STR-7045

USA and Canada Model

FM STEREO/FM-AM RECEIVER

SPECIFICATIONS

FM TUNER SECTION

Frequency Range:	87.5 MHz to 108 MHz
Usable Sensitivity:	2.6 μV (IHF) 2.2 μV (S/N = 30 dB)
Signal-to-Noise Ratio:	70 dB
Capture Ratio:	1.5 dB
Frequency Response:	20 Hz to 15 kHz ±1 dB
Stereo Separation:	38 dB at 400 Hz

A-M TUNER SECTION

Frequency Range:	530 kHz to 1,605 kHz
Sensitivity:	48 dB/m, built-in bar antenna (S/N = 20 dB) 20 μV, external antenna
Signal-to-Noise Ratio:	50 dB

AUDIO AMPLIFIER SECTION

Dynamic Power Output: (IHF constant power supply method)	145 watts (4 ohms), both channels operating 100 watts (8 ohms), both channels operating
Continuous Power Output: (rated output)	At 1 kHz 50 watts (4 ohms) per channel, both channels operating 40 watts (8 ohms) per channel, both channels operating At 20 Hz ~ 20 kHz 30 watts (8 ohms) per channel, both channels operating
Harmonic Distortion:	Less than 0.2 % at 1 kHz at rated output Less than 0.1 % at 1 watt output
Frequency Response:	PHONO: RIAA equalization curve ±1 dB TAPE REC/PB, AUX: 10 Hz to 60 kHz $^{+0}_{-3}$ dB

GENERAL

Power Consumption:	160 watts
Power Requirement:	120 volts ac
Dimensions:	471 (w) x 157 (h) x375 (d) mm 18 9/16 (w) x 6 3/16 (h) x 14 3/4 (d) inches
Net Weight:	14.1 kg (31 lb 10 oz)

SONY®

SERVICE MANUAL

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SECTION 1
TECHNICAL DESCRIPTION

1-1. SPECIFICATIONS

Fm Tuner Section

Antenna	300 ohms balanced
Frequency range:	87.5 MHz to 108 MHz
Sensitivity:	2.6 μV (IHF usable sensitivity) 2.2 μV (S/N = 30 dB) 1.8 μV (S/N = 20 dB)
Signal-to-noise ratio:	70 dB
Capture ratio:	1.5 dB
Selectivity:	70 dB
Image rejection:	70 dB
I-f rejection:	90 dB
Spurious rejection:	90 dB
A-m suppression:	56 dB
Frequency response:	20 Hz to 15 kHz ±1 dB
Separation:	38 dB at 400 Hz
Harmonic distortion:	Mono: 0.2%, IHF (400 Hz, 75 kHz deviation Mod) Stereo: 0.5 %, IHF (400 Hz, 75 kHz deviation Mod)
19 kHz, 38 kHz suppression:	60 dB
SCA suppression:	55 dB
Muting level:	less than 5 μV

A-m Tuner Section

Antenna:	Built-in ferrite bar antenna with external antenna terminal
Frequency range:	530 kHz to 1,605 kHz
Sensitivity:	48 dB/m, built-in bar antenna (S/N = 20 dB) 20 μV, external antenna
Signal-to-noise ratio:	50 dB
I-f rejection:	46 dB at 1,000 kHz
Harmonic distortion:	0.8 %
Image rejection:	60 dB at 1,000 kHz

Audio Amplifier Section

Dynamic power output: (IHF constant power supply method)	145 watts (4 ohms), both channels operating 100 watts (8 ohms), both channels operating
Continuous power output: (rated output)	at 1 kHz 50 watts (4 ohms) per channel, both channels operating 40 watts (8 ohms) per channel, both channels operating at 20 Hz ~ 20 kHz 30 watts (8 ohms) per channel, both channels operating
20 Hz ~ 20 kHz power:	30 watts (8 ohms) both channels operating
Power bandwidth:	15 Hz to 30 kHz, IHF
Harmonic distortion:	less than 0.2 % at 1 kHz at rated output less than 0.1 % at 1 watt output
Frequency response:	PHONO : RIAA equalization curve ±1 dB TAPE, REC/PB, AUX: 10 Hz to 60 kHz $^{+0}_{-3}$ dB
Input sensitivity and impedance:	PHONO : 1.8 mV 47k ohms AUX : 140 mV 100k ohms TAPE : 140 mV 100k ohms REC/PB : 140 mV 100k ohms
Signal output and output impedance:	REC OUT : 250 mV 10k ohms REC/PB : 30 mV 80k ohms
Signal-to-noise ratio:	PHONO : greater than 70 dB (weighting network "B") TAPE : greater than 90 dB (weighting network "A") REC/PB : greater than 90 dB (weighting network "A")
Tone controls:	BASS : ±10 dB at 100 Hz TREBLE : ±10 dB at 10 kHz
High filter:	6 dB/oct above 5 kHz
Loudness control:	+10 dB at 50 Hz, +4 dB at 10 kHz (at 30 dB attenuation)

General

Power consumption:	160 watts
Power requirement:	120 volts ac
Dimensions:	471(w)×157(h)×375(d) mm $18\frac{9}{16}$(w)×$6\frac{3}{16}$(h)×$14\frac{3}{4}$(d) inches
Net weight:	14.1 kg (31 lb 10 oz)
Shipping weight:	17.9 kg (39 lb 7 oz)

1-2. DETAILED CIRCUIT ANALYSIS

The following describes the function or operation of all stages and controls. The text sequence follows signal paths. Stages are listed by transistor reference designation at the left margin; major components are also listed in a similar manner. Refer to the block diagram on page 11 to 12 and the schematic diagram on page 39 to 42.

Stage/Control	*Function*
Fm Front-End	
Balun	This transformer matches 300-ohm twin lead to the fm front-end's input stage, thereby coupling the receiver signal to the front-end.
Passive rf circuit	A triple-tuned circuit is employed between the antenna and mixer transistor. This passive coupling circuit contains no active amplifiers, so it is perfectly linear and cannot produce distortion and overload components. Thus, the factors that contribute to spurious responses are eliminated before the mixer.
Local oscillator	Supplies heterodyning voltage to the mixer via L104. The circuit is a modified Hartley type with feedback applied to the emitter from the tap on L104.
AFC circuit D101, D102 C120	An automatic frequency control circuit is incorporated in the oscillator circuit to eliminate frequency drift and precise tuning difficulty. The principle of afc operation is as follows: When the tuner is correctly tuned, the intermediate frequency is 10.7 MHz and no dc correction voltage is produced by the ratio detector as shown in the "S" curve response of Fig. 1-1. Thus the voltage applied to diode D101 is determined solely by the positive fixed reverse bias voltage supplied by zener diode D102. Now assume that the local oscillator frequency changes by $+\Delta f$. This means that the new intermediate frequency is 10.7 MHz $+\Delta f$. See Fig. 1-1. As a result a positive dc component is fed back to the anode of D101, decreasing the reverse voltage to it, and increasing D101's barrier capacitance. This decreases the local oscillator frequency, since the series circuit composed of C120 and D101 is connected in parallel to the tank circuit of the local oscillator. Conversely, if the local oscillator frequency decreases a negative dc voltage is fed back to D101 increasing the local oscillator frequency.
Mixer Q101	RF signals and local oscillator voltage are heterodyned in the gate-source junction of mixer Q101 to produce 10.7 MHz i-f output signal.
IFT101	Transformer IFT101 and capacitor C106 and C107 form a 10.7 MHz "high-C"-tuned circuit. This type of circuit has the advantage of reducing the higher order harmonics of 10.7 MHz which cause cross-modulation or spurious interference.

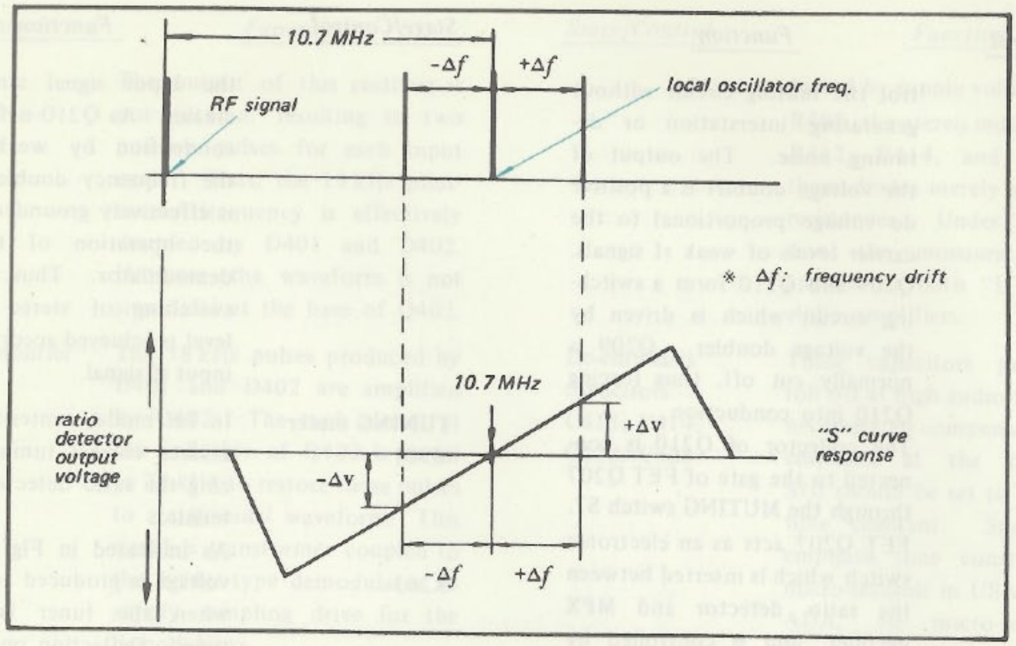


Fig. 1-1. Local oscillator frequency drift and afc voltage relationship

Stage/Control	*Function*
I-f amplifier Q103	The i-f signal coupled to the base of i-f amplifier Q103 by the secondary winding of IFT101 is amplified to achieve a favorable signal-to-noise ratio before application to the filters in the i-f strip.

I-f Amplifier

Stage/Control	*Function*
I-f amplifiers Q201 to Q205 CF201 to CF206	These i-f stages are basically RC coupled amplifiers (except Q205) that provide essentially flat response. The selectivity of this section is determined by three pairs of filters CF201-CF202, CF203-CF204 and CF205-CF206 in the interstage coupling path. Each of these filters is a two-section ceramic filter that operates in the "trapped-energy" mode. The filters provide extremely-sharp skirt selectivity and flat response inside the passband. Thus, these filters largely determine overall tuner selectivity.
I-f output Q206	Signal at the base of Q206 has had all amplitude variations removed by the preceding limiters, and only selected signals have been passed by ceramic filters. Q206 provides power to drive the ratio detector.
Diode limiters D201 to D206 D209, D210	Limiting is accomplished by diode pairs, connected in parallel and poled in opposite directions. The diodes conduct when the signal across them exceeds the barrier potential of about 0.6 volts in the forward direction. Thus the signal is limited in both directions to 1.2 volts peak-to-peak. The diodes provide symmetrical limiting.
Ratio detector D207, D208	T201 and diodes D207 and D208 form a balanced ratio detector that transforms the frequency-modulated signal into an audio signal. Output appears across C216.
Muting circuit Q207, Q208, Q209, Q210 D211 to D213	The i-f signal is extracted from limiter diodes D203 and D204 to drive the muting circuit. The extracted i-f signal is amplified by Q208 (FET) enough to drive voltage doubler D211 and D212 through tuned transformer T202. D213 provides positive fixed bias for Q209 through D211 and D212. T202 determines the bandwidth necessary to con-

Stage/Control	*Function*
	trol the muting circuit without generating interstation or detuning noise. The output of the voltage doubler is a positive dc voltage proportional to the carrier levels of weak rf signals. Q209 and Q210 form a switching circuit which is driven by the voltage doubler. Q209 is normally cut off, thus forcing Q210 into conduction. The collector of Q210 is connected to the gate of FET Q207 through the MUTING switch S7. FET Q207 acts as an electronic switch which is inserted between the ratio detector and MPX decoder, and is controlled by the gate voltage applied. With the MUTING switch ON, fm signals of average strength keep Q209 saturated, thus cutting off Q210. This causes Q207 to conduct and maintain normal operation. Weak stations and interstation noise can not produce sufficient dc voltage at the base of Q209 to keep it conducting. As a result, Q209 cuts off. This saturates Q210 and cuts off Q207. Thus, the audio output is muted. With the MUTING switch OFF, Q207 is kept conducting regardless of the strength of the fm signal by a positive bias voltage on its gate. RV201 adjusts the muting level.
Stereo-mono automatic-switching circuit Q210, D409	The collector of Q210 is also connected to the output terminal of the MPX decoder's frequency doubler through diode D409. This prevents noisy stereo reception by automatically switching the MPX decoder's operation into the monaural mode. This is needed, because, for the fm stereo broadcasting, the S/N ratio of a demodulated stereo signal degrades much more rapidly than that of a mono signal when the input signal strength decreases. As Q210 is forced into conduction by weak stations, the frequency doubler's output is effectively grounded, stopping the operation of the stereo demodulator. Thus, automatic switching of stereo to mono level is achieved according to the input rf signal.
TUNING meter M901	In fm mode, center-zero meter assures correct tuning by utilizing the ratio detector's characteristic.
R263	As indicated in Fig. 1-1, no dc voltage is produced across R263 when the tuner is correctly tuned. Deflection on the meter indicates the amount of deviation from the carrier frequency received. Note that the meter will indicate zero-reading when the tuner is not receiving any off-the-air signal.
SCA trap L203, C220	The composite signal containing monaural information from 0 to 15 kHz, the 19 kHz pilot carrier, and the fm stereo signal at 38 kHz are fed to Q207 through trap L203-C220. This trap removes the unwanted SCA signal to the gate of Q401 (the 19 kHz amplifier) through Q207.
MPX Decoder	
19 kHz amplifier Q401	This stage serves two functions. It extracts the 19 kHz pilot signal by means of a tuned circuit at its drain, and provides a low-impedance source of composite stereo signal (without pilot carrier) at its source. By using an FET, harmonics of the 19 kHz and 38 kHz components are reduced to a low level causing less carrier leak or beat interferance.
Frequency doubler D401, D402	Signals developed at the drain of Q401 are transformer coupled to a fullwave rectifier consisting of D401 and D402.

Stage/Control	*Function*
	The output of this rectifier is not filtered, resulting in two positive pulses for each input cycle. Thus, the 19 kHz pilot-carrier frequency is effectively doubled by D401 and D402. However, the waveform is not sinusoidal at the base of Q402.
38 kHz amplifier Q402	The 38 kHz pulses produced by D401 and D402 are amplified by Q402. The tank circuit at the collector of Q402 is tuned to 38 kHz to restore these pulses to a sinusoidal waveform. This signal is transformer coupled to the bridge-type demodulator to supply sampling drive for the demodulator.
STEREO lamp circuit Q403	The STEREO indicator lights when the FUNCTION switch is set to the FM-AUTO STEREO position and an fm stereo signal is received. The emitter of Q402 is connected to the base of Q403 (which is normally cut off). The circuit operates as follows: When a composite stereo signal is applied to the multiplex decoder, the 38 kHz pulses produced at the output of the frequency doubler yield a higher average current flow through Q402. This forces Q403 into conduction, lighting the STEREO indicator lamp PL904.
Multiplex demodulator D405, D406, D407, D408	The demodulator circuit employs four diodes in a balanced-bridge arrangement. This system has the advantage of cancelling residual rf components (38 kHz signal, some 19 kHz signal, and higher-order harmonics of these frequencies.) "L" and "R" components are developed at each side of the bridge as a result of demodulation, when the receiver is operated in the stereo mode. In the monaural mode, diodes D405 and D408 are forward biased by supply voltage through R405, the stereo indicator lamp, R412, R414, and R413, so these diodes merely act as small resistances. Under this condition, the monaural signal is applied to both "L" and "R" audio amplifiers.
De-emphasis capacitors C413, C414, C422, C423	These capacitors provide the roll off at high audio frequencies necessary to compensate for pre-emphasis at the transmitter. S10 should be set to the proper time constant. Specified de-emphasis time constant is 75 micro-seconds in USA and CANADA, 50 micro-seconds in Europe.
Audio preamplifier Q404, Q405 Q406, Q407	Demodulated L and R signals are amplified by these stages to the level required at the input of the following low pass filter.
Separation control RV401	The network that connects the emitters of Q404 and Q405 provides a form of negative feedback between left and right channels. Any residual "L" signal in the "R" channel (which is about 180° out of phase) is cancelled out by the "L" signal from the "L" channel. The same is true of residual "R" signal in the "L" channel. RV401 is therefore set for maximum separation.
LPF401	This filters out the unwanted higherorder harmonics of 19 kHz and 38 kHz leakage to obtain clear audio.

A-m Tuner

Stage/Control	*Function*
Antenna circuit	A-m signals are received by the antenna tank circuit formed by L904, C302, L902, CV901, CT301, C305 and C304. C302 is selected not for its effect upon tuning, but to reduce spurious radiation by the local oscillator.

Stage/Control	*Function*
Low-pass filter L301, C302	The low pass filter (L301 - C302) reduces the spurious radiation caused by local oscillator which may interfere another receiver or communication system through the external antenna.
Local oscillator Q305	This stage supplies the injection voltage necessary to receive a-m signal. In this modified Hartley oscillator circuit, feedback is applied to the emitter of Q305 from a low-impedance winding on oscillator coil T301.
Mixer Q301	Incoming rf signal is fed to the base of Q301, while the local oscillator voltage is injected to the emitter circuit of Q301. These two signals are heterodyned in the base-emitter junction of Q301 to produce the 455-kHz output. This stage functions as the gain control element of the agc system due to Q302 in the emitter circuit, as will be explained later.
CFT301	CFT301 is a combination unit which contains a double-tuned circuit and one ceramic filter tuned to 455 kHz. It develops the i-f signal, and determines the selectivity inside the pass-band. It also provides link coupling to i-f amplifier Q303.
I-f amplifier Q303	This stage is basically an RC-coupled amplifier and amplifies the i-f signal to the proper level required by the following stages.
I-f amplifier Q304	Q304 and IFT301 form a tuned amplifier circuit which provides power to drive diode detector D302.
Detector D302	The i-f signal from the secondary side of IFT301 is rectified by the diode D302. The i-f components of the output signal are filtered by C318, R320 and C319 and then cleaned audio signal is fed to the audio pre-amplifier through FUNCTION switch S1.

Stage/Control	*Function*
TUNING Meter M901	The detector (D302) output is also fed to the TUNING meter M901 since the dc component in the rectified a-m signal is roughly proportional to the input signal level (not exactly for strong signals due to agc action).
AGC circuit	There are two feedback loops which provide proper agc operation. One is the minor loop applying AGC to the i-f amplifier Q304 base circuit. The other is the major feedback loop applying dc from the emitter circuit of Q304 to the emitter circuit of Q301 through Q302. The minor feedback loop consists of D301, R317, C326, R326, C325 and R314. The a-m i-f signal is extracted from the collector circuit of Q304 through C314, and is rectified by diode D301. The output of the diode D301 is a positive dc voltage roughly proportional (not exactly due to agc action) to the carrier levels of input signal and fed to the base of Q304 through a filter circuit. Thus the output of diode D301 controls the current flow in Q304 and its emitter voltage as well. Major feedback is produced by the emitter circuit of Q304, R315, C322, C321, R325 and Q302. The emitter voltage of Q304 is applied to the base of Q302 through the filter circuit, determining the positive bias on Q302. As the Q302 shunts the emitter resistor of mixer Q301, it controls the operation of Q301 as a forward agc element. When the strong signal is received, Q302 is forced into conduction, shorting Q301 emitter to ground through R305. As a result, current flow in the Q301 (mixer) increases, reducing its current gain and allowing

Stage/Control	*Function*
	stable operation in a strong field-strength area.

Preamplifier Section

Stage/Control	*Function*
Equalizer amplifier Q501, Q502	These direct-coupled stages amplify the small signal provided by the phono cartridge to the level required at the input of the following tone-control amplifier.
Bias circuit R5C3, R508 R502	Dc bias voltage for Q501 is extracted from R508 in the emitter. circuit of Q502 and fed back to the base of Q501 through R502 and R503. This dc negative feedback technique provides stable operation during temperature changes.
Equalization circuit R509, R510, R511 R505 C505, C506	RIAA equalization is achieved by the negative-feedback loop containing R509, R510, R511, R505, C505 and C506. Be sure to use replacement components with the exact same values.
Equalization circuit	R513 (R563) in the output circuit prevents interaction between left and right channel-equalization when the MODE switch is set to L + R.
MODE switch S4	In the STEREO position of S4, left and right input signals are routed to their respective amplifiers. In the L + R position, the left and right signals are added and the sum is then fed to both amplifier channels. A rotary switch having two sections is used to obtain L + R signal even if the MONITOR switch is set to the TAPE position.
VOLUME control RV601 (RV651)	The equalized phono signals and signals applied to the other input terminals are fed to the VOLUME control through the MONITOR and MODE switches. The level of the signal applied to the following tone-control amplifier is determined by the setting of RV601.
LOUDNESS switch S5	This switch and R601, R602, C601, C602 compensate for the characteristics of the human ear which vary according to the loudness of the sound being heard. When this switch is set to ON and the VOLUME control is set for 30 dB attenuation, the overall frequency response is increased 10 dB at 50 Hz and 4 dB at 10 kHz with reference to the level at kHz.
Tone-control amplifier Q601, Q602 (Q651, Q652)	This direct-coupled two-stage amplifier has basically flat response, but it operates as a negative-feedback type tone-control circuit. The output generated at the collector circuit of Q602 is fed back to the emitter circuit of Q601 through the treble and bass tone-control network.
TREBLE control RV603 (RV653)	This increases or decreases the amount of negative feedback voltage determined by the setting of RV603. It has a range of ±10 dB at 10 kHz.
BASS control RV604 (RV654)	Similar to the treble control except for filter components and frequency characteristics, however in this circuit the negative feedback voltage is determined by the setting of RV604. This has a range of ±10 dB at 100 Hz.
HIGH FILTER S6	The high-cutoff filter (R616 and C613) eliminates unwanted high-frequency components (5 kHz and higher) from the input signal when its switch is ON.

Power Amplifier Section

Stage/Control	*Function*
Preamplifier Q701, Q702	Q701 and Q702 form a paraphase amplifier but signal out-

Stage/Control	*Function*
	put is extracted from the collector circuit of Q701. This circuit has a various advantages in direct coupling system. One is high stability despite temperature variations and another is high input impedance without reducing the amplifier's gain. The ac output appears across load resistor R705 (R755) in the collector circuit. An emitter decoupling circuit is formed by the emitter-base resistance of Q702, C702 and R708 in the base circuit of Q702. This circuit forms a frequency-selective ac bypass circuit to reduce the amplifier's gain at very low frequencies. Common emitter-resistor R706 keeps the dc current flow constant in the Q701 and Q702, thus increasing dc stability.
Bias power supply D701, D751	These diodes are forward biased by positive and negative power supply voltage through RV701 and RV751. They provide a stabilized voltage to bias transistor Q701 that is used to make the output terminal balance at zero dc through RV701.
Dc balance adj. RV701 (RV751)	
Thermal compensation and noise suppressor D711	As all the stages are directly coupled, dc stability is required. The negative temperature coefficient of D711 provides thermal compensation for the following driver stage. It also acts as a noise suppressor to reduce the popping noise due to unbalanced current flow in the following stages when the power switch is turned off.
Predriver Q703	Though this stage is a conventional flat amplifier, it determines the output voltage swings because the following stages are basically in the emitter-follower configuration. The ac load resistor for this stage is R712.

Stage/Control	*Function*
Dc bias adj. (idling current) Q704, RV702	Q704 is forced to conduct and operates as a small resistance providing the necessary forward bias on the two cascaded emitter-followers. RV702 controls the base bias of Q704, determining the impedance between the emitter and collector of Q704, and thereby controls the dc bias voltage for the following complementary circuit.
Thermal compensator for dc bias D702	The negative temperature coefficient of D702 provides thermal compensation for the complementary and power transistor circuits. D702 is attached to the power transistor's heat sink to detect temperature change in the power transistors.
Complementary circuit Q707, Q708	These transistors operate as emitter-followers to provide the current swings needed for the output stages and also provide the necessary phase inversion. Phase inversion is performed by using PNP and NPN type transistors.
Power transistor Q709, Q710	The output transistors (Q709 and Q710) are connected directly to a power supply of about ±40V. Q709 supplies power to the load during the positive half cycle and Q710 operates during the negative half cycle. As all the stages are directly coupled and designed to obtain zero potential at the output terminal, the large coupling capacitor at the output (which may cause power loss or distortion at low frequencies) is eliminated.
Protection circuit	To protect overloaded power transistors from destruction, a new protection circuit is employed. If a shortcircuit at the output terminals occurrs, the

Stage/Control	*Function*
	protection circuit holds the current in the power transistor low enough not to make it overheat and also limit the input drive signals.
	Fig. 1-2 shows a partial schematic diagram detailing the protection circuit. With reference to this diagram, the protection circuit operates as follows:
	Since the protection circuit is identical for positive going half cycles and negative going half cycles, only the positive going half cycle operation is described here. Q705 limits the positive-going half cycle of the drive voltage applied to the base of Q707 when power consumption at the Q709 collector exceeds the safety margin. Since power dissipation at the collector can be considered a function of collector voltage and current, the trigger signal for Q705 is taken from the collector and emitter. Base voltage is partly determined by the ratio of resistance of R719 and series resistance of R726 and RL (load). Base voltage is also determined by the current flow

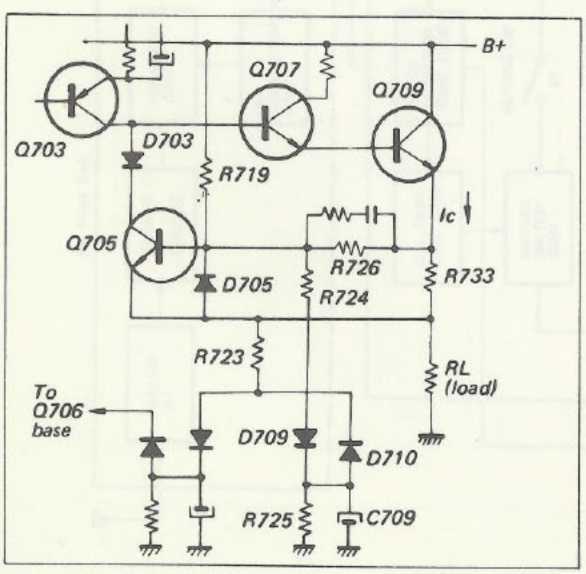


Fig. 1-2. Simplified protection circuit

Stage/Control	*Function*
	in the R733 and the collector voltage of Q709. Under normal operation, Q705 is cut off. When excessive current flows in the power transistor or power dissipation at the collector of power transistor exceeds the specified value, Q705 turns on and limits the input drive voltage to the power transistor. Limiting operation is also actuated by the condition of the load. The base voltage of Q705 is determined by the resistors R733, R726, R724, R725, and RL (load). D709 is employed to stop reverse voltage from applied being during the negative going-half cycle. Q705 turns limiting the input drive voltage to the power transistor when the load resistance decreases to some extent. Under reactive load conditions in class B amplifiers maximum current will flow when the voltage across the power transistor is maximum and this is the worst case for secondary breakdown. See Fig. 1-3. As all speakers have reactive properties, a protection circuit which covers the reactive region is required.
	Fig. 1-3 shows the operating load lines for one half of a class B output stage under conditions of equal load impedance; in one case the load is purely resistive and in the other case purely reactive. It is apparent that the reactive load case could result in transistor failure. D710, C709 and R723 form a circuit charging the base voltage according to the reactive voltage induced in the load to obtain proper protection operation. C709 and R725 form a discharging circuit to detect reactive dc voltage. D705 protects Q705 from breakdown between base and emitter due to detected reactive voltage

Stage/Control	Function
	across C709. D703 protects Q705 from the breakdown between collector and emitter during the negative-going half cycle.

