

# Technical Service Manual

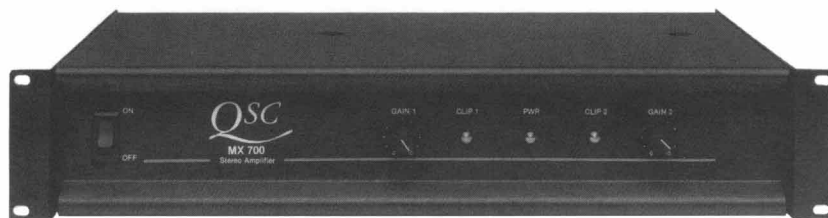
## MXa Series

- ▲ **MX 700**
- ▲ **MX 1000a**
- ▲ **MX 1500a**
- ▲ **MX 2000a**



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▲ **MX 700**



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▲ **MX 1000a**



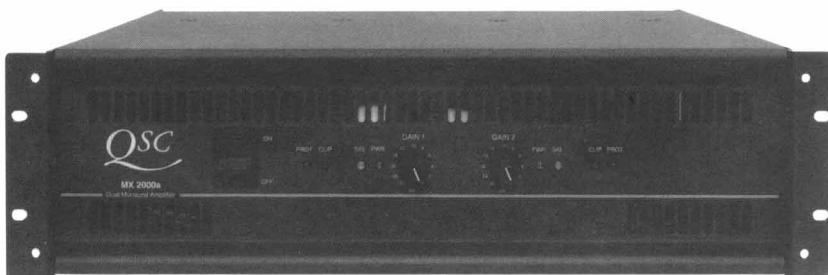
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▲ **MX 1500a**



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▲ **MX 2000a**



# **MXa SERIES AMPLIFIER SERVICE MANUAL**

**MX 700**

**MX 1000a**

**MX 1500a**

**MX 2000a**

**QSC CUSTOMER SERVICE**

**1-800-QSC-AUDIO**

**(800-772-2834)**



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# MX 700 Specifications



**WARNING:** An asterisk\* indicated the load impedances, power output levels and AC power requirements that Underwriters Laboratories (UL) and Canadian Standards Association (CSA) have determined are safe for operation of this product. Other values are shown for informational purposes only.

**OUTPUT POWER:** (per channel)

Continuous Average Output Both Channels Driven.

- 8 ohms, 20 Hz to 20 kHz, 0.1% THD 150\* watts
- 8 ohms, 1kHz, 1% THD 170 watts
- 4 ohms, 20 Hz to 20 kHz, 0.1% THD 225 watts
- 4 ohms, 1kHz, 1% THD 270 watts
- 2 ohms, 1kHz, 1% THD 350 watts ±1 dB

**OUTPUT POWER:** (bridged mono)

- 16 ohms, 20 Hz to 20 kHz, 0.1% THD 300\* watts
- 8 ohms, 20 Hz to 20 kHz, 0.1% THD 450 watts
- 4 ohms, 1 kHz 1% THD 700 watts ±1dB

**DISTORTION:**

SMPTE-IMD, Less than 0.05%

**FREQUENCY RESPONSE:**

20 Hz to 20 kHz, ±0.25 dB

**DAMPING FACTOR:** Greater than 200

**DYNAMIC HEADROOM:** 3dB at 4 ohms

**NOISE:** -100 dB at rated power, A weighted

**SENSITIVITY:** 0.96 Vrms at 8 ohms

**INPUT IMPEDANCE:** 10K unbalanced, 20K balanced

**CONTROLS:**

Front: AC Switch, (2) Gain Knobs

**INDICATORS:**

- PWR: Green LED
- CLIP: 2 Red LEDs

**CONNECTORS:** (each channel)

- Input: Barrier strip and 1/4" RTS (ring tip sleeve)
- Speakers: 5-way Binding Posts

**COOLING:**

Fan: rear intake, front exhaust

**AMPLIFIER PROTECTION:**

Full Short Circuit (U.S. Patent 4,321,554), open circuit, over-temp, ultrasonic and RF protection. Stable into reactive or mismatched loads.

**LOAD PROTECTION:**

AC coupled output. 2-Second On, Instant Off muting

**COMPLEMENTARY OUTPUT DEVICES:** 12

**AMPLIFIER POWER SUPPLY:**

Separate transformer secondaries, rectifiers, and DC filter capacitors

**POWER REQUIREMENTS:**

- 120 VAC, 60 Hz, at 1/3 rated power LOAD
- 8 ohms\* 3.7 Aac,\* 500 VA\*
- 4 ohms 5.7 Aac, 685 VA
- 2 ohms 8.8 Aac, 1056 VA

**DIMENSIONS:**

3.5" tall, 19.0" wide, 12.0" deep

**WEIGHT:**

25 lbs net, 30 lbs shipping

*SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE*

# MX 1000a Specifications



**OUTPUT POWER:** (per channel)

Continuous Average Output Both Channels Driven.

- 8 ohms, 20 Hz to 20 kHz, 0.1% THD 250 watts
- 8 ohms, 1kHz, 1% THD 275 watts
- 4 ohms, 20 Hz to 20 kHz, 0.1% THD 350 watts
- 4 ohms, 1kHz, 1% THD 400 watts
- 2 ohms, 1kHz, 1% THD 500 watts ±1 dB

**OUTPUT POWER:** (bridged mono)

- 16 ohms, 20 Hz to 20 kHz, 0.1% THD 500 watts
- 8 ohms, 20 Hz to 20 kHz, 0.1% THD 700 watts
- 4 ohms, 1 kHz 0.1% THD 1000 watts ±1dB

**DISTORTION:**

SMPTE-IMD, Less than 0.05%

**FREQUENCY RESPONSE:**

- 20 Hz to 20 kHz, ±0.15 dB
- 8 Hz to 100 kHz, +0/-3 dB

**DAMPING FACTOR:** Greater than 200

**DYNAMIC HEADROOM:** 3dB at 4 ohms

**NOISE:** 100 dB below rated output (20 Hz to 20 Hz)

**SENSITIVITY:** 1.12 Vrms for rated power (8 ohms)

**VOLTAGE GAIN:** 40 (32 dB)

**INPUT IMPEDANCE:** 10K unbalanced, 20K balanced

**CONTROLS:**

- Front: AC Switch, Ch 1 and Ch 2 Gain Knobs
- Rear: Parallel/Stereo/Bridged Switch

**INDICATORS:**

- PWR: Green LED
- SIG: Yellow LED
- CLIP: Red LED
- PROT: Red LED

**CONNECTORS:** (each channel)

- Input: Barrier strip and 1/4" RTS (ring tip sleeve)
- Speakers: 5-way Binding Posts

**COOLING:**

2-speed fan, rear-to-front air flow

**AMPLIFIER PROTECTION:**

Full short circuit\*, open circuit, ultrasonic, thermal, and RF protection. Stable into reactive or mismatched loads.

**LOAD PROTECTION:**

On/Off muting. DC-fault load grounding relay. Internal fault fuses.

**OUTPUT CIRCUIT TYPE:**

Complementary linear outputs, 2 step high efficiency circuit.

**POWER REQUIREMENTS:**

100, 120, 220-240 Vac, 50-60 Hz

**POWER CONSUMPTION:**

Normal Operation: 4 ohms per channel: less than 7.5 amps, 120 Vac (900 watts). Maximum (full power, 2 ohms per channel): 22 amps, 120 Vac (2640 watts).

**DIMENSIONS:**

- 19.0" (48.3 cm) rack mounting
- 3.50" (8.9 cm) tall (2 spaces)
- 17.9" (45.5 cm) deep (rear support ears)

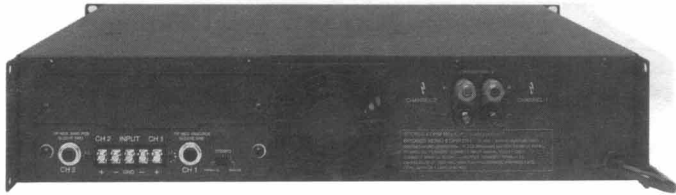
**WEIGHT:**

42 lbs (19.1 kg) net, 49 lbs (22.2kg) shipping

\*Output Averaging" short circuit protection (U.S. Patent 4,321,554)

*SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE*

# MX 1500a Specifications



## OUTPUT POWER: (per channel)

Continuous Average Output Both Channels Driven.  
 8 ohms, 20 Hz to 20 kHz, 0.1% THD 350 watts  
 8 ohms, 1kHz, 1% THD 400 watts  
 4 ohms, 20 Hz to 20 kHz, 0.1% THD 500 watts  
 4 ohms, 1kHz, 1% THD 600 watts  
 2 ohms, 1kHz, 1% THD 750 watts  $\pm 1$  dB

## OUTPUT POWER: (bridged mono)

16 ohms, 20 Hz to 20 kHz, 0.1% THD 700 watts  
 8 ohms, 20 Hz to 20 kHz, 0.1% THD 1000 watts  
 4 ohms, 1 kHz 0.1% THD 1500 watts  $\pm 1$ dB

## DISTORTION:

SMPTE-IMD, Less than 0.05%

## FREQUENCY RESPONSE:

20 Hz to 20 kHz,  $\pm 0.15$  dB  
 8 Hz to 100 kHz, +0/-3 dB

## DAMPING FACTOR:

Greater than 200

## DYNAMIC HEADROOM:

3dB at 4 ohms

## NOISE:

100 dB below rated output (20 Hz to 20 Hz)

## SENSITIVITY:

1.05 Vrms for rated power (8 ohms)

## VOLTAGE GAIN:

50 (34 dB)

## INPUT IMPEDANCE:

10K unbalanced, 20K balanced

## CONTROLS:

Front: AC Switch, Ch 1 and Ch 2 Gain Knobs  
 Rear: Parallel/Stereo/Bridged Switch

## INDICATORS:

PWR: Green LED  
 SIG: Yellow LED  
 CLIP: Red LED  
 PROT: Red LED

## CONNECTORS: (each channel)

Input: Barrier strip and 1/4" RTS (ring tip sleeve)  
 Speakers: 5-way Binding Posts

## COOLING:

2-speed fan, rear-to-front air flow

## AMPLIFIER PROTECTION:

Full short circuit\*, open circuit, ultrasonic, thermal, and RF protection. Stable into reactive or mismatched loads.

## LOAD PROTECTION:

On/Off muting. DC-fault load grounding relay. Internal fault fuses.

## OUTPUT CIRCUIT TYPE:

Complementary linear outputs, 2 step high efficiency circuit.

## POWER REQUIREMENTS:

100, 120, 220-240 Vac, 50-60 Hz

## POWER CONSUMPTION:

Normal Operation: 4 ohms per channel: less than 10.5 amps, 120 Vac (1260 watts). Maximum (full power, 2 ohms per channel): 29 amps, 120 Vac (3500 watts).

## DIMENSIONS:

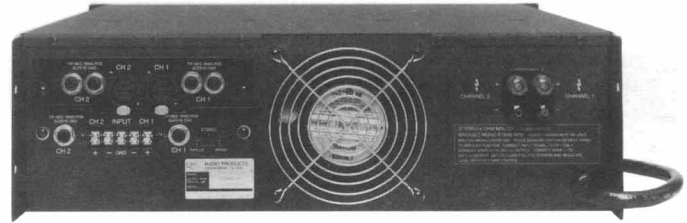
19.0" (48.3 cm) rack mounting  
 3.50" (8.9 cm) tall (2 spaces)  
 17.9" (45.5 cm) deep (rear support ears)

## WEIGHT:

42 lbs (19.1 kg) net, 49 lbs (22.2kg) shipping

\*Output Averaging™ short circuit protection (U.S. Patent 4,321,554)  
 SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

# MX 2000a Specifications



## OUTPUT POWER: (per channel)

Continuous Average Output Both Channels Driven.  
 8 ohms, 20 Hz to 20 kHz, 0.1% THD 450 watts  
 8 ohms, 1kHz, 1% THD 475 watts  
 4 ohms, 20 Hz to 20 kHz, 0.1% THD 650 watts  
 4 ohms, 1kHz, 1% THD 725 watts  
 2 ohms, 1kHz, 1% THD 1000 watts  $\pm 1$  dB

## OUTPUT POWER: (bridged mono)

16 ohms, 20 Hz to 20 kHz, 0.1% THD 900 watts  
 8 ohms, 20 Hz to 20 kHz, 0.1% THD 1300 watts  
 4 ohms, 1 kHz 0.1% THD 2000 watts  $\pm 1$ dB

## DISTORTION:

SMPTE-IMD, Less than 0.05%

## FREQUENCY RESPONSE:

20 Hz to 20 kHz,  $\pm 0.15$  dB  
 8 Hz to 100 kHz, +0/-3 dB

## DAMPING FACTOR:

Greater than 200

## DYNAMIC HEADROOM:

3dB at 4 ohms

## NOISE:

100 dB below rated output (20 Hz to 20 Hz)

## SENSITIVITY:

1.07 Vrms for rated power (8 ohms)

## VOLTAGE GAIN:

56 (35 dB)

## INPUT IMPEDANCE:

10K unbalanced, 20K balanced

## CONTROLS:

Front: AC Switch, Ch 1 and Ch 2 Gain Knobs  
 Rear: Parallel/Stereo/Bridged Switch

## INDICATORS:

PWR: Green LED  
 SIG: Yellow LED  
 CLIP: Red LED  
 PROT: Red LED

## CONNECTORS: (each channel)

Input: Barrier strip and 1/4" RTS (ring tip sleeve)  
 Speakers: 5-way Binding Posts

## COOLING:

2-speed fan, rear-to-front air flow

## AMPLIFIER PROTECTION:

Full short circuit\*, open circuit, ultrasonic, thermal, and RF protection. Stable into reactive or mismatched loads.

## LOAD PROTECTION:

On/Off muting. DC-fault load grounding relay. Internal fault fuses.

## OUTPUT CIRCUIT TYPE:

Complementary linear outputs, 2 step high efficiency circuit.

## POWER REQUIREMENTS:

100, 120, 220-240 Vac, 50-60 Hz

## POWER CONSUMPTION:

Normal Operation: 4 ohms per channel: less than 12 amps, 120 Vac (1440 watts). Maximum (full power, 2 ohms per channel): 37 amps, 120 Vac (4450 watts).

## DIMENSIONS:

19.0" (48.3 cm) rack mounting  
 3.50" (8.9 cm) tall (2 spaces)  
 17.9" (45.5 cm) deep (rear support ears)

## WEIGHT:

54 lbs (24.4 kg) net, 62 lbs (28.0 kg) shipping

\*Output Averaging™ short circuit protection (U.S. Patent 4,321,554)  
 SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

## General Instructions

### Introduction and General Information

This manual has been prepared to assist technicians with the repair and calibration of the QSC MXa amplifier line. The procedures described in this manual require advanced technical experience and sophisticated audio test equipment.

**NOTE:** *There are NO user serviceable components inside this product. Opening this product or attempting the adjustments described in this manual may expose the user to electrical shock. Refer servicing to qualified service personnel.*

Within the pages of this manual you will find MXa Schematics, Printed Circuit Board Drawings, Parts Lists, and Mechanical Assembly Drawings. This information should be used in conjunction with the Test & Troubleshooting Procedure section to repair, adjust, and maintain the amplifier.

The electrical and electronic components are identified by circuit identification numbers (on the schematics, and the parts list) and the QSC part number (on the parts list). The chassis assembly drawings are exploded-view drawings. The Test & Troubleshooting Procedure section refers to designations shown in the schematics.

The Technical Service Bulletin section describes the changes that have been made to the product, or product line. Although the schematic and other drawings included in the manual are specific to the most current revision of the product, this section describes the previous revisions. The revision identification letter (starting with the "REV A", for the original, revision) can be found on the solder side of the printed circuit board.

Although many of the electronic components used in this product may be available from electronic suppliers, some components are specially tested by QSC. A product repaired with non-QSC supplied components may not meet factory specifications. The product warranty may be voided by a repair using non-QSC components.

Parts orders to QSC should include the product model number, the serial number, the part description, and the QSC part number (from the parts list in this manual). Parts will be shipped via UPS, F.O.B. Costa Mesa, California. Shipping and COD charges may be added to the cost of the parts.

### Technical Service Notes MXa Series Service Bulletins

06/26/92 MXA001: Input sensitivity modification for MXa input board.

#### Required Test Equipment:

1. Distortion Analyzer with a 80KHz filter
2. Function Generator
3. 20MHz Oscilloscope
4. Re-flow Desoldering Equipment
5. Digital Multimeter
6. Variac with Bypass
7. High Power Load Bank
8. (Optional) Thermocouple probe

**CAUTION:** *Unlike most QSC products, this amplifier cannot be serviced without the equipment listed in the "Required Test Equipment" section of this manual. The complexity of the high-efficiency design requires professional audio service equipment for repair, performance verification, and calibration. Do not attempt to calibrate or repair this product without this equipment. Any damage caused by unauthorized service attempts will void the product's warranty.*



## MXa Series Test & Calibration

**NOTE:** This test procedure will refer to the amplifier's channels as CH1 (Channel 1) & CH2 (Channel 2).

### Test Equipment Requirements & Set-up

Connect a test load (capable of managing output powers of 500W-8 ohm, 800W-4 ohm, and 1000W-2 ohm) to the output terminals of the amplifier.

Connect a distortion analyzer with a resolution of 0.05%, 20-20kHz (or better) to the output terminals of the amplifier.

Connect the output of the signal generator to the input terminals of the amplifier and select an output of 1.00 VRMS, 2KHz.

Connect a dual-channel oscilloscope to the following test points:

- a 10X (vertical sensitivity - 2V/cm) scope probe to the channel speaker output.
- a 1X scope probe (vertical sensitivity - .1V/cm) to the distortion analyzer output.

Lift the ground on the scope and the distortion analyzer.

### Power Up

Set the amplifier's gain controls at full clockwise.

Slowly raise the variac voltage and watch for excessive current draw (Line current greater than 3/4 amps at 120 Volts.). **NOTE:** Make sure the fan is ON when the line voltage reaches 120VAC.

Turn the amp off and on a few times to verify the 1.5 - 3.0 second power-up delay. Check CH1 & CH2 for normal output signal.

### Verify 8 ohm midband power specification.

Apply 8 ohm loads to both channels (maintain 120VAC) and verify that the output RMS power for each channel is greater than or equal to the specification. Verify step switching (all models except the MX 700) on both channels by turning down the gain and observing on the scope's distortion trace step spikes coming together for both polarities toward the peak of the signal as gain is reduced.

### Bias Adjustment

Select an 8 ohm output load and apply a 20kHz input signal.

Adjust the input signal or CH1 gain control for an output of 20dB below full output one channel at a time.

Using the analyzer's distortion output, set the crossover trimpot (VR501 & VR601 on the MXa1000 and MXa1500, VR901 on the MXa2000, and TR3(a&b) on the MX700) for a crossover spike barely protruding from the noise signal (distortion must be less than .08%THD).

Set the CH1 & CH2 output load to 4 ohms and verify that the output distortion is less than 0.1%.

**NOTE:** If you do not have a distortion analyzer, a less accurate distortion setting can be made by monitoring the driver transistor bias current. With the amplifier at operating temperature and no input signal, adjust the bias trimpot to obtain a voltage of about 80mVDC across one of the emitter resistors of the driver transistors (Q501, Q502 & Q601, Q602 on the MXa1000 and MXa1500, Q907 on the MXa2000, and Q1 & Q2 (a&b) on the MX700).

### Two-ohm Short Circuit

Select a 4-ohm load and verify even clipping on both channels. Select a 2 ohm load, which will show substantial clipping.

Adjust the GAIN control to the threshold of clipping.

Adjust current limit trimpots (VR502, VR503 & VR602, VR603 on the MXa1000 and MXa1500, VR902 & VR903 on the MXa2000, and TR1 & TR2 (a&b) on the MX700) for a small amount of current limiting at the peaks of the output waveform.

Apply a short to the output of the channel one channel at a time. The AC line current draw should be approximately 3.0 - 5.0 amps a.c. (RMS) per channel.

### Frequency Response

Select an 8 ohm load on CH1 & CH2.

Note the output level just below output clipping.

Note the exact 2KHz level and compare it to the 20Hz and 20KHz output (20Hz -0.4dB max, 20KHz -0.5dB typical/ 1.0dB max).



## Thermal

Set the oscillator frequency to 2KHz and short the output of both channels and block the fan intake. The AC line current draw should be 6.5 - 7.5amps a.c. initially and increases to about 8.0 - 8.5A at thermal shutdown (one channel will normally shutdown earlier than the other).

Do not allow the test to continue if the AC current rises above 9A. See Troubleshooting, Protection / Limiting Circuit Problems.

When thermal shutdown occurs, unblock fan intake and verify AC idle current. Recheck the bias setting if the current is excessive.

Allow the amplifier to cool and recover from the thermal cycle. The amplifier must be able to recover into a 4 ohm load. Return the output load to 8 ohms.

## Output Noise

Set the amplifier GAIN to 0dB, with a 2kHz 1.00Vrms input signal. Note the output level.

With the input signal level off, measure the residual noise level (must be less than -100dB from full output).

This completes the electronic test procedure. Inspect the amplifier for mechanical defects. Inspect the solder connections. Reassemble the amplifier and verify the amplifier's operation before returning the product to service.

## Troubleshooting the MXa Amplifier

Please refer to the MXa schematics for the component identification numbers in this troubleshooting guide. This section can be used in principal to troubleshoot all models in the MXa line. In this section you will notice that we are referring primarily to channel 1 (CH.1). For channel two (CH. 2), you may cross-reference parts as necessary.

### Dead Channel *(no display lights)*

When the lights are out on a channel, this could mean that an internal fuse is blown within the amplifier. Replace this fuse with the appropriate fuse only. **Be sure the AC cord is unplugged from the wall!**

When a fuse is blown, then this may be an indication that excessive current draw is the real problem within the channel. The fuse blew to protect the amplifier from further damage.

After the fuse is replaced, be sure to use a variac to power the amplifier up slowly. Otherwise, you may just blow the fuse again. See below for troubleshooting AC power supply problems.

### Power Supply Problems

- **Stable, "hard" current draw (increases rapidly at only a few volts AC voltage):**

The amplifier draws high current when the AC supply voltage is first applied up (with signal but no load). This symptom means there is a short in the power stages of the circuit. It is possible to lift the fuse for each channel to isolate the problem to one channel. Look for:

- A shorted main bridge rectifier(s).
- Both supply clamping diodes (D7 & D8 on the MX 700, D512 & D513 on the MXa 1000 and MXa 1500, D901 & D911 on the MXa 2000) shorted.
- Either polarity of the driver transistors (Q501, Q502 on the MXa1000 and MXa1500, Q907 on the MXa2000, and Q1 & Q2 on the MX700) shorted .
- Either polarity of the main output power transistors shorted.
- A shorted power supply capacitor.



- **Medium-hard, fairly stable current draw (increases more slowly, can go to maybe 25 - 30 VAC before current becomes excessive.)**

The amplifier draws high current when the AC supply voltage is near 120VAC, but the current increases gradually as the supply voltage is increased. This symptom indicates that the driver/output circuits are turning on because of incorrect biasing. Look for:

- A driver (Q501, Q502 on the MXa1000 and MXa1500, Q907 on the MXa2000, and Q1 & Q2 on the MX700) or main output power transistor short(s).
- A shorted single-supply clamping diode (D7 & D8 on the MX 700, D512 & D513 on the MXa 1000 and MXa 1500, D901 & D911 on the MXa 2000).
- Open bias diodes (D1 & D2 on the MX 700, D505 & D506 on the MXa 1000 and MXa 1500, D903 & D910 on the MXa 2000) or resistive bias components (VR501 & VR601 on the MXa1000 and MXa1500, VR901 on the MXa2000, and TR3(a&b) on the MX700).

- **Soft current draw (above 60 volts AC before current begins to increase, amp may pass signal):**

The amplifier draws high current when the AC supply voltage is near 120VAC, but the current increases quickly as the supply voltages passes through a breakdown point. This symptom indicates that there is a component failing from voltage breakdown (VCEO) or a low voltage component failure. Look for:

- Severely misadjusted bias circuit.
- Severe oscillation causing current drain. This might be caused by a defective feedback component.
- One or both of the pull-up resistors (R17 & R18 on the MX 700, R517 & R518 on the MXa 1000 and MXa 1500, R917 & R922 on the MXa 2000) is open.

A “motor-boating” (slow pulsing) 2-5 amp current draw indicates a break in the bias circuit (often an open bias diode or a break in the circuit between the bias diodes).

- **Uneven voltage rails:**

If the high voltage power supplies are severely unbalanced, the fault may be caused by either an AC feedback defect or a DC component failure. First, remove IC1 and re-measure the power supplies. If the supplies are balanced with the opamp removed, the fault is in the feedback loop. Check the following components:

- Open emitter resistor (R15 & R16 on the MX 700, R501 & R502 on the MXa1000 and MXa 1500, R907 & R908 on the MXa 2000)
- The opamp (IC1 on the MX 700, U503 on the MXa 1000 and MXa 1500, U903 on the MXa 2000).
- The FET switches (none on the MX 700, Q503 & Q504 on the MXa 1000 and MXa 1500, Q906 & Q909 on the MXa 2000).

If the DC supplies remain offset with the opamp removed, inspect the +/-15VDC supplies. If either of these low voltage power supplies is at, or very near, 0 volts, the 15V zener, or the 15V filter capacitor, on the 15V op amp rails is shorted.

If both of the +/-15VDC supplies are above 3-4 volts the opamp, check the opamp second stage output voltage and the driver transistor base voltages. For example; if the output of the opamp is +1VDC or greater and the base of Q1 is between 0 and 0.5VDC, check the components in the bias circuit (or the opposite polarity components if the opamp output voltage is -1VDC).

