V version)	9080-3229-00
3	1	Printed Circuit Board Assy (Ref Section 6.3 for electrical parts)	9030-3225-00
4	2	Top/Bottom Cover	9100-3230-00
5	4	Transformer Bracket	9110-2629-00
6	1	Power Transformer (T101)	9140-2623-00
7	8	Washer, #6 Shoulder, Nylon	1006-0017-00
10	16	Screw, 4-40 X 3/8	1008-4035-00
11	8	Screw, 6-32 X 1/4" Pan Head, Phil	1008-6038-00
12	4	Screw, 6-32 X 3/8" Pan Head, Phil	1008-6013-00
13	4	Screw, 6-32 X 2" Pan Hd, Phil	1008-6036-00
14	8	Screw, 8-32 X 3/8" Pan Head, Phil	1008-8022-00
15	8	Washer, Lock, Int Th, #6	1006-0006-00
17	8	Washer, Lock, Int Th, #8	1006-0027-00
18	16	Nut, Keps, #4-40	1007-0001-00
19	4	Nut, Keps, #6-32	1007-0002-00
20	1	Nut, #6-32	1007-0003-00
22	1	Knob, Gray	2703-0002-00
23	1	Cap, Gray with Dot	2705-0001-00
24	1	Fuseholder, PCB Mount	2802-0011-01
25	1	Fuse holder Cap	57074-006

### 6.3 ELECTRICAL PARTS

ELECTRICAL PARTS		
Ref No.	Description	RTS Part No.
C102	Capacitor, Elect, 22uF, 50V	1513-R226-4I
C103	Capacitor, Elect, 22uF, 50V	1513-R226-4I
C104	Capacitor, Elect, 22uF, 50V	1513-R226-4I
C105	Capacitor, Ceramic, 2200pF, 5kV	517003-003
C106	Capacitor, Ceramic, 2200pF, 5kV	517003-003
C109	Capacitor, Ceramic Disc, 0.01uF, 1kV	1510-R103-2R
C110	Capacitor, Ceramic Disc, 0.01uF, 1kV	1510-R103-2R
C113	Capacitor, Ceramic Disc, 0.01uF, 1kV	1510-R103-2R
C114	Capacitor, Ceramic Disc, 0.01uF, 1kV	1510-R103-2R
C117	Capacitor, Elect, 11000uF, 75V	1513-R119-4K
C121	Capacitor, Elect, 10uF, 50V	1513-R106-4I
C122	Capacitor, Ceramic, Mono, 0.22uF, 50V	1511-R224-2I
C123	Capacitor, Elect, 10uF, 16V	1513-R106-4E
C124	Capacitor, Elect, 100uF, 16V	1513-R107-4E
C125	Capacitor, Ceramic Disc, 0.01uF, 1kV	1510-R103-2R
C126	Capacitor, Ceramic, Mono, 0.1uF, 50V	1511-R104-2I
C127	Capacitor, Ceramic, Mono, 0.01uF, 50V	1511-R103-2I
C128	Capacitor, Elect, 1uF, 35V	1513-R105-4G
C202	Capacitor, Elect, 10uF, 16V	1513-R106-4E
C203	Capacitor, Elect, 10uF, 16V	1513-R106-4E
C204	Capacitor, Elect, 10uF, 16V	1513-R106-4E
C206	Capacitor, Elect, 100uF, 25V	1513-R107-4F
C207	Capacitor, Elect, 100uF, 35V	1513-R107-4G
C208	Capacitor, Ceramic Disc, 220pF, 50V	1510-R221-2I
C209	Capacitor, Ceramic, Mono, 0.22uF, 50V	1511-R224-2I
C210	Capacitor, Ceramic, Mono, 0.1uF, 50V	1511-R104-2I
C211	Capacitor, Ceramic Disc, 120pF, 50V	1510-R121-2I
C212	Capacitor, Elect, 22uF, 50V	1513-R226-4I
C213	Capacitor, Ceramic Disc, 0.1, 500V	1510-R104-2Q
C214	Capacitor, Elect, 22uF, 50V	1513-R226-4I
C215	Capacitor, Ceramic Disc, .01uF, 1kV	1510-R103-2R
C216	Capacitor, Ceramic, Mono, 0.1uF, 50V	1511-R104-2I
C217	Capacitor, Elect, 22uF, 50V	1513-R226-4I
C302	Capacitor, Elect, 10uF, 16V	1513-R106-4E
C303	Capacitor, Elect, 10uF, 16V	1513-R106-4E
C304	Capacitor, Elect, 10uF, 16V	1513-R106-4E
C306	Capacitor, Elect, 100uF, 25V	1513-R107-4F
C307	Capacitor, Elect, 100uF, 35V	1513-R107-4G
C308	Capacitor, Ceramic Disc, 220pF, 50V	1510-R221-2I
C309	Capacitor, Ceramic, Mono, 0.22uF, 50V	1511-R224-2I
C310	Capacitor, Ceramic, Mono, 0.1uF, 50V	1511-R104-2I
C311	Capacitor, Ceramic Disc, 120pF, 50V	1510-R121-2I
C312	Capacitor, Elect, 22uF, 50V	1513-R226-4I
C313	Capacitor, Ceramic Disc, 0.1, 500V	1510-R104-2Q
C314	Capacitor, Elect, 22uF, 50V	1513-R226-4I
C315	Capacitor, Ceramic Disc, 0.01uF, 1kV	1510-R103-2R
C316	Capacitor, Ceramic, Mono, 0.1uF, 50V	1511-R104-2I
C317	Capacitor, Elect, 22uF, 50V	1513-R226-4I
C402	Capacitor, Elect, 10uF, 16V	1513-R106-4E
C403	Capacitor, Elect, 10uF, 16V	1513-R106-4E
C404	Capacitor, Elect, 10uF, 16V	1513-R106-4E
C406	Capacitor, Elect, 100uF, 25V	1513-R107-4F
C407	Capacitor, Elect, 100uF, 35V	1513-R107-4G



