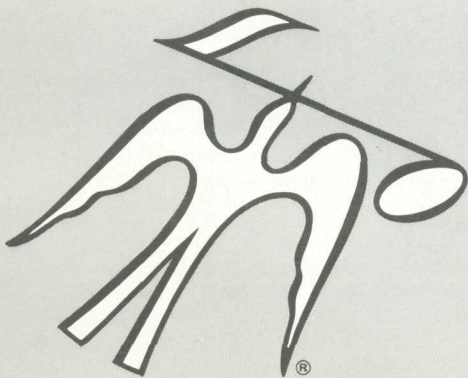
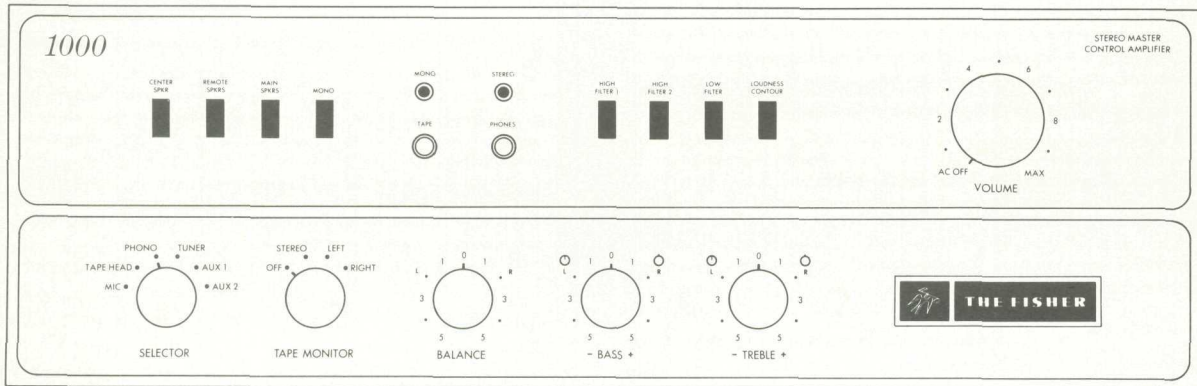


# Service Manual

# THE FISHER<sup>®</sup>



# TX-1000<sup>™</sup>

CHASSIS SERIAL NUMBERS  
BEGINNING 10001

PRICE \$1.00



**CAUTION:** This is a FISHER precision high-fidelity instrument. It should be serviced only by qualified personnel — trained in the repair of transistor equipment and printed circuitry.

### TEST EQUIPMENT REQUIRED

The following are needed to completely test and align modern high-fidelity instruments such as amplifiers, tuners and receivers.

Vacuum-Tube Voltohmmeter (100-mV DC scale)	10.7-MHz Sweep Generator
Audio Vacuum-Tube Voltmeter (10-mV AC scale)	455-kHz Sweep Generator
Oscilloscope (Flat to 100 kHz Minimum)	Line Voltage Autotransformer or Voltage Regulator
Audio (Sine-Wave) Generator	2 — Load Resistors, 4 or 8 Ohm, 50 Watt
Intermodulation Distortion Analyzer	2 — Full Range Speakers for Listening Tests
Harmonic Distortion Analyzer	Stereo Source — Turntable or Tape Recorder for Listening Tests
AM/FM Signal Generator	Soldering Iron with Small Tip
Multiplex Generator (preferably with RF output — FISHER Model 300 or equal)	Fully Insulated from Power Line
	Suction Desoldering Tool

### PRECAUTIONS

Many of these items are included just as a reminder—they are normal procedures for experienced technicians. Shortcuts can be taken but often they cause additional damage—to transistors, circuit components or the printed-circuit board.

**Soldering**—A well-tinned, hot, clean soldering iron tip will make it easier to solder without damage to the printed-circuit board or the many circuit components mounted on it. It is not the wattage of the iron that counts—it is the heat available at the tip. Some 50-watt irons reach temperatures of 1,000° F—others will hardly melt solder. Small-diameter tips should be used for single solder connections—larger pyramid and chisel tips are needed for larger areas.

- When removing defective resistors, capacitors, etc., the leads should be cut as close to the body of the circuit component as possible. (If the part is not being returned for in-warranty factory replacement it may be cut in half—with diagonal-cutting pliers—to make removal easier.)

- Special de-soldering tips are made for unsoldering multiple-terminal units like IF transformers and electrolytic capacitors. By unsoldering all terminals at the same time the part can be removed with little chance of breaking the printed-circuit board.

- Always disconnect the chassis from the power line when soldering. Turning the power switch OFF is not enough. Power-line leakage paths, through the heating element, can destroy transistors.

**Transistors**—Never attempt to do any work on the transistor amplifiers without first disconnecting the AC linecord and waiting until the power supply filter-capacitors have discharged.

- Guard against shorts—it takes only an instant for a base-to-collector short to destroy that transistor and possibly others direct-coupled to it. (In the time it takes for a dropped machine screw, washer or even the screwdriver, to glance off a pair of socket terminals (or between a terminal and the chassis) a transistor can be ruined.)

- DO NOT bias the base of any transistor to, or near, the same voltage applied to its collector.

- DO NOT use an ohmmeter for testing transistors. The voltage applied through the test probes may be higher than the base-emitter breakdown voltage of the transistor.

**Output Stage and Driver — Replacements for output and**

**driver transistors, if necessary, must be made from the same beta group as the original type. The beta group is indicated by a colored dot on the mounting flange of the transistor. Be sure to include this information, when ordering replacement transistors.**

- If one output transistor burns out (open or shorts), always remove ALL output transistors in that channel and check the bias adjustment, the control and other parts in the network with an ohmmeter before inserting a new transistor. All output transistors in one channel will be destroyed if the base-biasing circuit is open on the emitter end.

- When mounting a replacement power transistor be sure the bottom of the flange, the mica insulator and the surface of the heat sink are free of foreign matter. Dust and grit can prevent perfect contact reducing heat transfer to the heat sink. Metallic particles can puncture the insulator and cause shorts—ruining the transistor.

- Silicone grease must be used between the transistor and the mica insulator and between the mica and the heat sink for best heat conduction. (Use Dow-Corning DC-3 or C20194 or equivalent compounds made for power transistor heat conduction.)

- Use care when making connections to speakers and output terminals. Any frayed wire ends can cause shorts that may burn out the output transistors—they are direct-coupled to the speakers. To reduce the possibility of shorts at the speakers, lugs should be used on the exposed ends or at least the ends of the stranded wires should be tinned to prevent frayed wire ends. The current in the speakers and output circuitry is quite high. Poor contacts or small size wire can cause power losses in the speaker system. Use 14 or 16 AWG for long runs of speaker wiring.

**Voltage Measurements**—Voltage measurements are made with the line voltage adjusted to 117 volts and all readings are  $\pm 10\%$ . All voltages are DC, measured with a VTVM to ground, with no signal input unless otherwise noted.  indicates 1-kHz audio voltages, measured with an audio AC VTVM to ground at various points from the phono input to the power amplifier output.

**Alignment Procedures — Replacement of transistors and components in the front end, IF amplifier and multiplex decoder will normally not require realignment of these circuits. Realignment of these circuits, unless absolutely necessary, is not recommended. Do not attempt a realignment unless the required test equipment is available and the alignment procedure is thoroughly understood.**

BECAUSE ITS PRODUCTS ARE SUBJECT TO CONTINUOUS IMPROVEMENT, FISHER RADIO CORPORATION RESERVES THE RIGHT TO MODIFY ANY DESIGN OR SPECIFICATION WITHOUT NOTICE AND WITHOUT INCURRING ANY OBLIGATION.



