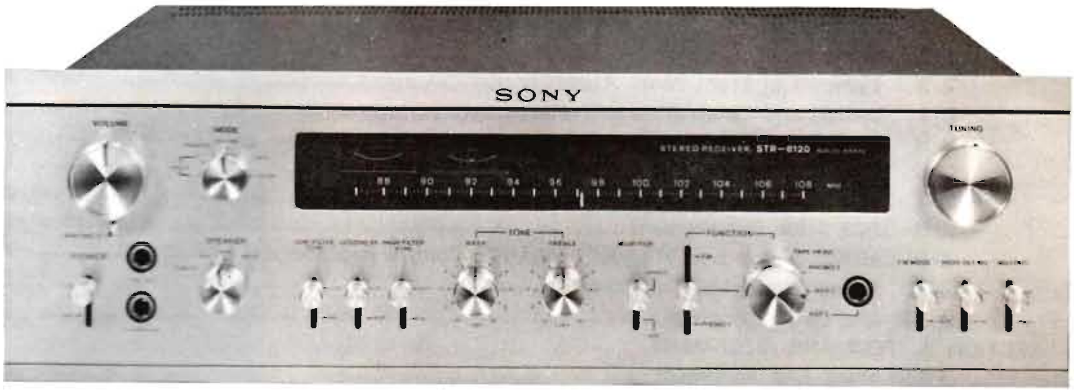
STR-6120



Specifications

Frequency range:	87 to 108 MHz
Usable sensitivity:	1.8μV (±1 dB), IHF
Selectivity:	100 dB, IHF
Dynamic power:	150W both channels, 8 ohms, IHF
Rated output:	60W each channel, 8 ohms
THD (Audio):	Less than 0.2% at 1 kHz under rated output
IMD (Audio):	Less than 0.3% at rated output
Power consumption:	Approx. 320W (IEC Standard) at rated output 330VA (CSA Standard)
Power requirement:	100, 117, 220, 240 V 50 60 Hz
Dimension:	19" (w) × 5 $^{11}/_{16}$" (h) × 15 $^{7}/_{8}$" (d) (483 mm × 145 mm × 405 mm w, h, d)
Weight:	34 lb 3 oz (15.5 kg)

SONY®

SERVICE MANUAL

SONY CORP. 7-35, Kitashinagawa 6-chome, Shinagawa-ku, Tokyo 141, JAPAN

TABLE OF CONTENTS

SECTION 1
GENERAL DESCRIPTION

1-1 Technical Specifications

FM Tuner Section

Frequency range: 87 to 108 MHz
Usable sensitivity: 1.8μV (±1 dB), IHF
Intermediate frequency: 10.7 MHz
S/N ratio: 70 dB
Capture ratio: 1.0 dB
Selectivity: 100 dB, IHF
Image rejection: 90 dB
I-f rejection: 100 dB
Spurious rejection: 100 dB
A-m suppression: 65 dB
Muting level: 3μV
Antenna terminals: 300 ohms balanced
75 ohms unbalanced
Frequency response: 20 Hz to 15,000 Hz ±0.5 dB
Harmonic distortion: Mono 0.2% at 400 Hz, 100% modulation
Stereo 0.35% at 400 Hz, 100% modulation
Fm stereo separation: Greater than 40 dB at mid-frequency, 100% modulation
Stereo auto-switching level: 3μV
SCA suppression: 65 dB
19kHz, 38kHz suppression: 70 dB

Amplifier Section

Dynamic power: 150W ±0.5 dB IHF into 8 ohms, 0.2% THD, both channels
Rated output: 60 W each channel, 4 ohms
60 W each channel, 8 ohms
35 W each channel, 16 ohms
Power band-width: 12 Hz to 70 kHz (8 ohms, IHF)
Harmonic distortion: Less than 0.2% at 1 kHz under rated output
Less than 0.05% at 1 kHz under 1 watt output
IM distortion (SMPTE): Less than 0.3% at rated output
Less than 0.05% at 1 watt output
Frequency response: TAPE HEAD NAB equalization curve ±0.5 dB
PHONO 1, 2 RIAA equalization curve ±0.5 dB
TUNER, TAPE
AUX 1, 2 15 Hz to 120 kHz (-3 dB)
REC/PB (input) at 1W output
Input sensitivity: TAPE HEAD 1.5 mV 500 k ohms
PHNO 1, 2 1.5 mV 47 k ohms
AUX 1, 2 170 mV 100 k ohms
TAPE 170 mV 100 k ohms
REC/PB (input) 170 mV 100 k ohms
Output voltage: REC OUT 170 mV 10 k ohms
CENTER CHANNEL OUT 3.5 V 1 k ohm (at rated output)
LINE OUT 3.5 V 1 k ohm (at rated output)
REC/PB (output) 20mV 80k ohms
Signal-to-noise ratio (IHF): TAPE HEAD Greater than 60 dB
PHONO 1, 2 Greater than 70 dB
AUX 1, 2 Greater than 90 dB
TAPE, REC/PB (input) Greater than 90 dB
Tone control: BASS 100Hz ±10dB (2dB/step)
TREBLE 10kHz ±10dB (2dB/step)
Filters: HIGH 12 dB/oct. above 9 kHz
LOW 12 dB/oct. below 50 Hz