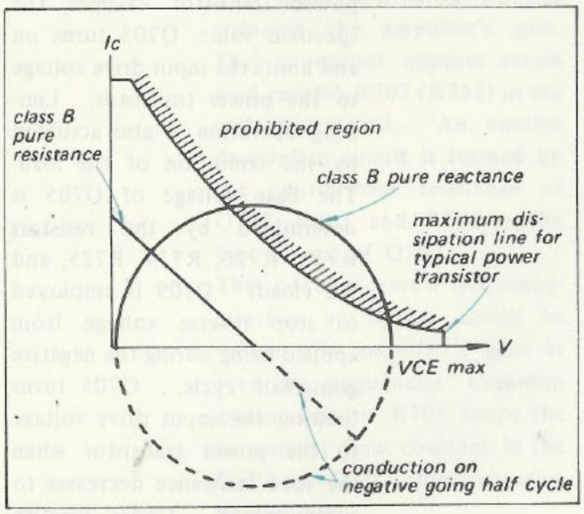
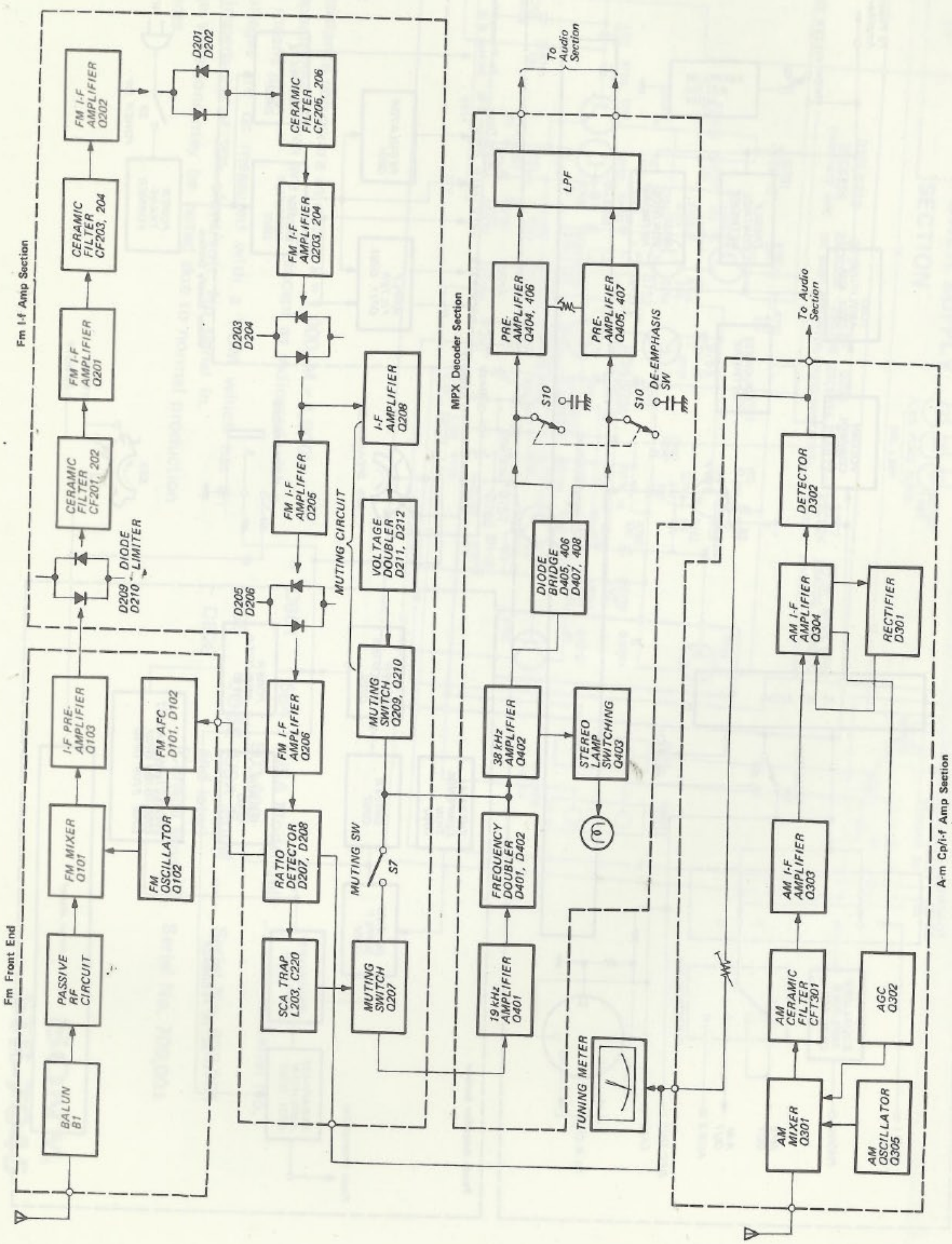


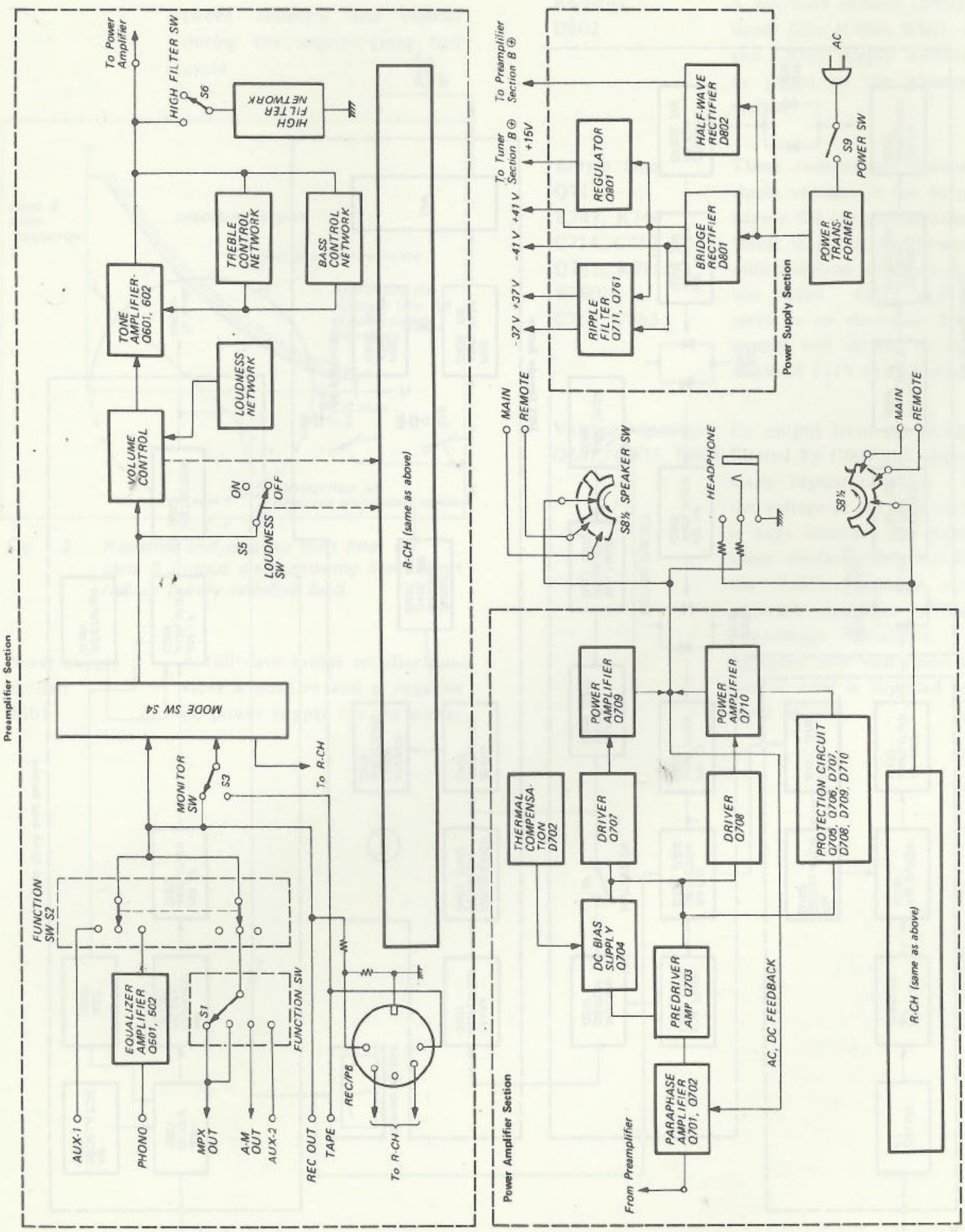
Fig. 1-3. Resistive and reactive load lines for class B output stage showing breakdown risk in purely resistive load

Stage/Control	Function
Power supply rectifier D801	A full-wave bridge rectifier provides a positive and a negative dc power supply for the power amplifier.
Rectifier D802	A half-wave rectifier (D802) and ripple filter (C809, R801, R802 and C810) supply well-filtered dc power to the preamplifier section.
Ripple filter Q711 R741, R740 C714, C713 Q761, R791 R790, C764, C763	These components reduce the ripple voltages in the dc power supply for the preamplifier and driver stages of the power amplifier section to an extremely-low value. Q711 and Q761 serve as an electronic filter to supply well filtered dc voltages of about ±37V to each stage.
Voltage regulator Q801, D803, D804	Dc output from the rectifier is filtered by C807 and applied to series regulator Q801. Since the voltage at the base of Q801 is kept constant by means of zener diodes D803 and D804, the emitter voltage remains constant regardless of load or line-voltage variations. The regulated and well filtered output of 15V is supplied to the tuner section.

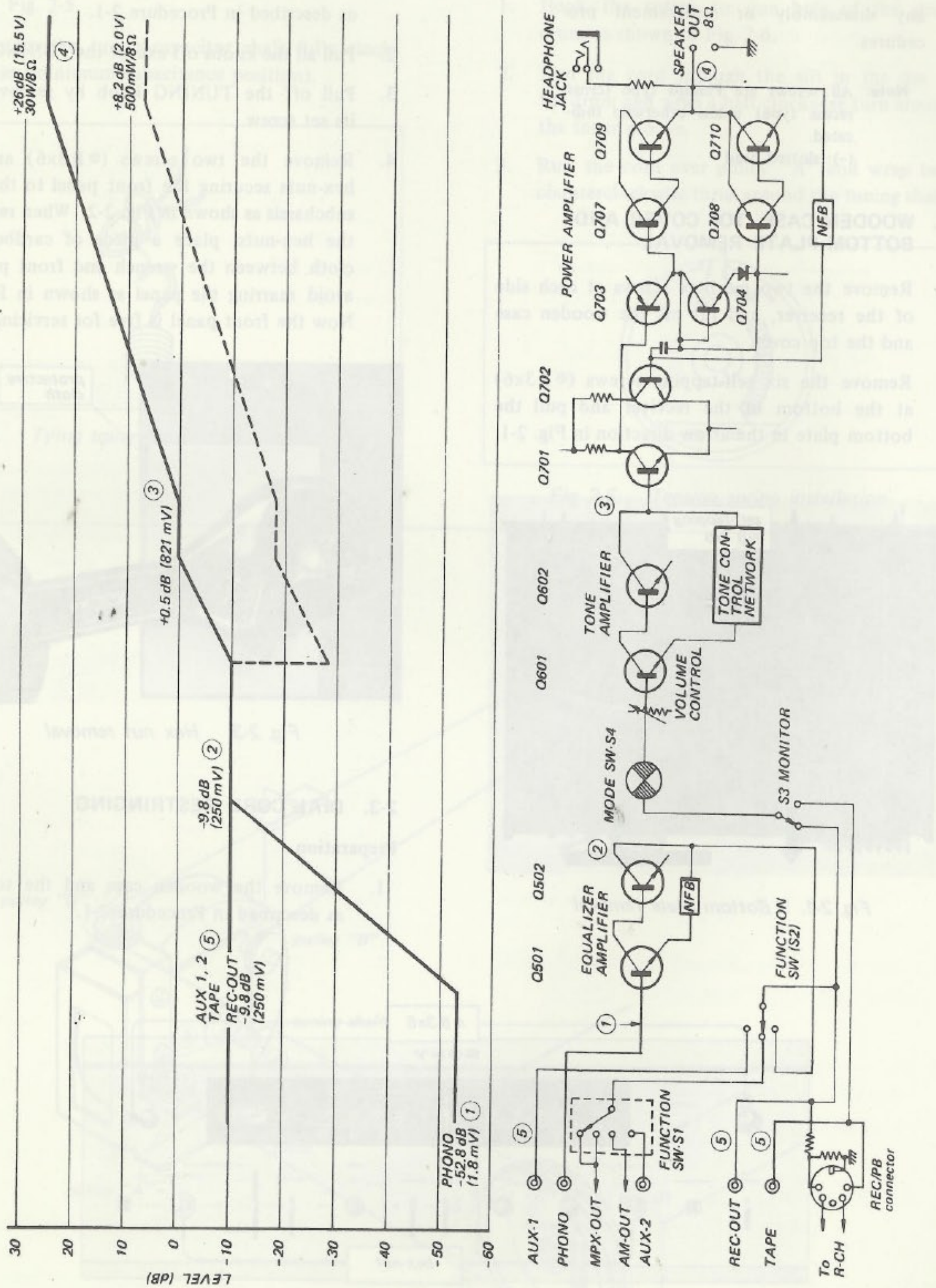
1-3. **BLOCK DIAGRAM — Tuner Section —**



— Audio Amp Section —



1-4. LEVEL DIAGRAM



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

SECTION 2
DISASSEMBLY AND REPLACEMENT

WARNING

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

Note: All screws are Phillips type (cross recess type) unless otherwise indicated.
(-): slotted head

2-1. WOODEN CASE, TOP COVER AND BOTTOM PLATE REMOVAL

1. Remove the two machine screws at each side of the receiver, and lift off the wooden case and the top cover.
2. Remove the six self-tapping screws (⊕B 3x6) at the bottom of the receiver and pull the bottom plate in the arrow direction in Fig. 2-1.

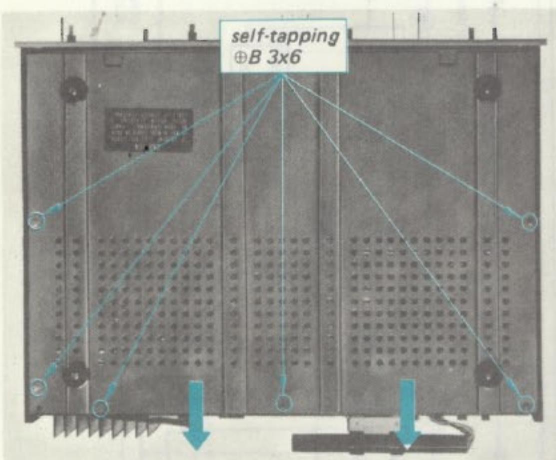


Fig. 2-1. Bottom plate removal

2-2. FRONT PANEL REMOVAL

1. Remove the wooden case and the top cover as described in Procedure 2-1.
2. Pull all the knobs off except the TUNING knob.
3. Pull off the TUNING knob by removing the its set screw.
4. Remove the two screws (⊕B 3x6) and two hex-nuts securing the front panel to the front subchassis as shown in Fig. 2-2. When removing the hex-nuts, place a piece of cardboard or cloth between the wrench and front panel to avoid marring the panel as shown in Fig. 2-3. Now the front panel is free for servicing.

Fig. 2-3. Hex nut removal

2-3. DIAL CORD RESTRINGING

Preparation

1. Remove the wooden case and the top cover as described in Procedure 2-1.

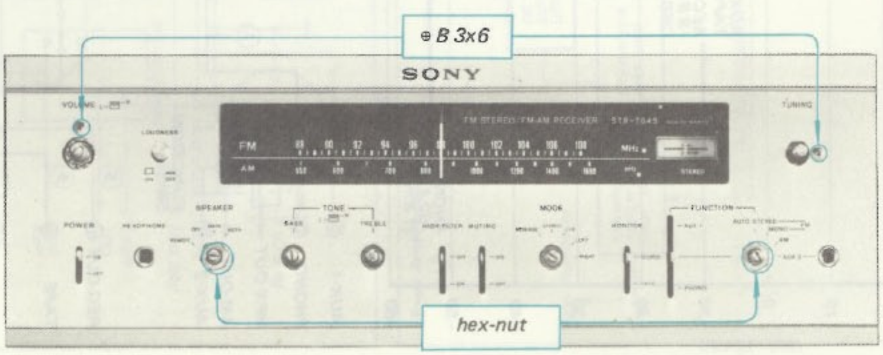


Fig. 2-2. Front panel removal

2. Cut a 1,500 mm (59") length of 0.3 mm (1/64 inch) diameter dial cord.
3. Tie the end of the cord to a spring as shown in Fig. 2-5.
4. Rotate the tuning-capacitor shaft fully clockwise (minimum capacitance position).

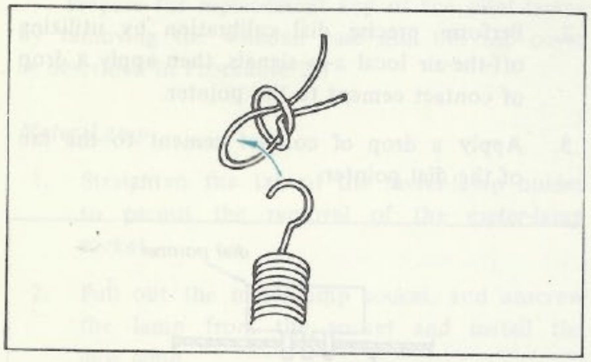


Fig. 2-4. Tying square knot to the tension spring

Procedure

While referring to Fig. 2-5, proceed as follows:

1. Hook the spring to one hole of the drive drum as shown in Fig. 2-6.
2. Run the cord through the slit in the rim of the drum and wrap a half clockwise turn around the inner groove.
3. Run the cord over pulley "A" and wrap two counterclockwise turns around the tuning shaft.

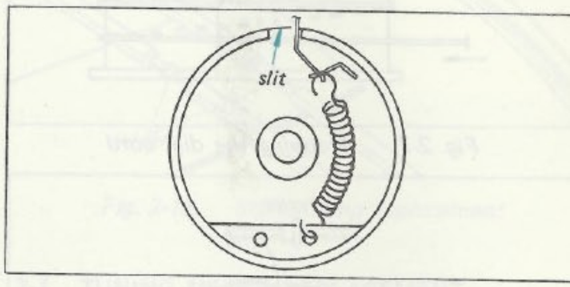


Fig. 2-6. Tension spring installation

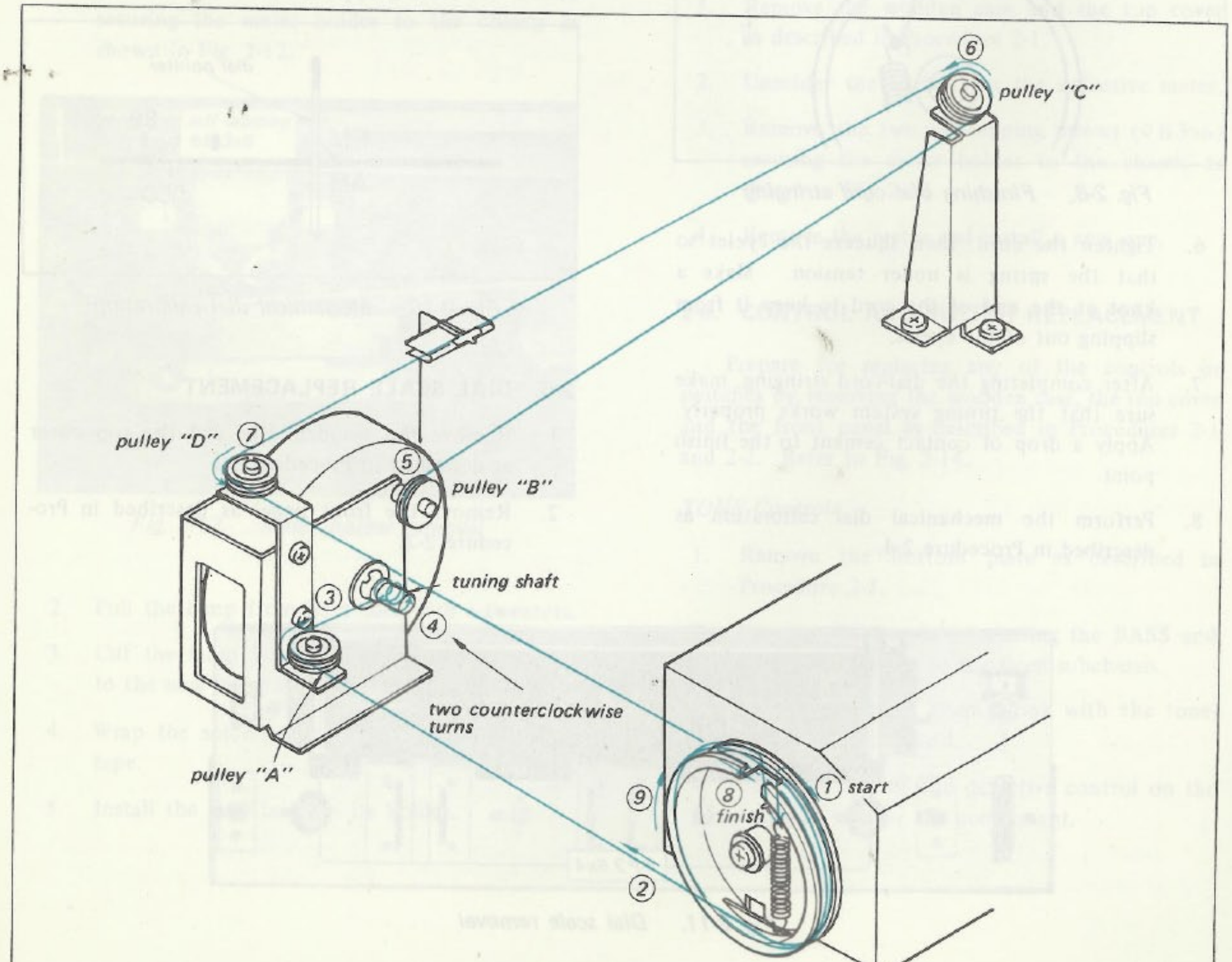


Fig. 2-5. Dial cord stringing

4. Run the cord over pulleys "B", "C" and "D", then wrap two clockwise turns around the drum from outer groove to inner groove as shown in Fig. 2-7.

5. Pass the doubled end of the cord through the eyelet, then hook it to the spring as shown in Fig. 2-8.

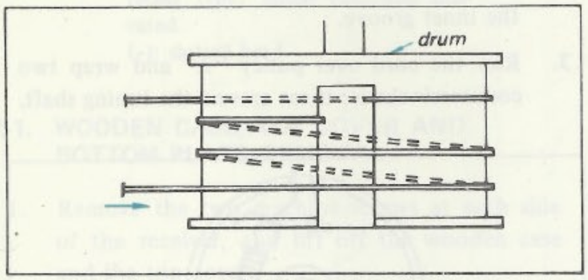


Fig. 2-7. Wrapping the dial cord

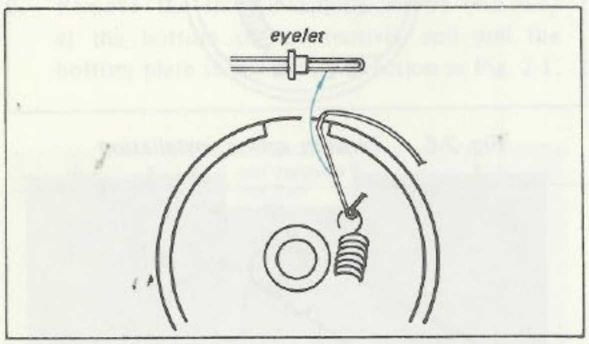


Fig. 2-8. Finishing dial cord stringing

6. Tighten the cord, then squeeze the eyelet so that the spring is under tension. Make a knot at the end of the cord to keep it from slipping out of the eyelet.

7. After completing the dial-cord stringing, make sure that the tuning system works properly. Apply a drop of contact cement to the finish point.

8. Perform the mechanical dial calibration as described in Procedure 2-4.

2-4. MECHANICAL DIAL CALIBRATION

Note: This is required after replacing the dial cord, dial scale or front-end assembly.

1. Put the dial pointer on the cord as shown in Fig. 2-9 and move it to a position shown in Fig. 2-10 on the dial scale when the tuning capacitor is set to the maximum capacitance.

2. Perform precise dial calibration by utilizing off-the-air local a-m signals, then apply a drop of contact cement to the pointer.

3. Apply a drop of contact cement to the tab of the dial pointer.

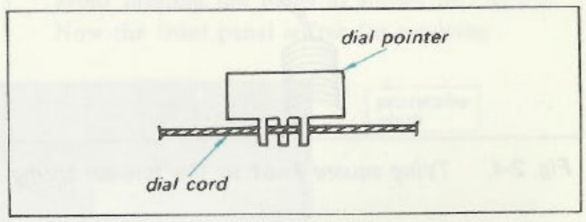


Fig. 2-9. Dial pointer installation

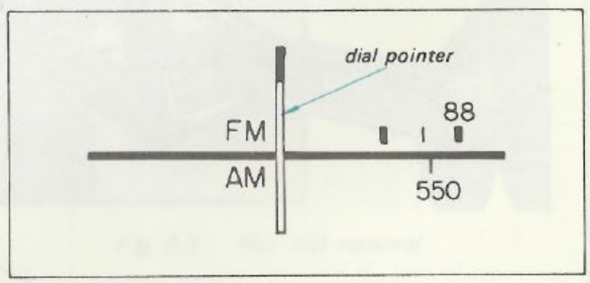


Fig. 2-10. Mechanical dial calibration

2-5. DIAL SCALE REPLACEMENT

1. Remove the wooden case and the top cover as described in Procedure 2-1.

2. Remove the front panel as described in Procedure 2-2.

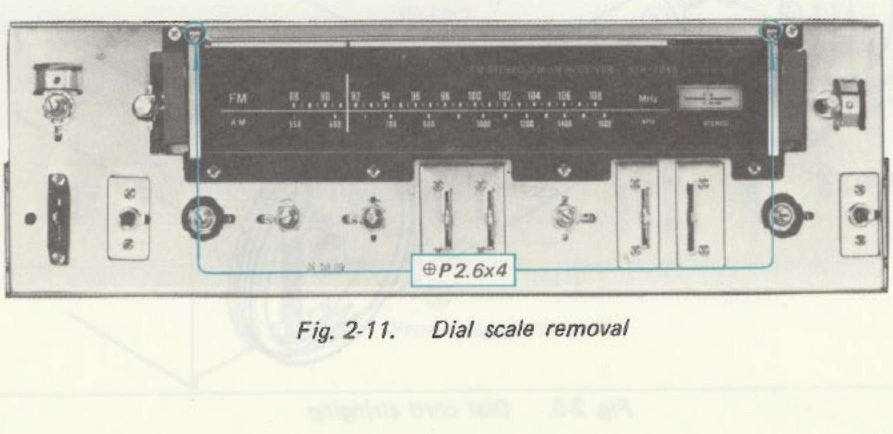


Fig. 2-11. Dial scale removal

3. Remove the two screws (⊕P 2.6x4) securing the dial-scale holder to the front subchassis as shown in Fig. 2-11.
4. Remove the defective dial scale and install the new dial scale.

2-6. PILOT LAMP REPLACEMENT

Prepare for replacement any of the pilot lamps by removing the wooden case and the top cover as described in Procedure 2-1.

Meter Lamp

1. Straighten the tab of the meter-lamp holder to permit the removal of the meter-lamp socket.
2. Pull out the meter-lamp socket, and unscrew the lamp from the socket and install the new lamp.

Stereo Lamp

1. Remove the two self-tapping screws (⊕B 3x6) securing the meter holder to the chassis as shown in Fig. 2-12.

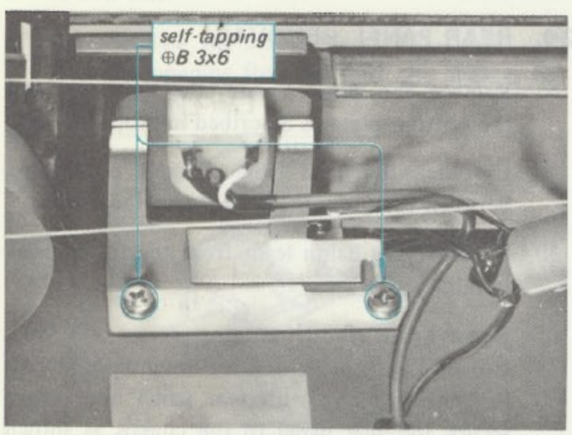


Fig. 2-12. Meter holder removal

2. Pull the lamp from its holder with a tweezers.
3. Cut the lamp leads and solder the lead wires to the new lamp as shown in Fig. 2-13.
4. Wrap the soldered connections with electrical tape.
5. Install the new lamp in its holder.

Dial Lamp

1. Remove the front panel as described in Procedure 2-2.
2. Pry out the fiber lamp shade and remove the lamp.

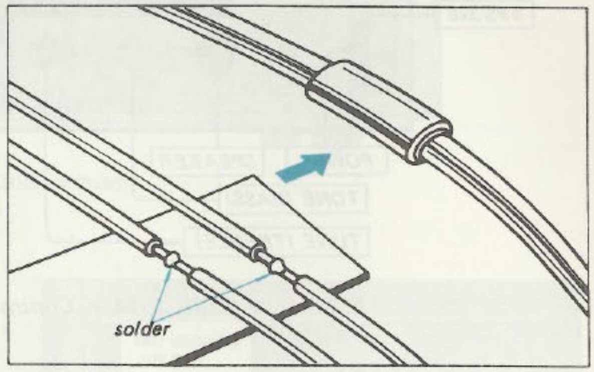


Fig. 2-13. Stereo lamp replacement

2-7. TUNING METER REPLACEMENT

1. Remove the wooden case and the top cover as described in Procedure 2-1.
2. Unsolder the leads from the defective meter.
3. Remove the two self-tapping screws (⊕B 3x6) securing the meter holder to the chassis as shown in Fig. 2-12.
4. Remove the meter and install a new one.

2-8. CONTROL AND SWITCH REPLACEMENT

Prepare for replacing any of the controls or switches by removing the wooden case, the top cover and the front panel as described in Procedures 2-1 and 2-2. Refer to Fig. 2-14.

TONE Controls

1. Remove the bottom plate as described in Procedure 2-1.
2. Remove the hex nuts securing the BASS and TREBLE controls to the front-subchassis.
3. Carefully remove them along with the tone-control circuit board.
4. Cut each lug of the defective control on the board to remove the component.