## SERVICE PROCEDURES

### POWER AMPLIFIER CENTER VOLTAGE ADJUSTMENT

- (1) Connect two 10K  $\pm 1\%$  resistors in series across capacitor C12 (2500  $\mu$ F). Connect the common lead of a DC VTVM to the junction of the two resistors.
- (2) Connect DC VTVM to the junction of resistors R827 and R829 (0.82 ohm) on the left channel portion of the dual channel power amplifier module. Adjust Center Voltage Adjust Pot. R813 on left channel predriver/driver board for reading of  $0 \pm 0.5$  VDC on DC VTVM.
- (3) Connect DC VTVM to the junction of resistors R826 and R828 (0.82 ohm) on the right channel portion of the dual channel power amplifier module. Adjust Center Voltage Adjust Pot. R813 on right channel predriver/driver board for reading of  $0 \pm 0.5$  VDC on DC VTVM.
- (4) Disconnect two 10K ohm resistors.

### POWER AMPLIFIER IDLING CURRENT ADJUSTMENT

**NOTE:** Power amplifier center voltage adjustment must be performed before starting this procedure.

- (1) Connect DC VTVM across resistor R827 (0.82 ohm) on the left channel portion of the dual channel power amplifier module. Adjust Output Bias Adjust Pot. R818 on left channel predriver/driver board for reading of  $40 \pm 10$  mV DC on DC VTVM.
- (2) Connect DC VTVM across resistor R826 (0.82 ohm) on the right channel portion of the dual channel power amplifier module. Adjust Output Bias Adjust Pot. R818 on right channel predriver/driver board for reading of  $40 \pm 10$  mV DC on DC VTVM.

### INTERMODULATION DISTORTION TEST

Set BALANCE, BASS and TREBLE controls to their center positions. Set SELECTOR switch to AUX 1 and TAPE MONITOR switch to STEREO. Push in MAIN SPKRS pushbutton. Check that MONO pushbutton is out. Unplug AC power cord.

- (1) Connect a 4-ohm, 50-watt resistor across the LEFT CHANNEL MAIN SPKR terminals. In parallel with the load resistor, connect the input leads of an IM (Inter-Modulation) distortion analyzer and the input leads of an AC VTVM capable of reading 0.1 volts with accuracy.
- (2) Connect IM-analyzer generator output to the LEFT CHANNEL MON IN jack.
- (3) Connect AC power cord and rotate VOLUME control to its maximum clockwise position—full volume.
- (4) Increase IM-analyzer generator input to set for 30 watts output (9.0 VAC across 4-ohm load resistor). AFTER ONE FULL MINUTE OF WARM-UP TIME, PROCEED TO NEXT STEP.
- (5) IM meter reading should be 0.8% or less.
- (6) Repeat preceding steps for right channel.

**NOTE:** If any of the preceding instructions are different from those in the IM-analyzer instruction manual, it is best to follow those in the manual. If a load resistor of 50-watt rating is built into the IM analyzer, a separate load resistor is not required.

### HARMONIC DISTORTION TEST

Set BALANCE, BASS and TREBLE controls to their center positions. Set SELECTOR switch to AUX 1 and TAPE

MONITOR switch to STEREO. Push in MAIN SPKRS pushbutton. Check that MONO pushbutton is out. Unplug AC power cord.

- (1) Connect a 4-ohm, 50-watt resistor across the LEFT CHANNEL MAIN SPKR terminals. In parallel with the load resistor, connect the input leads of an harmonic distortion analyzer and the input leads of an AC VTVM capable of reading 0.1 volts with accuracy.
- (2) Connect a low-distortion audio sine wave generator, set for 1000 Hz (cps), to the LEFT CHANNEL MON IN jack.
- (3) Connect AC power cord and rotate VOLUME control to its maximum clockwise position—full volume.
- (4) Increase audio generator input to set for 45 watts output (13.4 VAC across 4-ohm load resistor). Harmonic distortion meter should read 0.8% or less.
- (5) Repeat preceding steps for right channel.

### POWER OUTPUT MEASUREMENT

The output amplifier of this unit is designed to deliver its full-rated power with program material (voice or music) into 4- to 16-ohm loads for an indefinite period of time.

When a constant audio tone is used as a signal to measure the continuous RMS power output, the following precautions must be taken.

- (1) Measure the power output of one channel at a time.
- (2) Limit the measurement period to 10 minutes with a load resistance between 4 and 16 ohms.

**WARNING:** If the power output of both channels must ever be measured simultaneously, use a load of 4 to 8 ohms per channel and limit measurements to a period not longer than 3 minutes for a 4-ohm load and not longer than 5 minutes for an 8-ohm load.

### REPLACING MONO AND STEREO LAMPS

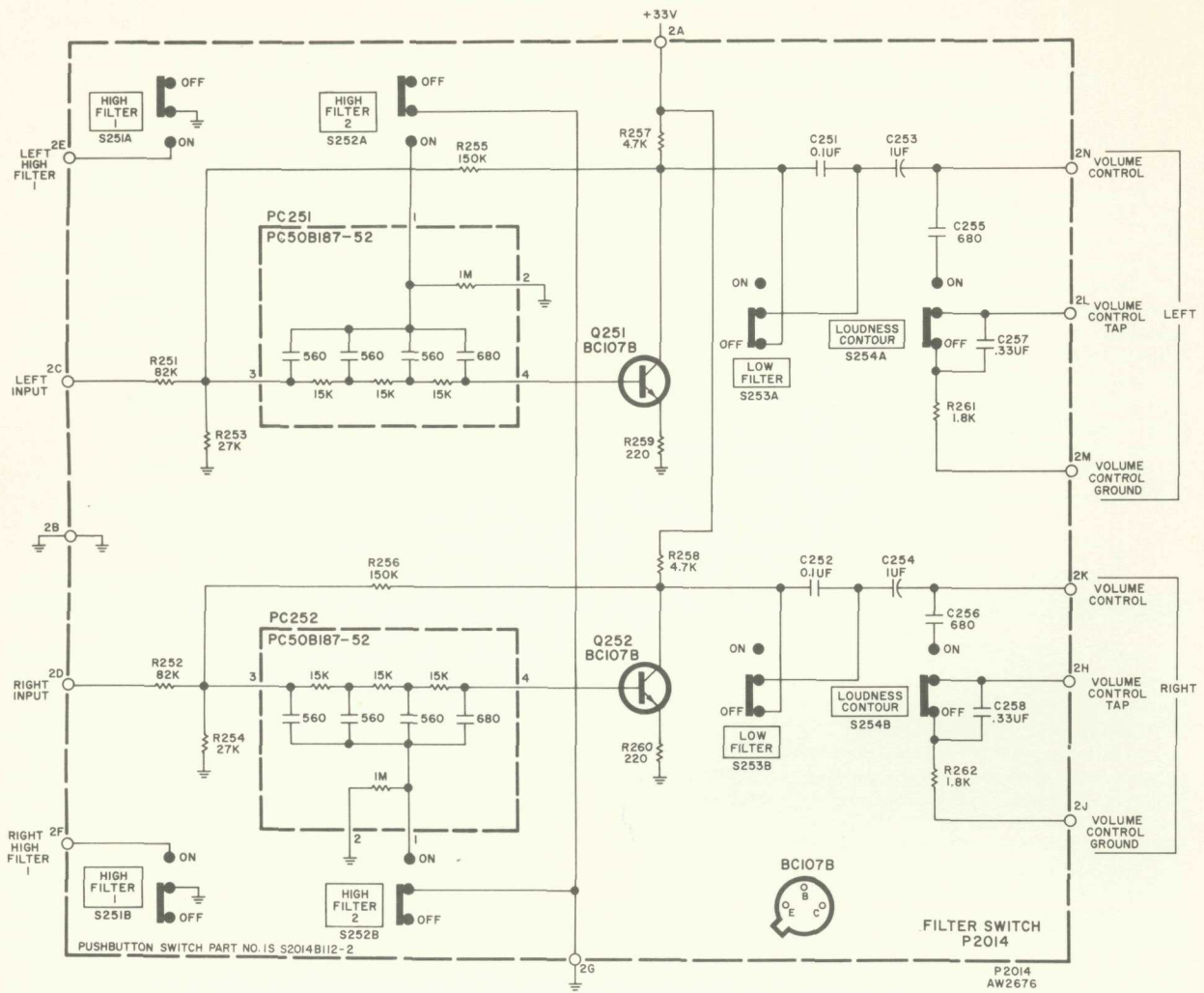
To replace the MONO and STEREO lamps, proceed as follows:

