



Set using ISO screws

HP-211A

AEP Model



HP-211A

SS-210

SONY®
SERVICE MANUAL

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SECTION 1

TECHNICAL DESCRIPTION

1-1. TECHNICAL SPECIFICATIONS

Technical specifications for the HP-211A are listed in Table 1-1.

TABLE 1-1.
HP-211A TECHNICAL SPECIFICATIONS

Fm Tuner Section		Audio Amplifier Section	
Antenna:	300 ohms balanced	Dynamic power:	28 watts, both channels (IHF constant power operating, 8 ohms, 1% THD supply method)
Frequency range:	87.5 to 108 MHz	Music power output:	36 watts total (EIA)
Intermediate frequency:	10.7 MHz	Continuous RMS power:	10 watts, per channel, both channels operating, 8 ohms
Usable sensitivity:	2.2 μ V (S/N = 30 dB)	Harmonic distortion:	Less than 1.0% at 1 kHz at rated output
Signal-to-noise ratio:	65 dB, IHF	Frequency response:	TAPE } 40 Hz to 40 kHz AUX } (± 3 dB) at 1-watt output
Capture ratio:	4 dB, IHF	Input sensitivity and impedance:	PHONO: 3.5 mV, 50 k ohms TAPE: 400 mV, 100 k ohms AUX: 250 mV, 100 k ohms REC/PB: 400 mV, 50 k ohms
Selectivity:	35 dB, IHF	Signal output:	REC OUT: 250 mV, 10 k ohms REC/PB: 30 mV, 80 k ohms
Image rejection:	40 dB	Signal-to-noise ratio (IHF (B) network):	PHONO: greater than 58 dB TAPE } greater than 66 dB AUX }
I-f rejection:	90 dB	Tone controls:	BASS: ± 10 dB at 100 Hz TREBLE: ± 10 dB at 10 kHz
A-m suppression:	45 dB	Loudness:	6 dB up at 50 Hz 3 dB up at 10 kHz (VOLUME-control attenuation: 30 dB)
Frequency response:	20 to 15,000 Hz ± 3 dB		
Harmonic distortion:	Mono: 0.5% at 400 Hz Stereo: 1.0% at 400 Hz		
Fm-stereo separation:	Greater than 35 dB at 400 Hz		
19-kHz, 38-kHz suppression:	45 dB		
A-m Tuner Section			
Frequency range:	530 to 1,605 kHz		
Intermediate frequency:	455 kHz		
Sensitivity:	50 dB/m, built-in antenna 20 μ V, external antenna		
Signal-to-noise ratio:	50 dB		

Phonograph Section	
Record player:	SONY TTS-312 (33 1/3, 45 rpm)
Cartridge:	SONY IM Cartridge VM-10P
Output voltage:	5 mV
Stylus force:	3 g
Stylus:	SONY Diamond Stylus ND-114P

Speaker Section (SS-210)	
System:	2-way (6 1/2" (16 cm) woofer, 2" (5 cm) tweeter)
Impedance:	8 ohms
Dimensions:	9 1/4" (width) x 15" (height) x 8 3/8" (depth) 235 mm (width) x 380 mm (height) x 213 mm (depth)
Net weight:	6 lb 10 oz (3.0 kg)
Shipping weight:	18 lb 12 oz (8.5 kg) per pair in shipping carton

General	
Power consumption:	95 watts
Power requirements:	110, 127, 220, 240 V 50/60 Hz ac
Dimensions:	16 9/16" (width) x 9 1/2" (height) x 16 1/8" (depth) 421 mm (width) x 241 mm (height) x 410 mm (depth)

Net weight:	25 lb 9 oz (11.5 kg) (without speaker system)
Shipping weight:	33 lb 11 oz (15 kg) (without speaker system)

1-2. ANALYSIS FOR NEWLY ADAPTED CIRCUIT

1. Fm/A-m I-f Strip

Notice that the RC coupled amplifier Q202 and tuned amplifier Q203 form an fm/a-m i-f amplifier stage. Changeover for tuned circuit is not necessary because of the wide difference in the intermediate frequencies. But dc bias changeover circuit for these amplifiers is provided to permit the proper operation both at fm and a-m i-f signal amplification. Referring to partial schematic diagram Fig. 1-1, dc bias changeover operation is performed by switching S1-1 (FUNCTION switch). In A-M mode, bias voltage is supplied through R237, R242. This holds the collector current of Q202 to 0.3 mA and Q203 to 2 mA, permitting proper amplification for a-m i-f signals. In FM mode, bias voltage is now supplied through paralleled circuit of R237/R238, R242/R244. This increases bias current ensuring limiter response in fm mode.

2. MPX Decoder Circuit

(a) Subchannel boost circuit

R302 and C301 form a subchannel signal boost circuit (high pass filter) and inserted between SCA trap and base circuit of Q301 (19 kHz amplifier). This upgrades the channel separation without employing negative-feedback type cancellation circuit. See Fig. 1-2.

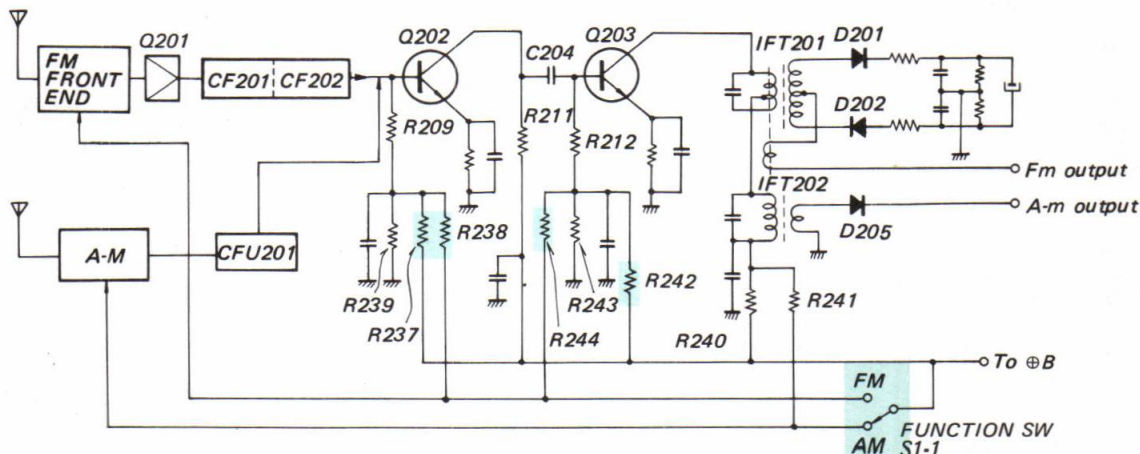


Fig. 1-1. Partial schematic diagram of fm/a-m i-f strip

(b) Frequency doubler circuit

Q302 and tuned circuit in the collector circuit forms a frequency doubler circuit. Input 19 kHz signal is rectified between base-emitter junction and amplified at Q302 since it operates as class "C" amplifier. As 19 kHz pulses in the base circuit includes its higher-order

harmonics, tank circuit tuned to 38 kHz is inserted in the collector to restore 38 kHz sinusoidal waveform. This signal is transformer coupled to bridge-type demodulator to supply sampling drive for the demodulator. See Fig. 1-2.

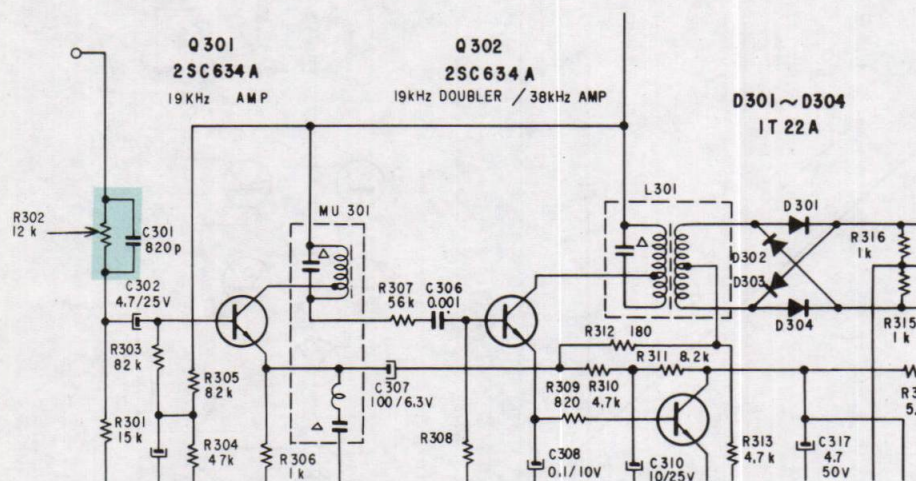


Fig. 1-2. Partial schematic diagram of MPX decoder

The diagram illustrates the frequency response and circuitry of a portable stereo receiver. The top portion is a graph of gain in dB versus frequency in kHz, showing the performance of various input and output stages. The bottom portion is a schematic diagram of the receiver's internal components, including the tuner, detector, and power output stages.

Frequency Response Graph:

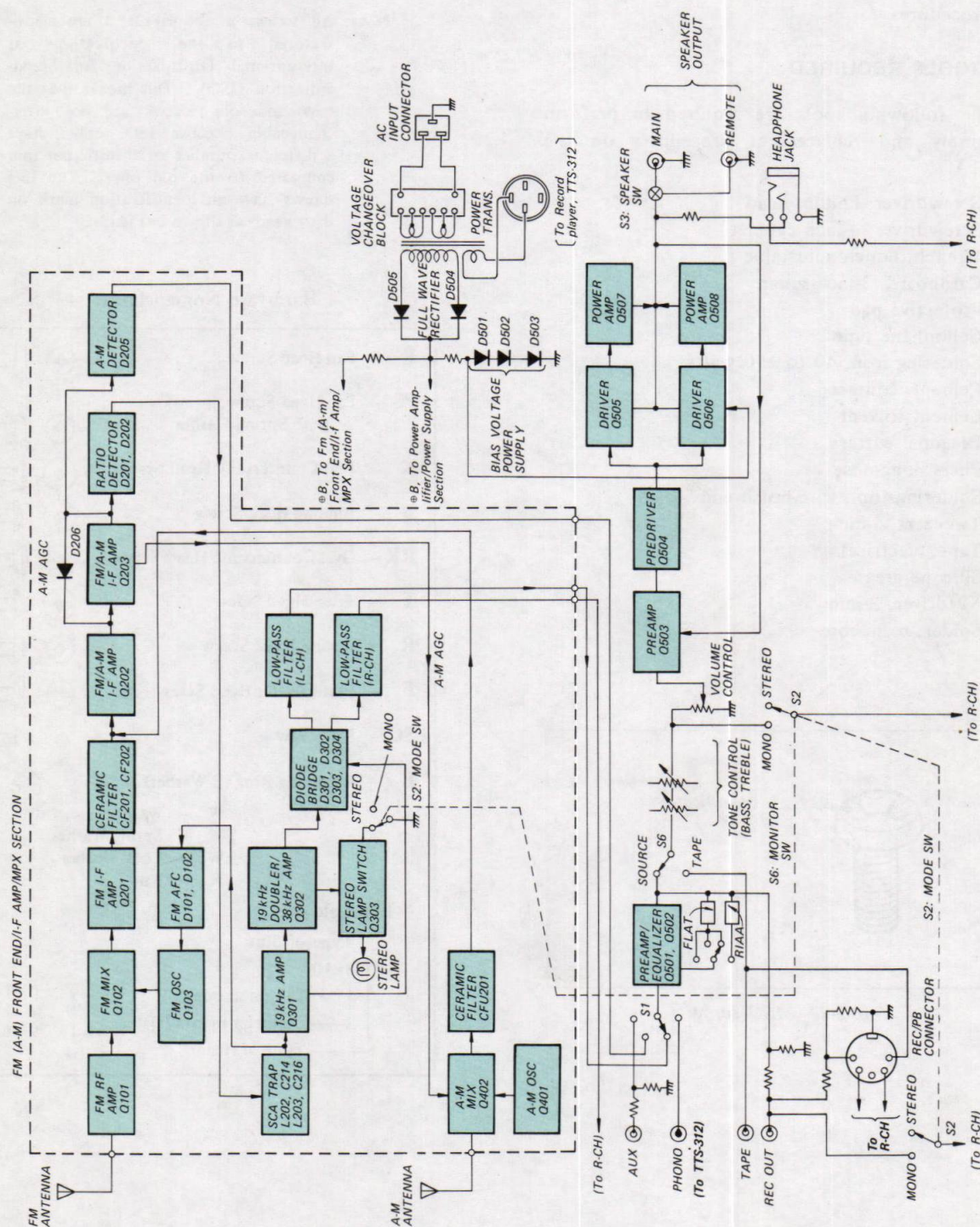
- Y-axis:** Gain in dB, ranging from -50 to +30.
- X-axis:** Frequency in kHz, ranging from 0.1 to 10.
- Curves and Levels:**
 - REC/PB IN (TAPE):** -5 dB (400 mV)
 - REC/PB OUT:** -10 dB (250 mV) and -28 dB (30 mV)
 - PHONO:** -47 dB (3.5 mV)
 - AUX:** -10 dB (250 mV)
 - REC OUT:** -10 dB (250 mV)
 - REC/PB OUT:** -28 dB (30 mV)
 - PHONO:** -47 dB (3.5 mV)
 - AUX:** -10 dB (250 mV)
 - REC OUT:** -10 dB (250 mV)
 - REC/PB OUT:** -28 dB (30 mV)
 - PHONO:** -47 dB (3.5 mV)
 - AUX:** -10 dB (250 mV)
- Reference Levels:**
 - +21.3 dB (16.9 V) 10W/8 Ω
 - +8.2 dB (2 V) 500 mW/8 Ω
 - 45.1 dB (4.26 mV)
 - 32 dB (20 mV)

Circuit Diagram:

- Tuner Section:** Includes transistors Q501, Q502, and Q503, with a variable capacitor (C1) and a function switch (S1).
- Detector Section:** Includes transistors Q504, Q505, and Q506, with a volume control (C2) and a tone control (C3).
- Power Output Section:** Includes transistors Q507 and Q508, with a speaker output (S3) and a speaker switch (S2).
- Other Components:** Includes a headphoned jack, a mono/stereo switch (S2), and a mode switch (S2).

Note: Signal voltages are measured with an ac VTVM and expressed in dB referred to 0.775 V, 1 kHz.

1-4. BLOCK DIAGRAM



SECTION 2

DISASSEMBLY AND REPLACEMENT PROCEDURES

WARNING

Unplug the ac power cord before starting any disassembly or replacement procedures.

2-1. TOOLS REQUIRED

The following tools are required to perform disassembly and replacement procedures on the HP-211A.

- Screwdriver, Phillips-head
- Screwdriver, 4-inch cabinet
- Wrench, 6-inch adjustable
- Cardboard, 3-inch-square
- Protective pad
- Cellophane tape
- Soldering iron, 40 to 150 watts
- Cement, contact
- Cement solvent
- Diagonal cutters
- Pliers, long-nose
- Soldering tool, wire-brush end
- Tweezers, 6-inch
- Tape, electrical
- Silicone grease
- Nutdriver, 3-mm
- Solder, rosin-core

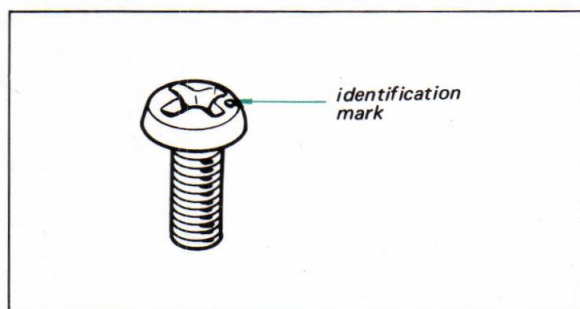


Fig. 2-1. ISO screw

2-2. HARDWARE IDENTIFICATION GUIDE

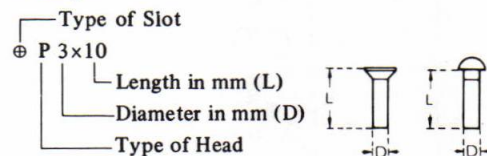
The following chart will help you to decipher the hardware codes given in this service manual.

Note: All screws in the HP-211A are manufactured to the specifications of International Organization for Standardization (ISO). This means that the new and old screws are not interchangeable because ISO screws have a different number of threads per mm compared to the old ones. The ISO screws have an identification mark on their heads as shown in Fig. 2-1.

— Hardware Nomenclature —

P	— Pan Head Screw		
PS	— Pan Head Screw with Spring Washer		
K	— Flat Countersunk Head Screw ...		
B	— Binding Head Screw		
RK	— Oval Countersunk Head Screw ..		
T	— Truss Head Screw		
R	— Round Head Screw		
F	— Flat Fillister Head Screw		
SC	— Set Screw		
E	— Retaining Ring (E Washer)		
	W — Washer		
	SW — Spring Washer		
	LW — Lock Washer		
	N — Nut		

— Example —



2-3. TOP COVER REMOVAL

1. Open the top cover, and then push the lower part of top cover to the right as shown in Fig. 2-2. This frees the top cover.
2. To reassemble the top cover, reverse the foregoing procedure.