General Section

Power requirements: 100, 117, 220, 240 V 50/60 Hz
Power consumption: Approx. 320W (IEC Standard)
330 VA (CSA Standard)
at rated output
Dimensions: 19″(w) × $5^{11}/_{16}$″(h) × $15^{7}/_{8}$″(d)
(483 mm × 145 mm × 405 mm w, h, d)
Weight: 34 lb 3 oz (15.5 kg)

1-2 General Information

Tuner

The Field Effect Transistors in the tuner are employed to achieve excellent sensitivity, noise figure and high overload capacity. The Hartley type local oscillator using a silicon transistor provides drift-free operation, eliminating the need for automatic frequency control. Nine i-f stages, using eight piezoelectric resonators, ensure high sensitivity, sharp skirt response and essentially flat response within the selected channel's frequency range. This results in excellent adjacent-channel rejection and low distortion on fm broadcasts. A unique electronic switching system in the multiplex section gives smooth and clickless switching between mono and stereo modes of operation. Switching is fully automatic and immune to the effects of inter-station noise. An ingenious muting circuit, employing one FET and nine transistors, cuts out inter-station noise without killing those weak stations. This combination results "pulling-in" the weak stations while preserving a smooth and quiet operation. Excellent stereo separation is maintained under all receiving conditions.

Amplifier

The preamplifier, consisting of the equalizer and flat amplifiers, accepts and processes inputs from all sources and distributes output signals to the power amplifier, which delivers up to 150 watts of dynamic power (75 watts each channel) to an 8 ohm load, measured according to the IHF Standards, while being protected by the driver limiters. As mentioned above, the power amplifier has enough capability to emphasize low frequencies employing the Base Boost circuit. In addition, all controls are designed and placed for maximum operating convenience.

1-3 Circuit Description

Following is a description of the function of all the stages and controls in the STR-6120. The description follows the signal path. Refer to the block diagram on page 25 to 28 and the schematic diagram on page 38 to 43.

(A) TUNER

Front End Section

Stage/Control	Function
Balun B1-1	This is a transformer that matches either 75-ohm coaxial cable or 300-ohm twin lead to the tuner's input stage.
RF Amplifier Q_{101}, Q_{105}	The rf amplifier is designed to provide stable amplification, sharp selectivity at fm broadcast frequencies, and an optimum noise figure. Field-effect transistors are ideally suited for this job as they have characteristics similar to that of a triode and in addition have wide dynamic range. The latter characteristic results in very low cross-modulation products. The stage employs two FETs in a common-gate (similar to a grounded-grid circuit) configuration to compensate the tolerance of FET's operating characteristics. The triple-tuned coupling is employed between rf and mixer stages to provide sharp selectivity. The secondary winding of L_{101} is tapped-down to match the low input impedance of the common-gate amplifier.
Local Oscillator Q_{104}	Q_{104} supplies injection signals to the mixer through L_{105}. The circuit is a Hartley type with feedback applied to the emitter from the tap on L_{105}. Temperature changes have little effect on the oscillator tuning. The oscillator is extremely stable and does not require AFC.
Mixer Q_{102}	Rf signals and local-oscillator signals are heterodyned in the gate-source junction of Q_{102} to produce the 10.7 MHz intermediate frequency output. IFT_{101} is a tuned transformer to develop the i-f output and provide required selectivity. The low impedance output winding is provided to match the following i-f stage.
I-F Amplifier Q_{103}	This stage amplifies the output of the mixer to drive the i-f amplifier section that follows.

I-F Amplifier Section

Stage/Control	Function
I-F Amplifiers Q_{201} to Q_{203}	These i-f stages are basically RC coupled amplifiers that provide essentially flat response.
Solid-State Filters CF_{201} to CF_{208}	The selectivity of this section is determined by the solid-state filters in the interstage coupling paths.