- (1) Unplug AC power cord.
- (2) Gently pull all knobs off the front panel control shafts. Remove the hex nuts from the control shafts.
- (3) Carefully pry off the small front panel nameplate. Loosen and remove the machine screw hidden behind the nameplate.
- (4) Remove the screws which hold the top cover to the chassis and lift off the top cover. Remove the nut which holds the left topside of the front panel. Lift off the panel.
- (5) Remove the fiberglass sleeving from the lamp.
- (6) Gently push in on the lamp and turn it counterclockwise to remove. Place the new lamp in the socket, push in gently and turn it clockwise to lock it in place.
- (7) Replace the fiberglass sleeving on the lamp.
- (8) Replace the front panel and secure it with the hex nuts removed previously. Replace the knobs on the control shafts.
- (9) Replace the nut which holds the left topside of the front panel. Replace the top cover on the chassis and secure with the screws removed previously.
- (10) Insert and tighten the machine screw in the hole behind the nameplate mount. Push the nameplate into the mounting holes on the front panel.

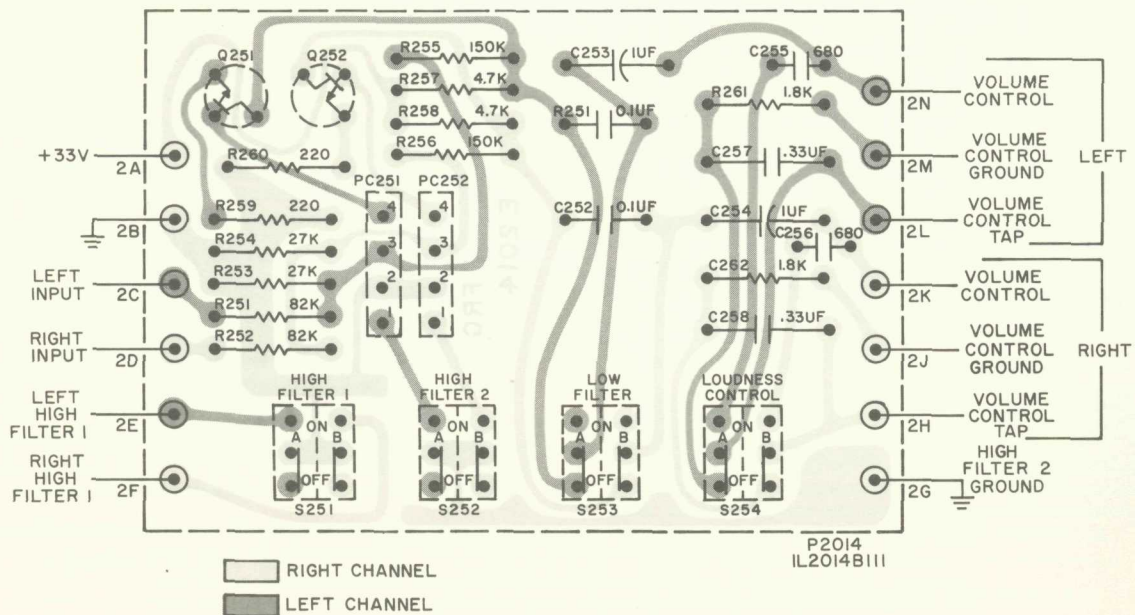
### CLEANING FRONT PANEL

**WARNING:** Use only plain lukewarm water and a freshly laundered, soft lint-free cloth to clean the front control panel.

