

SERVICE MANUAL

PRICE \$1.00
701
SERIAL NUMBERS
BEGINNING 10001

The Fisher® 701



Four-Channel Stereophonic AM/FM Receiver

WORLD LEADER IN HIGH QUALITY STEREO

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CAUTION:

This precision high-fidelity instrument should be serviced only by qualified personnel, trained in the repair of transistor equipment and printed circuitry.

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

SOLDERING: A well-tinned, hot, clean soldering iron tip will make soldering easier, without causing damage to the printed circuit board or the components mounted on it. Regular use of a sponge cleaner will maintain a clean soldering surface. The heat available at the tip, (not the wattage of the iron) is important. Some 50-watt irons reach temperatures of 1,000° F, while others will hardly melt solder. Small-diameter tips should be used for single solder connections, pyramid and chisel tips for large areas.

Always disconnect the AC power cord from the line when soldering. Turning the power switch OFF is not sufficient. Power-line leakage paths, through the heating elements of the iron, may destroy transistors.

PARTS REMOVAL: If a part is not being returned for in-warranty factory replacement, it may be cut in half (with diagonal cutting pliers) to make removal easier. Multiple terminal parts, such as IF transformers, or electrolytic capacitors, should be removed using special de-soldering tips made especially for this purpose. Removing solder from terminals, reduces the possibility of breaking the printed circuit board when the part is removed.

ACCIDENTAL SHORTS: A clean working area, free of metal particles, screws, etc., is an important preventive in avoiding servicing problems. Screws, removed from the chassis during servicing, should be stored in a box until needed. While a set is operating, it takes only an instant for a base-to-collector short to destroy a transistor (and others direct-coupled to it). In the time it takes for a dropped screw, washer, or screwdriver, to contact a pair of terminals (or terminal and chassis), a transistor can be ruined.

SOLID-STATE DEVICES: Integrated Circuits contain the equivalent of many circuit parts, including transistors, diodes, resistors, and capacitors. The preferred troubleshooting procedure requires isolating the trouble to one stage using AC signal tracing methods. Once the suspected stage is located the DC voltages at the input and output leads are measured to give an accurate indication of the operating conditions of the IC. DO NOT use an ohmmeter, to check continuity with the IC mounted on the printed circuit board. Forward biasing the internal junctions within the IC may burn out the transistors. Do not replace a defective IC until all external resistors, capacitors, and transformers are checked first, to prevent the replacement IC from failing immediately due to a defect in the connecting components. Solder and unsolder each lead separately using a pliers or other heat sink on the lead to

prevent damage from excessive heat. Check that the leads are connected to the correct locations on the printed circuit board before turning the set on.

Whenever possible, a transistor tester should be used to determine the condition of a transistor or diode. Ohmmeter checks do not provide conclusive data, and many even destroy the junction(s) within the device.

Never attempt to repair a transistor power amplifier module until the power supply filter-capacitors are fully discharged.

If an output or driver transistor becomes defective (opens or shorts), always check ALL direct-coupled transistors and diodes in that channel. In addition, check the bias pot., and other parts in the bias network, before installing replacement transistors. All output and driver transistors in one channel may be destroyed if the bias network is defective. After parts replacement, check bias for specified idling current.

In some applications, replacement of transistors must be made from the same beta group as the original type. The beta group is indicated by a colored marking on the transistor. Include this information when ordering replacements.

When mounting a replacement power transistor, be sure the bottom of the flange, mica insulator, and the surface of the heat sink, are free of foreign matter. Dust and grit will prevent flat contact, reducing heat transfer to the heat sink. Metallic particles can puncture the insulator, cause a short, and destroy 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 transfer. Use Dow-Corning DC-3, or an equivalent compound made for power transistor heat conduction.

Use care when making connections to speakers and output terminals. To reduce the possibility of shorts, lugs should be used on the exposed ends, or stranded wire should be tinned to prevent frayed wire ends. Current in the speakers and output circuitry is quite high — poor contacts, or small wire, can cause significant power losses. For wire lengths greater than 30 feet, 16 AWG, or heavier, should be used.

VOLTAGE MEASUREMENTS: All voltages are measured with the line voltage adjusted to 120 volts. All measured voltages are $\pm 20\%$. DC voltages are measured to chassis with a VTVM, with no signal input unless otherwise noted. AC signal voltages are measured under the conditions specified on the schematic.

ALIGNMENT PROCEDURES: DO NOT attempt realignment unless the required test equipment is available, and the alignment procedure is thoroughly understood.

TEST EQUIPMENT and MECHANICAL DISASSEMBLY

The following equipment is required to completely test and align the 701 AM-FM Receiver.

- Line Voltage Autotransformer or Voltage Regulator
- DC Vacuum Tube Voltmeter
- Accurately Calibrated AC Vacuum Tube Voltmeter
- Oscilloscope (Flat to 100 KHz Minimum)
- Low-Distortion Audio (Sine Wave) Generator
- Harmonic Distortion Analyzer
- 2 — Load resistors, 8-Ohms, 100 Watt (Minimum Rating)
- AM/FM Signal Generator
- 10.7 MHz Sweep Generator (Fisher 3024*)
- Multiplex Generator with RF output (Fisher 1536*)
- 455 KHz Sweep Generator (Fisher 3025*)
- Stereo Source — Turntable, Tape Recorder, etc.
- Soldering Iron with Small Tip, Fully Insulated from AC Line
- Suction Desoldering Tool

* with Power Supply (Fisher 1561)

REMOVING DRESS PANEL

- (1) Remove screws securing top cover to chassis. Remove cover.
- (2) Gently pull TAPE MONITOR, SELECTOR, MODE, BASS, TREBLE, BALANCE, SPEAKERS, TUNING, and VOLUME knobs from their control shafts. Remove hex nuts from shafts.
- (3) Unscrew hexagonal spacers (2) at top left and top right of dial bracket. Remove dress panel.
- (4) Reverse procedure for re-assembly.

REPLACING DIAL GLASS

- (1) Remove dress panel.
- (2) Remove left and right dial glass retainers and remove dial glass.
- (3) Install a new dial glass by reversing procedure.

REPLACING DIAL LAMPS

- (1) Remove the screws securing top cover to chassis. Remove cover.
- (2) Remove lamp assembly leads from pins 50 and 51. Note the position of wires taped against the metal bracket.
- (3) Snap out defective lamp assembly from the rear of bracket. Insert a new lamp assembly and connect leads to pins 50 and 51. Tape wires against metal bracket as noted in step (2).
- (4) Replace dress panel.

REPLACING DIAL POINTER LAMP

- (1) Remove the screws securing top cover to chassis. Remove cover.
- (2) Remove lamp assembly leads from pins 51 and 53.
- (3) Bend metal flap back and remove wire support from the metal bracket behind dial glass.
- (4) Remove dial cord from tab on dial pointer. Carefully disengage pointer assembly and pull free of dial bracket.
- (5) Remove the wire that retains sleeving in lamp housing. Snap out lamp assembly from housing and remove.
- (6) Re-assemble new lamp assembly in reverse order.
- (7) Check pointer adjustment. Refer to DIAL STRINGING.

REPLACING STEREO BEACON, 2-CH, 4-CH, AND MONO LAMPS

NOTE: The indicator assembly above the meter contains all four lamps and must be replaced as a unit.

- (1) Remove the screws securing top cover to chassis. Remove cover.
- (2) Disconnect three lampholder assembly leads from pins 56, 16, and DD on tuner board and three leads from pins 39, 40, and 41 on control amplifier board. Label each wire for reference.
- (3) Remove the two nuts securing indicator assembly to dial bracket and remove assembly.
- (4) Insert new indicator assembly and connect leads to the tuner and control amplifier boards as labeled. Replace cover.

REPLACING METER LAMPS

NOTE: The lampholder assembly at the rear of the meter contains both the autoscanner and meter lamps, and must be replaced as a unit.

- (1) Remove the screws securing top cover to chassis. Remove cover.
- (2) Remove lampholder assembly leads from pins 16, DD, 30, and 5V on tuner board. Label wires for reference.
- (3) Gently lift retaining spring that holds lampholder assembly at rear of meter and remove assembly.
- (4) Insert new lampholder assembly under the retaining spring and re-connect wires.

REPLACING METER

- (1) Remove the screws securing top cover. Remove cover.
- (2) Remove lampholder assembly from rear of meter.
- (3) Remove meter leads from pins 26 and 28 on tuner board. Label wires for reference.
- (4) Gently pry meter from the back of dial panel and scrape residual adhesive from panel. Transfer meter leads to new meter.
- (5) Peel backing from one side of replacement adhesive mounting pad and affix it to replacement meter. Peel backing from other side of pad, align meter face over panel cutout, and press meter firmly to back of panel.
- (6) Re-connect meter leads to tuner board.
- (7) Replace lampholder assembly.
- (8) Check meter calibration. Refer to TUNER ALIGNMENT. Replace cover.

REMOVING PC BOARDS

To remove most boards, disconnect leads and remove screws securing board to its nylon mounts. Label all wires for reference. Some boards have guide pins or front panel controls and require additional removal procedures as follows:

VOLUME CONTROL BOARD

NOTE: The volume control board on the front panel contains both left and right volume controls and must be replaced as a unit.

- (1) Remove dress panel.
- (2) Remove the screw securing connector board to dial bracket. Disconnect connector board.
- (3) Remove the four screws securing volume control board to dial bracket. Remove board.
- (4) Replace in reverse order.

TUNER BOARD

- (1) Disconnect wiring and label for reference.
- (2) Remove connecting board.
- (3) Remove dial cord.
- (4) Remove eight screws securing board to its nylon mounts and lift board straight up.
- (5) Reverse procedure to replace.
- (6) Restring dial cord. Refer to DIAL STRINGING procedure.

AUTOSCAN BOARD

- (1) Remove dress panel.
- (2) Remove volume control board.
- (3) Remove screws securing connector boards and remove connectors.
- (4) Remove two screws securing AUTOSCAN TUNING pushbuttons.
- (5) Remove screws securing autoscanner board to nylon mounts and remove board.
- (6) Replace in reverse order.

AUDIO FILTER BOARD

- (1) Remove dress panel.
- (2) Remove the screws securing bottom cover to chassis. Remove cover.
- (3) Remove the screws securing HIGH FILTER, LOUDNESS, and MUTING pushbutton bracket.
- (4) Remove the screws securing audio filter board to nylon mounts and remove board.
- (5) Replace in reverse order.

CONTROL AMPLIFIER BOARD

- (1) Remove audio filter board.
- (2) Remove hex nuts that secure extender shafts of TAPE MONITOR, SELECTOR, and SPEAKER switches to chassis front panel. Remove couplings that secure extender shafts to switch shafts. Pull extender shafts out towards the rear.
- (3) Disconnect leads from pins 39, 40, and 41 and label for reference.
- (4) Carefully remove (pull up) red slide-restrainer on 12-pin printed circuit board connector interconnecting audio input board. Slide connector to the side that disconnects pins on the control amplifier board.
- (5) Remove hex nuts securing BALANCE and MODE switch shafts to chassis front panel.
- (6) Remove screws securing the control amplifier board to its nylon mounts. Lift up rear of board to clear switch shafts and remove board.
- (7) Replace in reverse order.

AUDIO INPUT BOARD

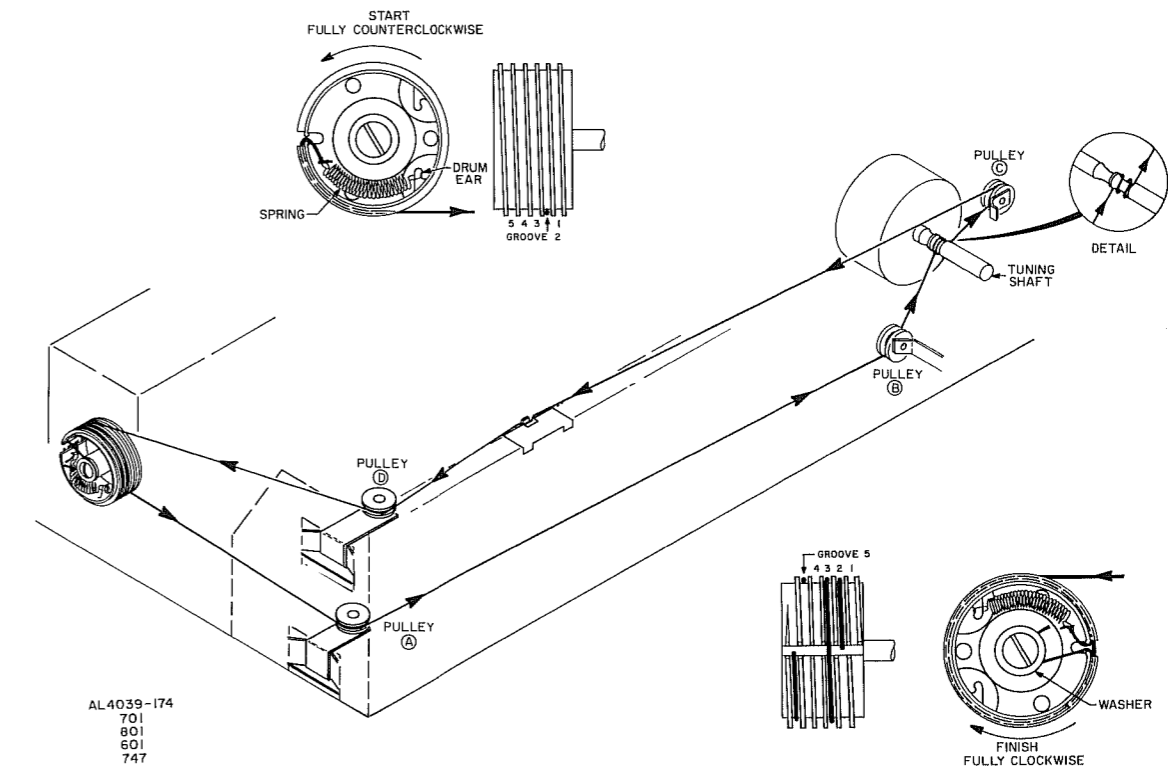
- (1) Remove dress panel. Remove the screws that secure bottom cover to chassis. Remove cover.
- (2) Remove hex nuts that secure the extender shafts of TAPE MONITOR and SELECTOR switches to chassis front panel. Remove coupling holding extender shafts at other end.
- (3) Carefully remove (pull up) red slide-restrainers on 6-pin and 12-pin printed circuit board connectors. Slide connectors to the side that disconnects pins to the audio input board.
- (4) Remove three screws holding input/output jack connector board on the rear panel.
- (5) Remove eight screws securing the audio input board to its nylon mounts. Remove the board with input/output jacks from chassis.
- (6) Replace in reverse order.

POWER SUPPLY BOARD

- (1) Remove dress panel. Remove screws securing bottom cover to chassis and remove cover.
- (2) Remove hex nut securing extender shaft of SPEAKERS switch to chassis front panel. Remove coupling holding extender shaft at other end.
- (3) Disconnect leads from pins on power supply board and leads from board to SPEAKERS terminals on rear panel. Label all wires for reference.
- (4) Carefully remove (pull up) red slide-restrainer on 6-pin printed circuit board connector. Slide connector to the side that disconnects pins on power supply board.
- (5) Remove four screws securing rear panel to chassis. Bend back rear panel.
- (6) Remove eleven screws securing power supply board to chassis mounts and remove board.
- (7) Replace in reverse order.

