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## MECHANICAL DISASSEMBLY

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## REMOVING DRESS PANEL

- (1) Unplug AC power cord.
- (2) Remove screws securing the top and bottom covers to the chassis and heat sink. Remove the covers.
- (3) From the rear of the panel, remove the two screws securing the TUNE-O-MATIC pushbutton assembly to the back of the panel. Gently pull assembly away from panel.
- (4) Gently pull the SELECTOR, BASS, TREBLE, BALANCE, VOLUME, and TUNING knobs from the control shafts. Remove the hex nuts from the shafts and remove panel.
- (5) Reverse procedure for reassembly.

## REMOVING DIAL GLASS ASSEMBLY

- (1) Remove dress panel. Refer to REMOVING DRESS PANEL procedure.
- (2) Gently pull the four leads from the terminal pins on the top rear of the meter and label each lead with its associated pin location for easy replacement.
- (3) Gently pull the two pairs of dial lamp leads from the terminal pins on the chassis and label each lead.
- (4) Gently pull the pair of meter leads from the terminal pins on the chassis and label.
- (5) Remove the screws holding the dial glass panel. Remove the panel with the dial glass, pilot lamps, and meter attached by tilting out the bottom of the panel and sliding downward. Be careful to avoid deforming dial pointer.
- (6) Reverse procedure for reassembly.

## REMOVING P.C. BOARDS

To remove a board from its nylon mounts, squeeze the loop of each mounting clip (using pliers), and lift each corner of the board. To remount the board, align the mounting holes over the clips, and press firmly.

To remove any of the three boards containing the front panel controls and switches, use the following procedure:

- (1) Remove dress panel. Refer to REMOVING DRESS PANEL procedure.
- (2) a. Remove CONTROL AMPLIFIER board by removing hex nuts from BASS, TREBLE, and BALANCE controls.  
b. Remove each pushbutton mounting board by removing the appropriate pushbutton knobs and the two screws and nuts holding the switch to the chassis.

## REPLACING DIAL LAMPS

- (1) Remove dress panel. Refer to REMOVING DRESS PANEL procedure.
- (2) Snap out the defective lamp from the spring clip. Place the new lamp into the socket so that the unpainted side of the lamp faces the edge of the dial glass.
- (3) Replace the dress panel and knobs.

## REPLACING STEREO BEACON AND METER LAMPS

**NOTE:** The compartmented lamp assembly (FR No. M21C604-2), mounted on the rear of the meter, contains the meter lamp and the STEREO BEACON lamp, and must be replaced as a complete unit.

- (1) Unplug AC power cord.
- (2) Remove the screws securing the top cover to the chassis and heat sink. Remove the cover.
- (3) Gently pull the four wires off the terminal pins on the top rear of the meter. Label each wire with its associated pin location to make replacement easier.
- (4) Gently unsnap the compartmented lamp assembly from the top rear of the meter.
- (5) Center the replacement lamp assembly between the flanges and press firmly on to meter.
- (6) Reconnect the four wires to their associated terminal pins on the replacement lamp assembly.
- (7) Replace the top cover.

## REPLACING METER

- (1) Remove dress panel. Refer to REMOVING DRESS PANEL procedure.
- (2) Remove dial glass assembly. Refer to REMOVING DIAL GLASS ASSEMBLY procedure.
- (3) Gently pry the meter off the dial glass panel, and scrape off the residual adhesive.
- (4) Peel the backing from one side of the replacement adhesive mounting pad (FR No. E51A219), and affix it to the replacement meter (FR No. M21C604-1). Peel the backing from the remaining side of the pad, align the meter face over the panel cutout, and firmly press meter to back of panel.
- (5) Remount dial glass assembly.
- (6) Reinstall dress panel. Reconnect all leads to their respective terminal pins.
- (7) Check meter calibration. Refer to FM ALIGNMENT procedure.
- (8) Install top and bottom covers.

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## DIAL STRINGING

- (1) Remove screws securing top and bottom covers to chassis and heat sink. Remove covers. Remove pointer.
- (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 3.
- (5) Pull cord taut and wrap 2 turns CCW around tuning shaft. See detail.
- (6) Guide cord under and around pulley "A", and around pulleys "B" and "C". Keep cord taut.
- (7) Rotate drum fully CW, allowing cord to wind onto drum.
- (8) Guide cord under drum into groove 5, through rim slot, and under washer.
- (9) Pull cord taut, and tighten screw.
- (10) Rotate drum CCW and CW to distribute tensioning.
- (11) Repeat steps (9) and (10) until spring is tensioned.
- (12) Place cord over and under tabs on pointer (see detail), and place pointer on top of rail.
- (13) Turn tuning shaft fully CCW. Slide pointer to (0) while holding tuning shaft fully CCW. Cement pointer to cord to prevent slippage. Allow cement to thoroughly dry.
- (14) Check dial calibration. Refer to FM/AM ALIGNMENT.