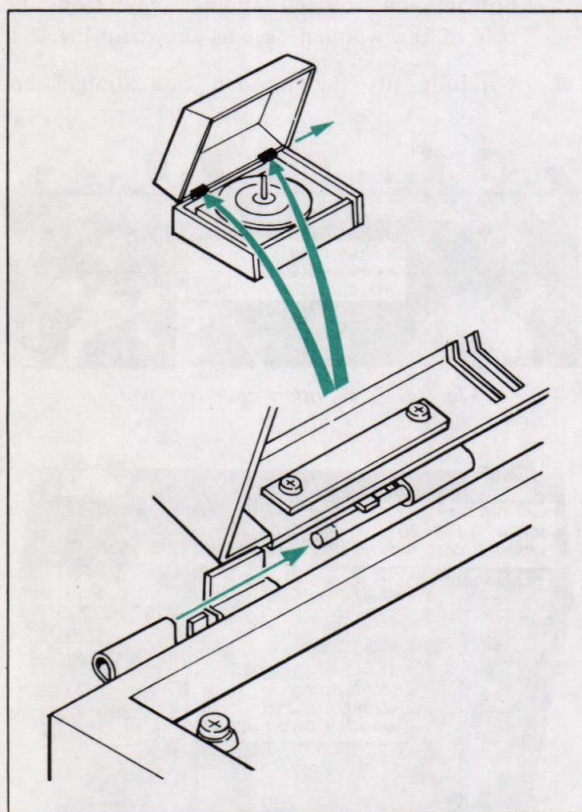


Fig. 2-2. Top cover removal

2-4. RECORD PLAYER REMOVAL

1. Remove the top cover as described in Procedure 2-3.
2. Set the speed selector knob to OFF (neutral) position.
3. Lift the turntable straight up.
4. Remove the three transit screws ($\ominus$ PSW 5x30) and two screws ($\oplus$ PW 5x30) securing the turntable base to the wooden case.
5. Carefully lift the turntable base while disconnecting the four push-on connector and the 4-P connector from the bottom of the player.
6. Remove the player and motor board, and place it on a soft protective pad.

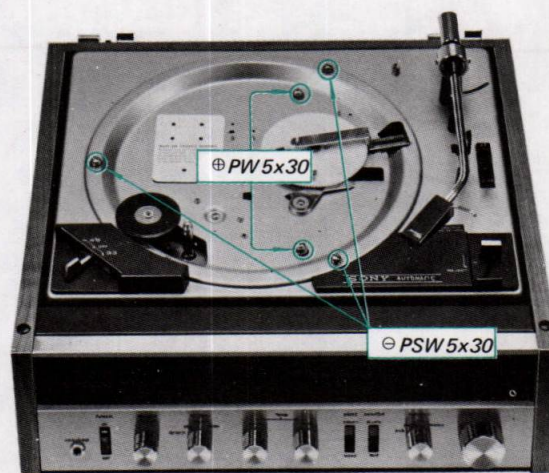


Fig. 2-3. Record player removal

2-5. FRONT PANEL REMOVAL

1. Remove the top cover as described in Procedure 2-3.
2. Remove all the control knobs by pulling them off.
3. Remove the HEADPHONE jack by using jack driver or pliers.
4. Remove the one self-tapping screw securing the front panel to the front subchassis as shown in Fig. 2-5.
5. Refer to cross sectional view Fig. 2-4, press the top of the front panel as shown in Fig. 2-5.
This frees the front panel.
6. To reassemble the front panel, reverse the foregoing procedures.

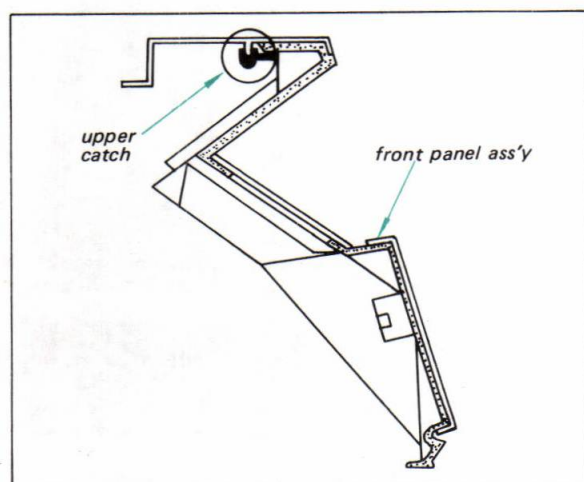


Fig. 2-4. Cross sectional view of front panel

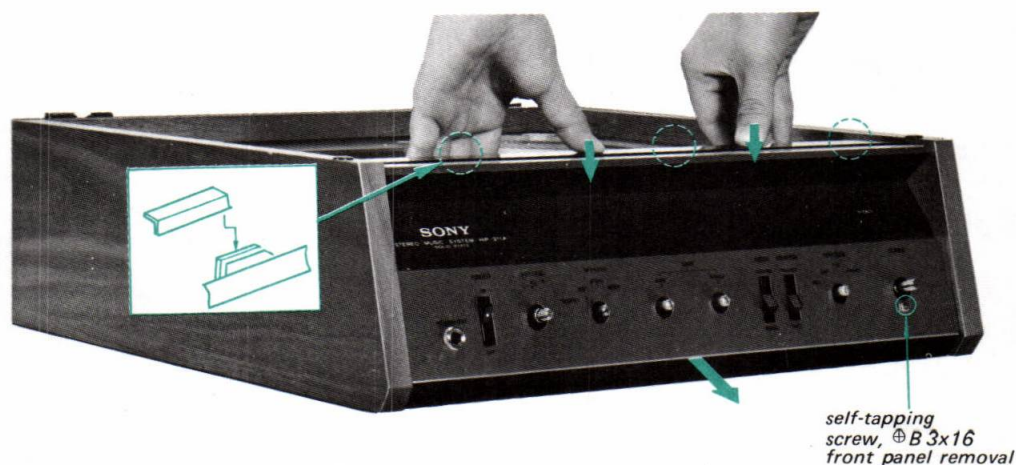


Fig. 2-5. Front panel removal

2-6. WOODEN CASE REMOVAL

1. Remove the record changer as described in Procedure 2-4.
2. Remove the two self-tapping screws securing the motor board bracket to the front subchassis as shown in Fig. 2-6.
3. Remove the six self-tapping screws from the bottom and one self-tapping screw from the rear of the wooden case as shown in Fig. 2-7.
4. Carefully lift the wooden case straight up.



Fig. 2-6. Wooden case removal

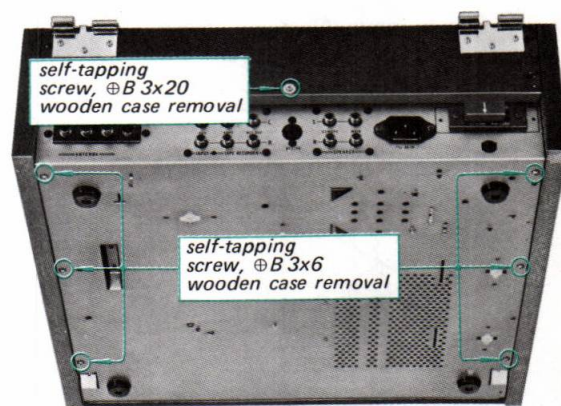


Fig. 2-7. Bottom view

2-7. DIAL-CORD RESTRINGING

Preparation

1. Remove the front panel and wooden case as described in Procedures 2-5 and 2-6.
2. Cut a 71-inch (1,800 mm) length of $\frac{1}{64}$ -inch (0.3 mm) diameter dial cord.
3. Tie the end of the cord to a spring as shown in Fig. 2-8.
4. Rotate the tuning-capacitor drive drum fully counterclockwise (minimum capacitance position).

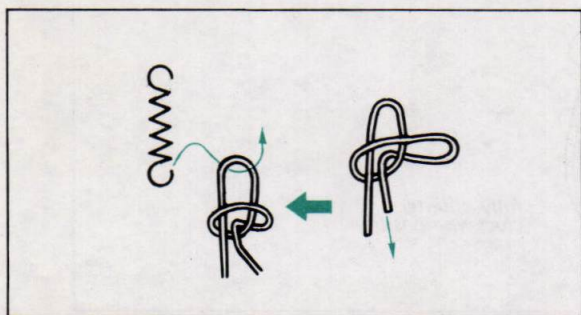


Fig. 2-8. Tying square knot in the coil spring

Procedure

While referring to Fig. 2-13, proceed as follows:

1. Hook the spring to one hole of the drive drum as shown in Fig. 2-9, and then squeeze it.

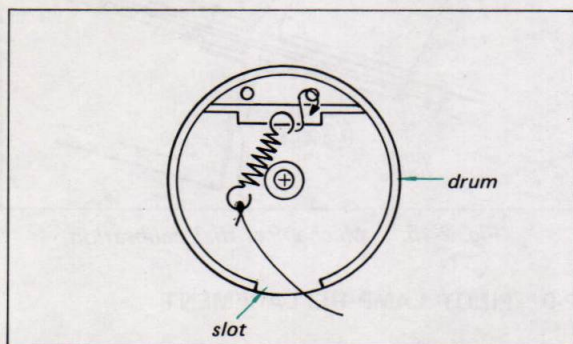


Fig. 2-9. Coil spring installation

2. Run the cord through the slot in the rim of the drum and wrap one and half counterclockwise turn in the inner side groove. See Fig. 2-10.
3. Run the cord over pulley "A", and then wrap three counterclockwise turns around the tuning shaft.

4. Run the cord over pulleys "B", "C" and "D", then wrap three counterclockwise turns around the drum from outer groove to inner groove as shown in Fig. 2-10.

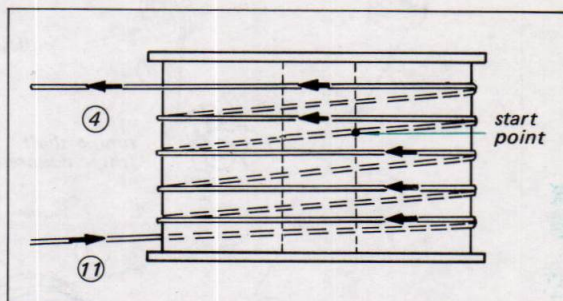


Fig. 2-10. Wrapping the dial cord

5. Pass the doubled end of the cord through the eyelet (See Fig. 2-11), then hook it to the spring as shown in Fig. 2-12.
6. Tighten the cord, then squeeze the eyelet so that the spring is under tension. Make a knot in the cord end to keep it from slipping out of the eyelet. See Fig. 2-11.
7. After completing the dial-cord stringing, make sure that the tuning system works properly. Apply a drop of contact cement to the knots. Perform the mechanical dial calibration.

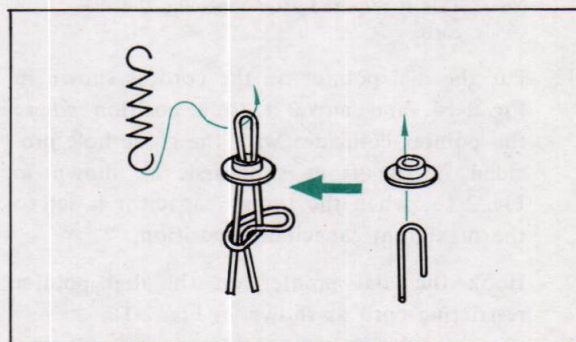


Fig. 2-11. Detail of dial cord finish

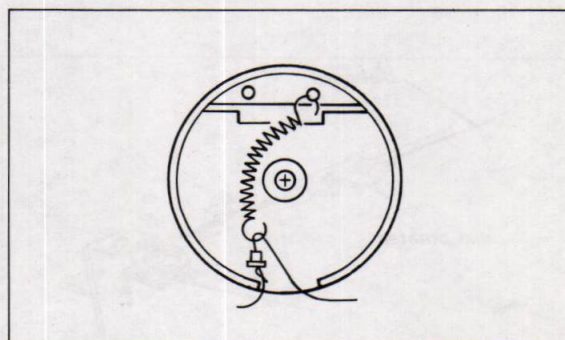


Fig. 2-12. End of dial cord stringing

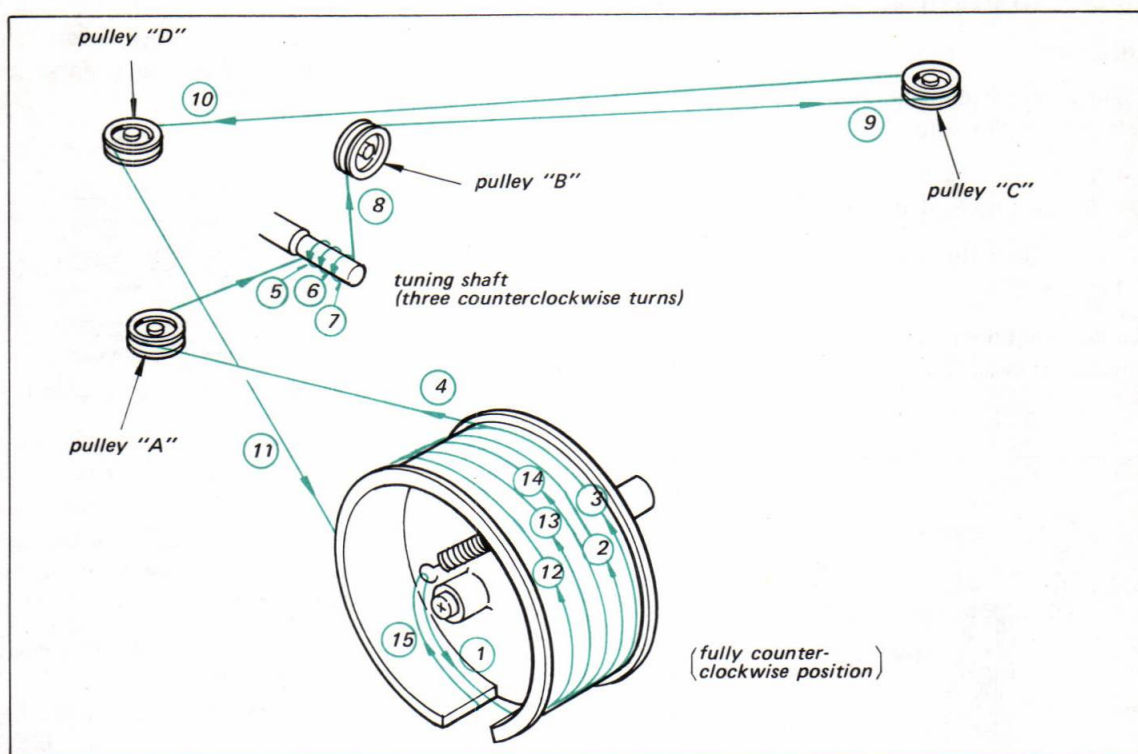


Fig. 2-13. Dial cord stringing

2-8. MECHANICAL DIAL CALIBRATION

Note: This is required after replacing the dial cord.

1. Put the dial pointer on the cord as shown in Fig. 2-14, and move it to a position where the pointer coincides with the guide hole provided in the front subchassis as shown in Fig. 2-15, when the tuning capacitor is set to the maximum capacitance position.
2. Hook the dial pointer on the dial pointer restricting cord as shown in Fig. 2-15.
3. Perform frequency coverage alignment as described in Procedure 3-2.

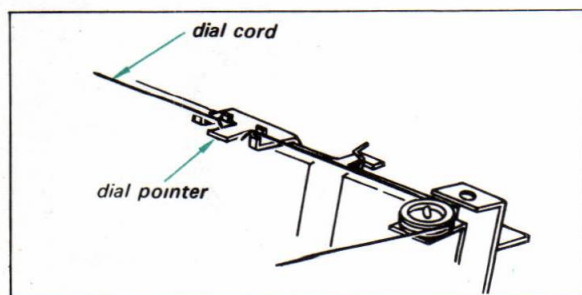


Fig. 2-14. Dial pointer installation

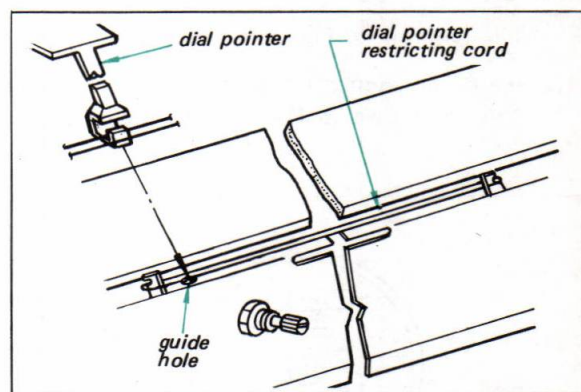


Fig. 2-15. Mechanical dial calibration

2-9. PILOT LAMP REPLACEMENT

Prepare for replacing any of the pilot lamps by removing the record player as described in Procedure 2-4.

Stereo Lamp

1. Pull the lamp from its rubber holder.
2. Unsolder the defective lamp leads from the connecting terminals on the fm (a-m) front end/i-f amp/MPX board, and then install the new lamp.

Dial Lamp

1. Remove the front panel as described in Procedure 2-5.
2. Pry out the defective lamp, and then install the new one.

2-10. CONTROL AND SWITCH REPLACEMENT

Prepare for replacing any of the controls or switches by removing the front panel as described in Procedure 2-5.

TONE Controls

1. Remove the hex nuts that secure the BASS and TREBLE controls to the front subchassis as shown in Fig. 2-16.
2. Carefully remove them along with the tone control circuit board.
3. Cut each lug of the defective control on the board to remove the part.
4. Unsolder and remove the clipped lugs, and clean out the holes in the tone control board.
5. Install the replacement control.