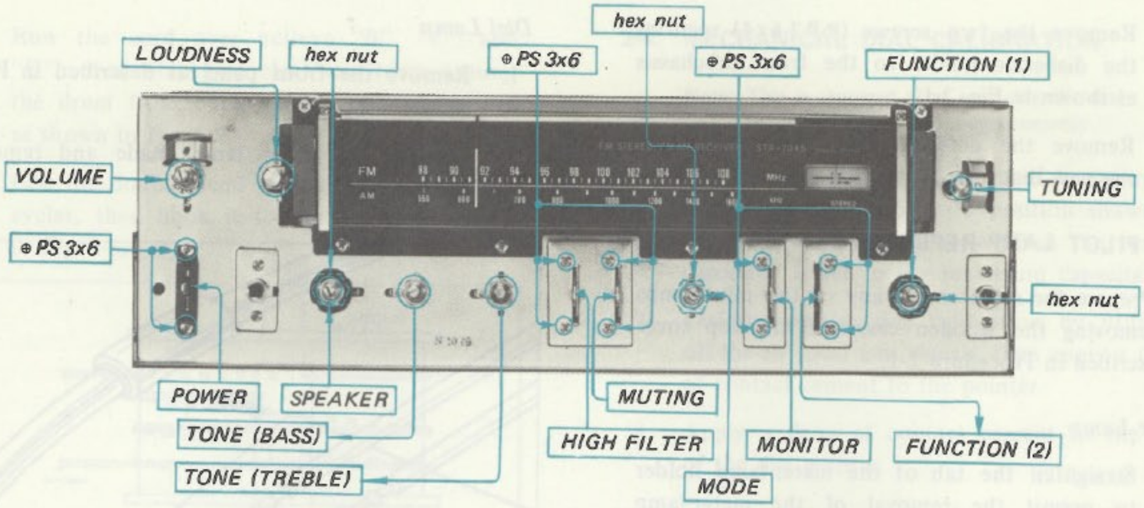


Fig. 2-14. Control and switch replacement

5. Unsolder and remove the clipped lugs, and clean out the holes of the circuit board.

6. Install a new control.

POWER, HIGH FILTER, MUTING, MONITOR, FUNCTION (2) Switches

1. Remove the two screws (⊕PS 3x6) securing switches to the front subchassis as shown in Fig. 2-14.

2. Unsolder the lead wires from the defective switch and install the replacement switch.

SPEAKER, MODE, FUNCTION (1) Switches

1. Apply a drop of cement solvent to the ring spacer on the switches. Wait a few seconds for the cement to dissolve, and pry out the spacer with a screwdriver.

2. Remove the hex nut securing the switches to the front-subchassis as shown in Fig. 2-14.

3. Unsolder the lead wires from the defective switch and install the new switch.

LOUDNESS Switch

1. Fasten the dial cord to the drum with cellophane tape.

2. Remove the two self-tapping screws (⊕B 3x6) securing the dial pulley bracket to the chassis as shown in Fig. 2-15.

3. Put the bracket aside and remove the screw (⊕B 2.6x4) securing the loudness switch to the front subchassis.

4. Remove it along with the loudness control board and install a new switch or replacement mounted circuit board including loudness switch (Part No. X-48030-23-0).

2-9. REAR PANEL REMOVAL

1. Remove the wooden case, the top cover and the bottom plate as described in Procedure 2-1.

2. Unsolder the lead wire (black) connecting between the ground terminal and the chassis.

3. Unsolder the balun leads from the fm antenna terminal.

4. Remove the six self-tapping screws (⊕B 3x6), two of them secure the bar antenna holder to the chassis along with rear panel and others secure the rear panel to the chassis as shown in Fig. 2-16. This frees the rear panel.

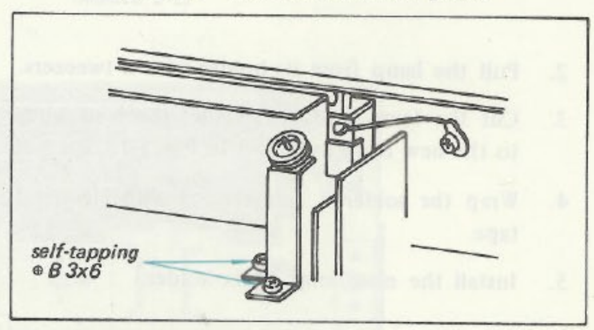


Fig. 2-15. Dial pulley bracket removal

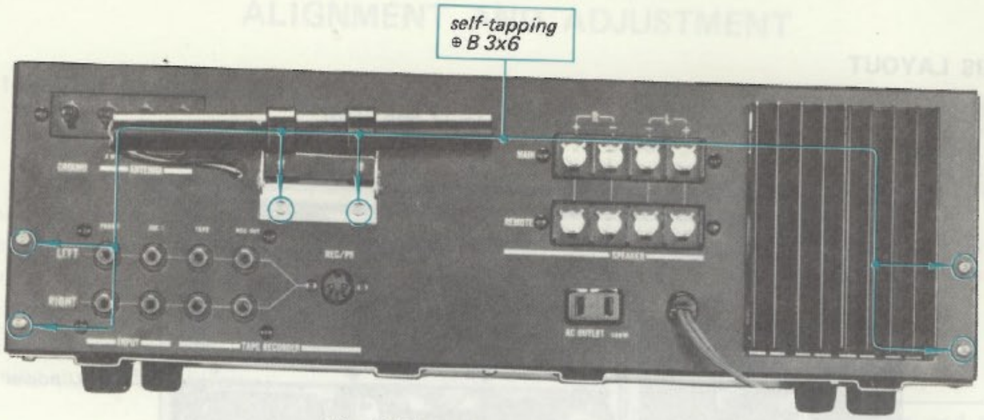


Fig. 2-16. Rear panel removal

2-10. REPLACEMENT OF COMPONENTS SECURED TO THE REAR PANEL BY NYLON RIVETS

1. Remove the wooden case, and the top cover as described in Procedure 2-1.
2. Remove the nylon rivets securing the defective component by pushing its end with a tweezers as shown in Fig. 2-17.
3. Remove the defective component and install a new one.
4. To reinstall the rivet, insert the flared part into the opening first and push the head as far as it will go.

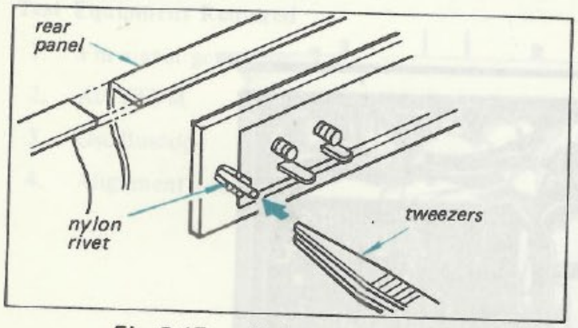


Fig. 2-17. Nylon rivet removal

2-11. POWER TRANSISTOR REPLACEMENT

1. Remove the wooden case, top cover and bottom plate as described in Procedure 2-1.
2. Remove the four self-tapping screws (⊕B 3x8) securing the heat sink to the chassis as shown in Fig. 2-18.

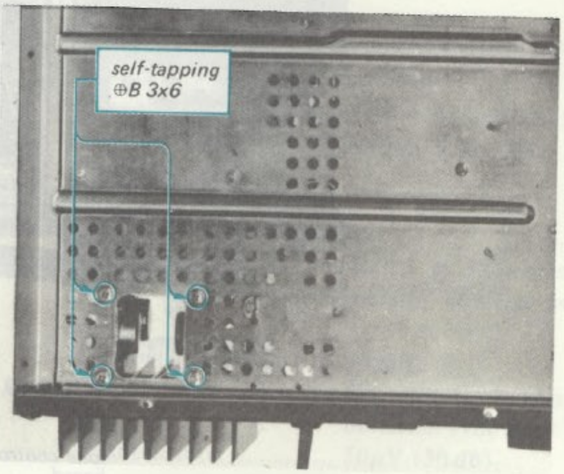


Fig. 2-18. Heat sink removal

3. Cut the emitter and base leads of the defective power transistor with a diagonal cutter. This prevents damage to the mica insulator when removing the defective power transistor.
4. Carefully draw back the heat sink, and remove the two screws (⊕B 3x12) and nuts securing the power transistor to the heat sink.
5. When replacing the power transistor, apply a coating of a thermal compound or a heat-transferring grease to both sides of the mica insulator. Any excess compound or grease squeezed out when the mounting screws are tightened should be wiped off with a clean cloth. This prevents accumulation of conductive dust particles that might eventually cause a short.

2-12. CHASSIS LAYOUT

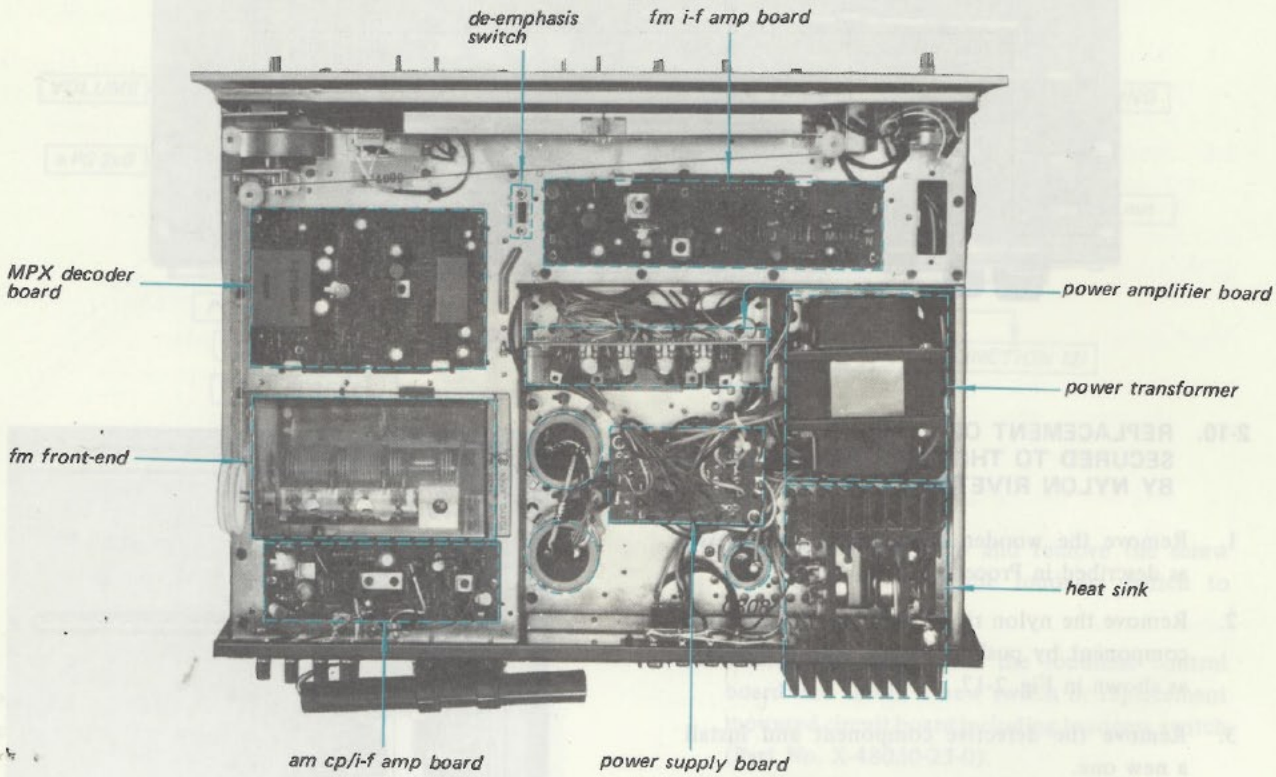


Fig. 2-19. Chassis top view

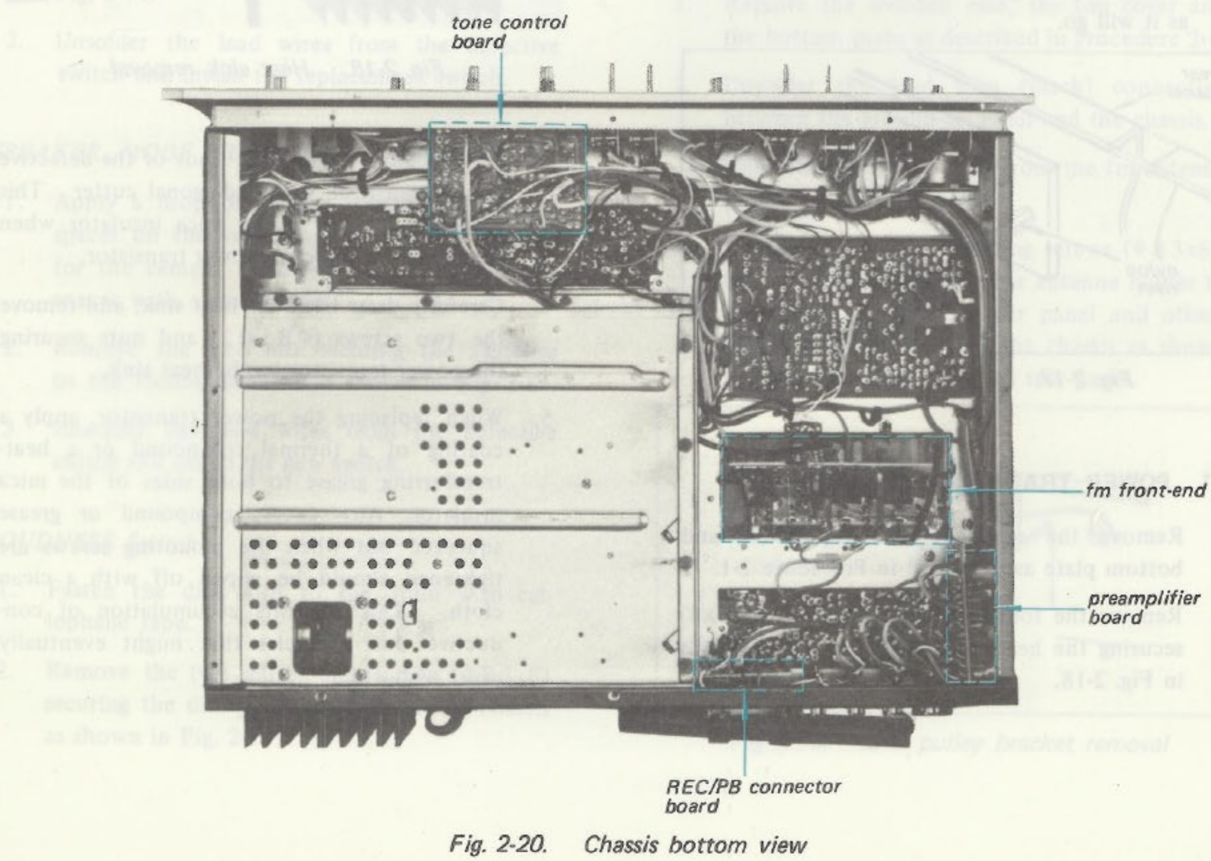


Fig. 2-20. Chassis bottom view

SECTION 3
ALIGNMENT AND ADJUSTMENT

3-1. FM I-F STRIP 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

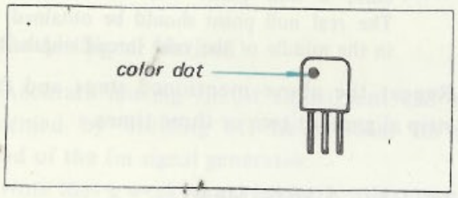


Fig. 3-1. Fm i-f ceramic filter

Test Equipment Required

1. Fm signal generator
2. Ac VTVM
3. Oscilloscope
4. Alignment tools

Note: This alignment is needed only after IFT101 in the front-end, rf trimmer capacitors (CT102, CT103), or T201 (discriminator transformer) has been replaced or repaired.

All signal generator output levels specified in the fm section are for terminated output.

Preparation

1. Remove the wooden case and the top cover as described in Procedure 2-1 on page 14.
2. Connect the input cable of the ac VTVM to the REC OUT jack (J504).
3. Connect the signal-generator output to the fm antenna terminal as shown in Fig. 3-2.
4. Short the connection point of R241 and C215 (AFC circuit) to ground as shown in Fig. 3-3.

Procedure

1. With the equipment connected as shown in Fig. 3-2, set the signal-generator controls as follows:
   - Carrier frequency .... 98 MHz
   - Modulation .... Fm, 400 Hz, 75 kHz deviation (100%)
   - Output level .... 30μV (30 dB)
2. Set the receiver controls as follows:
   - FUNCTION switch .... FM MONO
   - MODE switch................ STEREO
   - VOLUME control .... Minimum
3. Tune the receiver to the signal generator's carrier frequency.
4. Turn the core of transformers IFT101 and T201 (bottom core) (see Fig. 3-3 and Fig. 3-5) for maximum output with the alignment tool.

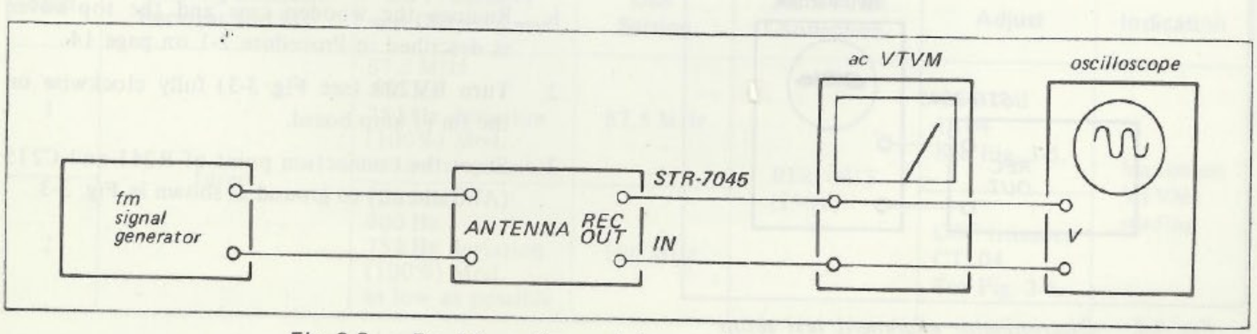


Fig. 3-2. Fm i-f, muting and front-end alignment test setup

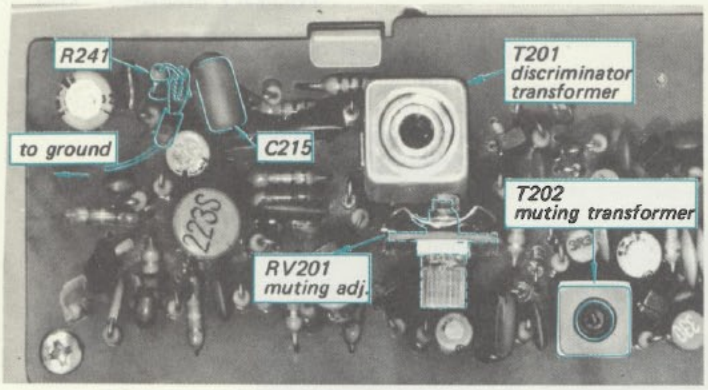


Fig. 3-3. Interruption of afc circuit and parts location

3-2. FM DISCRIMINATOR ALIGNMENT

Note: There are two or three methods of discriminator alignment, but only the simplified method using the tuner's TUNING meter is described here.

Test Equipment Required

1. Oscilloscope
2. Alignment tools

Preparation

1. Remove the wooden case and the top cover as described in Procedure 2-1 on page 14.
2. Connect the input cable of the oscilloscope to REC OUT jack (J504) as shown in Fig. 3-4.
3. Short the connection point of R241 and C215 (AFC circuit) to ground as shown in Fig. 3-3.

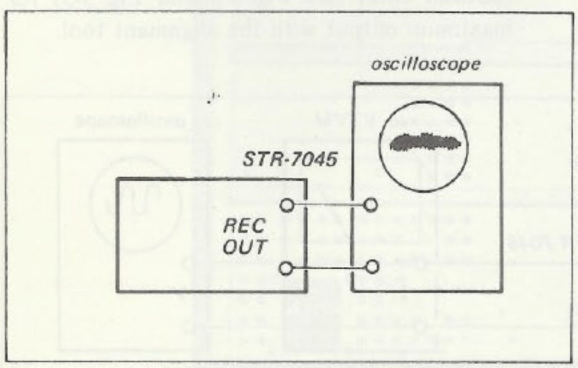


Fig. 3-4. Discriminator alignment test setup

Procedure

1. With the equipment connected as shown in Fig. 3-2, set the receiver controls as follows:
   FUNCTION switch .... FM MONO
   MODE switch .... STEREO
   No signal should be received.
2. Adjust the controls of the oscilloscope to provide a visible indication of noise. Always watch the oscilloscope to confirm that the tuner is not receiving any off-the-air signals.
3. Turn the top core (secondary side) of discriminator transformer T201 (see Fig. 3-3) with a hex-head alignment tool for a null-point reading on the TUNING meter. If the discriminator transformer (T201) is not aligned correctly, some deviation on the TUNING meter will be observed.

   Note: Turn the core carefully and slowly. At both extreme positions of the top core, a null point will be observed. The real null point should be obtained in the middle of the core thread length.
4. Repeat the above mentioned steps and fm i-f strip alignment two or three times.

3-3. MUTING ADJUSTMENT

Note: Two methods of muting adjustment are available, signal generator adjustment and adjustment by using an off-the-air signal. You can use either of them.

Signal Generator Method

Test Equipment Required

1. Fm signal generator
2. Ac VTVM or oscilloscope
3. Alignment tool

Preparation

1. Remove the wooden case and the top cover as described in Procedure 2-1 on page 14.
2. Turn RV201 (see Fig. 3-3) fully clockwise on the fm i-f amp board.
3. Short the connection point of R241 and C215 (AFC circuit) to ground as shown in Fig. 3-3.

TABLE 3-2 MUTING ADJUSTMENT

Coupling Between Receiver and SG	SG Frequency and Output Level	Dial Indication	Adjust	Remarks
Direct	98 MHz 400 Hz, 22.5 kHz deviation (30%) Mod.	98 MHz	T202 See Fig. 3-3	Turn the core of T202 to obtain proper muting operation.

Procedure

1. With the equipment connected as shown in Fig. 3-2, set the receiver controls as follows:

   FUNCTION switch .... FM MONO
   MODE switch .... STEREO
   MUTING switch .... ON

2. Follow the procedure given in Table 3-2. Note that the muting circuit should begin to operate at the symmetrical deflection point of TUNING meter when detuning the tuner to higher or lower than the reference carrier frequency.

Off-the-Air Signal Method

Accurate muting circuit adjustment can also be performed by utilizing off-the-air local fm signals instead of the fm signal generator.

Note that a weak signal is best for this purpose.

3-4. FM FREQUENCY COVERAGE ALIGNMENT

CAUTION

Never attempt alignment of the front-end section except for the frequency-coverage and dial-calibration adjustments. The front-end section of the tuner has been carefully adjusted at the factory, so very little adjustment is necessary in the field. Alignment need not be performed when the front-end FET is replaced since changes in FET parameters have little effect upon tuning. If an rf-stage adjustment is required, ask your nearest SONY Service Station to send your unit to the Factory Service Center for a complete front-end alignment.

Exercise caution when returning the faulty unit so that it will not be damaged during transit. The warranty will not cover damage incurrent in transit to the Factory Service Center.

Note: Before starting this alignment, the discriminator-transformer alignment should be performed.

Signal Generator Method

Test Equipment Required

1. Fm signal generator
2. Ac VTVM
3. Alignment tools

TABLE 3-3 FM FREQUENCY COVERAGE ALIGNMENT

Step	Coupling Between Receiver and SG	SG Frequency and Output Level	Dial Setting	Ac VTVM Connection	Adjust	Indication
1	Direct	87.5 MHz 400 Hz 75 kHz deviation (100%) Mod. as low as possible	87.5 MHz	REC OUT (J504)	OSC coil L104 See Fig. 3-5.	Maximum VTVM reading
2		108 MHz 400 Hz 75 kHz deviation (100%) Mod. as low as possible	108 MHz		OSC trimmer CT104 See Fig. 3-5.	

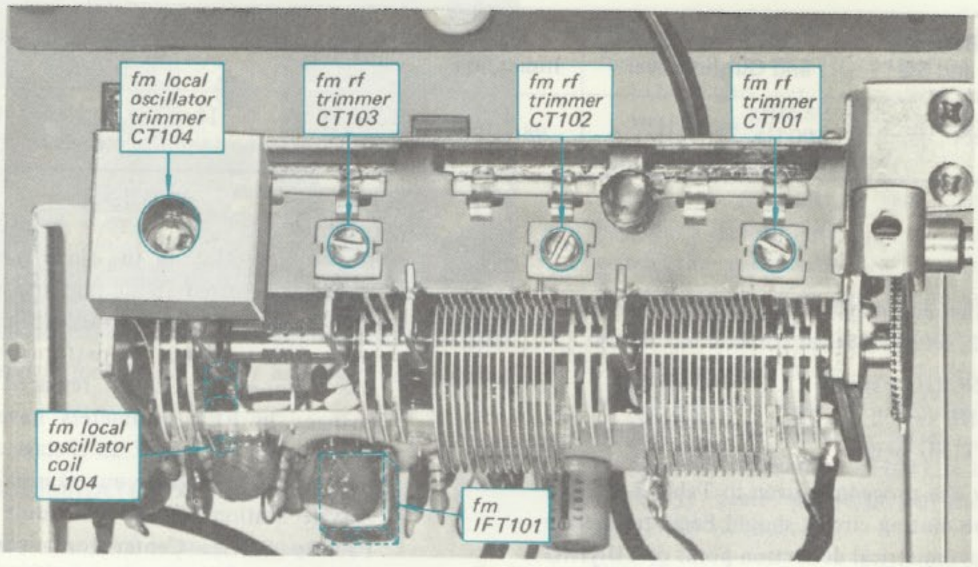


Fig. 3-5. Adjustment parts location

Preparation

1. Remove the wooden case and the top cover as described in Procedure 2-1 on page 14.
2. Connect the equipment as shown in Fig. 3-2.
3. Set the receiver controls as follows:
   FUNCTION switch .... FM MONO
   MODE switch .... STEREO
4. Short the connection point of R241 and C215 (AFC circuit) to ground as shown in Fig. 3-3.

Follow the procedures given in Table 3-3 when performing this alignment with an fm signal generator. Be sure that the dial is mechanically calibrated as described in Procedure 2-4 on page 16.

Off-the-Air Signal Method

Accurate dial calibration and a frequency-coverage alignment can also be performed by utilizing off-the-air local fm signals. However, before performing this alignment, be sure that the dial pointer is correctly positioned as described in Procedure 2-4 on page 16.

Procedure

1. Short the connection point of R241 and C215 (AFC circuit) to ground as shown in Fig. 3-3.
2. Tune the receiver to the lowest frequency station.
3. Check the dial scale for a calibration accuracy of ±200 kHz from the carrier frequency of the station. If the dial-accuracy deviation exceeds this limit, turn the local-oscillator coil L104 (see Fig. 3-5) slightly until optimum dial calibrations is obtained.
4. Tune the receiver to the highest-frequency station in your locality. If the dial-calibration error is excessive, adjust local-oscillator trimmer CT104 (see Fig. 3-5) for maximum calibration accuracy.
5. Repeat steps 3 and 4.

3-5. FM STEREO SEPARATION ADJUSTMENT

Test Equipment Required

1. Fm stereo signal generator
2. Ac VTVM
3. Oscilloscope

Preparation

1. Remove the wooden case and the top cover as described in Procedure 2-1 on page 14.
2. Connect the equipment as shown in Fig. 3-6, then set the fm stereo signal generator controls as follows:
   Carrier frequency .... 98 MHz
   Output level .... 1,000 μV (60 dB)
   Mode .... STEREO
   Audio (400 Hz) Mod....... 67.5 kHz (90%)
   Pilot (19 kHz) Mod .... 7.5 kHz (10%)

Note: 75 kHz (100%) if the metering indicates total modulation (audio-pilot).