Stage/Control	Function
	They are basically two-section ceramic filters that operate in a "trapped-energy" mode. The filters provide extremely sharp skirt selectivity and flat response inside the pass band. These filters determine the overall selectivity of the tuner.
Diode Limiters D_{201} to D_{208}	Limiting is accomplished by these diode pairs, connected in parallel and poled in opposite directions.

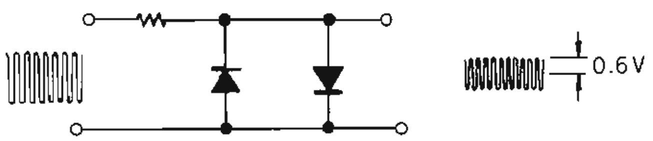


Fig. 1-3-1 Diode Limiter

Stage/Control	Function
	The diodes conduct when the voltage across them exceeds the barrier potential of about 0.6 volts. Thus, the signal is limited in both directions to 1.2 volts peak-to-peak. The diodes provide symmetrical limiting.
I-F Amplifier Q_{204}	The diode limiters are passive devices and introduce loss. Therefore amplifiers, such as Q_{204} provide additional gain needed to drive the limiters.
Muting Circuit Detector Q_{206}, D_{209}, D_{210}	The i-f signal is extracted from the collector of Q_{204} to drive the muting circuit detector. Q_{206} acts as a buffer amplifier to drive the voltage doubler D_{209}, D_{210} and associated capacitors C_{227}, C_{228} and C_{229}. The output of this circuit is a positive dc voltage proportional to the carrier level. This dc voltage is applied to Q_{410} on the Muting Circuit Board.
Tuner Input Meter M-1	An i-f output from the collector circuit of Q_{205} is coupled to D_{211} through C_{230}, R_{249}. This half-wave rectifier feeds a dc signal to the TUNER INPUT METER M-1. Since all previous stages have fixed gain, the current through M-1 is directly proportional to the signal level. R_{251} is the calibration adjustment.

Limiter-Detector Circuit Section

Stage/Control	Function
I-F Amplifiers Q_{301}, Q_{302}	These are conventional RC coupled amplifiers that supply the necessary interstage gain to drive the diode limiters.
Diode Limiters D_{301} to D_{304}	
I-F Output Q_{303}	Q_{303} provides the power to drive the ratio detector.
Ratio Detector D_{305}, D_{306}	IFT_{301} and the diodes D_{305} and D_{306} form a balanced ratio detector that transforms the frequency-modulated signal into an audio signal.
R_{319}	The output of the ratio detector appears across R_{322}. R_{319} is the balance control for the ratio detector.
Tuning Meter M-2	A null-type meter connected across the balanced output of the ratio detector is used as a tuning indicator. C_{323} removes the ac component of the signal.
Emitter Follower Q_{304}	Q_{304} supplies demodulated signals to the MPX and Muting circuits.

Multiplex Decoder Section

The stereo signal is extracted by a switching or time-division decoder.

Stage/Control	Function
Q_{501}	This amplifier stage provides two outputs. The composite f-m signal is extracted from its emitter circuit, and the 19 kHz pilot signal is taken from a tuned circuit in the collector circuit.
19 kHz Amplifier Q_{502}	The 19 kHz pilot signal, separated by the tuned coupling circuits between Q_{501} and Q_{502}, is amplified by Q_{502} to drive the frequency doubler.
Frequency Doubler D_{501}, D_{502}	Signals developed at the collector of Q_{502} are transformer coupled to the full-wave rectifier D_{501} and D_{502}.

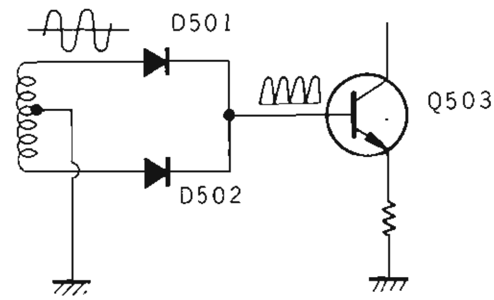


Fig. 1-3-2 Frequency Doubler

The output of this rectifier is not filtered, and produces two positive pulses for each input cycle. Thus the 19 kHz frequency is effectively doubled by D_{501} and D_{502}. However, the waveform is not sinusoidal at the base of Q_{503}.