If the +/- high voltage supplies are both near 0 volts, the power supply transformer or its connections may be defective. Inspect the AC voltage at the transformer secondary connections.

If the proper AC voltage is present on the secondary connections (these are given in your power supply wiring diagrams), inspect the supply fuse. If the AC voltage is still not present, the transformer wiring, or a power supply connector may be defective.

## Signal Amplification Problems

- **The amplifier has an unstable output.**

**NOTE:** Do not confuse instability with 120Hz noise in the signal, which evenly spreads the trace vertically. To find this signal, sync the oscilloscope to the AC line and reduce the scope sweep rate to 10mS range, to look for 60-120Hz hum frequencies.

Distinguish between instability (fuzziness), “ringing” which is momentary instability after a transition, “step” distortion, crossover distortion (both often show ringing), and “overall” distortion.

- Check feedback components located at the second stage of your op amp.
- Verify ground continuity between input audio ground, power ground and chassis ground.

The signal is usually distorted with signs of high frequency oscillation on the waveform. (The oscillation is usually worse on a particular part of the waveform.)

If the amplifier exhibits a severe oscillation, this is often affected by a change in the output impedance. If this is the case:

- Check capacitors (C2 on the MX700, C518, C519, C520, C523 on the MXa1000 and MXa 1500, C924, C925, C926, C927, on the MXa 2000).
- Substitute the IC and check the IC socket for contamination (IC1 on the MX700, U503 on the MXa 1000 and MXa 1500, U903 on the MXa 2000).

If the amplifier has an excessive crossover spike or oscillation at zero crossing. Check for:

- Shorted bias diodes (D1 & D2 on the MX 700, D505 & D506 on the MXa 1000 and MXa 1500, D903 & D910 on the MXa 2000).
- A defective trimpot (VR501 & VR601 on the MXa1000 and MXa1500, VR901 on the MXa2000, and TR3(a&b) on the MX700).
- Open pull-up resistors (R17 & R18 on the MX 700, R517 & R518 on the MXa1000 and MXa 1500, R917 & R922 on the MXa 2000) on the output devices.

If the distortion is present with no output no-load, verify that the feedback components are good.

- **The amplifier won't provide full power into a load.**

Look for:

- Defective FETs and/or FET drive circuitry.
- Short circuit current limits (VR502, VR503 & VR602, VR603 on the MXa1000 and MXa1500, VR902 & VR903 on the MXa2000, and TR1 & TR2 (a&b) on the MX700) that are set too low.
- Several open output transistors (Base-Emitter or Emitter-Collector).

**NOTE:** Check the driver transistor gain.

To test for this, check the voltage dropped across the output transistor emitter resistors with an input signal and an output load. Any resistor that has a significantly different voltage drop indicates a defect in the associated output transistor or the emitter resistor.

- **No output signal from a single channel with all power supplies balanced.**

This fault is often caused by a failure in the input circuitry. Look for:

- A defective op amp. It is not practical to test the IC, but it is possible to check for signal presence at the input and output terminals of the IC.
- A damaged or defective resistor network at the first stage differential op amp circuit.
- A defective input connector or input wiring multi-conductor cable.
- Defective relay and/or turn on circuit (except 700).

### Protection Circuit Problems

**NOTE:** The output of this amplifier is "AC coupled" through the filter capacitors. This eliminates the need for DC load protection. A "PTC" (Positive Temperature Coefficient) sensing resistor is mounted on the main heatsink. This component's resistance increases with increasing temperatures. When the resistance of these temperature dependent resistors increases to approximately 10k ohms, the protection circuit will eventually disable both channels.

The protection circuit functions within this board are muting, thermal, DC. For protection related problems observe the following:

- Broken solder connection or lead on the PTC.
- Open relay drive transistors (Q512, Q513 on the MXa1000 and MXa1500, Q915 & Q916 on the MXa2000, and none on the MX 700).
- Shorted driver transistor (Q501, Q502 on the MXa1000 and MXa1500, Q907 on the MXa2000, and Q1 & Q2 on the MX700).
- Defective relay or component in thermal shutdown or DC fault circuitry.

The MX 700 has a different protection scheme than that of the other MXa models. This circuit is simple. Problems will originate in the following areas.

- Q11 and/or Q12 open or shorted.
- LD3 open or leaky.
- D8 open.
- Z5 open, shorted, or leaky.

**MXa Series Parts List****MX700 Main Board Assembly**

Part Number	Description	Reference
CA-027100-BM	27PF, 100V, 10%, MICA	C2A,B
CA-110100-BM	100PF, 100V, 5%, MICA	C1A,B C6A,B
CA-168100-BD	680PF, 100V, 10%, DISK	C19A,B C20A,B
CA-222200-BP	.0022UF, 200V, 10%, MYLAR	C11A,B C4A,B
CA-322100-BP	.022UF, 100V, 10%, MYLAR	C18A,B C7A,B
CA-368100-BP	.068UF, 100V, 10%, MYLAR	C5A,B
CA-368250-AS	.068UF, 250V, SURGE CAP	C10
CA-547016-BN	4.7UF, 16V, RADIAL, NON-POLAR	C3A,B
CA-547160-BE	4.7UF, 160V, ELEC, RADIAL, 10%	C16
CA-647050-BE	47UF, 50V, ELEC., RADIAL, 10%	C17
CA-710035-BE	100UF, 35V, ELEC., RADIAL, 10%	C8A,B C9A,B
CA-822100-BE	2200UF, 100V, ELEC, RADIAL, 10%	C12-15A,B
CH-000622-BX	MX-700 HEAT SINK FAB	
CH-000624-AX	CLAMP TO-3 PL 6 FINGER	
CO-000000-ZT	Z-TABS WITH SUPPORTS	Z1 THRU 12
CO-000005-BS	5 POSITION BARRIER STRIP	J1
CO-000008-IC,	8 PIN IC SOCKET	IC1A,B
CO-300112-PJ	“.25” PHONE JACK PC MOUNT	CO1A,B
CO-641119-AH	8 PIN .156”/C HEADER	J2
HW-000007-HW	5MM FUSE CLIP	F1A,B
HW-000012-HW	3/4” STAMPED BRACKET W/#6	SW1 (REF)
HW-060100-SO	#6-32 X 1” STANDOFF INSULATED	
HW-060402-SP	7/8” X #8 SNAP-IN STANDOFF	J1
IC-005532-OP	5532 OP-AMP	IC1A,B
LB-100006-PC	PRODUCTION CONTROL LABEL SMALL 1	
MS-000048-HS	HEAT SINK, ISOL TO-220	REF:Q1A,B REF:Q2A,B F1A,B
MS-10.250-FU	250V 10A 5X20MM FUSE	
PC-000640-CX	MX-700 MAIN PCB	
PL-903125-SP	BIVAR 903-125 SPACER	LD1A,B
	R38A,B	
PL-905156-SP	SPACER, BIVAR 905-156	LD3
PL-905385-SP	BIVAR 905-385 SPACER	LD1A,B LD2
PL-909235-SP	BIVAR 909-235 SPACER	LD1A,B LD2
PT-125000-AT	250 OHM TRIMPOT	TR3A,B
PT-220000-AT	2K OHM TRIMPOT	TR1A,B
PT-250000-CR	5K OHM NOBLE RIGHT ANGLE POT	
QD-000004-TX	MPS-U05 TRANSISTOR, NPN	Q12
QD-000018-QD	2SC3298B DRIVER TRANSISTOR	Q1A,B
QD-000019-QD	2SA1306B DRIVER TRANSISTOR	Q2A,B
QD-000134-LG	GREEN T-1 3/4 LED, HLMP 3519	LD2
QD-000134-LR	RED T-1 3/4 LED, XC 4655	LD1A,B
QD-0003.9-ZT	3.9V TESTED ZENER	Z3A,B Z4A,B
QD-001302-PN	180V 12A TO3P TRANSISTOR	Q3-5A,B
QD-001340-LR	RED T-1 3/4 LED, UTILITY	LD3
QD-003281-NP	180V 12A TO3P TRANSISTOR	Q7-9A,B
QD-004004-DX	1N4004 DIODE	D10A,B D11A,B D6A,B D7A,B

QD-004744-ZA	1N4744A 15 VOLT ZENER DIODE	D8 Z1A,B Z2A,B Z5 12A,B 13A,B D4A,B,5A,B 1/4W., OR 8500-7 9T D1A,B 2A,B DIE P/N: Q11
QD-004934-DX	1N4934 DIODE	B2A,B B1A,B
QD-004934-VP	1N4934 VERTICAL PREP DIODE	R23-25A,B R27-29A,B R31A,B R15A,B R16A,B R44 DIE: 9610C PC1,PC2, R38A,B
QD-008599-TX	MPS 8599 TRANSISTOR, PNP	R32A,B
QD-1.5200-BX	1.5A 200 VOLT BRIDGE RECTIFIER	R17A,B R18A,B R36A,B
QD-400400-BX	40 AMP,400 VOLT, BR. RECTIFIER	
RE-.02205-FW	.22 OHM, 3WATT, WIREWOUND, 10%	R9A,B R5A,B R22A,B R10A,B
RE-.56005-EM	5.6 OHM, 2 WATT METAL OXIDE 5%	
RE-.68005-DM	6.8 OHM, 1 WATT, MET. OXIDE 5%	
RE-000009-VP	90 C PTC RESISTOR VERT. PREP.	R42 R20A,B R21A,B R34,41 R6A,B R39 R35
RE-000050-NR	SC-50 NTC RESISTOR	R40 R33 RN1A,B
RE-001005-EM	10 OHM, 2 WATT, METAL OXIDE 5%	
RE-002205-DM	22 OHM, 1 WATT, METAL OXIDE 5%	
RE-007505-BC	75 OHM, 1/4 WATT	
RE-010005-BC	100 OHM, 1/4 WATT, CARBON, 5%	
RE-020001-BM	200 OHM, 1/4 WATT, MET FILM 1%	
RE-045010-HW	450 OHM, 5 WATT, WIREWOUND 10%	
RE-082005-BC	820 OHM, 1/4 WATT, CARBON, 5%	
	R12A,B R13A,B	
RE-112005-HW	1.2K OHM, 5 WATT	
RE-124005-EM	2.4K OHM, 2 WATT MET. OXIDE 5%	
RE-168005-BC	6.8K OHM, 1/4 WATT, CARBON 5%	
RE-210001-BM	10.0K OHM, 1/4W., MET. FLM. 1%	
RE-210005-EM	10K OHM, 2 WATT, MET. OXIDE 5%	
RE-247005-BC	47K OHM, 1/4 WATT, CARBON 5%	
RE-247005-DM	47K OHM, 1W, 5% METAL OXIDE	
RE-310005-BC	100K OHM, 1/4 WATT. CARBON 5%	
RE-315005-BC	150K OHM, 1/4 WATT, CARBON 5%	
RN-210002-BM	10K OHM, 8 PIN, SIP	
SC-060041-PP	6-32 X 1/4” TYPE I PH PAN, BLK	
SC-081101-SP	#8-18,AB,5/8,TYPE 1 (PHIL) PH	
SW-000028-SW	55C THERMAL SWITCH N.O. TO-220,SW1	
WC-0.3022-JW	.3” JUMPER, WHITE, 22 GA SLD	W1,2,3,4 W10,13 W5,6,7,8, W12 W9
WC-0.6022-JW	6” JUMPER, WHITE, 22 GA, SLD	
WC-003051-TQ	12” 5 CONN FLEX CABLE	L1A,B
WC-2.2522-JW	2.25” JUMPER, WHT, 22 GA, SLD	
XF-200016-CR	2UH,16GA., COIL/VERTICAL	



**MX1000a Main Board Assembly**

Part Number	Description	Reference		REF: Q501
CA-015100-BD	15pF, 100V, 10%, DISK	C528,628	PL-903125-SP	R511 2PL
CA-018100-BM	18PF, 100V, 10%, MICA	C519,619	PL-905100-SP	R611 2PL
CA-068100-BD	68PF, 100V, 10%, DISK	C521,621	PL-905156-SP	D505,506
		C522,622		D605,606
CA-122100-BD	220PF,100V,10%,DISK	C527,627	PT-110000-AT	L501 2 PL
CA-210100-BP	.001uF, 100V, 10%, MYLAR	C503,506	PT-220000-AT	L601 2 PL
		C603,606		LD601
CA-222200-BP	.0022uF, 200V, 10%, MYLAR	C523,623	QD-000018-QD	REF: LD501
CA-310100-BP	.01uF, 100V, 10%, MYLAR	C508,608	QD-000019-QD	VR501,601
CA-322100-BP	.022UF,100V,10%,MYLAR	C524,624	QD-000031-QD	VR502,602
CA-410100-BP	.1UF, 100V, 10%, MYLAR	C501,601		VR503,603
		C505,605	QD-0004.7-ZT	Q502,602
		C513,613		Q501,601
		C514,614	QD-0007.5-ZT	Q503,504
CA-412100-CP	.12uF, 100V, 5%, MYLAR	C518,618	QD-000810-DX	Q603,604
CA-610035-BE	10uF, 35V, ELEC., RADIAL, 10%	C515,615		D511,611
CA-647010-BN	47uF, 10V, RADIAL, NON-POLAR		QD-0007.5-ZT	D514,614
C520,620			QD-000810-DX	D517,617
CA-647050-BE	47uF, 50V, ELEC., RADIAL, 10%	C504,604		D501,601
		C516,616	QD-001302-PN	D502,602
CA-722010-BN	220uF, 10V, RADIAL, NON-POLAR		QD-001340-LR	Q508-Q510
C517,617			QD-003281-NP	Q608-Q610
CA-722025-BE	220uF, 25V, ELEC., RADIAL, 10%		QD-004004-DX	LD501,601
C525,625				Q505-507
		C526,626	QD-004410-TX	Q605-607
CA-747010-BE	470uF, 16V, ELEC., RADIAL, 20%		QD-004744-ZA	D515,516
C507,607				D518,615
CA-915050-AE	15000 UF, 50V, ELEC. RAD. 20%		QD-004934-DX	D616,618
C509,609				Q511,611
		C510,610	QD-004934-DX	Q513,613
		C511,611		D509,609
		C512,612		D510,610
CH-000624-AX	CLAMP TO-3 PL 6 FINGER	ETC, Q605		D521,621
		ETC.		D522,622
		REF: Q505		D507,607
CH-400003-00	CLAMP TO-220 6 FINGER	ETC, Q601	QD-004934-VP	D508,608
		ETC.		D519,619
		REF: Q501		D520,620
CH-410008-00	EX/MX 2 SPACE HEATSINK		QD-005402-DX	D523,623
CO-000008-IC	8 PIN IC SOCKET	REF: U503		D524,624
		U603	QD-008599-TX	D505,605
CO-000033-CO	4 PIN HEADER, METER	J502 2 PL	QD-1.5200-BX	D506,606
		J602 2 PL	QD-400400-BX	D512,612
CO-000044-CO	HEADER 14 PIN .100 X .100	J503,603		D513,613
CO-000045-CO	.156 HEADER 4 PIN	J51	RE-.02205-FW	Q512,612
CO-000047-CO	HEADER, VERTICAL PIN, PCB, 6PIN	J501,601		BR503,603
		J52		BR501,601
HW-000007-HW	5MM FUSE CLIP	F501-F504		BR502,602
		F601-F604		R513-R515
		REF:		R519-R521
IC-000008-00	SMT MODULE, POS. STEP DRIVER	U501,601	RE-.27005-EM	R613-R615
IC-000009-00	SMT MODULE, NEG STEP DRIVER	U502,602		R619-R621
IC-005532-OP	5532 OP-AMP	U503,603	RE-.33005-DM	R504,604
LB-100007-PC	PRODUCTION CONTROL LABEL LARGE			R508,608
MS-15.125-MS	15A 125V 5MM X 20MM FUSE	F501-F504	RE-.56005-EM	R501,502
		F601-F604		R543,601
			RE-000009-VP	R602,643
NW-060010-SL	#6 SPLIT TOOTH LOCKWASHER		RE-000050-NR	R525,625
PL-000039-PL	TO-220 X 6 INSULATOR	ETC, Q601	RE-001005-EM	R516,616
		ETC.		R511,611
				R523,623
				R524,624
				R526,626

**MX1000a Main Board Assembly (cont.)**

Part Number	Description	Reference
		R527,627
RE-002205-DM	22 OHM, 1 WATT, METAL OXIDE 5%	R505,605 R506,606 R517,617 R518,618
RE-004705-BC	47 OHM, 1/4 WATT, CARBON, 5%	R544,644
RE-007505-DM	75 OHM 1 WATT METAL OXIDE 5%	R531,631
RE-015005-BC	150 OHM, 1/4 WATT, CARBON, 5%	R547,647
RE-027005-BC	270 OHM 1/4 WATT CARBON 5%	R533,633
RE-043201-BM	432 OHM, 1/4 WATT, MET.FILM,1%	R541,641
RE-045010-HW	450 OHM, 5 WATT, WIREWOUND 10%	R548,648
RE-110005-BC	1K OHM, 1/4 WATT, CARBON, 5%	R512,612 R522,622 R545,645
RE-115005-BC	1.5K OHM, 1/4 WATT, CARBON 5	R540,640
RE-130005-EM	3K OHM, 2 WATT, MET. OXIDE 5%	R510,610 R534,634 R537,637
RE-130005-HW	3K OHM, 5 WATT, WIREWOUND, 10%	R535,635 R536,636 R539,639 R546,646
RE-210005-EM	10K OHM, 2 WATT, MET. OXIDE 5%	R532,632
RE-212005-BC	12K OHM, 1/4 WATT 5% CARBON	R503,603 R507,607 R529,629
RE-221501-CM	21.5K OHM, 1/2 WATT, MET.FM 1%	R538,638
RE-222006-BM	22K OHM, 1 WATT, METAL OXIDE, 5%	R509,609
RE-275001-BM	75K OHM, 1/4 WATT, MET. FLM 1%	R542,642
RE-282005-BC	82K OHM 1/4 WATT CARBON 5%	R549,649
RE-333005-BC	330K OHM, 1/4 WATT, CARBON 5%	R528,628 R530,630
RN-122002-BM	2.2K OHM SIP	RN503,603
RN-210002-BM	10K OHM, 8 PIN, SIP	RN502,602
RN-310002-BM	100K OHM, 8 PIN, SIP	RN501,601
SC-062050-PP	#6 X 5/16" "B" P/P ZINC	
SC-081101-SP	#8-18, AB, 5/8, TYPE 1 (PHIL) PH	
SW-000029-SW	SPKR PROTECT RELAY, T-90 STYLE	K501,601
SW-000550-00	55 C THERMAL CUT-IN 25 DEG.ANG	
WC-0.5018-JW	.5" JUMPER, WHT., 18 GA, SOLID	W1
WC-0.6022-JW	.6" JUMPER, WHITE, 22 GA, SLD	W7-9
WC-1.2518-JW	1.25" JUMPER, WHITE 18 GA, SLD	W6,10,11
WC-2.0018-JW	2.00", 18GA, JUMPER	W2-5
XF-200014-CR	2UH, 14 GA, COIL/VERTICAL	L501,601

**MX1000a Chassis Assembly**

Part Number	Description	Reference
CH-004112-00	INPUT PANEL, LOWER MX SERIES	
CH-140210-BX	1400 KNOB FABRICATION	
CH-400016-00	BLANK UPPER INPUT PANEL	
CH-410000-00	CHASSIS, 2 SPACE, EX/MXA SERIES	
CH-410010-00	RACK EAR EX/MX 2 SPACE	
CO-000001-DB	DUAL BINDING POST	
CO-000004-CO	QD/RING TERMINAL	

HW-060090-SO	#6-32 X 9/16" HEX STANDOFF	
LB-004002-00	LBL, INPUT PNL, LWR, MXa SERIES	
LB-100000-CT	CHASSIS CONTROL TAG	
LB-100001-00	LABEL FACEPLATE MX 1000a	
LB-150002-00	LBL, OUTPUT, MXa	
LB-160225-00	SERIAL NUM GEN W OUTPUT PWR	
MS-100003-FN	MX 1500 115V, 50-60HZ, FAN	
NW-060410-ET	#6 EXTERNAL TOOTH LOCKWASHER	
NW-060500-KP	#6-32 KEPS NUT	
NW-062010-FW	#6 FLT WSHR, SAE, ZINC, 3/64 THK	
NW-080500-KP	#8-32 KEPS NUT	
NW-380803-HN	3/8" DRESS NUT	
NW-381023-FW	3/8" DRESS WASHER	
PL-000000-AF	ADHESIVE FEET	
PL-000003-CP	AC CORD PROTECTOR	
PL-000018-00	SHROUD, FAN	
PL-000019-00	PROTECTIVE BARRIER, MXa 2 SP	
PL-000032-PL	MX1500 FAN FINGER GUARD	
PL-000035-PL	NYLATCH STNDOFF 1/4 TURN .25LG	
PL-000042-PL	BUSHING, STRAIN RELIEF, INT., RD	
PL-000043-PL	STNDOFF, 1/4 TURN, .75LG, PCB MTG	
PL-000045-PL	RIVET, PLASTIC, SCREW TYPE	
PL-040601-PL	FLAT CABLE CLIPS	
SC-060042-PP	6-32 X 1/4" P/P ZINC, SEMS, IT	
SC-060081-PP	#6-32 X 1/2" P/P BLACK	
SC-080051-PS	#8-32 X 5/16" P/P SEMS BLACK	
SC-082051-PL	SCREW, TAP, PAN PH #8X5/16" "B" BK	
SC-100061-PS	#10-32 X 3/8" P/P SEMS BLACK	
SW-000016-SW	SPST SNAP IN POWER SWITCH	
WC-003010-TQ	QSC WIRE 3010, 3", BLACK	
WC-003070-00	AC POWER CORD ASSY EX/MX 2 SP	
WC-003071-00	WIRE ASSY, AC SWITCH	
WC-003074-00	WIRE ASSY, OUTPUT EX/MXA 2 SP	
WC-003076-00	WIRE ASSY, FAN MX A 2 SPACE	
WC-003086-00	WIRE ASSY, THERMOSTAT SW 2 SP	
XF-001010-00	MX 1000a TRANSFORMER	

**MX1500a Main Board Assembly**

Part Number	Description	Reference
CA-018100-BM	18PF, 100V, 10%, MICA	C519,619
CA-068100-BD	68PF, 100V, 10%, DISK	C521,621 C522,622
CA-122100-BD	220PF, 100V, 10%, DISK	C527,627
CA-210100-BP	.001UF, 100V, 10%, MYLAR C506,606	C503,603
CA-222200-BP	.0022UF, 200V, 10%, MYLAR	C523,623
CA-310100-BP	.01UF, 100V, 10%, MYLAR	C508,608
CA-322100-BP	.022UF, 100V, 10%, MYLAR	C524,624
CA-410100-BP	.1UF, 100V, 10%, MYLAR	C501,505 C513,514 C518,601 C605,613 C614,618
CA-610035-BE	10UF, 35V, ELEC., RADIAL, 10%	C515,615
CA-647010-BN	47UF, 10V, RADIAL, NON-POLAR	C520,620
CA-647050-BE	47UF, 50V, ELEC., RADIAL, 10%	C504,604 C516,616
CA-722010-BN	220UF, 10V, RADIAL, NON-POLAR	C517,617
CA-722025-BE	220UF, 25V, ELEC., RADIAL, 10%	C525,625 C526,626