DIAL STRINGING

- (1) Remove the screws securing top cover to chassis. Remove cover.
- (2) Rotate tuning capacitor fully CCW. Loosen screw in center of drum and remove old dial cord.
- (3) Tie end of new cord to end of dial spring. Fasten spring to bottom right ear inside drum. See illustration.
- (4) Run cord through rim slot into underside of groove 2. Guide cord around pulley "A", under pulley "B", and wrap two turns CCW around tuning shaft. See detail.
- (5) Guide cord under and around pulley "C", and around pulley "D". Keep cord taut.
- (6) Rotate drum fully CW, allowing cord to wind onto drum.
- (7) Guide cord over drum into groove 5, through rim slot, and under washer. See illustration.
- (8) Pull cord taut, and tighten screw.
- (9) Rotate drum CCW and CW to distribute tensioning.
- (10) Repeat (8) and (9) until spring is tensioned.
- (11) Place cord over tab on pointer. Rotate tuning shaft CCW. Slide pointer to 0 while holding tuning shaft fully CCW.
- (12) Check dial calibration. Refer to TUNER ALIGNMENT.



HARMONIC DISTORTION TEST 3

CAUTION:

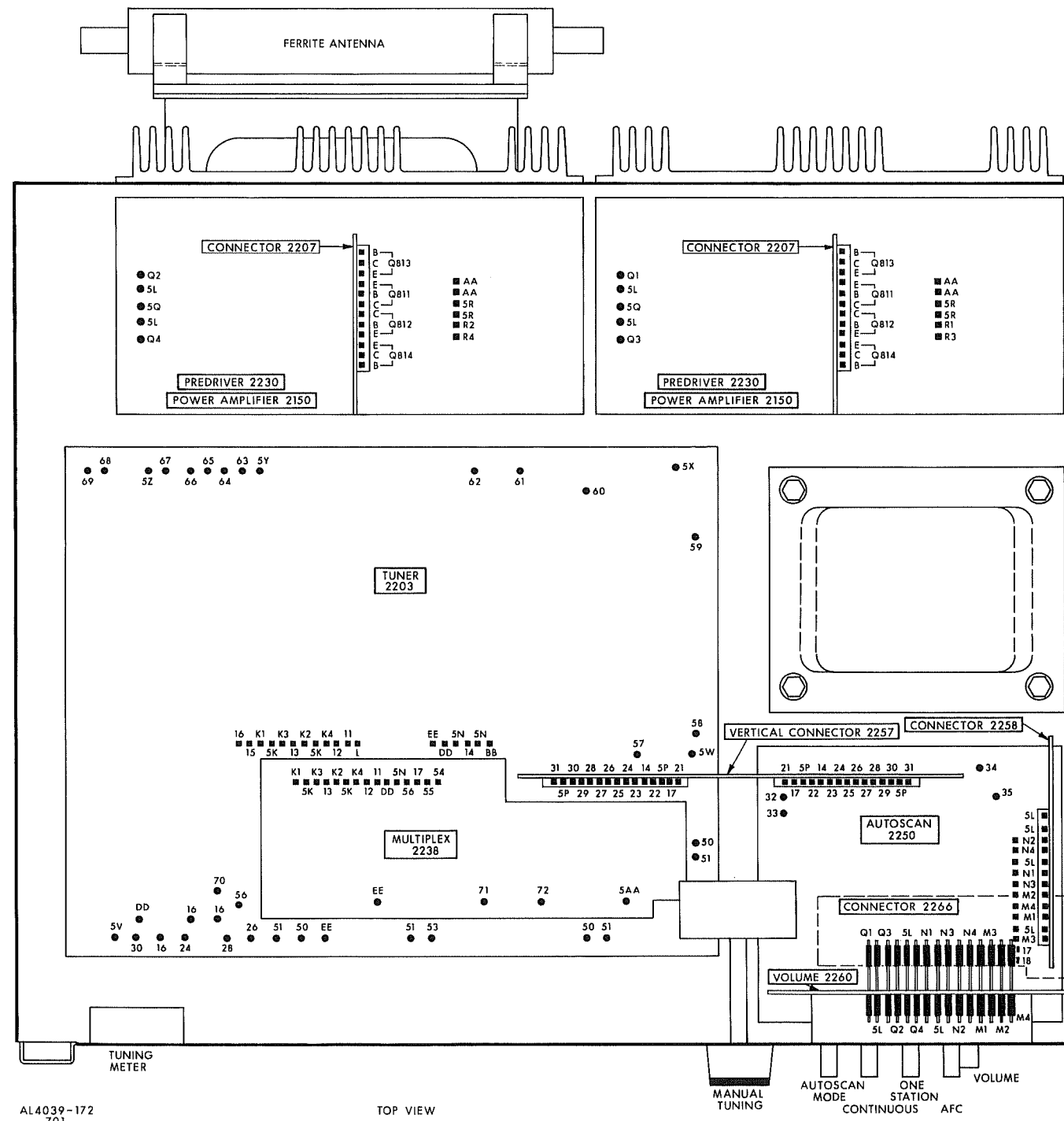
- (A) Test one channel at a time.
- (B) Limit tests to 10 minutes.
- (C) Use a load with a minimum power rating of 100 watts.

Unplug AC power cord. Release all pushbuttons. Slide FRONT and REAR VOLUME controls to 0. Set BASS, TREBLE, and BALANCE to their center positions. Set TAPE MONITOR to OFF, SELECTOR to AUX 1, MODE to 4-CH STEREO, and SPEAKERS to MAIN.

- (1) Connect a low-distortion sine-wave generator to the AUX 1 IN-FRONT L jack. Set generator frequency to 1kHz, and output level to minimum.
- (2) Connect an 8-ohm load resistor between MAIN SPEAKERS-FRONT L and COMMON terminals. Connect a harmonic distortion analyzer and an AC VTVM across the load.
- (3) Connect AC power cord and slide FRONT VOLUME to maximum.
- (4) Increase generator output for 50 watts RMS (20.0V across 8-ohm load), HD meter should indicate 1% or less.
- (5) Repeat preceding steps for FRONT R, REAR L, and REAR R channels.

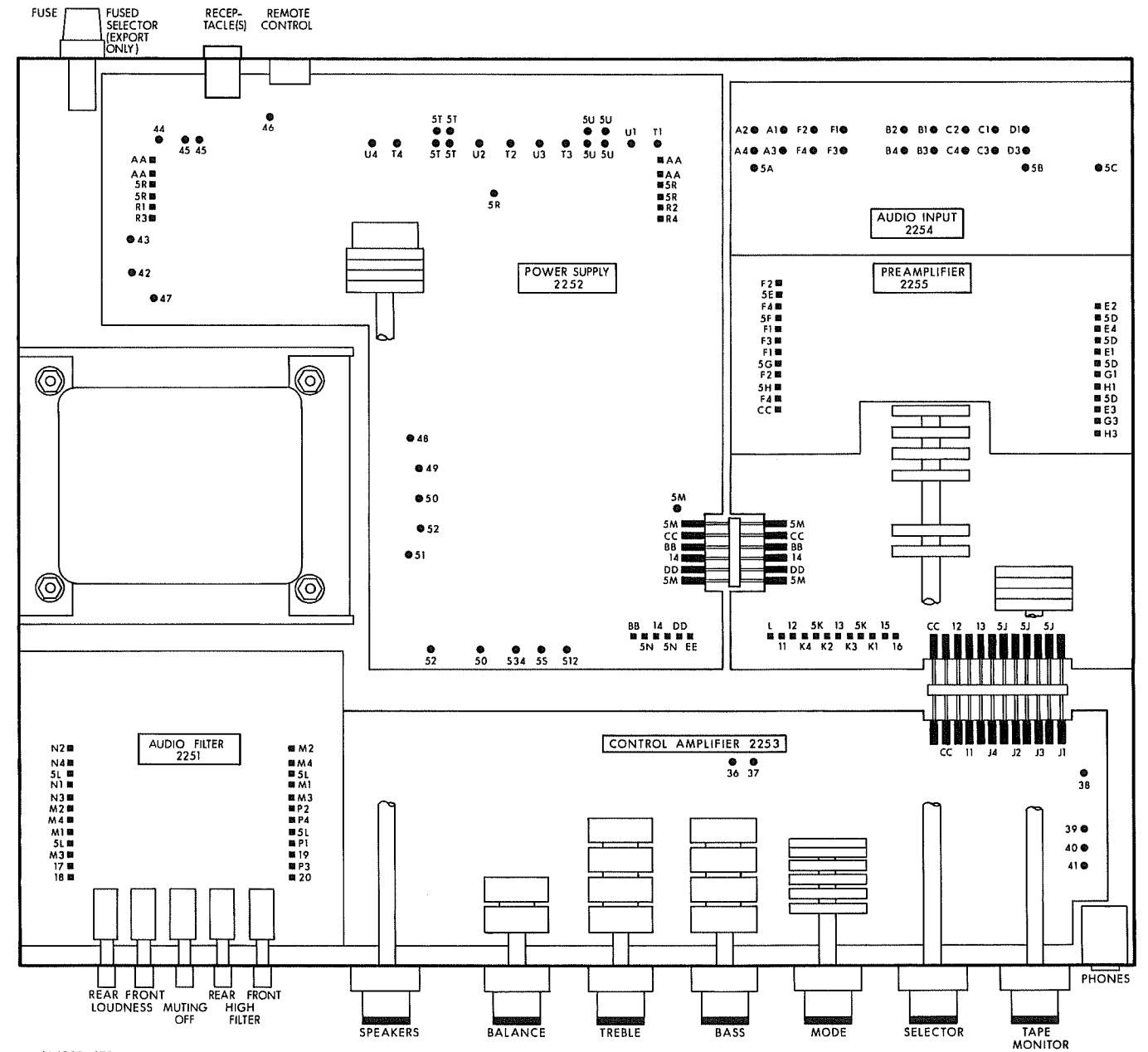
PARTS LIST

DESCRIPTION	PART NO.	DESCRIPTION	PART NO.
Antenna Bracket	AB4039-120	Knob, Dual Inner; Bass, Treble, Balance	EK20038
Antenna Bracket Support	AB4072-112	Knob, Dual Outer; Bass, Treble, Balance	EK20037
Bottom Cover	AA4072-114	Knob, Manual Tuning	EK20035
Top Cover	AA4039-116	Knob, Pushbutton	EK20030
Channel Rubber	A670-137	Knob, Selector, Speakers, Mode, Tape Monitor	EK20036
Dial Glass Retainer	AB4039-130	Knob, Volume	EK20029
Dial Glass Screened	AS4039-107	Meter Clip	HH4039-129
Dial Pointer Assembly	AS20503-1	Nameplate "701"	NP22612
Dress Panel Assembly	AS4039-114	Plastic Foot	E51A172
Extender Shaft Coupling	H50A799	Dial Cord Drum	E51D156
FM Dipole Antenna	LA51319-1	Tuning Shaft Assembly	AS20722-3