# 2014 FILTER SWITCH

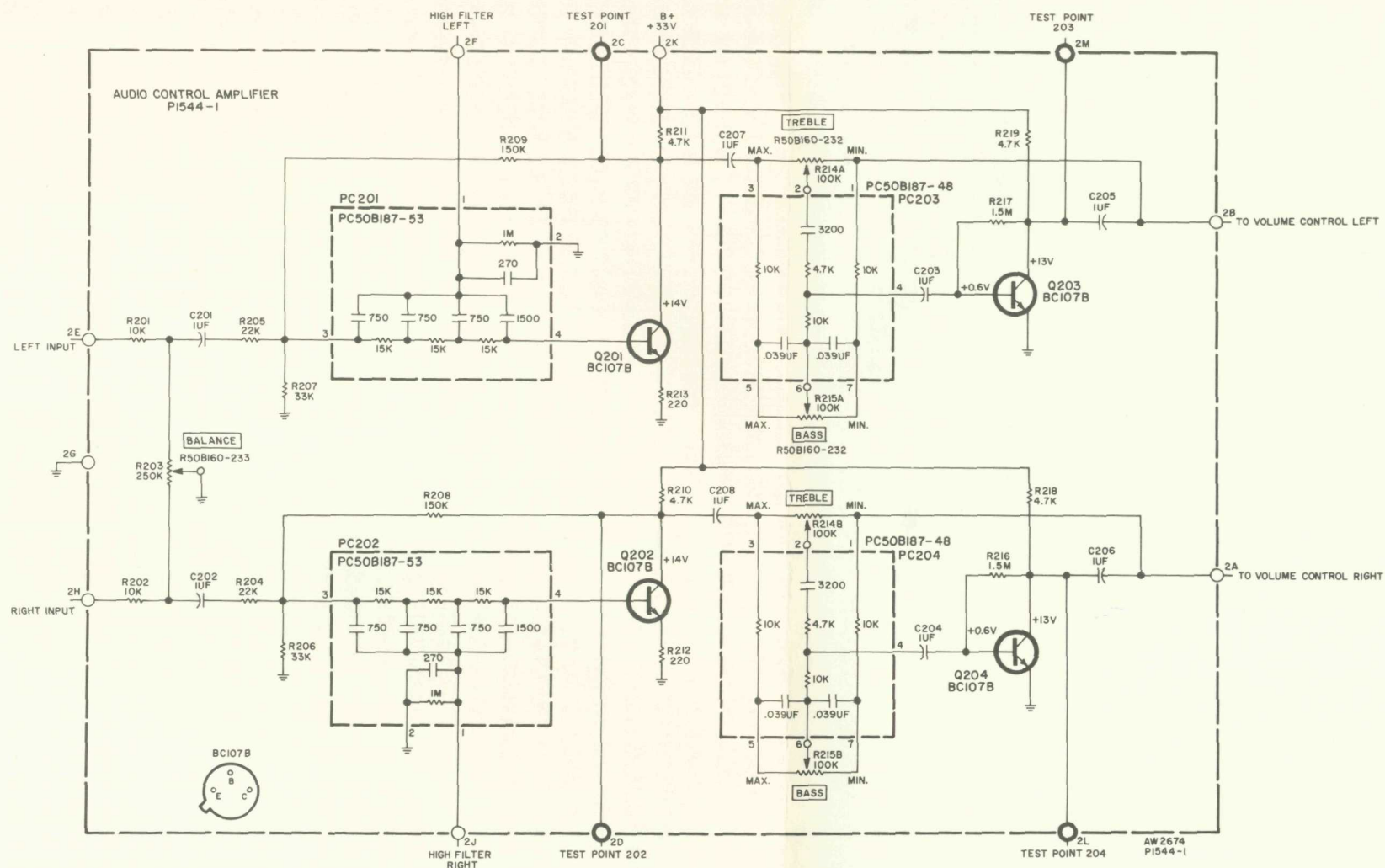


## BOARD VIEWED FROM COMPONENT SIDE

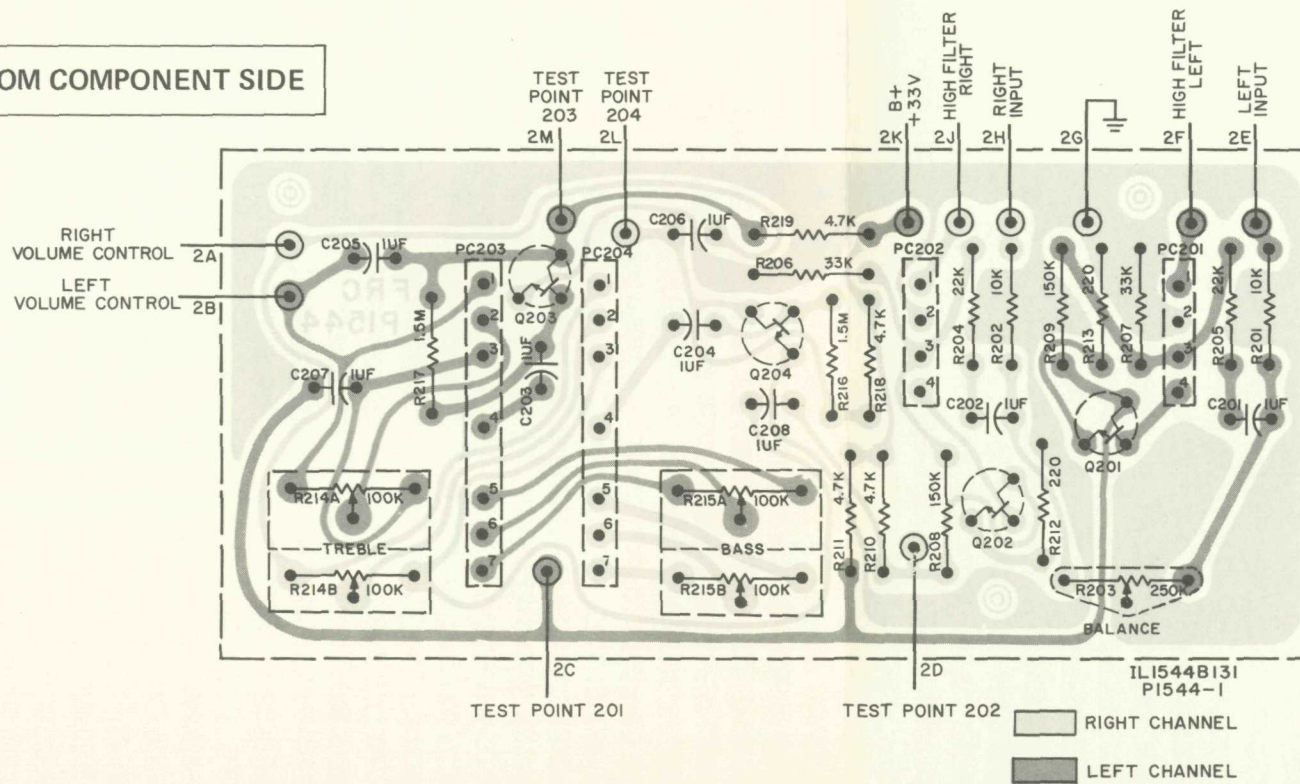




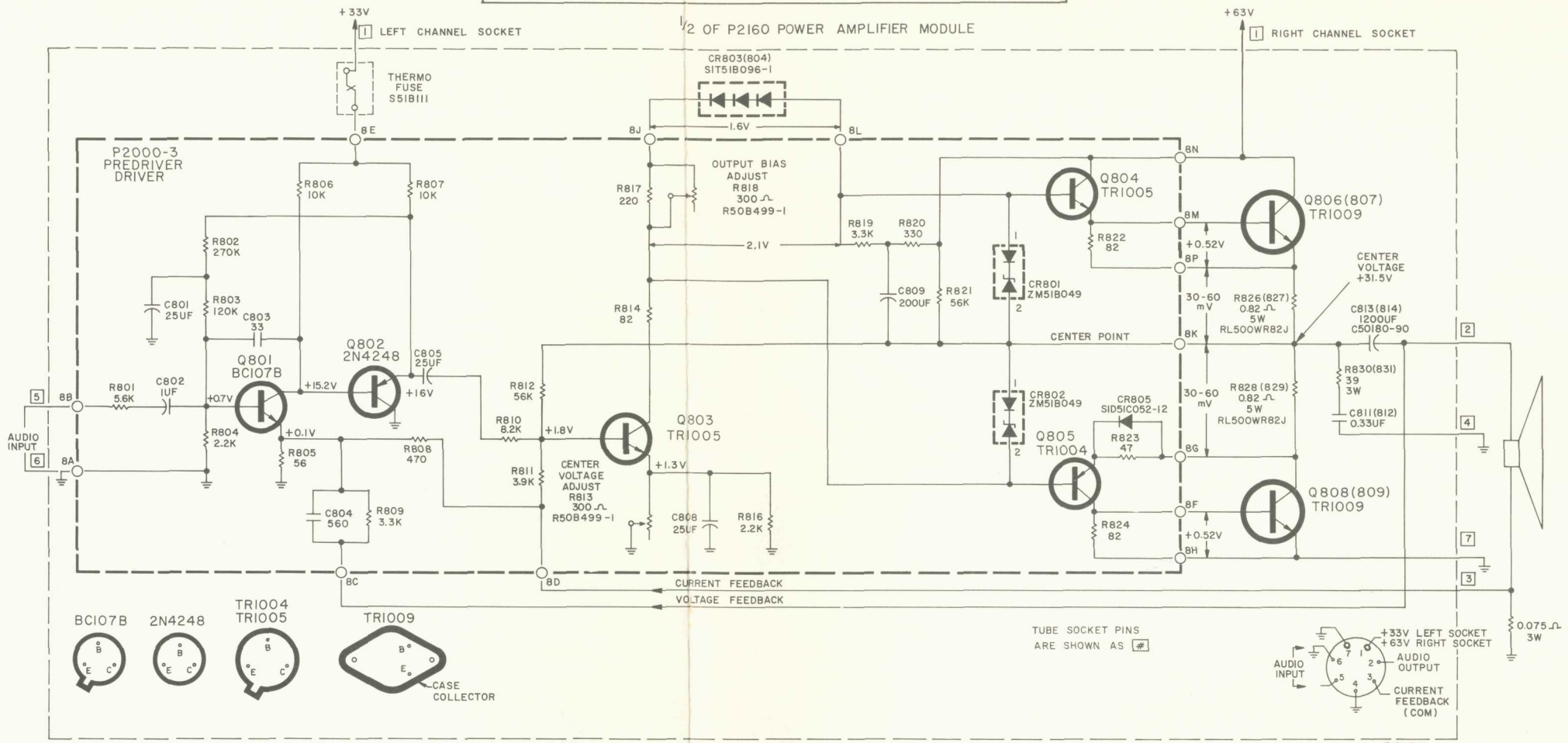
# 1544-1 AUDIO CONTROL AMPLIFIER



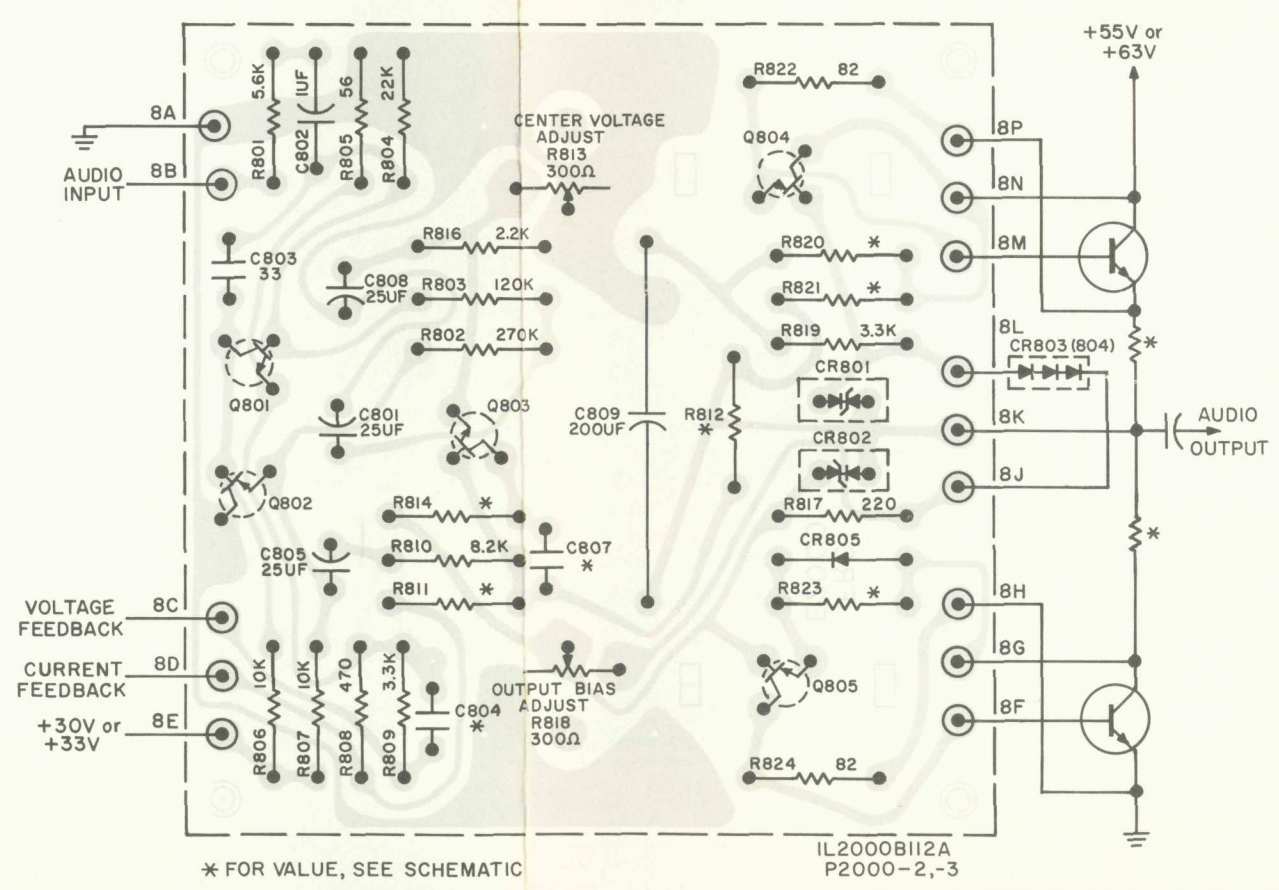
## BOARD VIEWED FROM COMPONENT SIDE



# 2160 DUAL CHANNEL POWER