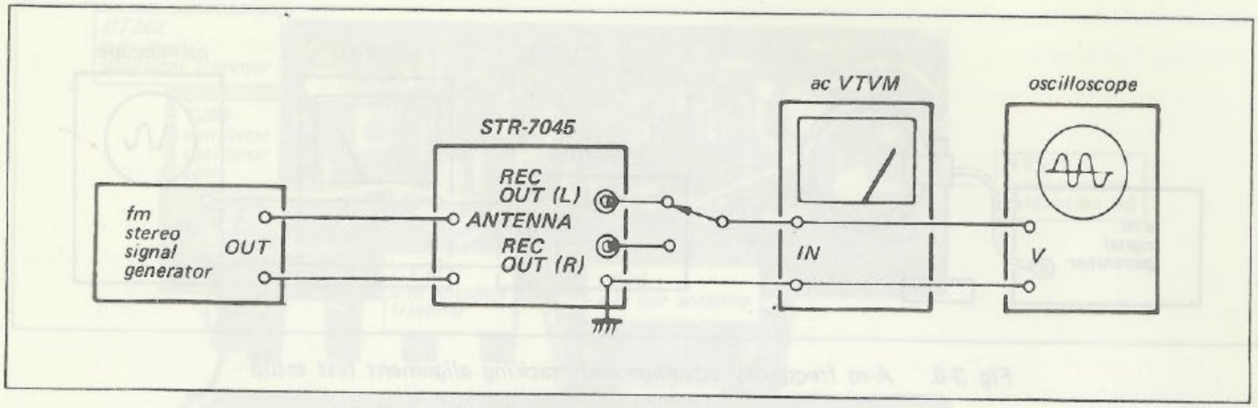


Fig. 3-6. Fm stereo separation adjustment test setup

Procedure

1. Precisely tune the receiver to the carrier frequency of stereo signal generator, then turn the top core of switching transformer T401 (see Fig. 3-7) to obtain maximum output at the left channel. Note that this adjustment has a close relationship with stereo distortion.
2. Record the output level of the left channel when the stereo signal generator input selector is set to the left channel.
3. Switch the stereo signal generator input selector to the right channel and read the residual signal level in the left channel.
4. The output-level to residual-level ratio represents the separation. Adjust separation adj. control RV401 (see Fig. 3-7) for minimum residual level. Check the right channel for separation. Usually, about an 8 to 9 dB difference in channel separation exists. Readjust RV401 for minimum difference between left- and right-channel separation. While doing this, remember that the output level also changes according to the setting of RV401.

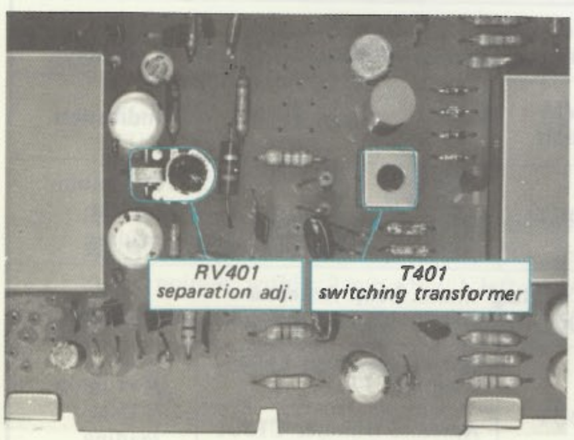


Fig. 3-7. Adjustment parts location

3-6. A-M I-F STRIP ALIGNMENT

Note: No adjustment is required in the field even if after replacing any of i-f transformers (CFT301 or IFT301).

3-7. A-M FREQUENCY COVERAGE AND TRACKING ALIGNMENT

Preparation

Remove the wooden case and the top cover as described in Procedure 2-1 on page 14. Then, set the FUNCTION switch to AM.

Signal Generator Method

Test Equipment Required

1. A-m signal generator
2. Loop antenna
3. Ac VTVM or oscilloscope

Procedure

With the equipment connected as shown in Fig. 3-8, follow the procedures given in Table 3-4 when performing this alignment with an a-m signal generator. Before starting this alignment, be sure that the dial pointer is correctly positioned as described in Procedure 2-4 on page 16.

Off-the-Air Signal Method

Accurate dial calibration, and a frequency-coverage and tracking alignment can also be performed by utilizing off-the-air local a-m signals. However, before performing this alignment, be sure that the dial pointer is correctly positioned as described in Procedure 2-4 on page 16.

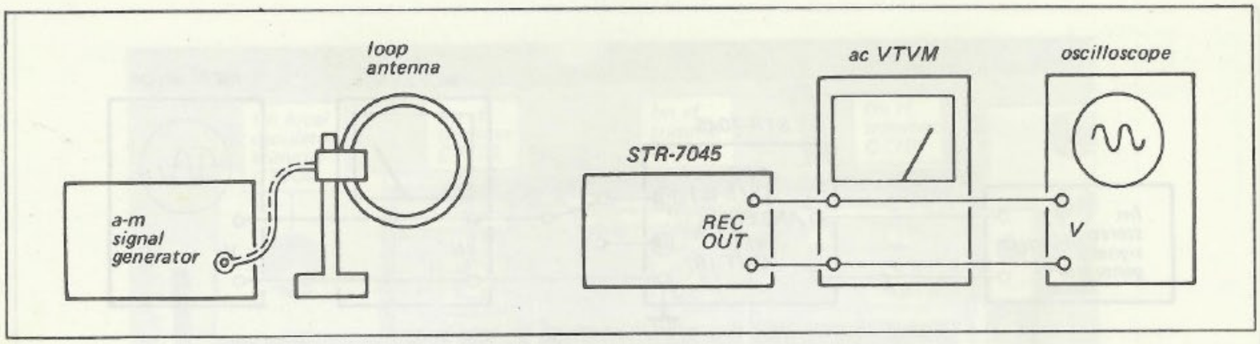


Fig. 3-8. A-m frequency coverage and tracking alignment test setup

Procedure

1. Tune the receiver to the lowest-frequency station in your locality.
   Check the dial scale for a calibration accuracy of ±20 kHz from the carrier frequency. If the dial calibration error exceeds this limit, adjust the local oscillator-coil T301 (see Fig. 3-10) slightly until optimum dial calibration is obtained.
2. Tune the receiver to the highest-frequency station in your locality. If the dial calibration error exceeds ±30 kHz from the carrier frequency, adjust local-oscillator trimmer-capacitor CT302 (see Fig. 3-10) to obtain maximum calibration accuracy. Repeat the above steps two or three times.

Tracking Alignment

1. Tune the receiver to the station whose carrier frequency is closest to 620 kHz and adjust the position of a-m bar antenna core (see Fig. 3-9) for maximum output.
2. Tune the receiver to the station whose carrier frequency is closest to 1,400 kHz and adjust antenna trimmer capacitor CT301 (see Fig. 3-10) to obtain maximum output.
3. Repeat the above steps two or three times.

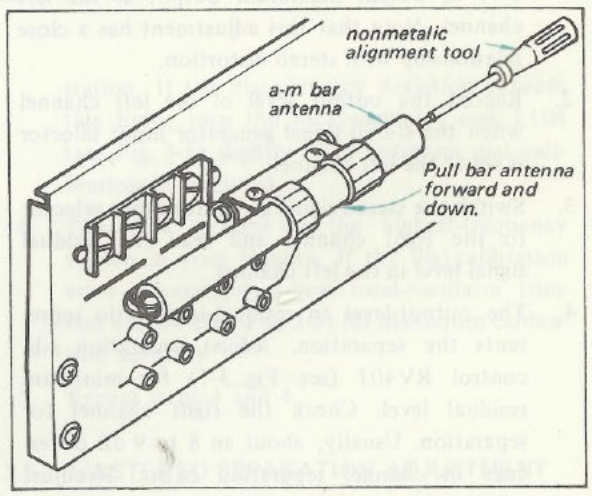


Fig. 3-9. A-m bar antenna core alignment

TABLE 3-4 A-M FREQUENCY COVERAGE AND TRACKING ALIGNMENT

A-M FREQUENCY COVERAGE ALIGNMENT			**SG Coupling .... Loop Antenna** **SG Output Level .... 400 Hz, 30% (as low as possible)**		
Step	**SG Frequency**	**Dial Setting**	**Ac VTVM Connection**	**Adjust**	**Indication**
1	550 kHz	550 kHz	REC OUT	OSC coil T301 (See Fig. 3-10.)	Maximum VTVM reading
2	1,600 kHz	1,600 kHz		OSC trimmer CT302 (See Fig. 3-10.)	
A-M TRACKING ALIGNMENT			**SG Coupling .... Loop Antenna** **SG Output Level .... 400 Hz, 30% (as low as possible)**		
1	600 kHz	Tune to the SG signal.	REC OUT	Bar antenna coil L904 (See Fig. 3-9.)	Maximum VTVM reading
2	1,400 kHz			Antenna trimmer CT301 (See Fig. 3-10.)	

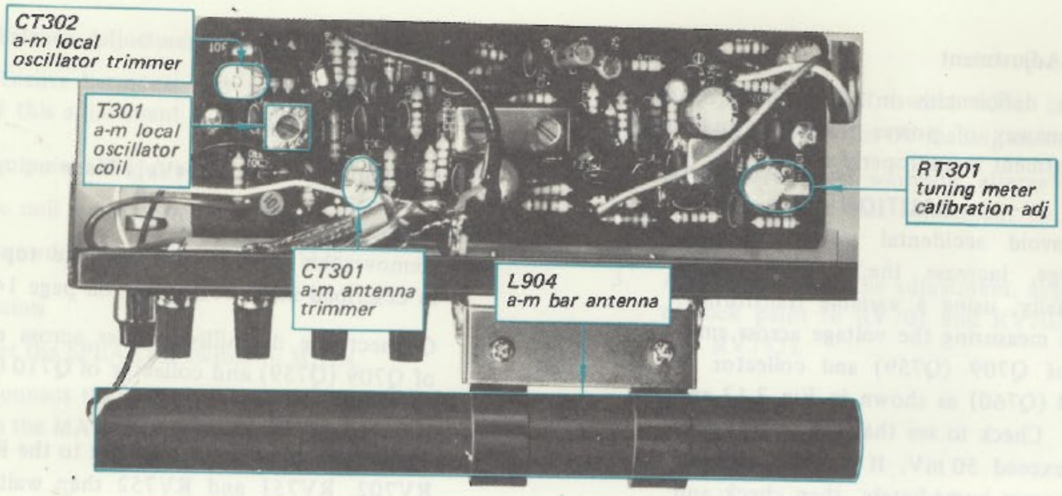


Fig. 3-10. Adjustment parts location

3-8. TUNING METER CALIBRATION

Test Equipment Required

1. Signal generator
2. Ac VTVM
3. Loop antenna
4. Alignment tools

Preparation

1. Remove the wooden case and the top cover as described in Procedure 2-1 on page 14.

Procedure

1. Connect the equipment as shown in Fig. 3-11.
2. Set the a-m signal generator and receiver controls as follows:

   Carrier frequency .... 1,000 kHz
   Output level .... 104 dB/m (160 mV/m) at a-m bar antenna
   Modulation (400 Hz) 30%
   VOLUME control .... Minimum
   FUNCTION switch .... AM
   MONITOR switch .... SOURCE

3. Precisely tune the receiver to the signal and adjust RT301 (see Fig. 3-10) to obtain the meter pointer within 2 mm (5/64") left of its maximum indication as shown in Fig. 3-12.

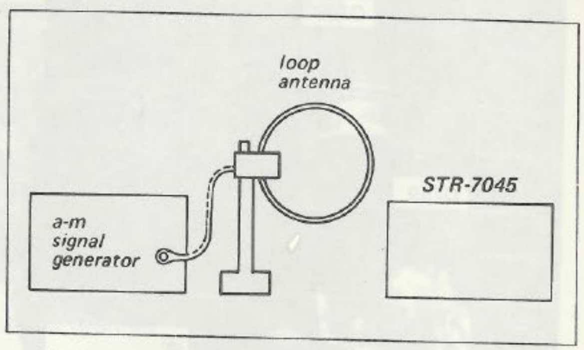


Fig. 3-11. Tuning meter calibration test setup

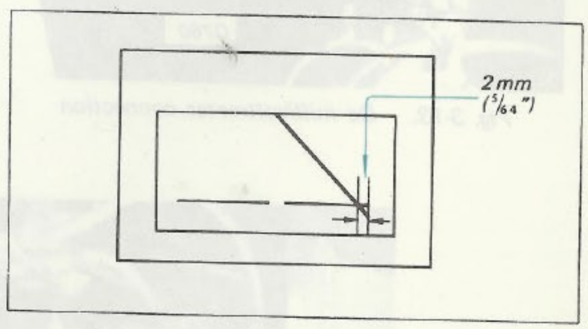


Fig. 3-12. Tuning meter calibration

3-9. POWER AMPLIFIER ADJUSTMENT

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

1. Dc-Bias Adjustment

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

CAUTION

To avoid accidental power transistor damage, increase the ac line voltage gradually, using a variable transformer, while measuring the voltage across emitter of Q709 (Q759) and collector of Q710 (Q760) as shown in Fig. 3-13 and 3-14. Check to see that the reading does not exceed 50 mV. If it does, turn off the power immediately, then check and repair the trouble in the power amplifier board.

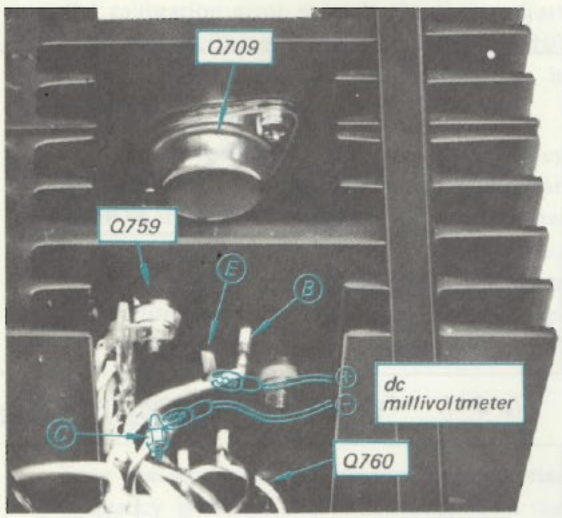


Fig. 3-13. Dc millivoltmeter connection

Test Equipment Required

1. Dc millivoltmeter
2. Variable transformer
3. Screwdriver with 3 mm (1/8") blade

Preparation

1. Remove the wooden case and the top cover as described in Procedure 2-1 on page 14.
2. Connect the dc millivoltmeter across emitter of Q709 (Q759) and collector of Q710 (Q760) as shown in Fig. 3-13 and 3-14.
3. Apply a drop of cement solvent to the RV701, RV702, RV751 and RV752 then wait a few seconds for the cement to dissolve.

Procedure

1. Set the adjustable resistors (see Fig. 3-15) on the power-amplifier board as follows:
   RV702 .... fully
   (L-CH, dc bias) counterclockwise
   RV752
   (R-CH, dc bias)........... fully clockwise
   RV701, RV751
   (dc balance) .... mid-position
2. Set the variable transformer for minimum output.
3. Turn the POWER switch ON, and increase the line voltage up to the rated value.
4. Adjust RV702 and RV752 to obtain a 50 mV reading on the meter, and perform the dc-balance adjustment.

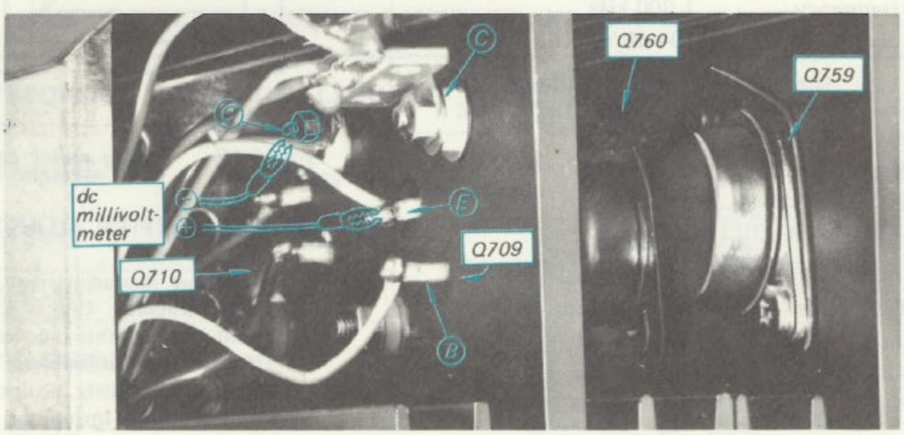


Fig. 3-14. Dc millivoltmeter connection

2. Dc-Balance Adjustment

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

Test Equipment Required

1. Dc null meter or dc millivoltmeter
2. Screwdriver with 3 mm (1/8") blade

Preparation

1. Set the SPEAKER switch to MAIN.
2. Connect the dc null meter or dc millivoltmeter to the MAIN speaker output terminal.

Procedure

1. Turn the POWER switch ON, and adjust RV701 (RV751) for 0V reading on the meter.
2. After 10 minutes warm-up, alternately repeat this and the dc bias adjustment two or three times.
3. After completing the adjustment, apply a drop of lock paint to RV701 and RV702 (RV751 and RV752).

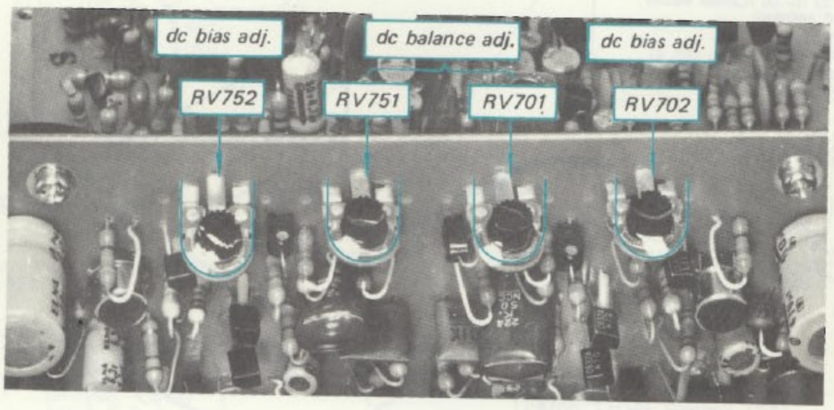


Fig. 3-15. Adjustment parts location

SECTION 4
REPACKING

The STR-7045 original shipping carton and packing material are the ideal container for shipping the unit. However to secure the maximum protection, the STR-7045 must be repacked in these materials precisely as before. The proper repacking procedures are shown in Fig. 4-1.

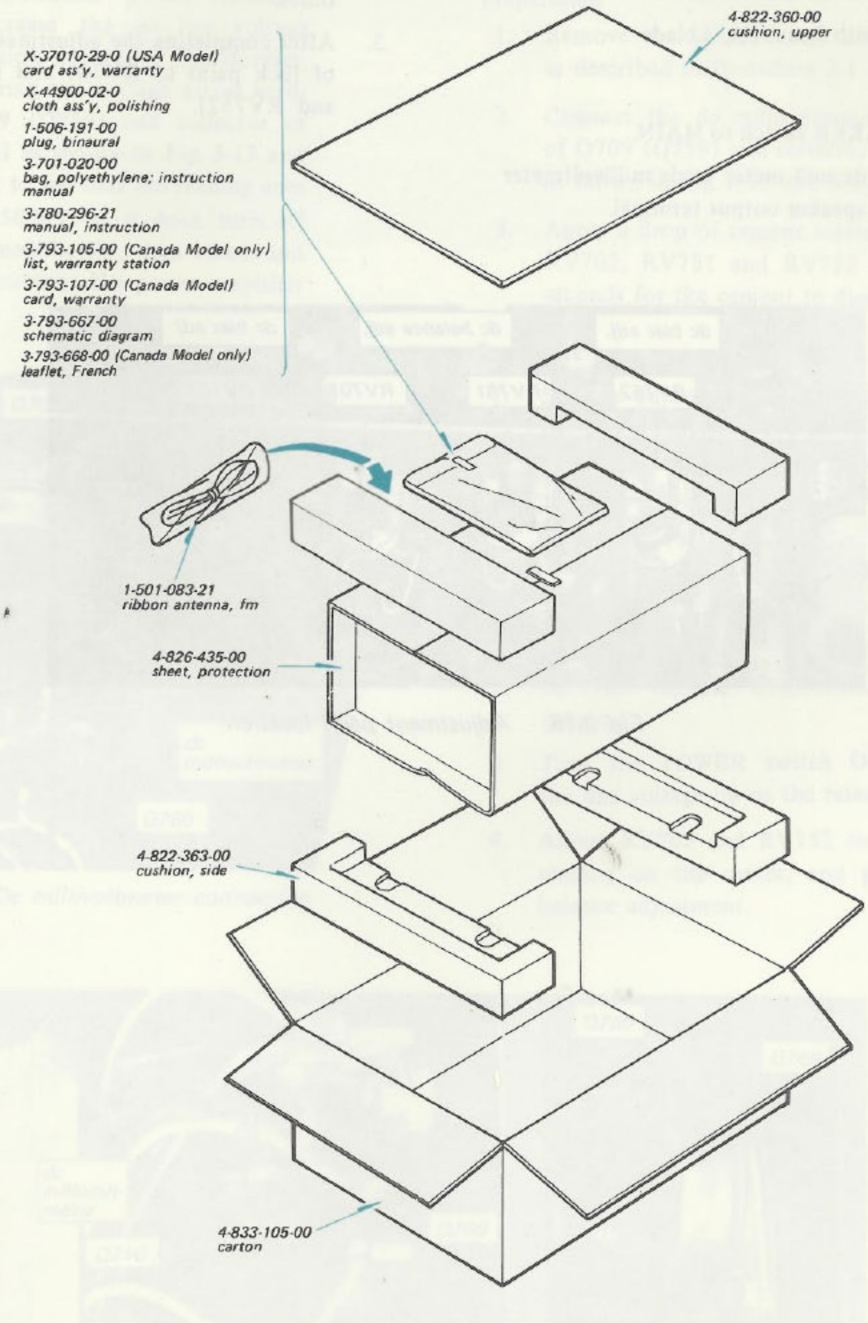


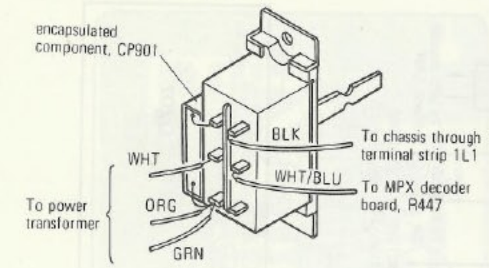
Fig. 4-1. Repacking

Note: Applicable Serial Numbers:
USA Model .... 800,001 and later
Canada Model .... 700,001 and later

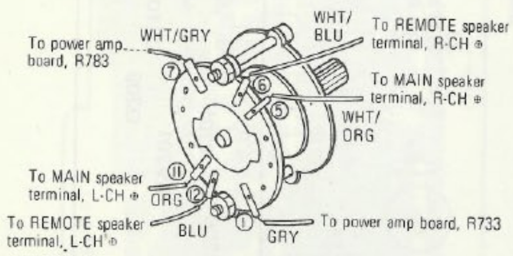
SECTION 5
DIAGRAMS

5-1. WIRING FOR SWITCHES – Front Panel –

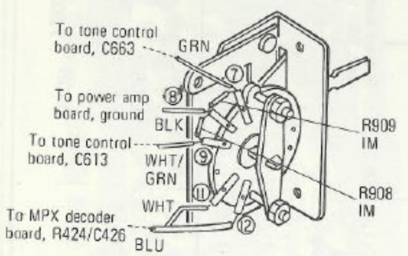
POWER Switch (S9)



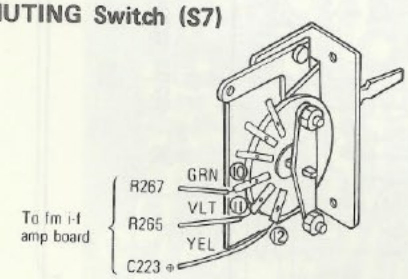
SPEAKER Switch (S8)



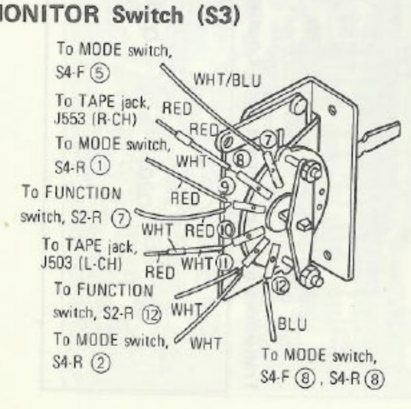
HIGH FILTER Switch (S6)



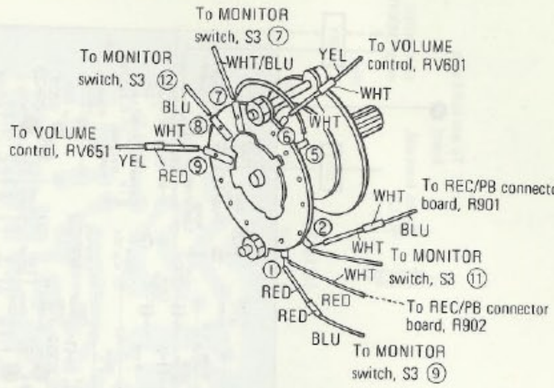
MUTING Switch (S7)



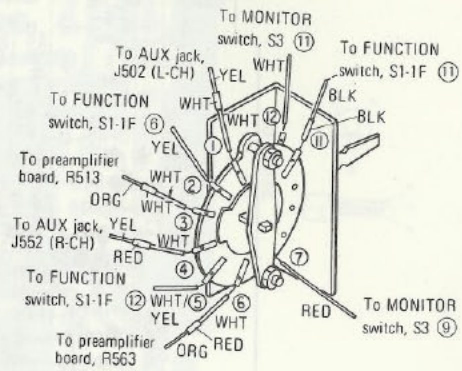
MONITOR Switch (S3)



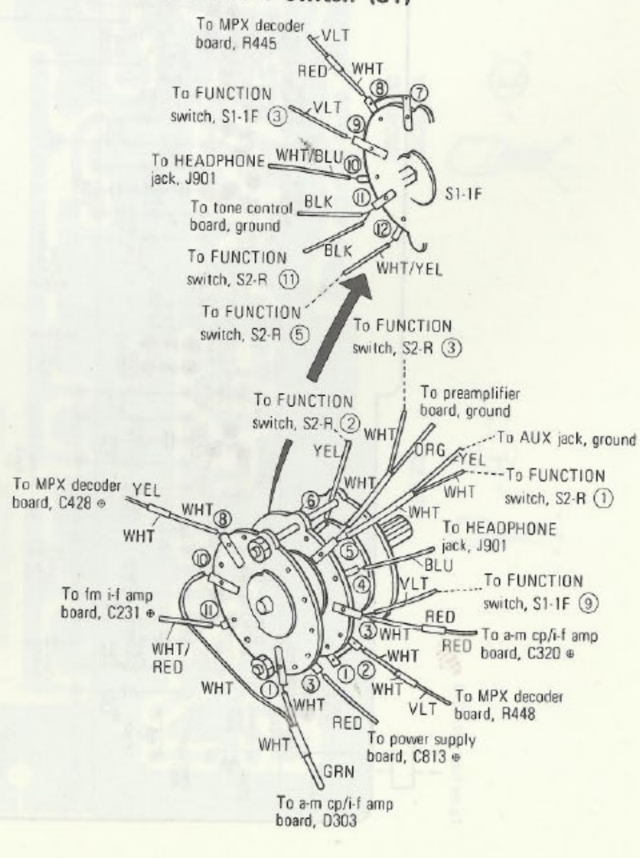
MODE Switch (S4)



FUNCTION Switch (S2)

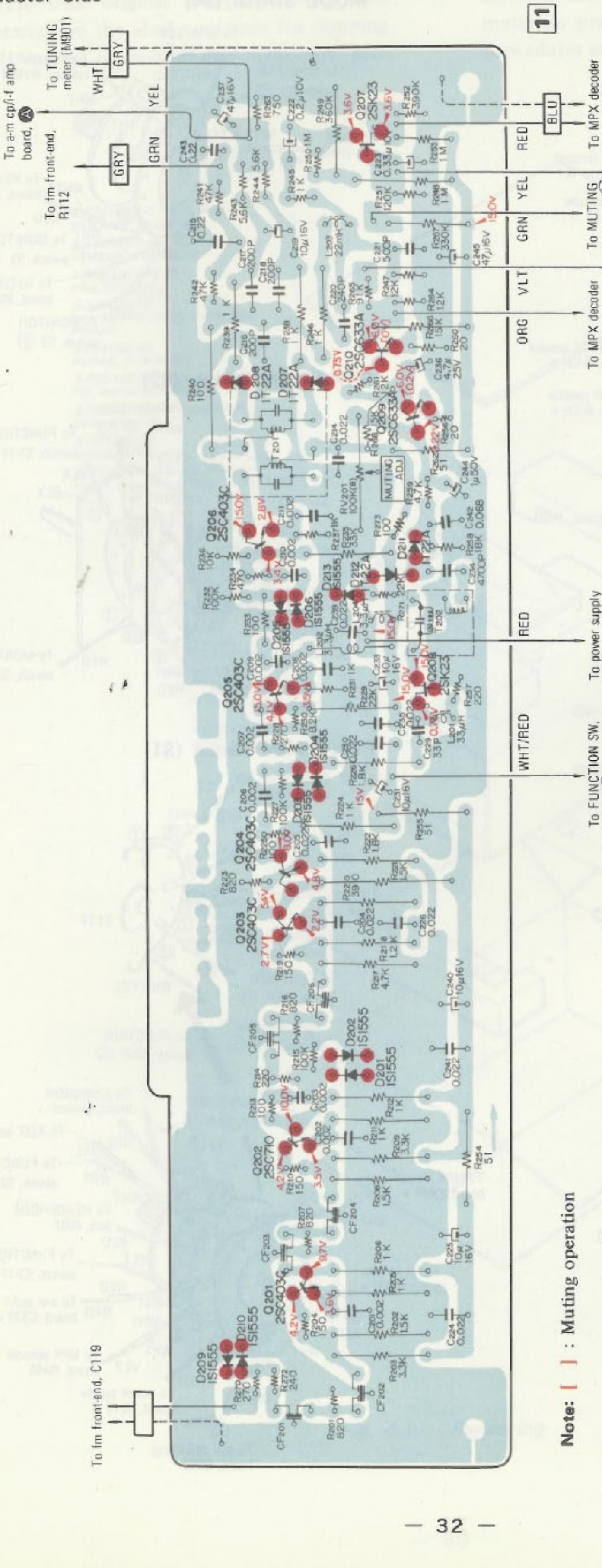


FUNCTION Switch (S1)