FUNCTION Switch (rotary/slide switch)

1. Remove the hex nut securing it to the front subchassis as shown in Fig. 2-16.
2. Remove the lead wires from the clamp/PCB support one by one and then unhook the fiber support as shown in Fig. 2-17. This frees the preamplifier board.
3. With a soldering iron having a solder-sucking tip, clean the solder from each lug of the defective switch and the printed circuit board.
4. Install the replacement switch.

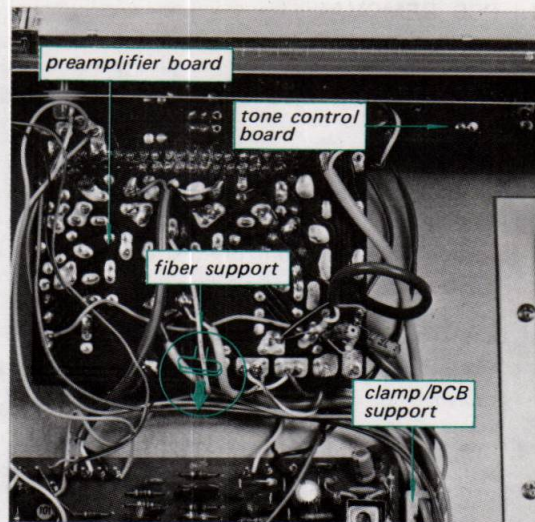


Fig. 2-17. Preamplifier board removal

VOLUME Control, SPEAKER Switch and HEADPHONE Jack

1. Remove the hex nuts that secure them to the front subchassis as shown in Fig. 2-16.
2. Unsolder the lead wires from the defective parts, and then install the replacement parts.

MODE, MONITOR and POWER Switches

1. Remove the two self-tapping screws securing the switch to the front subchassis as shown in Fig. 2-16.
2. Unsolder the lead wires from the defective switch, and then install the replacement switch.

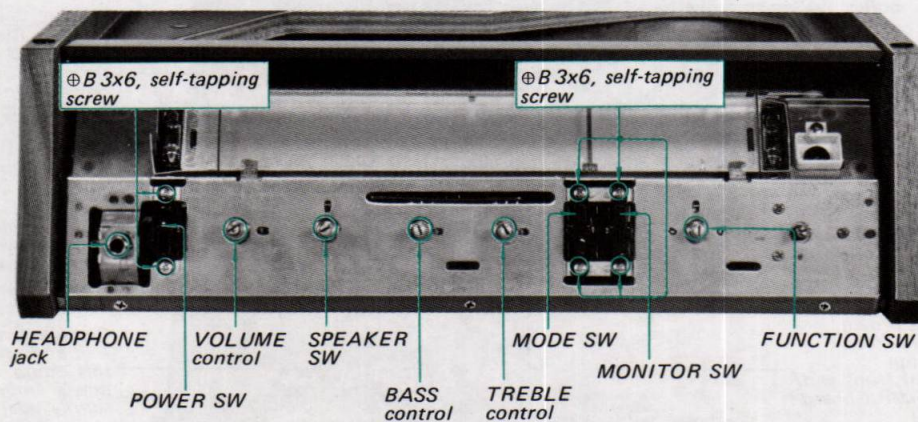


Fig. 2-16. Control and switch replacement

2-11. PCB REMOVAL

Prepare for removing any of the printed circuit boards by removing wooden case as described in Procedure 2-6.

Tone Control and Preamplifier Boards

1. Refer to the tone control replacement procedures for tone-control board removal as described in Procedure 2-10.
2. Refer to the function switch replacement procedures for preamplifier board removal as described in Procedure 2-10. See Fig. 2-17.

Fm (A-m) Front End/I-f Amp/MPX Board

1. Fasten the dial cord to the drum, pulley "A" and pulley "D" with cellophane tape. This helps you to restring the dial cord.
2. Unsolder the fm and a-m antenna lead wires from the antenna terminals.
3. Remove the two self-tapping screws ($\oplus B 3 \times 6$) securing the tuning capacitor and PCB brackets to the chassis as shown in Fig. 2-18. This frees the fm (a-m) front end/i-f amp/MPX board.

Power Amp/Power Supply Board

1. Remove the two lead wires (shield wire of green and black) from the power amp/power supply PCB support and the two lead wires (red and orange) from the fm (a-m) front end/i-f amp/MPX PCB support, and then remove the two self-tapping screws ($\oplus B 3 \times 6$) securing the heat sink to the chassis as shown

in Fig. 2-18. This frees the power amp/power supply PCB.

2. Insert the tabs of the PCB into the opening in the chassis as shown in Fig. 2-19. The helps replacing or checking the components mounted on PCB.

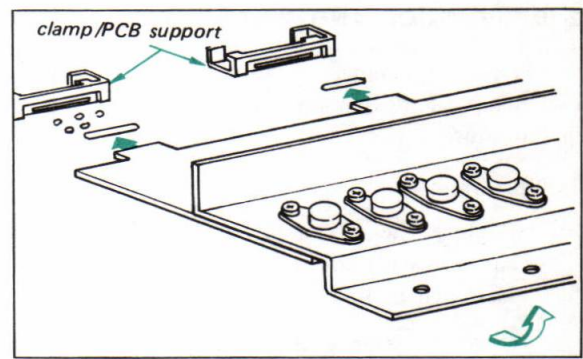


Fig. 2-19. Power amplifier/power supply board removal

2-12. REPLACEMENT OF COMPONENTS SECURED TO THE REAR PANEL BY NYLON RIVETS

1. Remove the nylon rivets securing the defective component by pushing its end with a pair of tweezers as shown in Fig. 2-20.
2. Remove the defective component and then install a new one.
3. To reinstall the rivet, insert the flared part into the opening first, and then push the head as far as it goes as shown in Fig. 2-21.

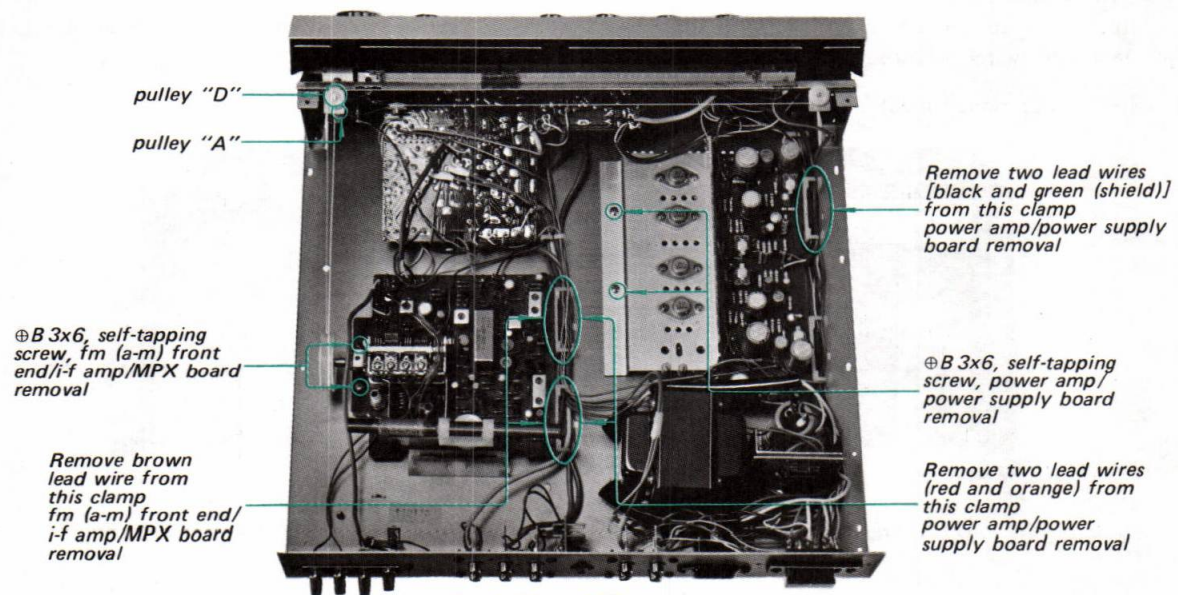


Fig. 2-18. PCB removal

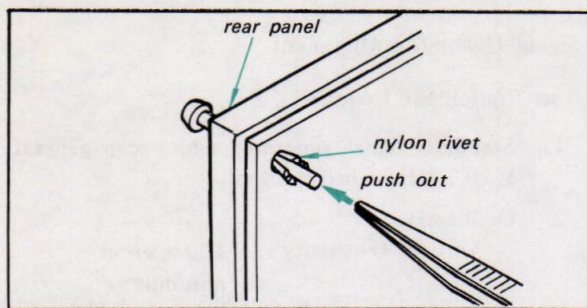


Fig. 2-20. Nylon rivet removal

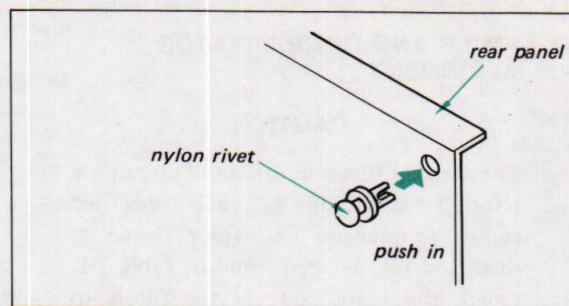
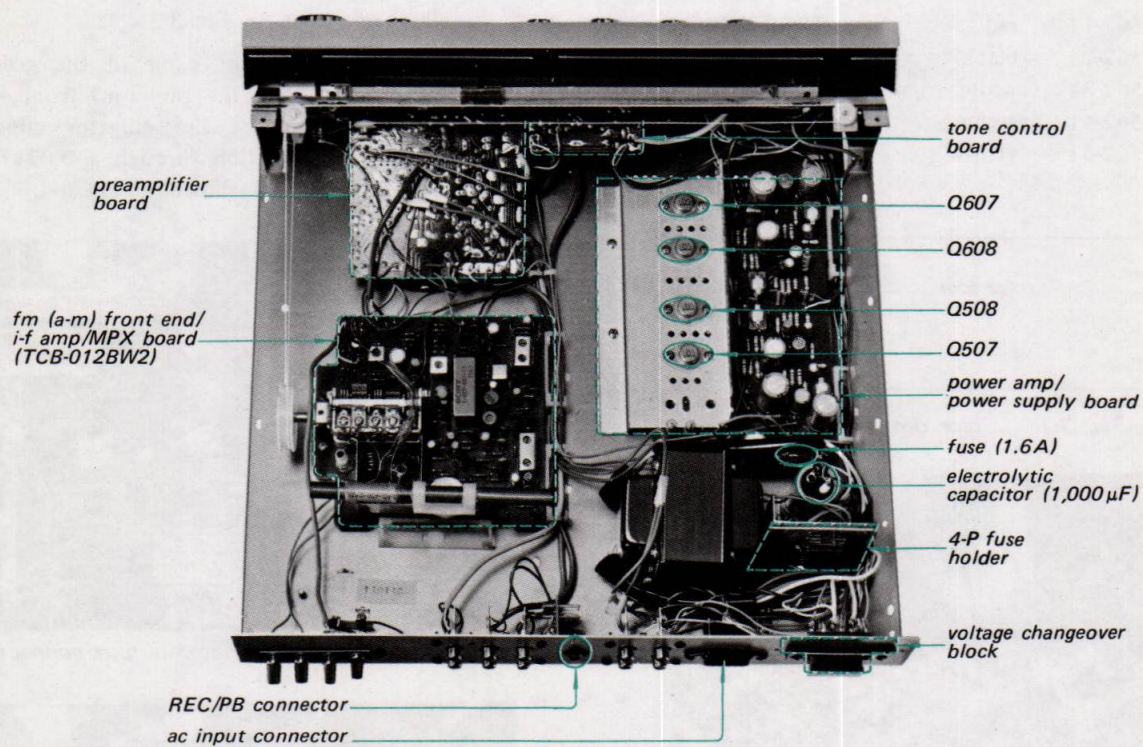


Fig. 2-21. Nylon rivet installation

2-13. CHASSIS LAYOUT



SECTION 3

ALIGNMENT AND ADJUSTMENT PROCEDURES

3-1. FM I-F AND DISCRIMINATOR ALIGNMENT

CAUTION

The ceramic filters in the fm i-f circuit are selected according to their specified center frequencies and color coded as shown in Fig. 3-1 and listed in Table 3-1. Check the color code of the filters to identify the same center frequency when replacing any of these filters.

TABLE 3-1.
FM I-F CERAMIC FILTERS

Part No.	Color	Specified Center Freq.
1-403-562-11	red	10.70 MHz
1-403-562-21	black	10.66 MHz
1-403-562-31	white	10.74 MHz
1-403-562-41	green	10.62 MHz
1-403-562-51	yellow	10.78 MHz

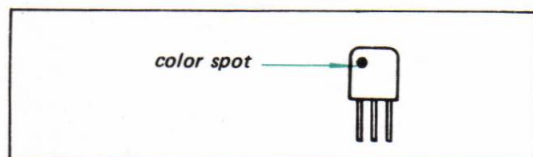


Fig. 3-1. Color dot on ceramic filter

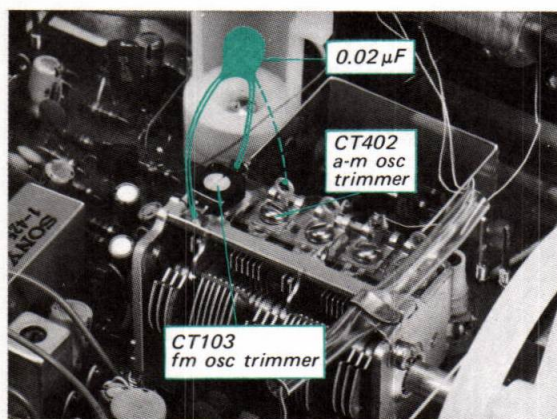


Fig. 3-2. Interruption of fm or a-m local oscillator operation

Note: Local oscillator should be killed when performing this alignment. To stop the local oscillator's operation, shunt the oscillator capacitor with a 0.02 μF capacitor. See Fig. 3-2.

Signal Generator Alignment

Test Equipment Required

1. Standard signal generator which can generate a 10.7-MHz a-m/fm signal.
2. Oscilloscope
Vertical sensitivity 100 mV/cm minimum
3. Alignment tools

Preparation

1. Connect the input cable of the oscilloscope with alligator clips to C217 and ground on the fm (a-m) front end/i-f amp/MPX board, and solder a 0.02 μF capacitor across these clips, as shown in Fig. 3-3.
2. Connect the output cable of the generator across CV102 on the fm (a-m) front end/i-f amp/MPX board. Use alligator clips and make the connection through a 0.02 μF coupling capacitor as shown in Fig. 3-4.

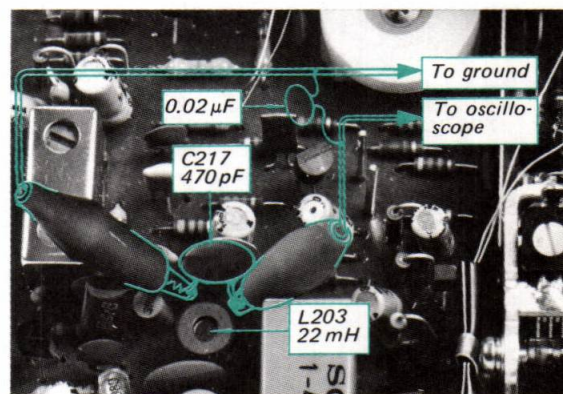


Fig. 3-3. Fm discriminator output connection

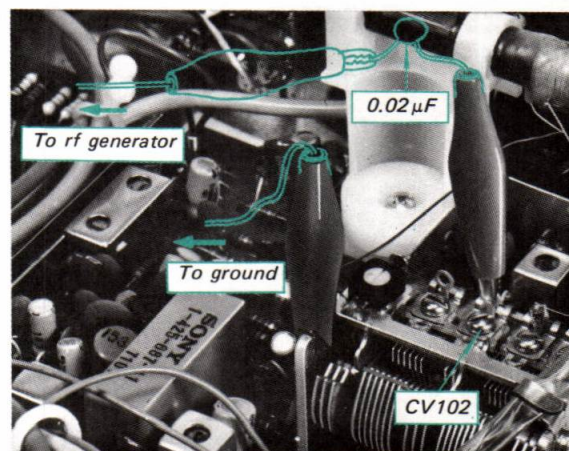


Fig. 3-4. 10.7 MHz signal injection

Procedure

1. With the equipment connected as shown in Fig. 3-5, set the signal-generator's controls as follows:

Frequency Specified frequency
of ceramic filter.
See Table 3-1.
Modulation Fm, 400 Hz, 100%
(75 kHz)
Output level 1,000 μ V (60 dB)

2. Set the receiver's controls as follows:

FUNCTION switch FM
VOLUME control Minimum

3. Adjust the signal generator's frequency slightly to obtain a maximum output, and then change the signal generator's modulation to a-m, 400 Hz 30%.
4. If the discriminator transformer IFT201 is not aligned correctly, 400-Hz ripple will be observed as shown in Fig. 3-6.
5. Turn the secondary side core (green) of discriminator transformer IFT201 (see Fig. 3-12) with an alignment tool to obtain a minimum indication on the oscilloscope as shown in Fig. 3-6.



Fig. 3-6. Fm discriminator alignment output response

Note: Turn the core carefully and slowly because the output appearing on the oscilloscope jumps up and down when turning the core. This might cause difficulty in determining the point of minimum output.
Also, at both extreme positions of the top core, decreased output will be observed. The real null point should be obtained in the middle of the core

thread length, and maximum output occurs at each side of the true null point.