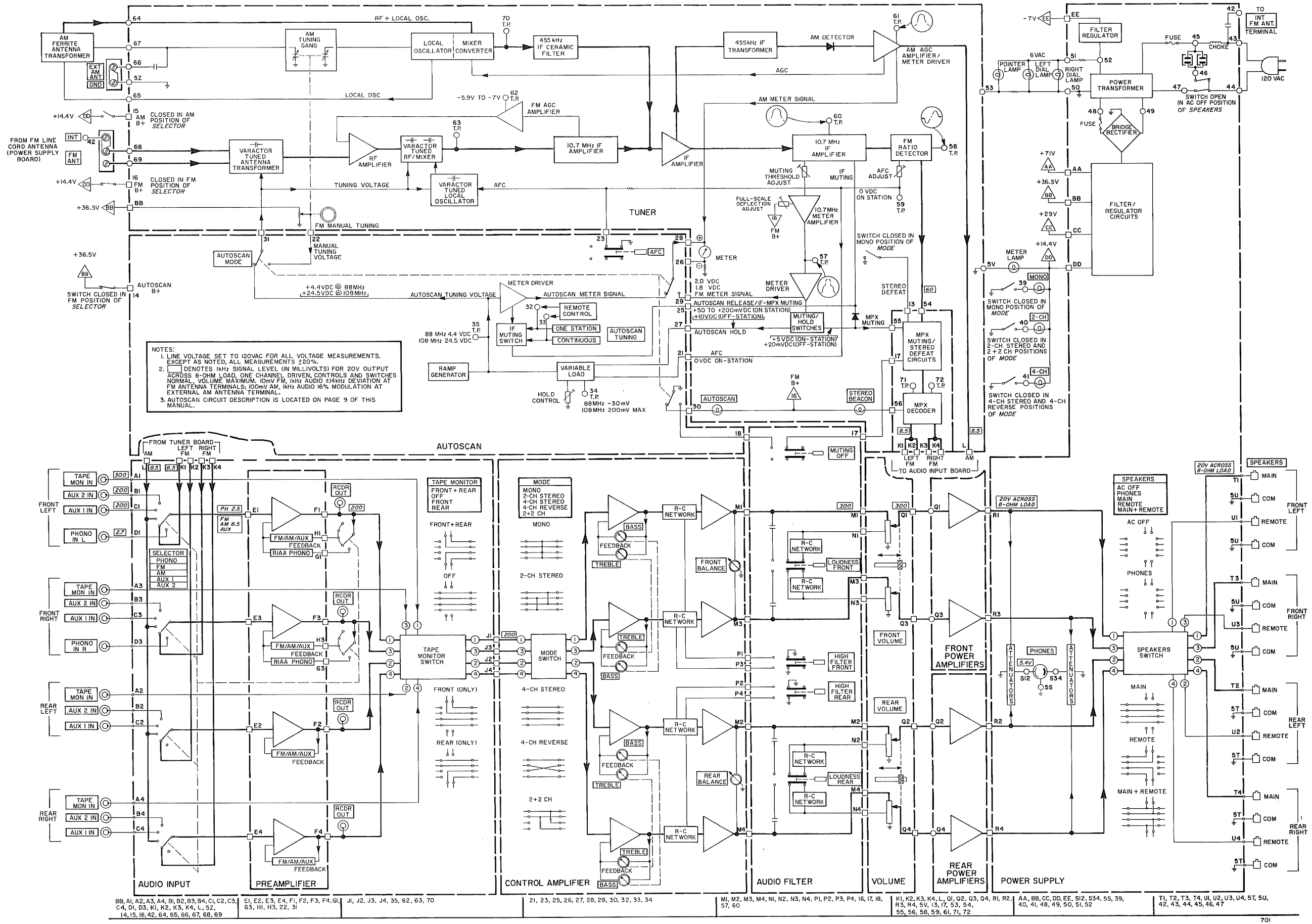
AL4039-172
701

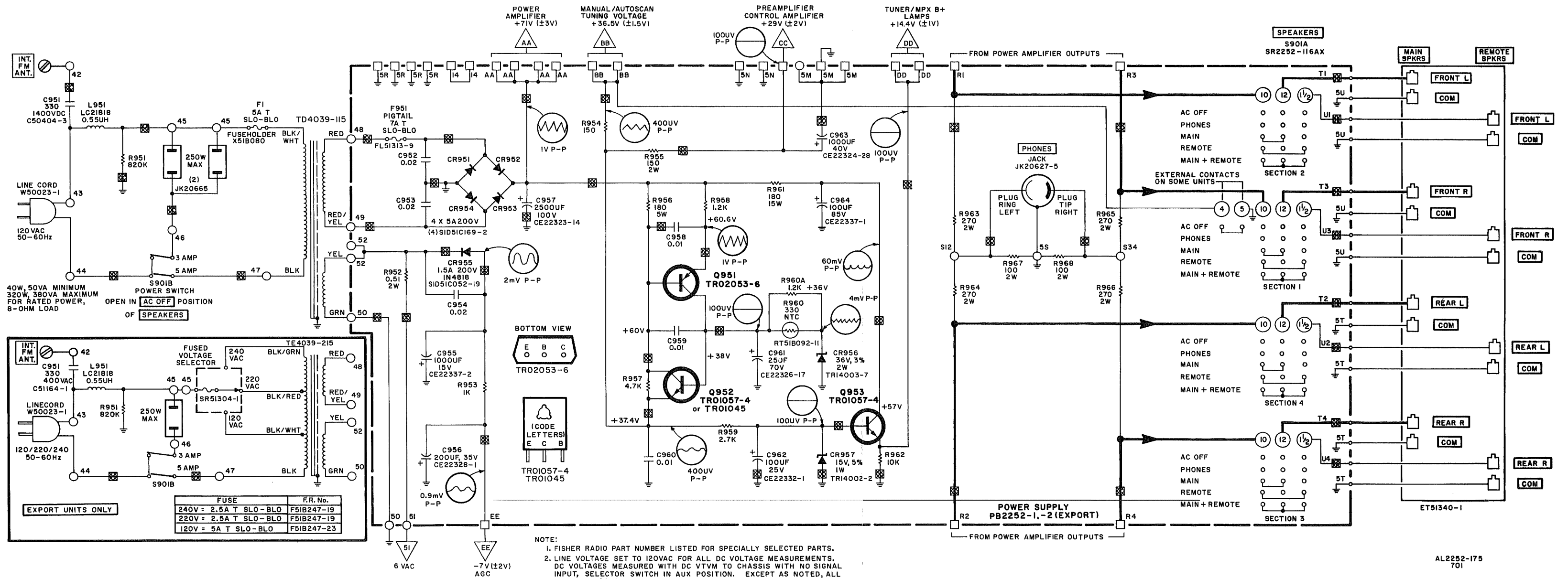
TOP VIEW

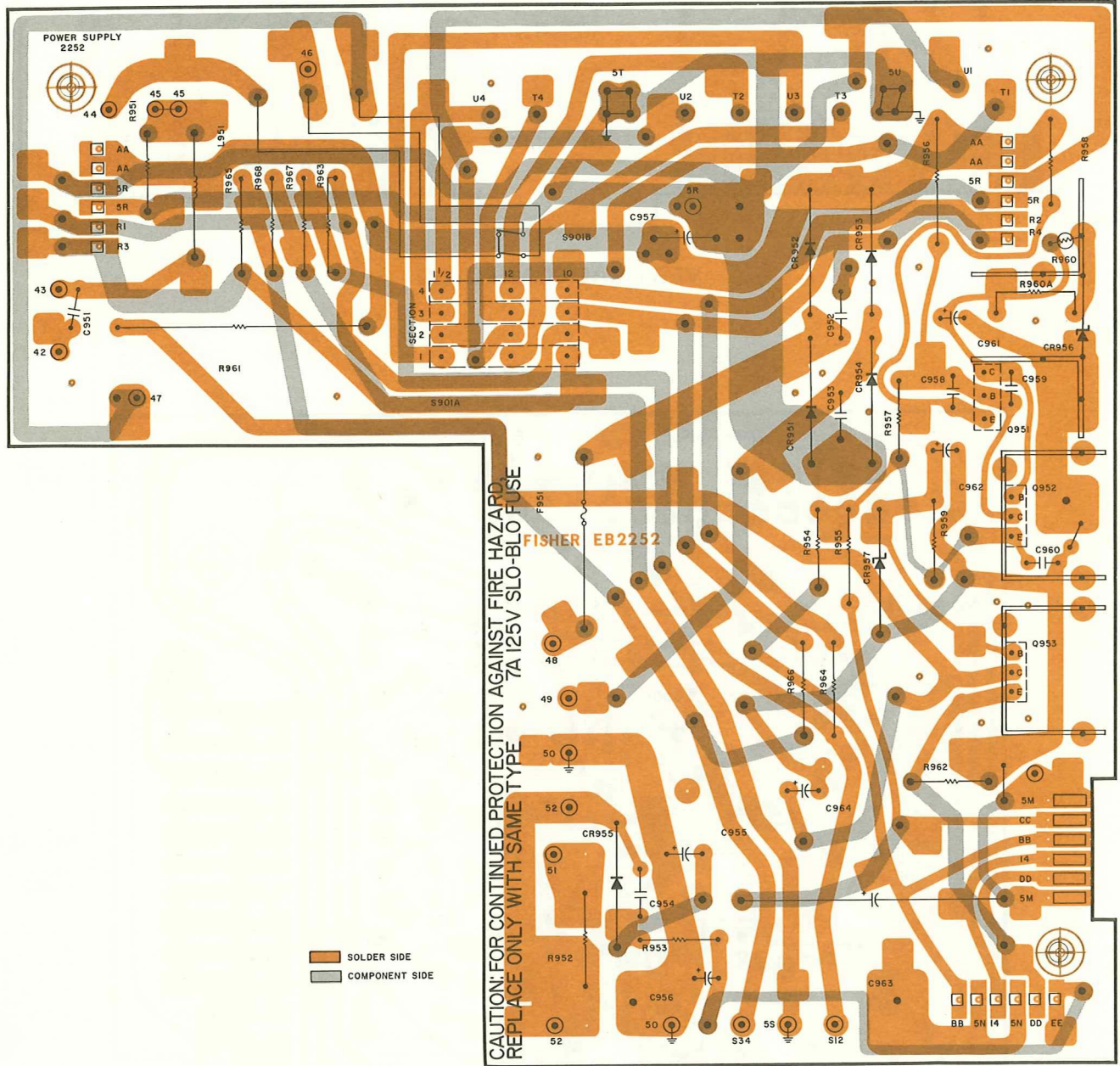


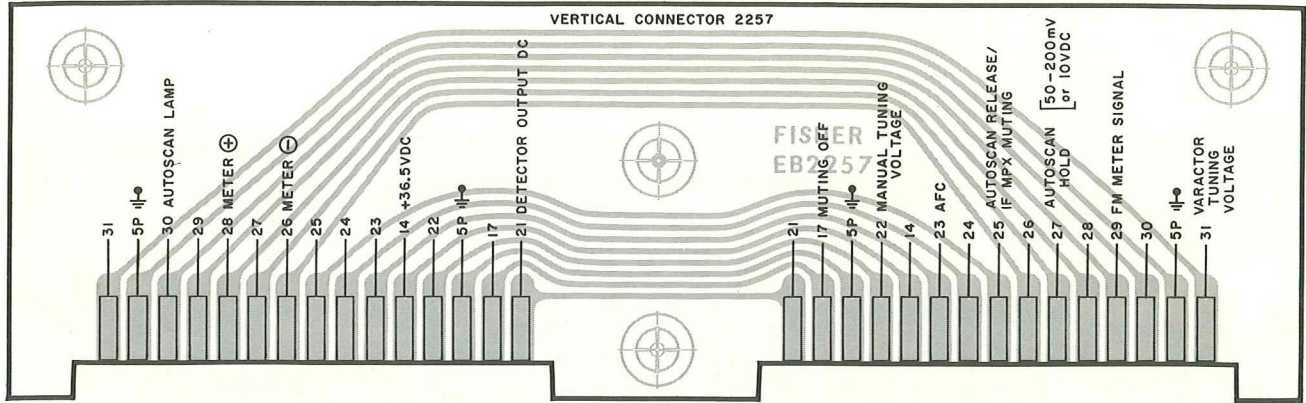
AL4039-173
701
WITHOUT DECODER

BOTTOM VIEW



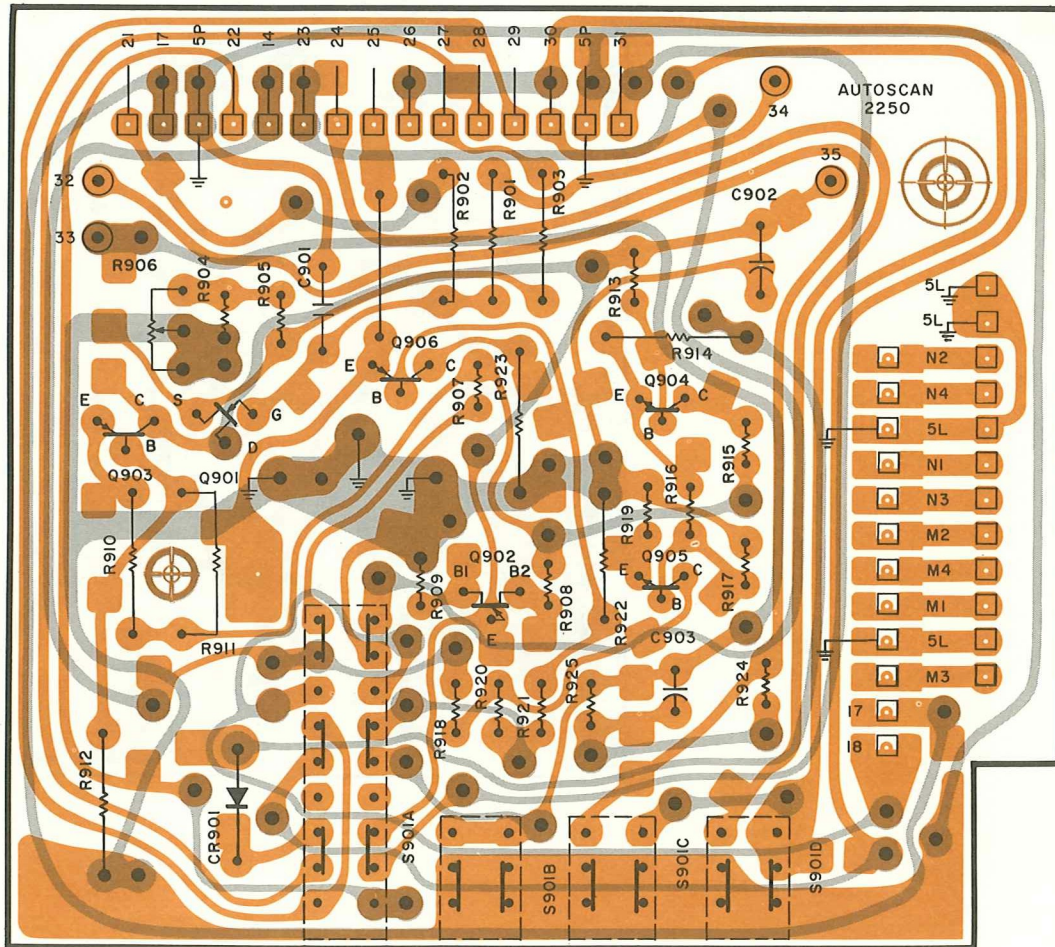






VERTICAL CONNECTOR

AL2257-III



SOLDER SIDE
 COMPONENT SIDE AL2250-III

CIRCUIT DESCRIPTION

The 701 utilizes variable-capacitance diodes, called varactors, to tune the FM RF circuitry. When reverse-biased, these diodes exhibit a change in capacity as the reverse-bias voltage is changed (i.e. increasing voltage decreases capacity). The front-end, therefore, is tuned by an applied DC 'tuning' voltage instead of a mechanical tuning gang. The AUTO-SCAN circuit generates and controls the tuning voltage.

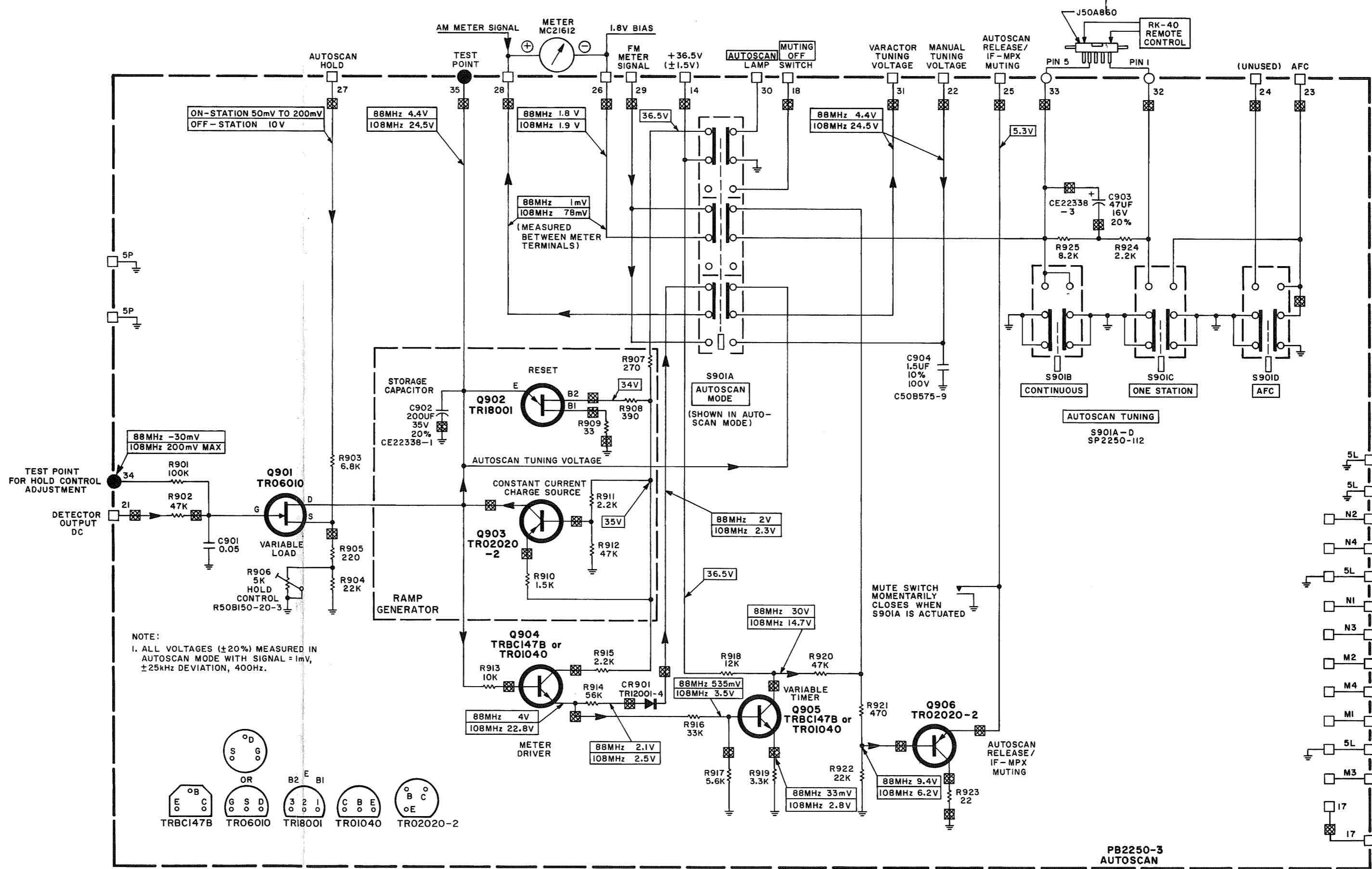
Transistor Q903 provides a constant-current charging source for storage capacitor C902. As the tuning voltage on C902 rises, the front-end tunes upscale toward 108MHz. When the tuning voltage rises to approximately +25V (108.5MHz), the emitter peak-point voltage of unijunction transistor Q902 is reached, and C902 is discharged (through Q902) to approximately 3 volts. The moment C902 is discharged, Q902 resumes its normal operating state (essentially open-circuit), and the charging cycle repeats.