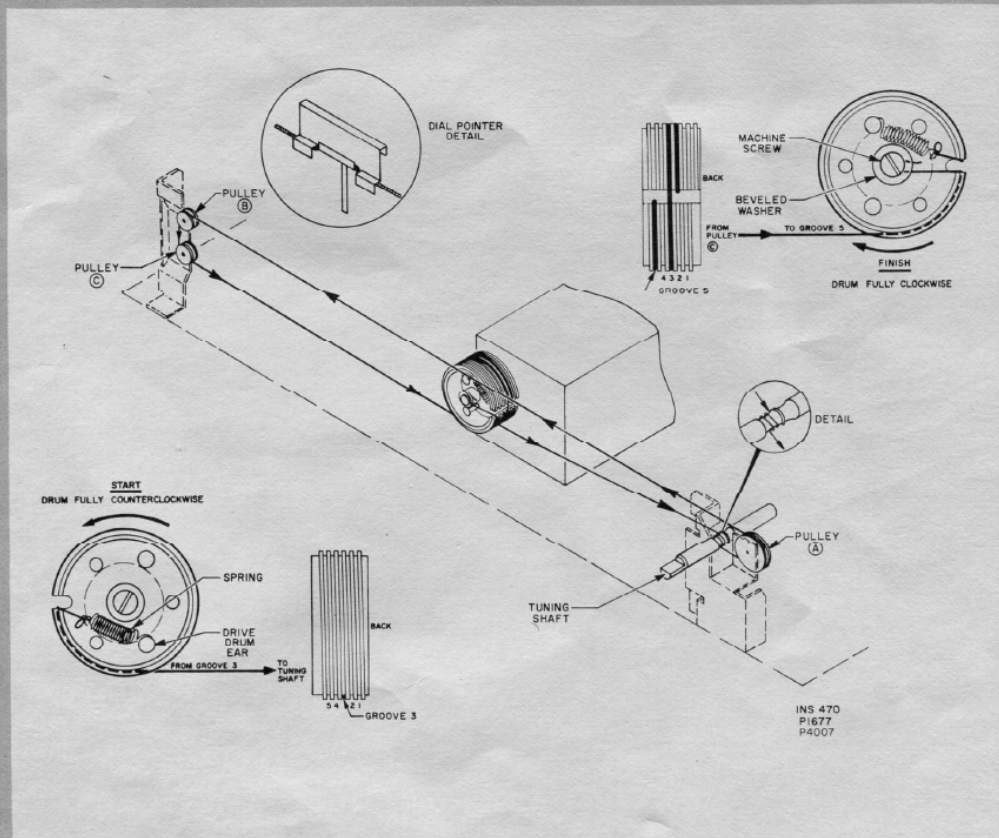
## HARMONIC DISTORTION TEST

**CAUTION:**

- (A) Measure the power of one channel at a time.
- (B) Limit measurements to 10 minutes.
- (C) Use a load resistor with a minimum rating of 50 watts.