ELECTRICAL PARTS		
Ref No.	Description	RTS Part No.
C408	Capacitor, Ceramic Disc, 220pF, 50V	1510-R221-2I
C409	Capacitor, Ceramic, Mon, 0.22uF, 50V	1511-R224-2I
C410	Capacitor, Ceramic, Mono, 0.1uF, 50V	1511-R104-2I
C411	Capacitor, Ceramic Disc, 120pF, 50V	1510-R121-2I
C412	Capacitor, Elect, 22uF, 50V	1513-R226-4I
C413	Capacitor, Ceramic Disc, 0.1, 500V	1510-R104-2Q
C414	Capacitor, Elect, 22uF, 50V	1513-R226-4I
C415	Capacitor, Ceramic Disc, 0.01uF, 1kV	1510-R103-2R
C416	Capacitor, Ceramic, Mono, 0.1uF, 50V	1511-R104-2I
C417	Capacitor, Elect, 22uF, 50V	1513-R226-4I
C601	Capacitor, Mylar, 0.001uF, 50V	1514-R102-2I
C602	Capacitor, Ceramic Disc, 100pF, 50V	1510-R101-2I
C603	Capacitor, Ceramic, Mono, 0.22uF, 50V	1511-R224-2I
C604	Capacitor, Elect, 47uF, 16V	1513-R476-4E
C605	Capacitor, Elect, 47uF, 50V	1513-R476-4I
C606	Capacitor, Elect, 10uF, 50V	1513-R106-4I
C607	Capacitor, Ceramic Disc, 10pF, 50V	1510-R100-2I
D101	Diode, Rectifier, 7A, MR752	1601-0752-00
D102	Diode, Rectifier, 7A, MR752	1601-0752-00
D105	Diode, Rectifier, 7A, MR752	1601-0752-00
D106	Diode, Rectifier, 7A, MR752	1601-0752-00
D109	Diode, Rectifier, 1A, 1N4004	1601-4004-00
D110	Diode, Rectifier, 1A, 1N4004	1601-4004-00
D111	Diode, Rectifier, 1A, 1N4004	1601-4004-00
D112	Diode, Rectifier, 1A, 1N4004	1601-4004-00
D201	Diode, Zener, 1/2W, 10V, 5%, 1N5240B	1601-5240-0B
D202	Diode, Zener, 1/2W, 20V, 5%, 1N5250B	1601-5250-0B
D203	Diode, Zener, 5W, 36V, 5%, 1N5365B	1601-5365-0B
D204	Diode, Rectifier, 1A, 1N4004	1601-4004-00
D205	Diode, Zener, 1/2W, 20V, 5%, 1N5250B	1601-5250-0B
D206	Diode, Rectifier, 1A, 1N4004	1601-4004-00
D207	Diode, Zener, 1/2W, 5.1V, 5%, 1N5231B	1601-5231-0B
D208	Diode, Zener, 1/2W, 5.1V, 5%, 1N5231B	1601-5231-0B
D209	Diode, Zener, 1/2W, 5.1V, 5%, 1N5231B	1601-5231-0B
D210	Diode, Zener, 1/2W, 5.1V, 5%, 1N5231B	1601-5231-0B
D211	Diode, Signal, 1N914B	1601-0914-0B
D212	Diode, Signal, 1N914B	1601-0914-0B
D214	Diode, Rectifier, 7A, MR752	1601-0752-00
D215	Diode, Signal, 1N914B	1601-0914-0B
D301	Diode, Zener, 1/2W, 10V, 5%, 1N5240B	1601-5240-0B
D302	Diode, Zener, 1/2W, 20V, 5%, 1N5250B	1601-5250-0B
D303	Diode, Zener, 5W, 36V, 5%, 1N5365B	1601-5365-0B
D304	Diode, Rectifier, 1A, 1N4004	1601-4004-00
D305	Diode, Zener, 1/2W, 20V, 5%, 1N5250B	1601-5250-0B
D306	Diode, Rectifier, 1A, 1N4004	1601-4004-00
D307	Diode, Zener, 1/2W, 5.1V, 5%, 1N5231B	1601-5231-0B
D308	Diode, Zener, 1/2W, 5.1V, 5%, 1N5231B	1601-5231-0B
D309	Diode, Zener, 1/2W, 5.1V, 5%, 1N5231B	1601-5231-0B
D310	Diode, Zener, 1/2W, 5.1V, 5%, 1N5231B	1601-5231-0B
D311	Diode, Signal, 1N914B	1601-0914-0B
D312	Diode, Signal, 1N914B	1601-0914-0B
D314	Diode, Rectifier, 7A, MR752	1601-0752-00
D315	Diode, Signal, 1N914B	1601-0914-0B
D401	Diode, Zener, 1/2W, 10V, 5%, 1N5240B	1601-5240-0B
D402	Diode, Zener, 1/2W, 20V, 5%, 1N5250B	1601-5250-0B
D403	Diode, Zener, 5W, 36V, 5%, 1N5365B	1601-5365-0B