# MXa Amplifier Series

# Parts Lists

CA-747010-BE	470uF, 16V, ELEC., RADIAL, 20%	C507,607			D521,621
CA-915050-AE	15000 uF, 50V, ELEC. RAD. 20%	C509-C512			D522,622
C609-C612					D507,607
CH-000624-AX	CLAMP TO-3 PL 6 FINGER	ETC, Q605		QD-004934-DX	1N4934 DIODE
		ETC.			D508,608
		REF: Q505			D519,619
CH-004111-00	HEATSINK, EXTRUSION EX/MXa 2 SP 1				D520,620
CH-400003-00	CLAMP TO-220 6 FINGER	ETC, Q601			D523,623
		ETC.		QD-004934-VP	1N4934 VERTICAL PREP DIODE
		REF: Q501			D505,605
CO-000008-IC	8 PIN IC SOCKET, REF: U503				D506,606
		U603		QD-005402-DX	1N5402 DIODE
CO-000033-CO	4 PIN HEADER, METER	J502 2 PL			D513,613
		J602 2 PL		QD-008599-TX	MPS 8599 TRANSISTOR, PNP
CO-000044-CO	HEADER 14 PIN .100 X .100	J503,603		QD-1.5200-BX	1.5A 200 VOLT BRIDGE RECTIFIER
CO-000045-CO	.156 HEADER 4 PIN	J51		QD-400400-BX	40 AMP,400 VOLT, BR. RECTIFIER
CO-000047-CO	HEADER, VERTICAL PIN, PCB, 6PIN	J501,601			BR501,601
		J52		RE-.02205-FW	.22 OHM, 3WATT, WIREWOUND, 10%
HW-000007-HW	5MM FUSE CLIP	F501-F504			R513-R515
		F601-F604			R519-R521
		REF:		RE-.27005-EM	2.7 OHM, 2 WATT, METAL OX, 5%
IC-000008-00	SMT MODULE, POS. STEP DRIVER	U501,601			R504,604
IC-000009-00	SMT MODULE, NEG STEP DRIVER	U502,602		RE-.33005-DM	3.3 OHM, 1 WATT, METL OXIDE 5%
IC-005532-OP	5532 OP-AMP	U503,603			R508,608
LB-100007-PC	PRODUCTION CONTROL LABEL LARGE				R501,601
MS-15.125-MS	15A 125V 5MM X 20MM FUSE	F501-F504			R502,602
		F601-F604		RE-.56005-EM	5.6 OHM, 2 WATT METAL OXIDE 5%
				RE-000009-VP	90 C PTC RESISTOR VERT. PREP.
NW-060010-SL	#6 SPLIT TOOTH LOCKWASHER			RE-000050-NR	SC-50 NTC RESISTOR
PL-000039-PL	TO-220 X 6 INSULATOR	ETC, Q601		RE-001005-EM	10 OHM, 2 WATT, METAL OXIDE 5%
		ETC.			R511,611
		REF: Q501			R523,623
PL-903125-SP	BIVAR 903-125 SPACER	R511 2PL			R524,624
		R611 2PL		RE-002205-DM	22 OHM, 1 WATT, METAL OXIDE 5%
PL-905100-SP	BIVAR 905-100 SPACER	D505,506			R505,605
		D605,606			R506,606
PL-905156-SP	SPACER, BIVAR 905-156	L501 2 PL			R517,617
		L601 2 PL		RE-004705-BC	47 OHM, 1/4 WATT, CARBON, 5%
		LD601		RE-012005-DM	120 OHM, 1 WATT, MET. OXIDE 5%
		REF: LD501		RE-015005-BC	150 OHM, 1/4 WATT, CARBON, 5%
PT-110000-AT	100 OHM TRIMPOT	VR501,601		RE-027005-BC	270 OHM 1/4 WATT CARBON 5%
PT-220000-AT	2K OHM TRIMPOT	VR502,602		RE-033201-BM	332 OHM, 1/4 WATT, MET.FILM,1%
		VR503,603		RE-045010-HW	450 OHM, 5 WATT, WIREWOUND 10%
QD-000018-QD	2SC3298B DRIVER TRANSISTOR	Q502,602		RE-110005-BC	1K OHM, 1/4 WATT, CARBON, 5%
QD-000019-QD	2SA1306B DRIVER TRANSISTOR	Q501,601			R512,612
QD-000031-QD	FET SWITCH, 60V, 50A	Q503,603			R522,622
		Q504,604		RE-130005-EM	3K OHM, 2 WATT, MET. OXIDE 5%
QD-0004.7-ZT	4.7V TESTED ZENER	D511,611			R545,645
		D514,614			R510,610
QD-0007.5-ZT	7.5V TESTED ZENER	D517,617		RE-135005-HW	3.5K OHM, 5 WATT WIREWOUND 10%
QD-000810-DX	TO-220 8A/100V DIODE, FAST	D501,601			R534,634
		D502,602			R537,637
QD-001302-PN	180V 12A TO3P TRANSISTOR	Q508-Q510			R535,635
		Q608-Q610		RE-147005-BC	4.7K OHM, 1/4 WATT, CARBON, 5%
QD-001340-LR	RED T-1 3/4 LED, UTILITY	LD501,601		RE-210005-EM	10K OHM, 2 WATT, MET. OXIDE 5%
QD-003281-NP	180V 12A TO3P TRANSISTOR	Q505-507		RE-212005-BC	12K OHM, 1/4 WATT 5% CARBON
		Q605-607			R503,603
QD-004004-DX	1N4004 DIODE	D515,516			R507,607
		D518,615		RE-221501-CM	21.5K OHM, 1/2 WATT, MET.FM 1%
		D616,618		RE-222006-BM	22K OHM, 1 WATT, METAL OXIDE,5%
QD-004410-TX	2N4410, TRANSISTOR, NPN, TO-92	Q511,611		RE-275001-BM	75K OHM, 1/4 WATT, MET. FLM 1%
		Q513,613		RE-310005-BC	100K OHM, 1/4 WATT. CARBON 5%
QD-004744-ZA	1N4744A 15 VOLT ZENER DIODE	D509,609		RE-339005-BC	390K OHM, 1/4 WATT, CARBON 5%
		D510,610			R528,628
					R530,630
				RN-122002-BM	2.2K OHM SIP
					RN503,603



## MX1500a Main Board Assembly (cont.)

Part Number	Description	Reference
RN-210002-BM	10K OHM, 8 PIN, SIP	RN502,602
RN-310002-BM	100K OHM, 8 PIN, SIP	RN501,601
SC-062050-PP	#6 X 5/16" "B" P/P ZINC	
SC-081101-SP	#8-18, AB, 5/8, TYPE 1 (PHIL) PH	
SW-000029-SW	SPKR PROTECT RELAY, T-90 STYLE	K501,601
SW-000550-00	55 C THERMAL CUT-IN 25 DEG.ANG	
WC-0.5018-JW	.5" JUMPER, WHT., 18 GA, SOLID	W1
WC-0.6022-JW	.6" JUMPER, WHITE, 22 GA, SLD	W7-9
WC-1.2518-JW	1.25" JUMPER, WHITE 18 GA, SLD	W6,10,11
WC-2.0018-JW	2.00", 18GA, JUMPER	W2-5
XF-200014-CR	2UH, 14 GA, COIL/VERTICAL	L501,601

## MX1500a Chassis Assembly

Part Number	Description	Reference
CH-004112-00	INPUT PANEL, LOWER MX SERIES	
CH-140210-BX	1400 KNOB FABRICATION	
CH-400016-00	BLANK UPPER INPUT PANEL	
CH-410000-00	CHASSIS, 2 SPACE,EX/MXA SERIES	
CH-410010-00	RACK EAR EX/MX 2 SPACE	
CO-000001-DB	DUAL BINDING POST	
CO-000004-CO	QD/RING TERMINAL	
HW-060090-SO	#6-32 X 9/16" HEX STANDOFF	
LB-004002-00	LBL,INPUT PNL,LWR,MXA SERIES	
LB-100000-CT	CHASSIS CONTROL TAG	
LB-150001-00	LABEL FACEPLATE MX 1500A	
LB-150002-00	LBL, OUTPUT, MX-A	
LB-160225-00	SERIAL NUM GEN W OUTPUT PWR	
MS-100003-FN	MX 1500 115V, 50-60HZ, FAN	
NW-060410-ET	#6 EXTERNAL TOOTH LOCKWASHER	
NW-060500-KP	#6-32 KEPS NUT	
NW-062010-FW	#6 FLT WSHR,SAE,ZINC,3/64 THK	
NW-080500-KP	#8-32 KEPS NUT	
NW-380803-HN	3/8" DRESS NUT	
NW-381023-FW	3/8" DRESS WASHER	
PL-000000-AF	ADHESIVE FEET	
PL-000003-CP	AC CORD PROTECTOR	
PL-000018-00	SHROUD, FAN	
PL-000019-00	PROTECTIVE BARRIER, MXa 2 SP	
PL-000032-PL	MX1500 FAN FINGER GUARD	
PL-000035-PL	NYLATCH STNDOFF 1/4 TURN .25LG	
PL-000042-PL	BUSHING,STRAIN RELIEF,INT., RD	
PL-000043-PL	STNDOFF,1/4TURN,.75LG, PCB MTG	
PL-000045-PL	RIVET, PLASTIC, SCREW TYPE	
PL-040601-PL	FLAT CABLE CLIPS	
SC-060042-PP,	6-32 X 1/4" P/P ZINC, SEMS, IT	
SC-060081-PP	#6-32 X 1/2" P/P BLACK	
SC-080051-PS	#8-32 X 5/16" P/P SEMS BLACK	
SC-082051-PL	SCREW, TAP, PAN PH #8X5/16" "B" BK	
SC-100061-PS	#10-32 X 3/8" P/P SEMS BLACK	
SW-000016-SW	SPST SNAP IN POWER SWITCH	
WC-003010-TQ	QSC WIRE 3010, 3", BLACK	
WC-003070-00	AC POWER CORD ASSY EX/MX 2 SP	
WC-003071-00	WIRE ASSY, AC SWITCH	

WC-003074-00	WIRE ASSY, OUTPUT EX/MXa 2 SP
WC-003076-00	WIRE ASSY, FAN MXa 2 SPACE
WC-003086-00	WIRE ASSY, THERMOSTAT SW 2 SP
XF-001510-00	MX 1500a TRANSFORMER

## MX2000a Main Board Assembly

Part Number	Description	Reference
CA-018100-BM	18PF, 100V, 10%, MICA	C925
CA-068100-BD	68PF, 100V, 10%, DISK	C922, 923
CA-122100-BD	220PF, 100V, 10%, DISK	C931
CA-210100-BP	.001uF, 100V, 10%, MYLAR	C902, 916
CA-222200-BP	.0022uF, 200V, 10%, MYLAR	C926
CA-310100-BP	.01uF, 100V, 10%, MYLAR	C908
CA-322100-BP	.022uF, 100V, 10%, MYLAR	C930
CA-410100-BP	.1uF, 100V, 10%, MYLAR	C907, 909 C917,921
CA-412100-CP	.12uF, 100V, 5%, MYLAR	C927
CA-610035-BE	10uF, 35V, ELEC., RADIAL, 10%	C919
CA-647010-BN	47uF, 10V, RADIAL, NON-POLAR	C924
CA-647050-BE	47uF, 50V, ELEC., RADIAL, 10%	C920, 901
CA-722010-BN	220uF, 10V, RADIAL, NON-POLAR	C918
CA-722025-BE	220uF, 25V, ELEC., RADIAL, 10%	C928, 929
CA-747010-BE	470uF, 16V, ELEC., RADIAL, 20%	C915
CA-912063-AE	12,000uF, 63V, ELEC; RAD, 20%	C903-906 C911-914
CH-000624-AX	CLAMP TO-3 PL 6 FINGER	ETC. REF: Q901
CH-400003-00	CLAMP TO-220 6 FINGER	ETC. REF: Q906
CH-400008-00	EX-4000 EXTRU & FAB HEATSINK	
CO-000008-IC	8 PIN IC SOCKET	REF: U903
CO-000033-CO	4 PIN HEADER, METER	J903 2 PL
CO-000041-CO	PCB MOUNT 12 PIN HEADER ASSY	J901
CO-000055-CO	14 PIN HEADER/LOCKING STD.	J902
IC-000008-00	SMT MODULE, POS. STEP DRIVER	U901
IC-000009-00	SMT MODULE, NEG STEP DRIVER	U902
IC-005532-OP	5532 OP-AMP	U903
LB-100007-PC	PRODUCTION CONTROL LABEL LARGE	
NW-060010-SL	#6 SPLIT TOOTH LOCKWASHER	
PC-002010-00	MX 2000A MAIN PCB	
PL-000039-PL	TO-220 X 6 INSULATOR	ETC. REF: Q906
PL-903125-SP	BIVAR 903-125 SPACER	D910 R921 2 PL REF: D903
PL-905156-SP	SPACER, BIVAR 905-156	L901 2 PL LD901
PT-110000-AT	100 OHM TRIMPOT	VR901
PT-220000-AT	2K OHM TRIMPOT	VR902, 903
QD-000018-QD	2SC3298B DRIVER TRANSISTOR	Q907
QD-000019-QD	2SA1306B DRIVER TRANSISTOR	Q908
QD-000023-QD	IN5955, 180V ZENER, 1.5W	D906, 907
QD-000031-QD	FET SWITCH, 60V, 50A	Q906, 909
QD-0004.7-ZT	4.7V TESTED ZENER	D919, 920
QD-0007.5-ZT	7.5V TESTED ZENER	D913
QD-000810-DX	TO-220 8A/100V DIODE,FAST	D904, 905
QD-001302-PN	180V 12A TO3P TRANSISTOR	Q901-905
QD-001340-LR	RED T-1 3/4 LED, UTILITY	LD901
QD-003281-NP	180V 12A TO3P TRANSISTOR	Q910-914





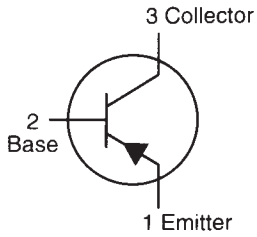
QD-004004-DX	1N4004 DIODE	D914-916	CH-400010-00	EX-4000 RACK EAR
QD-004148-DX	DIODE 1N4148	D908,909	CH-400016-00	BLANK UPPER INPUT PANEL
QD-004410-TX	2N4410, TRANSISTOR, NPN, TO-92	C915,917	CH-420000-00	CHASSIS 3 SPACE, EX/MX SERIES
QD-004744-ZA	1N4744A 15 VOLT ZENER DIODE	D902,912	CO-000001-DB	DUAL BINDING POST
		D923,924	HW-060000-HW	#6-32 x 9/16", NYLON STANDOFF
QD-004934-DX	1N4934 DIODE	D917,918	HW-060090-SO	#6-32 X 9/16", HEX STANDOFF
		D921,922	HW-080002-HW	#8-32 x 2.5", HEX STANDOFF
		D925,926	LB-004002-00	LBL, INPUT PNL, LWR, MXa SERIES
QD-004934-VP	1N4934 VERTICAL PREP DIODE	D903,910	LB-100000-CT	CHASSIS CONTROL TAG
QD-005402-DX	1N5402 DIODE	D901,911	LB-150002-00	LBL, OUTPUT, MXa
QD-008599-TX	MPS 8599 TRANSISTOR, PNP	Q916	LB-160225-00	SERIAL NUM GEN W OUTPUT PWR
QD-1.5200-BX	1.5A 200 VOLT BRIDGE RECTIFIER	BR903	LB-200001-00	LABEL FACEPLATE MX 2000a
QD-400400-BX	40 AMP,400 VOLT, BR. RECTIFIER	BR901,902	MS-100004-FN	MX 2000 FAN, 4.7", 115V
RE-.02205-FW	.22 OHM, 3WATT, WIREWOUND, 10%	R901-905	MS-100005-FG	MX 2000 FAN GUARD
		R910-914	NW-060410-ET	#6 EXTERNAL TOOTH LOCKWASHER
RE-.27005-EM	2.7 OHM, 2 WATT, METAL OX, 5%	R906,909	NW-060500-KP	#6-32 KEPS NUT
RE-.33005-DM	3.3 OHM, 1 WATT, METL OXIDE 5%	R908	NW-062010-FW	#6 FLT WSHR,SAE,ZINC,3/64 THK
		R939,907	NW-080001-NW	#8 EXT TOOTH LOCKWASHER, ZINC
RE-.56005-EM	5.6 OHM, 2 WATT METAL OXIDE 5%	R944	NW-080500-KP	#8-32 KEPS NUT
RE-000009-VP	90 C PTC RESISTOR VERT. PREP.	R915	NW-380803-HN	3/8" DRESS NUT
RE-000050-NR	SC-50 NTC RESISTOR	R921	NW-381023-FW	3/8" DRESS WASHER
RE-001005-EM	10 OHM, 2 WATT, METAL OXIDE 5%	R930,931	PL-000000-AF	ADHESIVE FEET
		R942,943	PL-000003-CP	AC CORD PROTECTOR
RE-002205-DM	22 OHM, 1 WATT, METAL OXIDE 5%	R916,917	PL-000015-PL	SMALL CABLE CLIP
		R922,923	PL-000038-PL	INSULATOR AC PCB
RE-004705-BC	47 OHM, 1/4 WATT, CARBON, 5%	R941	PL-000044-PL	BUSHING, STRAIN RELIEF
RE-015005-BC	150 OHM, 1/4 WATT, CARBON, 5%	R953	PL-905156-SP	SPACER, BIVAR 905-156
RE-022005-DM	220 OHM 1 WATT METAL OXIDE 5%	R935	SC-060042-PP	6-32 X 1/4" P/P ZINC, SEMS, IT
RE-027005-BC	270 OHM 1/4 WATT CARBON 5%	R936	SC-060081-PP	#6-32 X 1/2" P/P BLACK
RE-028001-BM	280 OHM, 1/4 WATT, MET. FILM, 1%	R952	SC-080051-PS	#8-32 X 5/16" P/P SEMS BLACK
RE-045010-HW	450 OHM, 5 WATT, WIREWOUND 10%	R945	SC-082051-PL	SCREW, TAP, PAN PH #8X5/16" "B" BK
RE-110005-BC	1K OHM, 1/4 WATT, CARBON, 5%	R951,956	SC-082120-PP	#8-16 X 3/4" P/P B PT
RE-110005-BC	1K OHM, 1/4 WATT, CARBON, 5%	R957	SC-100061-PS	#10-32 X 3/8" P/P SEMS BLACK
RE-130005-EM	3K OHM, 2 WATT, MET. OXIDE 5%	R919,925	SW-000027-SW	DPST AC SWITCH
		R937	WC-003010-TQ	QSC WIRE 3010, 3", BLACK
RE-182005-EM	8.2K OHM, 2W, MET. OXIDE 5%	R926-929	WC-003042-AX	MX 2000 CH 1 SPKR WIRE ASSY
		R946-949	WC-003043-AX	MX 2000 CH 2 SPKR WIRE ASSY
RE-210005-BC	10K OHM, 1/4 WATT, CARBON 5%	R950	WC-003053-00	AC CORD, PREPPED
RE-210005-EM	10K OHM, 2 WATT, MET. OXIDE 5%	R932	WC-003060-00	AC SWITCH WIRE, RED/BLACK
RE-212005-BC	12K OHM, 1/4 WATT 5% CARBON	R920,924	WC-003061-00	AC SWITCH WIRE, RED, 13.62"
		R938	WC-003062-00	AC SWITCH WIRE, RED. 6.12"
RE-221501-CM	21.5K OHM, 1/2 WATT, MET.FM 1%	R954	WC-003085-00	WIRE ASSY FAN AC MX A 3 SPACE
RE-222006-BM	22K OHM,1 WATT,METAL OXIDE,5%	R918	WC-003087-00	WIRE ASSY, THERMOSTAT SW 3 SP
RE-260401-BM	60.4K OHM, 1/4 WATT, MET.FM 1%	R955	XF-002010-00	MX 2000A TRANSFORMER
RE-312005-BC	120K OHM, 1/4 WATT, CARBON 5%	R940		
RE-339005-BC	390K OHM, 1/4 WATT, CARBON 5%	R933,934		
RN-122002-BM	2.2K OHM SIP	RN903		
RN-210002-BM	10K OHM, 8 PIN, SIP	RN902		
RN-310002-BM	100K OHM, 8 PIN, SIP	RN901		
SC-062050-PP	#6 X 5/16" "B" P/P ZINC			
SC-081101-SP	#8-18, AB, 5/8, TYPE 1 (PHIL) PH			
SW-000029-SW	SPKR PROTECT RELAY, T-90 STYLE	K901		
SW-000550-00	55 C THERMAL CUT-IN 25 DEG. ANG			
XF-200014-CR	2UH, 14 GA, COIL/VERTICAL	L901		

## MX2000a Chassis Assembly

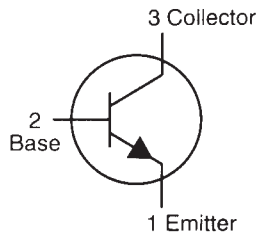
Part Number	Description	Reference
CH-004112-00	INPUT PANEL, LOWER MX SERIES	
CH-140210-BX	1400 KNOB FABRICATION	

**Semiconductors**

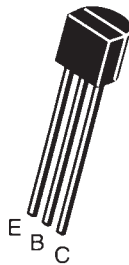
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**MPS8599**  
PNP



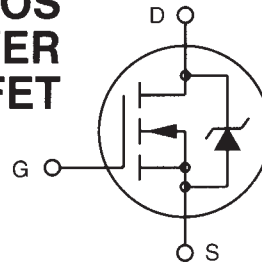
**2N4409**  
**2N4410**  
NPN



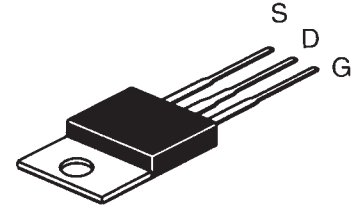
SMALL SIGNAL  
TRANSISTORS



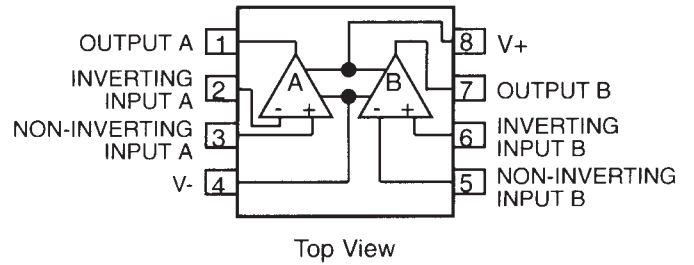
**TMOS  
POWER  
FET**



**MTP50N6E**

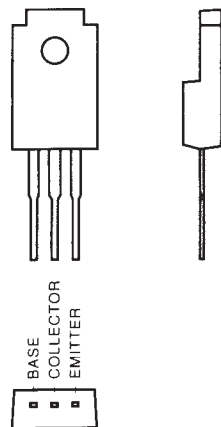


**NE5532AN OP AMP**



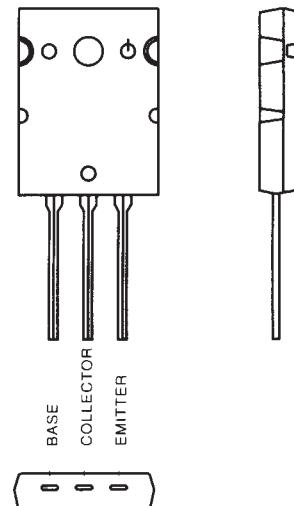
**DRIVER  
TRANSISTORS**

**2SA1306** PNP  
**2SC3298** NPN

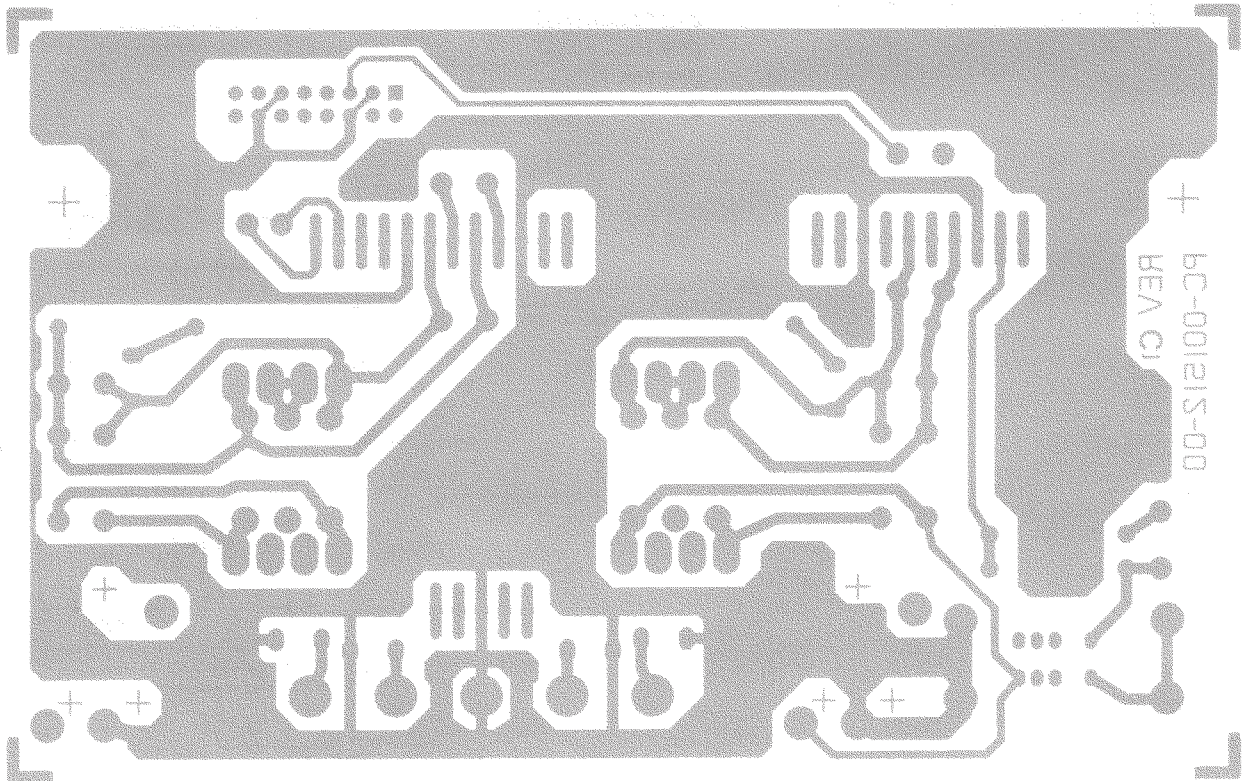
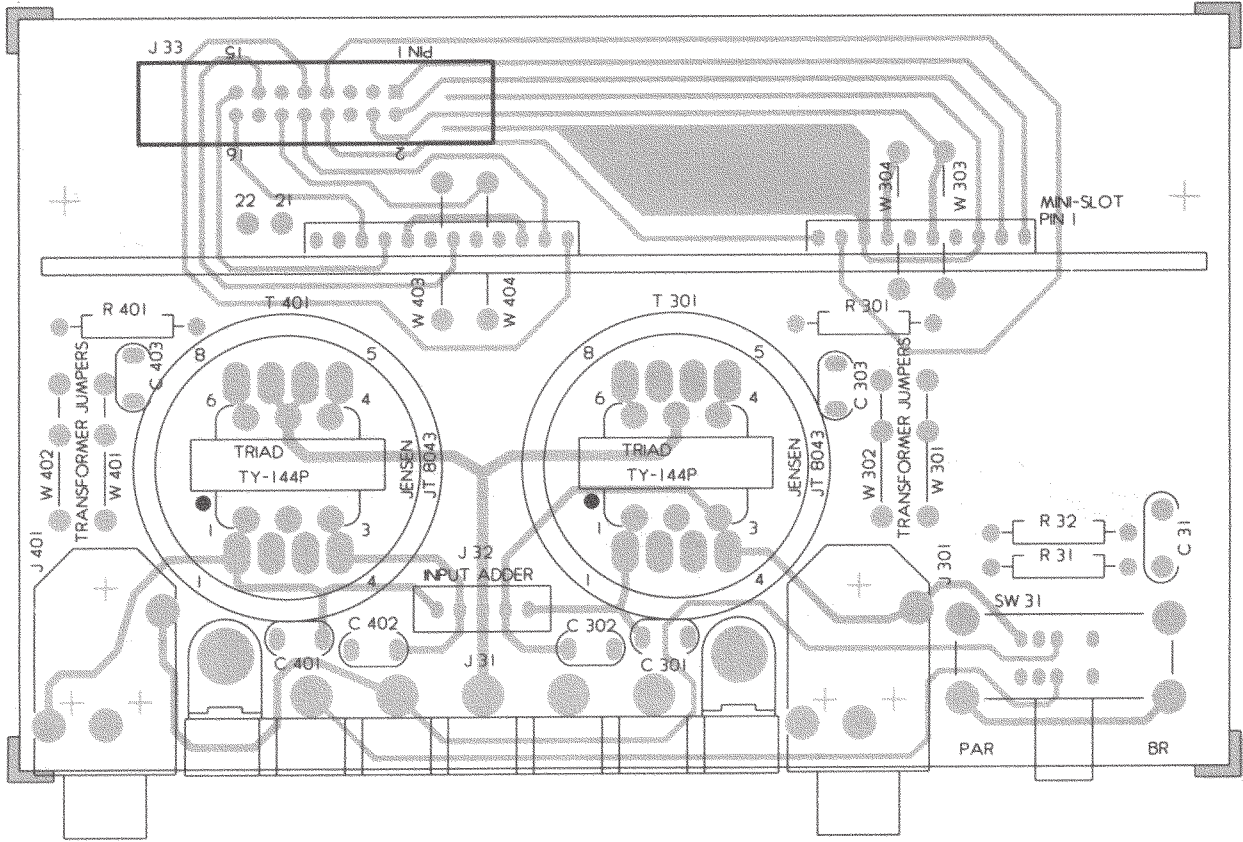