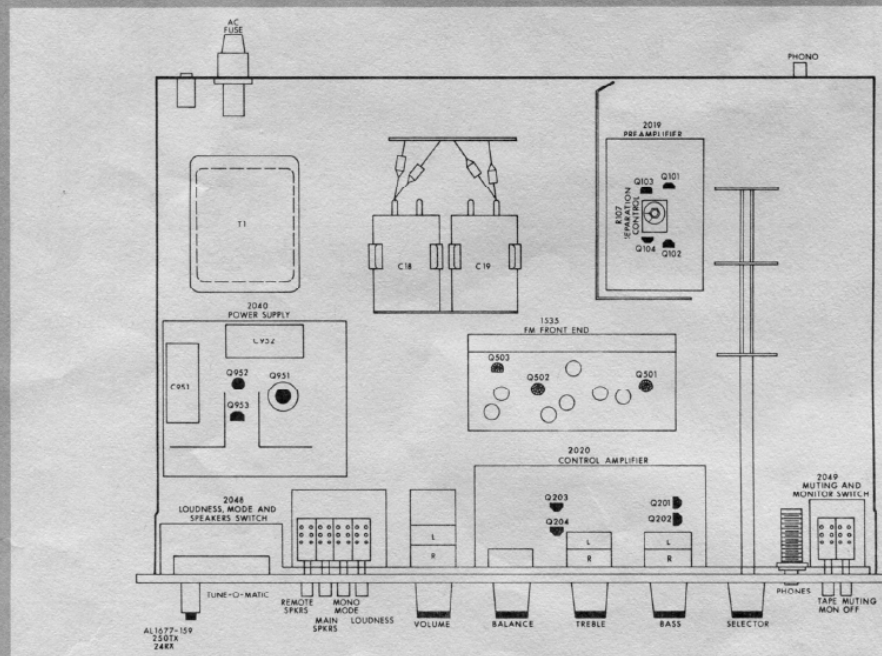
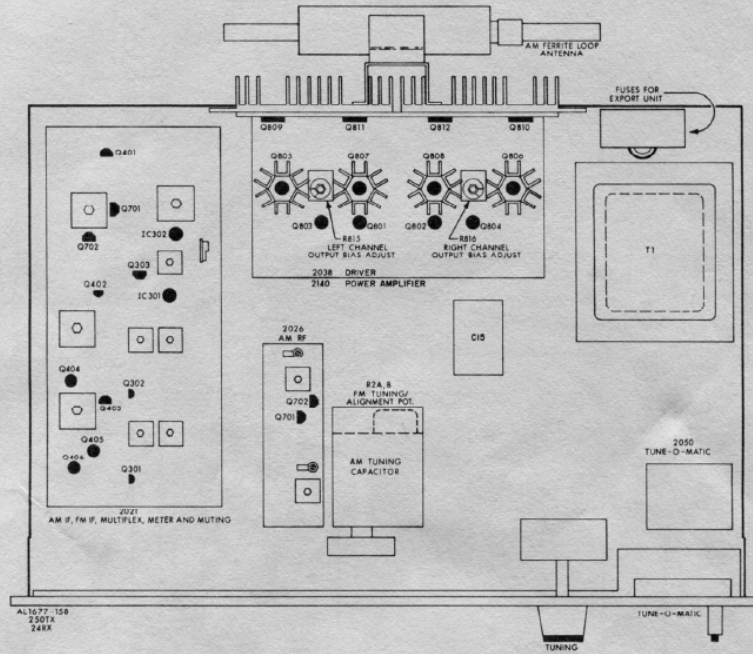
Set BASS and TREBLE controls to flat, and SELECTOR switch to AUX. Depress MAIN SPKRS switch. Unplug AC power cord.

- (1) Connect a low-distortion sine-wave generator to the LEFT AUX IN jack. Set generator frequency to 1,000 Hz, and output level to minimum.
- (2) Connect an 8-ohm load resistor between the LEFT SPKRS MAIN and COMMon terminals. In parallel with the load resistor, connect the input leads of an HD analyzer and the input leads of an accurately calibrated AC VTVM.
- (3) Connect AC power cord and rotate VOLUME control to maximum.
- (4) Increase generator level for 32 watts output (15.9V RMS across 8-ohm load). HD meter should read 0.5% or less.
- (5) Repeat preceding steps for right channel.