ELECTRICAL PARTS		
Ref No.	Description	RTS Part No.
D404	Diode, Rectifier, 1A, 1N4004	1601-4004-00
D405	Diode, Zener, 1/2W, 20V, 5%, 1N5250B	1601-5250-0B
D406	Diode, Rectifier, 1A, 1N4004	1601-4004-00
D407	Diode, Zener, 1/2W, 5.1V, 5%, 1N5231B	1601-5231-0B
D408	Diode, Zener, 1/2W, 5.1V, 5%, 1N5231B	1601-5231-0B
D409	Diode, Zener, 1/2W, 5.1V, 5%, 1N5231B	1601-5231-0B
D410	Diode, Zener, 1/2W, 5.1V, 5%, 1N5231B	1601-5231-0B
D411	Diode, Signal, 1N914B	1601-0914-0B
D412	Diode, Signal, 1N914B	1601-0914-0B
D414	Diode, Rectifier, 7A, MR752	1601-0752-00
D415	Diode, Signal, 1N914B	1601-0914-0B
D601	Diode, Rectifier, 1A, 1N4004	1601-4004-00
D602	Diode, Rectifier, 1A, 1N4004	1601-4004-00
DS5	Overheat Indicator Lamp	1802-0006-00
DS101	LED, Red	1801-0147-0R
DS201	LED, Green	1801-0147-0G
DS301	LED, Green	1801-0147-0G
DS401	LED, Green	1801-0147-0G
F105	Fuse, 3A Slow Blo ( 100-120 VAC use)	2801-0018-00
	Fuse, 1.5A Slow Blo ( 200-240 VAC use)	2801-0019-00
F201	Fuse, 3A Fast Blo	50547-010
F301	Fuse, 3A Fast Blo	50547-010
F401	Fuse, 3A Fast Blo	50547-010
J101	Connector, 3-Pin Audio, Male	2018-0010-00
J102	Connector, 3-Pin Audio, Male	2018-0010-00
J103	Connector, 3-Pin Audio, Male	2018-0010-00
J104	Connector, 3-Pin Audio, Male	2018-0010-00
J105	Connector, 3-Pin Audio, Male	2018-0010-00
J106	Connector, 3-Pin Audio, Male	2018-0010-00
J107	Connector, 4-Pin Audio, Male	2018-0006-00
J108	Connector, 4-Pin Audio, Male	2018-0006-00
J109	Connector, 4-Pin Audio, Male	2018-0006-00
J110	Connector, 3-Pin Audio, Female	2018-0011-00
J111	Connector, Cordset, AC	2018-0012-00
LS-1	Audible Alert	2605-0003-00
Q101	Transistor, NPN, 2N5210	1602-5210-00
Q201	Transistor, NPN, 2N5210	1602-5210-00
Q301	Transistor, NPN, 2N5210	1602-5210-00
Q401	Transistor, NPN, 2N5210	1602-5210-00
R101	Resistor, Carbon, 100K, 5%, 1/4W	1402-1003-5D
R102	Resistor, Carbon, 100K, 5%, 1/4W	1402-1003-5D
R103	Resistor, Carbon, 100K, 5%, 1/4W	1402-1003-5D
R107	Resistor, Carbon, 5.6K, 5%, 1/4W	1402-5601-5D
R108	Resistor, Carbon, 240 ohm 5%, 1/4W	1402-2400-5D
R109	Resistor, Carbon, 1.3K, 5%, 1/4W	1402-1301-5D
R110	Resistor, Carbon, 240 ohm, 5%, 1/4W	1402-2400-5D
R111	Resistor, Variable, Audio, 10K	1406-0032-00
R113	Resistor, Carbon, 10K, 5%, 1/2W	1402-1002-5E
R114	Resistor, Carbon, 4.7K, 5%, 1/4W	1402-4701-5D
R115	Resistor, Carbon, 100K, 5%, 1/4W	1402-1003-5D
R116	Resistor, Carbon, 2.2M, 5%, 1/4W	1402-2204-5D
R117	Resistor, Carbon, 1.0M, 5%, 1/4W	1402-1004-5D
R118	Resistor, Carbon, 47K, 5%, 1/4W	1402-4702-5D
R119	Resistor, Carbon, 2.2K, 5%, 1/4W	1402-2201-5D
R120	Resistor, Carbon, 22K, 5%, 1/4W	1402-2202-5D
R121	Resistor, Carbon, 11K, 5%, 1/4W	1402-1102-5D