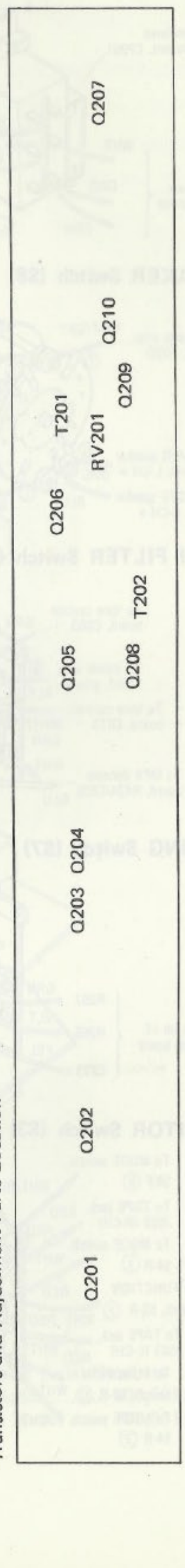
5-2. MOUNTING DIAGRAM – Fm I-f Amp Board –

– Conductor Side –

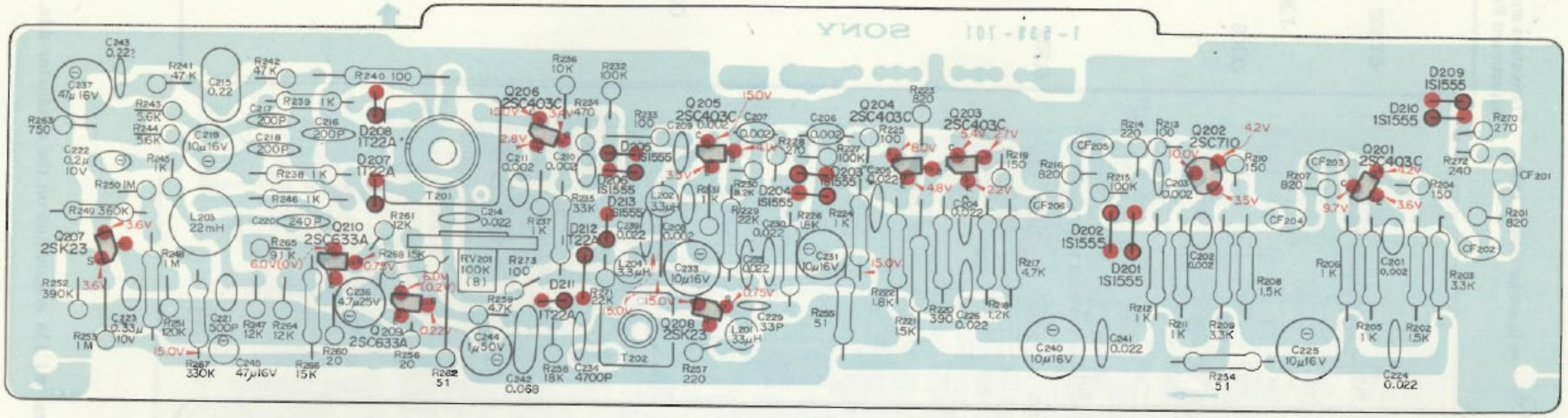


Note: [ ] : Muting operation

Transistors and Adjustment Parts Location

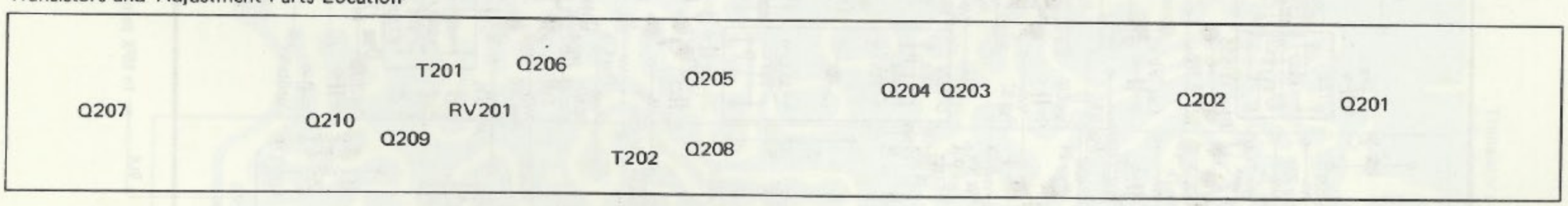


— Component Side —



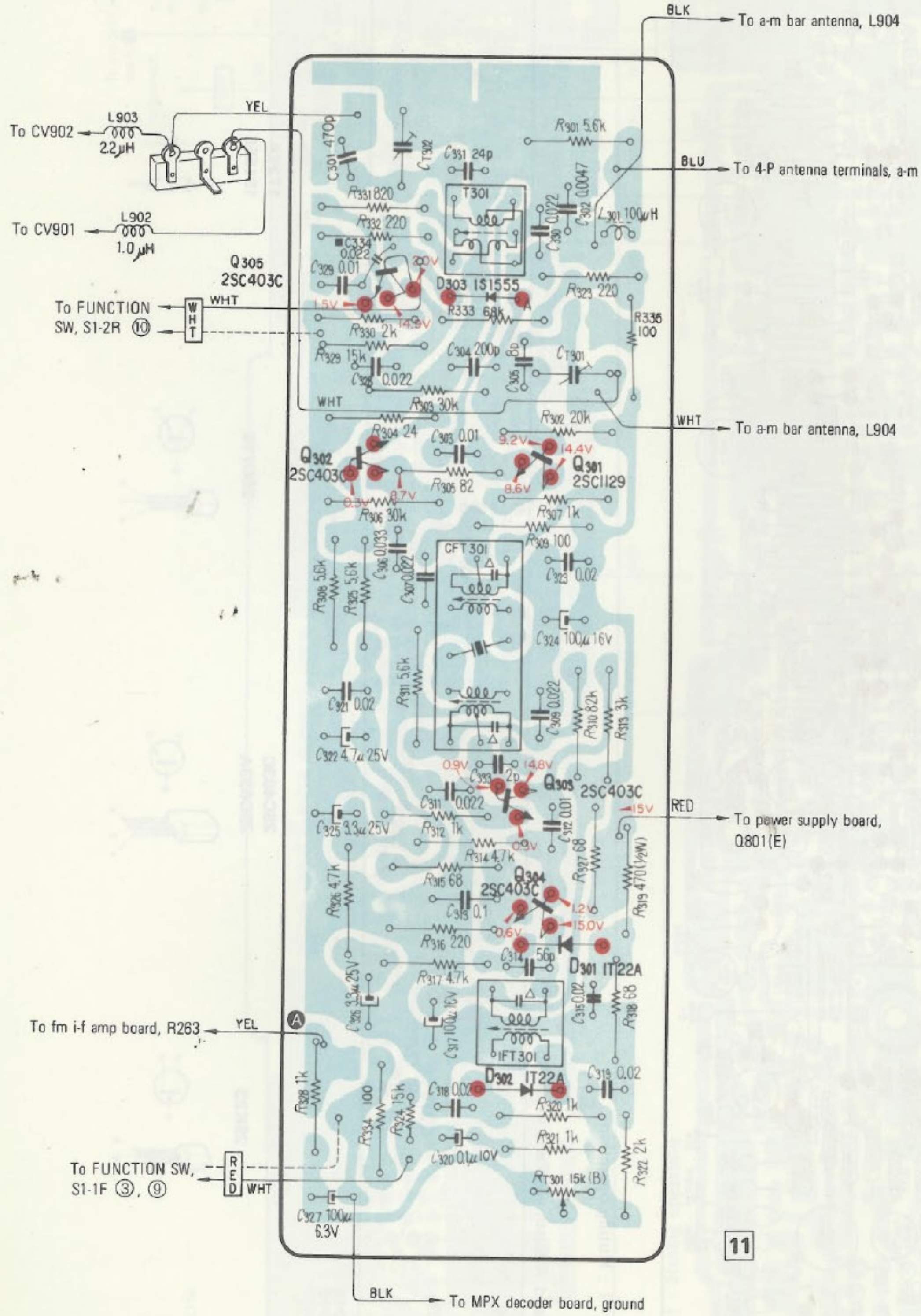
Note: [ ] : Muting operation

Transistors and Adjustment Parts Location

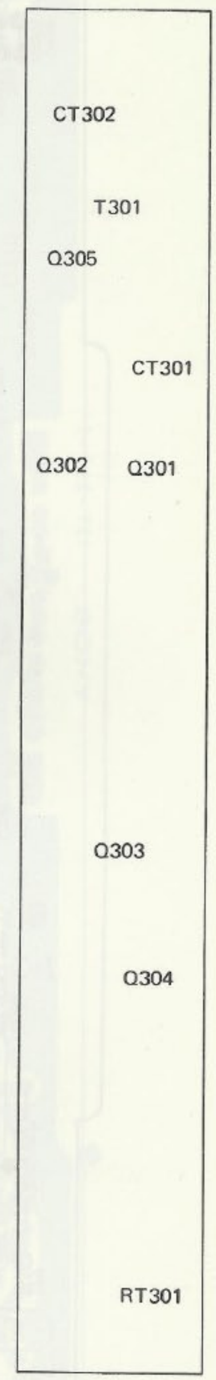


5-3. MOUNTING DIAGRAM – A-m Cp/I-f Amp Board –

– Conductor Side –

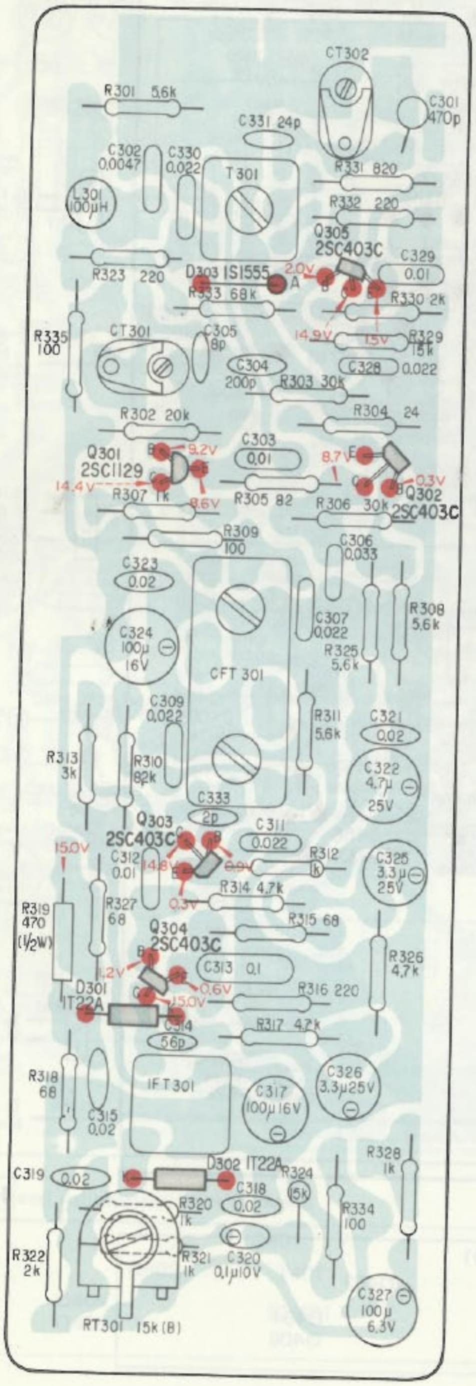


Transistors and Adjustment Parts Location

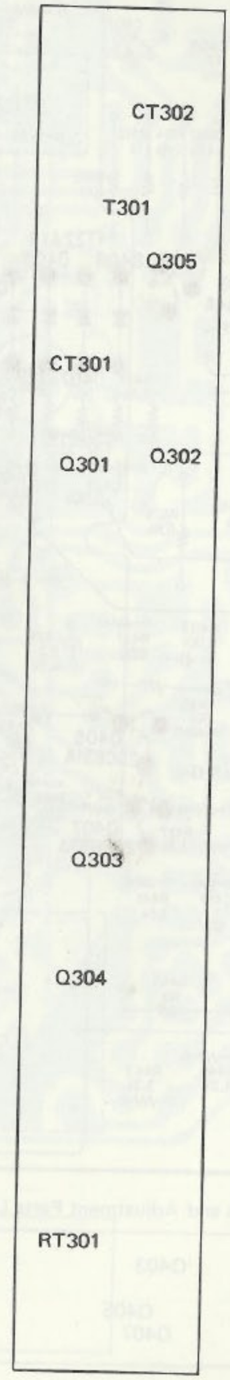


Note: ■ C334 is mounted on the conductor side.

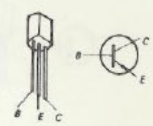
– Component Side –



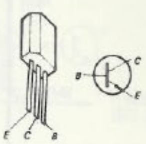
Transistors and Adjustment Parts Location



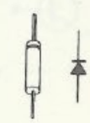
2SC1129



2SC403C

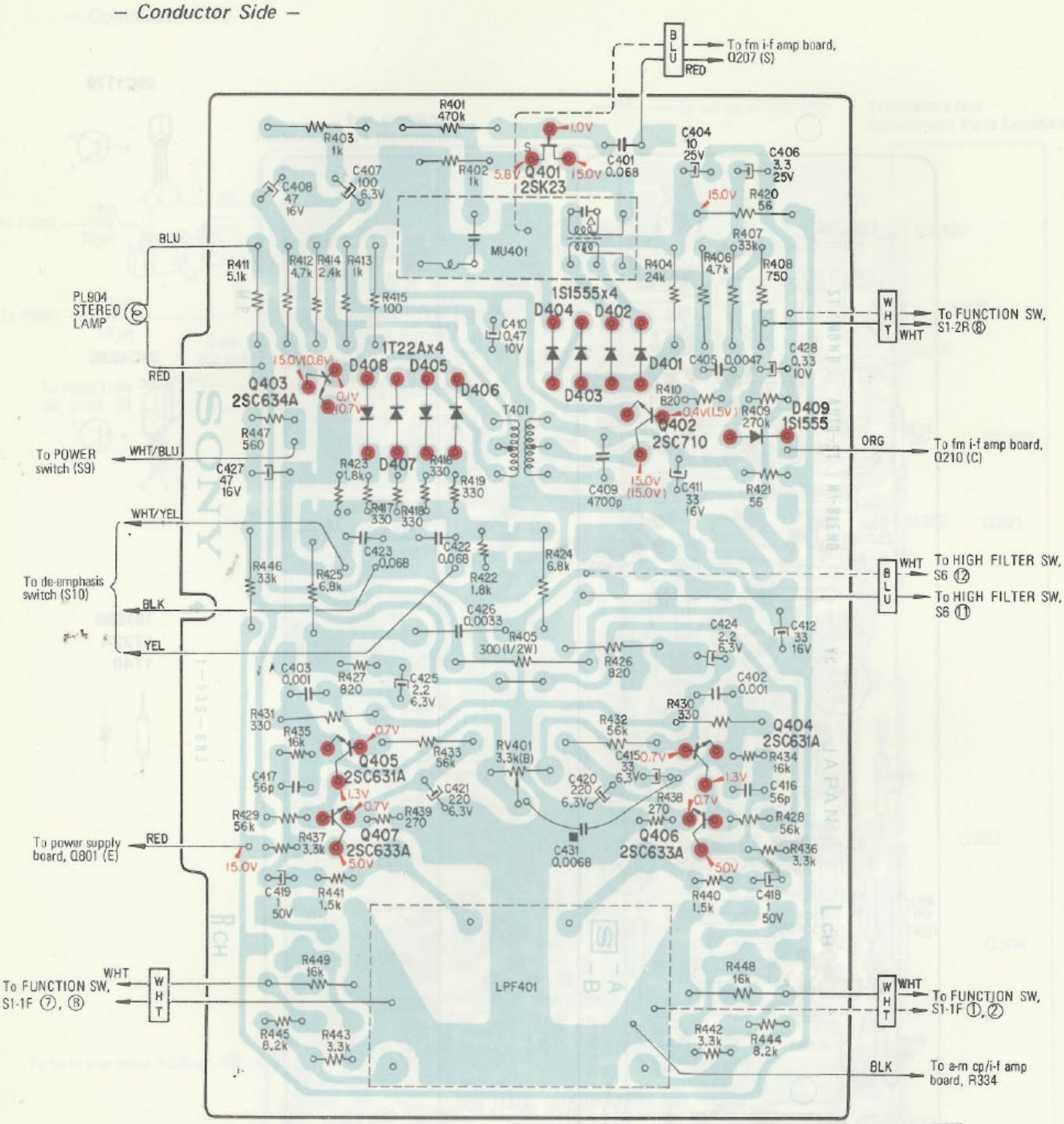


1S1555
1T22A
1T40



5-4. MOUNTING DIAGRAM – MPX Decoder Board –

– Conductor Side –

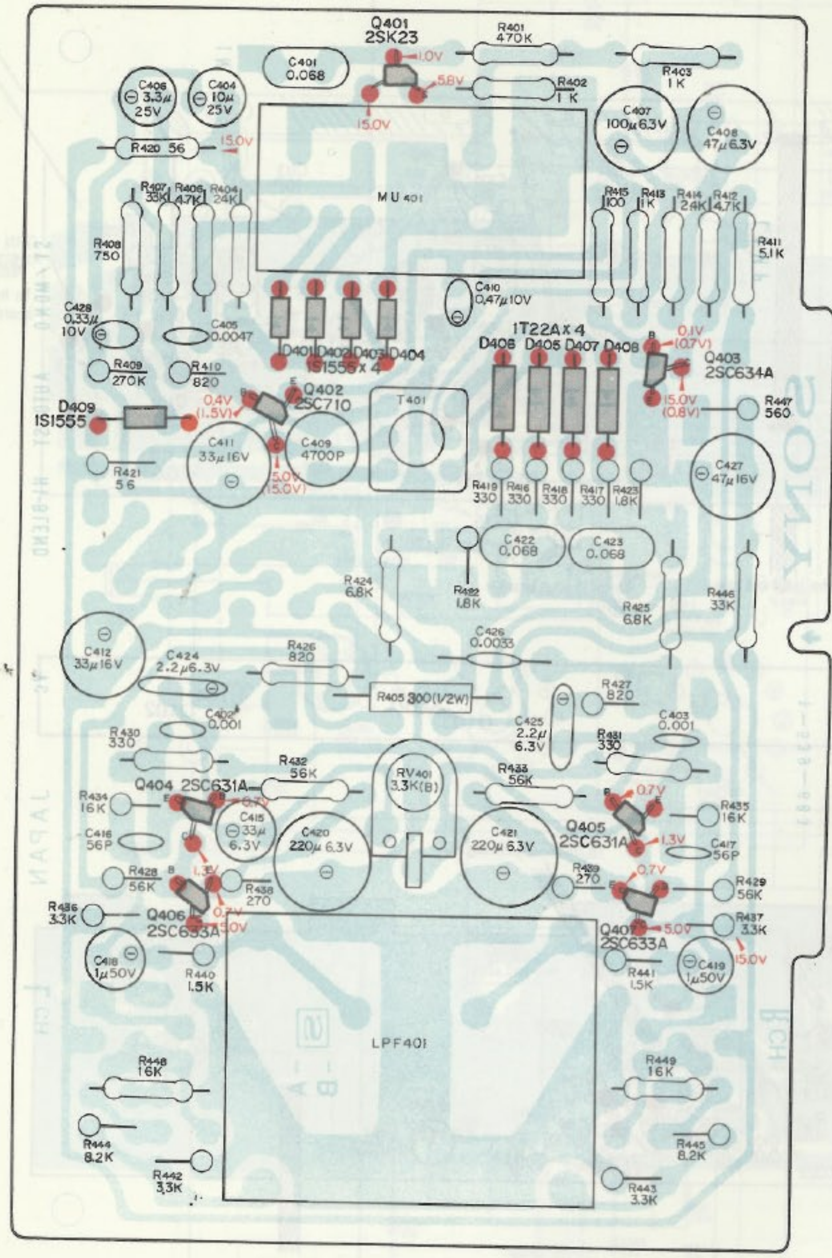


Transistors and Adjustment Parts Location

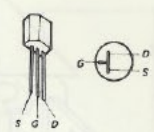
Q403	Q401 T401	Q402
Q405 Q407	RV401	Q404 Q406

Note: ■ C431 is mounted on the conductor side.
( ) Stereo operation

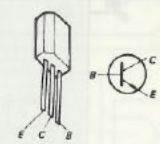
– Component Side –



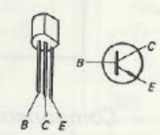
2SK23



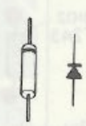
2SC631A
2SC633A
2SC634A



2SC710



1T22A
1S1555



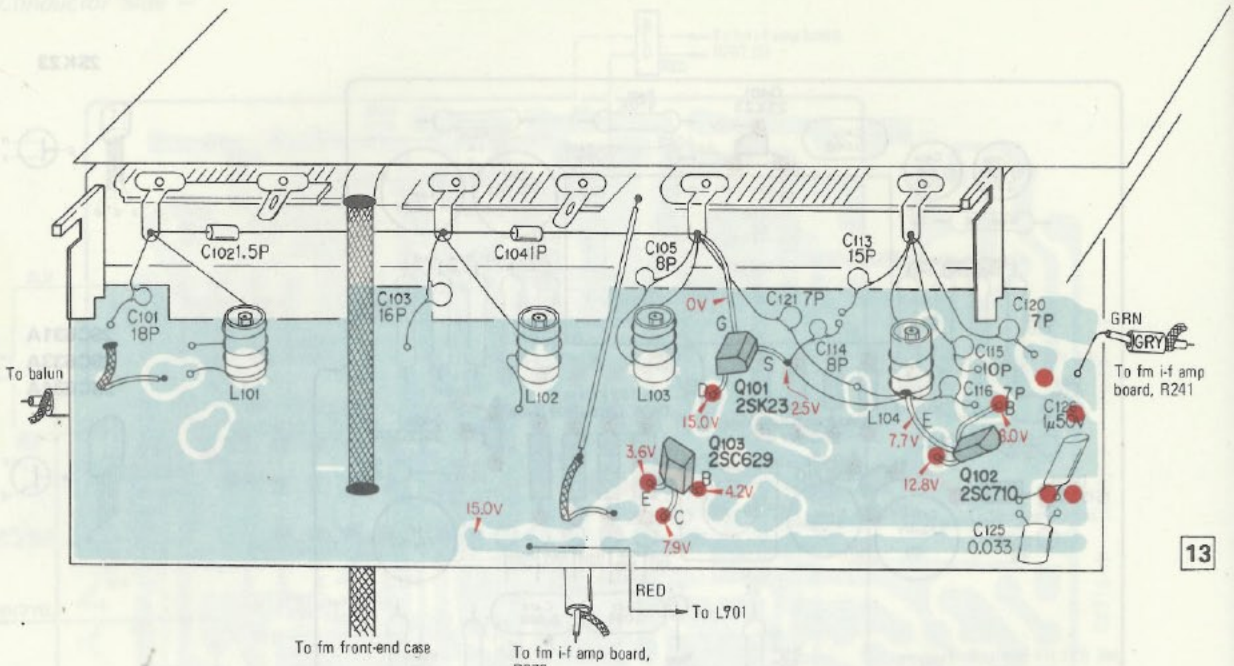
Transistors and Adjustment Parts Location

		Q401	Q403
	Q402	T401	
Q404		RV401	Q405
Q406			Q407

Note: ( ) Stereo operation

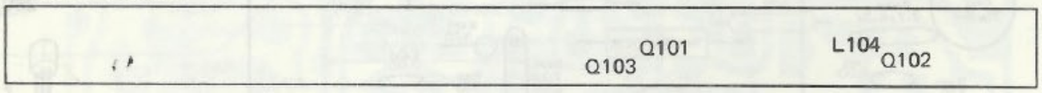
5-5. MOUNTING DIAGRAM – Fm Front-End –

– Conductor Side –

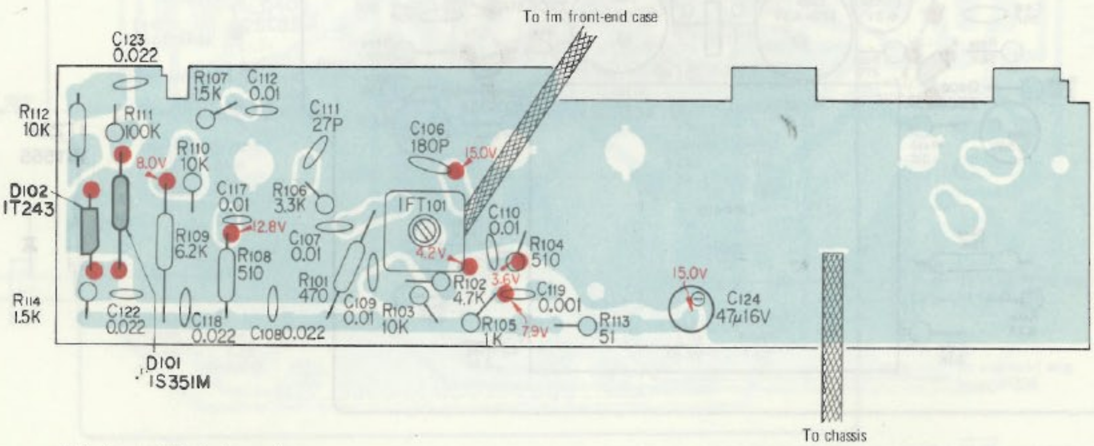


13

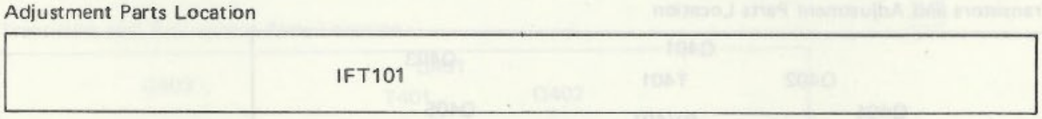
Transistor Location



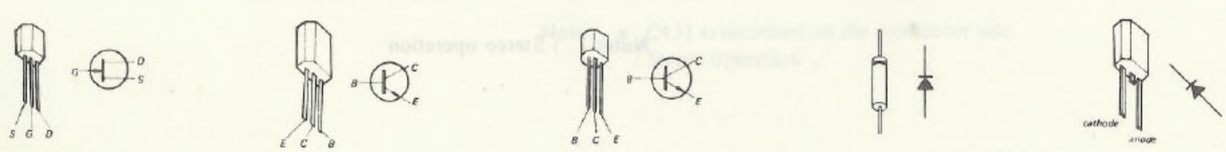
– Component Side –



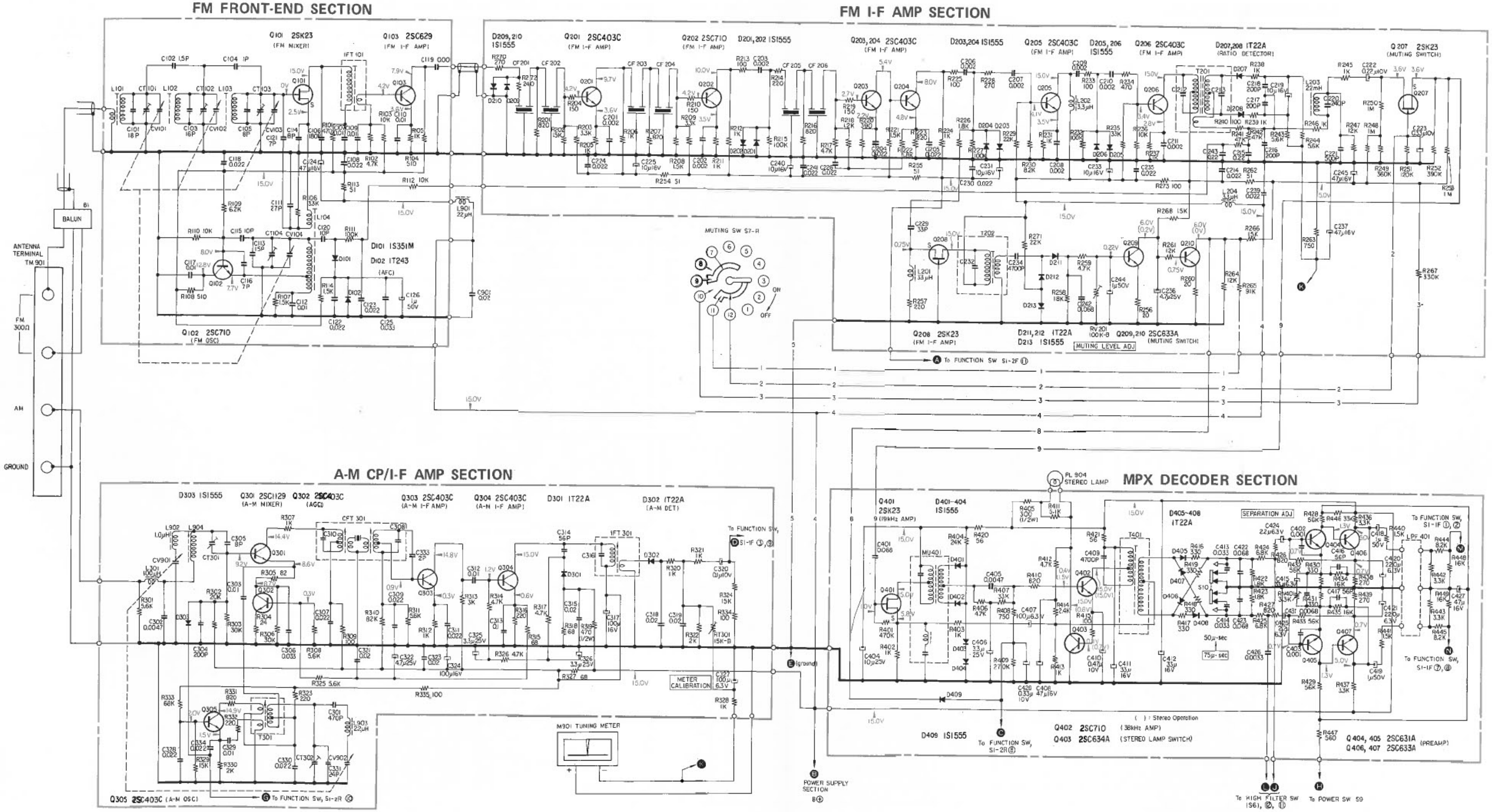
Adjustment Parts Location



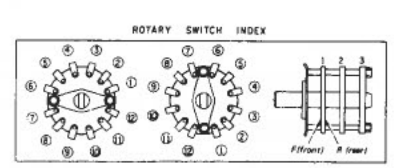
2SK23 2SC629 2SC710 1S351M 1T243



5-6. SCHEMATIC DIAGRAM — Tuner Section —



Ref. No.	Function	Position
S7	MUTING SW	ON
S10	DE-EMPHASIS SW (50 μsec — 75 μsec)	75 μsec



Note:

All resistance values are in ohms. k = 1,000, M = 1,000k

All capacitance values are in μF except as indicated with p, which means μμF.