Stage/Control	Function
38 kHz Amplifier Q_{503}	The 38 kHz pulses produced by D_{501} and D_{502} are amplified by Q_{503}. The tank circuit at the collector of Q_{503} is tuned to 38 kHz to restore the sinusoidal wave-shape to the signal. This signal is transformer coupled to the bridge-type demodulator to supply sampling drive for the demodulator.
Pilot and SCA Filters C_{507}/L_{505} and C_{508}/L_{506}	The composite signal is coupled from the emitter of Q_{501} to the resonant circuits C_{507}/L_{505} and C_{508}/L_{506}. The first one of these is tuned to 19 kHz to eliminate the pilot carrier. The second tank tunes to 67 kHz to eliminate the SCA signal.
Multiplex Demodulator D_{503} to D_{506}	The demodulator circuit employs four diodes in a balanced bridge arrangement. The system cancels much of the residual rf products. The 38 kHz pulses switch the composite signal in the switching transformer to produce L and R signals at the output when the tuner operates in the stereo mode.
De-emphasis C_{516}, C_{517}	These capacitors are selected to provide the necessary roll-off at high audio frequencies to compensate pre-emphasis at the transmitter.
Audio Preamplifier Q_{504}, Q_{505}	Demodulated L and R signals are amplified by these stages.
HIGH BLEND Switch S_{15}	The HIGH BLEND switch allows the mixing of high frequency audio signals between stereo channels. When placed in the IN position the switch operates to reduce the noise of demodulated stereo signal.
Gain Adjustment R_{531}, R_{532}	These resistors are factory selected to compensate for differences in demodulator efficiency and provide equal overall gain in both channels.
Channel Separation Adjustment R_{537}	The network that connects the emitters of Q_{504} and Q_{505} provides a form of negative feedback between left and right channels. Any residual L signals in the R channel are cancelled out by the signals from the L channel. The same is true on residual R signals in the L channel. R_{537} is therefore set the maximum channel separation.
Emitter Followers Q_{506}, Q_{507}	Emitter followers are used at this point to provide a low-impedance source of signal for the low-pass filters that follow.
Low-pass Filter LPF_{501}	The filter removes all residual i-f and subcarrier components. It is important that these components be removed completely to prevent beat interference with bias oscillators in tape recorders fed from the tuner.
Audio Amplifiers and Emitter Followers Q_{508} to Q_{511}	Transistors Q_{508} and Q_{509} make up for the insertion loss of the low-pass filter. Q_{510} and Q_{511} act as emitter followers to produce output signals across a low-impedance. Positive feedback is employed between the collectors of Q_{510} and Q_{511}, and the emitters of Q_{508} and Q_{509} respectively through C_{525} and C_{526} to compensate the loss of high audio frequencies in the low-pass filter.
Mode Switching Q_{512} to Q_{514}	These three transistors operate as direct-coupled switches to establish the operating mode.

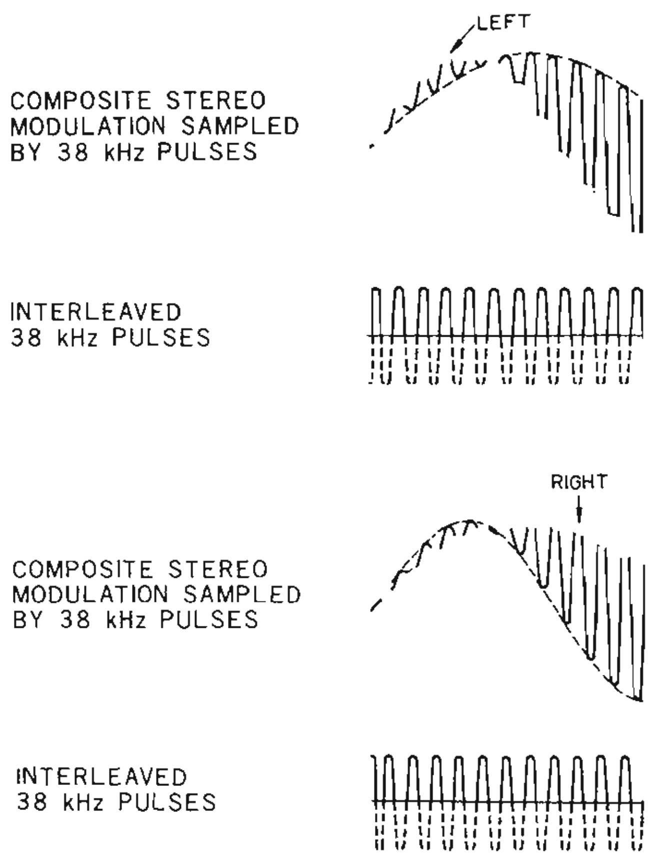


Fig. 1-3-3 Stereo Switching Mode

Stage/Control	Function
Mode Switch in AUTO ST position	When a stereo signal is received, the dc component of the signal developed by the 38 kHz doubler (D_{501}, D_{502}) is coupled through R_{509} to turn on Q_{512}. This turns Q_{513} off and Q_{514} on. When Q_{514} is saturated the forward bias applied to D_{503} and D_{506} in the multiplex demodulator is removed and the demodulator operates in the multiplex mode.
Mode Switch in ST ONLY position	The switching circuit consisting of Q_{512}, Q_{513} and Q_{514} functions in the same way as in the AUTO ST position, except that the muting relay REL-1 is controlled by Q_{514}. (See Muting Circuit Section.) The effect is to mute all but stereo signals.