ELECTRICAL PARTS		
Ref No.	Description	RTS Part No.
R122	Resistor, Carbon, 1K, 5%, 1/4W	1402-1001-5D
R123	Resistor, Carbon, 100K, 5%, 1/4W	1402-1003-5D
R201	Resistor, Metal Film, 10.0K, 1%, 1/4W	1403-1002-2D
R202	Resistor, Metal Film, 10.0K, 1%, 1/4W	1403-1002-2D
R203	Resistor, Carbon, 10K, 5%, 1/4W	1402-1002-5D
R204	Resistor, Carbon, 2.7 ohm, 5%, 1/4W	1402-2R70-5D
R205	Resistor, Carbon, 3.6K, 5%, 1/4W	1402-3601-5D
R206	Resistor, Carbon, 10K, 5%, 1/4W	1402-1002-5D
R207	Resistor, Carbon, 390 ohm, 5%, 1/4W	1402-3900-5D
R208	Resistor, Metal Film, 2.26K, 1%, 1/4W	1403-2261-2D
R210	Resistor, Carbon, 22K, 5%, 1/4W	1402-2202-5D
R211	Resistor, Metal Film, 243 ohm, 1%, 1/4W	1403-2430-2D
R212	Resistor, Carbon, 47 ohm, 5%, 1/4W	1402-47R0-5D
R213	Resistor, Carbon, 47 ohm, 5%, 1/4W	1402-47R0-5D
R214	Resistor, Metal Film, 47.5K, 1%, 1/4W	1403-4752-2D
R215	Resistor, Metal Film, 47.5K, 1%, 1/4W	1403-4752-2D
R216	Resistor, Metal Film, 42.2K, 1%, 1/4W	1403-4222-2D
R217	Resistor, Carbon, 100 ohm, 5%, 1/4W	1402-1000-5D
R218	Resistor, Carbon, 10K, 5%, 1/4W	1402-1002-5D
R219	Resistor, Wirewound, 2.0 ohm, 5%, 5W	1404-02R0-5I
R220	Resistor, Metal Film, 100 ohm, 1%, 1/4W	1403-1000-2D
R221	Resistor, Wirewound, 2.0 ohm, 5%, 5W	1404-02R0-5I
R222	Resistor, Carbon, 470 ohm, 5%, 1/4W	1402-4700-5D
R223	Resistor, Metal Film, 42.2K, 1%, 1/4W	1403-4222-2D
R225	Resistor, Metal Film, 100 ohm, 1%, 1/4W	1403-1000-2D
R226	Resistor, Carbon, 22K, 5%, 1/4W	1402-2202-5D
R227	Resistor, Carbon, 3.3K, 5%, 1W	1402-3301-5F
R301	Resistor, Metal Film, 10.0K, 1%, 1/4W	1403-1002-2D
R302	Resistor, Metal Film, 10.0K, 1%, 1/4W	1403-1002-2D
R303	Resistor, Carbon, 10K, 5%, 1/4W	1402-1002-5D
R304	Resistor, Carbon, 2.7 ohm, 5%, 1/4W	1402-2R70-5D
R305	Resistor, Carbon, 3.6K, 5%, 1/4W	1402-3601-5D
R306	Resistor, Carbon, 10K, 5%, 1/4W	1402-1002-5D
R307	Resistor, Carbon, 390 ohm, 5%, 1/4W	1402-3900-5D
R308	Resistor, Metal Film, 2.26K, 1%, 1/4W	1403-2261-2D
R310	Resistor, Carbon, 22K, 5%, 1/4W	1402-2202-5D
R311	Resistor, Metal Film, 243 ohm, 1%, 1/4W	1403-2430-2D
R312	Resistor, Carbon, 47 ohm, 5%, 1/4W	1402-47R0-5D
R313	Resistor, Carbon, 47 ohm, 5%, 1/4W	1402-47R0-5D
R314	Resistor, Metal Film, 47.5K, 1%, 1/4W	1403-4752-2D
R315	Resistor, Metal Film, 47.5K, 1%, 1/4W	1403-4752-2D
R316	Resistor, Metal Film, 42.2K, 1%, 1/4W	1403-4222-2D
R317	Resistor, Carbon, 100 ohm, 5%, 1/4W	1402-1000-5D
R318	Resistor, Carbon, 10K, 5%, 1/4W	1402-1002-5D
R319	Resistor, Wirewound, 2.0 ohm, 5%, 5W	1404-02R0-5I
R320	Resistor, Metal Film, 100 ohm, 1%, 1/4W	1403-1000-2D
R321	Resistor, Wirewound, 2.0 ohm, 5%, 5W	1404-02R0-5I
R322	Resistor, Carbon, 470 ohm, 5%, 1/4W	1402-4700-5D
R323	Resistor, Metal Film, 42.2K, 1%, 1/4W	1403-4222-2D
R325	Resistor, Metal Film, 100 ohm, 1%, 1/4W	1403-1000-2D
R326	Resistor, Carbon, 22K, 5%, 1/4W	1402-2202-5D
R327	Resistor, Carbon, 3.3K, 5%, 1W	1402-3301-5F
R401	Resistor, Metal Film, 10.0K, 1%, 1/4W	1403-1002-2D
R402	Resistor, Metal Film, 10.0K, 1%, 1/4W	1403-1002-2D
R403	Resistor, Carbon, 10K, 5%, 1/4W	1402-1002-5D
R404	Resistor, Carbon, 2.7 ohm, 5%, 1/4W	1402-2R70-5D