AMPLIFIER MODULE

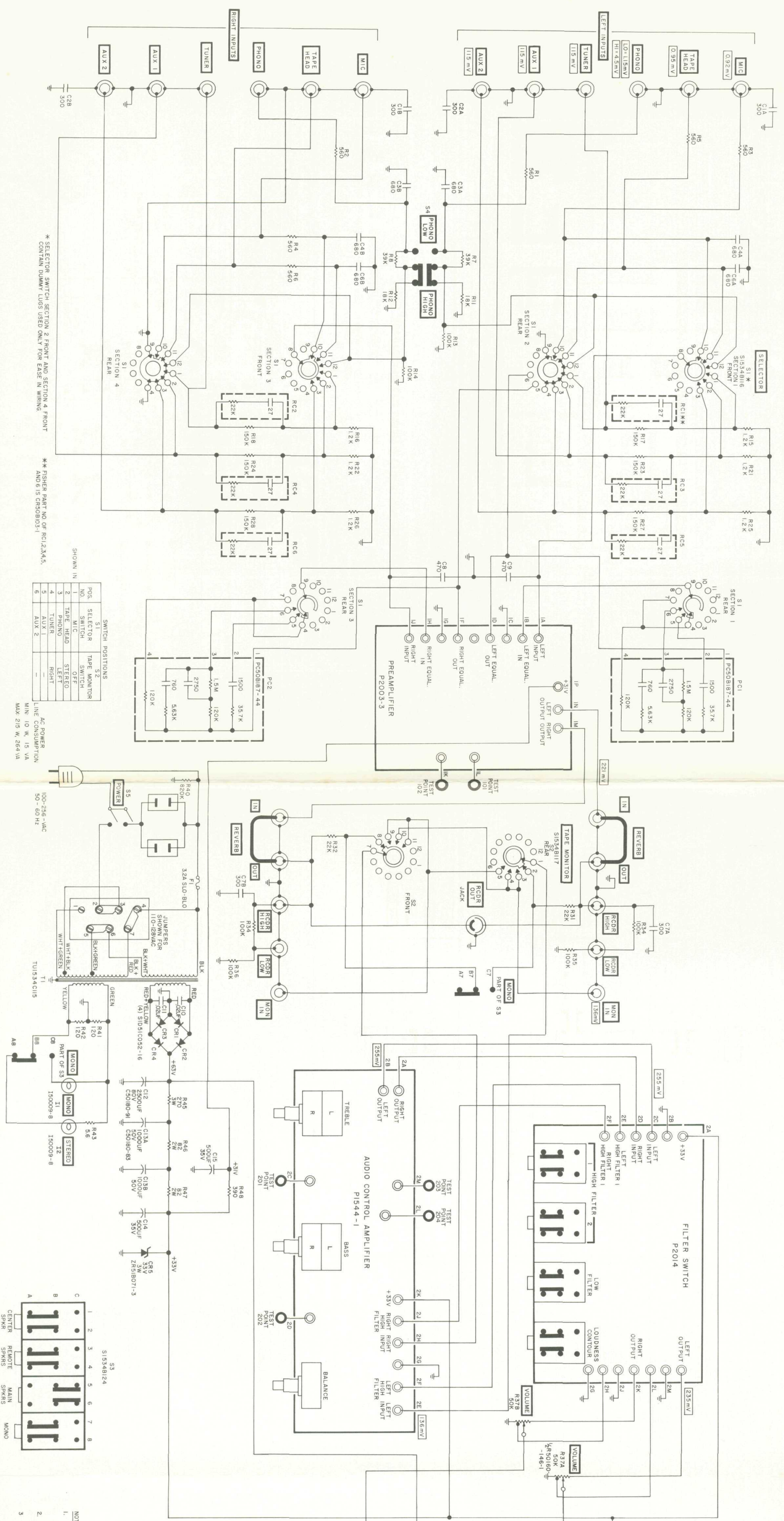


## BOARD VIEWED FROM COMPONENT SIDE





**MAIN CHASSIS**



\* SELECTOR SWITCH SECTION 2 FRONT AND SECTION 4 FRONT  
CONTAIN DUMMY LUGS USED ONLY FOR EASE IN WIRING

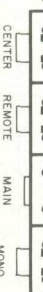
\*\* FISHER PART NO. OF RCL2,3,4,5,  
AND 6 IS CR50802-1