6. Change the signal generator's modulation to fm, 400 Hz 100% (75 kHz).
7. Turn the core of fm IFT101 and primary side core (brown) of discriminator transformer IFT201 (see Fig. 3-12), to obtain the maximum output.

3-2. FM FREQUENCY COVERAGE AND TRACKING ALIGNMENT

Note: Before starting this alignment, the fm i-f and discriminator alignment should be performed.

Test Equipment Required

1. Standard fm signal generator
2. Ac VTVM
3. Alignment tools

Preparation

1. Connect the equipment as shown in Fig. 3-8.
2. Set the receiver's controls as follows:
FUNCTION switch FM
VOLUME control Minimum
3. Short the connection point of R114 and C118 (AFC circuit) to ground as shown in Fig. 3-7.

Generator Alignment

Follow the procedures given in Table 3-2 when performing this alignment with an fm signal generator. Be sure that the dial is mechanically calibrated.

Off-the-Air Alignment

Accurate dial calibration and a frequency-coverage test can also be performed by utilizing off-the-air local fm signals. However, before performing the following procedure, be sure that the dial is mechanically calibrated and AFC circuit is shorted to ground.

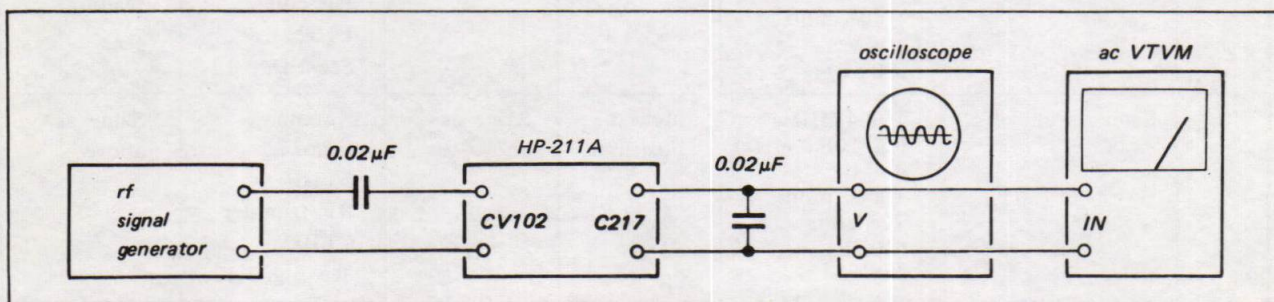


Fig. 3-5. Test setup for fm discriminator alignment by rf signal generator

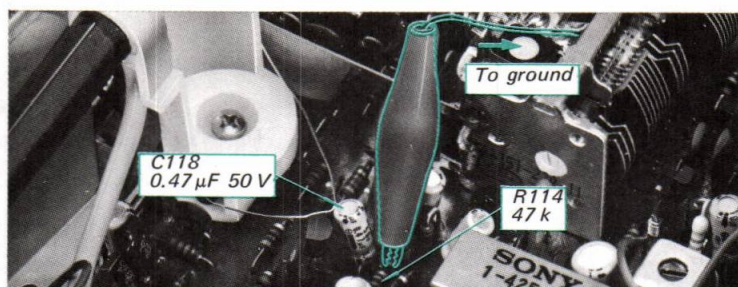


Fig. 3-7. Interruption of AFC circuit

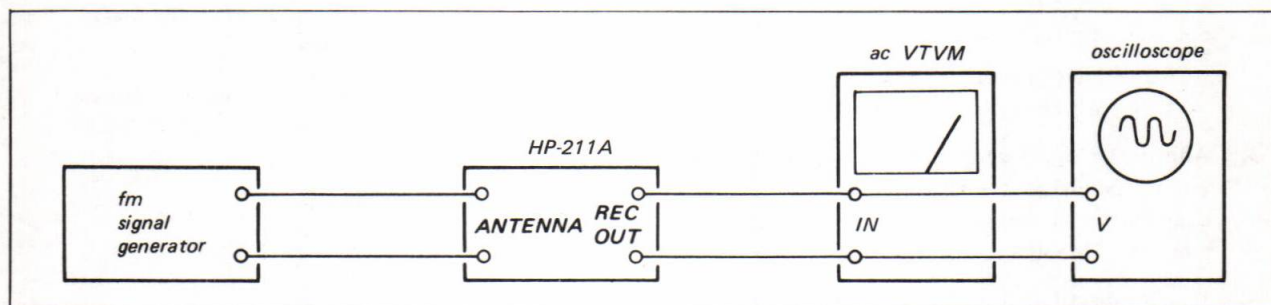


Fig. 3-8. Fm frequency coverage and tracking alignment test setup

TABLE 3-2. FM FREQUENCY COVERAGE AND TRACKING ALIGNMENT

FM FREQUENCY COVERAGE ALIGNMENT						
Step	Coupling Between Receiver and SSG	SSG Frequency and Output Level	Tuner Dial Indication	Ac VTVM Connection	Adjust	Indication
1.	Direct coupling	87.2 MHz (* 87.5 MHz) 400 Hz 100% mod. 10µV (20 dB)	lowest position	REC OUT	OSC coil L103 See Fig. 3-12.	Maximum VTVM reading
2.	Same as above	108.4 MHz (* 108.0 MHz) 400 Hz 100% mod. 10µV (20 dB)	highest position	Same as above	OSC trimmer CT103 See Fig. 3-12.	Same as above
FM TRACKING ALIGNMENT						
1.	Direct coupling	87.2 MHz (* 87.5 MHz) 400 Hz 100% mod. 10µV (20 dB)	lowest position	REC OUT	Antenna coil L101 RF coil L102 See Fig. 3-12.	Maximum VTVM reading
2.	Same as above	108.4 MHz (* 108.0 MHz) 400 Hz 100% mod. 10µV (20 dB)	highest position	Same as above	Antenna trimmer CT101 RF trimmer CT102 See Fig. 3-12.	Same as above

* West Germany Model only

3-3. FM STEREO SEPARATION ADJUSTMENT

Test Equipment Required

1. MPX generator
2. Fm signal generator
3. Audio oscillator
4. Ac VTVM
5. Oscilloscope
6. Alignment tools

Preparation

Before starting the stereo-separation adjustment, check and adjust the phase between the 19-kHz pilot signal and the sub-channel signal in the MPX stereo generator as follows:

1. With the equipment connected as shown in Fig. 3-9, set the MPX and audio signal-generator's control as follows:

MAIN CHANNEL OFF
 SUB CHANNEL ON
 PILOT (19 kHz) OFF
 AUDIO OSCILLATOR
 OUTPUT 400 Hz,
 250 mV

2. Adjust the oscilloscope controls to obtain a visible indication. Be sure the scope's horizontal display switch is set for external input.
3. Turn the pilot-signal (19 kHz) phase control to obtain an in-phase and stable lissajous pattern as shown in Fig. 3-10.

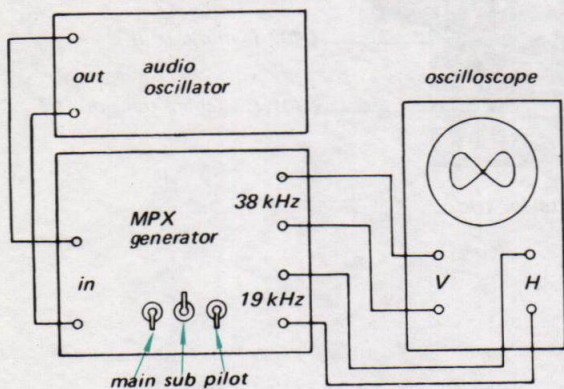


Fig. 3-9. MPX generator preadjustment

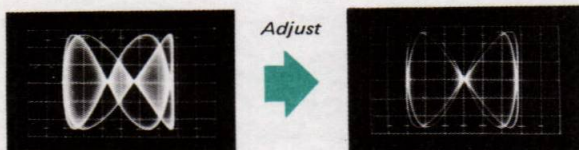


Fig. 3-10. Lissajous pattern

Procedure

1. Connect the equipment as shown in Fig. 3-11. Set the fm signal-generator's control as follows:

Carrier frequency 98 MHz
 Output level 1,000 μ V (60 dB)
 Modulation:
 Main channel (400 Hz) 33.75 kHz (45%)
 Sub channel (38 kHz) 33.75 kHz (45%)
 Pilot (19 kHz) 7.5 kHz (10%)

The above mentioned modulation levels can be set as follows:

- (a) With the equipment connected as shown in Fig. 3-11 set the MPX stereo generator controls as follows.
 MAIN CHANNEL OFF
 SUB CHANNEL OFF
 19 kHz (PILOT) ON
 - (b) Adjust the 19-kHz signal level to obtain a 7.5-kHz deviation on the FM SSG modulation indicator.
 - (c) Reset the MPX stereo-generator's control as follows:
 MAIN CHANNEL ON
 SUB CHANNEL OFF
 19 kHz (PILOT) OFF
 INPUT SELECTOR L-CH
 - (d) Adjust the audio-oscillator output (400 Hz) to obtain a 33.75-kHz deviation on the FM SSG modulation indicator.
 - (e) Set all controls to ON.
2. Precisely tune the set to the SSG's carrier frequency then turn the top core of switching transformer L301 (see Fig. 3-12) to obtain maximum output at the left channel.
 3. Record the output level of the left channel when the MPX generator input selector is set to the left channel.
 4. Switch the input selector to the right channel and read the residual signal level in the left channel.
 5. The output-level to residual-level ratio represents the separation. Turn the top core of switching transformer L301 (see Fig. 3-12) for minimum residual level. Check the right channel for separation.
 6. Readjust switching transformer L301 for minimum difference between left- and right-channel separation.

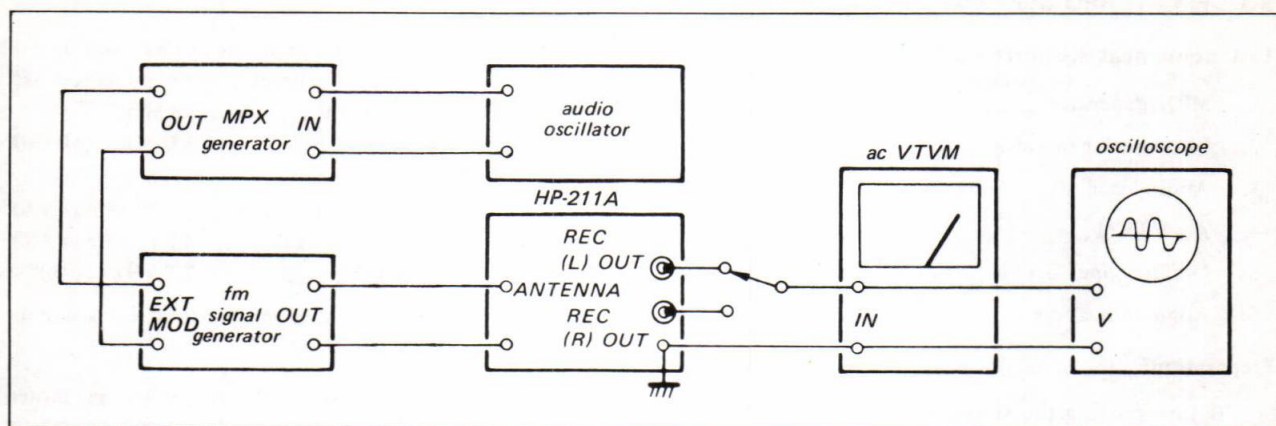


Fig. 3-11. Fm stereo separation adjustment test setup

Adjustment Parts Location

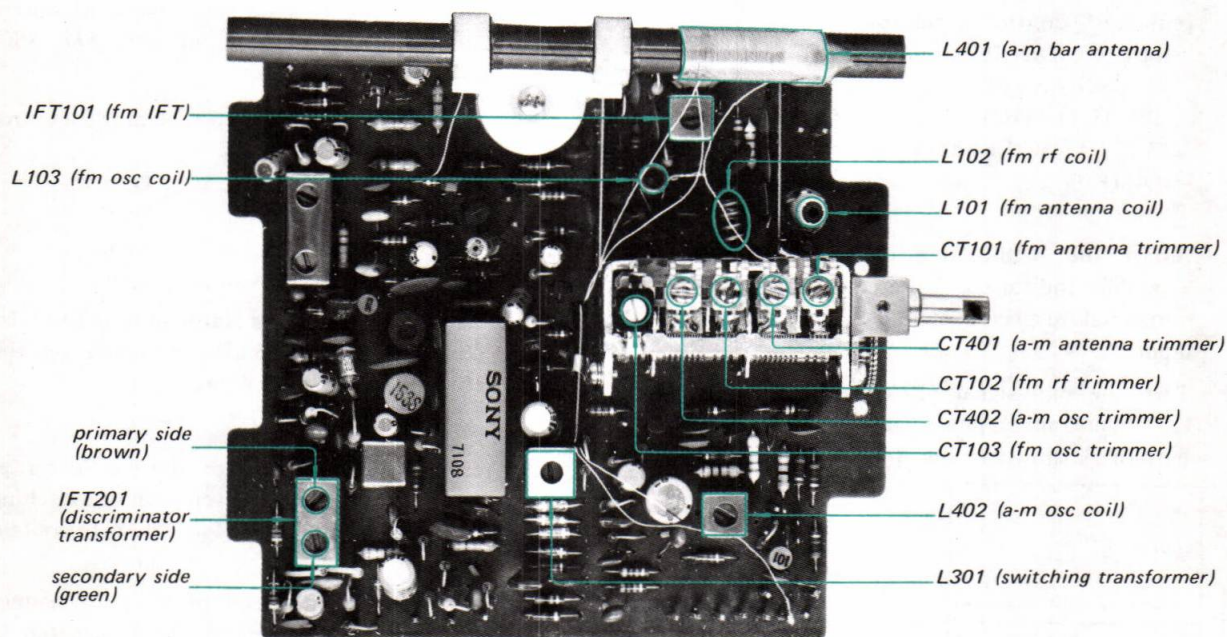


Fig. 3-12. Adjustment parts location

3-4. A-M I-F STRIP ALIGNMENT

Note: The a-m i-f transformers (CFU201 and IFT202) are shipped from the factory with all adjustment set for correct operation. Therefore no adjustment is required in field service.

3-5. A-M FREQUENCY COVERAGE AND TRACKING ALIGNMENT

Preparation

Remove the wooden case as described in Procedure 2-6. Then, set the receiver's Function switch to AM.

Signal Generator Method

Test Equipment Required

1. Signal generator
2. Loop antenna
3. Ac VTVM

Procedure

With the equipment connected as shown in Fig. 3-13, follow the procedures given in Table 3-3 when performing this alignment with an a-m signal generator.

Off-the-Air Signal Method

Accurate dial calibration, and a frequency-coverage and tracking test can also be performed by utilizing off-the-air local a-m signals. However, before performing the following procedure, be sure that the dial is mechanically calibrated.

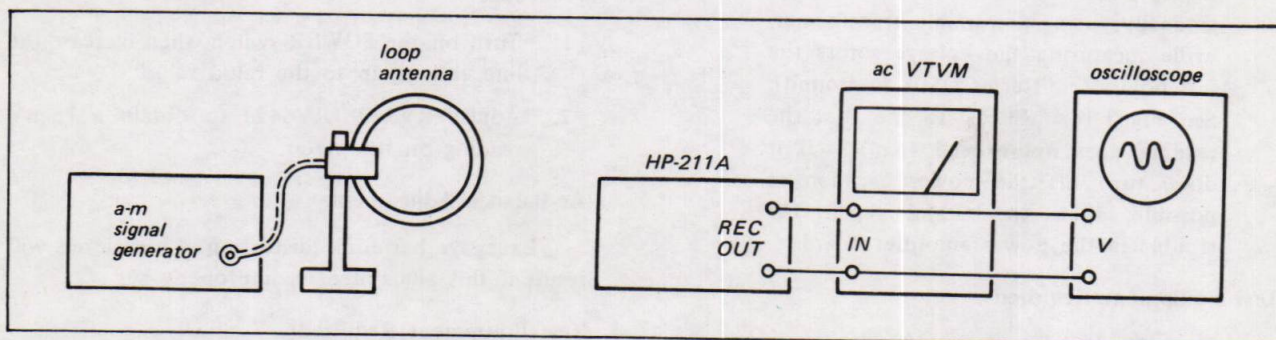


Fig. 3-13. A-m frequency coverage and tracking alignment test setup

TABLE 3-3. A-M FREQUENCY COVERAGE AND TRACKING ALIGNMENT

A-M FREQUENCY COVERAGE ALIGNMENT					
SSG Coupling	SSG Frequency and Output Level	Tuner Dial Indication	Ac VTVM Connection	Adjust	Indication
Loop antenna	520 kHz 400 Hz 30% mod. 1,000 μ V (60 dB)	lowest position	REC OUT	OSC coil L402 See Fig. 3-12.	Maximum VTVM reading
Loop antenna	1,680 kHz Same as above	highest position	Same as above	OSC trimmer CT402 See Fig. 3-12.	Same as above
A-M TRACKING ALIGNMENT					
Loop antenna	600 kHz 400 Hz 30% mod. Output level as low as possible	Tune to the SSG's signal	REC OUT	Position of antenna coil L401 See Fig. 3-12.	Maximum VTVM reading
Loop antenna	1,400 kHz Same as above	Same as above	Same as above	Antenna trimmer CT401 See Fig. 3-12.	Same as above

3-6. POWER-AMPLIFIER ADJUSTMENTS

Note: There are two adjustments in the power amplifier. One is dc bias adjustment and the other is ac balance adjustment. These adjustments should be alternately repeated two or three times after replacing any of the power-amplifier transistors until the best operation is obtained.