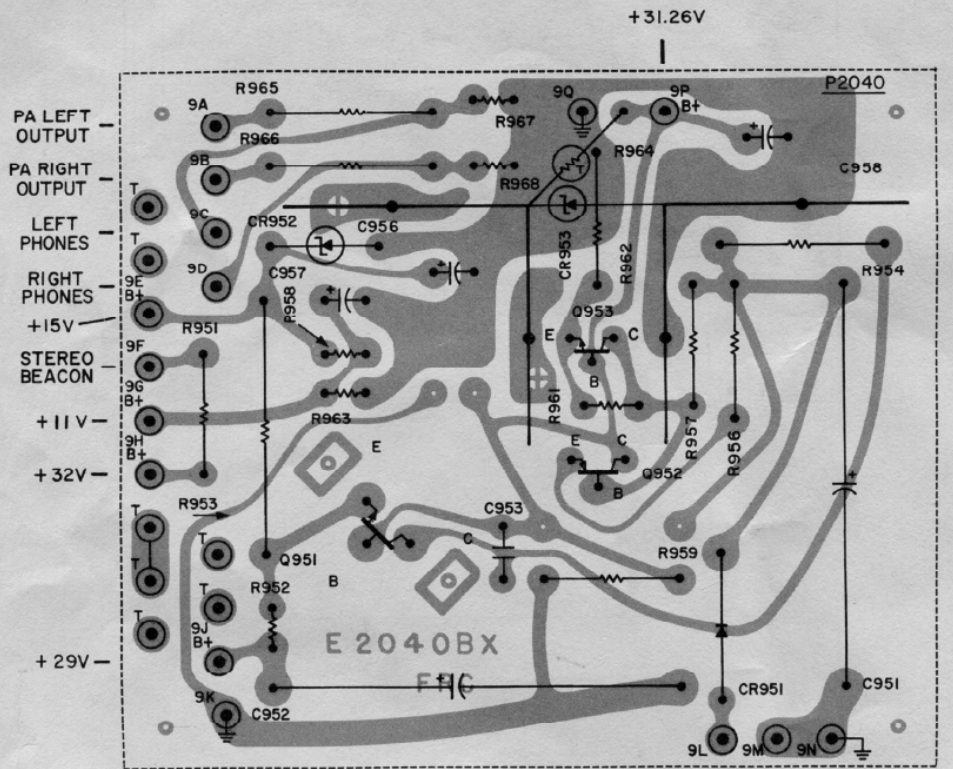
CHASSIS LAYOUT

TOP VIEW



BOTTOM VIEW

2040-1 POWER SUPPLY

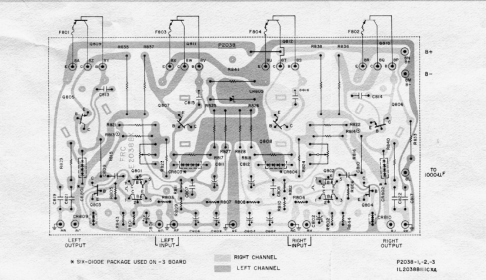
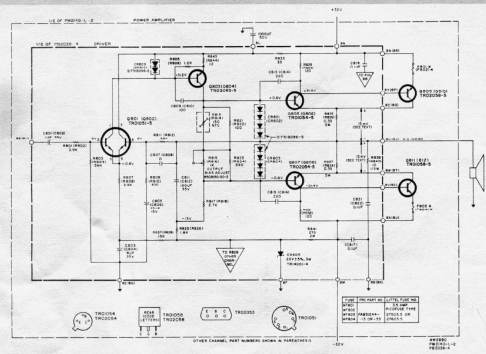


T = TERMINAL LUG USED FOR EASE IN WIRING.

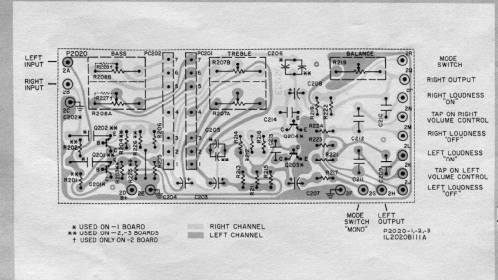
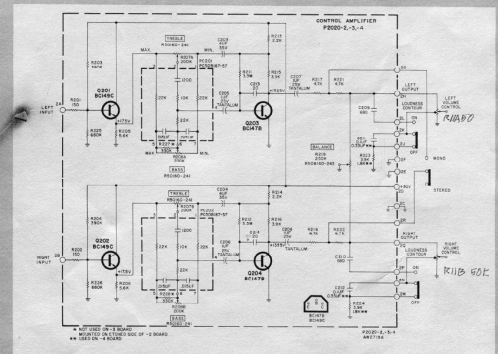
P2040-1  
1L2040B112A



2140-2 POWER AMPLIFIER



2020-2, -3 CONTROL AMPLIFIER



**CENTER VOLTAGE TEST**

Turn VOLUME control to minimum. Depress MAIN SPKR'S switch.  
 (1) Connect DC VTVM across LEFT MAIN SPKR'S terminals. Meter should read 0VDC ( $\pm 100$  mV).  
 (2) Connect DC VTVM across RIGHT MAIN SPKR'S terminals. Meter should read 0VDC ( $\pm 100$  mV).