ELECTRICAL PARTS		
Ref No.	Description	RTS Part No.
R405	Resistor, Carbon, 3.6K, 5%, 1/4W	1402-3601-5D
R406	Resistor, Carbon, 10K, 5%, 1/4W	1402-1002-5D
R407	Resistor, Carbon, 390 ohm, 5%, 1/4W	1402-3900-5D
R408	Resistor, Metal Film, 2.26K, 1%, 1/4W	1403-2261-2D
R410	Resistor, Carbon, 22K, 5%, 1/4W	1402-2202-5D
R411	Resistor, Metal Film, 243 ohm, 1%, 1/4W	1403-2430-2D
R412	Resistor, Carbon, 47 ohm, 5%, 1/4W	1402-47R0-5D
R413	Resistor, Carbon, 47 ohm, 5%, 1/4W	1402-47R0-5D
R414	Resistor, Metal Film, 47.5K, 1%, 1/4W	1403-4752-2D
R415	Resistor, Metal Film, 47.5K, 1%, 1/4W	1403-4752-2D
R416	Resistor, Metal Film, 42.2K, 1%, 1/4W	1403-4222-2D
R417	Resistor, Carbon, 100 ohm, 5%, 1/4W	1402-1000-5D
R418	Resistor, Carbon, 10K, 5%, 1/4W	1402-1002-5D
R419	Resistor, Wirewound, 2.0 ohm, 5%, 5W	1404-02R0-5I
R420	Resistor, Metal Film, 100 ohm, 1%, 1/4W	1403-1000-2D
R421	Resistor, Wirewound, 2.0 ohm, 5%, 5W	1404-02R0-5I
R422	Resistor, Carbon, 470 ohm, 5%, 1/4W	1402-4700-5D
R423	Resistor, Metal Film, 42.2K, 1%, 1/4W	1403-4222-2D
R425	Resistor, Metal Film, 100 ohm, 1%, 1/4W	1403-1000-2D
R426	Resistor, Carbon, 22K, 5%, 1/4W	1402-2202-5D
R427	Resistor, Carbon, 3.3K, 5%, 1W	1402-3301-5F
R601	Resistor, Carbon, 47 ohm, 5%, 1/4W	1402-47R0-5D
R602	Resistor, Carbon, 1K, +5%, 1/4W	1402-1001-5D
R603	Resistor, Carbon, 10K, 5%, 1/4W	1402-1002-5D
R604	Resistor, Metal Film, 60.4K, 1%, 1/4W	1403-6042-2D
R605	Resistor, Metal Film, 60.4K, 1%, 1/4W	1403-6042-2D
R606	Resistor, Carbon, 1K, 5%, 1/4W	1402-1001-5D
R607	Resistor, Metal Film, 20.0K, 1%, 1/4W	1403-2002-2D
R608	Resistor, Metal Film, 20.0K, 1%, 1/4W	1403-2002-2D
R609	Resistor, Carbon, 100 ohm, 5%, 1/4W	1402-1000-5D
R610	Resistor, Carbon, 100K, 5%, 1/4W	1402-1003-5D
S101	Thermal Cut-out	1914-0001-00
S102	Power Switch, Marquardt 1802.1123	1912-0004-00
S104	Switch, Toggle, 3-Position PC Mount	1903-0051-00
S106	Switch, Toggle, SPDT PC Mount	1903-0050-00
S107	Switch, Slide, DPDT, 115/230V	1902-0001-00
S201	Switch, Toggle, SPDT PC Mount	1903-0016-00
S301	Switch, Toggle, SPDT PC Mount	1903-0016-00
S401	Switch, Toggle, SPDT PC Mount	1903-0016-00
T101	Power Transformer	9140-2623-00
T103	Transformer, Audio, 10K:600 ohm	2306-0012-00
U101	Voltage Regulator, LM317HVK	1603-0009-00
U102	Voltage Regulator, LM317T	1603-0317-0T
U103	IC, CD4011AE	1603-4011-00
U201	Voltage Regulator, LM317HVK	1603-0009-00
U202	IC, Dual Op-amp, NE5532N	1603-5532-0N
U301	Voltage Regulator, LM317HVK	1603-0009-00
U302	IC, Dual Op-amp, NE5532N	1603-5532-0N
U401	Voltage Regulator, LM317HVK	1603-0009-00
U402	IC, Dual Op-amp, NE5532N	1603-5532-0N
U601	IC, Dual Op-amp, NE5532N	1603-5532-0N

9030322500, C

## SECTION 7: DIAGRAMS

Drawing Number	Title
AS3225	P.C.B., Assembly, Power Supply, Model PS31
SD3225	Schematic Diagram, Power Supply, Model PS31, sheet 1 of 2
SD3225	Schematic Diagram, Power Supply, Model PS31, sheet 2 of 2
AS3233	Final Assembly, Model PS31
WD3525	Wiring Diagram, Model PS31