Dc-Bias Adjustment

Serious deficiencies in performance, such as thermal runaway of power transistors, will result if this adjustment is improperly set.

CAUTION

To avoid accidental power transistor damage, increase the ac line voltage gradually, using a variable transformer, while measuring the voltage across the test points (emitter of Q508 to ground). See Fig. 3-14. Check to see that the reading does not exceed 15 mV. If it does, turn off the power as soon as possible, then check and repair the trouble in the power amplifier board.

Test Equipment Required

1. Dc millivoltmeter
2. Variable transformer
3. Screwdriver with 3 mm ($\frac{1}{8}$ ") blade

Preparation

1. Remove the record player as described in Procedure 2-4.
2. Connect the dc millivoltmeter across the test points as shown in Fig. 3-14.
3. Set the adjustable resistors (Fig. 3-14) on the power-amplifier board as follows:
RV542 (L-CH) (dc bias) fully counter-clockwise.
RV642 (R-CH) (dc bias) fully counter-clockwise
RV541, RV641 mid-position (ac balance)
4. Set the variable transformer for minimum output.

Procedure

1. Turn on the POWER switch, then increase the line voltage up to the rated value.
2. Adjust RV542 (RV642) to obtain a 15 mV reading on the meter.

Ac-Balance Adjustment

Excessive harmonic distortion at high levels will result if this adjustment is improperly set.

Test Equipment Required

1. Audio oscillator
2. Attenuator

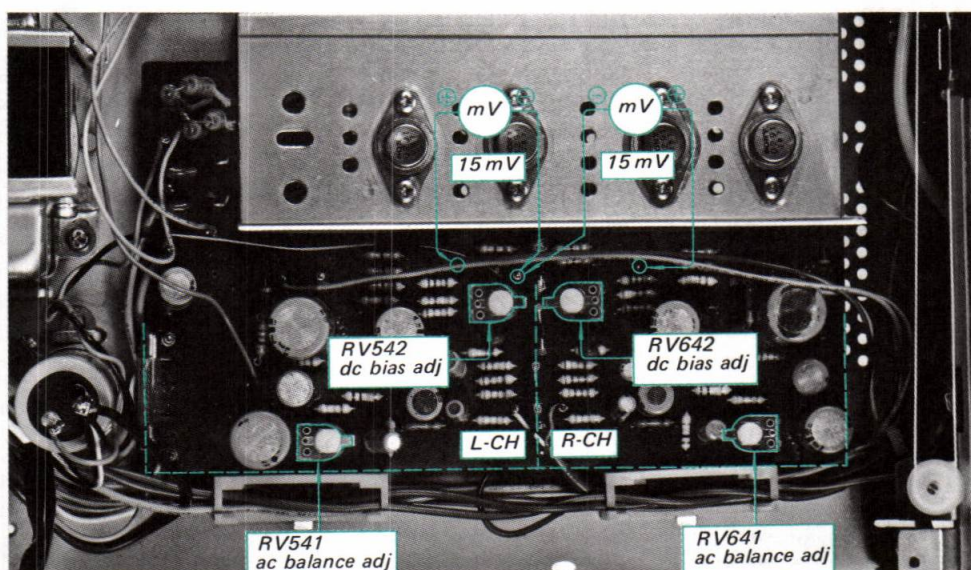


Fig. 3-14. Dc millivoltmeter connection and parts location

3. Oscilloscope
4. Resistor, 600Ω $\frac{1}{4}$ W
5. Dummy load, 8Ω 15 W
6. Screwdriver with 3 mm ($\frac{1}{8}$ ") blade
7. Connecting Cord

Preparation

Set the receiver's controls as follows:

MONITOR switchTAPE
VOLUME controlMinimum
TONE controlmid position

Procedure

1. With the equipment connected as shown in Fig. 3-15, set the POWER switch to the ON position and feed a 1-kHz, 0.775-V (0 dB) signal to the TAPE input jack through the attenuator.
2. While watching the waveform on the oscilloscope, alternately turn the VOLUME control

and adjust RV541 (RV641). Set RV541 (RV641) so that the positive and negative peaks of the output waveform are simultaneously clipped (as shown in Fig. 3-16) when increasing the VOLUME control just beyond the point that causes distortion.

3. Repeat the dc bias and ac balance adjustments two or three times.
4. After completing the adjustment, apply a drop of lock paint to RV541 (RV641) and RV542 (RV642).

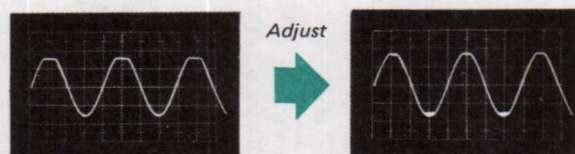


Fig. 3-16. Output waveform of ac balance adjustment

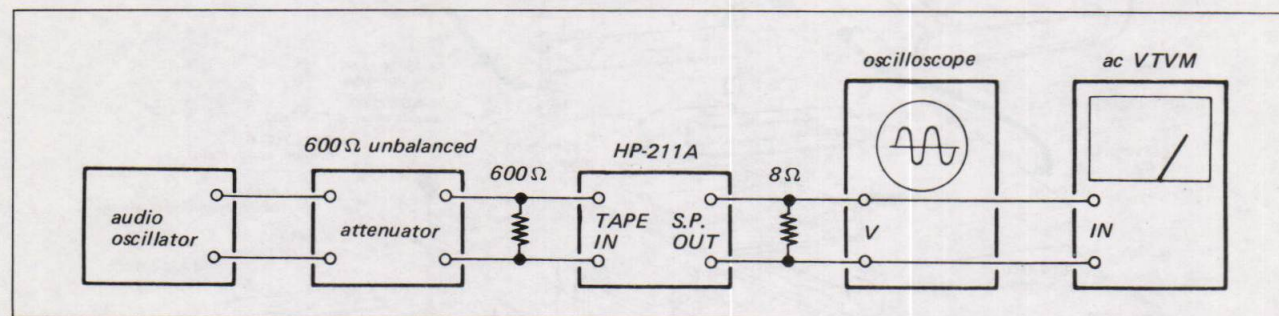
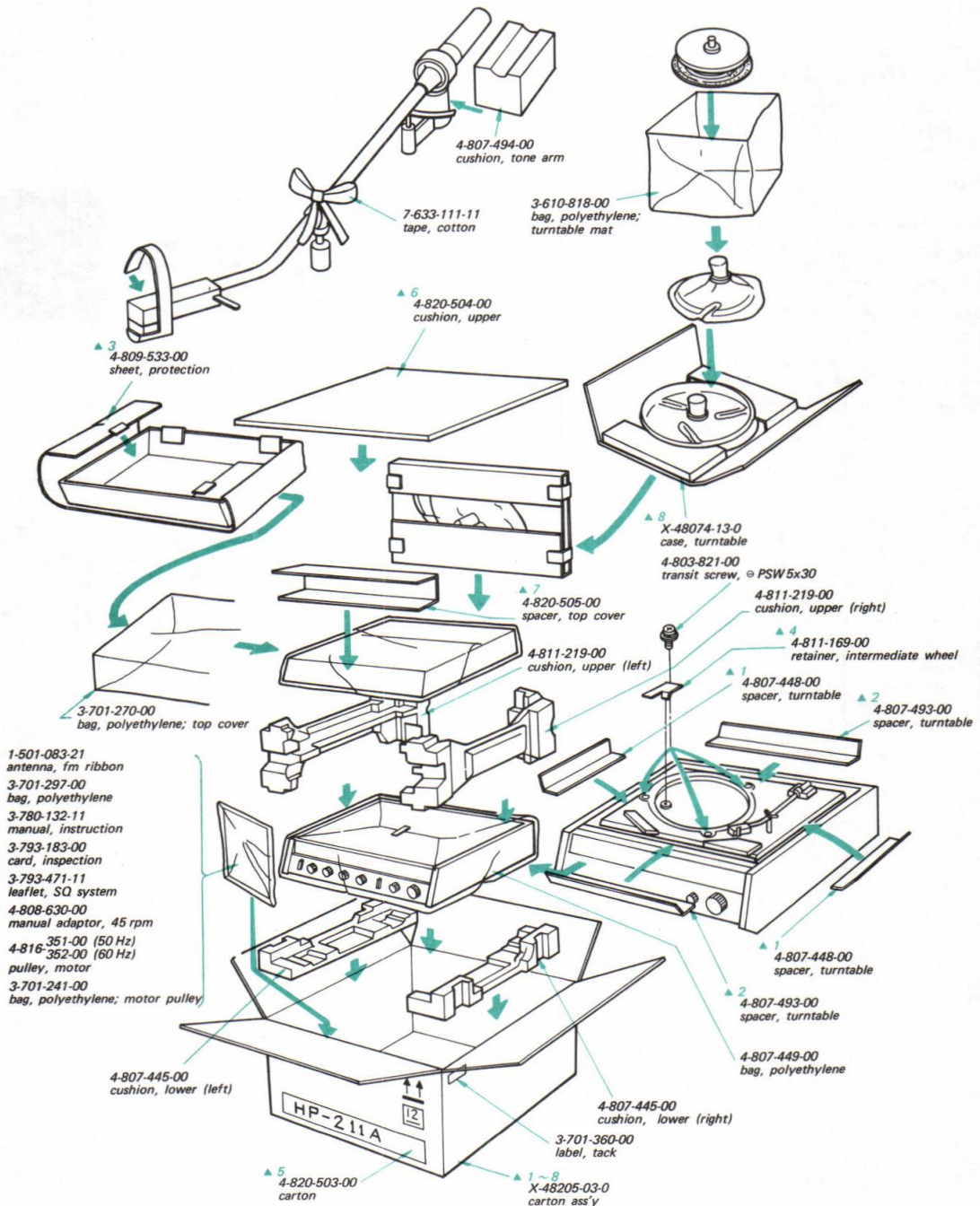


Fig. 3-15. Ac balance adjustment test setup

SECTION 4 REPACKING

The HP-211A's original shipping carton and packing materials are the ideal containers for shipping the unit. However to secure the maximum

protection, the HP-211A must be repacked in these materials precisely as before. The proper repacking procedures are shown in Fig. 4-1.



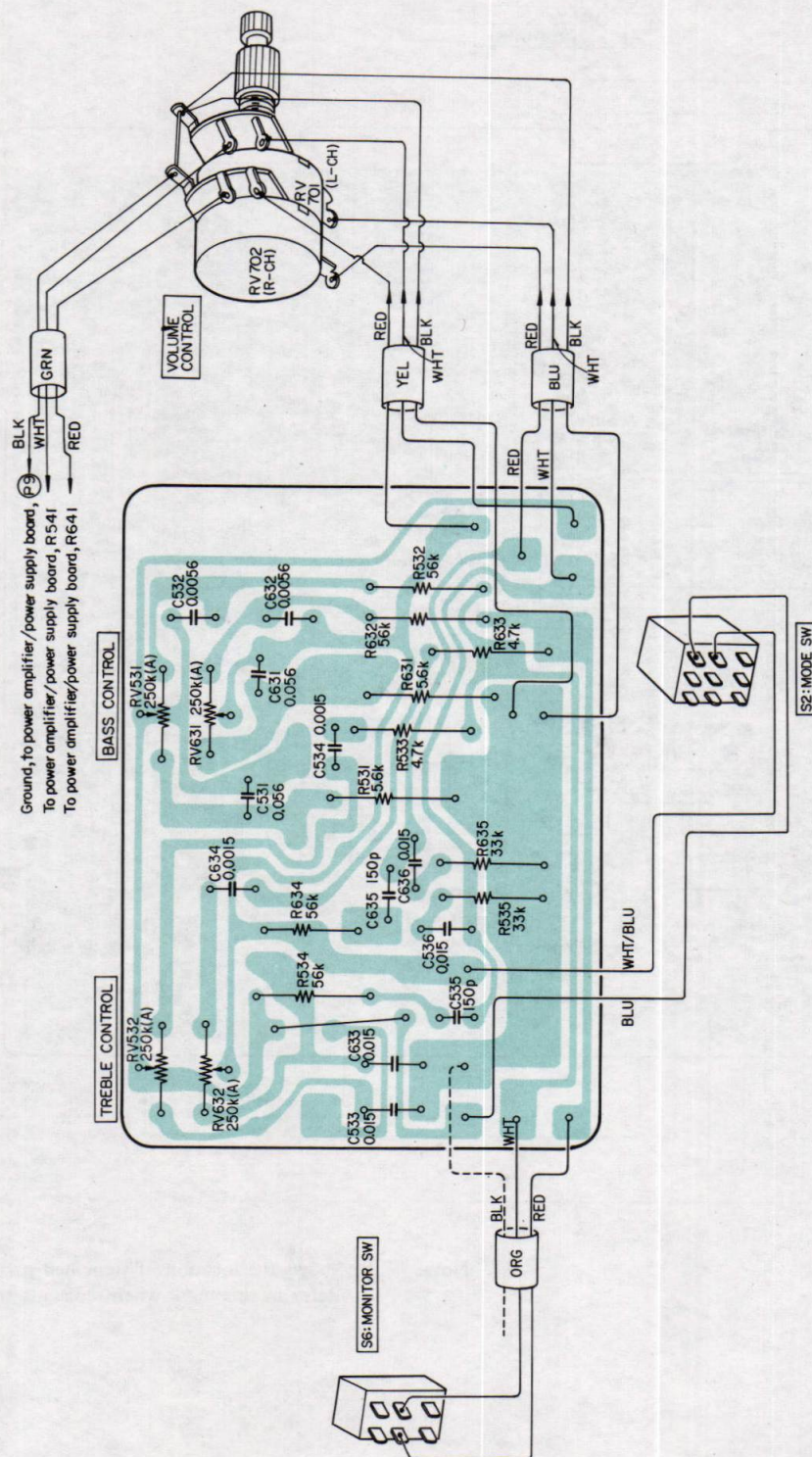
Note: ▲ 1 ~ 8 Carton ass'y (X-48205-03-0) includes all the parts marked ▲.

Fig. 4-1.

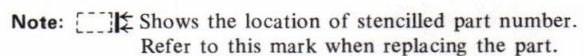
SECTION 5 DIAGRAMS

5-1. MOUNTING DIAGRAM – Tone Control Board –

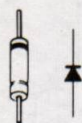
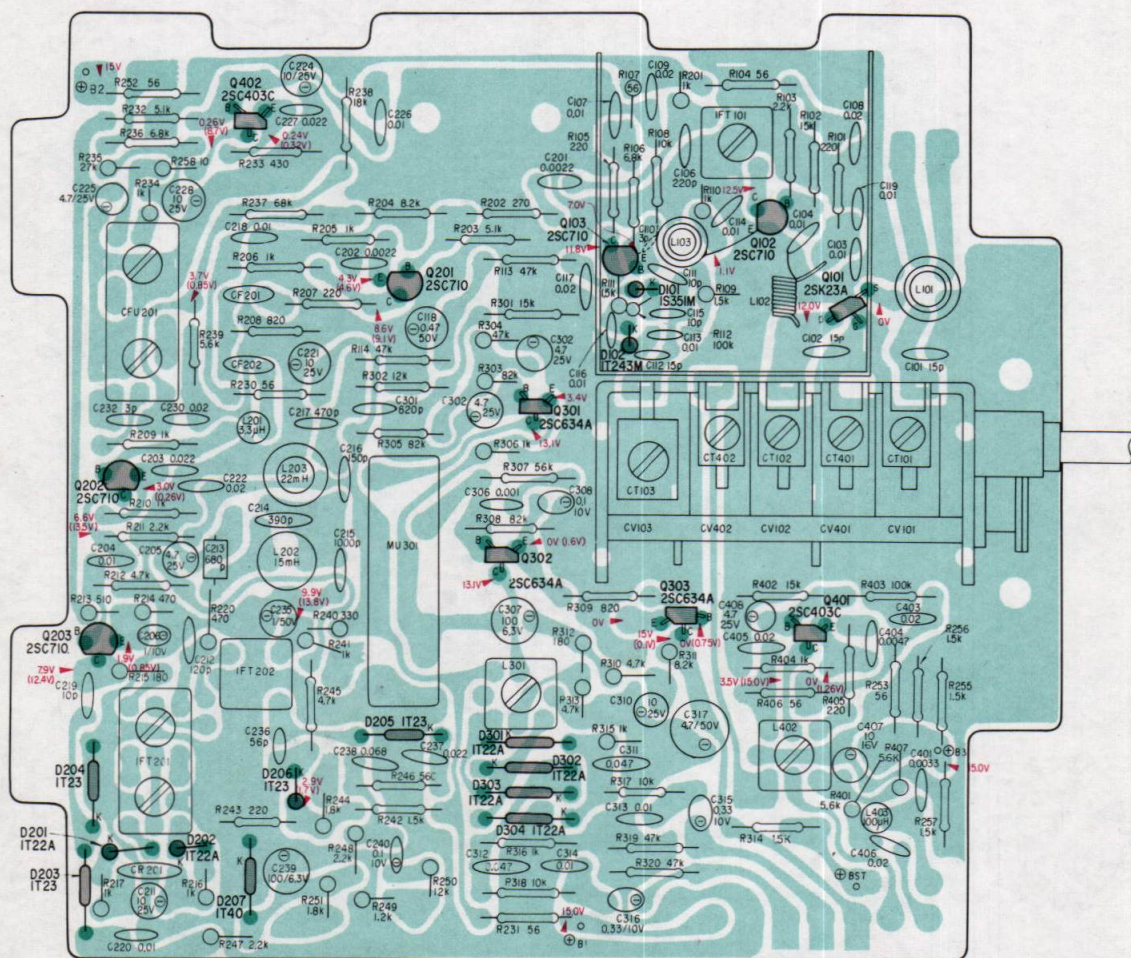
– Conductor Side –