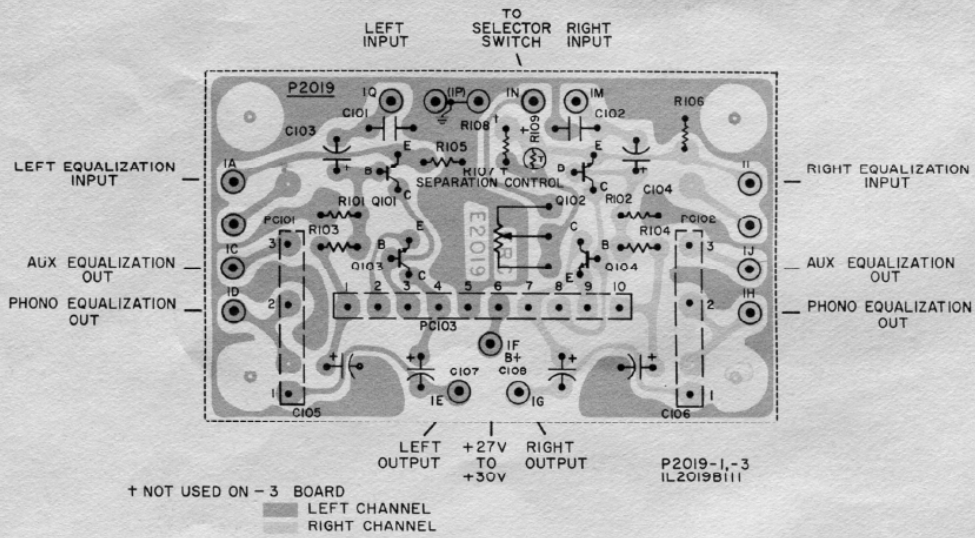
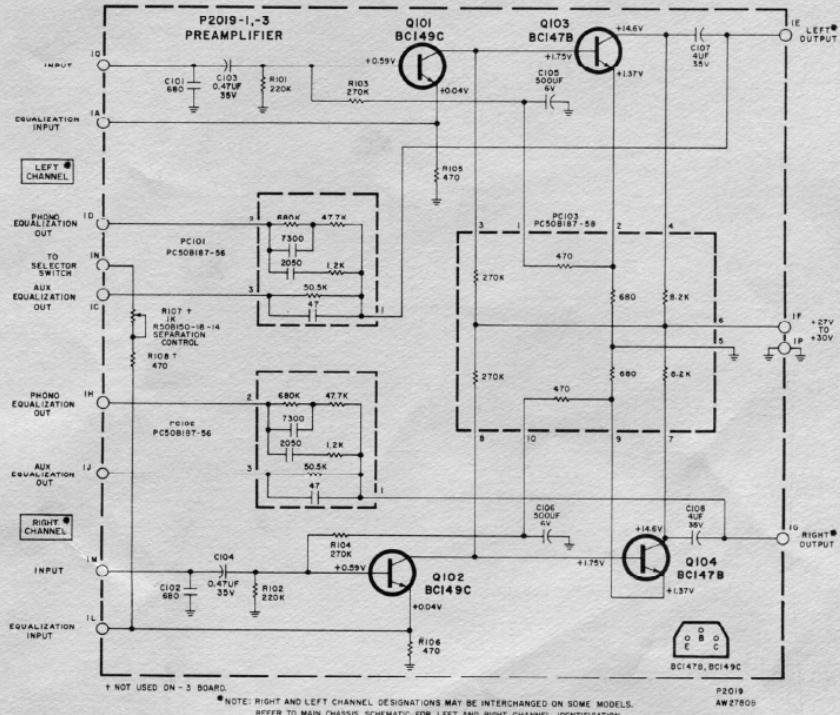
**IDLING CURRENT ADJUSTMENT**

Turn VOLUME control to minimum.  
 (1) Connect ground lead of DC VTVM to pin 8C and probe to pin 8Z. BE CAREFUL TO AVOID SHORTING ADJACENT PINS. Set BIAS ADJUST pot, R816 for 15 mVDC.  
 (2) Connect ground lead of DC VTVM to pin 8J and probe to pin 8O. BE CAREFUL TO AVOID SHORTING ADJACENT PINS. Set BIAS ADJUST pot, R816 for 15 mVDC.