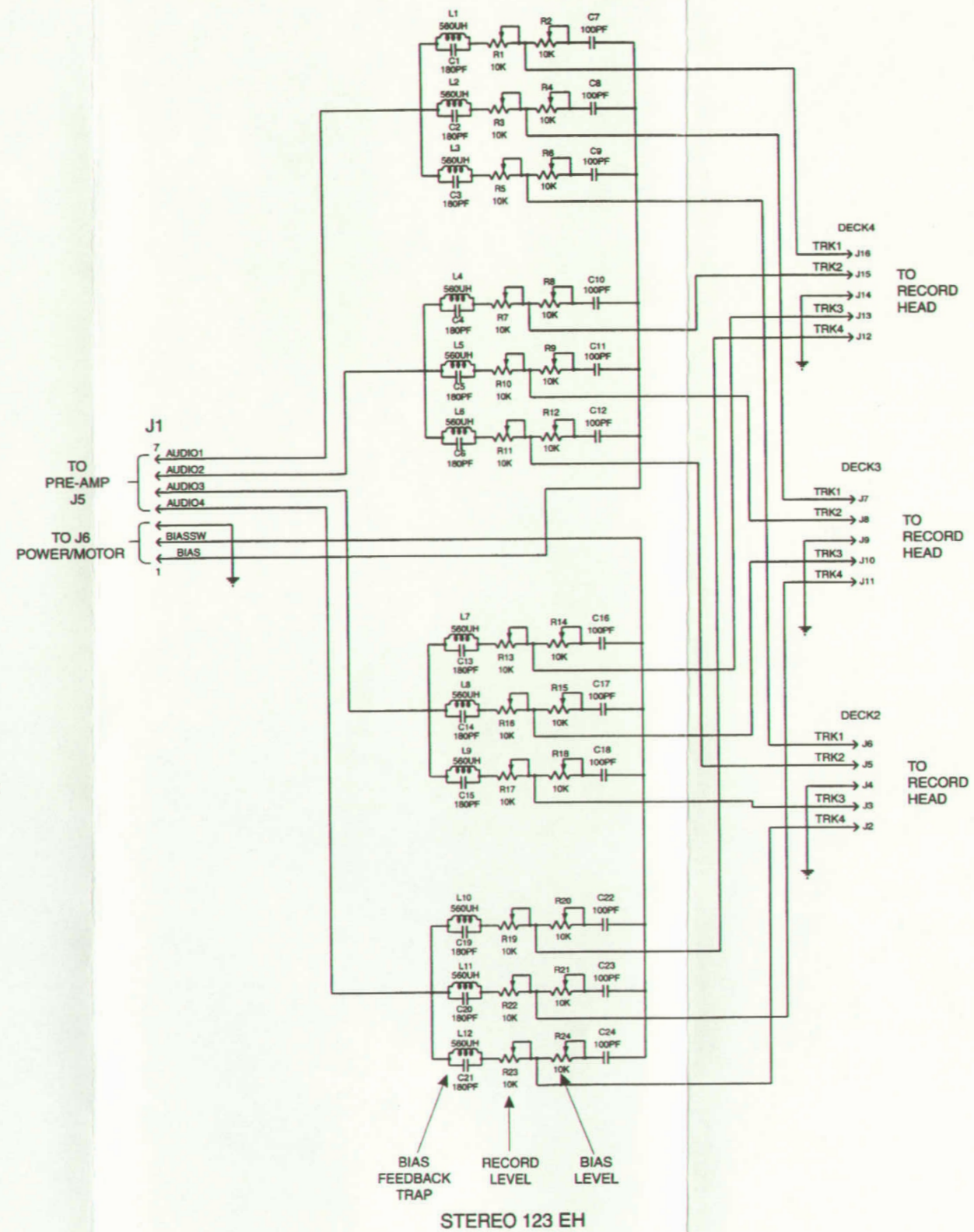
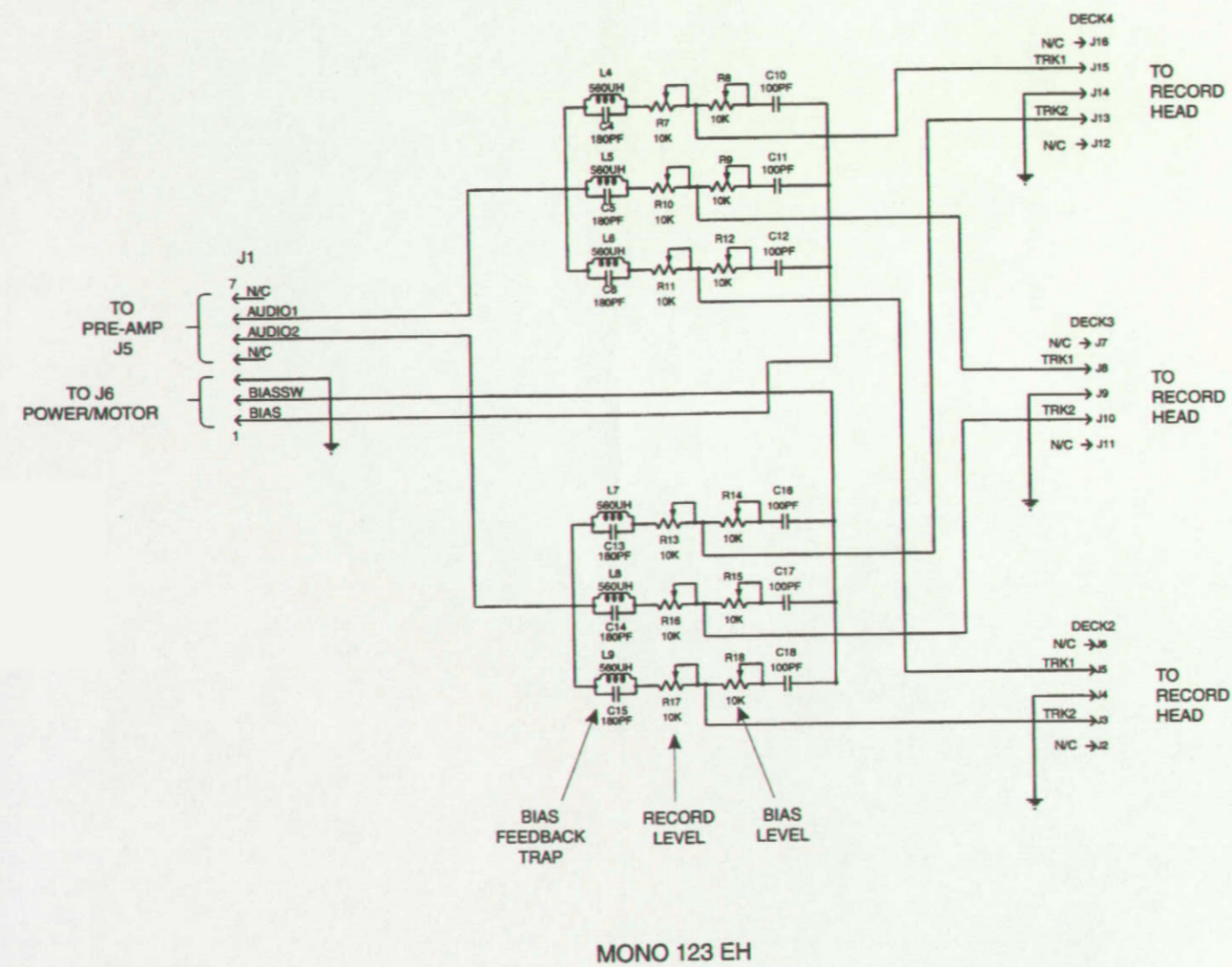
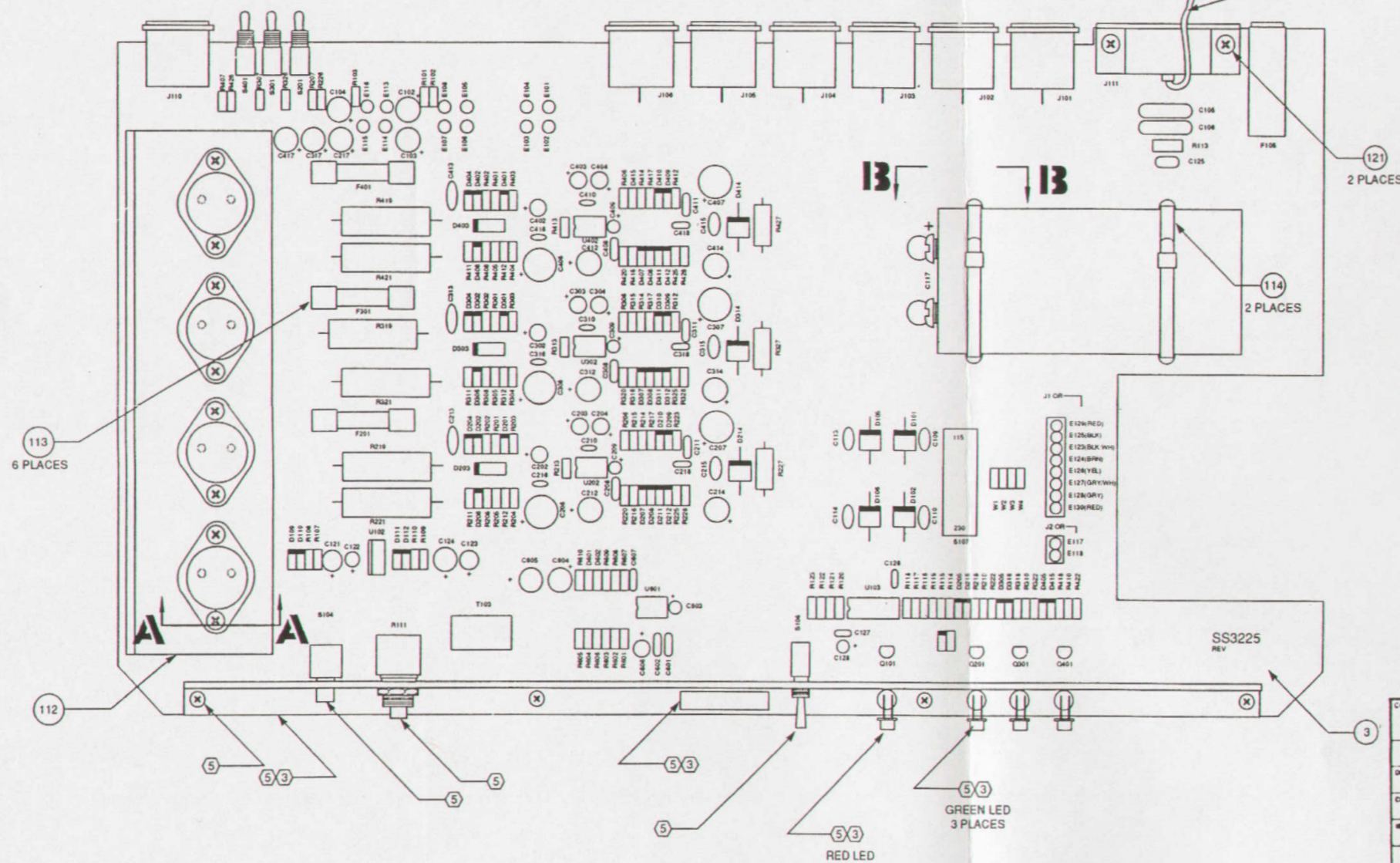