**POWER  
TRANSISTORS**

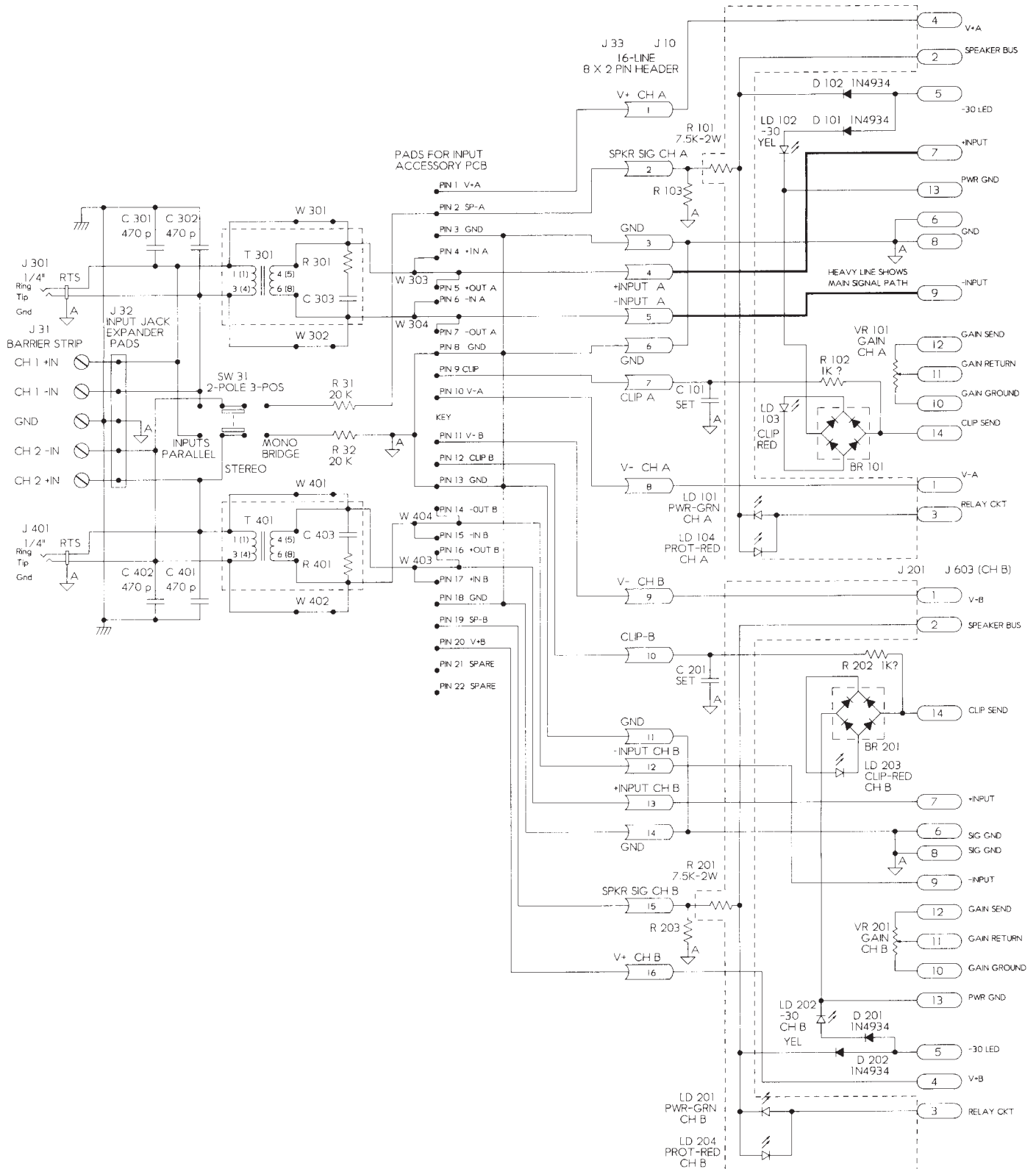
**2SA1302** PNP  
**2SC3281** NPN



# Input PCB Trace Layout

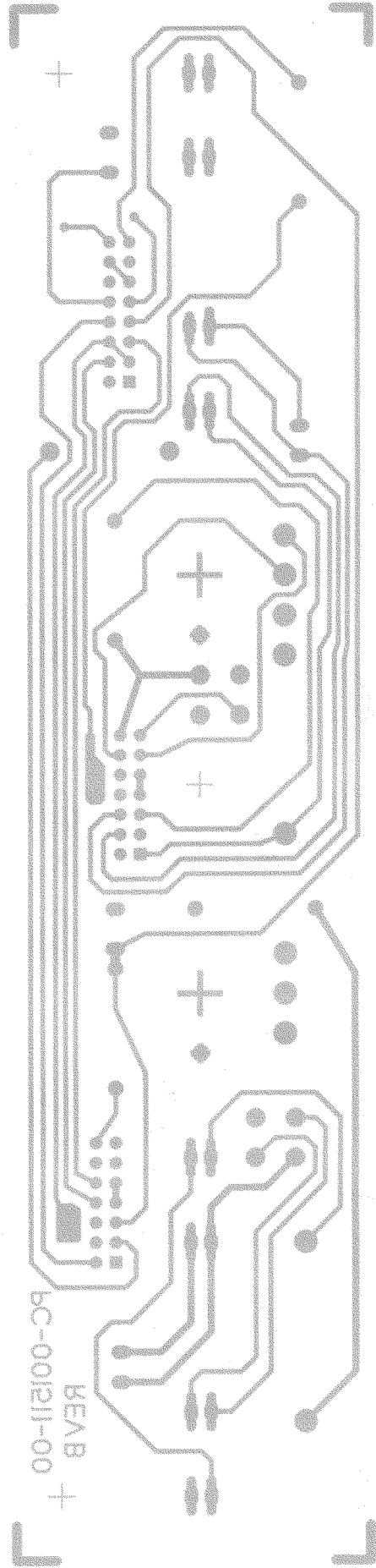
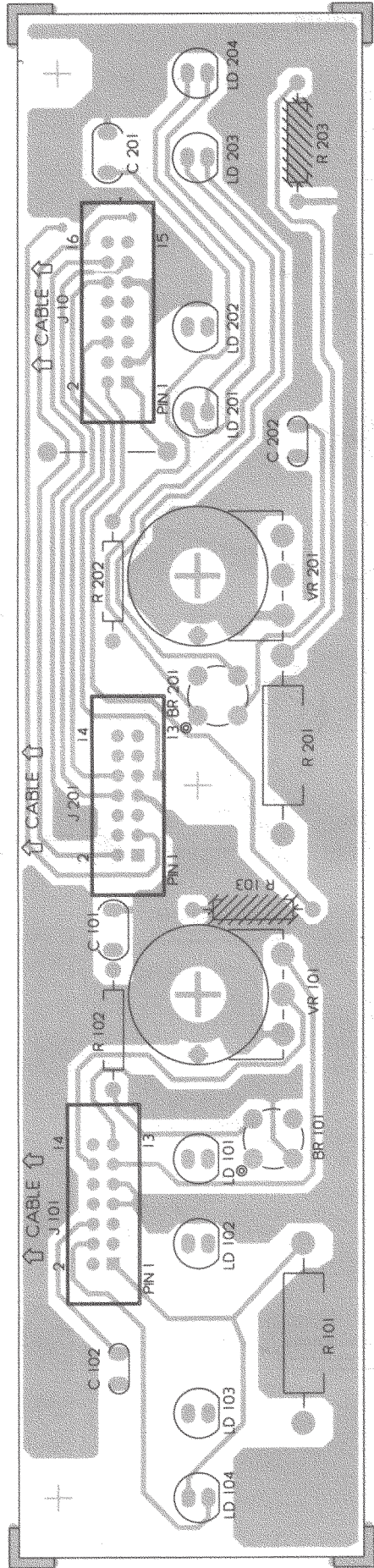