— Conductor Side —



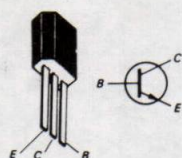
— Component Side —



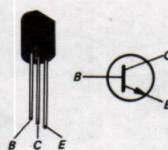
1T23
1T22A
1S351M
1T40



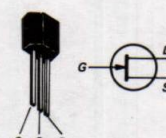
1T243M



2SC403C
2SC634A

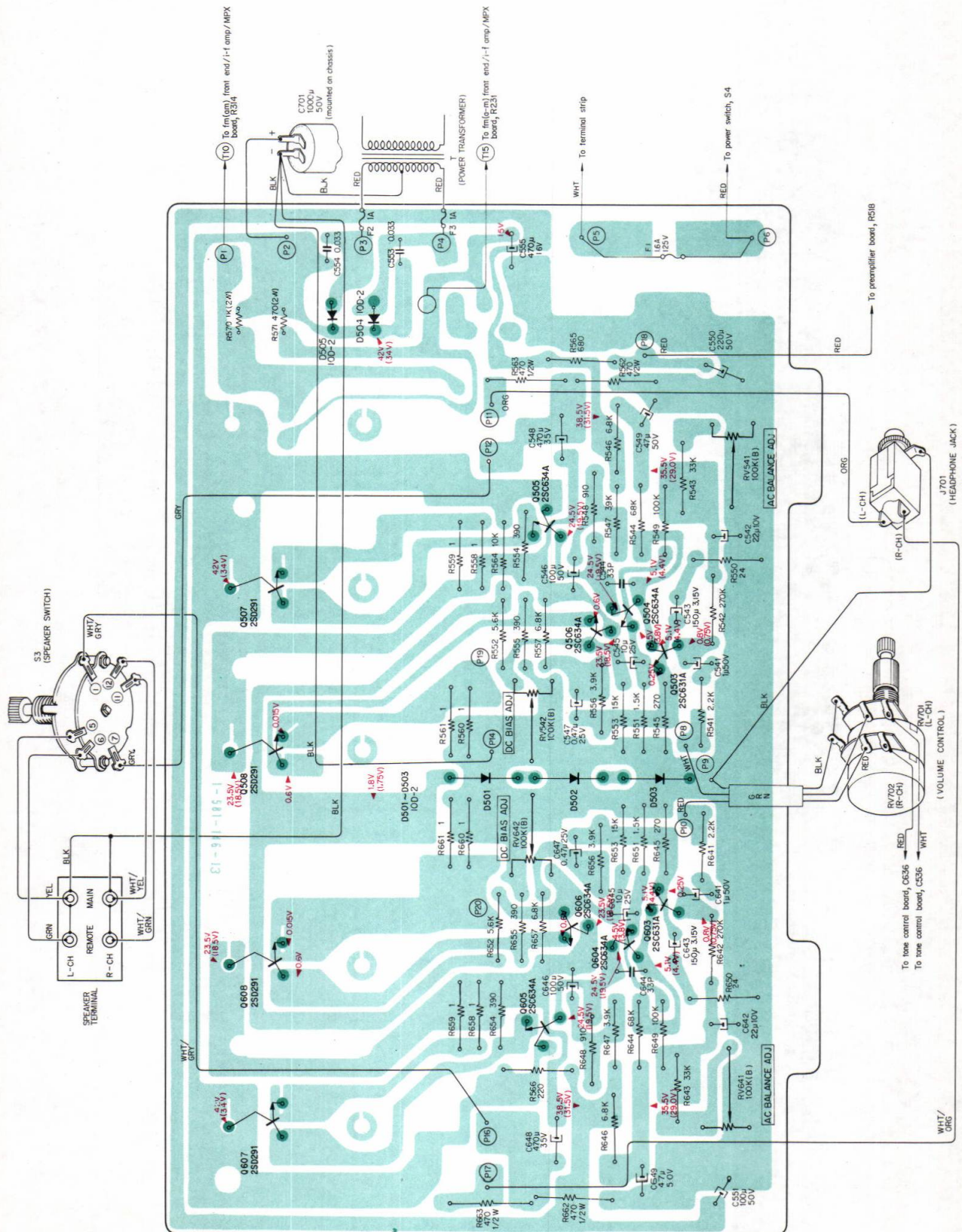


2SC710

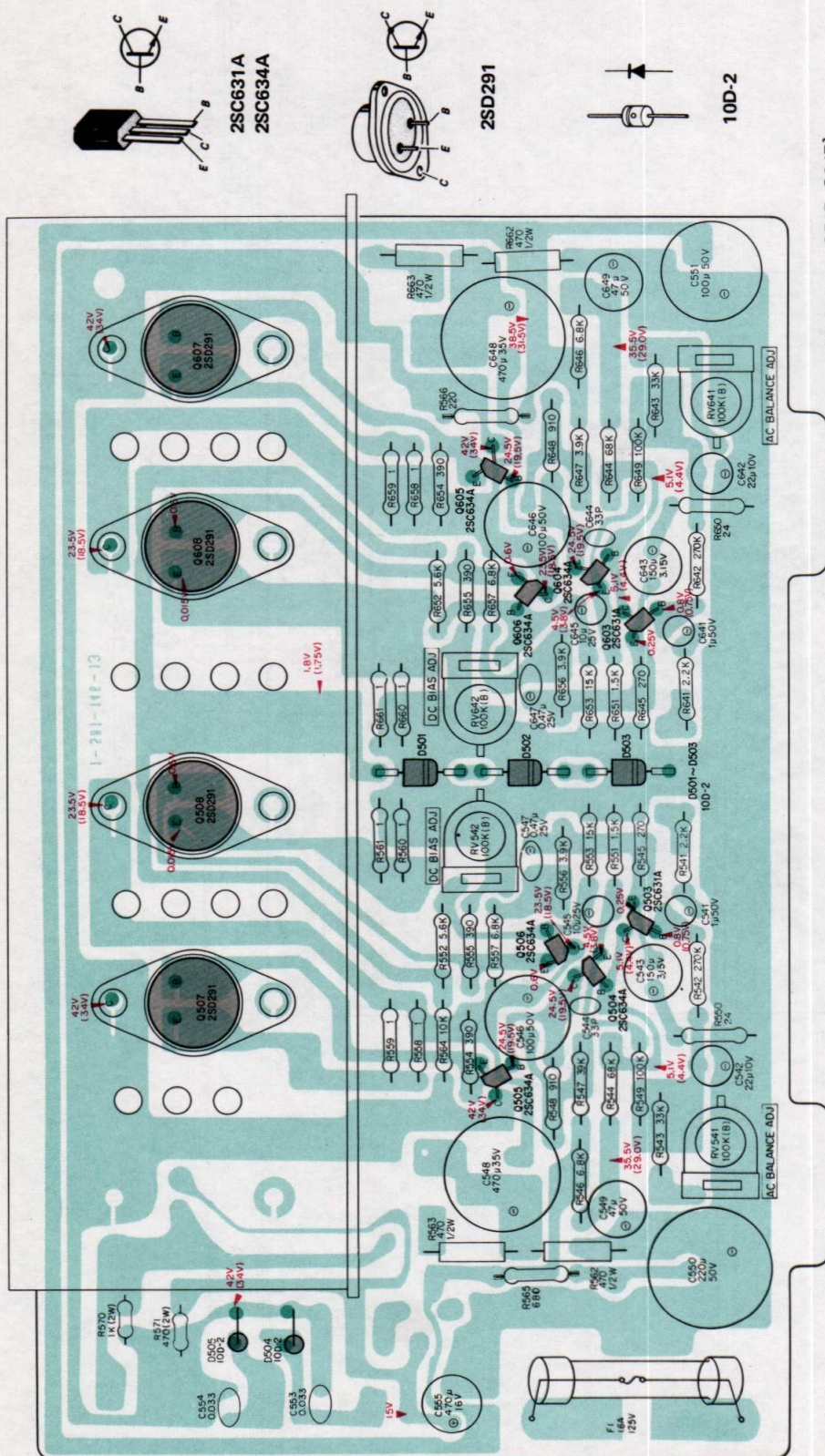


2SK23A

— Conductor Side —

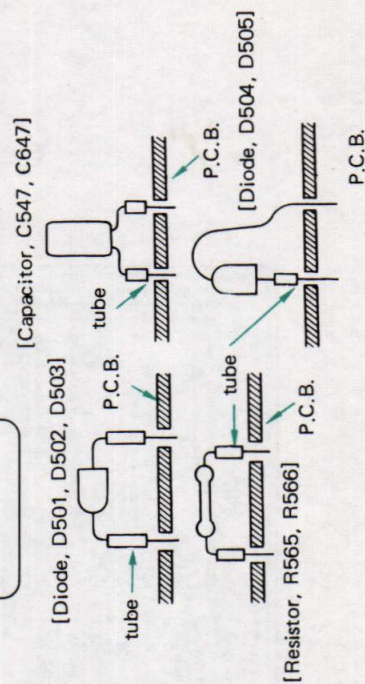


— *Component Side* —

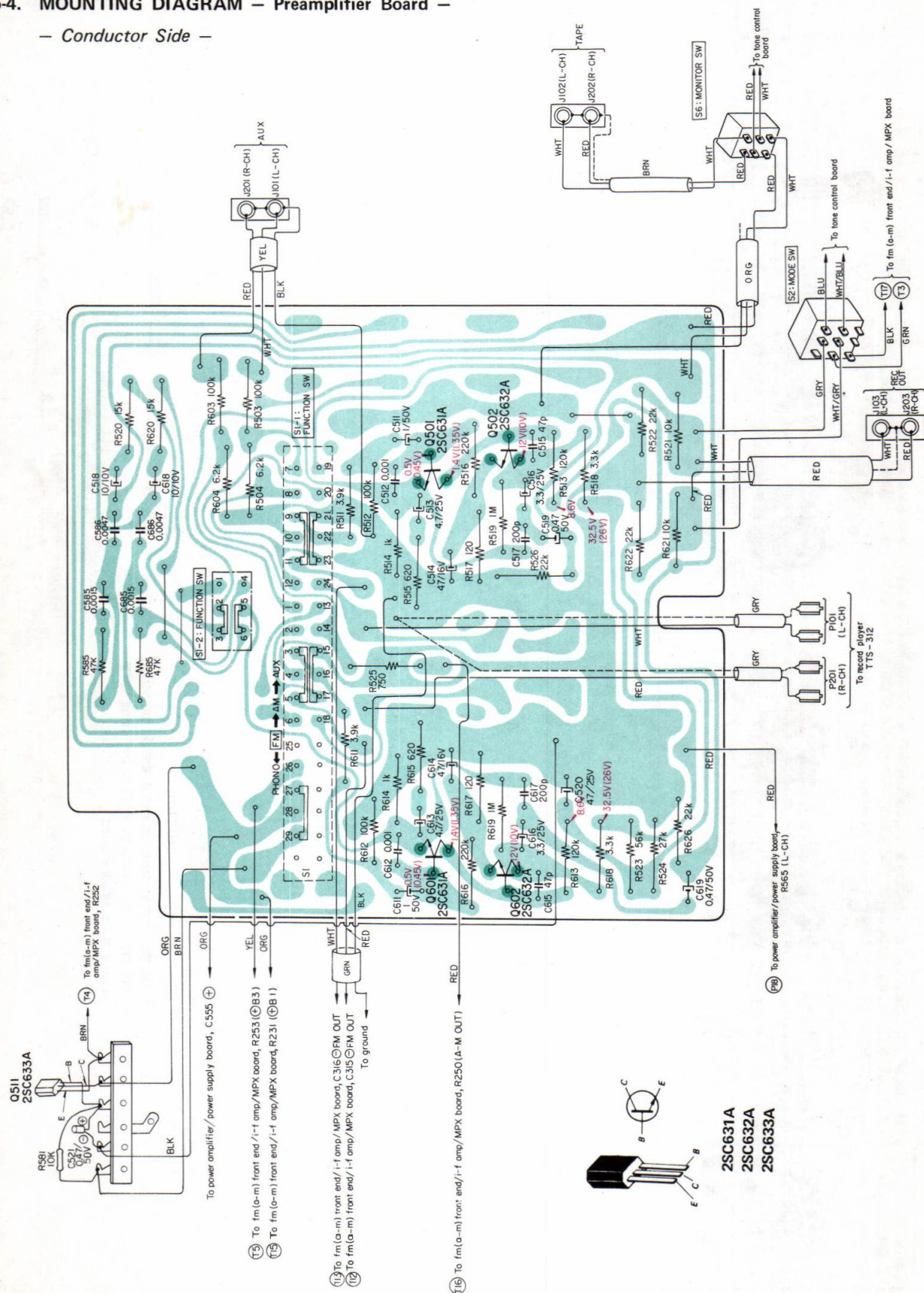


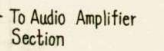
CAUTION

All the components as listed should be stand off from the surface of PCB by using insulating tube as illustrated.



— Conductor Side —





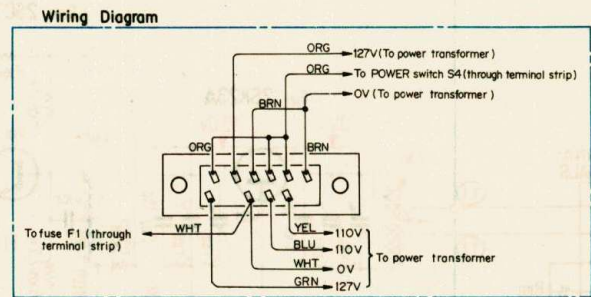
Note:

All voltages represent an average value and should hold within $\pm 10\%$.

Voltage in () are measured in a-m mode.

[] : STEREO Operation

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The diagram, titled "ROTARY SWITCH INDEX", illustrates the wiring for a 12-position rotary switch. It includes two top-down views of the switch and a side view of the shaft.

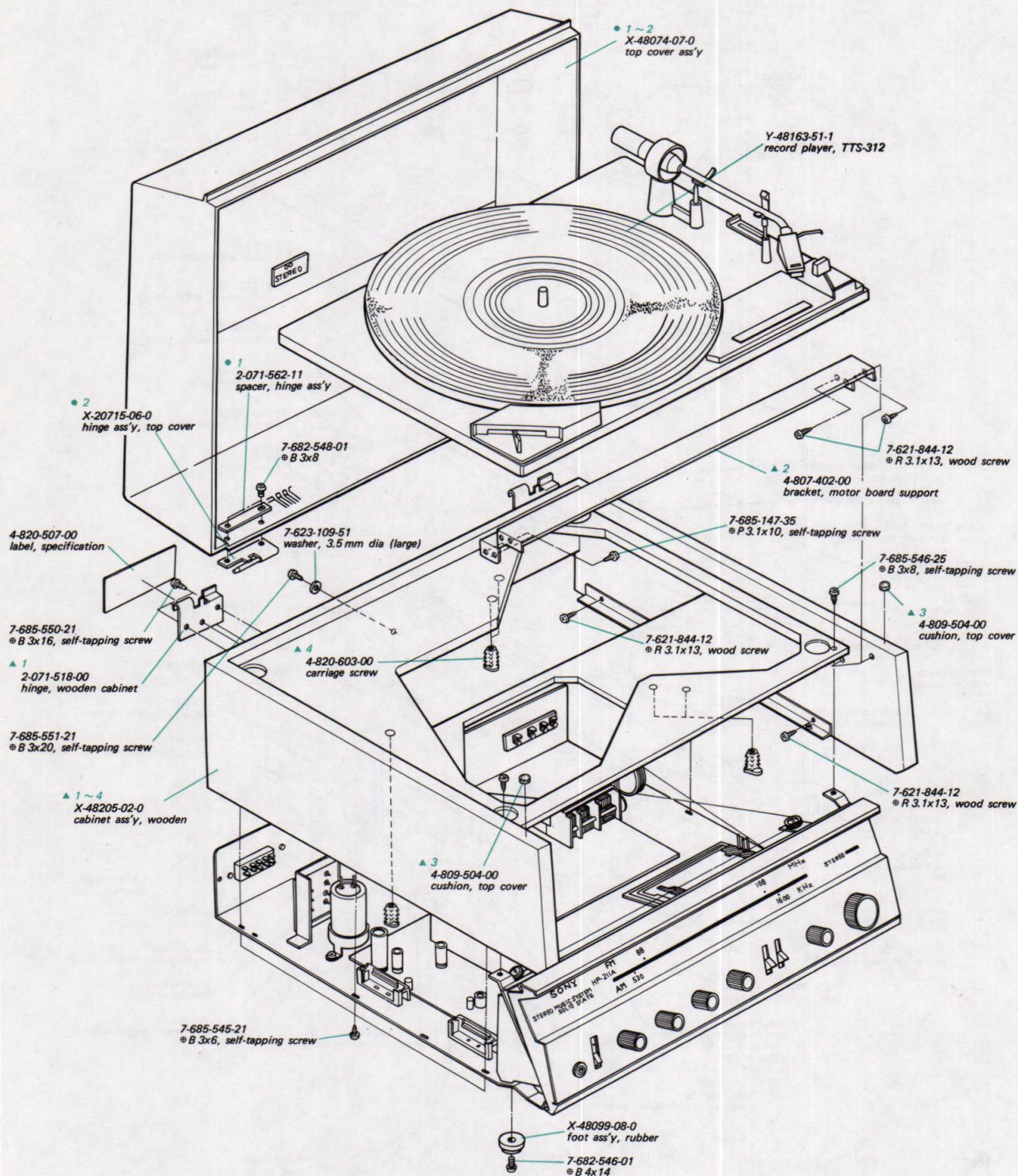
- Left View:** Shows a 12-position rotary switch with positions numbered 1 through 12 clockwise starting from the top right. The internal wiring is shown as a central hub with 12 segments, each connected to an external terminal. The wiring pattern is as follows:
 - Position 1: Connected to terminal 1
 - Position 2: Connected to terminal 2
 - Position 3: Connected to terminal 3
 - Position 4: Connected to terminal 4
 - Position 5: Connected to terminal 5
 - Position 6: Connected to terminal 6
 - Position 7: Connected to terminal 7
 - Position 8: Connected to terminal 8
 - Position 9: Connected to terminal 9
 - Position 10: Connected to terminal 10
 - Position 11: Connected to terminal 11
 - Position 12: Connected to terminal 12
- Right View:** Shows the same 12-position rotary switch, but with a different wiring pattern. The wiring is as follows:
 - Position 1: Connected to terminal 1
 - Position 2: Connected to terminal 2
 - Position 3: Connected to terminal 3
 - Position 4: Connected to terminal 4
 - Position 5: Connected to terminal 5
 - Position 6: Connected to terminal 6
 - Position 7: Connected to terminal 7
 - Position 8: Connected to terminal 8
 - Position 9: Connected to terminal 9
 - Position 10: Connected to terminal 10
 - Position 11: Connected to terminal 11
 - Position 12: Connected to terminal 12
- Side View:** Shows the shaft of the rotary switch with three positions labeled 1, 2, and 3. The shaft is labeled "F (front)" and "R (rear)".