Field-effect transistor Q901 functions as a variable load across the constant current charge source. The gate of Q901 is DC-coupled to the output of the ratio detector. When the output voltage of the detector sweeps to zero (exact center of station), Q901 loads the charging source to maintain a constant tuning voltage on C902. The hold control, R906, is adjusted to set the load current equal to the charge current (constant tuning voltage) when the gate voltage is zero. The source of Q901 is connected through R903 to the autoscan hold circuit. When the receiver is tuned on-station, the hold voltage is approximately zero. When the receiver is tuned off-station, the hold circuit is released, and the hold voltage steps rapidly to +10 volts. This biases Q901 to minimum load conditions, and allows the tuning voltage to rise. At the next desired station, the hold and detector voltages swing to zero, and Q901 loads Q903 to establish and hold the tuning voltage.

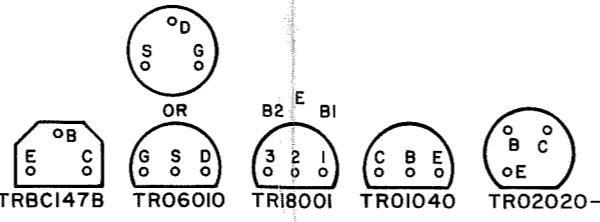
The emitter of Q906 is DC-coupled to the input of the autoscan hold circuit. On-station, Q906 is reverse-biased. Pressing the CONTINUOUS pushbutton grounds the base and forward-biases Q906. The resulting low voltage on the emitter releases the hold circuit and allows the receiver to scan. In addition, Q906 mutes the IF and multiplex circuits. Pressing the ONE STATION pushbutton grounds the base of Q906 through R924 and R925. The time during which the hold circuit is released is sufficiently long to allow the receiver to tune off-station, and is short enough to prevent station skipping. This time is determined by the charging rate of C903. As the voltage across C903 rises, Q906 resumes reverse-bias conditions, causing the hold circuit to become operative.

To sweep 1MHz requires a change in tuning voltage of approximately 1/2 volt at 88MHz, and approximately 1 1/2 volts at 108MHz. Therefore, tuning time varies about 1:3 between 88MHz and 108MHz. The corresponding release time at 108MHz must be three times longer than at 88 MHz. Variable timer transistor Q905 progressively lowers the voltage applied to C903, and lengthens the release time at 108 MHz.

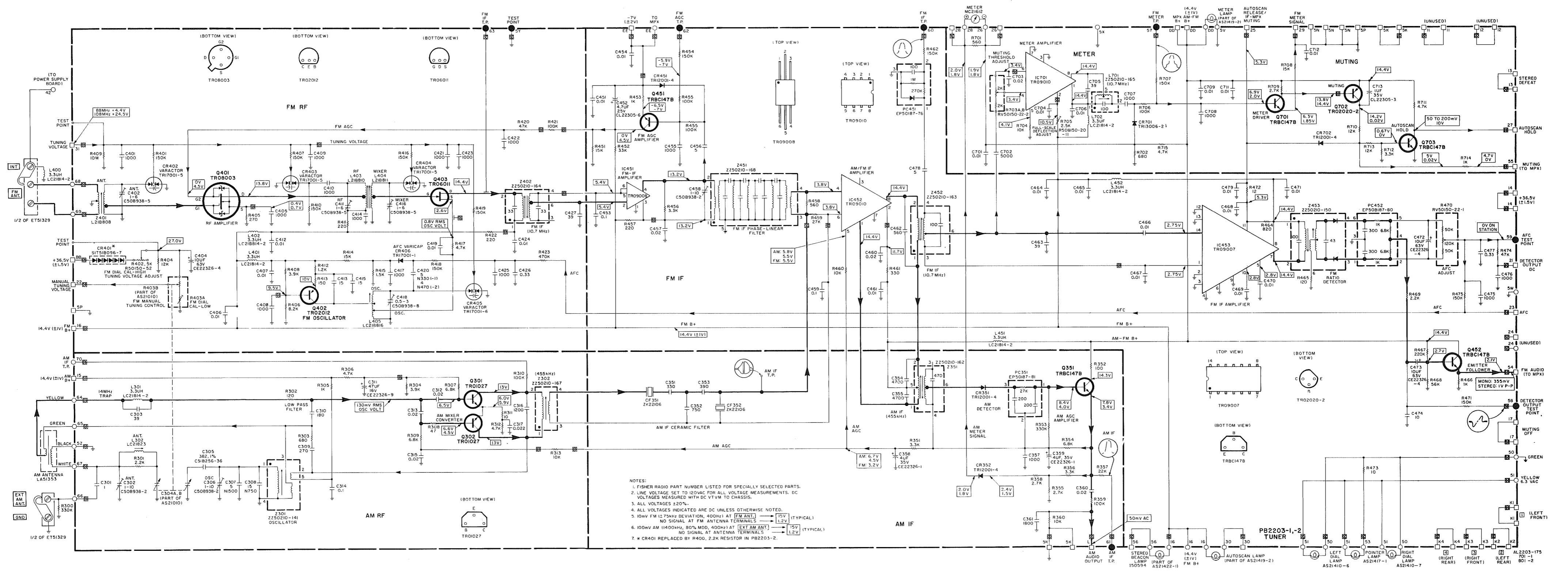
To eliminate switch noise, the IF and multiplex circuits are momentarily disabled by the mute switch whenever the AUTO-SCAN MODE switch is actuated.



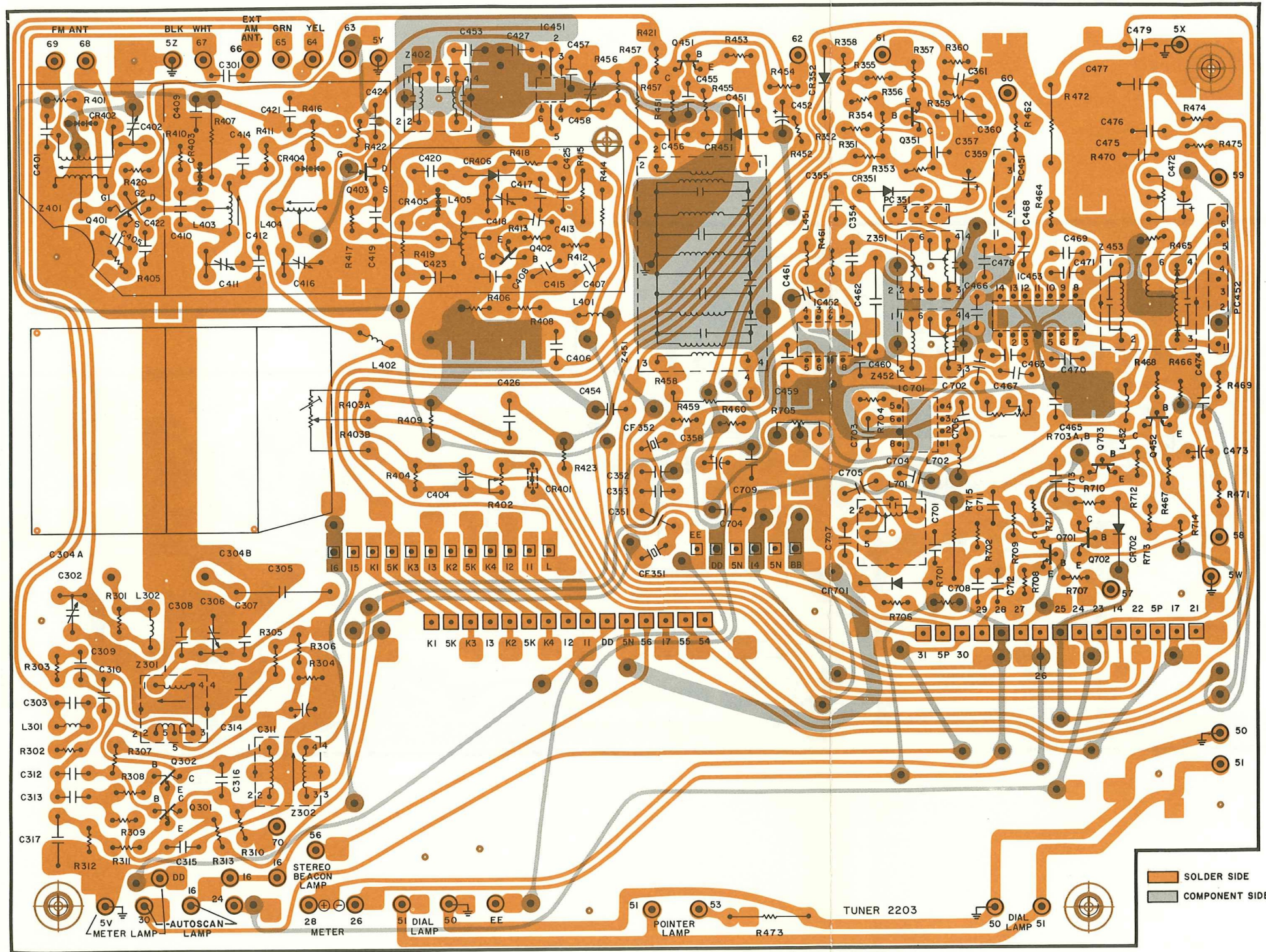
NOTE:
1. ALL VOLTAGES (±20%) MEASURED IN AUTOSCAN MODE WITH SIGNAL = 1mV, ±25kHz DEVIATION, 400Hz.



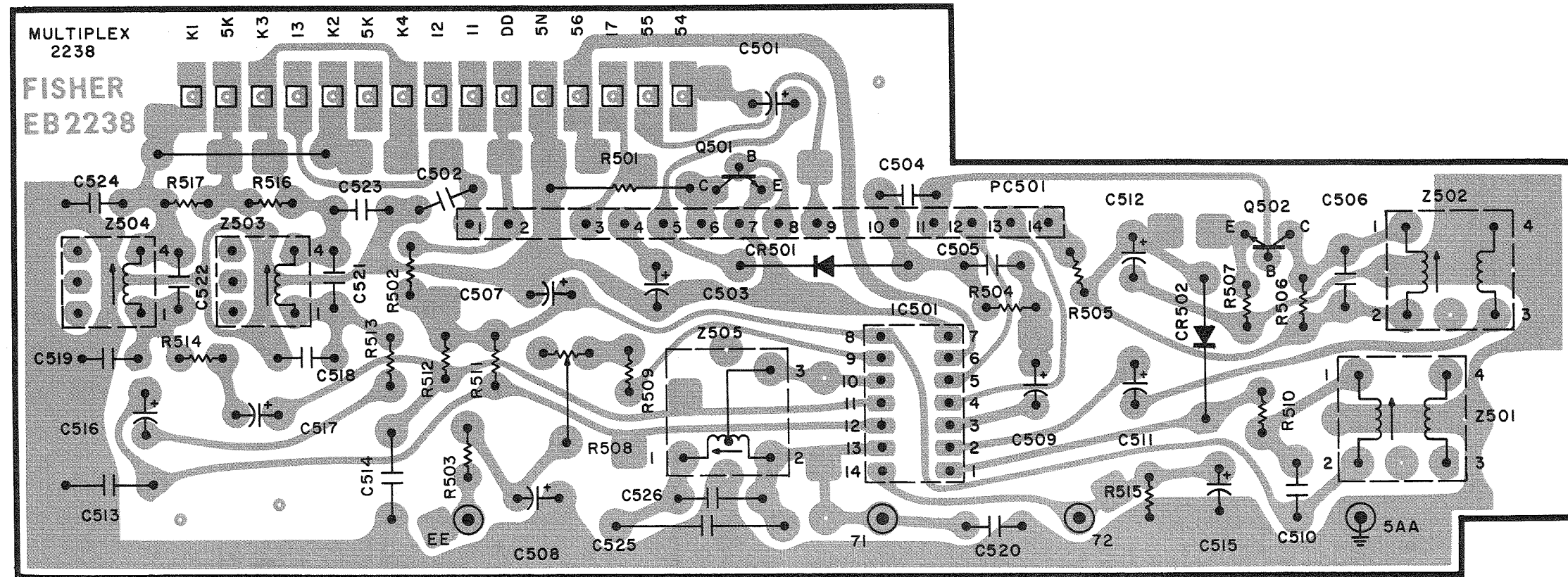
**PB2250-3
AUTOSCAN**



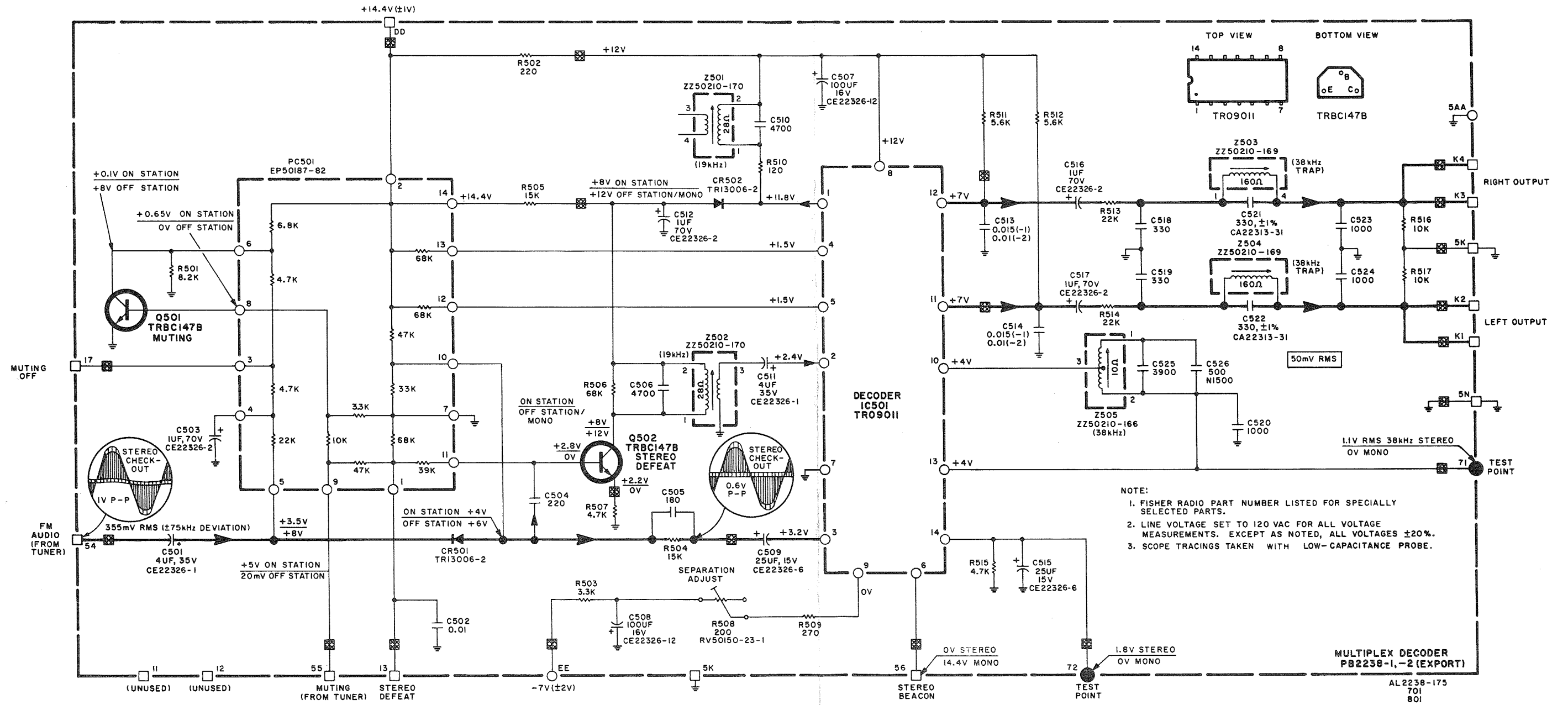
- NOTES:
1. FISHER RADIO PART NUMBER LISTED FOR SPECIALLY SELECTED PARTS.
 2. LINE VOLTAGE SET TO 120VAC FOR ALL VOLTAGE MEASUREMENTS. DC VOLTAGES MEASURED WITH DC VTVM TO CHASSIS.
 3. ALL VOLTAGES ±20%.
 4. ALL VOLTAGES INDICATED ARE DC UNLESS OTHERWISE NOTED.
 5. 10mV FM (12.75kHz DEVIATION, 400Hz) AT [FM ANT.] NO SIGNAL AT FM ANTENNA TERMINALS → 1.5V (TYPICAL)
 6. 100mV AM (1400Hz, 30% MOD, 400Hz) AT [EXT AM ANT.] NO SIGNAL AT ANTENNA TERMINALS → 1.5V (TYPICAL)
 7. * CR401 REPLACED BY R400, 2.2K RESISTOR IN PB2203-2.