# Input PCB & Display PCB Schematic

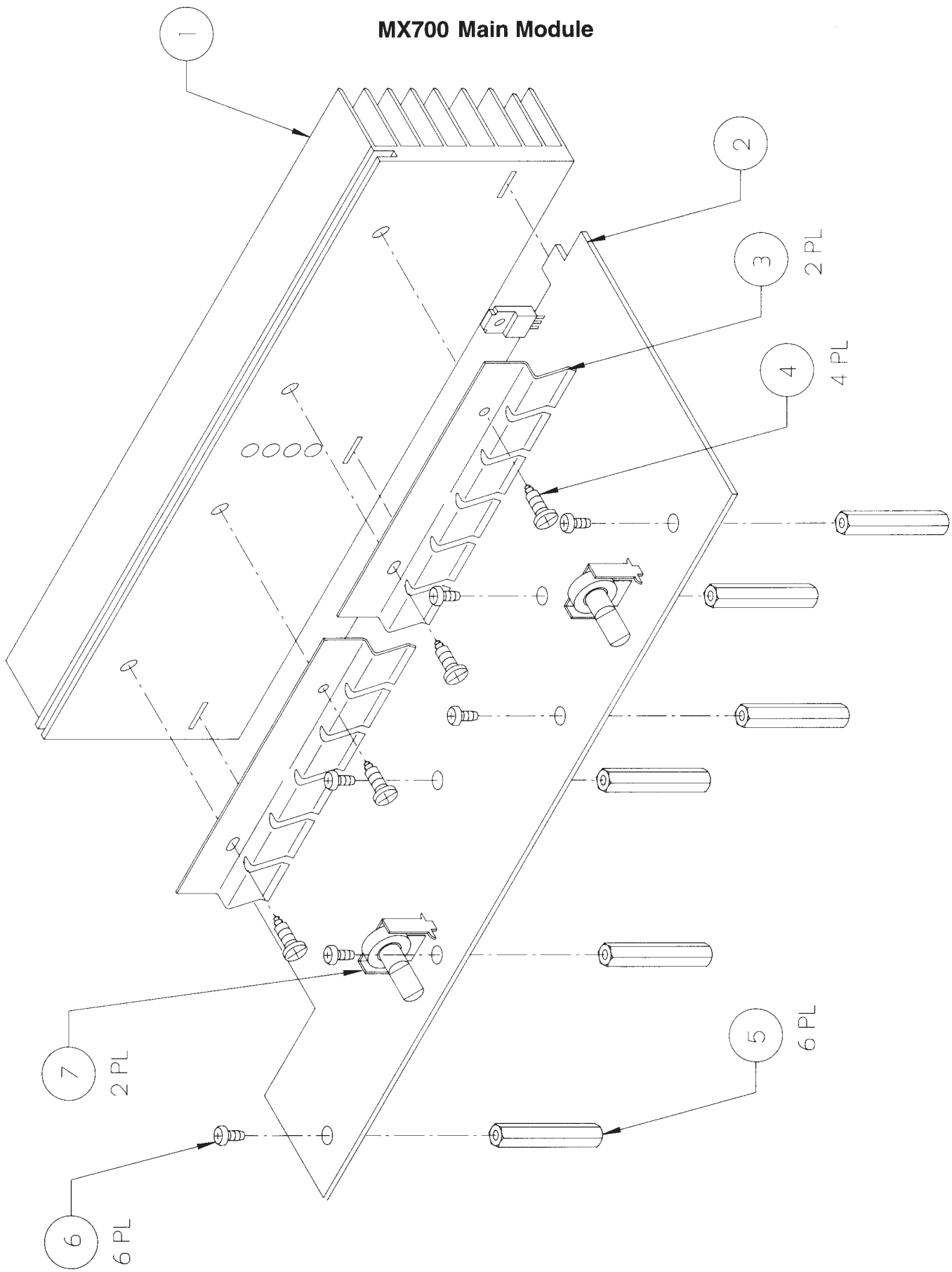




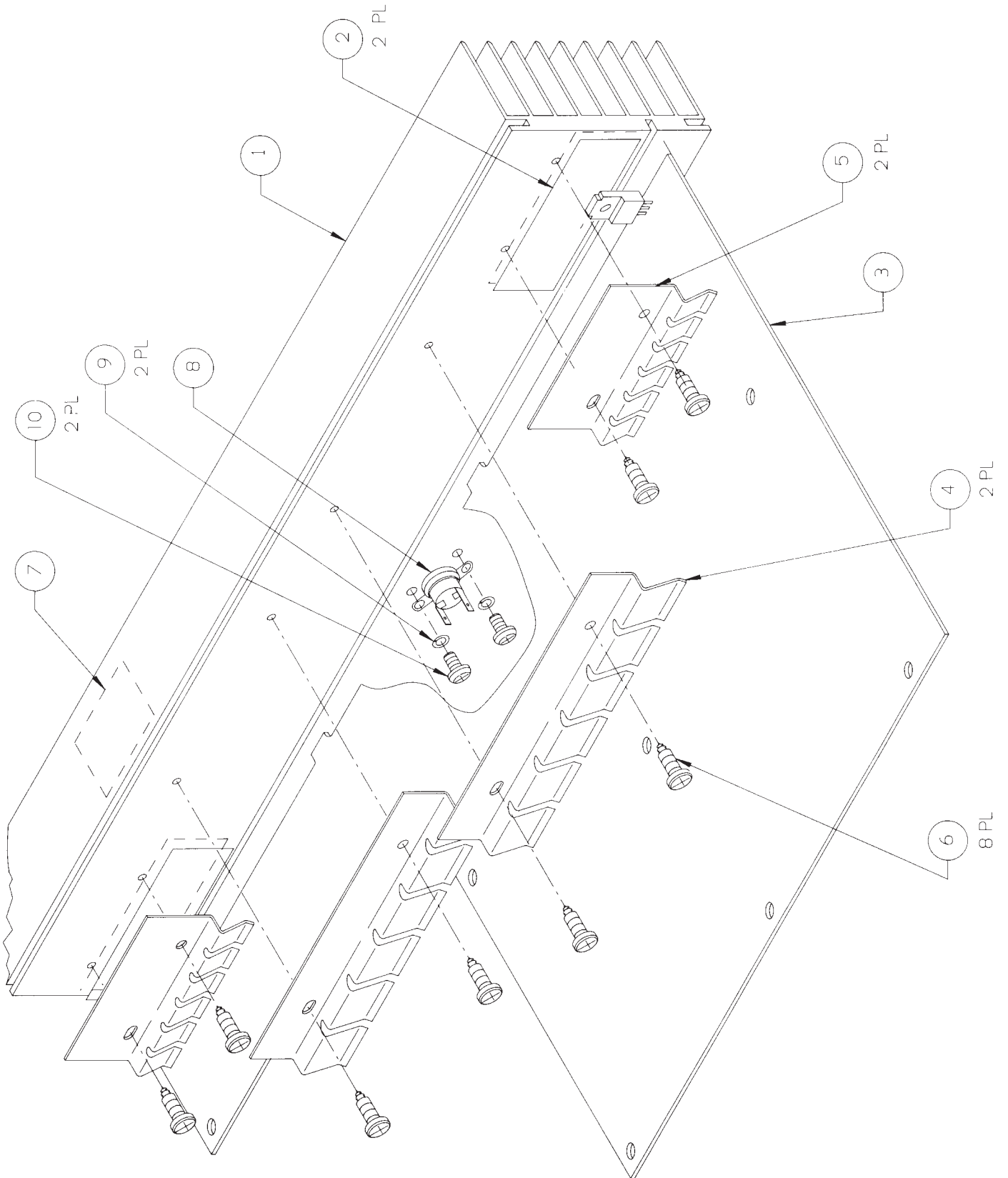
# Display PCB Trace Layout



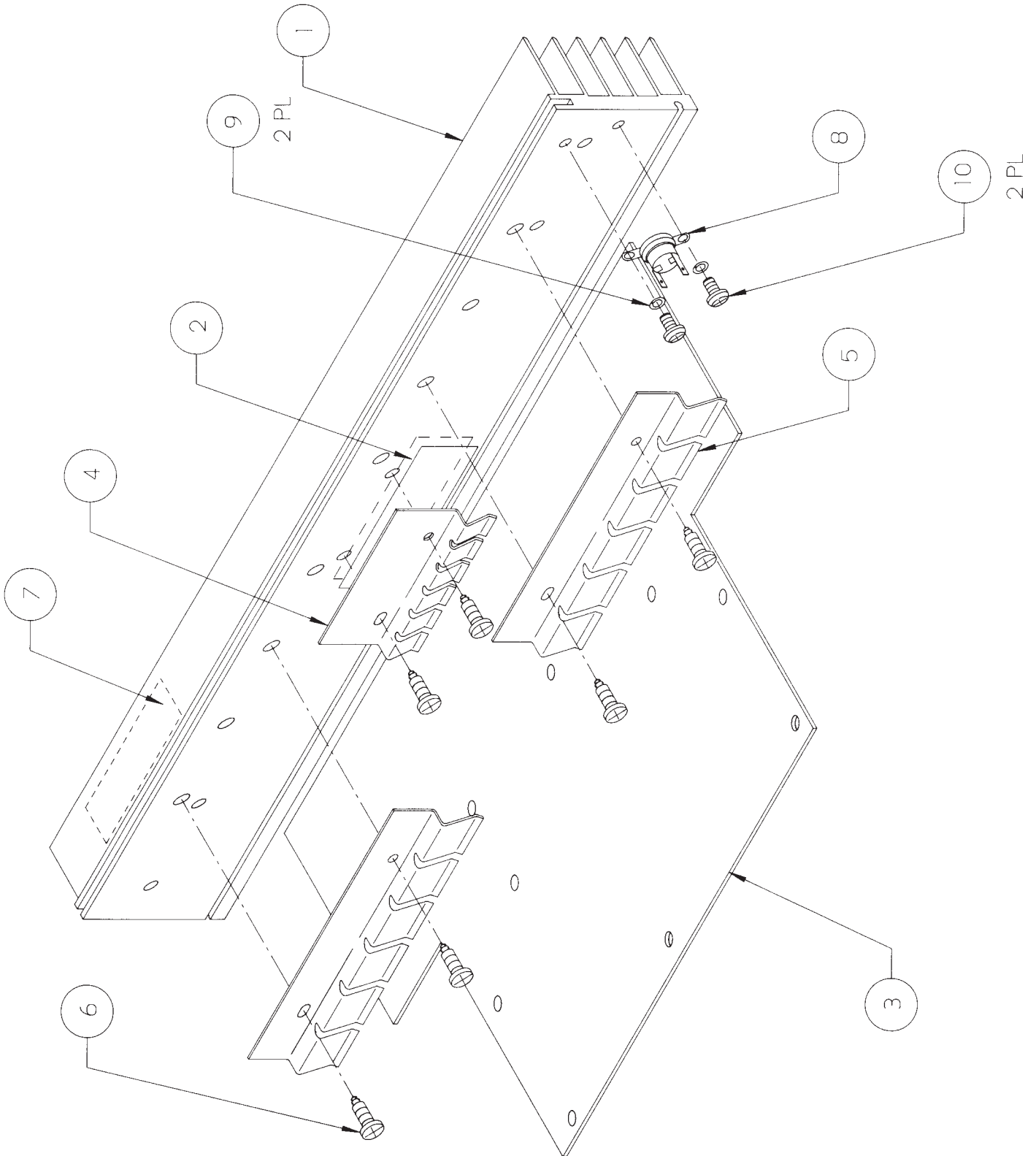
### MX700 Main Module



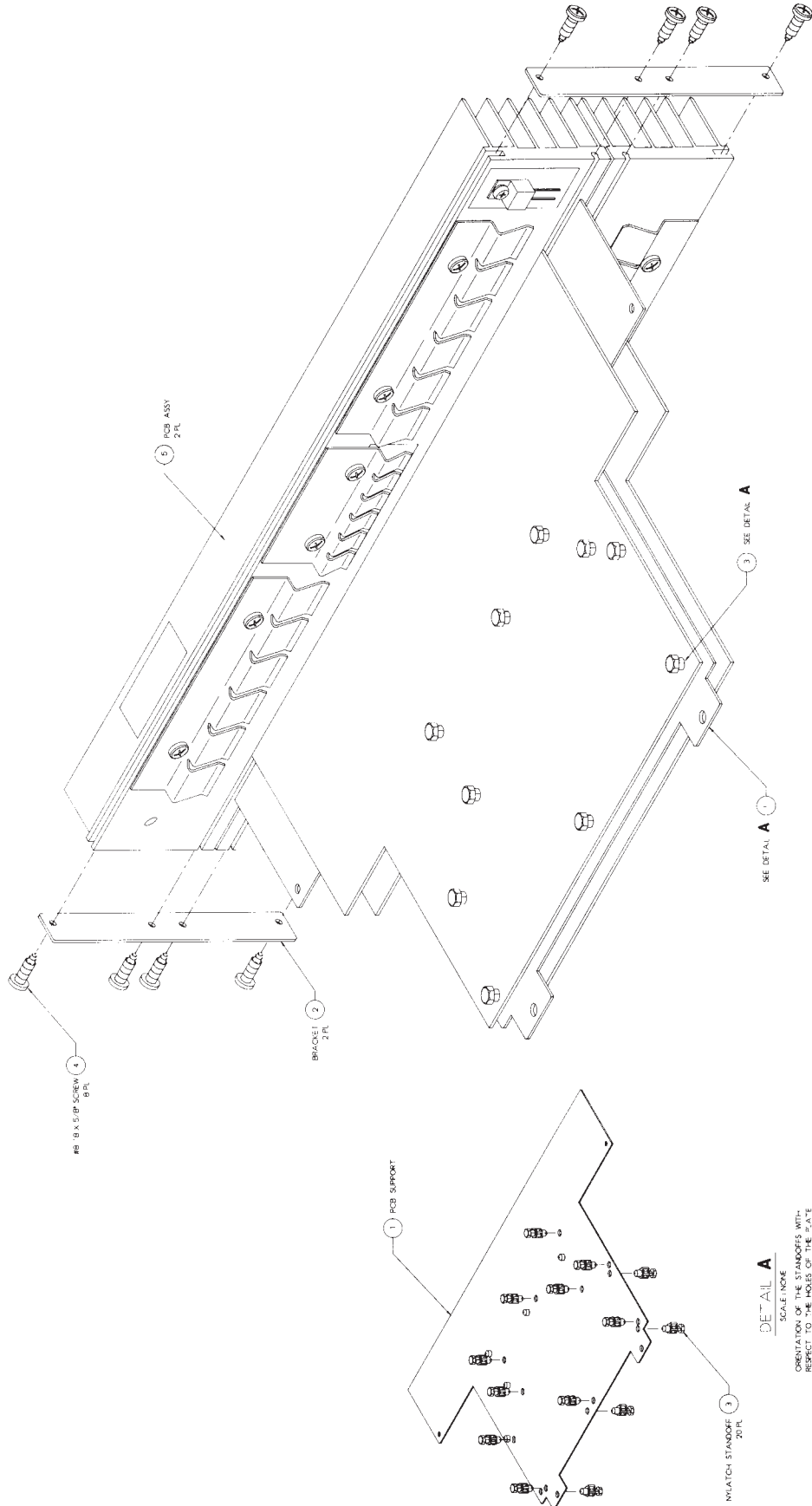
MX1000a/MX1500a Main Module



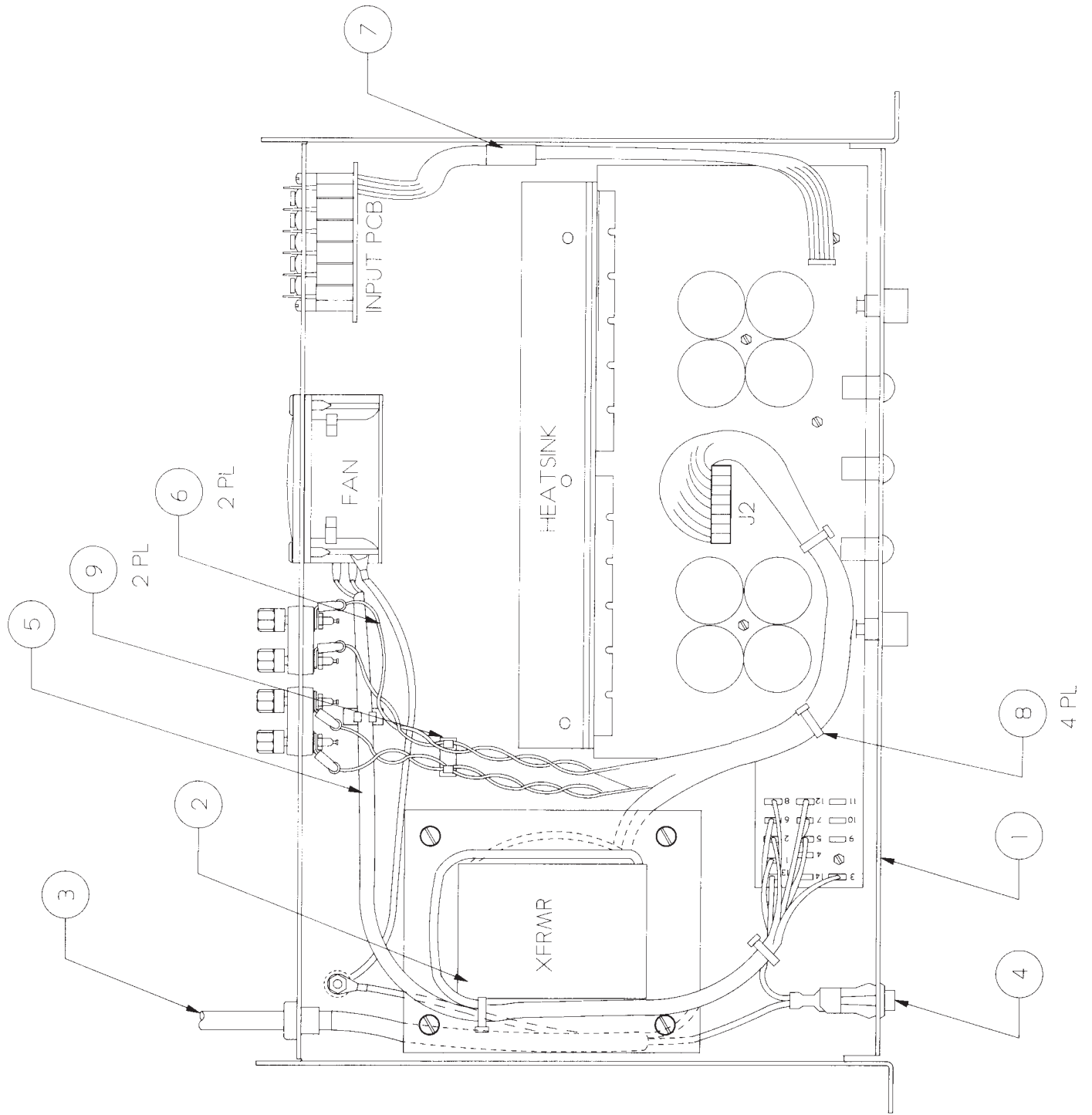
### MX2000a Main Module



### MX2000a Main Module Assembly

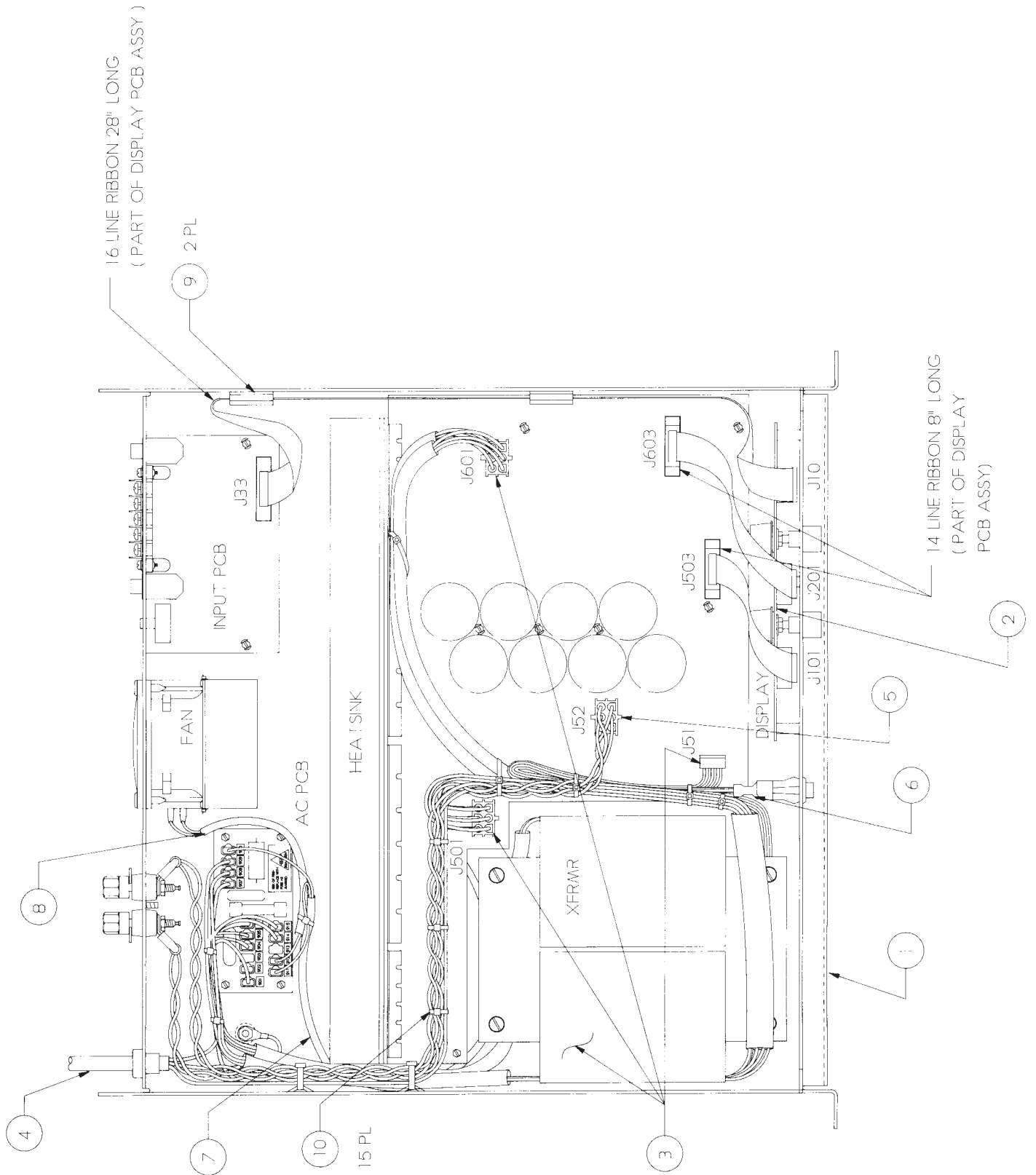


**MX700 Chassis Assembly**

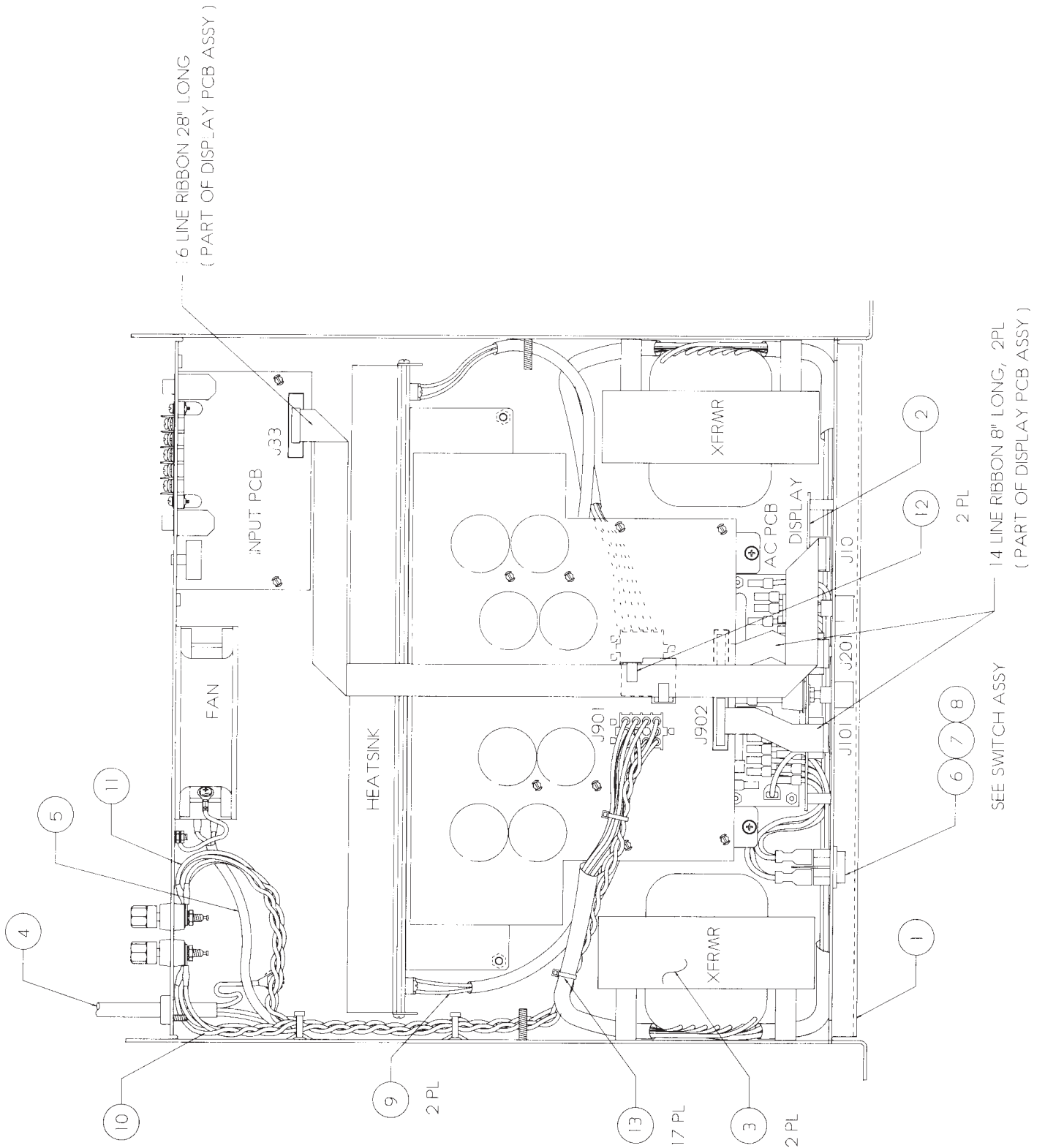




**MX1000a/MX1500a Chassis Assembly**

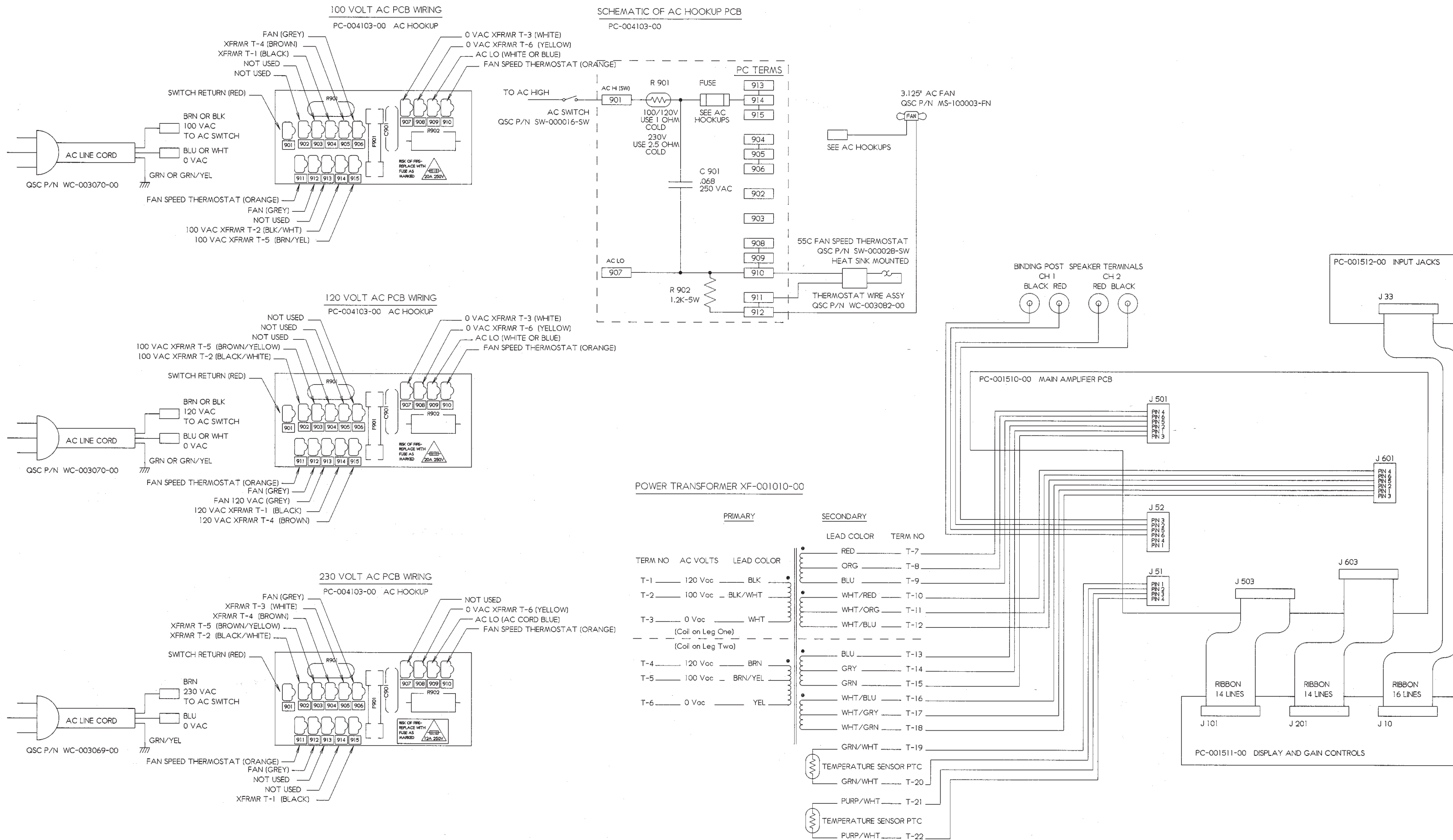


### MX2000a Chassis Assembly

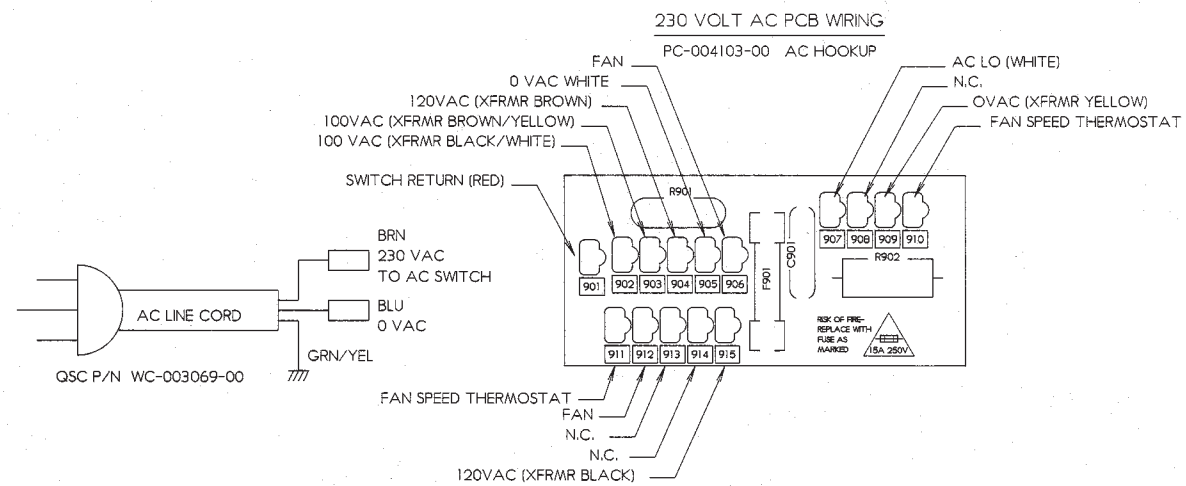
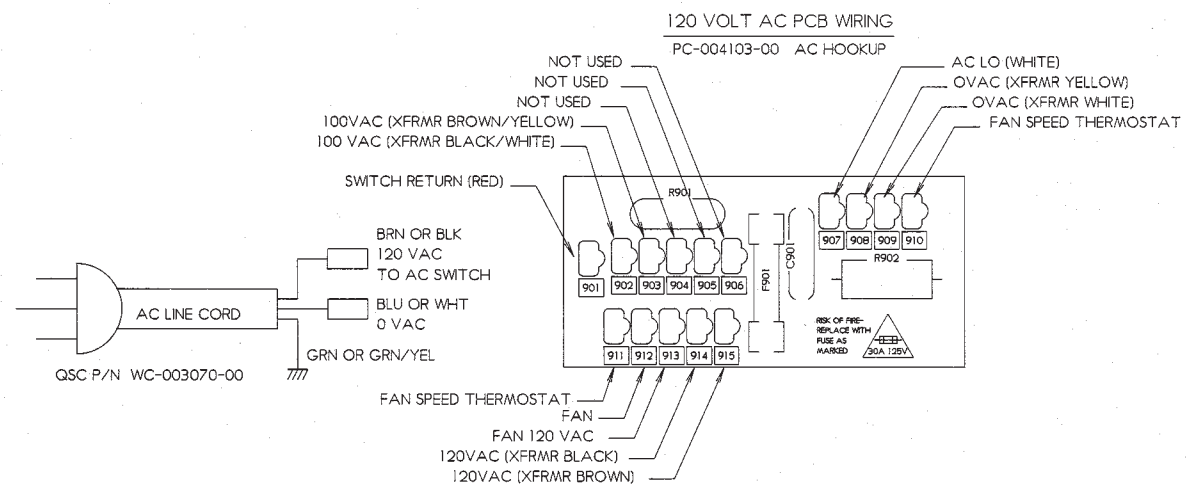
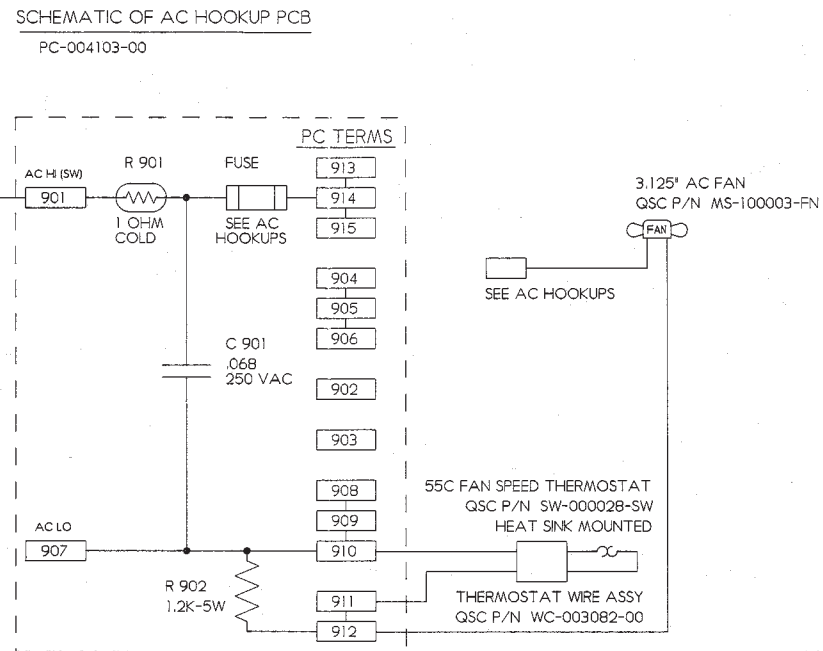
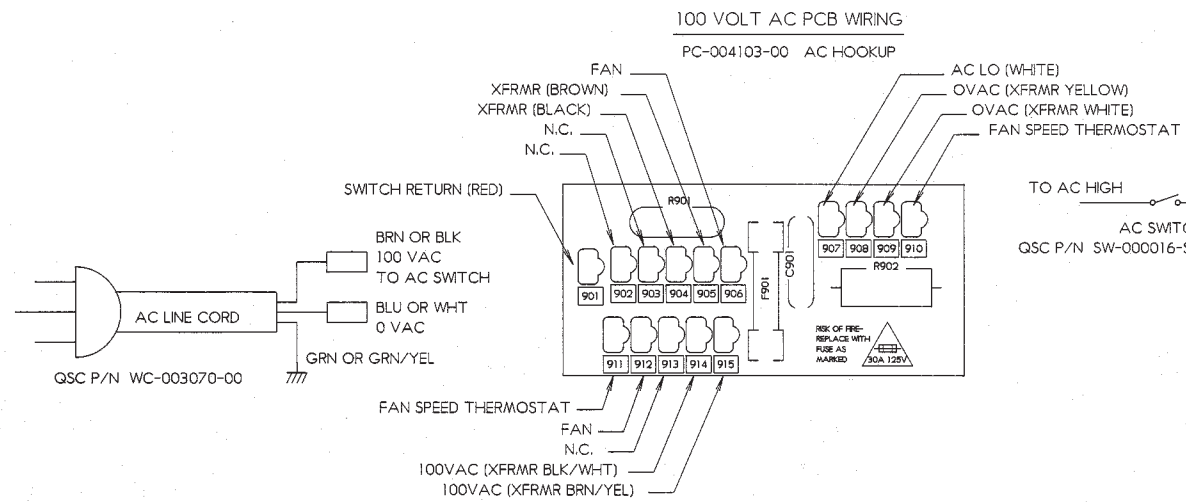




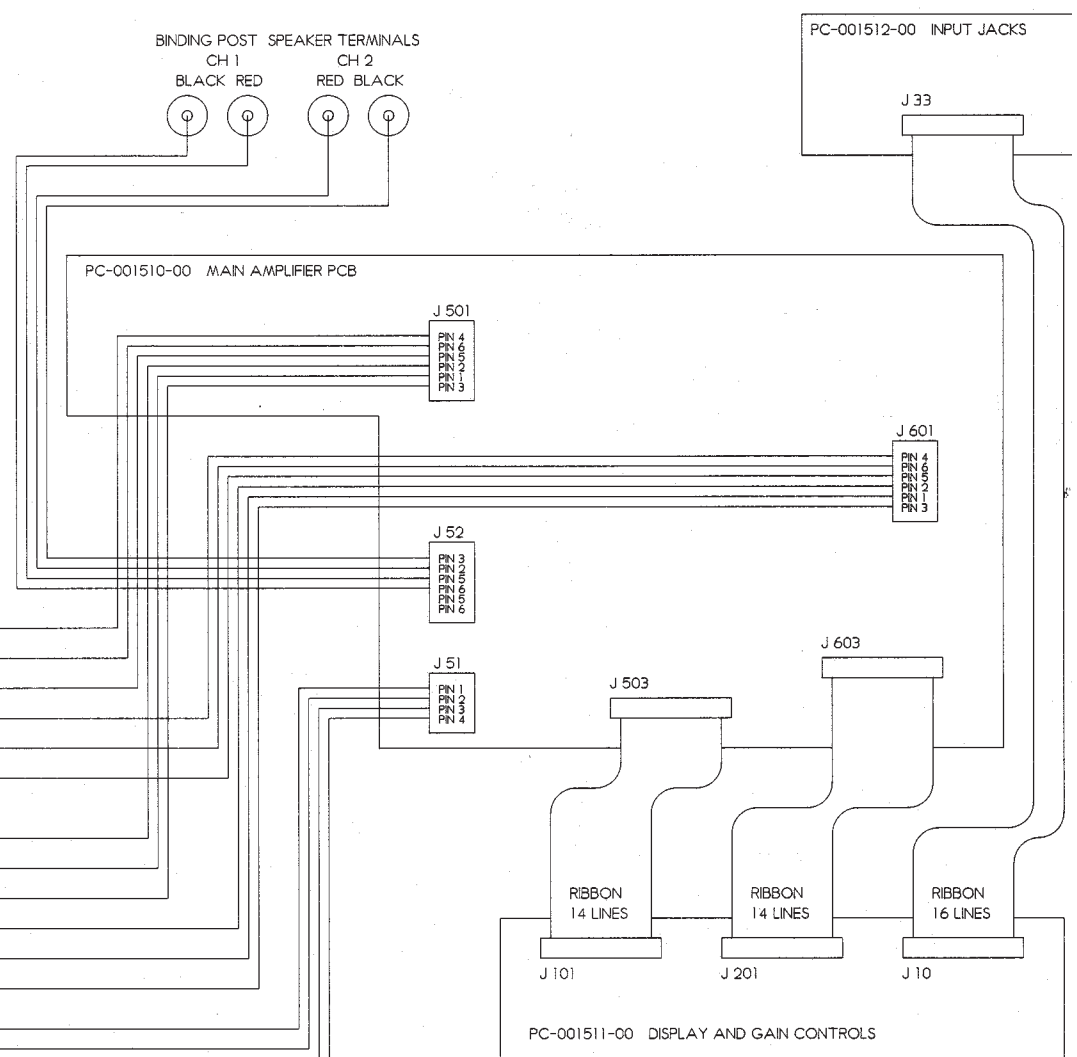
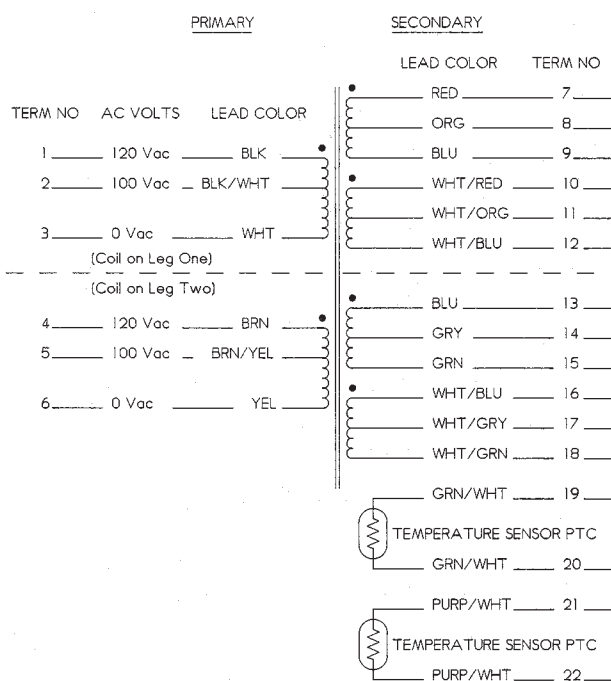
# MX1000a Wiring Diagram