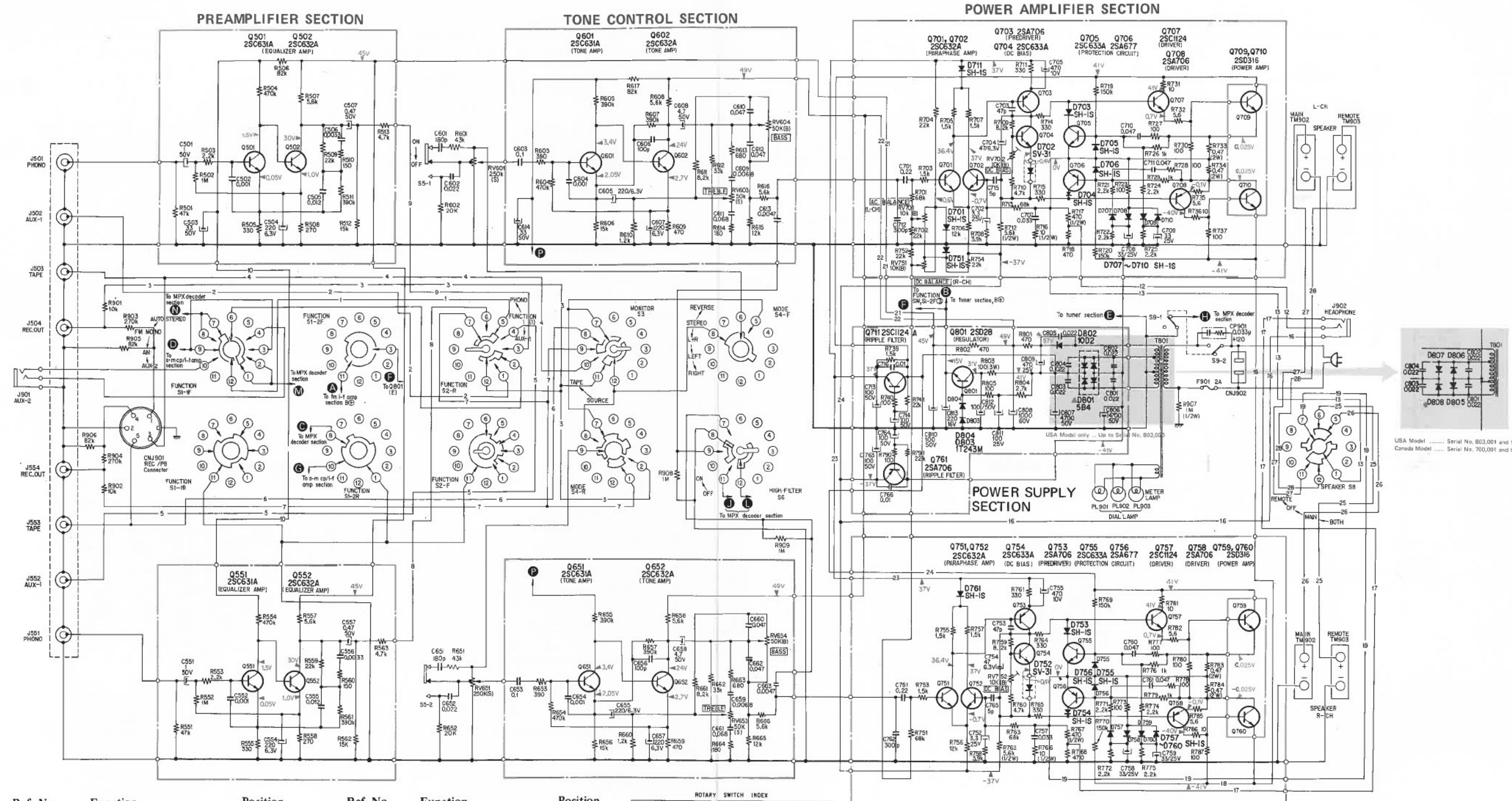
All voltages are dc measured with a VOM which has an input impedance of 20k ohms/volt. No signal in.

Voltage variations may be noted due to normal production tolerances.

( ) : Stereo operation

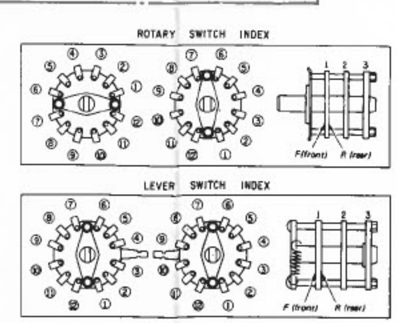
[ ] : Muting operation

5-7. SCHEMATIC DIAGRAM — Audio Amp Section —



Ref. No.	Function	Position
S1-1~2	FUNCTION (1) SW (AUTO STEREO - FM MONO - AM - AUX - 2)	AUTO STEREO
S2	FUNCTION (2) SW (AUX-1 - FUNCTION (1) - PHONO)	FUNCTION (1)
S3	MONITOR SW (SOURCE - TAPE)	SOURCE
S4	MODE SW (REVERSE - STEREO - L+R - LEFT - RIGHT)	STEREO

Ref. No.	Function	Position
S5-1~2	LOUDNESS SW	ON
S6	HIGH FILTER SW	OFF
S8	SPEAKER SW (REMOTE - OFF - MAIN - BOTH)	BOTH
S9-1~2	POWER SW	OFF



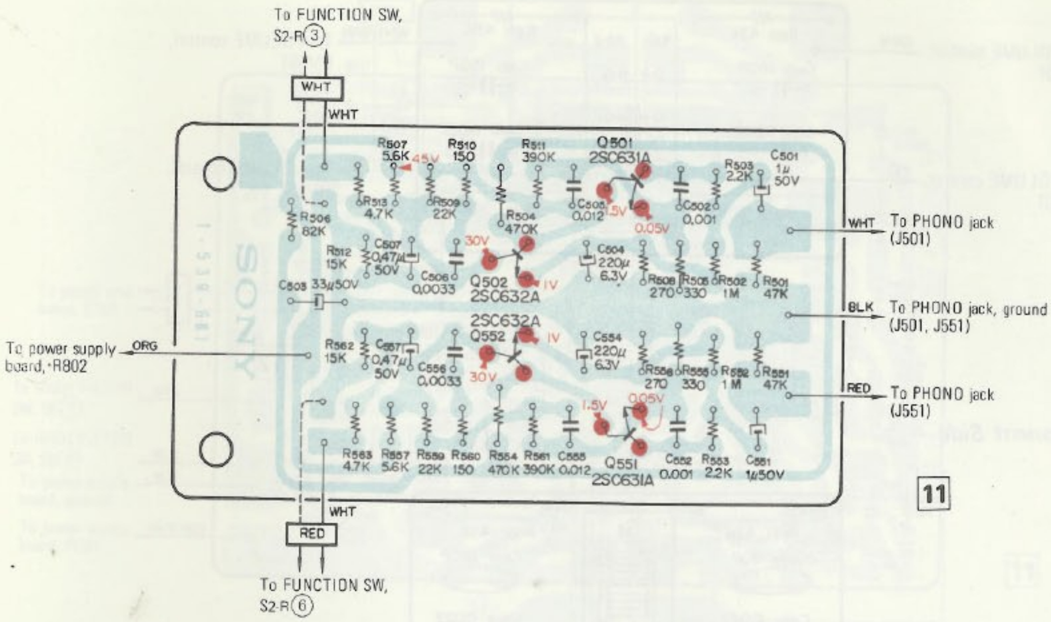
Note:

All resistance values are in ohms. k = 1,000, M = 1,000k
All capacitance values are in μF except as indicated with p, which means μμF.
All voltages are dc measured with a VOM which has an input impedance of 20k ohms/volt. No signal in.
Voltage variations may be noted due to normal production tolerances.

▲	D801	5B4	(USA Model only ...... Up to Serial No. 803,000)
●	D805 ~ D808	UO-5E	(USA Model ...... Serial No. 803,001 and later) (Canada Model ... Serial No. 700,001 and later)

5-8. MOUNTING DIAGRAM – Preamplifier Board –

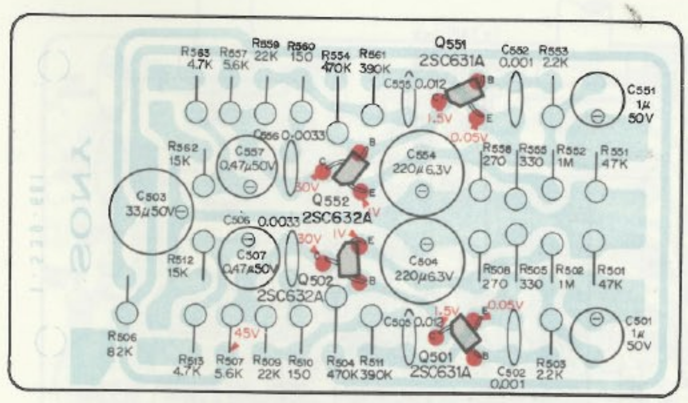
– Conductor Side –



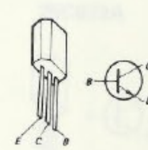
Transistor Location

	Q501
Q502	
Q552	
	Q551

– Component Side –



2SC631A
2SC632A

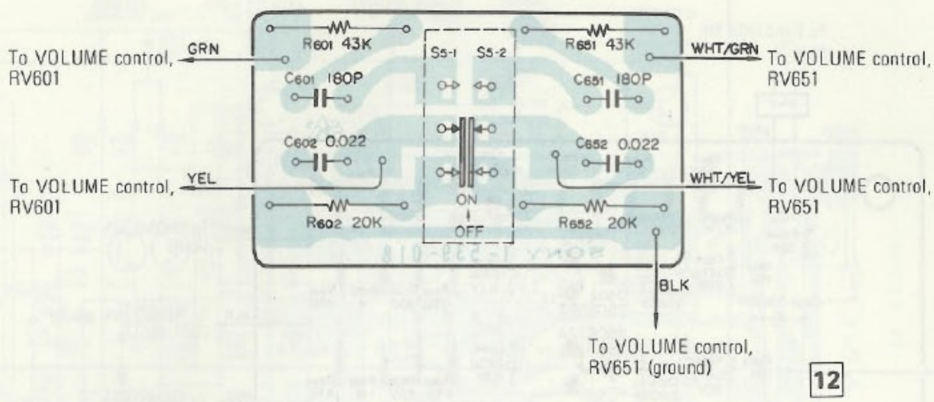


Transistor Location

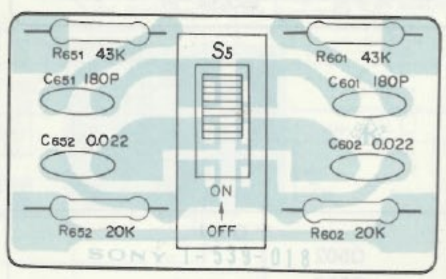
	Q551
Q552	
Q502	
	Q501

5-9. MOUNTING DIAGRAM – Loudness Control Board –

– Conductor Side –

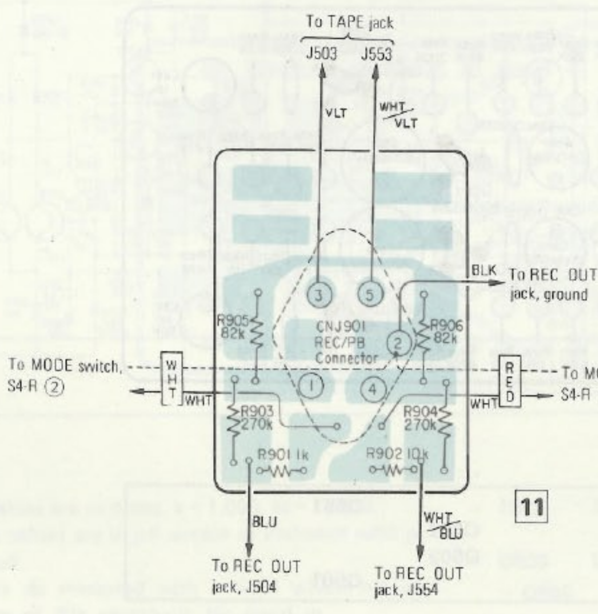


– Component Side –



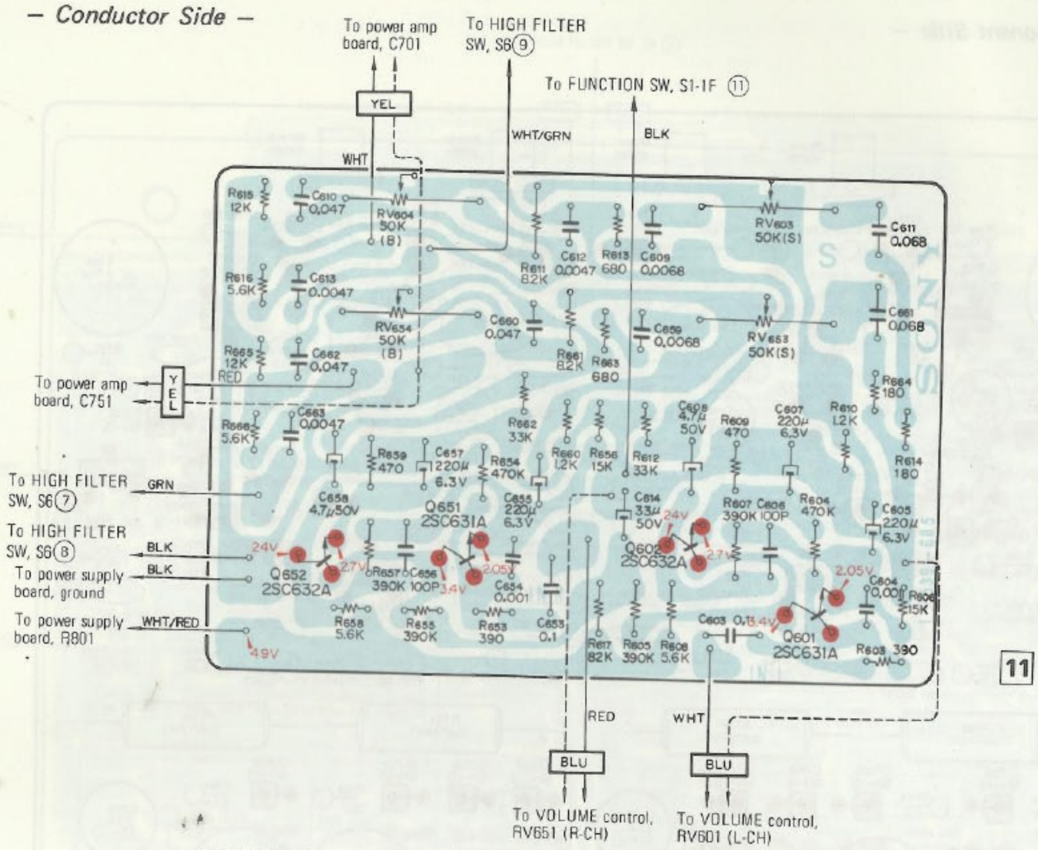
5-10. MOUNTING DIAGRAM – REC/PB Connector Board –

– Conductor Side –



5-11. MOUNTING DIAGRAM – Tone Control Board –

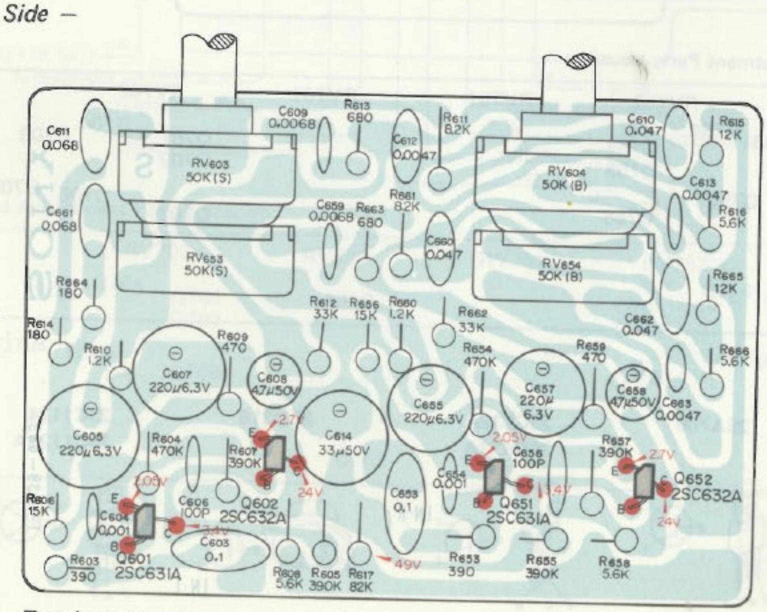
– Conductor Side –



Transistor Location

Q652	Q651	Q602	Q601

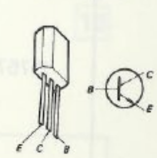
– Component Side –



Transistor Location

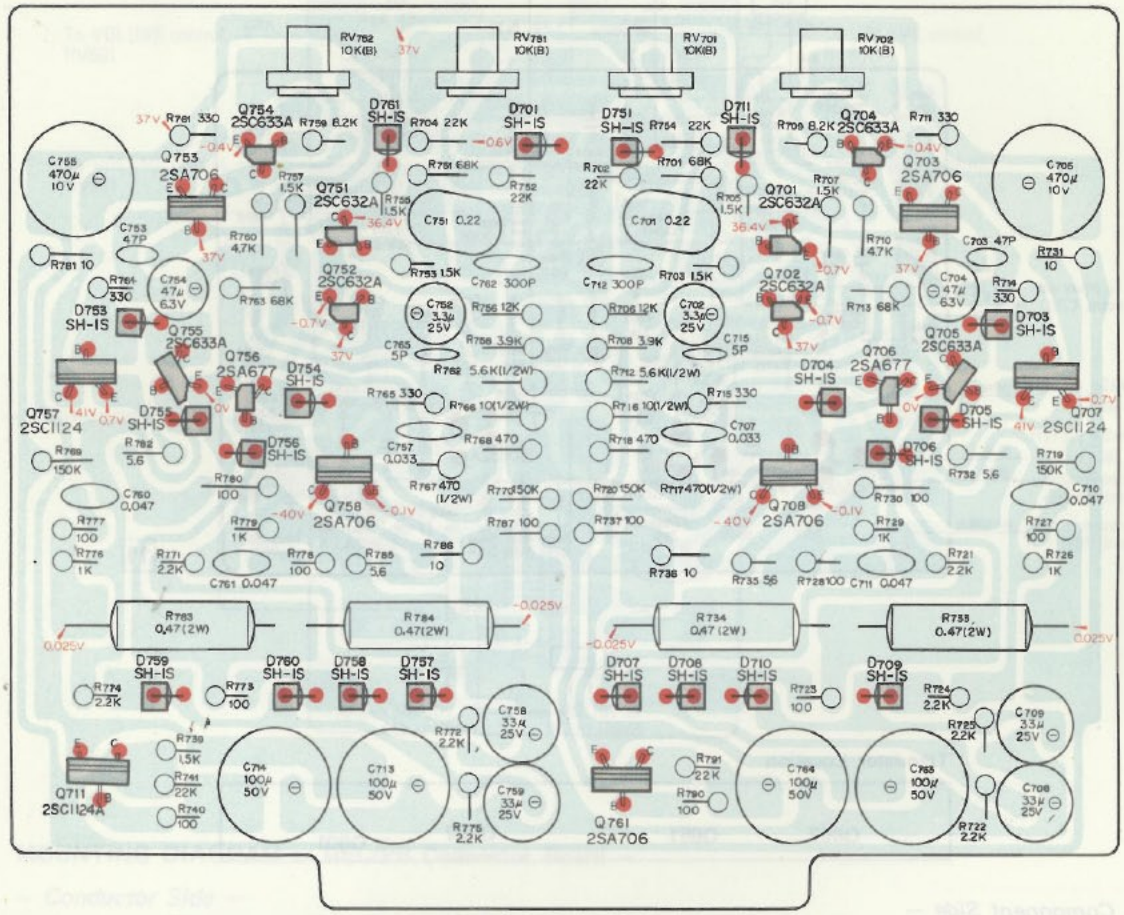
Q601	Q602	Q651	Q652

2SC631A
2SC632A

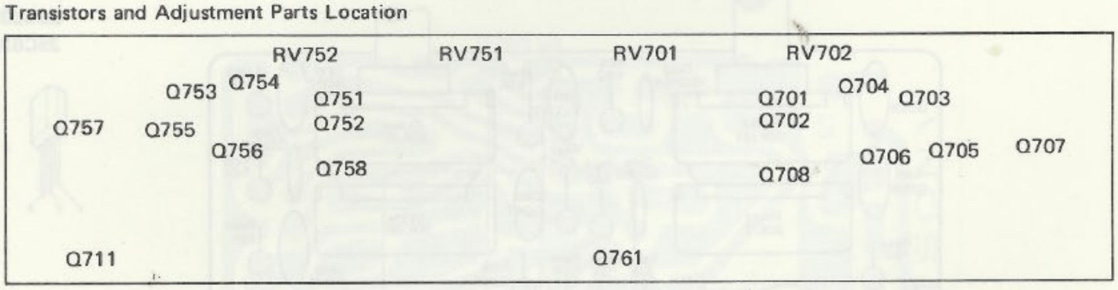


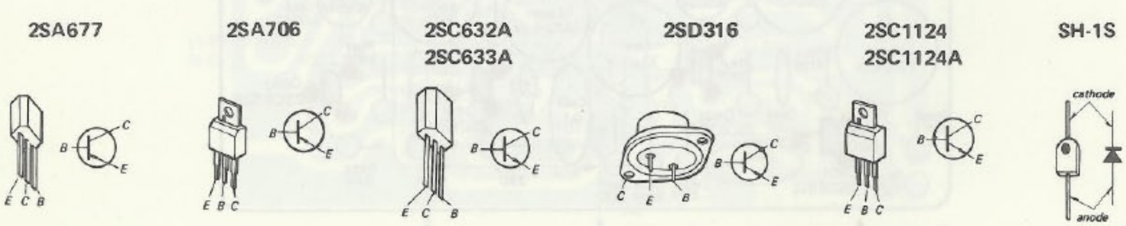
5-12. MOUNTING DIAGRAM – Power Amplifier Board –

– Component Side –

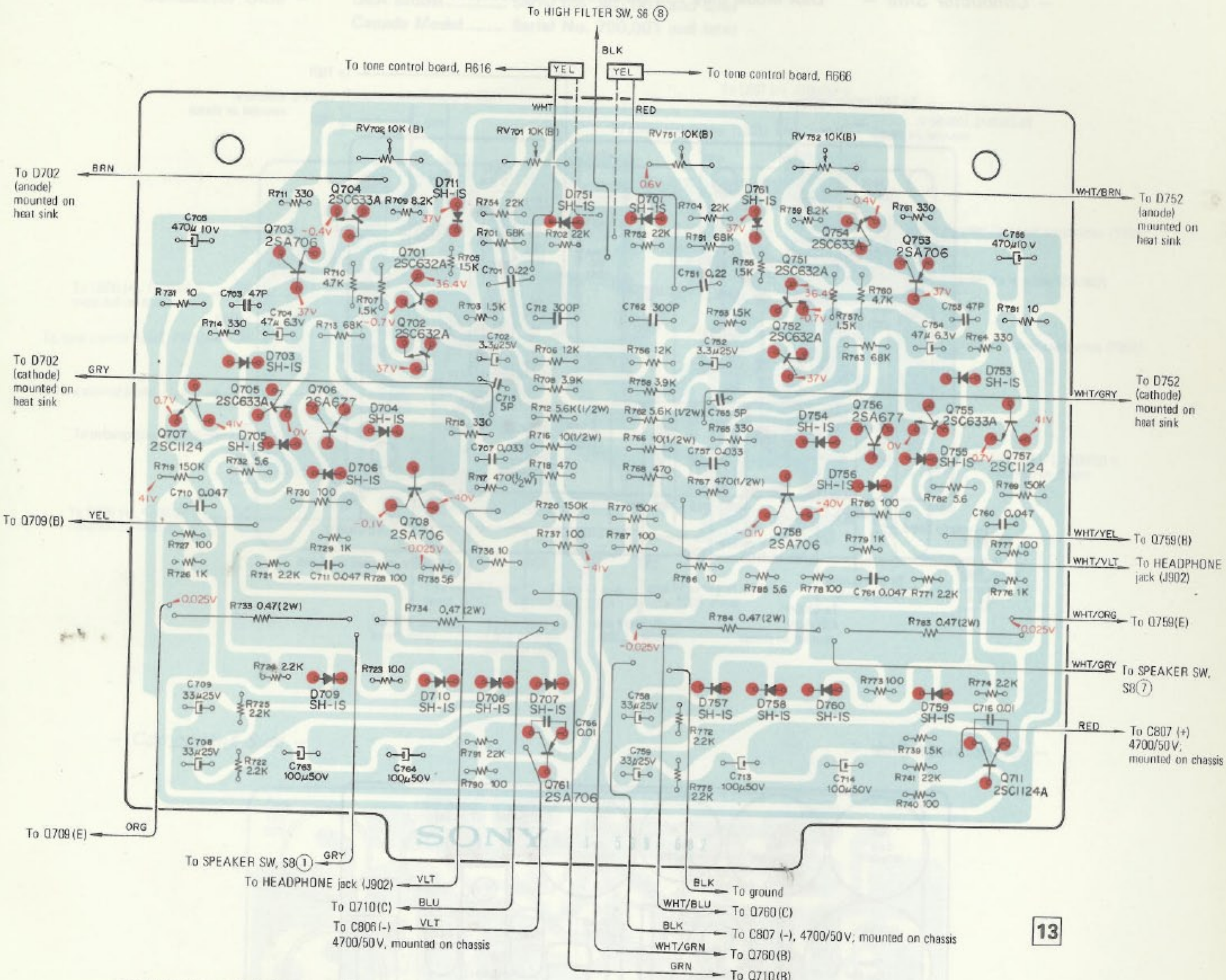


Transistors and Adjustment Parts Location



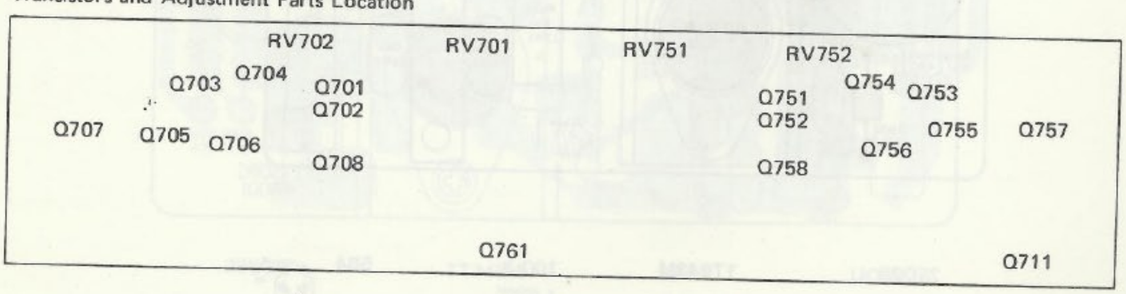


— Conductor Side —



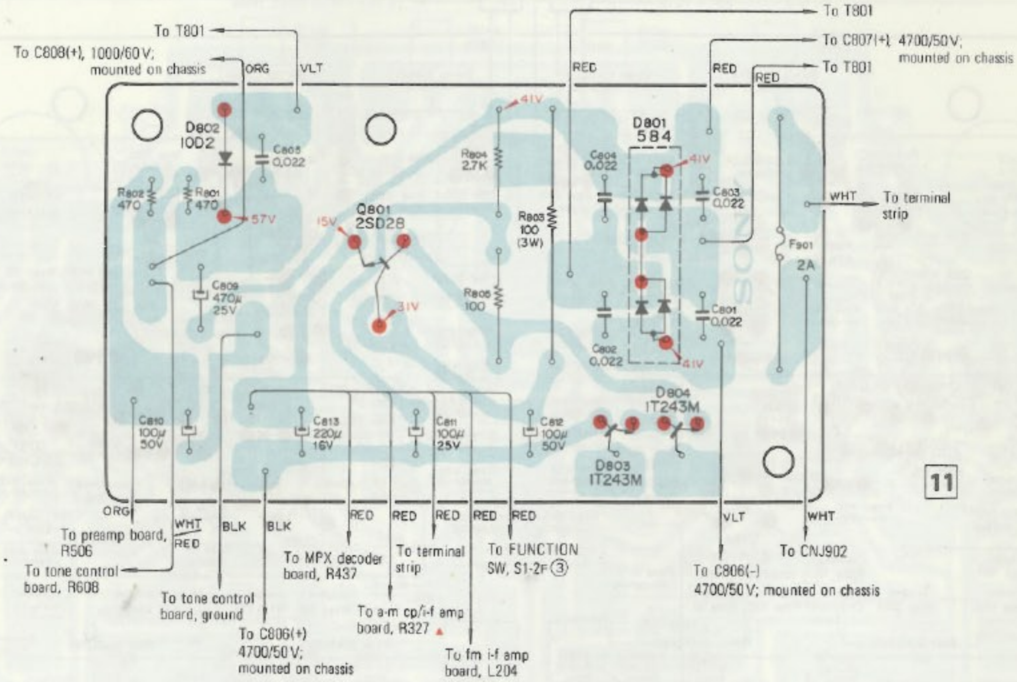
13

Transistors and Adjustment Parts Location

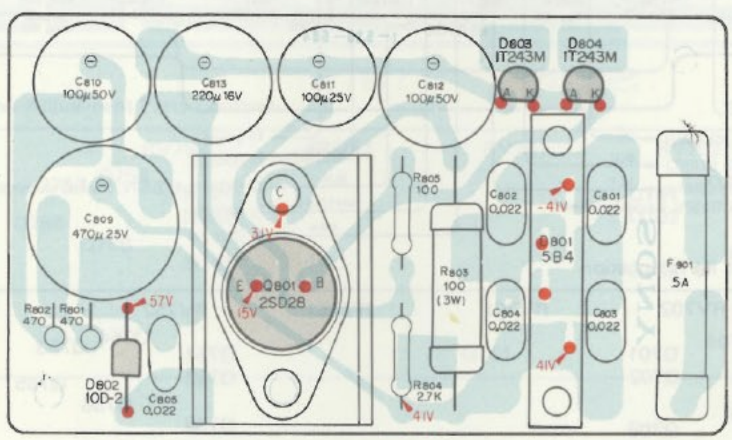


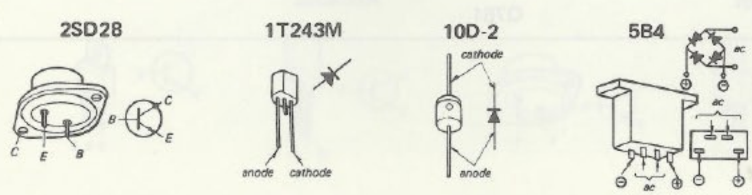
5-13. MOUNTING DIAGRAM – Power Supply Board –