SWITCH POSITIONS

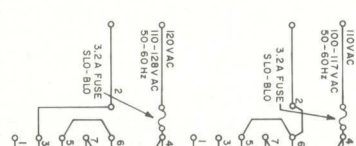
POS. NO.	SECTION 1	SECTION 2
1	SELECTOR SWITCH	TAPE MONITOR SWITCH
2	TAPE HEAD	STEREO
3	PHONO	LEFT
4	AUX 1	RIGHT
5	AUX 2	
6	AUX 2	

AC POWER  
LINE CONNECTION  
MIN. 10 W. 15 VA  
MAX. 215 W. 264 VA

100-256-VAC  
50-60 Hz

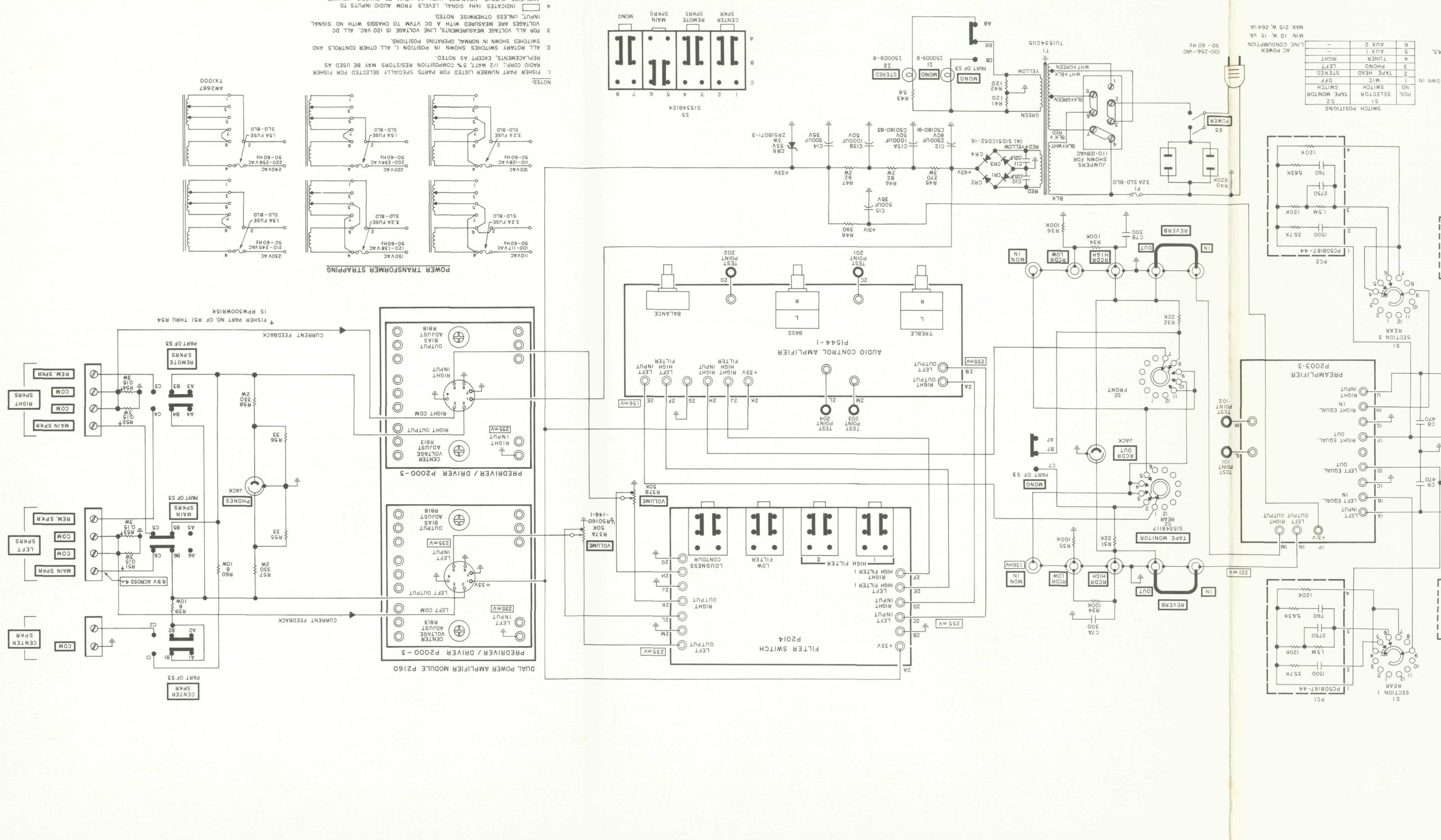


- NOTES:
1. FISHER PART NUMBER LIST RADIO CORP., 1/2 WATT, 1 REPLACEMENTS, EXCEPT 1 SWITCHES SHOWN IN NORMAL POSITION.
  2. ALL ROTARY SWITCHES SWITCHES SHOWN IN NORMAL POSITION.
  3. FOR ALL VOLTAGE MEASUREMENTS, UNLESS OTHERWISE SPECIFIED, MEASURE AC VOLTAGES ARE MEASURED ACROSS THE OUTPUT, MEASUREMENT MAXIMUM. ALL





MAIN CHASSIS

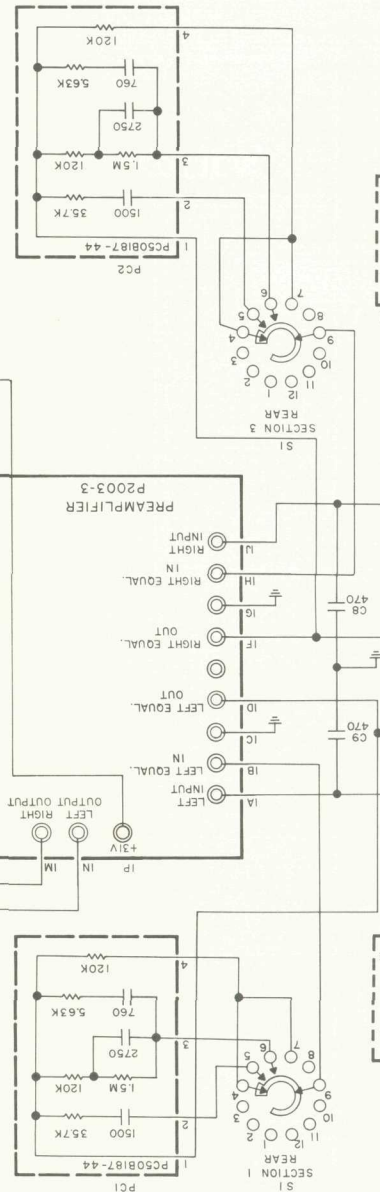


- NOTES:
- RADIO PART NUMBER LISTED FOR PARTS SPECIALLY SELECTED FOR FISHER REPLACEMENTS, EXCEPT AS NOTED.
  - ALL ROTARY SWITCHES SHOWN IN POSITION 1, ALL OTHER CONTROLS AND SWITCHES SHOWN IN NORMAL OPERATING POSITIONS.
  - FOR ALL VOLTAGE MEASUREMENTS, LINE VOLTAGE IS 120 VAC. ALL DC VOLTAGES ARE MEASURED WITH A DC VTVM TO CHASSIS. VOLUME INDICATES INHZ SIGNAL LEVELS FROM AUDIO INPUTS TO AMPLIFIER OUTPUT. MEASURED WITH AC VTVM TO CHASSIS. VOLUME UNLESS OTHERWISE NOTED.
  - INDICATES INHZ SIGNAL LEVELS FROM AUDIO INPUTS TO AMPLIFIER OUTPUT. MEASURED WITH AC VTVM TO CHASSIS. VOLUME UNLESS OTHERWISE NOTED.