# MX150a Wiring Diagram

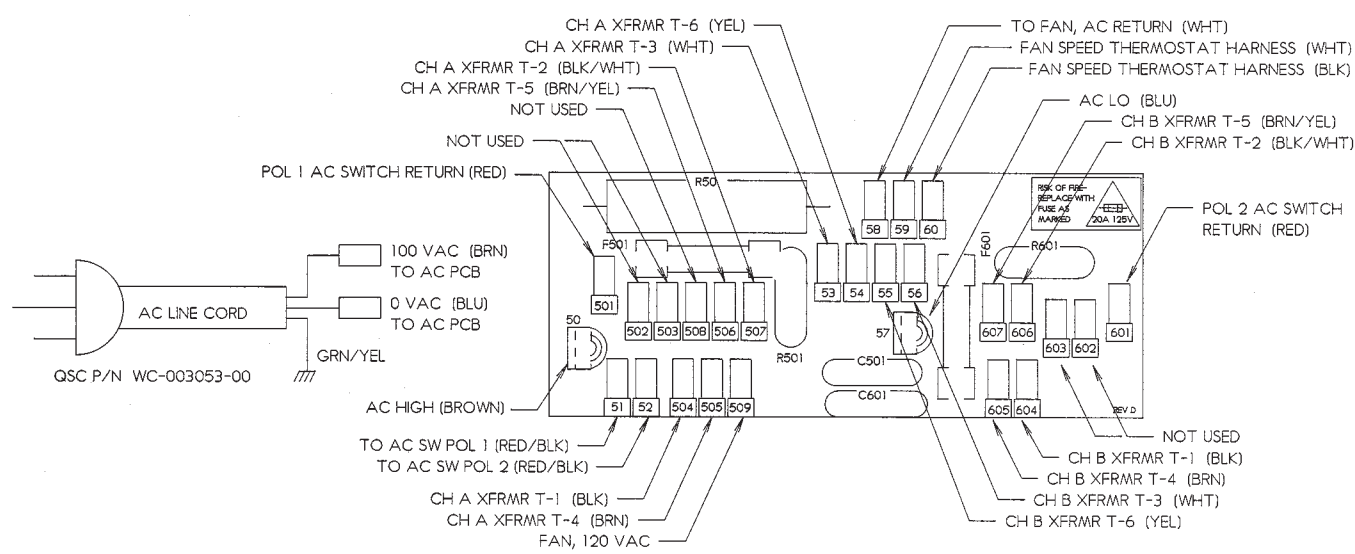


### POWER TRANSFORMER XF-001510-00

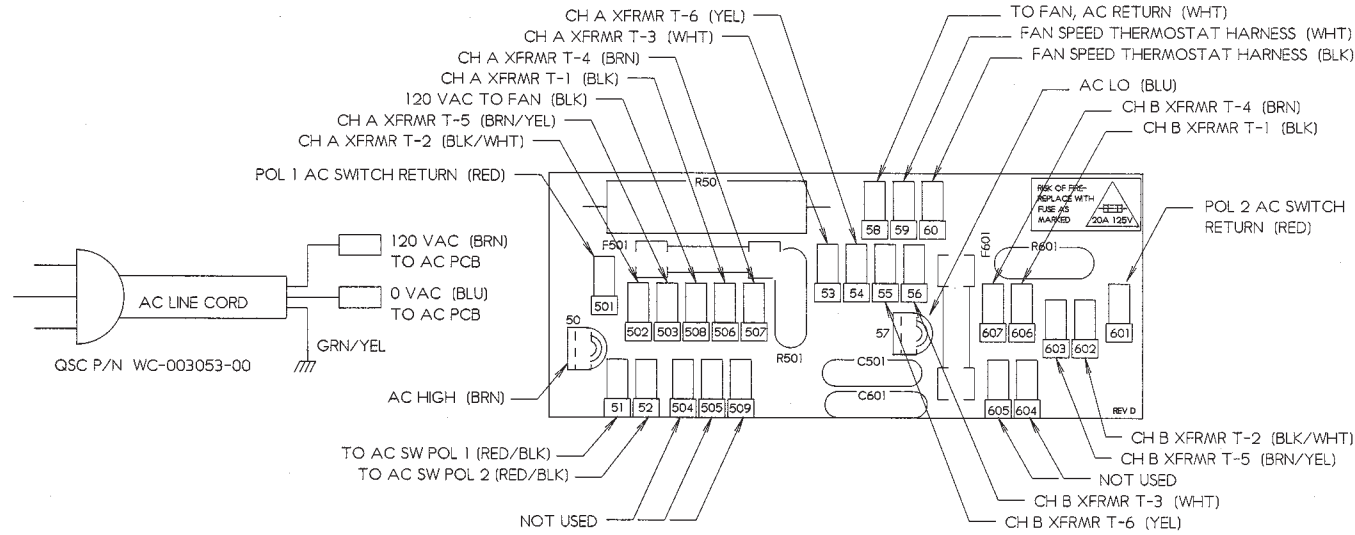


# MX2000a Wiring Diagram

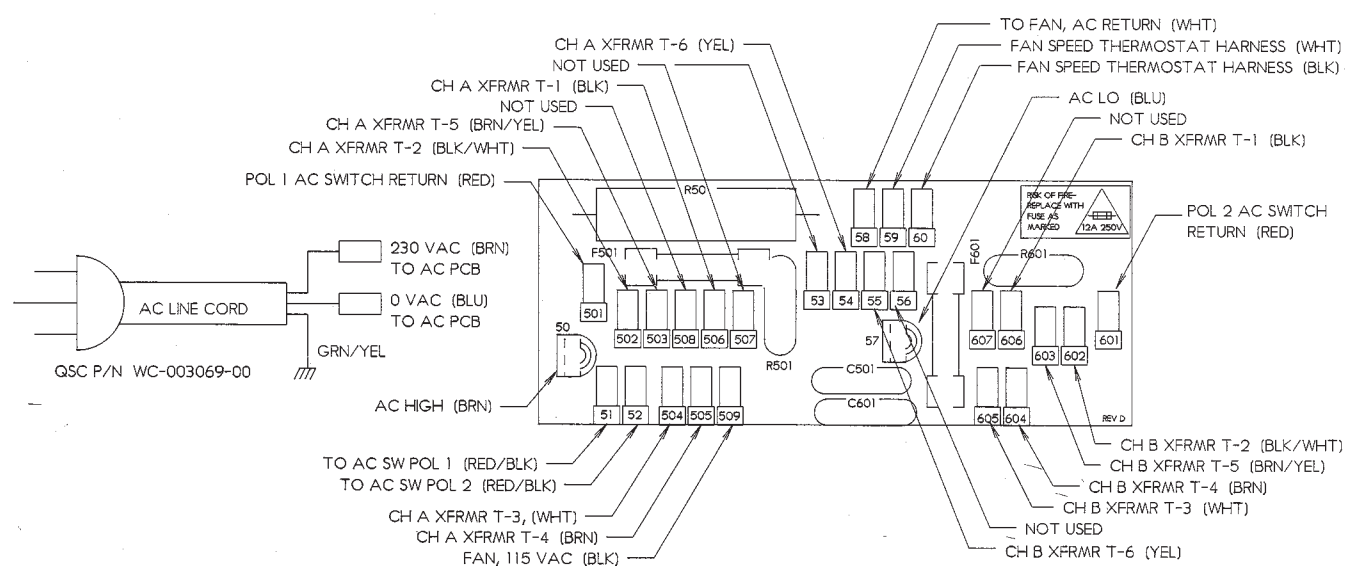
## 100 VOLT AC PCB WIRING



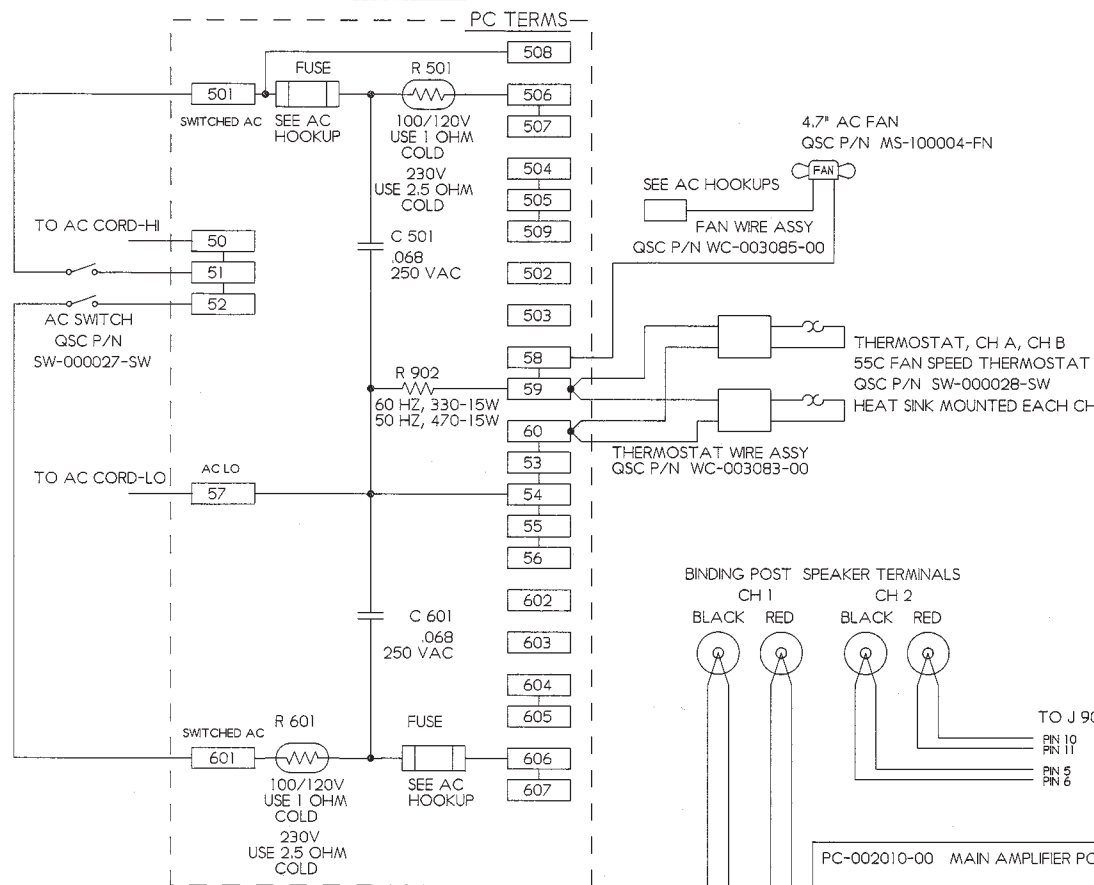
## 120 VOLT AC PCB WIRING



## 230 VOLT AC PCB WIRING



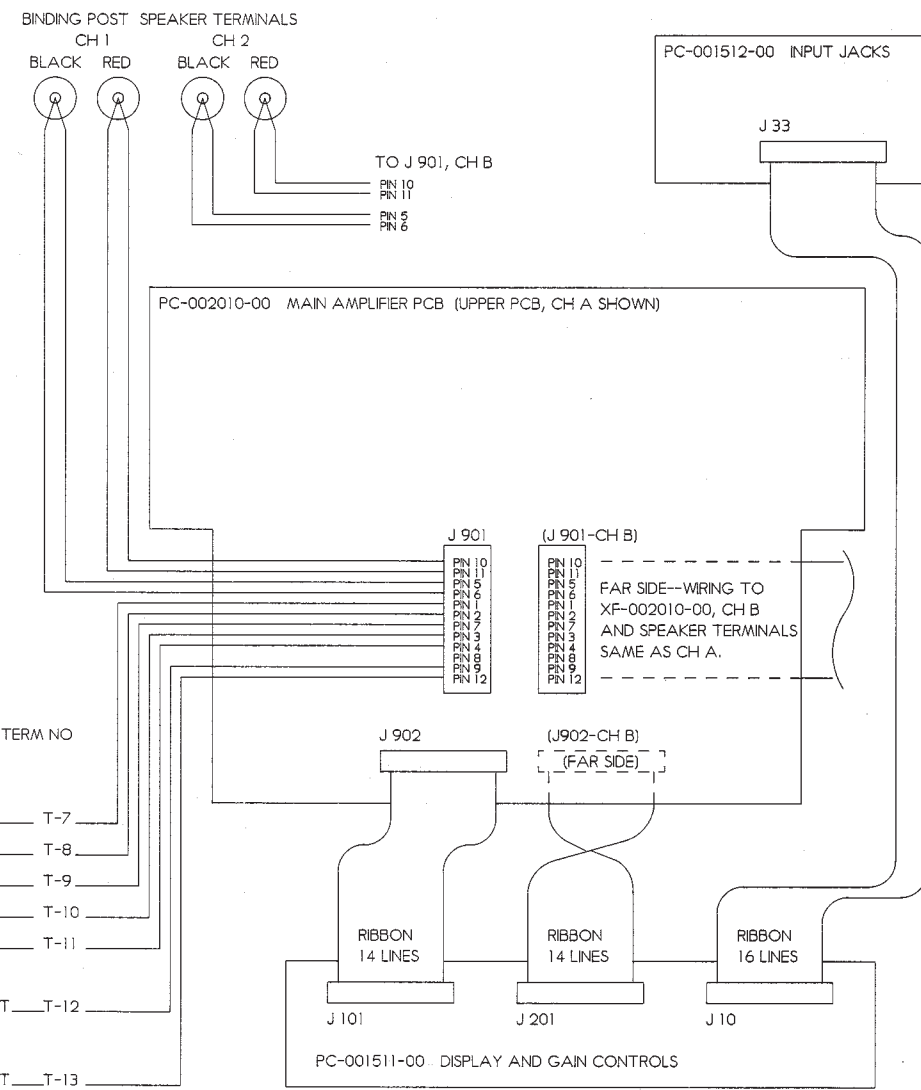
## SCHEMATIC FOR PC-004003-00 REV B



## SCHEMATIC, XF-002010-00 POWER TRANSFORMER

ONE EACH FOR CHANNEL A AND B.

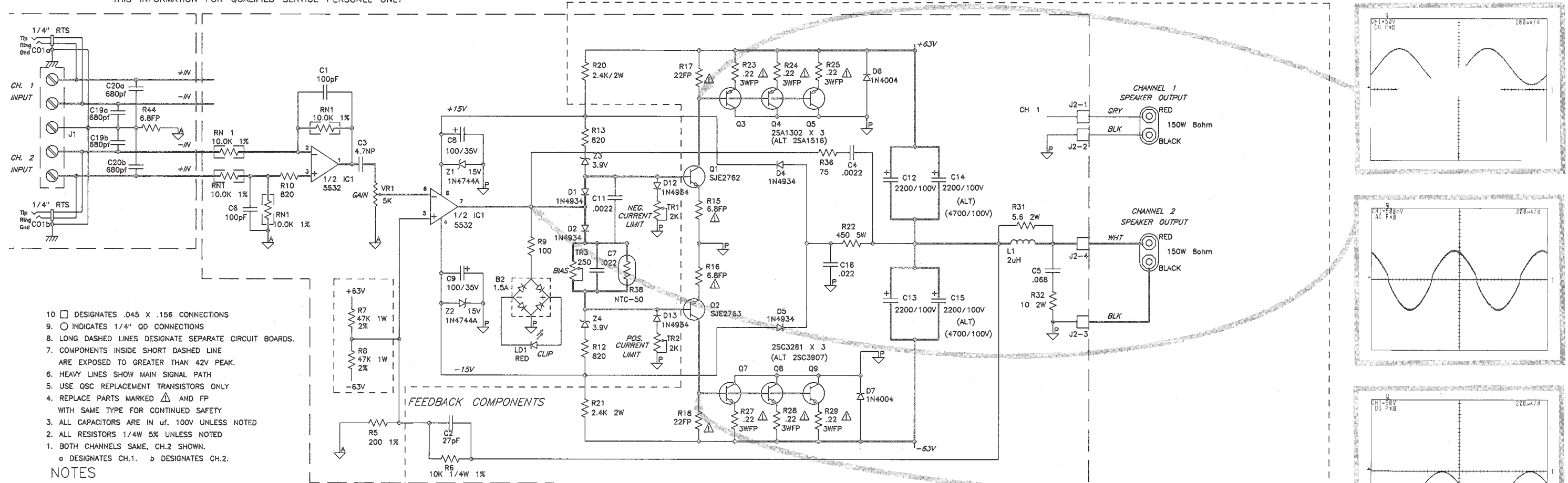
TERM NO	AC VOLTS	LEAD COLOR	PRIMARY	SECONDARY	LEAD COLOR	TERM NO
T-1	120 Vac	BLK			RED	T-7
T-2	100 Vac	BLK/WHT			ORG	T-8
T-3	0 Vac	WHT			BLU - CT	T-9
T-4	120 Vac	BRN			GREY	T-10
T-5	100 Vac	BRN/YEL			GRN	T-11
T-6	0 Vac	YEL			PURP/WHT	T-12
					SEE PARA 3.3.2	
					PURP/WHT	T-13



# MX700 Schematic

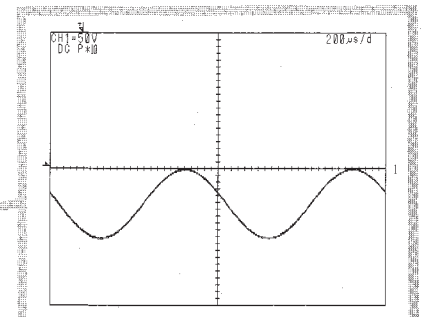
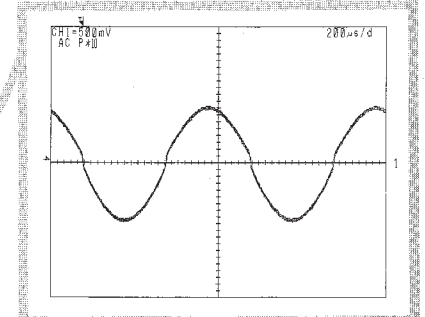
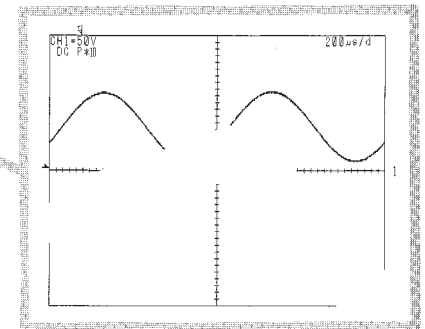
## QSC POWER AMPLIFIER MODEL MX700

SH-000630-CX, REV E PCB, 02-19-90  
THIS INFORMATION FOR QUALIFIED SERVICE PERSONEL ONLY



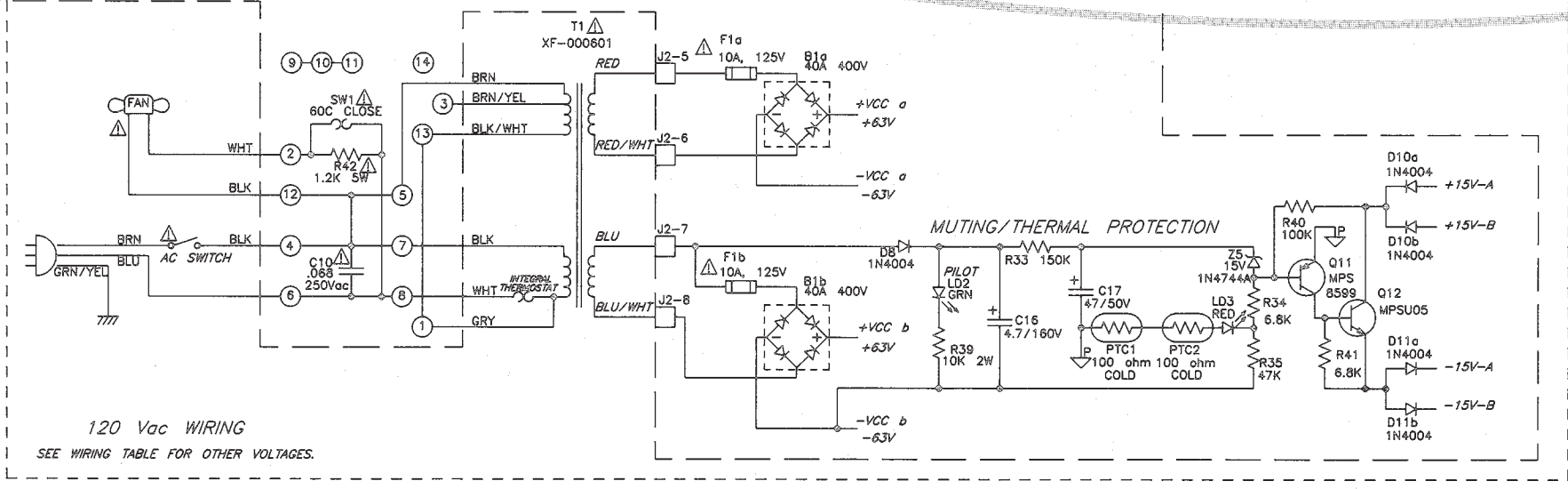
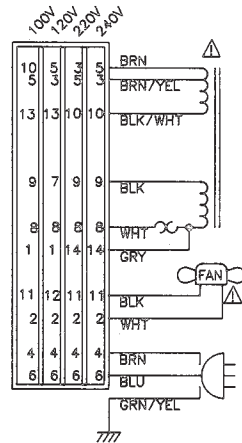
- 10 □ DESIGNATES .045 X .156 CONNECTIONS
- 9. ○ INDICATES 1/4" QD CONNECTIONS
- 8. LONG DASHED LINES DESIGNATE SEPARATE CIRCUIT BOARDS.
- 7. COMPONENTS INSIDE SHORT DASHED LINE ARE EXPOSED TO GREATER THAN 42V PEAK.
- 6. HEAVY LINES SHOW MAIN SIGNAL PATH
- 5. USE QSC REPLACEMENT TRANSISTORS ONLY
- 4. REPLACE PARTS MARKED  $\Delta$  AND FP WITH SAME TYPE FOR CONTINUED SAFETY
- 3. ALL CAPACITORS ARE IN  $\mu$ F. 100V UNLESS NOTED
- 2. ALL RESISTORS 1/4W 5% UNLESS NOTED
- 1. BOTH CHANNELS SAME, CH.2 SHOWN.
- DESIGNATES CH.1. b DESIGNATES CH.2.

### NOTES



LAST USED	NOT USED
B3	B3
C21	C21
D13	D3, 9
F1	
IC2	IC2
LD3	
Q13	Q6,10,13
R43	R1,2,3,4,11 14,19,26,30 37,43
TR3	
Z5	
RN1	
VR1	
PTC 2	
L1	
SW1	

### WIRING CHART XF-000601



120 Vac WIRING  
SEE WIRING TABLE FOR OTHER VOLTAGES.



# MX1000a Schematic

- NOTES.
1. CH B IDENTICAL TO CH A, EXCEPT PART NUMBER SEQUENCE R 601, 602 ETC.
  2. ALL RESISTORS 1/4-WATT, 5% UNLESS NOTED.
  3. ALL CAPACITORS 100V UNLESS NOTED.
  4. TOLERANCE 20% FOR ELECTROLYTIC TYPES, 10% ON OTHER TYPES.
  5. R 516, 516 IS POSITIVE TEMPERATURE COEFFICIENT RESISTOR MOUNTED TO HEAT SINK. RESISTANCE 100 OHM COLD, RISING AT 55 C. QSC P/N RE-000060-PT
  6. Q 503, 504, 603, 604 ARE SWITCHING FETS. QSC P/N QD-000031-QD. 125 W, 60 V MINIMUM, ON-RESISTANCE 0.030 OHMS MAX.
  7. ZENERS D 517, 617, MARKED 7.5 V, TESTED FOR LOW LEAKAGE, QSC P/N QD-0007.5-ZT.
  8. BRIDGE RECTIFIER BR 503, 603, 1.5A, 100V.
  9. PARTS MARKED WITH TRIANGLE  $\Delta$  MUST BE REPLACED WITH EXACT TYPE ONLY.
  10. CIRCUIT ENCLOSED WITHIN DOTTED OUTLINE  $\cdots$  HAS VOLTAGES GREATER THAN 42V.