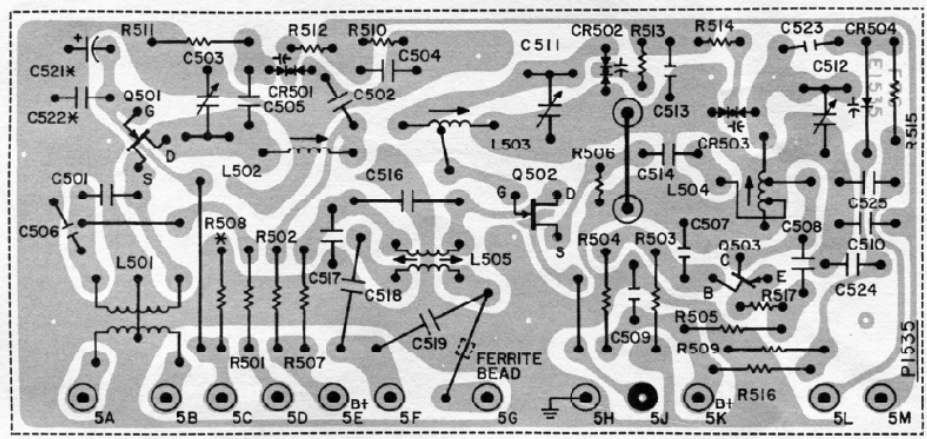
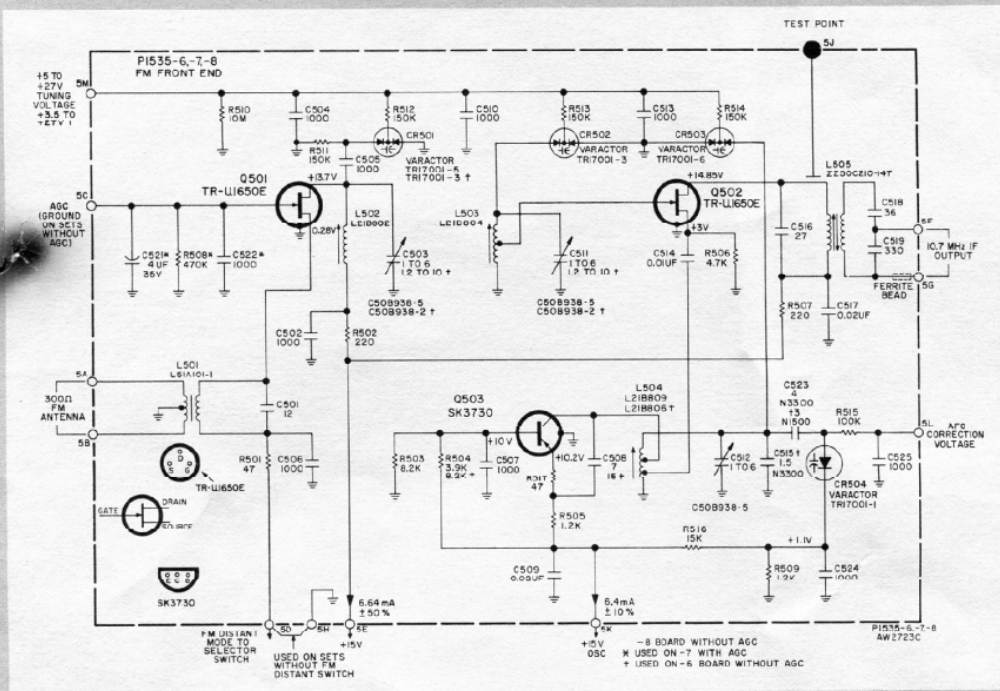
**NOTE:** Idling current will increase and stabilize as amplifier temperature normalizes.  
 (3) Allow unit to warm up 15 minutes. Repeat steps (1) and (2), resetting BIAS ADJUST pots for 15 mVDC.