– Conductor Side – **USA Model only ...... Up to Serial No. 803,000**



– Component Side –

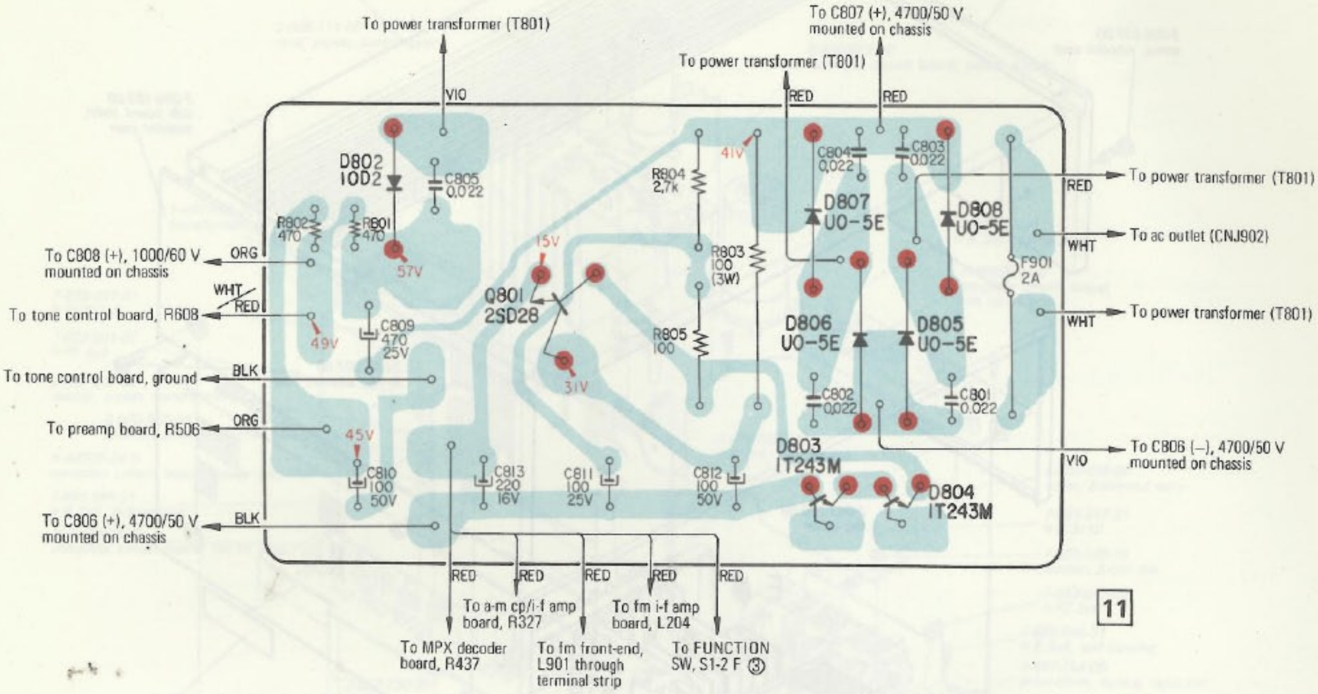




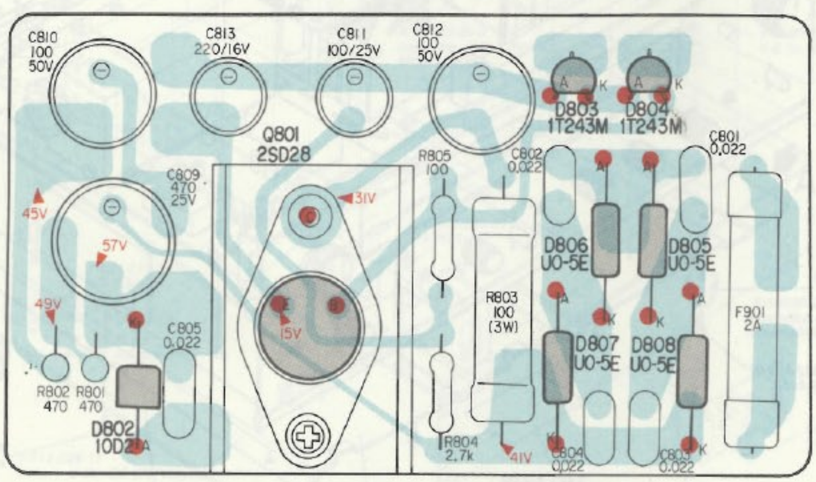
5-13. MOUNTING DIAGRAM – Power Supply Board –

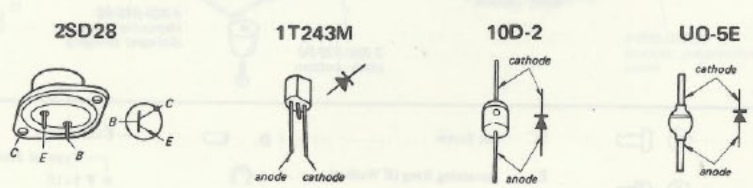
– Conductor Side –

USA Model .... Serial No. 803,001 and later
Canada Model .... Serial No. 700,001 and later



– Component Side –

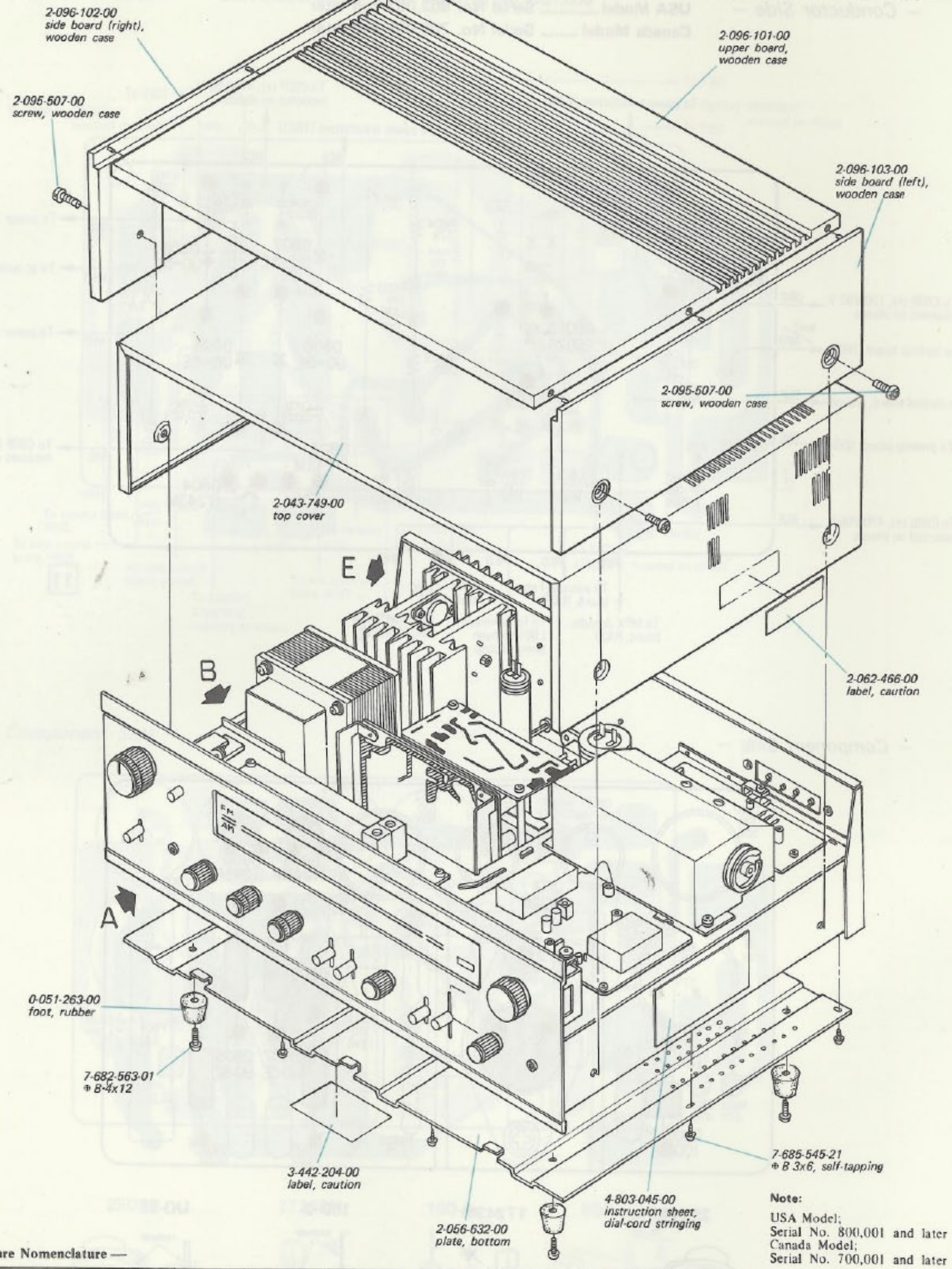




SECTION 6
EXPLODED VIEWS

(1)

Note: All screws in this service manual are Phillips type (cross recess type) unless otherwise indicated. (–): slotted head.



Note:
USA Model;
Serial No. 800,001 and later
Canada Model;
Serial No. 700,001 and later

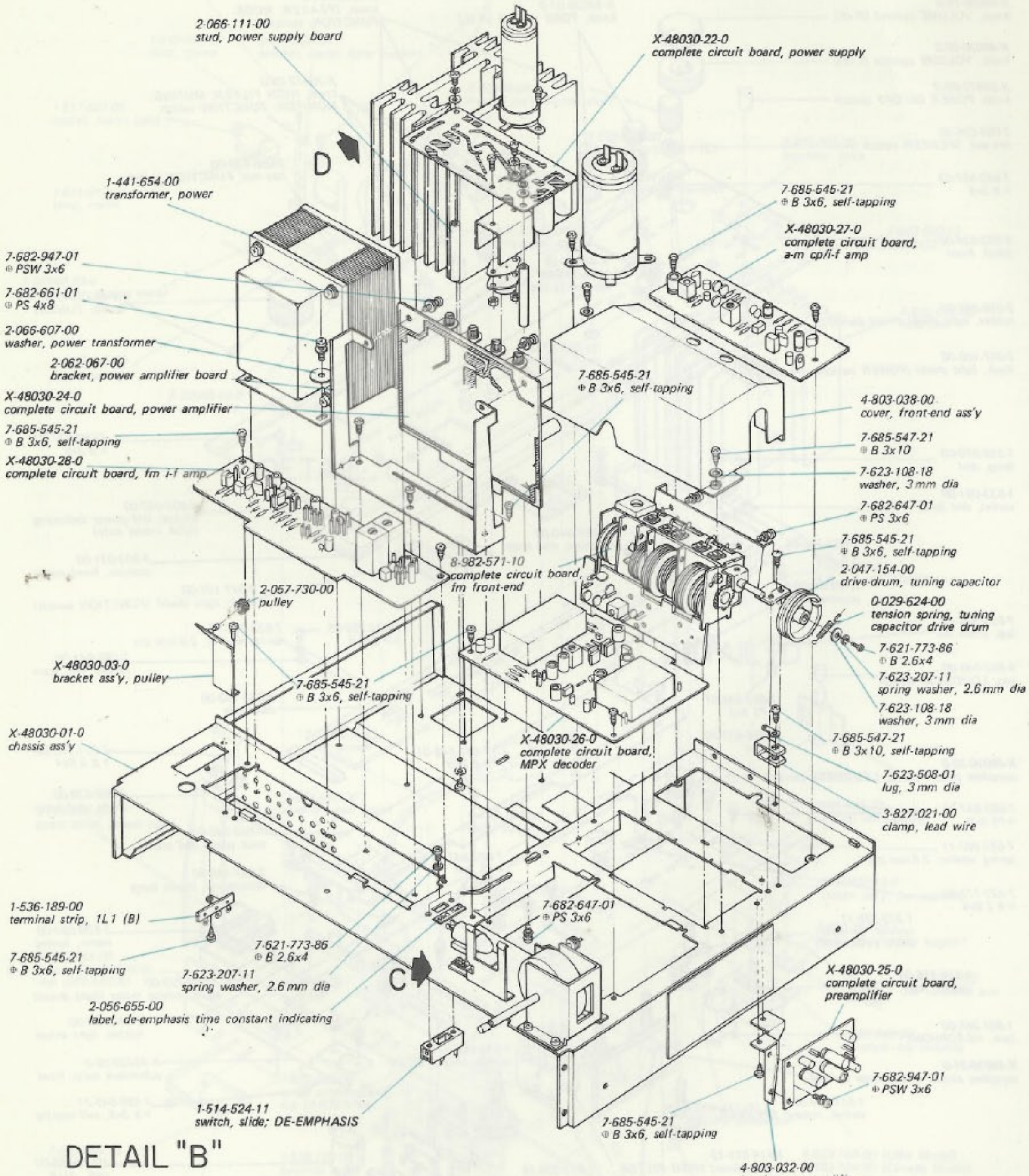
— Hardware Nomenclature —

- P – Pan Head Screw
- PS – Pan Head Screw with Spring Washer
- PSW – Pan Head Screw with Spring Washer and Washer
- B – Binding Head Screw
- SC – Set Screw
- E – Retaining Ring (E Washer)
- W – Washer
- SW – Spring Washer
- LW – Lock Washer
- N – Nut

– Example –

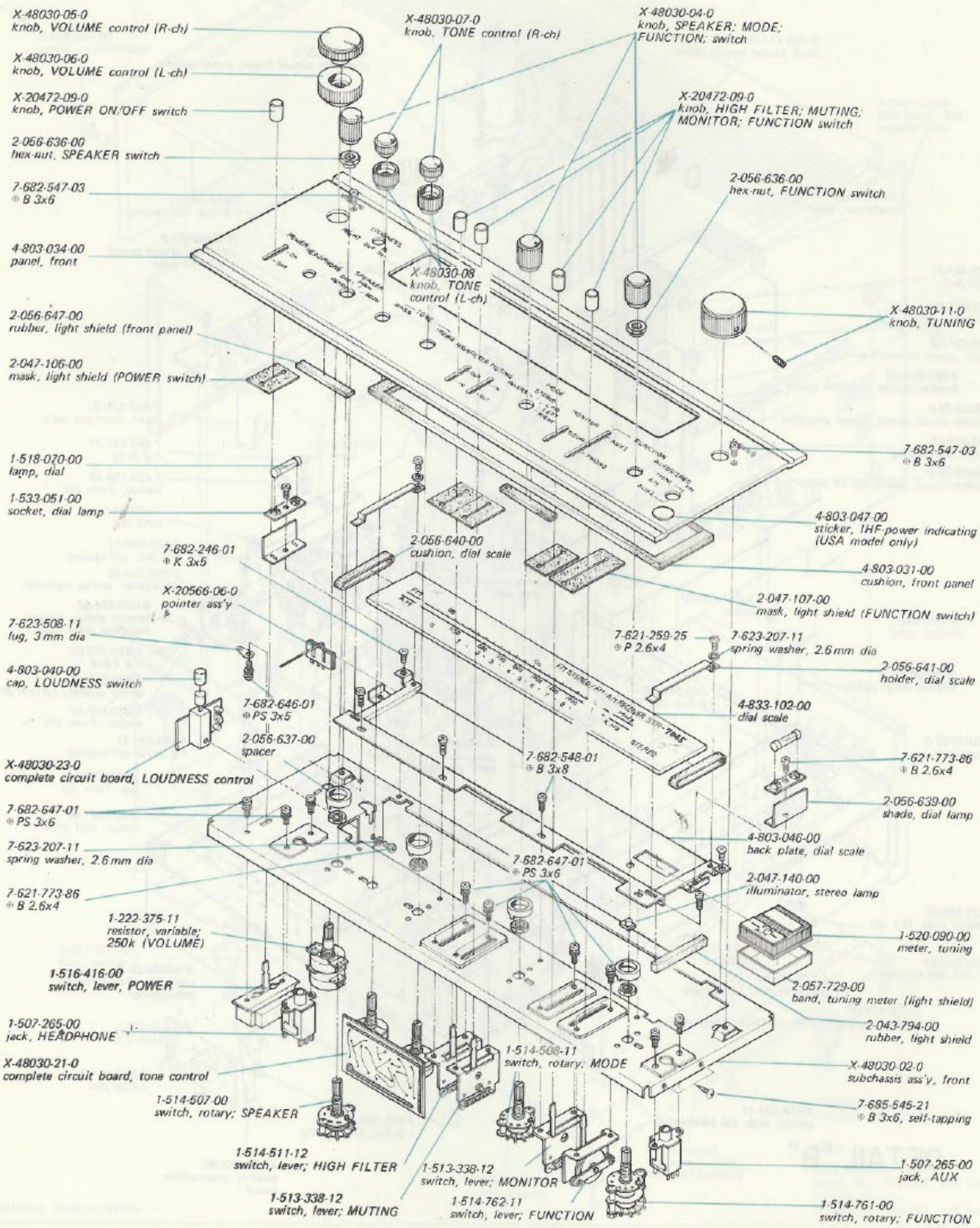
⊕ P 3×10
- Type of Slot
- Length in mm (L)
- Diameter in mm (D)
- Type of Head

(2)


2-066-111-00
stud, power supply board
X-48030-22-0
complete circuit board, power supply
D
1-441-654-00
transformer, power
7-685-545-21
⊕ B 3x6, self-tapping
X-48030-27-0
complete circuit board, a-m cp/i-f amp
7-682-947-01
⊕ PSW 3x6
7-682-661-01
⊕ PS 4x8
2-066-607-00
washer, power transformer
2-062-067-00
bracket, power amplifier board
7-685-545-21
⊕ B 3x6, self-tapping
X-48030-24-0
complete circuit board, power amplifier
4-803-038-00
cover, front-end ass'y
7-685-545-21
⊕ B 3x6, self-tapping
7-685-547-21
⊕ B 3x10
X-48030-28-0
complete circuit board, fm i-f amp
7-623-108-18
washer, 3 mm dia
7-682-647-01
⊕ PS 3x6
7-685-545-21
⊕ B 3x6, self-tapping
8-982-571-10
complete circuit board, fm front-end
2-047-154-00
drive-drum, tuning capacitor
2-057-730-00
pulley
0-029-624-00
tension spring, tuning capacitor drive drum
7-621-773-86
⊕ B 2.6x4
X-48030-03-0
bracket ass'y, pulley
7-685-545-21
⊕ B 3x6, self-tapping
7-623-207-11
spring washer, 2.6 mm dia
7-623-108-18
washer, 3 mm dia
X-48030-01-0
chassis ass'y
X-48030-26-0
complete circuit board, MPX decoder
7-685-547-21
⊕ B 3x10, self-tapping
7-623-508-01
lug, 3 mm dia
3-827-021-00
clamp, lead wire
1-536-189-00
terminal strip, 1L1 (B)
7-682-647-01
⊕ PS 3x6
7-621-773-86
⊕ B 2.6x4
7-685-545-21
⊕ B 3x6, self-tapping
7-623-207-11
spring washer, 2.6 mm dia
C
X-48030-25-0
complete circuit board, preamplifier
2-056-655-00
label, de-emphasis time constant indicating
7-682-947-01
⊕ PSW 3x6
1-514-524-11
switch, slide; DE-EMPHASIS
7-685-545-21
⊕ B 3x6, self-tapping
4-803-032-00
bracket, preamplifier board

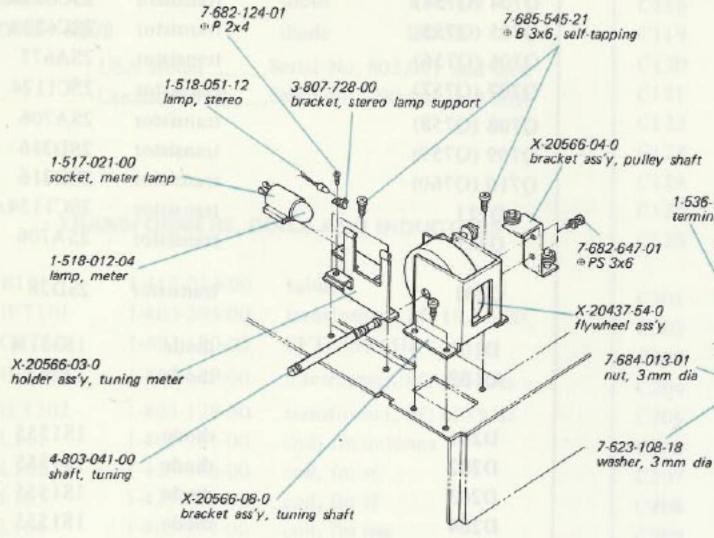
DETAIL "B"

(3)

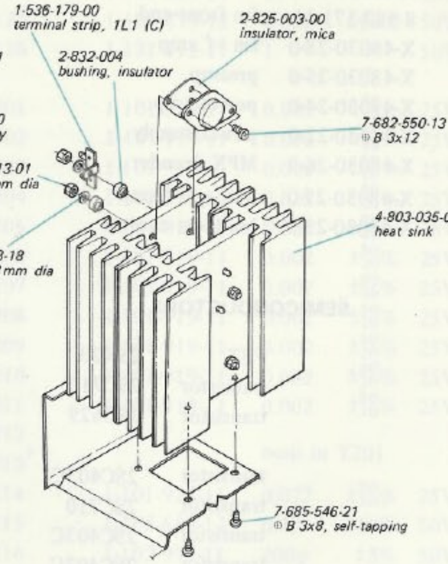


DETAIL "A" (TURN CLOCKWISE 90°)

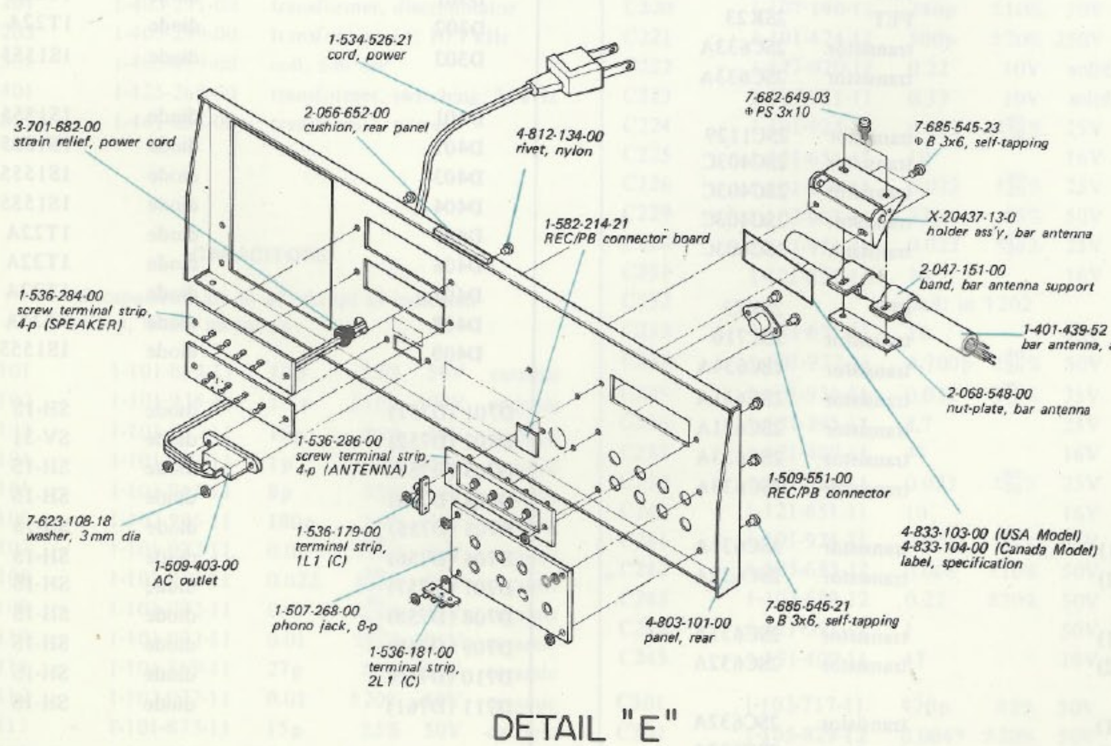
(4)



DETAIL "C"



DETAIL "D"



DETAIL "E"

SECTION 7
ELECTRICAL PARTS LIST

Note: Applicable Serial Numbers:
USA Model........ 800,001 and later
Canada Model ... 700,001 and later

COMPLETE CIRCUIT BOARDS

Ref. No.	Part No.	Description
	X-48030-21-0	tone control
	8-982-571-10	fm front-end
	X-48030-28-0	fm i-f amp
	X-48030-25-0	preamp
	X-48030-24-0	power amp
	X-48030-22-0	power supply
	X-48030-26-0	MPX decoder
	X-48030-27-0	a-m cp/i-f amp
	X-48030-23-0	loudness control

SEMICONDUCTORS

Ref. No.	Part No.	Description
Q101	FET	2SK23
Q102	transistor	2SC710
Q103	transistor	2SC629
Q201	transistor	2SC403C
Q202	transistor	2SC710
Q203	transistor	2SC403C
Q204	transistor	2SC403C
Q205	transistor	2SC403C
Q206	transistor	2SC403C
Q207	FET	2SK23
Q208	FET	2SK23
Q209	transistor	2SC633A
Q210	transistor	2SC633A
Q301	transistor	2SC1129
Q302	transistor	2SC403C
Q303	transistor	2SC403C
Q304	transistor	2SC403C
Q305	transistor	2SC403C
Q401	FET	2SK23
Q402	transistor	2SC710
Q403	transistor	2SC634A
Q404	transistor	2SC631A
Q405	transistor	2SC631A
Q406	transistor	2SC633A
Q407	transistor	2SC633A
Q501 (Q551)	transistor	2SC631A
Q502 (Q552)	transistor	2SC632A
Q601 (Q651)	transistor	2SC631A
Q602 (Q652)	transistor	2SC632A
Q701 (Q751)	transistor	2SC632A
Q702 (Q752)	transistor	2SC632A
Q703 (Q753)	transistor	2SA706
Q704 (Q754)	transistor	2SC633A
Q705 (Q755)	transistor	2SC633A
Q706 (Q756)	transistor	2SA677
Q707 (Q757)	transistor	2SC1124
Q708 (Q758)	transistor	2SA706
Q709 (Q759)	transistor	2SD316
Q710 (Q760)	transistor	2SD316
Q711	transistor	2SC1124A
Q761	transistor	2SA706
Q801	transistor	2SD28
D101	diode	1S351M
D102	diode	1T243
D201	diode	1S1555
D202	diode	1S1555
D203	diode	1S1555
D204	diode	1S1555
D205	diode	1S1555
D206	diode	1S1555
D207	diode	1T22A
D208	diode	1T22A
D209	diode	1S1555
D210	diode	1S1555
D211	diode	1T22A
D212	diode	1T22A
D213	diode	1S1555
D301	diode	1T22A
D302	diode	1T22A
D303	diode	1S1555
D401	diode	1S1555
D402	diode	1S1555
D403	diode	1S1555
D404	diode	1S1555
D405	diode	1T22A
D406	diode	1T22A
D407	diode	1T22A
D408	diode	1T22A
D409	diode	1S1555
D701 (D751)	diode	SH-1S
D702 (D752)	diode	SV-31
D703 (D753)	diode	SH-1S
D704 (D754)	diode	SH-1S
D705 (D755)	diode	SH-1S
D706 (D756)	diode	SH-1S
D707 (D757)	diode	SH-1S
D708 (D758)	diode	SH-1S
D709 (D759)	diode	SH-1S
D710 (D760)	diode	SH-1S
D711 (D761)	diode	SH-1S
▲D801	diode	5B4

▲ (USA Model only .... Up to Serial No. 803,000)

Ref. No.	Part No.	Description
D802	diode	10D2
D803	diode	1T243M
D804	diode	1T243M
• D805~D808	diode	UO-5E

• { USA Model ....Serial No. 803,001 and later
  Canada Model......Serial No. 700,001 and later

TRANSFORMERS, COILS AND INDUCTORS

Ref. No.	Part No.	Description
B101	1-417-014-00	balun
IFT101	1-403-295-00	transformer, i-f; 10.7 MHz
CFT301	1-403-150-00	CFT, 455 kHz
IFT301	1-403-149-00	transformer, i-f; 455 kHz
IFT302	1-403-128-00	transformer, i-f; 455 kHz
L101	1-401-351-00	coil, fm antenna
L102	1-425-446-00	coil, fm rf
L103	1-425-446-00	coil, fm rf
L104	1-405-377-00	coil, fm osc
L201	1-407-163-00	inductor, micro; 33μH
L202	1-407-184-00	inductor, micro; 3.3μH
L203	1-407-408-00	inductor, micro; 22mH
L204	1-407-184-00	inductor, micro; 3.3μH
L301	1-407-169-00	inductor, micro; 100μH
L901	1-407-161-00	inductor, micro; 22μH
L902	1-407-178-00	inductor, micro; 1.0μH
L903	1-407-182-00	inductor, micro; 2.2μH
L904	1-401-439-52	bar antenna, a-m
MU401	1-425-548-00	MPX unit
T201	1-403-291-00	transformer, discriminator
T202	1-403-299-00	transformer, i-f; 10.7 kHz
T301	1-405-459-00	coil, a-m osc
T401	1-425-260-00	transformer, switching; 38 kHz
T801	1-441-654-00	transformer, power

CAPACITORS

All capacitors are in μF except as indicated with p, which means μμ.