AL 2203-114B



AL2238-111A



FM ALIGNMENT

Except as noted, maintain generator output level as low as possible during alignment.

Set SELECTOR to FM and release AUTOSCAN MODE switch for manual tuning. Set MODE switch to MONO and depress MUTING OFF switch. Release all other pushbuttons. Set dial pointer to position of non-interference near 88 MHz. Slide FRONT and REAR VOLUME controls to 0.

IF

- (1) Connect vertical dc input of scope to pin 60, scope ground to pin 5X. Use a direct probe.
- (2) Connect 10.7 MHz sweep generator to pin 63, generator ground to pin 5Y.
- (3) Adjust top and bottom cores of Z402 and Z452 and trimmer C458 for maximum gain and symmetry. See FM IF illustration.
- (4) Increase generator level to full output. If necessary re-adjust top and bottom cores of Z452 for maximum gain and symmetry. See FM IF-LIMITED illustration.
- (5) Reduce generator output and re-adjust top and bottom cores of Z402 for maximum gain and symmetry. See FM IF illustration.

DETECTOR

- (6) Connect DC VTVM and vertical input of scope to detector output pin 58, meter and scope grounds to pin 5W.
- (7) Keep generator output as low as possible and adjust top and bottom cores of Z453 for maximum gain and symmetry. See FM DETECTOR illustration.
- (8) Reduce sweep to zero (10.7 MHz output only). Set DC VTVM to most sensitive scale. Readjust top core of Z453 for zero VDC at pin 58.

AFC

- (9) Connect DC VTVM to pin 59, meter ground to pin 5X. Set AFC ADJUST R470 for zero VDC at pin 59. Disconnect VTVM.

METER IF

- (10) Set generator output as low as possible and sweep to zero (10.7 MHz only).
 - (11) Connect DC VTVM to pin 57, ground to pin 5W. Adjust L701 for maximum gain. Disconnect VTVM.
- NOTE: If no signal is present at pin 57, verify that MUTING THRESHOLD ADJUST R703 is not turned fully counter-clockwise.

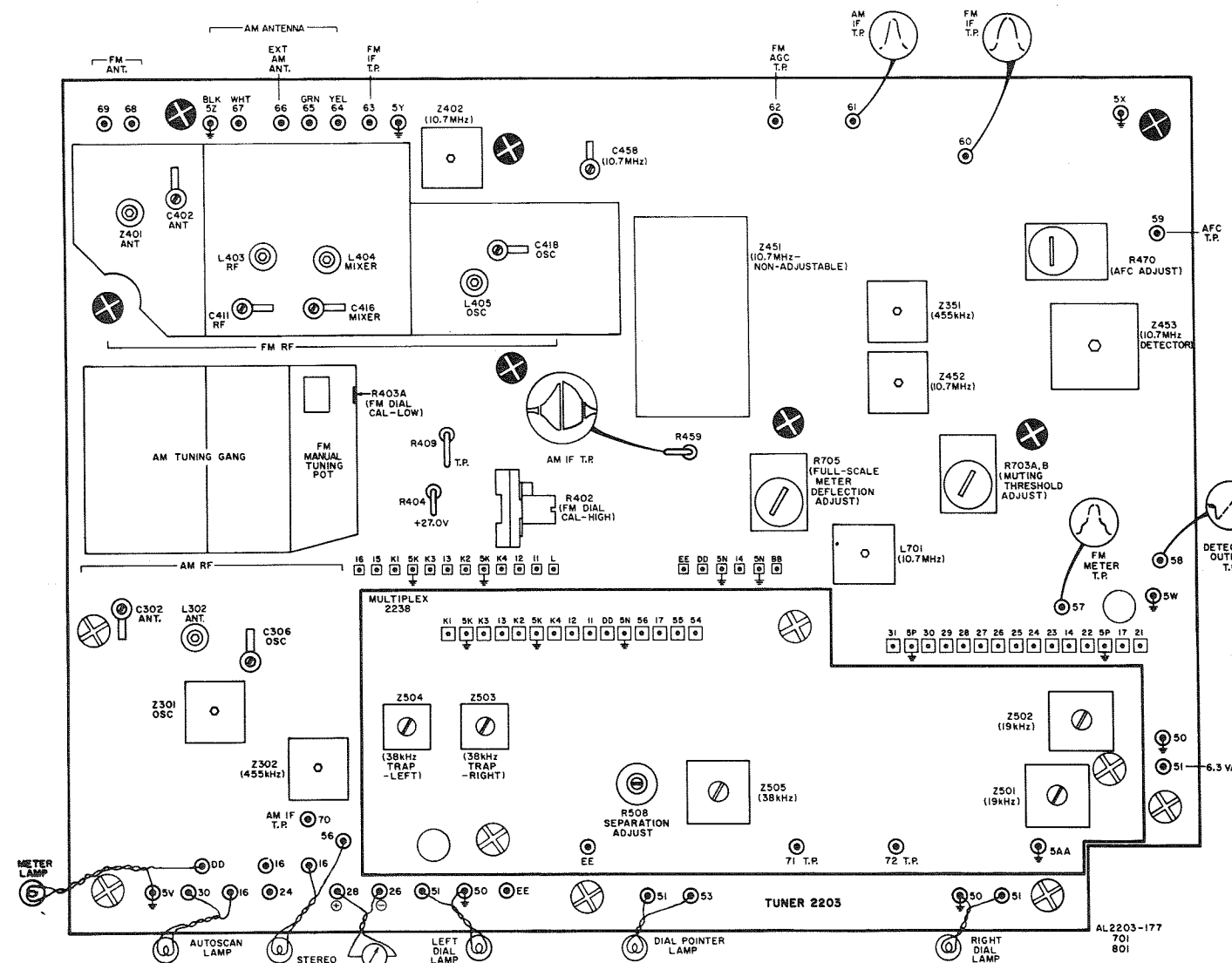
DIAL CALIBRATION

- (12) Turn MANUAL TUNING knob fully CCW. If pointer is not centered on 0, reposition it and cement pointer.
- (13) Connect DC VTVM to pin 31 (top end of R409). Set dial pointer to center of 108 MHz calibration bar (underneath number 108). Adjust R402 FM DIAL CAL-HIGH for exactly 24.5 VDC.
- (14) Set dial pointer to the center of 88 MHz calibration bar. Adjust R403A FM DIAL CAL-LOW for exactly 4.4 VDC.
- (15) Repeat steps (13) and (14) until correct voltages are obtained.

FRONT END

NOTE: This procedure uses 120-ohm composition resistors in series with each lead from the RF generator to match 50-ohm output to 300-ohm input impedances. These matching resistors reduce generator voltage to one-half at the antenna terminals. RF signal voltages specified in this procedure indicate generator output levels, not antenna terminal voltages.

- (16) Connect FM signal generator to FM ANTenna terminals through 120-ohm composition resistors. Modulate generator with 400Hz, ± 22.5 kHz (or ± 25 kHz) deviation. Connect AC VTVM to RCDR OUT FRONT L jack.
- (17) Set generator frequency and dial pointer accurately to 90 MHz. Adjust generator output for a front panel meter



NOTE: CHASSIS GROUNDS ARE COMPLETED THROUGH MOUNTING SCREWS (⊗). TIGHTEN BEFORE ATTEMPTING ALIGNMENT OR TEST.

indication between 2 and 3. Adjust cores of L405, L404, L403, and Z401 for maximum indication on AC VTVM. Reduce generator output as necessary to keep panel meter reading between 2 and 3.

- (18) Set generator frequency and dial pointer accurately to 106 MHz. Adjust trimmers C418, C416, C411, and C402 for maximum indication on AC VTVM. Reduce generator output to maintain panel meter indication between 2 and 3.
- (19) Repeat steps (17) and (18) until accurate dial calibration and maximum ac signal is obtained.

METER FULL SCALE

- (20) Set generator output to 100 mV and reduce sweep to zero. Set FULL SCALE METER DEFLECTION ADJUST R705 for a panel meter indication of 4.5.

MUTING

- (21) Set generator frequency and dial pointer to position of non-interference near 98 MHz. Modulate generator with 400 Hz, ± 22.5 kHz (or ± 25 kHz) deviation. Reduce generator output until noise is visible on sine-wave. Adjust generator frequency to center noise interference on positive and negative half-cycles. See SYMMETRICAL TUNING illustration.
- (22) Release MUTING OFF pushbutton. Set generator output to 20 μ V. Turn R703 MUTING THRESHOLD ADJUST counter-clockwise until audio disappears on scope trace, then

turn R703 clockwise slowly until audio reappears. Check adjustment by reducing generator output to 18 μ V. Audio should disappear. Disconnect VTVM and depress MUTING OFF pushbutton.

AFC PULL IN

- (23) Set generator to 98 MHz and reduce sweep to zero. Tune receiver to generator and adjust generator output for a peak meter indication of 4.5.
- (24) With AFC pushbutton released, detune receiver above 98 MHz for an indication between 2 and 3 on panel meter.
- (25) Press AFC pushbutton. Receiver should 'pull-in' for meter indication of 4.5. Release AFC pushbutton and detune receiver below generator for meter indication between 2 and 3. Receiver should 'pull-in' for meter indication of 4.5 when AFC pushbutton is depressed.

19kHz PILOT

- (26) Connect DC VTVM to pin 72, meter ground to pin 5AA. Depress AFC pushbutton. Set MODE switch to 2-CH STEREO.
- (27) Apply composite multiplex signal to the EXTERNAL MODULATION input of generator. Modulate generator with 19kHz pilot (10%), and 400Hz audio (90%) on left channel only. Set generator for ± 25 kHz peak deviation, generator output to 2mV.

- (28) Adjust cores of Z501 and Z502 for maximum DC at pin 72 (at least +0.7V).
- (29) Set generator for ± 75 kHz peak deviation. STEREO BEACON lamp should light, and meter should indicate at least +1.7VDC.

SEPARATION

- (30) Connect an AC VTVM to RCDR OUT FRONT L jack. Connect another AC VTVM to RCDR OUT FRONT R jack. Temporarily set R508 SEPARATION ADJUST to its approximate mechanical center of range.
- (31) Adjust core of Z505 for minimum indication on right channel meter.
- (32) Adjust R508 for minimum indication on right channel meter (at least 36dB below left channel).
- (33) Modulate right channel of multiplex signal. Left channel meter should indicate at least 36dB below right channel. If necessary, readjust Z505 and repeat steps (31) and (32).

STEREO BEACON

- (34) Reduce generator output to 15 μ V. STEREO BEACON lamp should turn off. Increase generator output to 35 μ V. Lamp should turn on. There is no adjustment for this test.

38kHz TRAP

- (35) Turn off audio and modulate generator with 19kHz pilot, ± 7.5 kHz deviation. Set generator output to 2 mV. Connect scope to RCDR OUT FRONT R jack.
- (36) Adjust core of Z503 to remove 38kHz component (cleanest 19kHz waveform). Refer to 38kHz TRAP illustration.
- (37) Connect scope to RCDR OUT FRONT L jack and adjust core of Z504 to remove 38kHz component from 19kHz waveform.

AUTOSCAN ADJUSTMENT AND TEST

Alignment of FM IF and RF, MPX and Detector should be checked before attempting to adjust autoscan circuit.

- (1) Connect FM signal generator to FM ANTenna terminals through 120-ohm composition resistors, one in series with each lead from the generator. Connect DC VTVM to pin 34 on autoscan board, ground to pin 5P.
- (2) Set SELECTOR to FM and MODE to 2-CH STEREO. Slide FRONT and REAR VOLUME controls to 0. Depress AUTOSCAN MODE pushbutton, release all others.
- (3) Set generator frequency to 88 MHz. Modulate generator with 400 Hz, ± 25 kHz deviation. Set generator output to 10 mV.
- (4) Tune receiver to generator frequency (at 88 MHz) by pressing CONTINUOUS pushbutton, release when meter reaches high end of scale.
- (5) Adjust HOLD control R906 for -30 mVDC. Use lowest (most sensitive) meter range.
- (6) Reduce generator output to 30 μ V. Press and hold CONTINUOUS pushbutton until meter reaches high end of scale. Receiver should automatically tune to generator frequency at 88 MHz. After 5 seconds, DC VTVM should indicate -30 mV.
- (7) Set generator frequency to 108 MHz. Tune receiver to generator frequency by pressing either CONTINUOUS or ONE STATION pushbutton. After 5 seconds, meter should indicate less than 200 mV.

AM ALIGNMENT

- (1) Set SELECTOR to AM and slide FRONT and REAR VOLUME controls to 0.
- (2) Connect 455 kHz sweep generator to pin 70, generator ground to pin 5V. Use a 0.1 μ F capacitor in series with generator lead.

IF

- (3) Using a low capacitance probe, connect scope input to top of R459 (junction of R459 and C353), scope ground to pin 5V. Detune bottom core of Z351 (primary) by turning clockwise.
- (4) Adjust core of Z302 for maximum gain.

(5) Connect scope to pin 61, ground to pin 5V. Adjust top and bottom cores of Z351 for maximum display and symmetry. Note that the frequency at which maximum response is obtained may be ± 2.5 kHz from center frequency. See AM IF illustration. Disconnect test equipment.