2019-4 PREAMPLIFIER

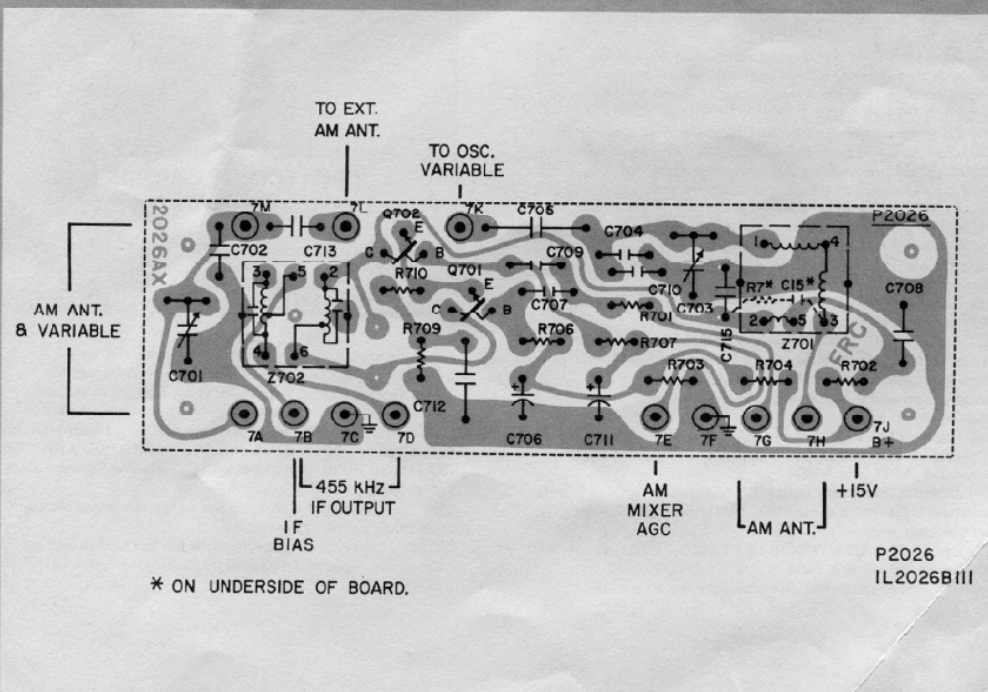
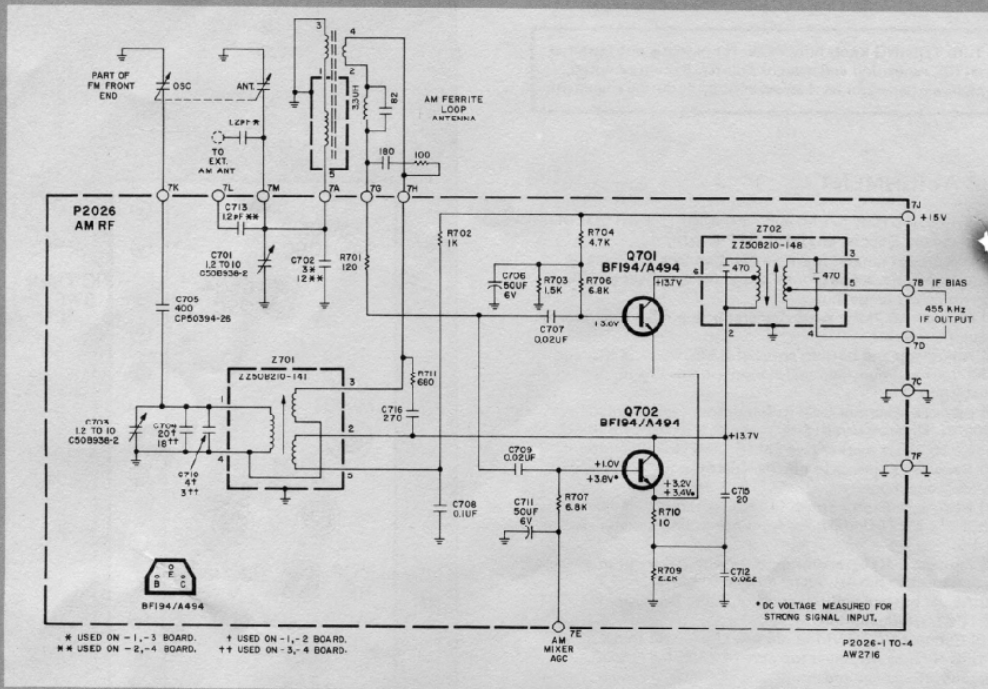
9



1535-7 FM RF



\* SEE SCHEMATIC  
 FM ANT.    AGC    +15V    10.7 MHz IF OUTPUT    TEST POINT (5J)    +15V OSC    AFC    +5V TO +27V TUNING VOLTAGE  
 PI535-1,-2,-6  
 IL1535B113D