SONY®
HP-211A

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SECTION 6 EXPLODED VIEWS

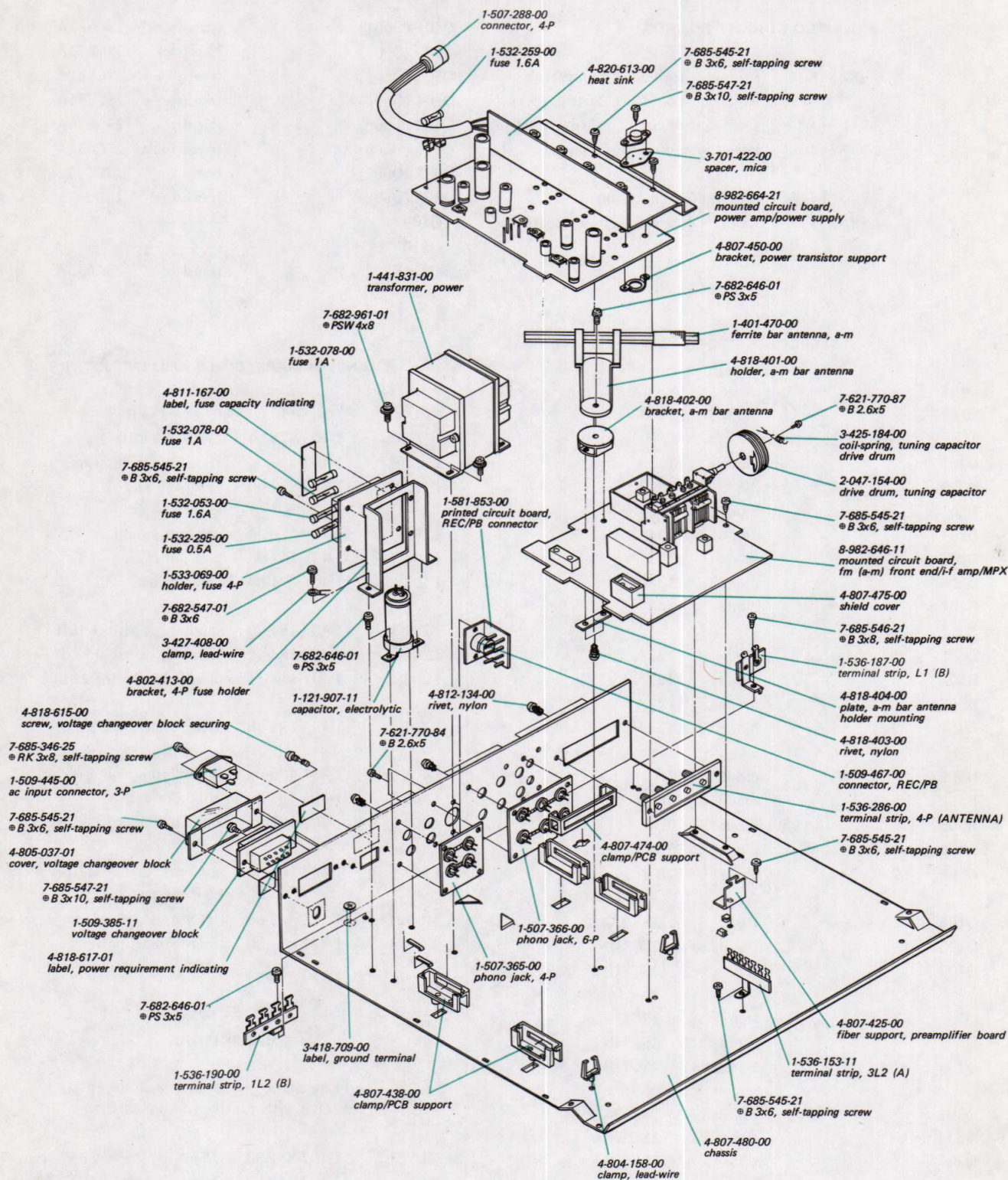
(1)



Note: • 1~2 Top cover ass'y (X-48074-07-0) includes all the parts marked •.
 ▲ 1~4 Cabinet ass'y (X-48205-02-0) includes all the parts marked ▲.

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(3)



SECTION 7

ELECTRICAL PARTS LIST

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
MOUNTED CIRCUIT BOARDS			Q501 (Q601)	transistor	2SC631A
8-982-646-11	fm (a-m) front-end/i-f amp/MPX	circuit board (TCB-012BW2)	Q502 (Q602)	transistor	2SC632A
8-982-664-10	tone control circuit board		Q503 (Q603)	transistor	2SC631A
8-982-664-21	power amplifier/power supply	circuit board	Q504 (Q604)	transistor	2SC634A
8-982-664-89	preamplifier circuit board		Q505 (Q605)	transistor	2SC634A
1-581-853-00	REC/PB connector circuit board		Q506 (Q606)	transistor	2SC634A
			Q507 (Q607)	transistor	2SD291
			Q508 (Q608)	transistor	2SD291
			Q509	-----	
			Q510	-----	
			Q511	transistor	2SC633A

SEMICONDUCTORS

D101	diode	1S351M
D102	diode	1T243M
D201	diode	1T22A
D202	diode	1T22A
D203	diode	1T23
D204	diode	1T23
D205	diode	1T23
D206	diode	1T23
D207	diode	1T40
D301	diode	1T22A
D302	diode	1T22A
D303	diode	1T22A
D304	diode	1T22A
D501	diode	10D-2
D502	diode	10D-2
D503	diode	10D-2
D504	diode	10D-2
D505	diode	10D-2
Q101	FET	2SK23A
Q102	transistor	2SC710
Q103	transistor	2SC710
Q201	transistor	2SC710
Q202	transistor	2SC710
Q203	transistor	2SC710
Q301	transistor	2SC634A
Q302	transistor	2SC634A
Q303	transistor	2SC634A
Q401	transistor	2SC403C
Q402	transistor	2SC403C

TRANSFORMERS, COILS AND INDUCTORS

CFU201	1-403-150-00	CFU, 455 kHz
IFT101	1-403-821-00	IFT, 10.7 MHz
IFT201	1-403-822-00	transformer, discriminator
IFT202	1-403-820-00	IFT, 455 kHz
L101	1-401-471-00	coil, fm antenna
L102	1-425-547-00	coil, fm rf
L103	1-405-434-00	coil, fm osc.
L201	1-407-184-00	inductor, micro 3.3 μ H
L202	1-407-585-12	inductor, micro 15 mH
L203	1-407-418-11	shielded inductor 22 mH
L301	1-425-688-00	transformer, switching
L401	1-401-470-00	bar antenna, a-m
L402	1-405-486-00	coil, a-m osc.
L403	1-407-169-00	inductor, micro 100 μ H
L911	1-407-169-00	inductor, micro 100 μ H
MU301	1-425-687-00	MPX unit
T	1-441-831-00	transformer, power

CAPACITORS

All capacitance values are in μ F except as indicated with p, which means μ μ F.

C101	1-102-951-00	15p	$\pm 5\%$	50 V	ceramic
C102	1-102-951-00	15p	$\pm 5\%$	50 V	ceramic
C103	1-101-118-00	0.01	$\pm 100\%$	50 V	ceramic
C104	1-101-923-00	0.01	$\pm 80\%$	25 V	ceramic

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>				<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>			
C105		-----				C236	1-101-884-00	56 p	±5%	50 V	ceramic
C106	1-102-978-00	220 p	±5%	50 V	ceramic	C237	1-105-677-12	0.022	±10%	50 V	mylar
C107	1-101-923-00	0.01	± $\frac{80}{20}$ %	25 V	ceramic	C238	1-105-683-12	0.068	±10%	50 V	mylar
C108	1-101-924-00	0.02	± $\frac{80}{20}$ %	25 V	ceramic	C239	1-121-413-00	100	± $\frac{100}{10}$ %	6.3 V	electrolytic
C109	1-101-924-00	0.02	± $\frac{80}{20}$ %	25 V	ceramic	C240	1-127-019-00	0.1	±20%	10 V	solid, aluminum
C110	1-102-862-00	3 p	±0.25 p	50 V	ceramic	C241	1-121-398-00	10	± $\frac{100}{10}$ %	25 V	electrolytic
C111	1-102-947-00	10 p	±5%	50 V	ceramic	C301	1-102-117-00	820 p	±10%	50 V	ceramic
C112	1-101-971-00	15 p	±5%	50 V	ceramic	C302	1-121-395-00	4.7	± $\frac{150}{10}$ %	25 V	electrolytic
C113	1-101-118-00	0.01	± $\frac{100}{0}$ %	50 V	ceramic	C303	1-121-395-00	4.7	± $\frac{150}{10}$ %	25 V	electrolytic
C114	1-101-923-00	0.01	± $\frac{80}{20}$ %	25 V	ceramic	C304		-----			
C115	1-102-947-00	10 p	±5%	50 V	ceramic	C305		-----			
C116	1-101-923-00	0.01	± $\frac{80}{20}$ %	25 V	ceramic	C306	1-105-661-12	0.001	±10%	50 V	mylar
C117	1-101-924-00	0.02	± $\frac{80}{20}$ %	25 V	ceramic	C307	1-121-413-00	100	± $\frac{100}{10}$ %	6.3 V	electrolytic
C118	1-121-434-00	0.47	± $\frac{75}{10}$ %	50 V	electrolytic	C308	1-127-019-00	0.1	±20%	10 V	solid, aluminum
C119	1-101-118-00	0.01	± $\frac{100}{10}$ %	50 V	ceramic	C309		-----			
C201	1-101-919-00	0.0022	± $\frac{80}{20}$ %	25 V	ceramic	C310	1-121-398-00	10	± $\frac{100}{10}$ %	25 V	electrolytic
C202	1-105-665-12	0.0022	±10%	50 V	mylar	C311	1-105-681-12	0.047	±10%	50 V	mylar
C203	1-105-677-12	0.022	±10%	50 V	mylar	C312	1-105-681-12	0.047	±10%	50 V	mylar
C204	1-101-923-00	0.01	± $\frac{80}{20}$ %	25 V	ceramic	C313	1-105-673-12	0.01	±10%	50 V	mylar
C205	1-121-395-00	4.7	± $\frac{150}{10}$ %	25 V	electrolytic	C314	1-105-673-12	0.01	±10%	50 V	mylar
C206	1-127-023-00	1	±20%	10 V	solid, aluminum	C315	1-127-021-00	0.33	±20%	10 V	solid, aluminum
C207		-----				C316	1-127-021-00	0.33	±20%	10 V	solid, aluminum
C208	1-101-923-00	0.01	± $\frac{80}{20}$ %	25 V	ceramic	C317	1-121-411-00	4.7	± $\frac{50}{10}$ %	50 V	electrolytic
C209		-----				C401	1-105-667-12	0.0033	±10%	50 V	mylar
C210		-----				C402	1-101-923-00	0.01	± $\frac{80}{20}$ %	25 V	ceramic
C211	1-121-398-00	10	± $\frac{100}{10}$ %	25 V	electrolytic	C403	1-101-924-00	0.02	± $\frac{80}{20}$ %	25 V	ceramic
C212	1-101-340-00	120 p	±10%	50 V	ceramic	C404	1-105-669-12	0.0047	±10%	50 V	mylar
C213	1-102-116-00	680 p	±10%	50 V	ceramic	C405	1-101-924-00	0.02	± $\frac{80}{20}$ %	25 V	ceramic
C214	1-102-822-00	390 p	±5%	50 V	ceramic	C406	1-101-924-00	0.02	± $\frac{80}{20}$ %	25 V	ceramic
C215	1-102-074-00	1,000 p	±10%	50 V	ceramic	C407	1-121-651-00	10	± $\frac{50}{10}$ %	16 V	electrolytic
C216	1-101-361-00	150 p	±5%	50 V	ceramic	C408	1-121-395-00	4.7	± $\frac{150}{10}$ %	25 V	electrolytic
C217	1-102-824-00	470 p	±5%	50 V	ceramic	C511 (C611)	1-121-391-00	1	± $\frac{150}{10}$ %	50 V	electrolytic
C218	1-101-923-00	0.01	± $\frac{80}{20}$ %	25 V	ceramic	C512 (C612)	1-105-661-12	0.001	±10%	50 V	mylar
C219	1-102-947-00	10 p	±5%	50 V	ceramic	C513 (C613)	1-121-395-00	4.7	± $\frac{150}{10}$ %	25 V	electrolytic
C220	1-101-923-00	0.01	± $\frac{80}{20}$ %	25 V	ceramic	C514 (C614)	1-121-409-00	47	± $\frac{100}{10}$ %	16 V	electrolytic
C221	1-121-398-00	10	± $\frac{100}{10}$ %	25 V	electrolytic	C515 (C615)	1-101-880-00	47 p	±10%	50 V	ceramic
C222	1-101-924-00	0.02	± $\frac{80}{20}$ %	25 V	ceramic	C516 (C616)	1-121-392-00	3.3	± $\frac{150}{10}$ %	25 V	electrolytic
C223		-----				C517 (C617)	1-102-977-00	200 p	±10%	50 V	ceramic
C224	1-121-398-00	10	± $\frac{100}{10}$ %	25 V	electrolytic	C518 (C618)	1-121-469-00	10	± $\frac{100}{10}$ %	10 V	electrolytic
C225	1-121-395-00	4.7	± $\frac{150}{10}$ %	25 V	electrolytic	C519 (C619)	1-121-726-00	0.47	± $\frac{150}{10}$ %	50 V	electrolytic
C226	1-101-923-00	0.01	± $\frac{80}{20}$ %	25 V	ceramic	C520	1-121-410-00	47	± $\frac{100}{10}$ %	25 V	electrolytic
C227	1-105-677-12	0.022	±10%	50 V	mylar	C521	1-121-951-00	0.47	±20%	50 V	electrolytic
C228	1-121-398-00	10	± $\frac{100}{10}$ %	25 V	electrolytic	C531 (C631)	1-105-682-12	0.056	±10%	50 V	mylar
C229		-----				C532 (C632)	1-105-670-12	0.0056	±10%	50 V	mylar
C230	1-101-924-00	0.02	± $\frac{80}{20}$ %	25 V	ceramic	C533 (C633)	1-105-675-12	0.015	±10%	50 V	mylar
C231		-----									
C232	1-102-940-00	3 p	±5%	50 V	ceramic						
C233		-----									
C234		-----									
C235	1-121-391-00	1	± $\frac{150}{10}$ %	50 V	electrolytic						