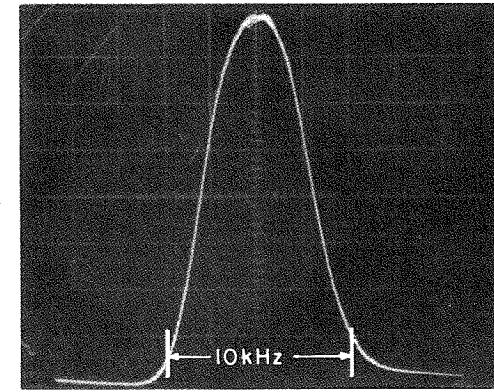
FRONT END

(6) Open EXT AM ANTenna GND link. Connect AM signal generator to the EXT AM ANT and GND terminals. Use a 220 pF capacitor in series with generator lead. Connect AC VTVM to RCDR OUT FRONT L jack.

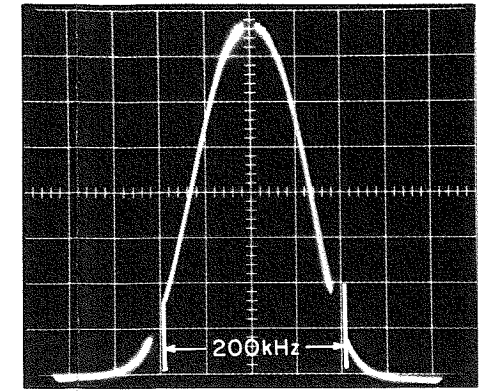
(7) Set generator frequency and dial pointer to center of 600 kHz calibration bar. Modulate generator with 400 Hz, 30% modulation. Adjust Z301 and Z302 for maximum audio.

(8) Set generator frequency and dial pointer to center of 1400 kHz calibration bar. Adjust C306 and C302 for maximum audio.

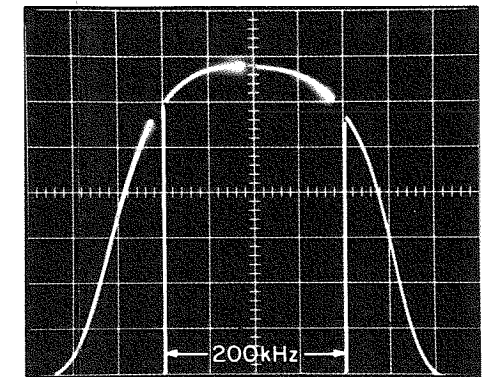
(9) Repeat steps (7) and (8) for maximum gain.



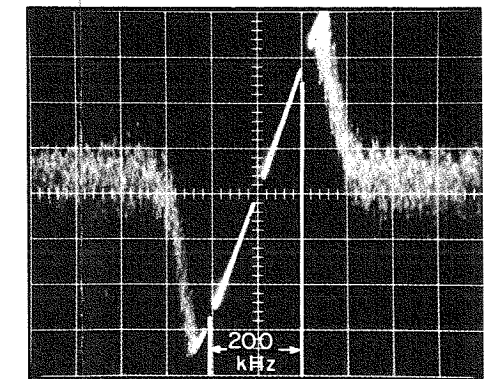
AM IF



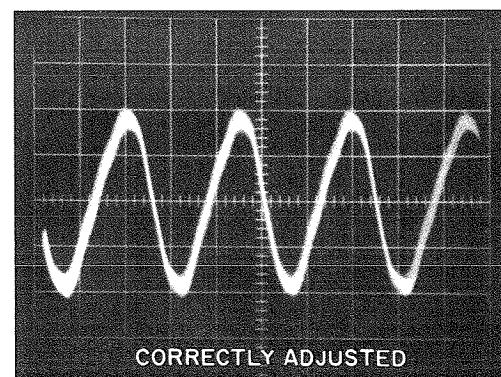
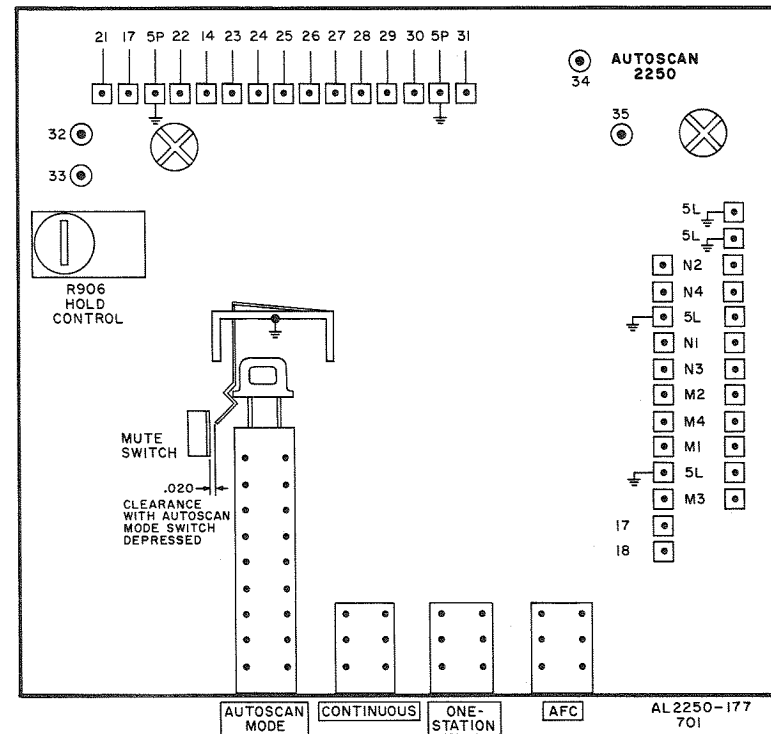
FM IF



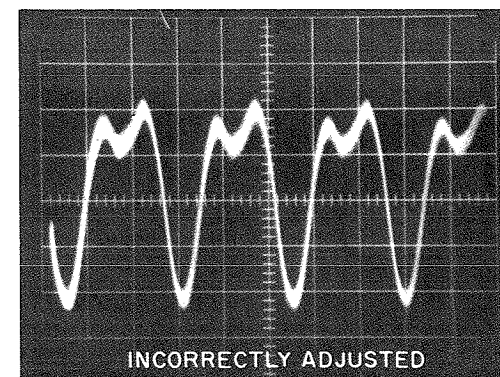
FM IF -LIMITED



FM DETECTOR

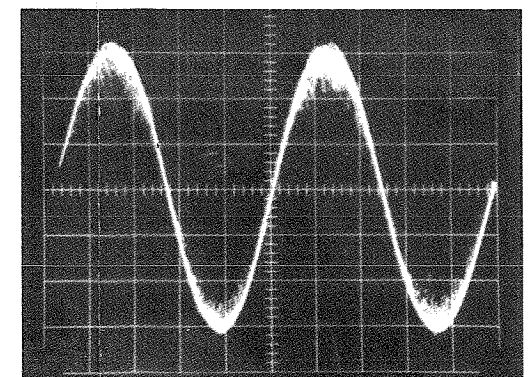


CORRECTLY ADJUSTED

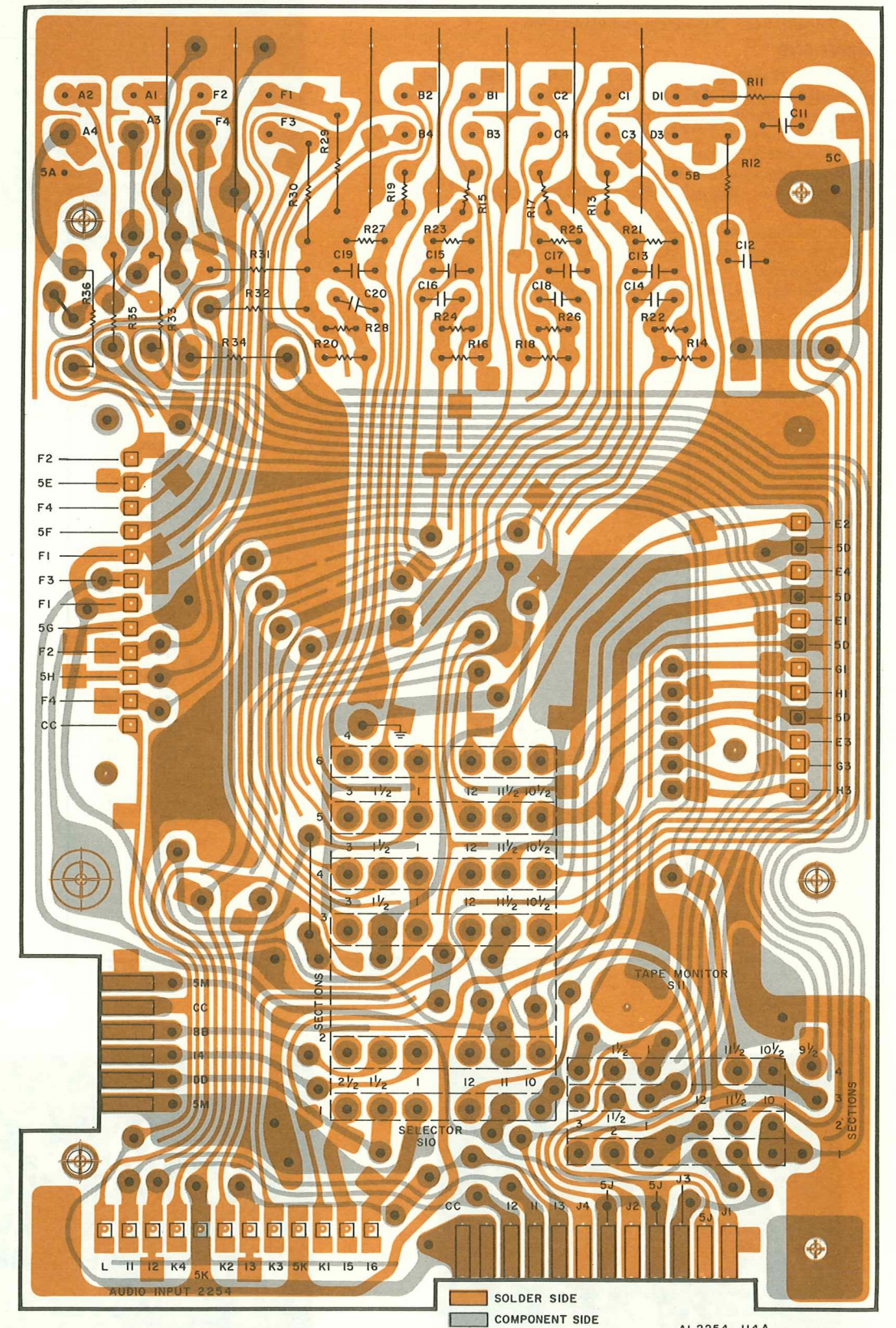
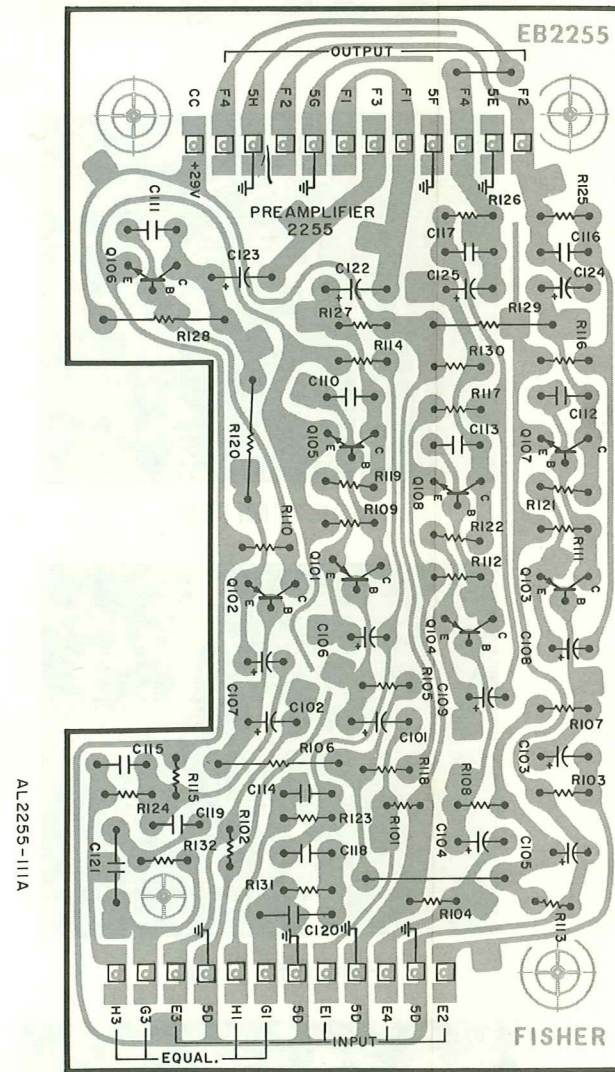