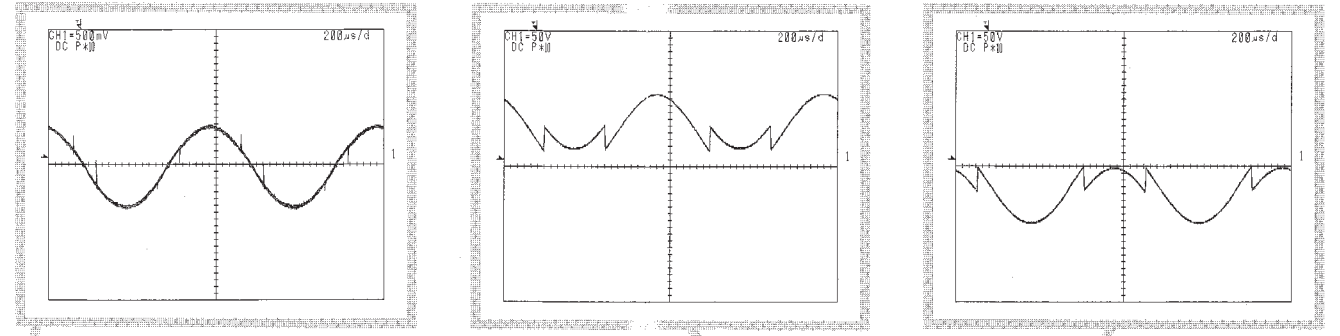
SCHEDULE OF TEST POINTS J 502-1 ETC

CH-A	CH-B
J 502-1	J 602-1
J 502-2	J 602-2
J 502-3	J 602-3
J 502-4	J 602-4
J 502-6	J 602-6
J 502-8	J 602-8

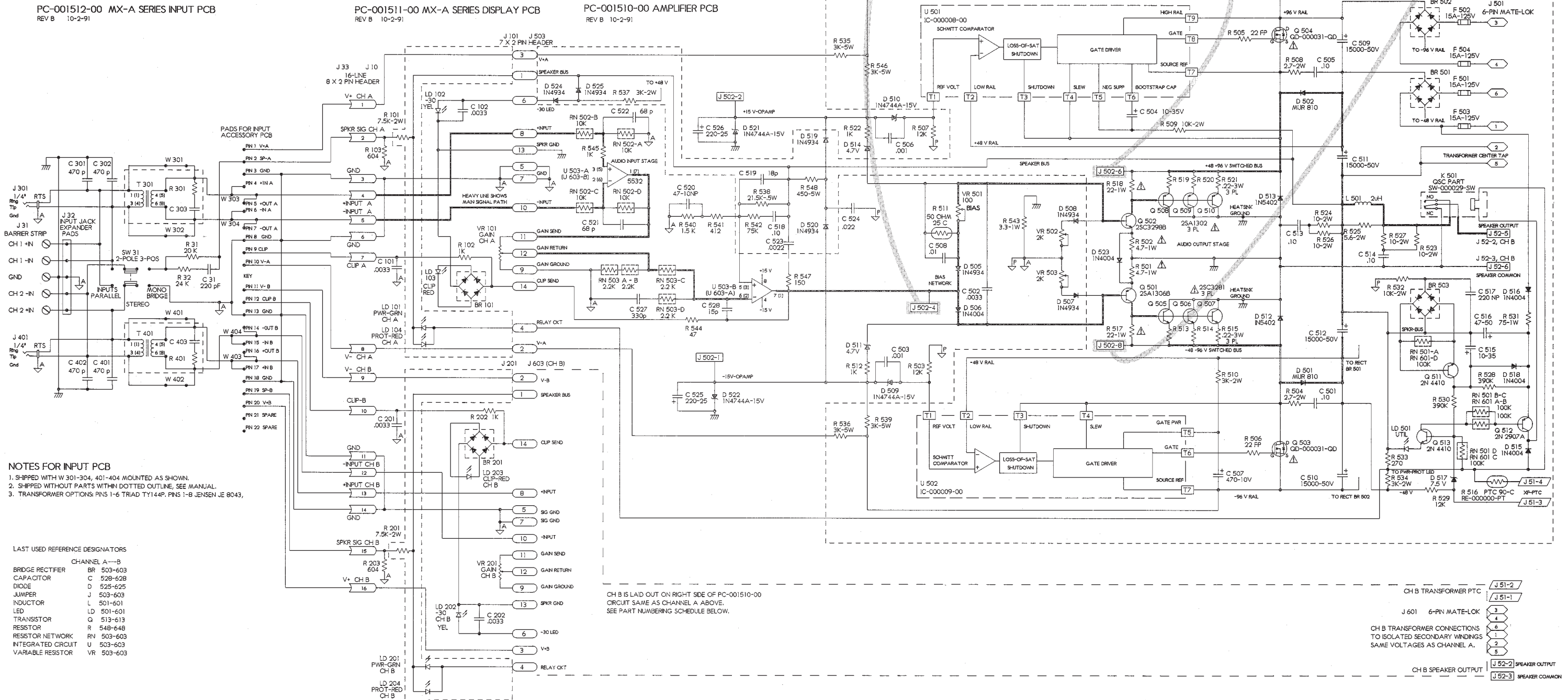
NEGATIVE LIMITING VOLTAGE  
POSITIVE LIMITING VOLTAGE  
NOT USED  
AMPLIFIER LOOP OP/AMP OUTPUT  
SWITCHED POS AMPLIFIER RAIL—CAUTION, HIGH VOLTAGE  
SWITCHED NEG AMPLIFIER RAIL—CAUTION, HIGH VOLTAGE

PART NUMBERING SCHEDULE FOR PCBs USED IN MX-1000-A

PCB NUMBER	DESCRIPTION	CH 1 PARTS	CH 2 PARTS	PARTS IN COMMON
PC-001511-00	DISPLAY PCB	101-199	201-299	10-29
PC-001512-00	INPUT PCB	301-399	401-499	31-49
PC-001513-00	AMP PCB	501-599	601-699	51-69
PC-004103-00	AC PCB	901-UP (SAME BOARD FOR CH 1, CH2)		



SCHEMATIC, 2-CH POWER AMPLIFIER, MX-1000-A  
REV B, 10-2-91, FOR PC-001510-00 REV B, PC-001511-00 REV B, PC-001512-00 REV B, POST-PROTO REVISIONS  
DOC NO. SH-001010-00



- NOTES FOR INPUT PCB
1. SHIPPED WITH W 301-304, 401-404 MOUNTED AS SHOWN.
  2. SHIPPED WITHOUT PARTS WITHIN DOTTED OUTLINE, SEE MANUAL.
  3. TRANSFORMER OPTIONS: PINS 1-6 TRIAD TY144P; PINS 1-B JENSEN JE 8043.

LAST USED REFERENCE DESIGNATORS

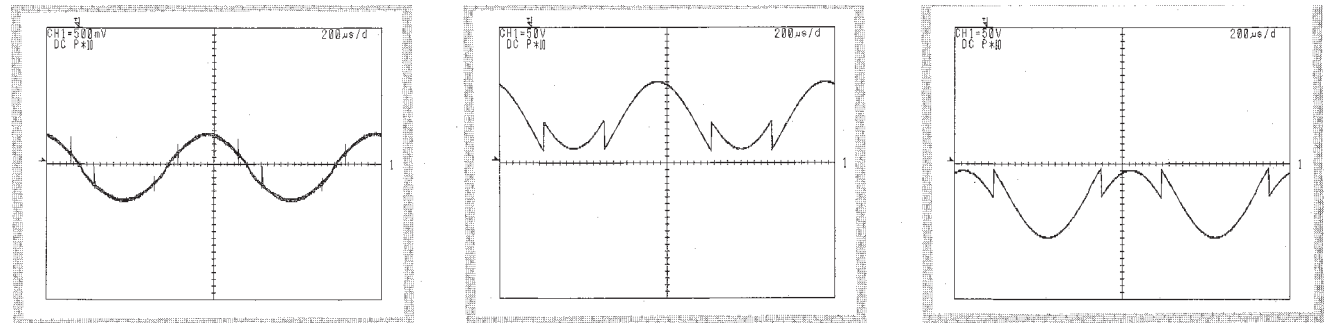
CHANNEL	A	B
BRIDGE RECTIFIER	BR 503-603	
CAPACITOR	C 528-628	
DIODE	D 525-625	
JUMPER	J 503-603	
INDUCTOR	L 501-601	
LED	LD 501-601	
TRANSISTOR	Q 513-613	
RESISTOR	R 549-649	
RESISTOR NETWORK	RN 503-603	
INTEGRATED CIRCUIT	U 503-603	
VARIABLE RESISTOR	VR 503-603	

CH B IS LAID OUT ON RIGHT SIDE OF PC-001510-00  
CIRCUIT SAME AS CHANNEL A ABOVE.  
SEE PART NUMBERING SCHEDULE BELOW.

- CH B TRANSFORMER PTC J 51-1
- J 601 6-PIN MATE-LOK 3
- CH B TRANSFORMER CONNECTIONS TO ISOLATED SECONDARY WINDINGS SAME VOLTAGES AS CHANNEL A. 4
- CH B SPEAKER OUTPUT J 52-2 SPEAKER OUTPUT
- J 52-3 SPEAKER COMMON 5

# MX1500a Schematic

**SCHEMATIC, 2-CH POWER AMPLIFIER, MX-1500-A**  
 REV B3, 11-4-91, PER PC-001510-00 REV B, PC-001511-00 REV B, PC-001512-00 REV B  
 DOC NO. 34-001510-00 FILE NO. S4-1510B.FCD, SEED FILE S41510B3.FCD



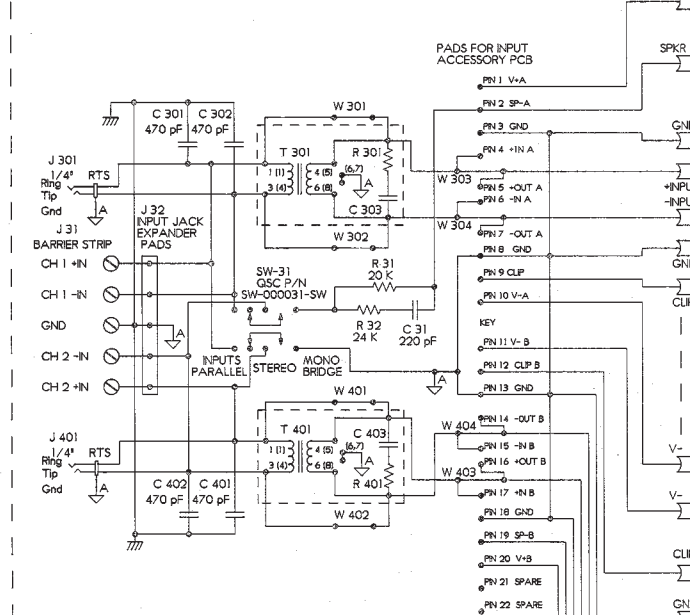
**PART NUMBERING SCHEDULE FOR PCBs USED IN MX-1500-A:**

PCB NUMBER	DESCRIPTION	CH 1 PARTS	CH 2 PARTS	PARTS IN COMMON
PC-001511-00	DISPLAY PCB	101-199	201-299	10-29
PC-001512-00	INPUT PCB	301-399	401-499	31-49
PC-001513-00	AHP PCB	501-599	601-699	51-69
PC-004103-00	AC PCB	901-UP (CH 1),	CH 2 ON SAME PCB	

**SCHEDULE OF TEST POINTS J 502-1 ETC**

CH-A	CH-B
J 502-1	J 602-1
J 502-2	J 602-2
J 502-3	J 602-3
J 502-4	J 602-4
J 502-6	J 602-6
J 502-8	J 602-8

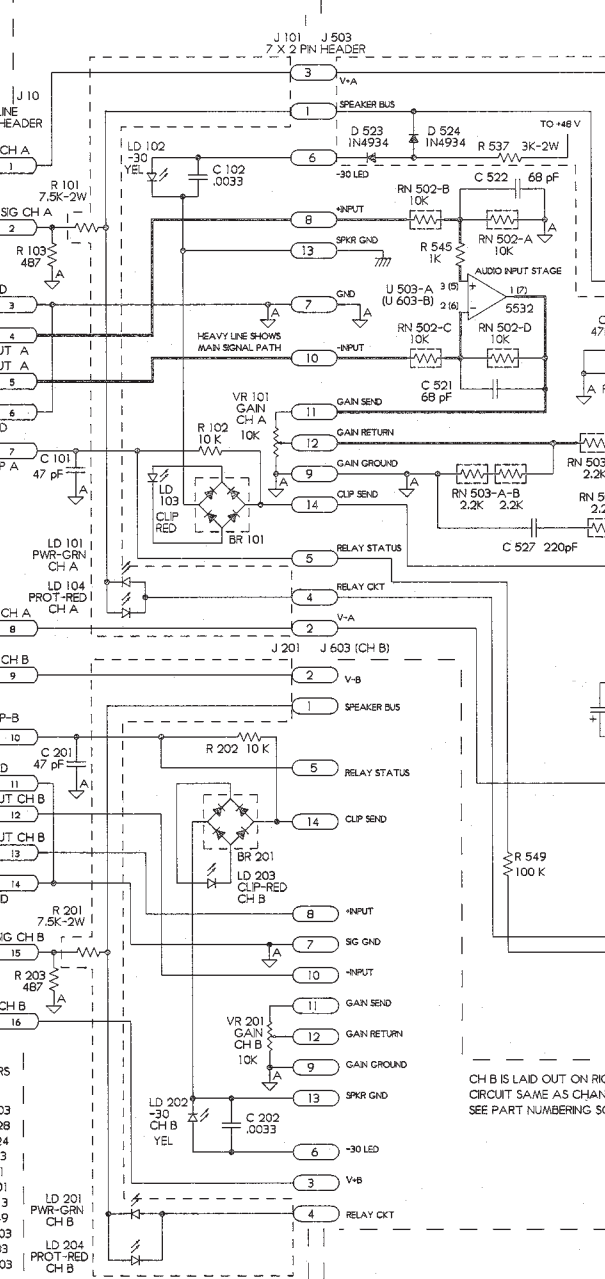
**PC-001512-00 MX-A SERIES INPUT PCB**



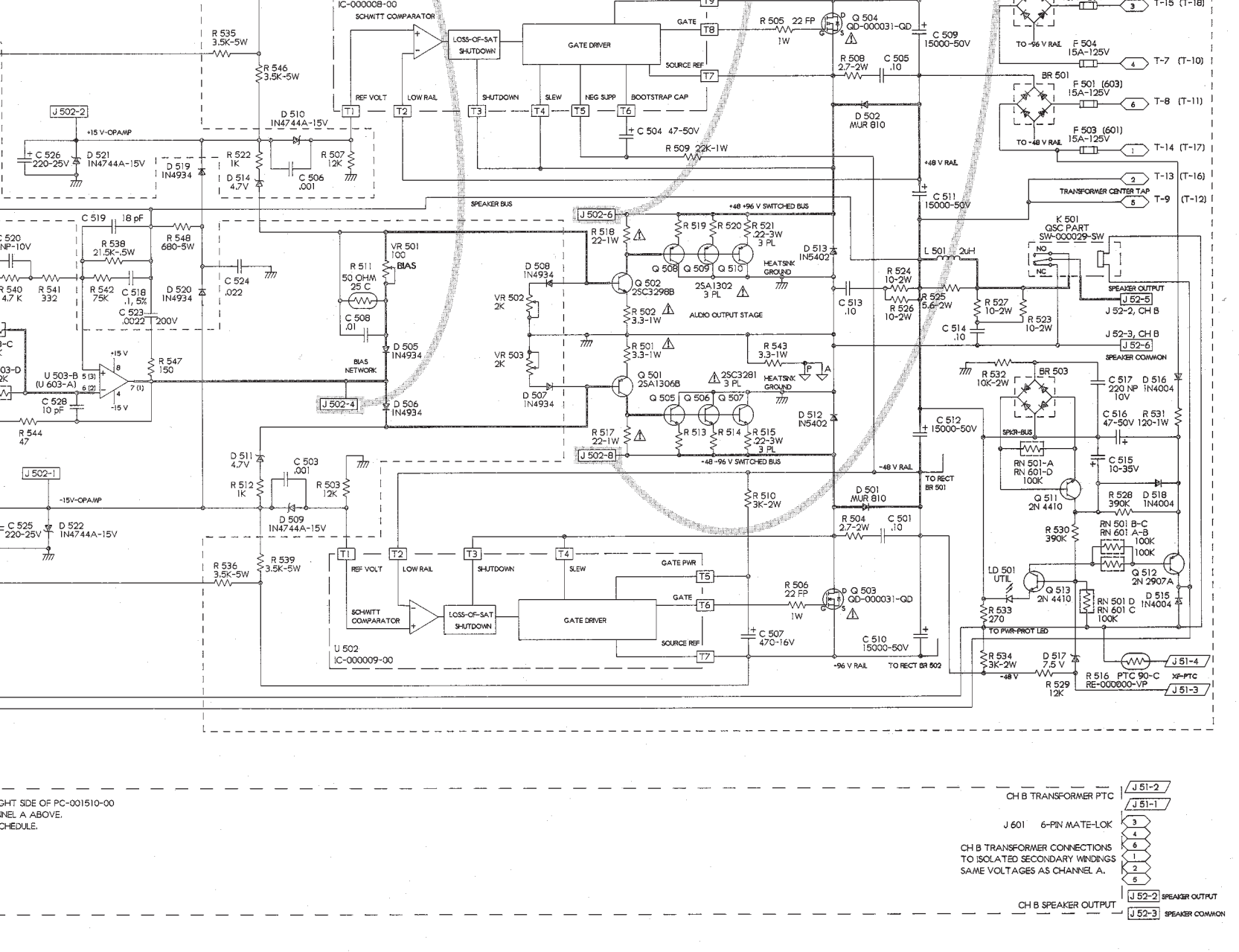
- INPUT PCB NOTES**
- BOARD SHIPPED WITH W 301-304, W 401-404 MOUNTED AS SHOWN.
  - PARTS WITHIN DOTTED OUTLINE FOR USER MODIFICATION. SEE MANUAL.
  - TRANSFORMER PIN NUMBERS: 1-6 TRIAD TY-144P (1-8 JENSEN JT 8043)

REV NOTES, REMOVE FOR RELEASE PRINTS.

**PC-001511-00 MX-A SERIES DISPLAY PCB**



**PC-001510-00 AMPLIFIER PCB**

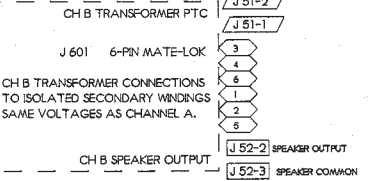


- NOTES**
- CH B IDENTICAL TO CH A, EXCEPT PART NUMBER SEQUENCE R 601, 602 ETC.
  - ALL RESISTORS 1/4-WATT, 5% UNLESS NOTED.
  - ALL CAPACITORS 100V UNLESS NOTED.
  - TOLERANCE 20% FOR ELECTROLYTIC TYPES, 10% ON OTHER TYPES.
  - R 516, 616 IS POSITIVE TEMPERATURE COEFFICIENT RESISTOR, MTD TO HEAT SINK. RESISTANCE 100 OHM COLD, RISING AT 85 C. OSC P/N QD-000000-PT.
  - Q 503, 504, 603, 604 ARE SWITCHING FETS. OSC P/N QD-000031-QD.
  - Q 505, 605 60 V MINIMUM, ON-RESISTANCE 0.030 OHMS MAX.
  - ZENERS D 517, 617, MARKED 7.5 V, LOW LEAKAGE, OSC P/N QD-0007-5-ZT.
  - BRIDGE RECTIFIER BR 503, 603, 1.5A, 100V.
  - PARTS MARKED WITH TRIANGLE REPLACE WITH EXACT TYPE ONLY.
  - PARTS WITHIN DOTTED OUTLINE - - - VOLTAGES GREATER THAN 42V.

**LAST USED REFERENCE DESIGNATORS**

CHANNEL A---B	BRIDGE RECTIFIER	CAPACITOR	DIODE	JUMPER	INDUCTOR	LED	TRANSISTOR	RESISTOR	RESISTOR NETWORK	INTEGRATED CIRCUIT	VARIABLE RESISTOR
	BR 503-603	C 528-628	D 524-624	J 503-603	L 501-601	LD 501-601	Q 513-613	R 549-649	RN 503-603	U 503-603	VR 503-603

CH B IS Laid OUT ON RIGHT SIDE OF PC-001510-00 CIRCUIT SAME AS CHANNEL A ABOVE. SEE PART NUMBERING SCHEDULE.





# MX2000 Schematic

## SCHEMATIC, 2-CH POWER AMPLIFIER, MX-2000-A

REV A4, 11-4-91, PER PC-002010-00 REV A, PC-001511-00 REV B, PC-001512-00 REV B  
 DOC NO. SH-002010-00 FILE SH-2010A.FCD, SEED FILE NO SH-2010A.FCD

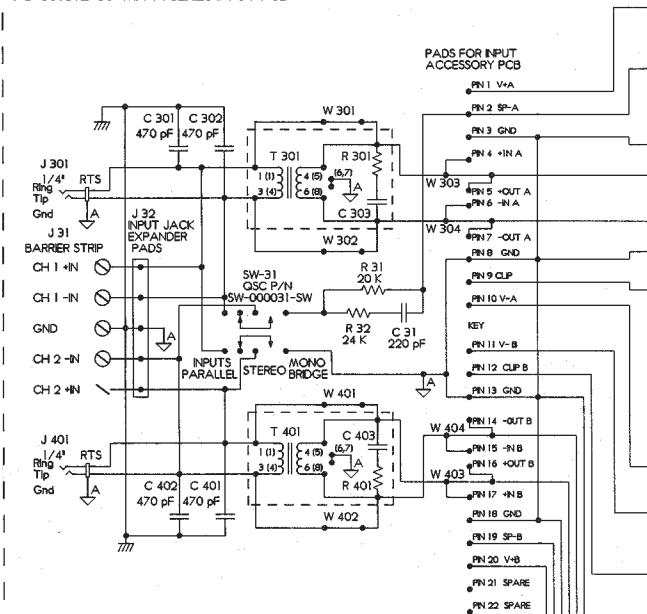
PART NUMBERING SCHEDULE FOR PCBs USED IN MX-2000-A

PCB NUMBER	DESCRIPTION	CH 1 PARTS	CH 2 PARTS	PARTS IN COMMON
PC-001511-00	DISPLAY PCB	101-199	201-299	10-29
PC-001512-00	INPUT PCB	301-399	401-499	31-49
PC-004003-00	AC PCB	501-599	601-699	51-69
PC-002010-00	AMPLIFIER PCB	901-UP (SAME BOARD FOR CH 1, CH 2)		

### SCHEDULE OF TEST POINTS J 903-1 ETC

- J 903-1 NEGATIVE LIMITING VOLTAGE
- J 903-2 POSITIVE LIMITING VOLTAGE
- J 903-3 NOT USED
- J 903-4 AMPLIFIER LOOP OPAMP OUTPUT
- J 903-6 SWITCHED POS AMPLIFIER RAIL--CAUTION, HIGH VOLTAGE
- J 903-8 SWITCHED NEG AMPLIFIER RAIL--CAUTION, HIGH VOLTAGE

### PC-001512-00 MX-A SERIES INPUT PCB



### INPUT PCB NOTES

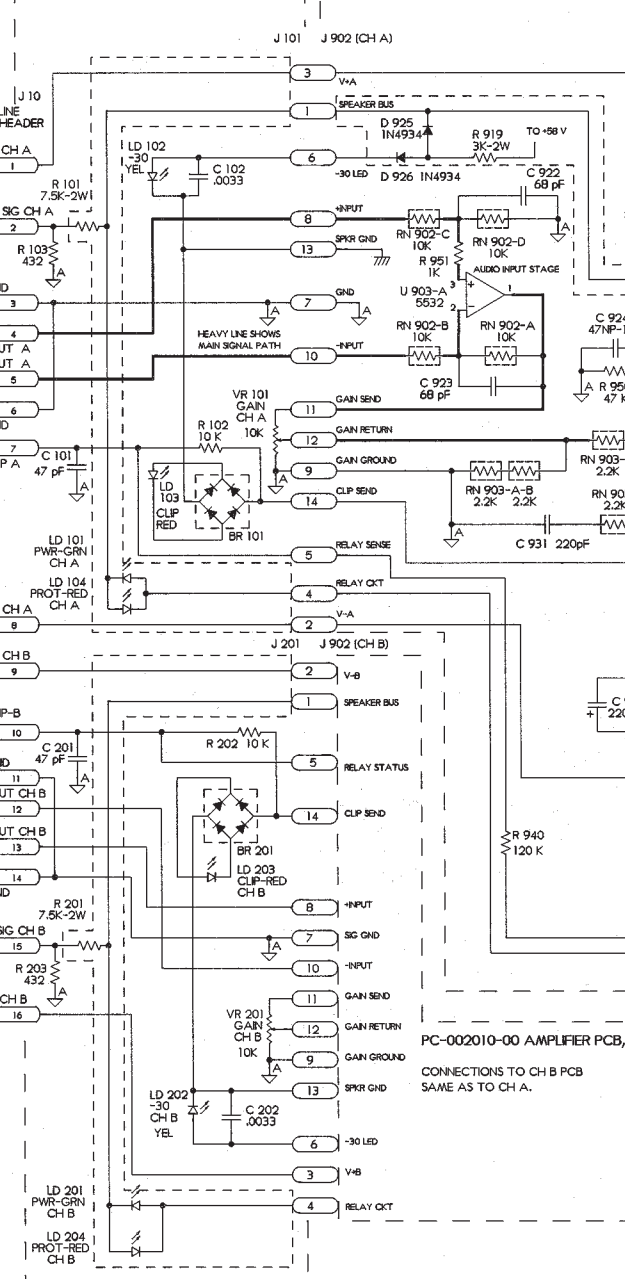
1. BOARD SHIPPED WITH W 301-304, W 401-404 MOUNTED AS SHOWN.
2. PARTS WITH IN DOTTED OUTLINE FOR USER MODIFICATION. SEE MANUAL.
3. TRANSFORMER PIN NUMBERS: 1-6 TRIAD TY-144P (1-8 JENSEN JT 8043)

- NOTES:
1. CH B IDENTICAL TO CH A.
  2. ALL RESISTORS 1/4-WATT, 5% UNLESS NOTED.
  3. ALL CAPACITORS 100V UNLESS NOTED.
  4. TOLERANCE 20% FOR ELECTROLYTIC TYPES, 10% ON OTHER TYPES.
  5. R 915 IS POSITIVE TEMPERATURE COEFFICIENT RESISTOR, MTD TO HEAT SINK. RESISTANCE 100 OHM COLD, RISING AT 85 C. QSC P/N RE-000000-PT.
  6. Q 906, 909 ARE SWITCHING FETS. QSC P/N QD-000031-QD. 125 W, 60 V MINIMUM, ON-RESISTANCE 0.030 OHMS MAX.
  7. ZENER D 913, MARKED 7.5 V, LOW LEAKAGE, QSC P/N QD-0007-5-ZT.
  8. BRIDGE RECTIFIER BR 901, 902 ARE 40A, 400V, QSC P/N QD400400-BX.
  9. PARTS MARKED WITH TRIANGLE  $\Delta$  REPLACE WITH EXACT TYPE ONLY.
  10. PARTS WITHIN DOTTED OUTLINE --- VOLTAGES GREATER THAN 42V.
  11. BRIDGE RECTIFIER BR 101, 201, 903, 1.5A, 100V.