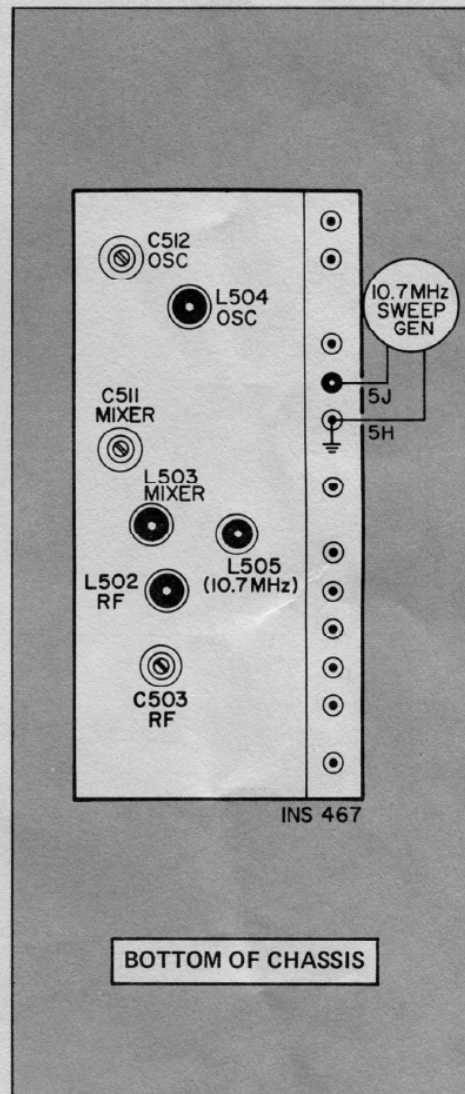


## TUNER ALIGNMENT

Turn TUNING knob fully CCW. If pointer is not centered on (0), reposition and cement pointer. Except as noted, maintain generator level as low as possible during alignment.

## FM ALIGNMENT

- (1) Set SELECTOR to FM, and AFC to OFF. Turn VOLUME minimum. Depress MUTING OFF switch.
- (2) Disconnect jumper from pin 3N. Connect AC input of scope to pin 3N, scope ground to pin 3G. Connect an 82k resistor across scope input.
- (3) Connect 10.7MHz sweep generator to pin 5J. generator ground to pin 5H.
- (4) Adjust top and bottom cores of Z305, Z304, Z302, and L505 for maximum gain and symmetry. See FM IF illustration.
- (5) Increase generator level to full output (approximately 100mV). If necessary, slightly readjust top core of Z305 to center 10.7MHz marker (see FM IF-LIMITED illustration).
- (6) Reconnect jumper to pin 3N. Disconnect 82k resistor across scope input.
- (7) Reduce generator sweep to zero (sweep off). Adjust R328 FM METER ADJ. for front panel tuning meter reading of 4.5.
- (8) Connect a 100k resistor in series with AC input of scope and connect to pin 4A, scope ground to pin 3L.
- (9) Adjust bottom and top cores of Z306. See FM DETECTOR illustration.
- (10) Connect DC VTVM to pin 4A. Use lowest (most sensitive) range. Readjust top core of Z306 for 0 VDC. Disconnect test equipment.
- (11) Depress MONO MODE and MANUAL switches. Connect an accurately calibrated DC VTVM to pin 9B (on TUNE-O-MATIC board).
- (12) Center dial pointer on 88MHz fiducial mark (1.1 on logging scale). Using a small screwdriver, adjust R2B (on back of AM tuning capacitor) for exactly 4.3 VDC. Disconnect DC VTVM.
- (13) Connect an FM signal generator to FM ANTenna terminals through 120-ohm composition resistors, one in series with each lead from the generator. Connect a scope and an AC VTVM to the LEFT RCDR OUT jack.
- (14) Set generator frequency and dial pointer accurately to 90MHz (1.85 on logging scale). Modulate generator with 400Hz,  $\pm 75$ kHz deviation. Adjust top and bottom core of L504, and top core of L503, and L502 for maximum AC, and maximum on front panel tuning meter.
- (15) Set generator frequency and dial pointer accurately to 106MHz (8.45 on logging scale). Adjust C512, C511, and C503 for maximum AC and maximum on front panel tuning meter.
- (16) Repeat steps (14) and (15) for accurate dial calibration and maximum audio.
- (17) Release MONO MODE switch. Increase generator level to 10mV. Connect MPX generator composite output to FM signal generator EXTERNAL MODULATION input. Modulate generator signal with 19kHz,  $\pm 7.5$ kHz deviation (10% pilot, no audio).
- (18) Connect DC VTVM to pin 4G. Tune receiver accurately to generator frequency. Adjust Z401, and Z402 for maximum DC (2.5 to 4 VDC).
- (19) Modulate generator with MPX composite signal,  $\pm 75$ kHz deviation (90% 1kHz audio, 10% 19kHz pilot). Modulate right channel only.
- (20) Connect an AC VTVM to LEFT RCDR OUT jack. Connect another AC VTVM to RIGHT RCDR OUT jack. Connect scope input through voltage divider to pin 4K.



- (21) Using an ohmmeter, temporarily set R107 SEPARATION CONTROL (on preamplifier board) to maximum resistance. Adjust Z403 for maximum scope amplitude and as straight a base-line as possible (see MPX OUTPUT illustration). Left channel AC should be minimum.
  - (22) Modulate left channel only. Adjust R107 SEPARATION CONTROL for minimum AC on right channel (at least 30dB below left channel).
  - (23) Modulate right channel only. Left channel should be at least 30dB below right channel.
- NOTE:** If separation measurements are not within 3dB of each other, readjust Z402 slightly, and repeat steps (21) through (23).