SWITCH POSITIONS

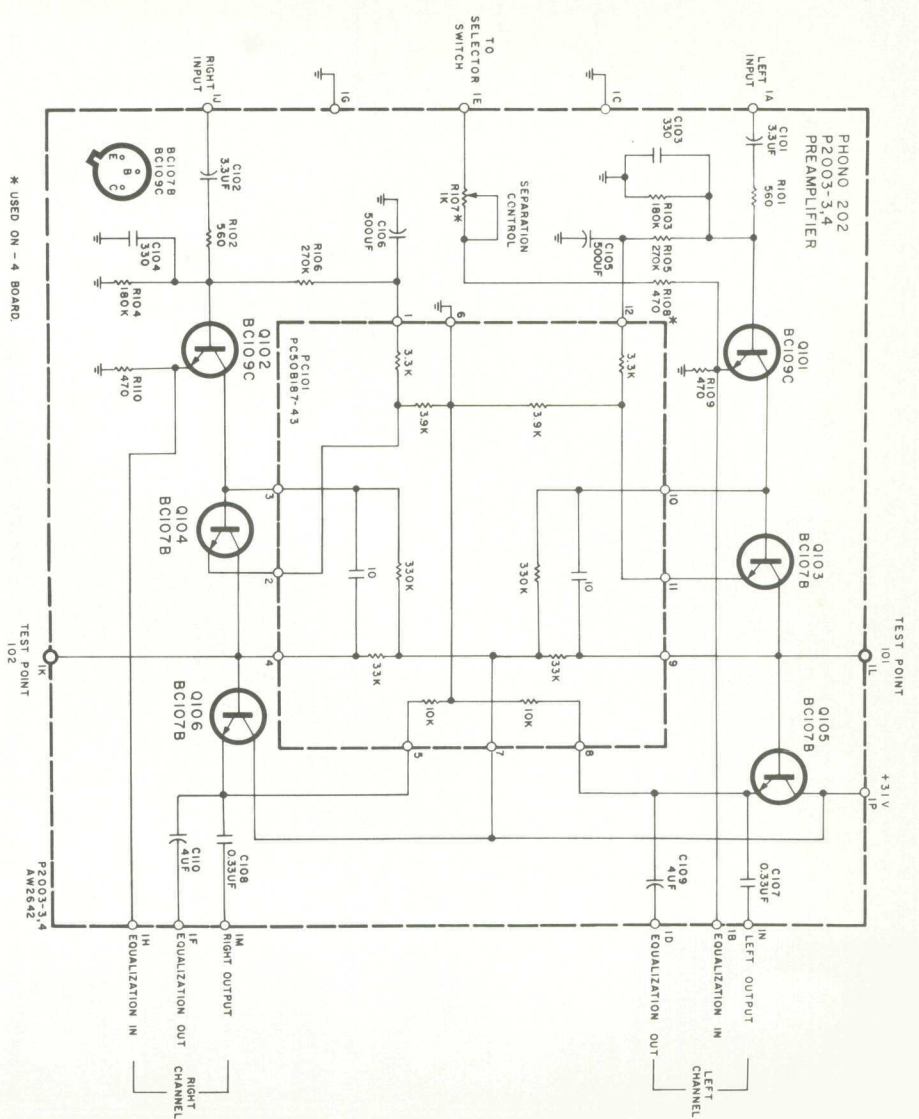
POS.	S1	TAPE MONITOR
NO.	SWITCH	OFF
1	MIC	STEREO
2	TAPE HEAD	LEFT
3	PHONE	RIGHT
4	TUNER	—
5	AUX 1	—
6	AUX 2	—