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>			<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>		
C534 (C634)	1-105-663-12	0.0015	±10%	50 V mylar	R204	1-202-405-00	8.2 k		
C535 (C635)	1-101-124-00	150 p	±10%	50 V ceramic	R205	1-202-383-00	1 k		
C536 (C636)	1-105-675-12	0.015	±10%	50 V mylar	R206	1-202-383-00	1 k		
C541 (C641)	1-121-391-00	1	± ¹⁵⁰ / ₁₀ %	50 V electrolytic	R207	1-202-367-00	220		
C542 (C642)	1-121-479-00	22	± ¹⁰⁰ / ₁₀ %	16 V electrolytic	R208	1-202-381-00	820		
C543 (C643)	1-121-741-00	150	±20%	3.15 V electrolytic	R209	1-202-383-00	1 k		
C544 (C644)	1-102-969-00	33 p	±10%	50 V ceramic	R210	1-244-673-00	1 k	±5%	¼W carbon
C545 (C645)	1-121-398-00	10	± ¹⁰⁰ / ₁₀ %	25 V electrolytic	R211	1-202-391-00	2.2 k		
C546 (C646)	1-121-417-00	100	± ¹⁰⁰ / ₁₀ %	50 V electrolytic	R212	1-202-399-00	4.7 k		
C547 (C647)	1-127-093-00	0.47	±20%	25 V solid, aluminum	R213	1-202-376-00	510		
C548 (C648)	1-121-361-00	470	± ¹⁰⁰ / ₁₀ %	35 V electrolytic	R214	1-242-665-00	470	±5%	¼W carbon
C549 (C649)	1-121-411-00	47	± ¹⁰⁰ / ₁₀ %	50 V electrolytic	R215	1-202-365-00	180		
C550	1-121-423-00	220	± ¹⁰⁰ / ₁₀ %	50 V electrolytic	R216	1-202-383-00	1 k		
C551	1-121-417-00	100	± ¹⁰⁰ / ₁₀ %	50 V electrolytic	R217	1-202-383-00	1 k		
C552	-----	-----	-----	-----	R218	-----	-----	-----	-----
C553	1-105-879-12	0.033	±20%	100 V mylar	R219	-----	-----	-----	-----
C554	1-105-879-12	0.033	±20%	100 V mylar	R220	1-202-375-00	470		
C555	1-121-426-00	470	± ¹⁰⁰ / ₁₀ %	16 V electrolytic	R230	1-202-343-00	56		
C585 (C685)	1-105-663-12	0.0015	±10%	50 V mylar	R231	1-202-343-00	56		
C586 (C686)	1-105-669-12	0.0047	±10%	50 V mylar	R232	1-202-400-00	5.1 k		
C701	1-121-907-00	1,000	± ¹⁰⁰ / ₁₀ %	50 V electrolytic	R233	1-244-664-00	430	±5%	¼W carbon
CV101, 102	1-151-235-00	capacitor, tuning			R234	1-202-383-00	1 k		
CV103, 401					R235	1-202-417-00	27 k		
CV402					R236	1-202-403-00	6.8 k		
					R237	1-244-717-00	68 k	±5%	¼W carbon
					R238	1-244-703-00	18 k	±5%	¼W carbon
					R239	1-244-691-00	5.6 k	±5%	¼W carbon
					R240	1-202-371-00	330		
					R241	1-202-383-00	1 k		
					R242	1-244-677-00	1.5 k	±5%	¼W carbon
					R243	1-244-657-00	220	±5%	¼W carbon
					R244	1-202-389-00	1.8 k		
					R245	1-202-399-00	4.7 k		
					R246	1-202-377-00	560		
					R247	1-202-391-00	2.2 k		
					R248	1-202-391-00	2.2 k		
					R249	1-242-675-00	1.2 k	±5%	¼W carbon
					R250	1-202-409-00	12 k		
					R251	1-202-389-00	1.8 k		
					R252	1-202-343-00	56		
					R253	1-202-343-00	56		
					R254	1-202-370-00	300		
					R255	1-202-387-00	1.5 k		
					R256	1-202-387-00	1.5 k		
					R257	1-202-387-00	1.5 k		
					R258	1-202-325-00	10		
					R301	1-202-411-00	15 k		
					R302	1-202-409-00	12 k		
					R303	1-202-429-00	82 k		
					R304	1-202-423-00	47 k		
					R305	1-202-429-00	82 k		

RESISTORS

All resistance values are in Ω , $\pm 5\%$, $\frac{1}{4}W$ and composition type unless otherwise indicated.

R101	1-202-367-00	220
R102	1-202-411-00	15 k
R103	1-202-391-00	2.2 k
R104	1-202-343-00	56
R105	1-202-367-00	220
R106	1-202-403-00	6.8 k
R107	1-202-343-00	56
R108	1-202-407-00	10 k
R109	1-202-387-00	1.5 k
R110	1-202-383-00	1 k
R111	1-202-387-00	1.5 k
R112	1-202-431-00	100 k
R113	1-202-423-00	47 k
R114	1-202-423-00	47 k
R201	1-202-383-00	1 k
R202	1-202-369-00	270
R203	1-202-400-00	5.1 k

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<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
RV701 RV702	1-222-501-00	250 k-(B)/250 k-(B) (VOLUME control)

SWITCHES

S1	1-516-053-21	switch, rotary/slide (FUNCTION)
	1-516-038-00	switch, slide (FUNCTION)
S2	1-514-664-00	switch, seesaw (MODE)
S3	1-514-507-00	switch, rotary (SPEAKER)
S4	1-514-875-00	switch, seesaw (POWER)
S6	1-514-899-00	switch, seesaw (MONITOR)

FILTERS

CF201	1-403-562-11	fm i-f, ceramic 10.70 MHz (red)
	1-403-562-21	fm i-f, ceramic 10.66 MHz (black)
CF202	1-403-562-31	fm i-f, ceramic 10.74 MHz (white)
	1-403-562-41	fm i-f, ceramic 10.62 MHz (green)
	1-403-562-51	fm i-f, ceramic 10.78 MHz (yellow)

MISCELLANEOUS

CP1, 2	1-231-057-12	encapsulated component, 120 Ω + 0.033 μ F
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<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
CR201	1-231-175-00	encapsulated component, 4.7 k Ω + 150 pF
P101 (P201)	1-507-080-00	push-on connector
J701	1-507-280-00	jack, HEADPHONE
CNJ5	1-507-288-00	connector, 4-P
J104 (J204)	1-507-365-00	phono jack, 4-P
J105 (J205)		
J101 (J201)	1-507-366-00	phono jack, 6-P
J102 (J202)		
J103 (J203)		
	1-509-385-11	voltage changeover block
	1-509-467-00	REC/PB connector
CNJ2	1-509-445-00	AC input connector, 3-P
	1-517-049-00	holder, dial lamp
PL2, 3	1-518-116-00	lamp, dial 11 V/0.36A
PL1	1-518-129-61	lamp, stereo 4.5 V/40 mA
F5	1-532-053-00	fuse, 1.6 A
F2, 3	1-532-078-00	fuse, 1 A
F1	1-532-259-00	fuse, 1.6 A
F4	1-532-295-00	fuse, 0.5 A
	1-533-069-00	holder, 4-P fuse
	1-536-153-11	terminal strip, 3L2 (A)
	1-536-187-00	terminal strip, L1 (B)
	1-536-190-00	terminal strip, 1L2 (B)
	1-536-286-00	terminal strip, 4-P (ANTENNA)
Y48163-51-1		record player, TTS-312

SONY CORPORATION

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SONY**HP-211A****HP-211A***AEP Model*No. 1
Dec. 1972

SERVICE MANUAL SUPPLEMENT

Subject: Modification on Preamplifier Section

This supplement updates the service manual to include production changes.
File this supplement with the service manual.

1. INTRODUCTION

The preamplifier section have been changed due to new dual type FUNCTION switch adoption.
Accordingly wiring also changed.

2. PARTS LIST FOR MODIFICATION

Ref. No.	Description	Former Part No./ Part Value	New Part No./ Part Value	Remarks
	complete circuit board, preamplifier	8-982-652-89	8-982-679-21	changed
S1	switch, rotary/slide (FUNCTION)	1-516-053-21	1-516-163-00	changed
Q511	transistor	2SC633A	_____	deleted
C521	electrolytic capacitor	1-121-951-11 0.47/50V	_____	deleted
R525	carbon resistor	1-244-670-11 750 $\pm 5\%$ $\frac{1}{4}W$	_____	deleted
R570	metal-oxide resistor	1-204-664-11 1k $\pm 5\%$ 2W	1-206-662-11 820 $\pm 5\%$ 2W	changed
R581	carbon resistor	1-244-697-11 10k $\pm 5\%$ $\frac{1}{4}W$	_____	deleted
R582	composition resistor	1-202-567-31 560 $\pm 10\%$ $\frac{1}{2}W$	1-202-565-31 470 $\pm 10\%$ $\frac{1}{2}W$	changed
	terminal strip 3L2	1-536-153-00	_____	deleted

3. INTERCHANGEABILITY

New and old circuit or circuit board are not interchangeable.

4. APPLICABLE SERIAL NUMBER

Serial No. 55,501 and later

5. DIAGRAMS

MOUNTING DIAGRAM

Preamplifier Board

(Serial No. 55,501 and later) on page 3

Fm (A-m) Front End/I-f Amp/MPX Board

(Serial No. 55,501 and later) on page 4

SCHEMATIC DIAGRAM

Fm (A-m) Front End/I-f Amp/MPX Section

(Serial No. 55,501 and later) on page 5

Audio Amplifier Section

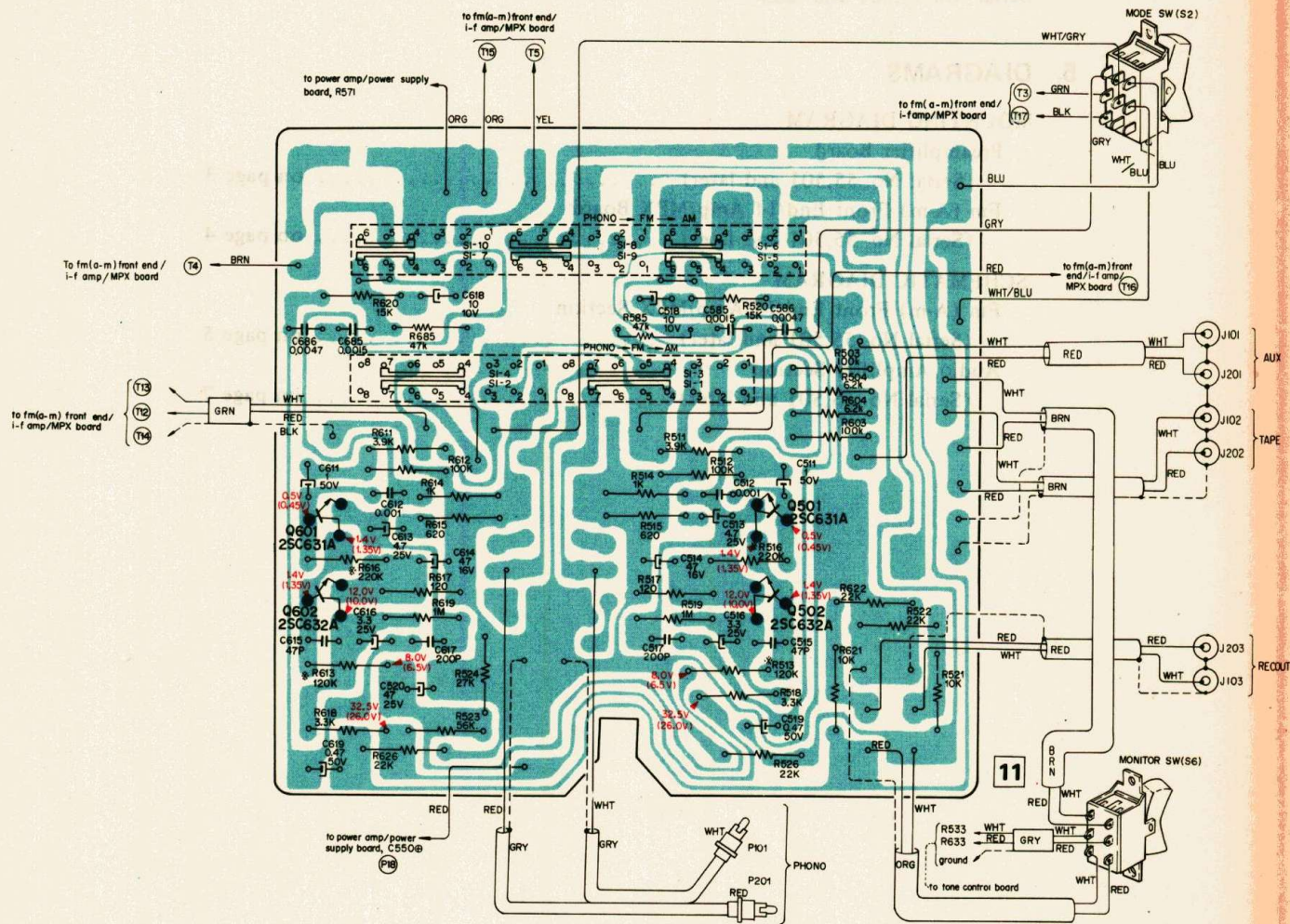
(Serial No. 55,501 and later) on page 7

5. DIAGRAMS

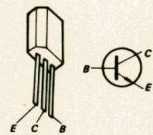
MOUNTING DIAGRAM — Preamplifier Board —

Serial No. 55,501 and later

— Conductor Side —



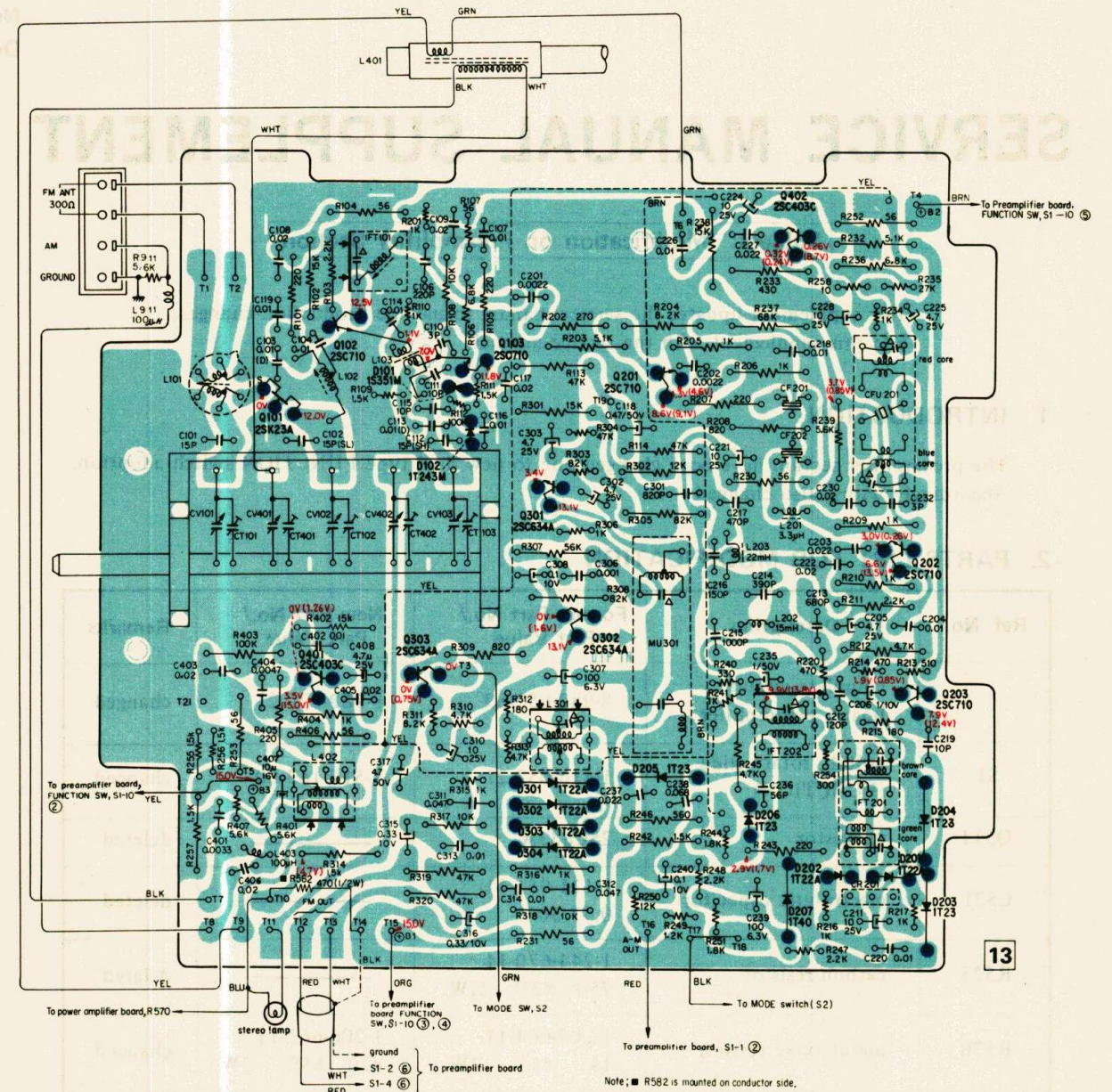
Note: * low-noise resistor

2SC631A
2SC632A

MOUNTING DIAGRAM — Fm (A-m) Front End/I-f Amp/MPX Board —

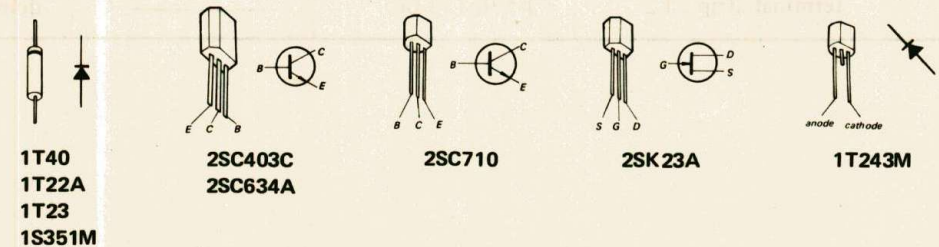
Serial No. 55,501 and later

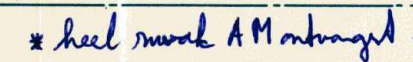
— Conductor Side —



Note: R582 is mounted on conductor side.

Note:

Shows the location of stenciled part number.
Refer to this mark when replacing the part.



[] : STEREO Operation

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