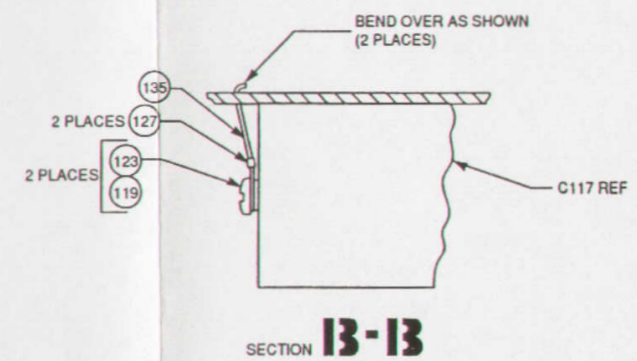
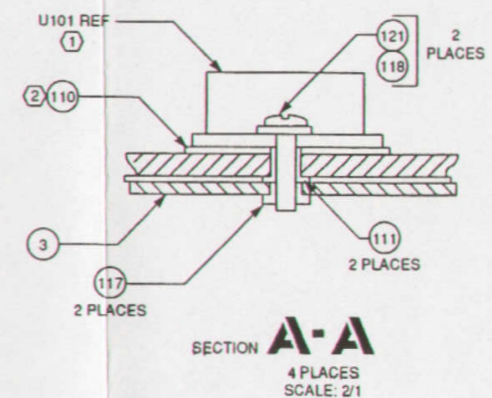
Figure 2-35  
Bias Distribution Schematic



- ⑤ ITEMS INDICATED ARE NOT INSTALLED AT THIS LEVEL
- ④ C218, C318, C418, R228, R328, & R428 NOT USED FOR STANDARD CONFIGURATION
- ③ INSTALL LED'S AND AUDIBLE ALERT AFTER INSTALLING BRACKET
- ② APPLY THERMAL GREASE BETWEEN MICA INSULATORS (ITEM 110) AND HEAT SINK (ITEM 112)
- ① U101, U202, U302 & U402 LEADS MUST BE CUT DOWN TO .425 ± .010 BEFORE INSTALLATION