AC POWER  
 MIN. 10 W. 15 VA  
 MAX. 215 W. 264 VA

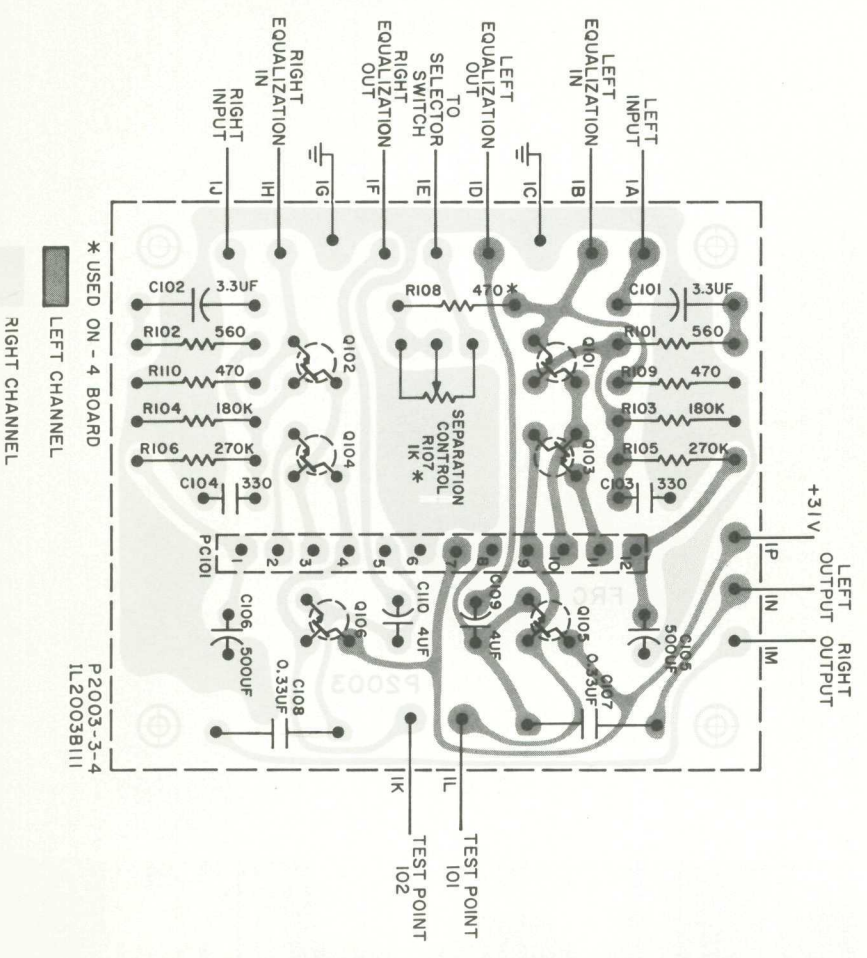




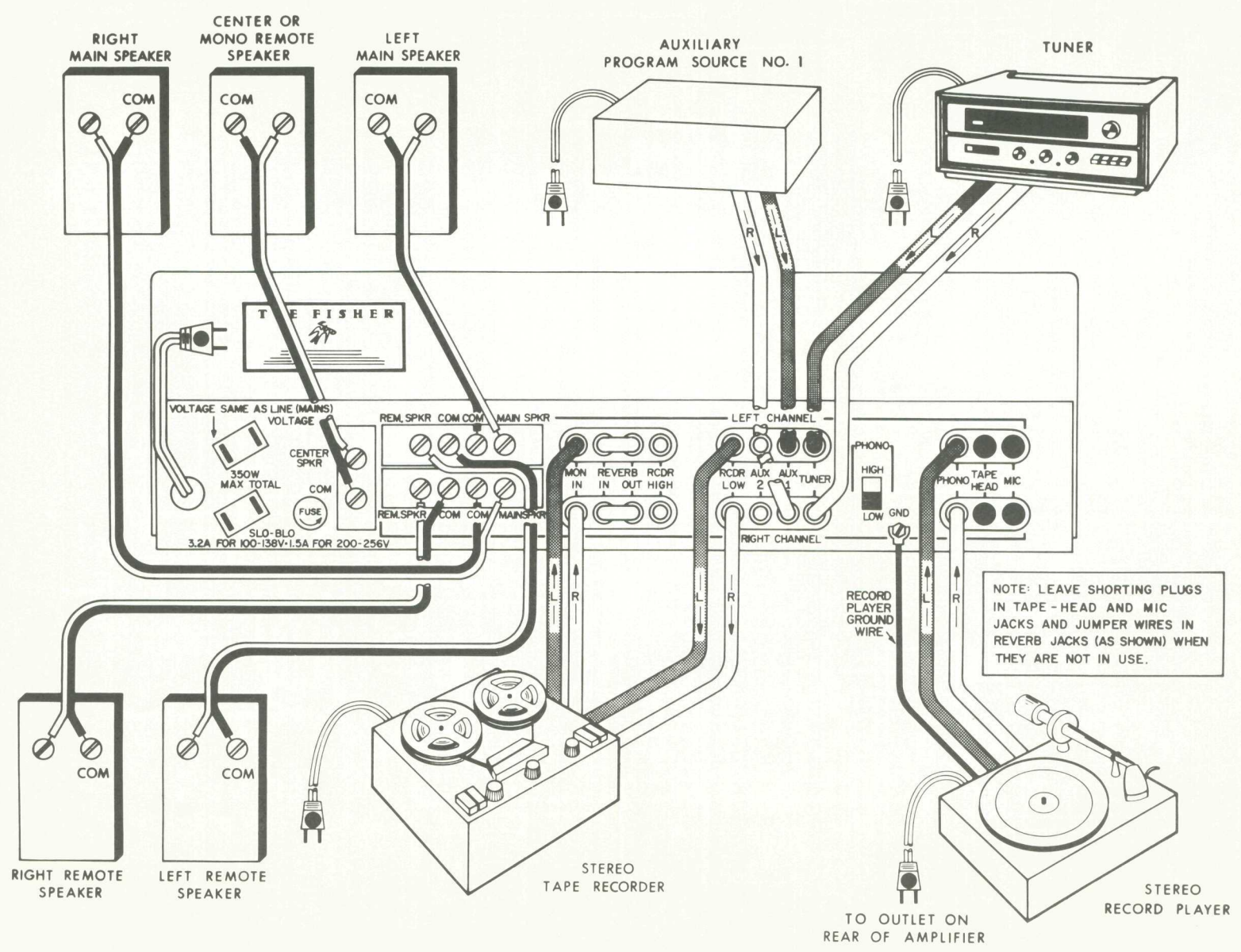
2003-3 PREAMPLIFIER



BOARD VIEWED FROM COMPONENT SIDE



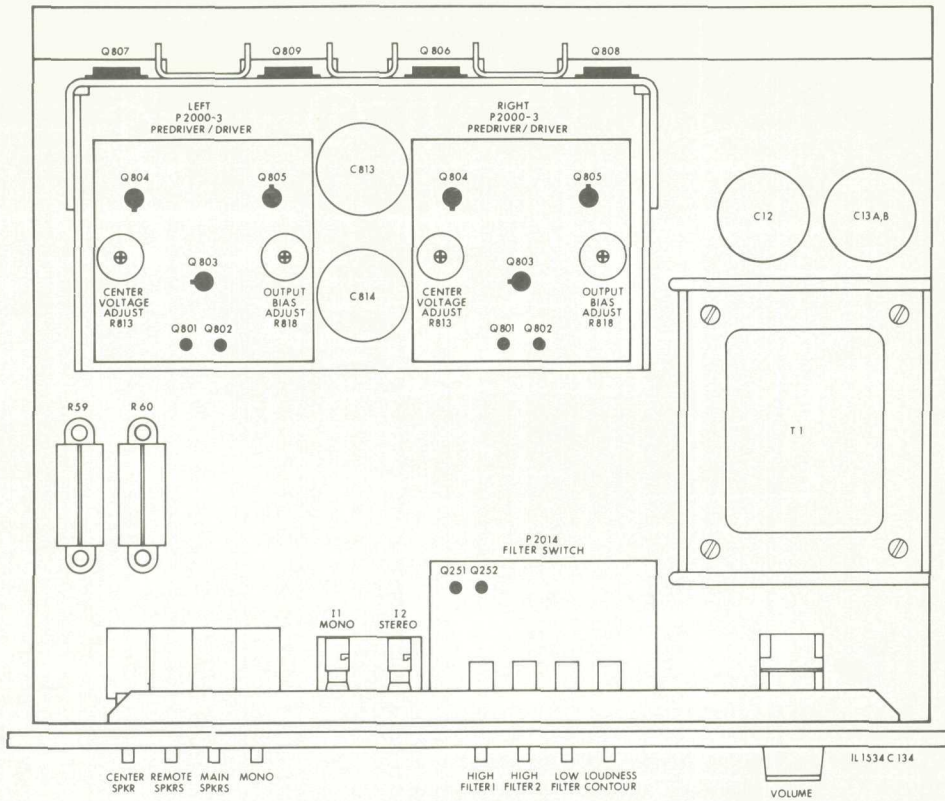
COMPONENT CONNECTIONS



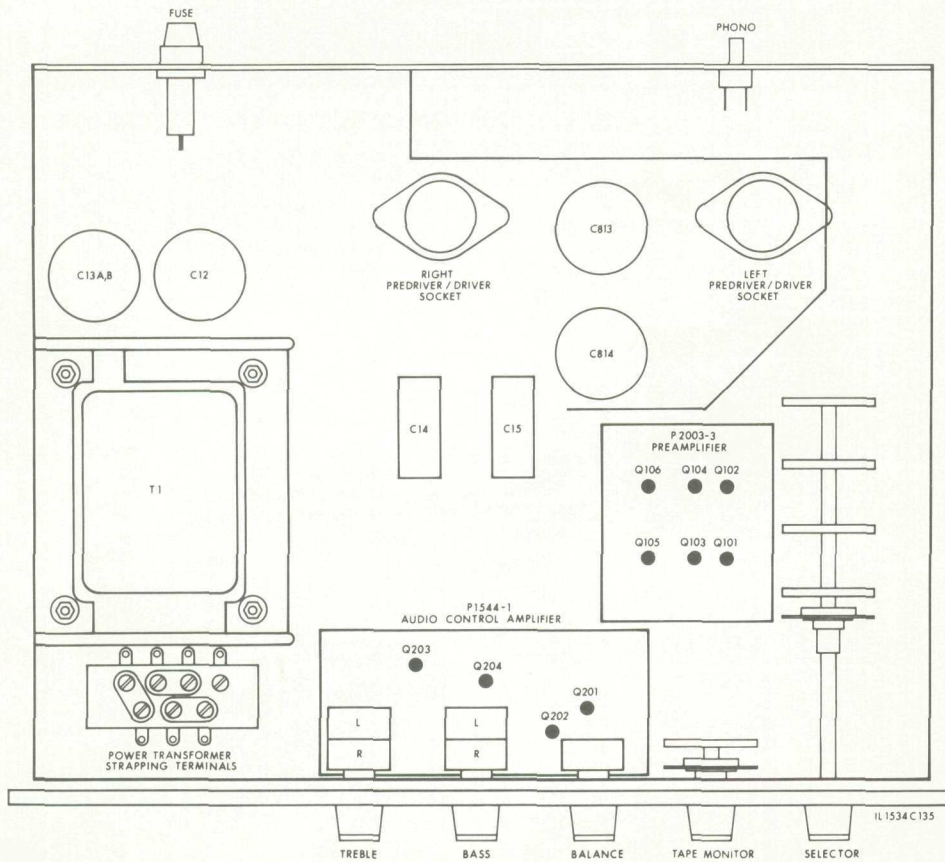


# CHASSIS LAYOUT

TOP



BOTTOM



FISHER RADIO CORPORATION • NEW YORK