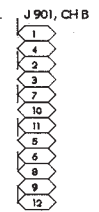
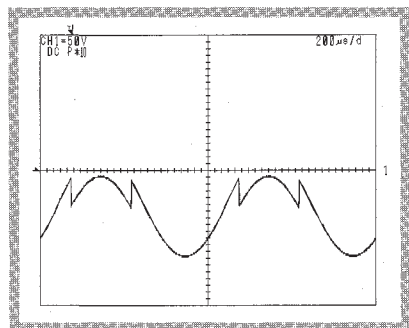
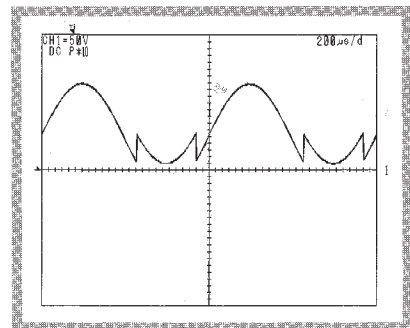
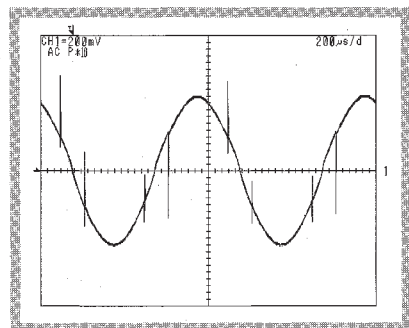
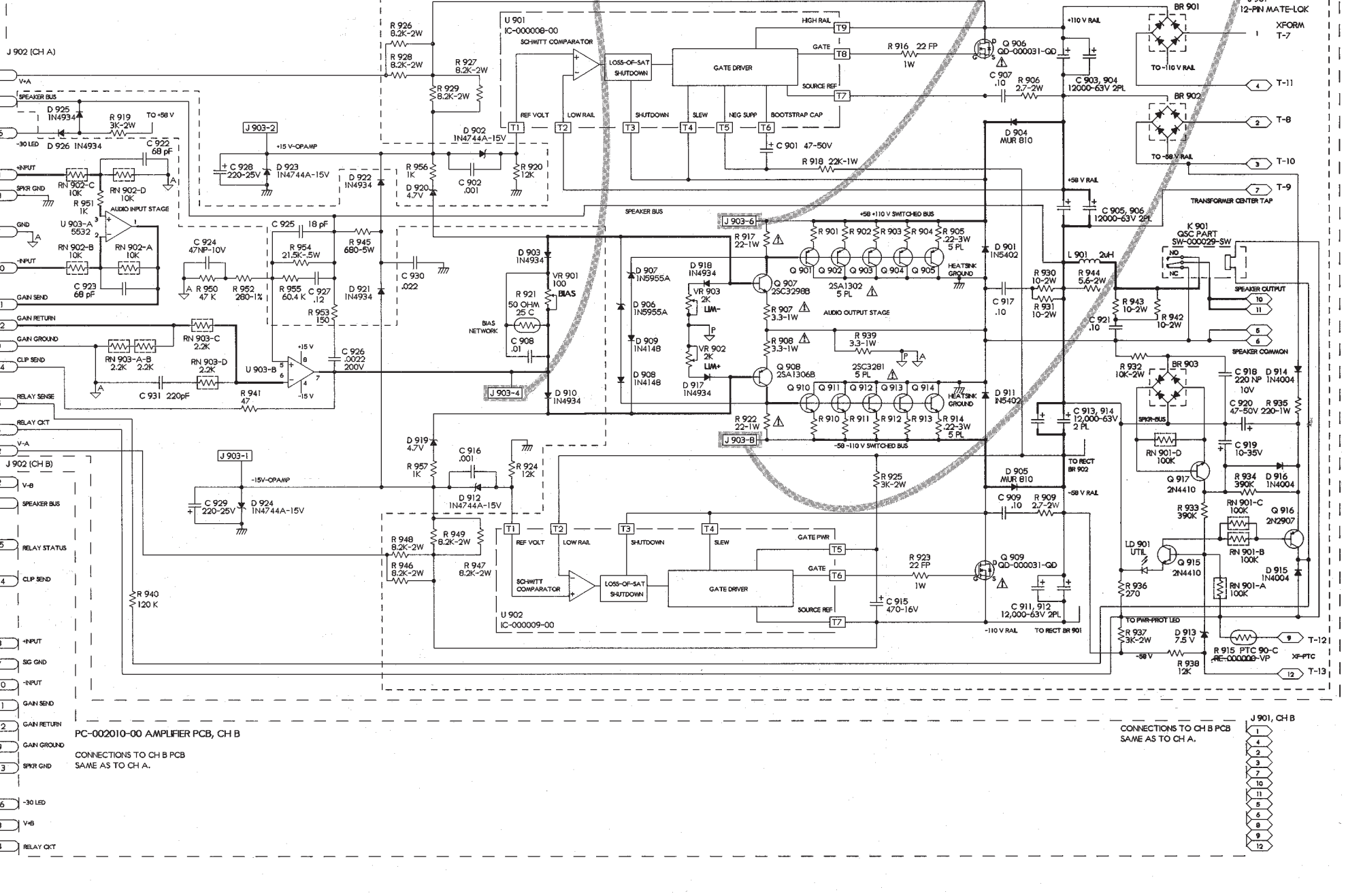
### LAST USED REFERENCE DESIGNATORS, PC-002010-00

COMPONENT	LAST USED
BRIDGE RECTIFIER	BR 903
CAPACITOR	C 931, NO C 910
DIODE	D 926
CONNECTOR	J 903
INDUCTOR	L 901
LED	LD 901
TRANSISTOR	Q 917
RESISTOR	R 957
RESISTOR NETWORK	RN 903
VARIABLE RESISTOR	VR 903

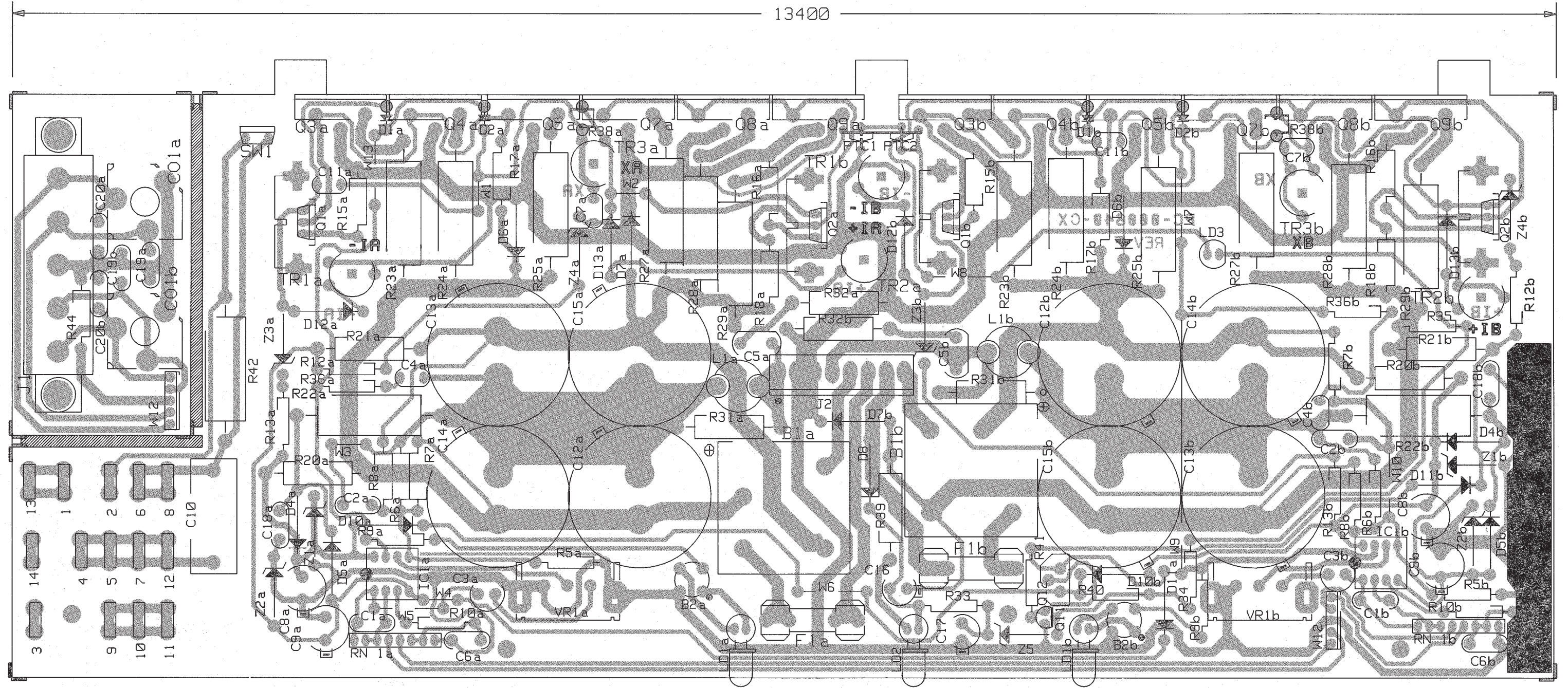
### PC-001511-00 MX-A SERIES DISPLAY PCB



### PC-002010-00 AMPLIFIER PCB

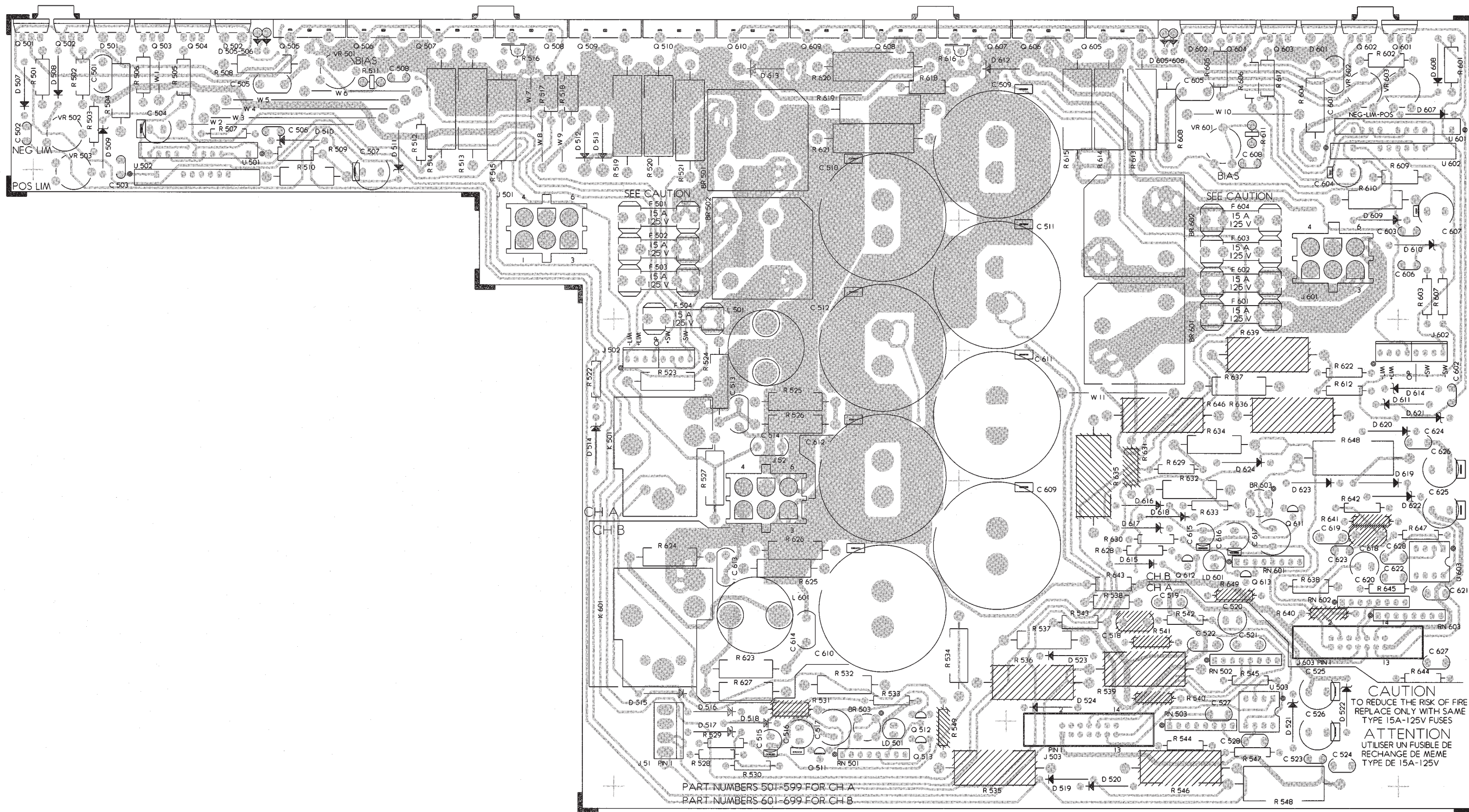






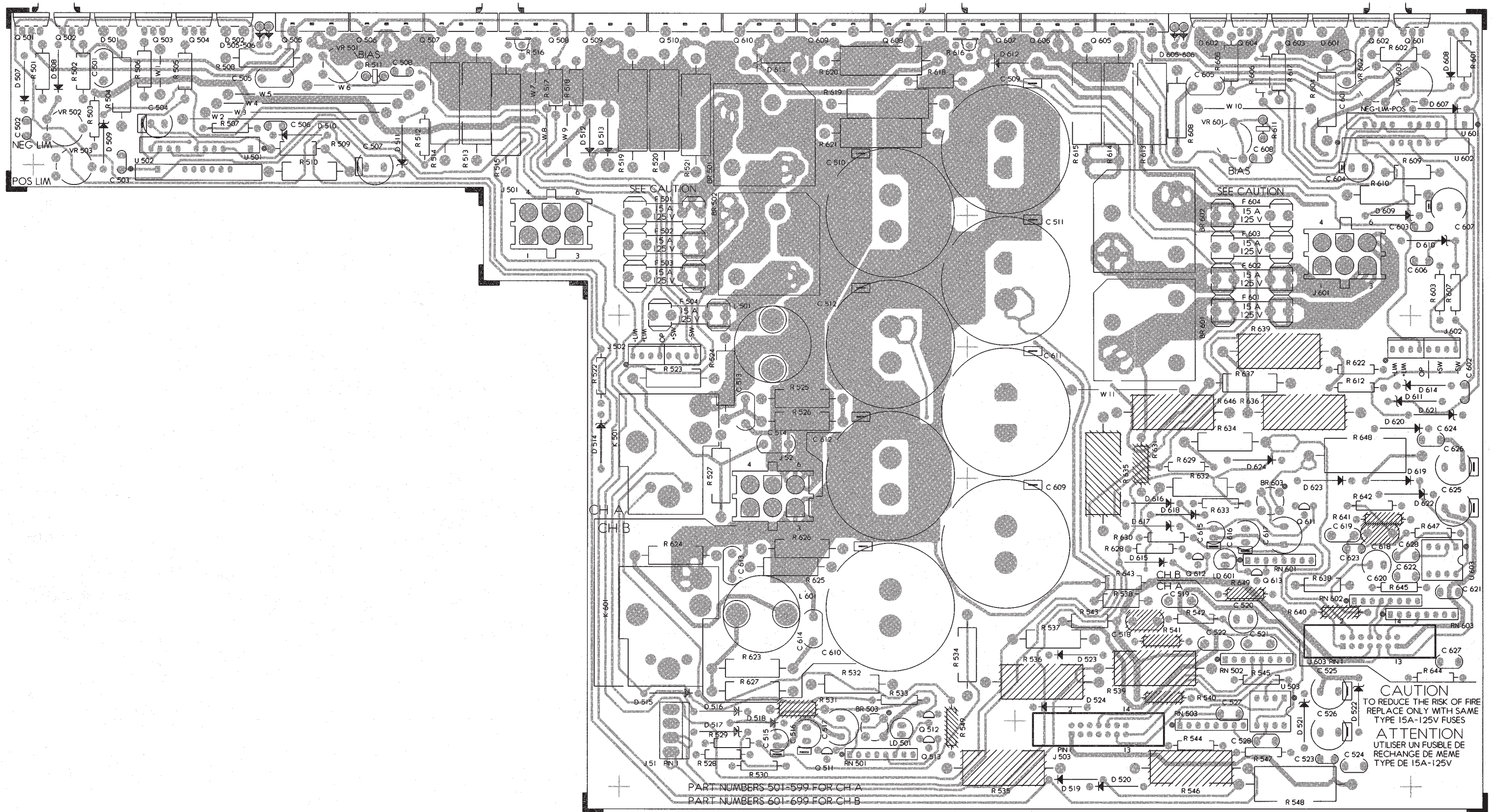


MX1000a/MX1500a Main Component Side PCB



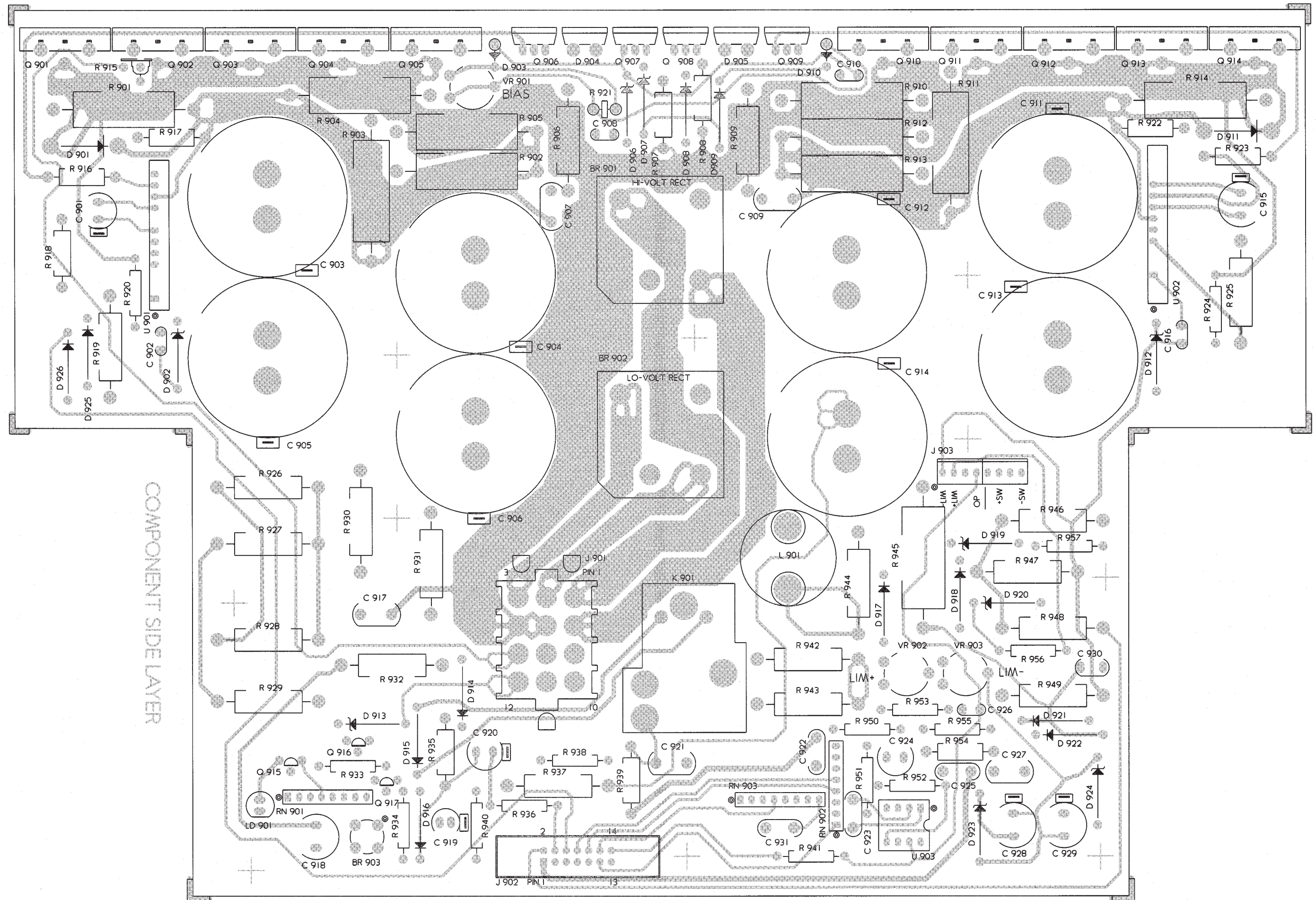


MX1000a/MX1500a Main Solder Side PCB

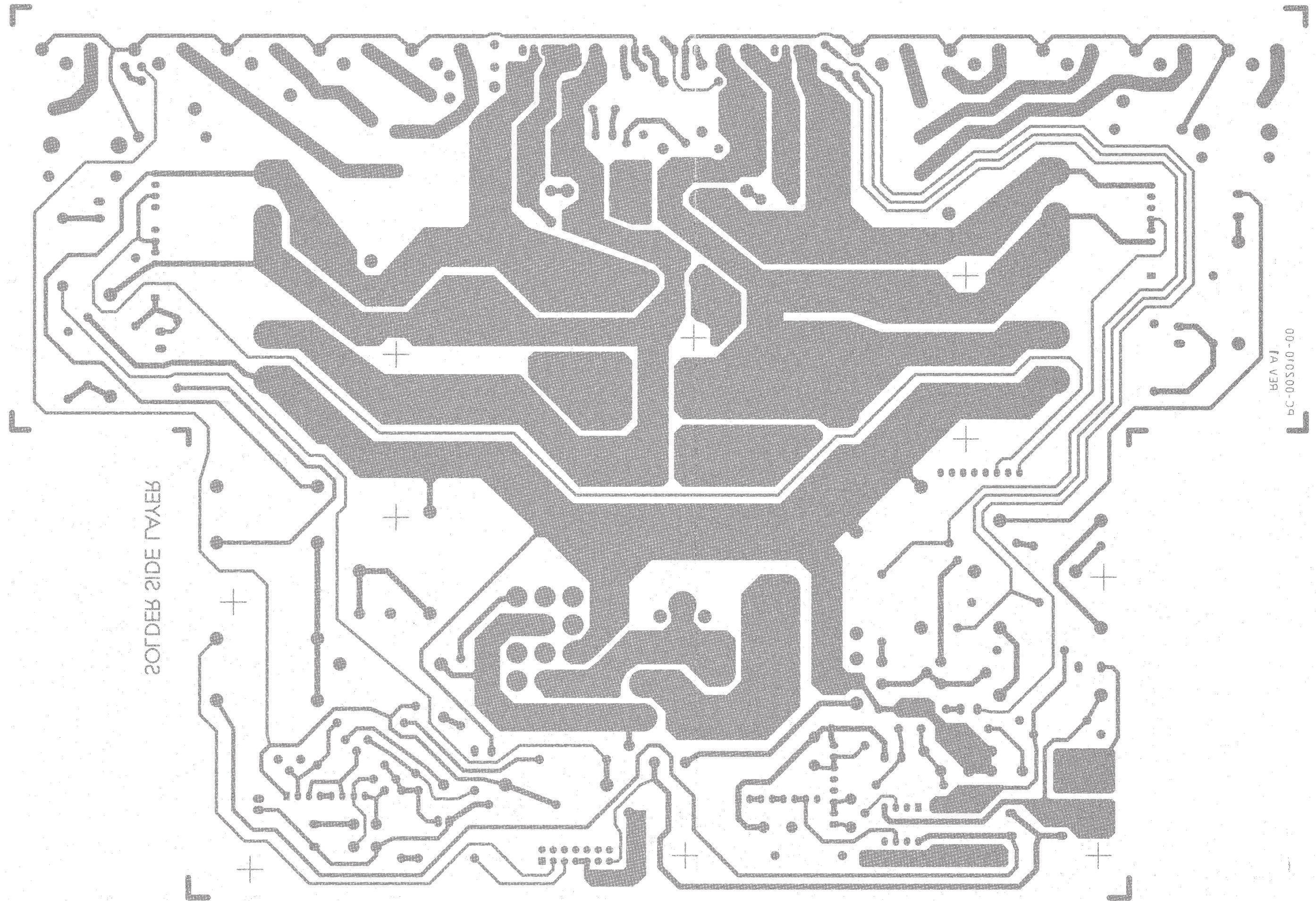




# MX2000a Main Component Side PCB







SOLDER SIDE LAYER

00-010500-00  
1A VER