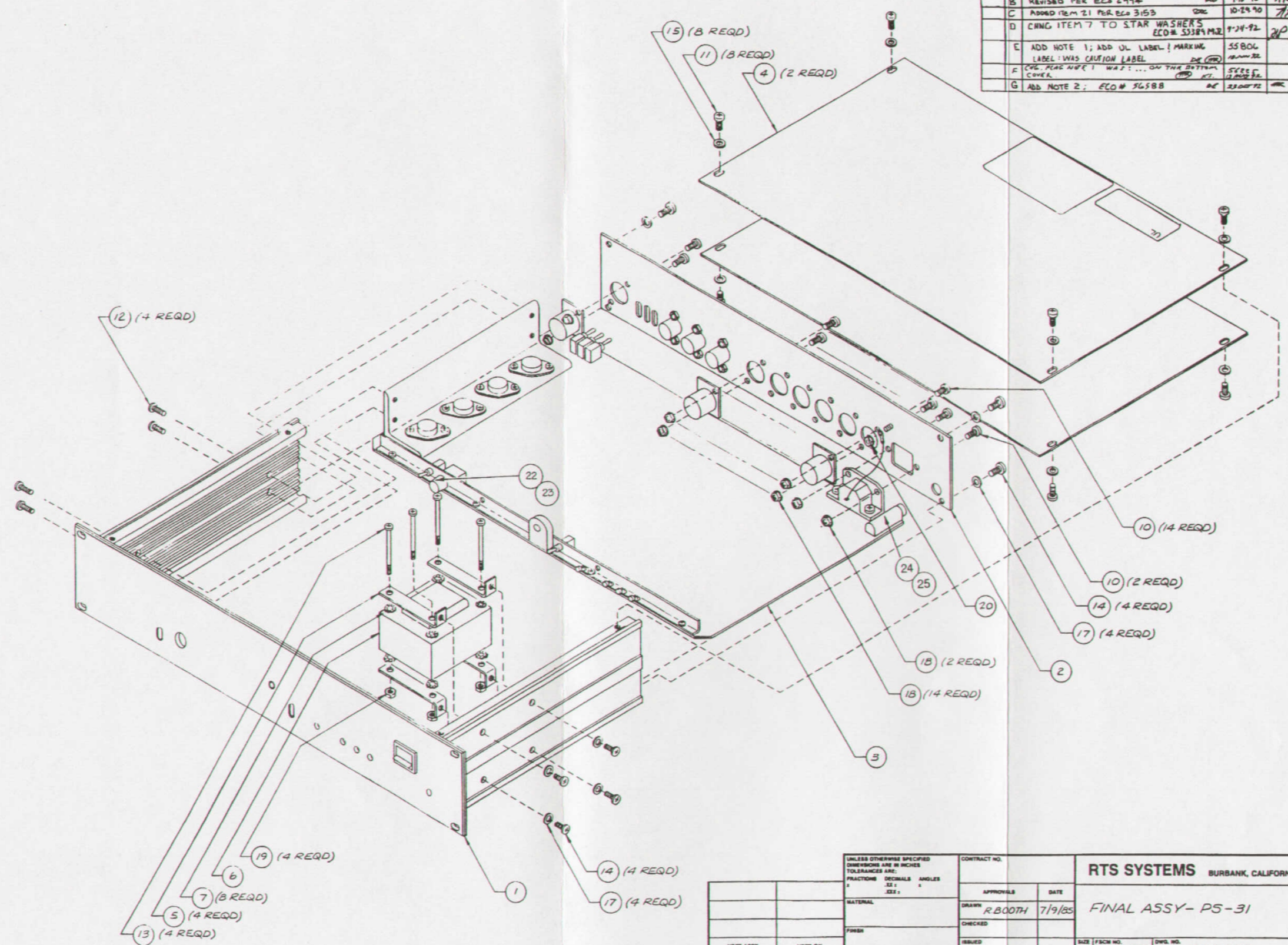


REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVE 1
	A	ADDED R407, R228, R328, R428, R426, C213, C218, C318, C418, C413, C607	6-27-85	
	B	REVISED PER ECO 1553	11-26-85	
	C	REVISED PER ECO 1610	4-28-86	
	D	ADDED R103, R407 5/B R307, R307 5/B R326, R103 5/B R226 ECO 1721	11-4-86	
	E	ADDED C313	RN 7-20-87	



CONTRACT NO.		RTS SYSTEMS		BURBANK, CALIFORNIA	
APPROVALS		DATE		P.C.B ASSY - POWER SUPPLY	
DRAWN		G. MORALES		1-4-85	
CHECKED				PS 31	
ISSUED					
SIZE		1/8" X 1/8" X 1/8"		REV	
D		60572		AS 3225	
SCALE		FULL		SHEET 1 OF 1	





REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	REVISED PER ECO 2475	8-10-89	
	B	REVISED PER ECO 2994	9-10-90	AL
	C	ADDED ITEM 21 PER ECO 3153	10-24-90	AK
	D	CHNG ITEM 7 TO STAR WASHERS ECO# 53384M2	9-24-92	AK
	E	ADD NOTE 1; ADD UL LABEL! MARKING LABEL: WAS CAUTION LABEL	5-5-04	
	F	CHG. PLAC. NOTE 1 WAS: ... ON THE BOTTOM COVER	5-5-04	
	G	ADD NOTE 2: ECO# 56588	2-20-07	AK

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .02 ± .005 ± .01		CONTRACT NO.		RTS SYSTEMS BURBANK, CALIFORNIA	
MATERIAL		APPROVALS	DATE	7/9/85	
FINISH		DRAWN	7/9/85	FINAL ASSY- P5-31	
NEXT ASSY		CHECKED			
USED ON		ISSUED			
APPLICATION		DO NOT SCALE DRAWING		SIZE: FROM NO.	DWG. NO.
				D 60572	AS3233
				SCALE 1/2"	SHEET 1



REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	REVISED PER ECO#2575	8-10-89	
	B	DELETED 24 AWG BLK WIRE FROM NEON LAMP PER ECO#2994	9-7-90	712
	C	ADDED NOTE 213 PER ECO#3153	10/27/90	712
	D	ADDED NOTES 4 & 5 PER ECO#3156	10-31-90	31/10/90
B,C-2	E	DEL NOTE 3, BACK WAS FRONT PER ECO#55384		4-24-92