Ref. No.	Part No.	Value	Tolerance	Voltage	Type
C101	1-101-862-11	18p	±5%	50V	ceramic
C102	1-101-938-11	1.5p	±10%	500V	ceramic
C103	1-101-952-11	16p	±5%	50V	ceramic
C104	1-101-937-11	1p	±10%	500V	ceramic
C105	1-101-945-11	8p	±5%	50V	ceramic
C106	1-102-985-11	180p	±5%	50V	ceramic
C107	1-101-072-11	0.01	$^{+80}_{-20}$%	50V	ceramic
C108	1-101-924-11	0.022	$^{+80}_{-20}$%	25V	ceramic
C109	1-101-072-11	0.01	$^{+80}_{-20}$%	25V	ceramic
C110	1-101-072-11	0.01	$^{+80}_{-20}$%	25V	ceramic
C111	1-101-869-11	27p	±5%	50V	ceramic
C112	1-102-077-11	0.01	±20%	50V	ceramic
C113	1-101-873-11	15p	±5%	50V	ceramic
C114	1-101-958-11	8p	±0.5p	50V	ceramic
C115	1-101-978-11	10p	±5%	50V	ceramic
C116	1-102-875-11	7p	±5%	50V	ceramic
C117	1-101-072-11	0.01	$^{+80}_{-20}$%	25V	ceramic
C118	1-101-924-11	0.022	$^{+80}_{-20}$%	25V	ceramic
C119	1-101-918-11	0.001	$^{+80}_{-20}$%	25V	ceramic
C120	1-101-978-11	10p	±5%	50V	ceramic
C121	1-101-957-11	7p	±0.5p	50V	ceramic
C122	1-101-924-11	0.022	$^{+80}_{-20}$%	25V	ceramic
C123	1-101-924-11	0.022	$^{+80}_{-20}$%	25V	ceramic
C124	1-121-353-11	47		16V	electrolytic
C125	1-105-679-12	0.033	±10%	50V	mylar
C126	1-121-391-11	1		50V	electrolytic
C201	1-101-919-11	0.002	$^{+80}_{-20}$%	25V	ceramic
C202	1-101-919-11	0.002	$^{+80}_{-20}$%	25V	ceramic
C203	1-101-919-11	0.002	$^{+80}_{-20}$%	25V	ceramic
C204	1-101-924-11	0.022	$^{+80}_{-20}$%	25V	ceramic
C205	1-101-924-11	0.022	$^{+80}_{-20}$%	25V	ceramic
C206	1-101-919-11	0.002	$^{+80}_{-20}$%	25V	ceramic
C207	1-101-919-11	0.002	$^{+80}_{-20}$%	25V	ceramic
C208	1-101-919-11	0.002	$^{+80}_{-20}$%	25V	ceramic
C209	1-101-919-11	0.002	$^{+80}_{-20}$%	25V	ceramic
C210	1-101-919-11	0.002	$^{+80}_{-20}$%	25V	ceramic
C211	1-101-919-11	0.002	$^{+80}_{-20}$%	25V	ceramic
C212, C213		built in T201			
C214	1-101-924-11	0.022	$^{+80}_{-20}$%	25V	ceramic
C215	1-105-689-12	0.22	±10%	50V	mylar
C216	1-102-977-11	200p	±5%	50V	ceramic
C217	1-102-977-11	200p	±5%	50V	ceramic
C218	1-102-977-11	200p	±5%	50V	ceramic
C219	1-121-651-11	10		16V	electrolytic
C220	1-107-140-11	240p	±10%	50V	silvered mica
C221	1-101-424-11	500p	±20%	250V	ceramic
C222	1-127-020-11	0.22		10V	solid aluminum
C223	1-127-021-11	0.33		10V	solid aluminum
C224	1-101-924-11	0.022	$^{+80}_{-20}$%	25V	ceramic
C225	1-121-651-11	10		16V	electrolytic
C226	1-101-924-11	0.022	$^{+80}_{-20}$%	25V	ceramic
C229	1-102-963-11	33p	±5%	50V	ceramic
C230	1-101-924-11	0.022	$^{+80}_{-20}$%	25V	ceramic
C231	1-121-651-11	10		16V	electrolytic
C232		built in T202			
C233	1-121-651-11	10		16V	electrolytic
C234	1-101-922-11	4,700p	$^{+80}_{-20}$%	50V	ceramic
C235	1-101-924-11	0.022	$^{+80}_{-20}$%	25V	ceramic
C236	1-121-395-11	4.7		25V	electrolytic
C237	1-121-409-11	47		16V	electrolytic
C239	1-101-924-11	0.022	$^{+80}_{-20}$%	25V	ceramic
C240	1-121-651-11	10		16V	electrolytic
C241	1-101-924-11	0.022	$^{+80}_{-20}$%	25V	ceramic
C242	1-105-683-12	0.068	±10%	50V	mylar
C243	1-105-689-12	0.22	±20%	50V	mylar
C244	1-121-391-11	1		50V	electrolytic
C245	1-121-409-11	47		16V	electrolytic
C301	1-103-717-11	470p	±5%	50V	styrol
C302	1-105-829-12	0.0047	±20%	50V	mylar
C303	1-105-673-12	0.01	±20%	50V	mylar
C304	1-102-977-11	200p	±5%	50V	ceramic

Ref. No.	Part No.	Description			
C305	1-102-945-11	8p	±5%	50V	ceramic
C306	1-105-679-12	0.033	±20%	50V	mylar
C307	1-105-677-12	0.022	±20%	50V	mylar
C308		built in CFT301			
C309	1-105-677-12	0.022	±20%	50V	mylar
C310		built in CFT301			
C311	1-105-677-12	0.022	±20%	50V	mylar
C312	1-105-673-12	0.01	±20%	50V	mylar
C313	1-105-685-12	0.1	±20%	50V	mylar
C314	1-101-884-11	56p	±5%	50V	ceramic
C315	1-101-924-11	0.02	$\pm^{80}_{20}\%$	25V	ceramic
C316		built in IFT301			
C317	1-121-415-11	100		16V	electrolytic
C318	1-101-924-11	0.02	$\pm^{80}_{20}\%$	25V	ceramic
C319	1-101-924-11	0.02	$\pm^{80}_{20}\%$	25V	ceramic
C320	1-127-019-11	0.1		10V	solid, aluminum
C321	1-102-924-11	0.02	$\pm^{80}_{20}\%$	50V	ceramic
C322	1-121-395-11	4.7		25V	electrolytic
C323	1-101-924-11	0.02	$\pm^{80}_{20}\%$	25V	ceramic
C324	1-121-415-11	100		16V	electrolytic
C325	1-121-392-11	3.3		25V	electrolytic
C326	1-121-392-11	3.3		25V	electrolytic
C327	1-121-413-11	100		6.3V	electrolytic
C328	1-105-677-12	0.022	±20%	50V	mylar
C329	1-105-673-12	0.01	±20%	50V	mylar
C330	1-105-677-12	0.022	±20%	50V	mylar
C331	1-102-960-11	24p	±5%	50V	ceramic
C332		--------------			
C333	1-102-935-11	2p	±0.25pF	50V	ceramic
C334	1-105-677-12	0.022	±20%	50V	mylar
CT301, CT302	1-141-095-11	capacitor, trimmer			
C401	1-105-683-12	0.068	±10%	50V	mylar
C402	1-105-661-12	0.001	±10%	50V	mylar
C403	1-105-661-12	0.001	±10%	50V	mylar
C404	1-121-398-11	10		25V	electrolytic
C405	1-105-669-12	0.0047	±10%	50V	mylar
C406	1-121-344-11	3.3		25V	electrolytic
C407	1-121-413-11	100		6.3V	electrolytic
C408	1-121-409-11	47		16V	electrolytic
C409	1-103-575-11	4,700p	±5%	50V	styrol
C410	1-127-022-11	0.47		10V	solid aluminum
C411	1-121-403-11	33		16V	electrolytic
C412	1-121-403-11	33		16V	electrolytic
C413	1-105-679-12	0.033	±10%	50V	mylar
C414	1-105-679-12	0.033	±10%	50V	mylar
C415	1-121-402-11	33		6.3V	electrolytic
C416	1-101-884-11	56p	±5%	50V	ceramic
C417	1-101-884-11	56p	±5%	50V	ceramic
C418	1-121-391-11	1		50V	electrolytic
C419	1-121-391-11	1		50V	electrolytic
C420	1-121-420-11	220		10V	electrolytic
C421	1-121-420-11	220		10V	electrolytic
C422	1-105-683-12	0.068	±10%	50V	mylar
C423	1-105-683-12	0.068	±10%	50V	mylar
C424	1-127-042-11	2.2		10V	solid aluminum
C425	1-127-042-11	2.2		10V	solid aluminum

Ref. No.	Part No.	Description			
C426	1-105-667-12	0.0033	±10%	50V	mylar
C427	1-121-409-11	47		16V	electrolytic
C428	1-127-021-11	0.33		10V	solid aluminum
C431	1-105-671-12	0.0068	±10%	50V	mylar
C501 (C551)	1-121-391-11	1		50V	electrolytic
C502 (C552)	1-105-661-12	0.001	±10%	50V	mylar
C503	1-121-405-11	33		50V	electrolytic
C504 (C554)	1-121-419-11	220		6.3V	electrolytic
C505 (C555)	1-105-674-12	0.012	±10%	50V	mylar
C506 (C556)	1-105-667-12	0.0033	±10%	50V	mylar
C507 (C557)	1-121-726-11	0.47		50V	electrolytic
C601 (C651)	1-107-137-11	180p	±10%	50V	silvered mica
C602 (C652)	1-105-837-12	0.022	±20%	50V	mylar
C603 (C653)	1-105-685-12	0.1	±10%	50V	mylar
C604 (C654)	1-105-661-12	0.001	±10%	50V	mylar
C605 (C655)	1-121-419-11	220		6.3V	electrolytic
C606 (C656)	1-107-131-11	100p	±10%	50V	silvered mica
C607 (C657)	1-121-419-11	220		6.3V	electrolytic
C608 (C658)	1-121-396-11	4.7		50V	electrolytic
C609 (C659)	1-105-671-12	0.0068	±10%	50V	mylar
C610 (C660)	1-105-681-12	0.047	±10%	50V	mylar
C611 (C661)	1-105-683-12	0.068	±10%	50V	mylar
C612 (C662)	1-105-681-12	0.047	±10%	50V	mylar
C613 (C663)	1-105-669-12	0.0047	±10%	50V	mylar
C614	1-121-405-11	33		50V	electrolytic
C701 (C751)	1-105-689-12	0.22	±10%	50V	mylar
C702 (C752)	1-121-344-11	3.3		25V	electrolytic
C703 (C753)	1-107-123-11	47p	±10%	50V	silvered mica
C704 (C754)	1-121-409-11	47		10V	electrolytic
C705 (C755)	1-121-425-11	470		10V	electrolytic
C707 (C757)	1-105-679-12	0.033	±10%	50V	mylar
C708 (C758)	1-121-404-11	33		25V	electrolytic
C709 (C759)	1-121-404-11	33		25V	electrolytic
C710 (C760)	1-105-681-12	0.047	±10%	50V	mylar
C711 (C761)	1-105-681-12	0.047	±10%	50V	mylar
C712 (C762)	1-107-142-11	300p	±10%	50V	silvered mica
C713 (C763)	1-121-417-11	100		50V	electrolytic
C714 (C764)	1-121-417-11	100		50V	electrolytic
C715 (C765)	1-102-016-11	5p	±0.5p	50V	ceramic
C716 (C766)	1-105-673-12	0.01	±10%	50V	mylar
C801	1-105-917-12	0.022	±20%	200V	mylar
C802	1-105-917-12	0.022	±20%	200V	mylar
C803	1-105-917-12	0.022	±20%	200V	mylar
C804	1-105-917-12	0.022	±20%	200V	mylar
C805	1-105-917-12	0.022	±20%	200V	mylar
C806	1-121-815-11	4,700		50V	electrolytic
C807	1-121-815-11	4,700		50V	electrolytic
C808	1-121-330-11	1,000		63V	electrolytic
C809	1-121-733-11	470		25V	electrolytic
C810	1-121-417-11	100		50V	electrolytic
C811	1-121-416-11	100		25V	electrolytic
C812	1-121-417-11	100		50V	electrolytic
C813	1-121-358-11	220		16V	electrolytic
C901	1-101-924-11	0.02	$\pm^{80}_{20}\%$	25V	ceramic

Ref. No.	Part No.	Description
CV101	1-151-191-13	capacitor, tuning
CV102		
CV103		
CV104		
CV901		
CV902		

RESISTORS

All resistors are in ohms, ±5%, ¼W and carbon type unless otherwise indicated.

Ref. No.	Part No.	Description
R101	1-244-665-11	470
R102	1-244-689-11	4.7 k
R103	1-244-697-11	10 k
R104	1-244-666-11	510
R105	1-244-673-11	1 k
R106	1-244-685-11	3.3 k
R107	1-244-677-11	1.5 k
R108	1-244-666-11	510
R109	1-244-692-11	6.2 k
R110	1-244-697-11	10 k
R111	1-244-721-11	100 k
R112	1-244-697-11	10 k
R113	1-244-642-11	51
R114	1-244-677-11	1.5 k
R201	1-244-671-11	820
R202	1-244-677-11	1.5 k
R203	1-244-685-11	3.3 k
R204	1-244-653-11	150
R205	1-244-673-11	1 k
R206	1-244-673-11	1 k
R207	1-244-671-11	820
R208	1-244-677-11	1.5 k
R209	1-244-685-11	3.3 k
R210	1-244-653-11	150
R211	1-244-673-11	1 k
R212	1-244-673-11	1 k
R213	1-244-649-11	100
R214	1-244-657-11	220
R215	1-244-721-11	100 k
R216	1-244-671-11	820
R217	1-244-689-11	4.7 k
R218	1-244-675-11	1.2 k
R219	1-244-653-11	150
R220	1-244-663-11	390
R221	1-244-677-11	1.5 k
R222	1-244-679-11	1.8 k
R223	1-244-671-11	820
R224	1-244-673-11	1 k
R225	1-244-649-11	100
R226	1-244-673-11	1 k
R227	1-244-721-11	100 k
R228	1-244-659-11	270
R229	1-244-705-11	22 k
R230	1-244-695-11	8.2 k
R231	1-244-673-11	1 k
R232	1-244-721-11	100 k
R233	1-244-649-11	100
R234	1-244-665-11	470
R235	1-244-709-11	33 k
R236	1-244-697-11	10 k
R237	1-244-673-11	1 k
R238	1-244-673-11	1 k
R239	1-244-673-11	1 k
R240	1-244-649-11	100
R241	1-244-713-11	47 k
R242	1-244-713-11	47 k
R243	1-244-691-11	5.6 k
R244	1-244-691-11	5.6 k
R245	1-244-673-11	1 k
R246	1-244-673-11	1 k
R247	1-244-699-11	12 k
R248	1-244-745-11	1 M
R249	1-244-734-11	360 k
R250	1-244-745-11	1 M
R251	1-244-723-11	120 k
R252	1-244-735-11	390 k
R253	1-244-745-11	1 M
R254	1-244-642-11	51
R255	1-244-642-11	51
R256	1-244-632-11	20
R257	1-244-657-11	220
R258	1-244-703-11	18 k
R259	1-244-689-11	4.7 k
R260	1-244-632-11	20
R261	1-244-699-11	12 k
R262	1-244-642-11	51
R263	1-244-670-11	750
R264	1-244-699-11	12 k
R265	1-244-720-11	91 k
R266	1-244-701-11	15 k
R267	1-244-733-11	330 k
R268	1-244-701-11	15 k
R269		
R270	1-244-659-11	270
R271	1-244-705-11	22 k
R272	1-244-658-11	240
R273	1-244-649-11	100
R301	1-244-691-11	5.6 k
R302	1-244-708-11	30 k
R303	1-244-708-11	30 k
R304	1-244-634-11	24
R305	1-244-647-11	82
R306	1-244-708-11	30 k
R307	1-244-673-11	1 k
R308	1-244-691-11	5.6 k
R309	1-244-649-11	100
R310	1-244-719-11	82 k
R311	1-244-691-11	5.6 k
R312	1-244-673-11	1 k
R313	1-244-684-11	3 k
R314	1-244-689-11	4.7 k
R315	1-244-645-11	68
R316	1-244-657-11	220

Ref. No.	Part No.	Description
R317	1-244-689-11	4.7 k
R318	1-244-645-11	68
R319	1-202-565-11	470 ½W composition
R320	1-244-673-11	1 k
R321	1-244-673-11	1 k
R322	1-244-680-11	2 k
R323	1-242-657-11	220
R324	1-242-701-11	15 k
R325	1-244-691-11	5.6 k
R326	1-244-689-11	4.7 k
R327	1-244-645-11	68
R328	1-244-673-11	1 k
R329	1-244-701-11	15 k
R330	1-244-680-11	2 k
R331	1-244-671-11	820
R332	1-244-657-11	220
R333	1-244-717-11	68 k
R334	1-244-649-11	100
R335	1-244-649-11	100
R401	1-244-737-11	470 k
R402	1-244-673-11	1 k
R403	1-244-673-11	1 k
R404	1-244-706-11	24 k
R405	1-202-560-11	300 ½W composition
R406	1-244-689-11	4.7 k
R407	1-244-709-11	33 k
R408	1-244-670-11	750
R409	1-244-731-11	270 k
R410	1-244-671-11	820
R411	1-244-690-11	5.1 k
R412	1-244-689-11	4.7 k
R413	1-244-673-11	1 k
R414	1-244-682-11	2.4 k
R415	1-244-649-11	100
R416	1-244-661-11	330
R417	1-244-661-11	330
R418	1-244-661-11	330
R419	1-244-661-11	330
R420	1-244-643-11	56
R421	1-244-643-11	56
R422	1-244-679-11	1.8 k
R423	1-244-679-11	1.8 k
R424	1-244-693-11	6.8 k
R425	1-244-693-11	6.8 k
R426	1-244-671-11	820
R427	1-244-671-11	820
R428	1-244-715-11	56 k
R429	1-244-715-11	56 k
R430	1-244-661-11	330
R431	1-244-661-11	330
R432	1-244-715-11	56 k
R433	1-244-715-11	56 k
R434	1-244-702-11	16 k
R435	1-244-702-11	16 k
R436	1-244-685-11	3.3 k
R437	1-244-685-11	3.3 k
R438	1-244-659-11	270

Ref. No.	Part No.	Description
R439	1-244-659-11	270
R440	1-244-677-11	1.5 k
R441	1-244-677-11	1.5 k
R442	1-244-685-11	3.3 k
R443	1-244-685-11	3.3 k
R444	1-244-695-11	8.2 k
R445	1-244-695-11	8.2 k
R446	1-244-709-11	33 k
R447	1-244-667-11	560
R448	1-244-702-11	16 k
R449	1-244-702-11	16 k
R501 (R551)	1-242-713-11	47 k
R502 (R552)	1-242-745-11	1 M
R503 (R553)	1-242-681-11	2.2 k
R504 (R554)	1-242-737-11	470 k
R505 (R555)	1-242-661-11	330
R506	1-242-719-11	82 k
R507 (R557)	1-242-691-11	5.6 k
R508 (R558)	1-242-659-11	270
R509 (R559)	1-242-705-11	22 k
R510 (R560)	1-242-653-11	150
R511 (R561)	1-242-735-11	390 k
R512 (R562)	1-242-701-11	15 k
R513 (R563)	1-242-689-11	4.7 k
R601 (R651)	1-244-712-11	43 k
R602 (R652)	1-244-704-11	20 k
R603 (R653)	1-242-663-11	390
R604 (R654)	1-242-737-11	470 k
R605 (R655)	1-242-735-11	390 k
R606 (R656)	1-242-701-11	15 k
R607 (R657)	1-242-735-11	390 k
R608 (R658)	1-242-691-11	5.6 k
R609 (R659)	1-242-665-11	470
R610 (R660)	1-242-675-11	1.2 k
R611 (R661)	1-242-695-11	8.2 k
R612 (R662)	1-242-709-11	33 k
R613 (R663)	1-242-669-11	680
R614 (R664)	1-242-655-11	180
R615 (R665)	1-242-699-11	12 k
R616 (R666)	1-242-691-11	5.6 k
R617	1-242-719-11	82 k
R701 (R751)	1-242-717-11	68 k
R702 (R752)	1-242-705-11	22 k
R703 (R753)	1-242-677-11	1.5 k
R704 (R754)	1-242-705-11	22 k
R705 (R755)	1-242-677-11	1.5 k
R706 (R756)	1-242-699-11	12 k
R707 (R757)	1-242-677-11	1.5 k
R708 (R758)	1-242-687-11	3.9 k
R709 (R759)	1-242-695-11	8.2 k
R710 (R760)	1-242-689-11	4.7 k
R711 (R761)	1-242-661-11	330
R712 (R762)	1-202-591-11	5.6 k ½W composition
R713 (R763)	1-242-717-11	68 k
R714 (R764)	1-242-661-11	330

Ref. No.	Part No.	Description		
R715 (R765)	1-242-661-11	330		
R716 (R766)	1-202-525-11	10	½W	composition
R717 (R767)	1-202-565-11	470	½W	composition
R718 (R768)	1-242-665-11	470		
R719 (R769)	1-242-725-11	150k		
R720 (R770)	1-242-725-11	150k		
R721 (R771)	1-242-681-11	2.2k		
R722 (R772)	1-242-681-11	2.2k		
R723 (R773)	1-242-649-11	100		
R724 (R774)	1-242-681-11	2.2k		
R725 (R775)	1-242-681-11	2.2k		
R726 (R776)	1-242-673-11	1k		
R727 (R777)	1-242-649-11	100		
R728 (R778)	1-242-649-11	100		
R729 (R779)	1-242-673-11	1k		
R730 (R780)	1-242-649-11	100		
R731 (R781)	1-242-625-11	10		
R732 (R782)	1-242-619-11	5.6		
R733 (R783)	1-217-153-11	0.47	2W	wirewound
R734 (R784)	1-217-153-11	0.47	2W	wirewound
R735 (R785)	1-242-619-11	5.6		
R736 (R786)	1-242-625-11	10		
R737 (R787)	1-242-649-11	100		
R739	1-242-677-11	1.5k		
R740 (R790)	1-242-649-11	100		
R741 (R791)	1-244-705-11	22k		
R801	1-244-865-11	470	½W	
R802	1-244-665-11	470		
R803	1-206-147-11	100	3W	metal-oxide
R804	1-244-683-11	2.7k		
R805	1-244-649-11	100		
R901	1-244-697-11	10k		
R902	1-244-697-11	10k		
R903	1-244-731-11	270k		
R904	1-244-731-11	270k		
R905	1-244-719-11	82k		
R906	1-244-719-11	82k		
R907	1-202-645-11	1M	½W	composition
R908	1-244-745-11	1M		
R909	1-244-745-11	1M		
RV201	1-221-966-11	100k(B), adjustable		
RT301	1-222-952-11	15k(B), adjustable		
RV401	1-222-948-11	3.3k(B), adjustable		
RV601 (RV651)	1-222-375-11	250k(S), variable (VOLUME control)		
RV603 (RV653)	1-222-373-11	50k(S), variable (TONE control)		
RV604 (RV654)	1-222-374-11	50k(B), variable (TONE control)		
RV701 (RV751)	1-222-981-11	10k(B), adjustable		
RV702 (RV752)	1-222-981-11	10k(B), adjustable		

SWITCHES

Ref. No.	Part No.	Description
S1	1-514-761-00	rotary (FUNCTION)
S2	1-514-762-11	lever (FUNCTION)
S3	1-513-338-12	lever (MONITOR)
S4	1-514-508-11	rotary (MODE)
S5	1-513-149-00	push (LOUDNESS)
S6	1-514-511-12	lever (HIGH FILTER)
S7	1-513-338-12	lever (MUTING)
S8	1-514-507-00	rotary (SPEAKER)
S9	1-516-416-00	lever (POWER)
S10	1-514-524-11	slide (DE-EMPHASIS)

FILTERS

Ref. No.	Part No.	Description	(Color)	(Specified Center Freq.)
CF201, CF202, CF203, CF204, CF205, CF206	1-403-562-11	fm i-f, ceramic	red	10.70MHz
	1-403-562-21	fm i-f, ceramic	black	10.66MHz
	1-403-562-31	fm i-f, ceramic	white	10.74MHz
	1-403-562-41	fm i-f, ceramic	green	10.62MHz
	1-403-562-51	fm i-f, ceramic	yellow	10.78MHz
LPF401	1-231-088-00	filter, low-pass		

MISCELLANEOUS

Ref. No.	Part No.	Description
	1-231-057-12	encapsulated component, 120Ω + 0.033μF
J901, J902	1-507-265-00	jack, AUX, HEADPHONE
	1-507-268-00	phono jack, 8-P
CNJ901	1-509-551-00	REC/PB connector
CNJ902	1-509-403-00	AC outlet
	1-517-021-00	socket, meter lamp
PL904	1-518-012-04	lamp, meter 8V 0.15A
	1-518-051-12	lamp, STEREO 4.5V 40mA
	1-518-070-00	lamp, dial 8V 0.3A
M901	1-520-090-00	meter, TUNING
	1-533-051-00	socket, dial lamp
	1-534-526-21	cord, power
	1-536-179-00	terminal strip, 1L1 (C)
	1-536-376-00	terminal strip, 2L1 (C)
	1-536-386-00	terminal strip, 1L1 (B)
TM901	1-536-286-00	screw terminal strip, 4-p (ANTENNA)
TM902, 903	1-536-284-00	screw terminal strip, 4-p (SPEAKER)
	1-582-214-00	printed circuit board, REC/PB connector

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