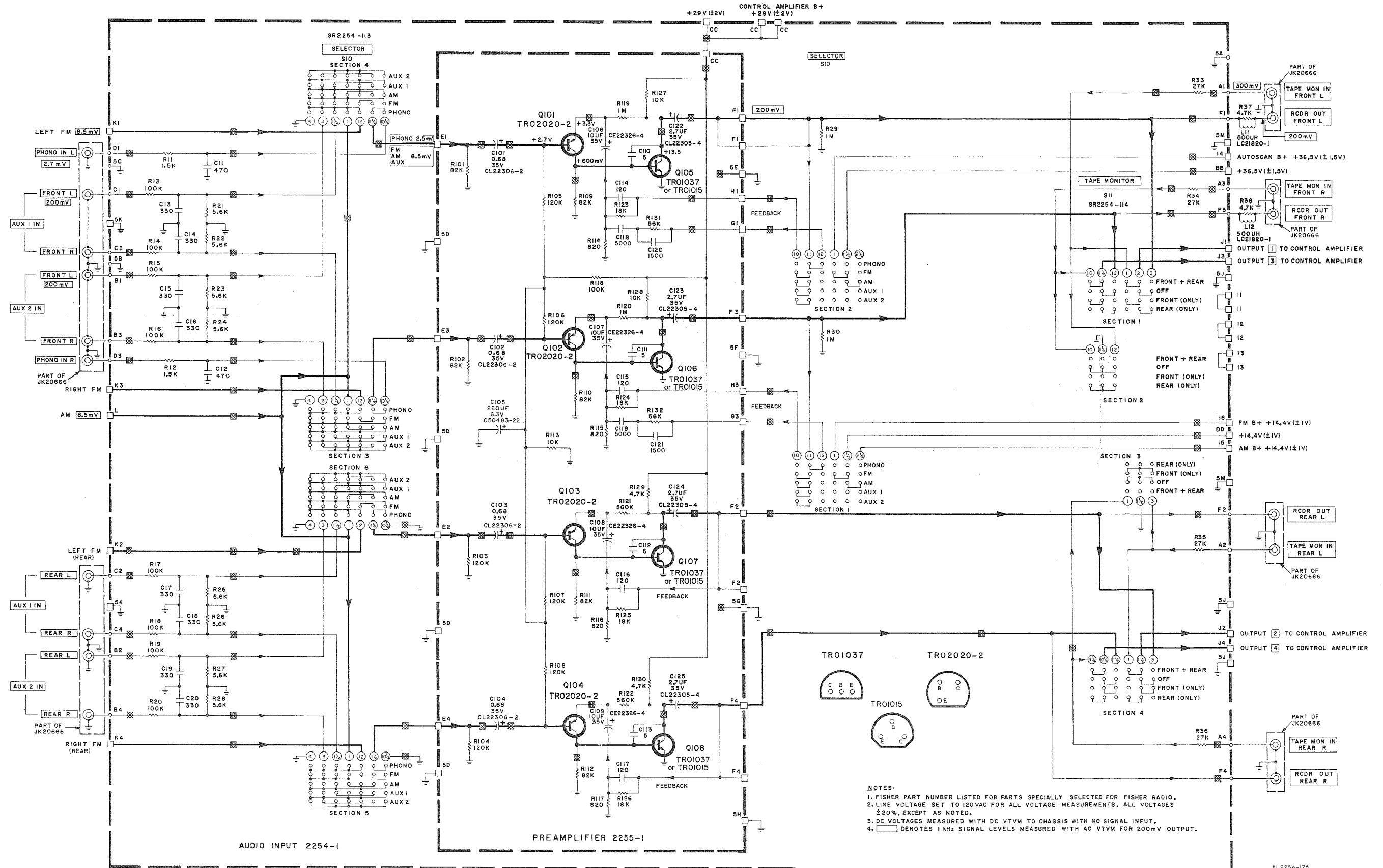
INCORRECTLY ADJUSTED

38 kHz TRAP

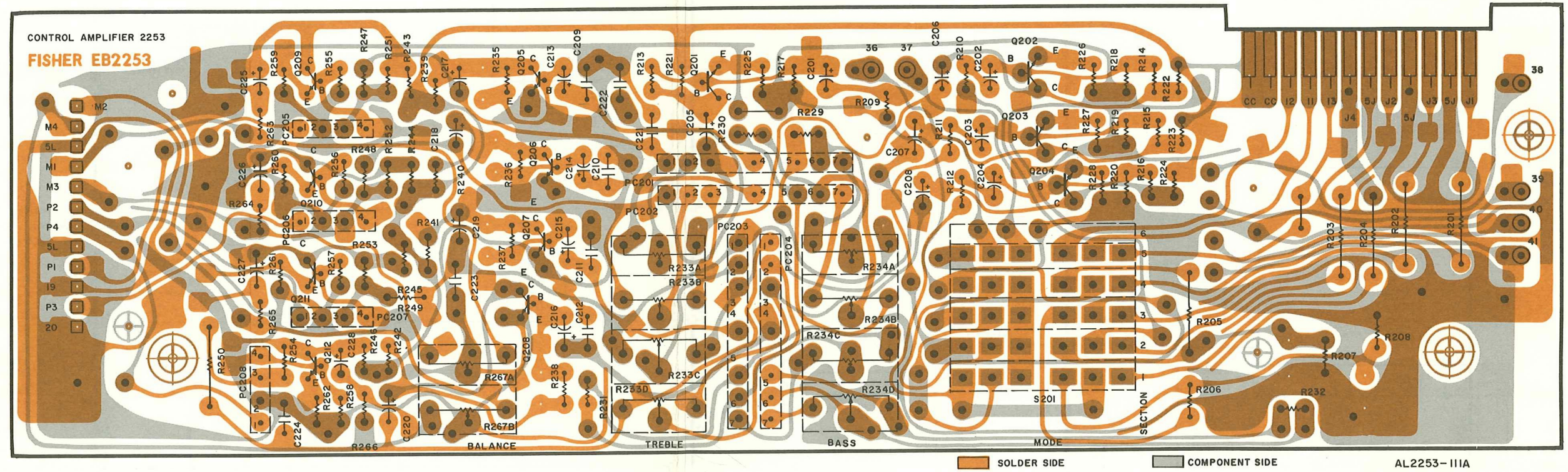


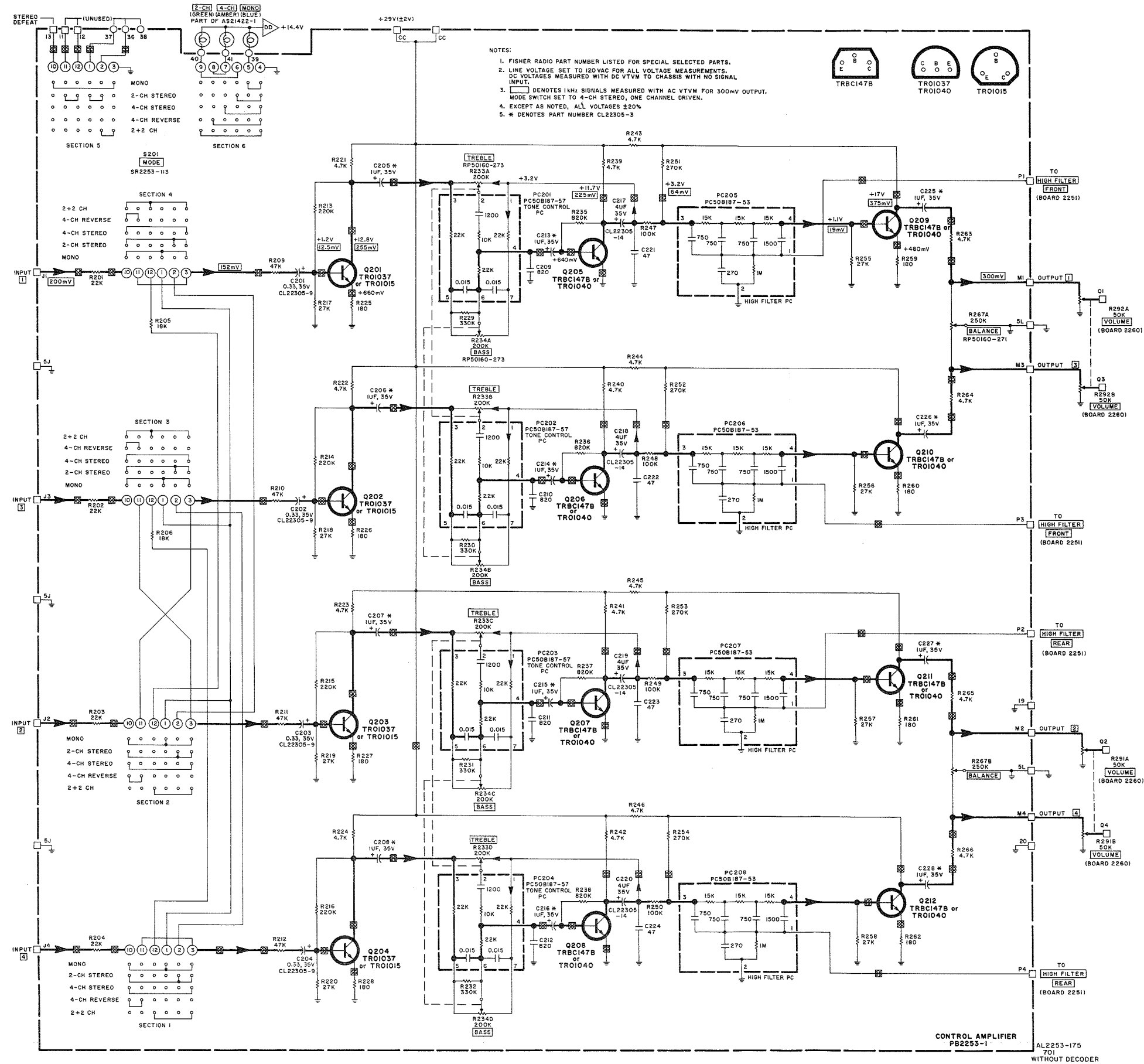
SYMMETRICAL TUNING

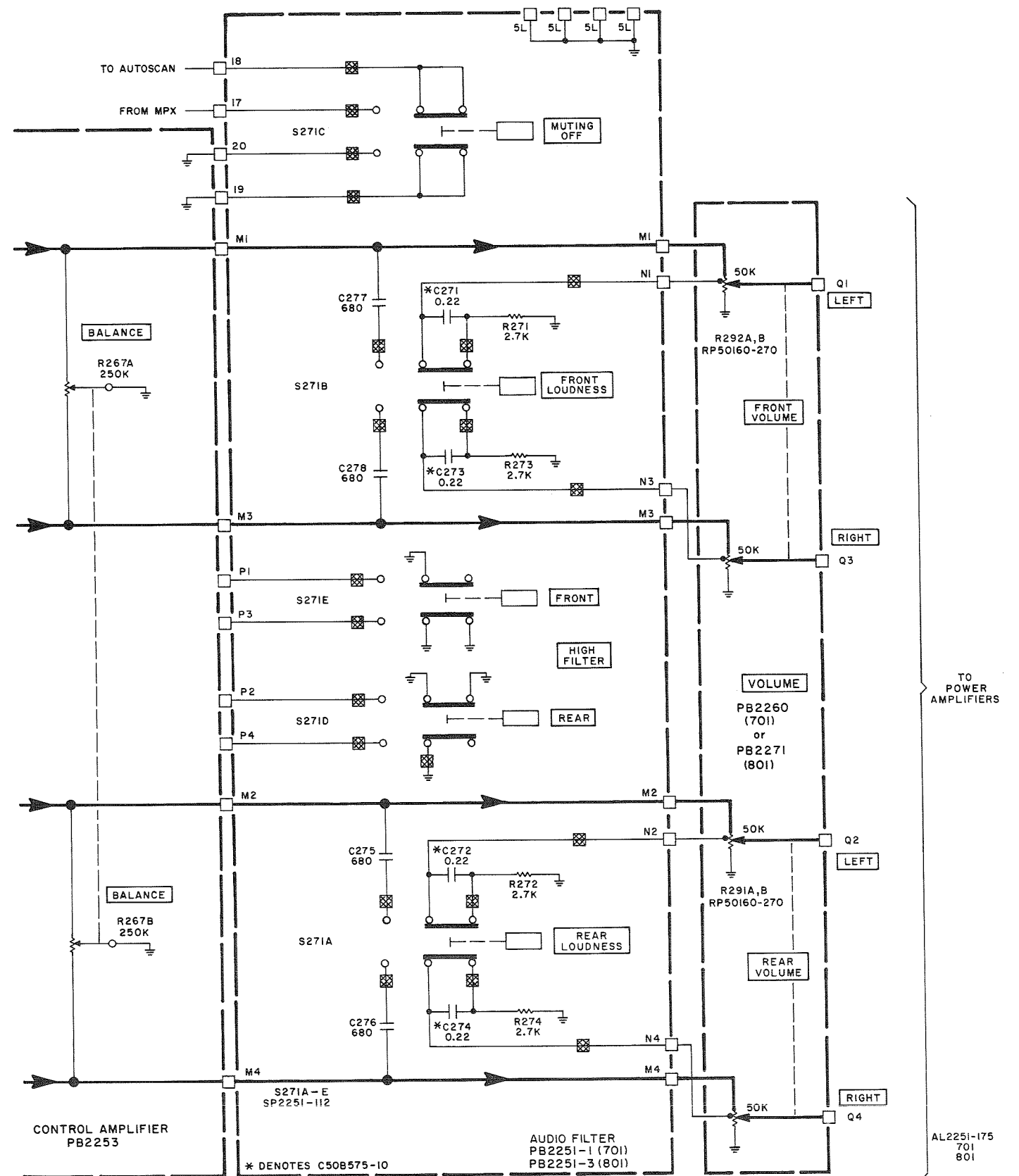
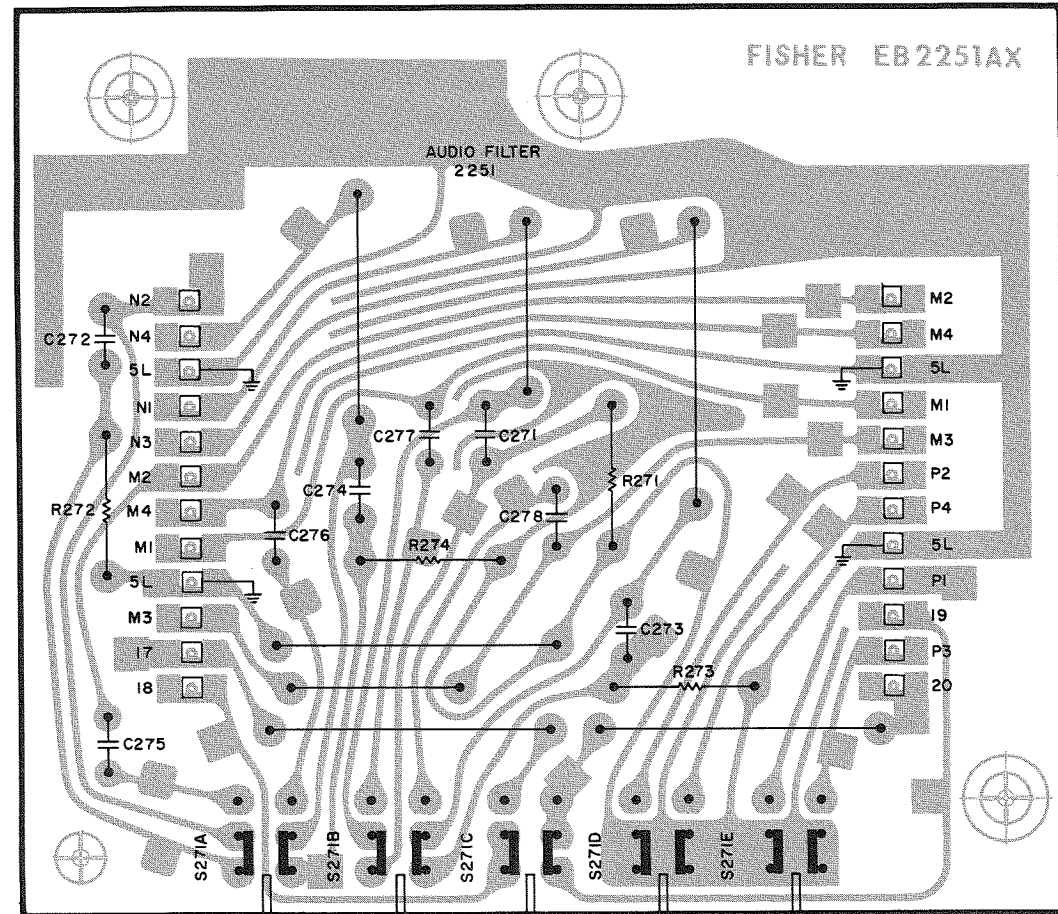


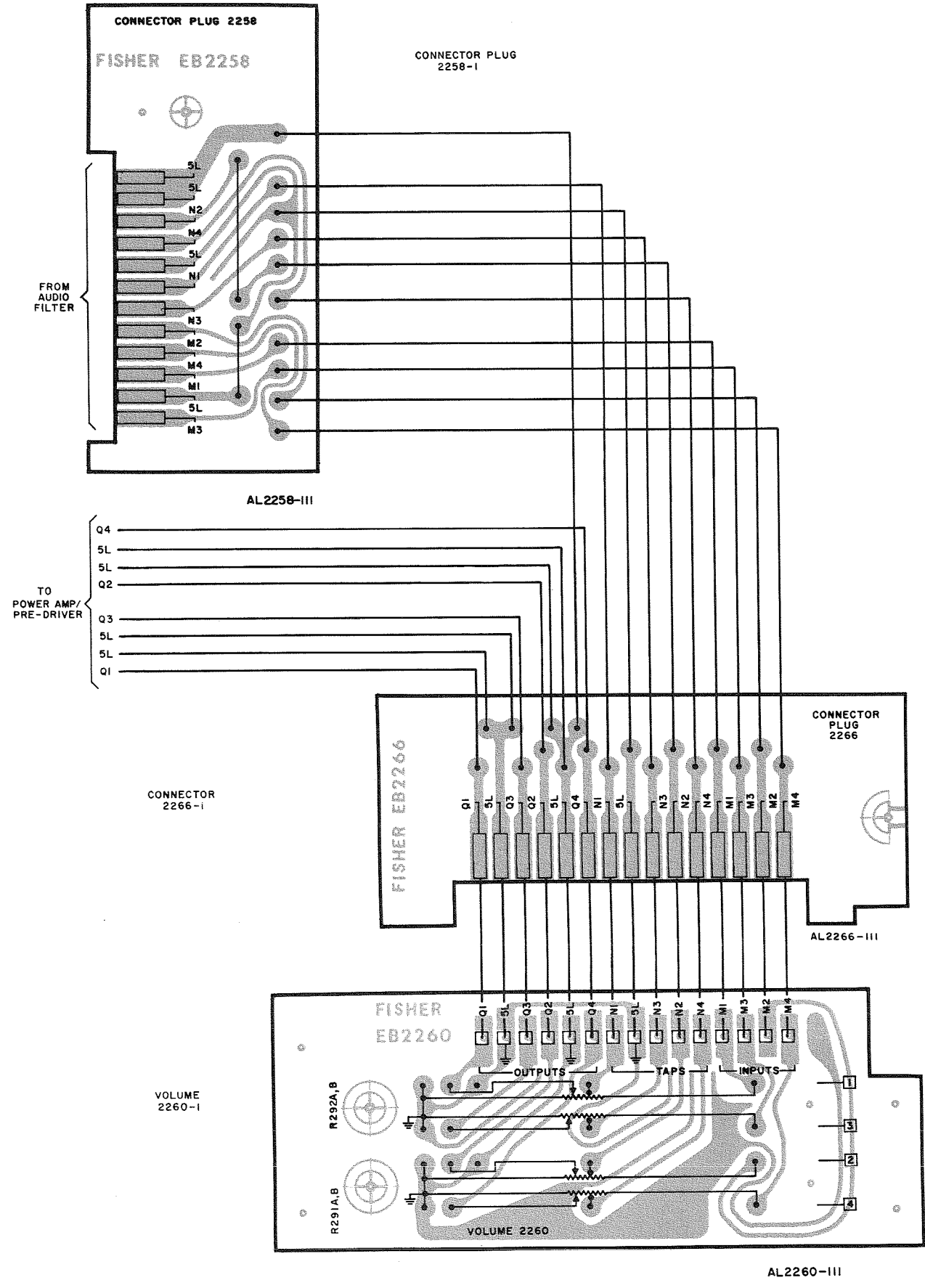


NOTES:
 1. FISHER PART NUMBER LISTED FOR PARTS SPECIALLY SELECTED FOR FISHER RADIO.
 2. LINE VOLTAGE SET TO 120VAC FOR ALL VOLTAGE MEASUREMENTS. ALL VOLTAGES ±20%, EXCEPT AS NOTED.
 3. DC VOLTAGES MEASURED WITH DC VTVM TO CHASSIS WITH NO SIGNAL INPUT.
 4. □ DENOTES 1 kHz SIGNAL LEVELS MEASURED WITH AC VTVM FOR 200mV OUTPUT.









CENTER VOLTAGE TEST

Slide FRONT and REAR VOLUME controls to 0. Warm-up unit about 10 minutes.

Connect common lead of DC VTVM to chassis ground. Connect probe to each emitter terminal of Q811 and Q812 on rear and front amplifiers. Meter should indicate +35.5V ($\pm 3V$) at each emitter. See illustration.

IDLING CURRENT ADJUSTMENT

Slide FRONT and REAR VOLUME controls to 0. Warm-up unit about 10 minutes. Set line voltage to 120 VAC.

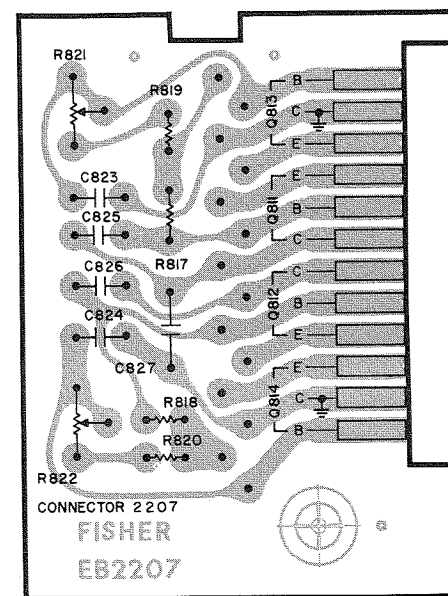
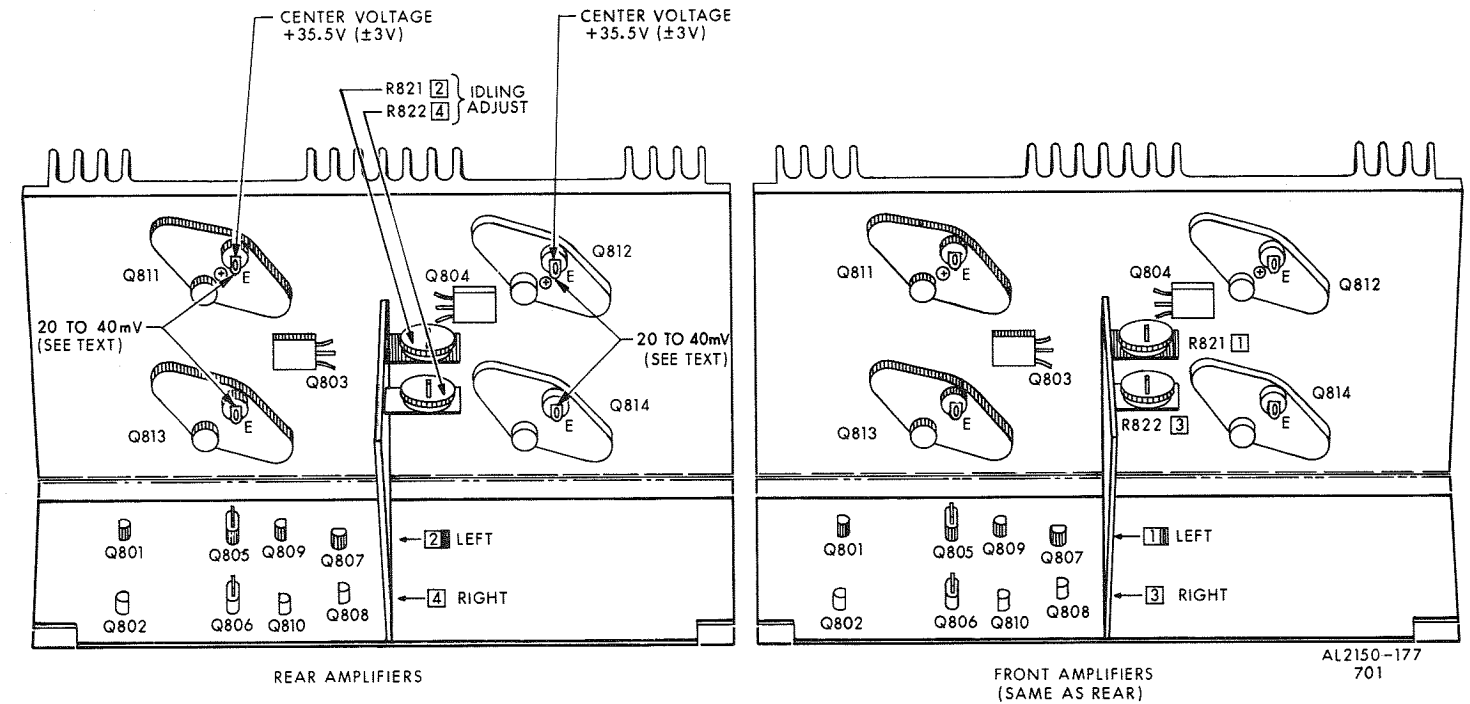
REAR AMPLIFIERS

(1) Connect common lead of DC VTVM to emitter terminal of Q813 and probe to emitter terminal of Q811. See illustration. Set IDLING ADJUST R821 for indication of 20 to 40 mV.

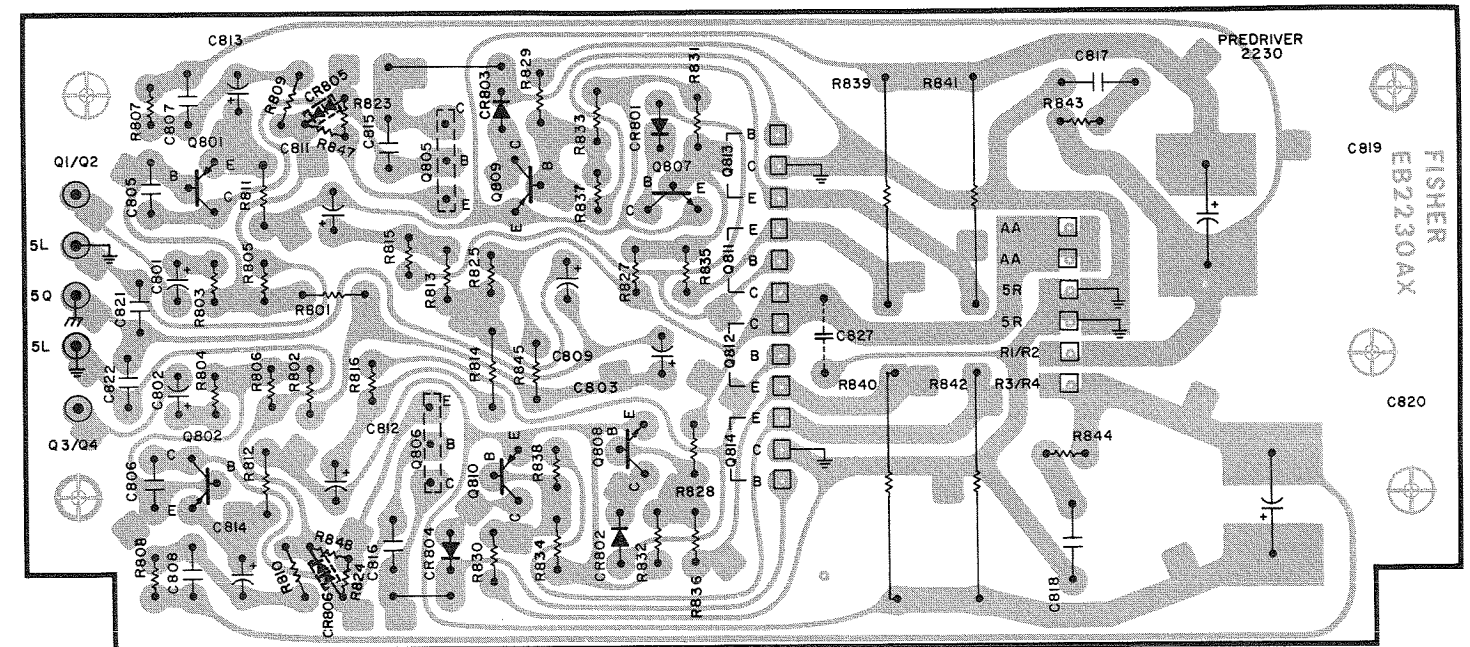
(2) Connect DC VTVM between emitters of Q812 and Q814 and adjust R822 for indication of 20 to 40 mV.

FRONT AMPLIFIERS

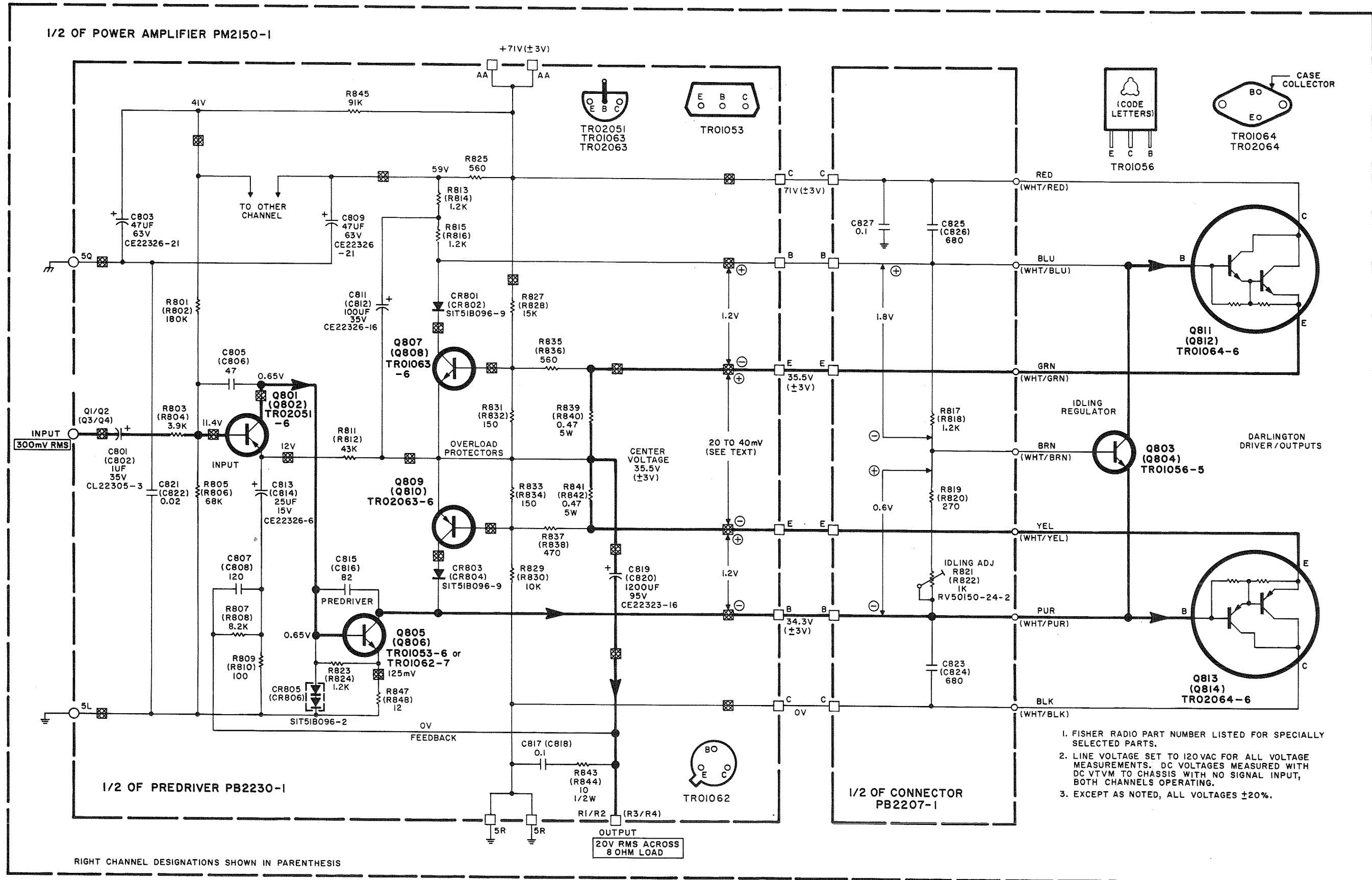
Repeat steps (1) and (2).



AL2207-111



AL2230-111AX





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