Muting Circuit Section

These circuits act to mute output when tuning is between stations or not sufficiently tuned to the center of a channel.

Stage/Control	Function
Interstation Muting Q_{409}, D_{401}, D_{402}	The hiss and static of interstation noise are extracted from the emitter of Q_{304} and applied to the base of Q_{409}. R_{420} and C_{402}, in the coupling circuit, filter out audio components so that the signal is primarily noise. Q_{409} amplifies the noise component and drives the voltage doubler, D_{401} and D_{402}. When interstation noise is received the dc output of D_{401} and D_{402} brings Q_{406} into conduction. This
Muting Relay Actuator Q_{407}, Q_{408}	in turn, cuts off Q_{407} and the collector voltage of Q_{407} rises toward B+. The collector of Q_{407} is coupled to the base of Q_{408} through the FM MODE Switch S_{14}, when it is in the AUTO ST position. Thus, Q_{408} turns on as Q_{407} turns off. The
Muting Relay REL-1	muting relay coil is in the collector circuit of Q_{408}. When this relay energizes, the audio output of both channels is shorted to ground.
Muting for the Detuned Condition Q_{401} to Q_{405}	The muting relay is also actuated if a station is being received but there is a considerable tuning error. This muting circuit operates from the negative or positive output of the ratio detector when the received station is not at the center of the detector's S curve. Dc output of the ratio detector, developed across C_{321}, is coupled to the gate of Q_{401}. The FET, Q_{401} is biassed so that Q_{402} is on and Q_{403} is off when there is zero dc at the ratio detector (correctly-tuned condition). As a result, Q_{404} is on and Q_{405} is off. Note that Q_{405} and Q_{406} share a common load. They act as an OR gate. If either Q_{405} or Q_{406} is off the muting relay will be de-energized. Thus, when the set is tuned correctly the muting system is inactive. A positive or negative output of the ratio detector triggers the muting system as follows. Consider a positive input to the FET, Q_{401}. The FET conducts more heavily, its drain voltage drops and Q_{402} cuts off. This makes Q_{404} cut off since Q_{404} can conduct only when Q_{402} is on and Q_{403} is off. If the set is detuned to produce a negative output, Q_{401} conducts less and both Q_{402} and Q_{403} come into conduction. In this case, as noted above, Q_{404} cuts off. Thus, Q_{404} cuts off if the output of the ratio detector is near its positive or negative peak. When Q_{404} cuts off, Q_{405} comes into conduction and, following the previously described action of Q_{407} and Q_{408}, the muting relay is energized.
Muting for Low Level Signals D_{209}, D_{210}, Q_{410}	In addition to interstation and detune-muting, the muting relay is also actuated if the signal level is below the value specified. This system operates from the dc output of the carrier level detector D_{209} and D_{210}. When the input signal is strong enough for operation in the stereo mode (20 db/μ or more) the positive voltage developed by D_{209} and D_{210} is applied to the base of Q_{410}. This transistor is normally cut off, but if the dc output of D_{209} and D_{210} swings positive enough, Q_{410} conducts and makes Q_{405} cut off. The latter results in the release of the muting relay.
MUTING Switch S_{13}	The muting system is disabled when the muting switch is set to OUT position. In this case a positive voltage is put at the base of Q_{407} through R_{416}. This turns on Q_{407} and keeps Q_{408} off. As the result the muting relay REL-1 is kept open.

Stage/Control	Function
Muting in the ST ONLY	When the FM Mode switch is in the ST ONLY position, Q_{405} is controlled by Q_{514}. The latter is on when 19 kHz pilot signal is detected in the D_{501}, D_{502} circuit. When Q_{514} is on, Q_{408} the muting relay is off. If the level of the pilot signal should drop so that Q_{514} turns off, Q_{408} will conduct and mute the output. Thus the tuner is muted except when a stereo signal is received.
Stereo Lamp PL_4	The stereo lamp lights when Q_{514} is on. Q_{514} acts as the ground return for the lamp when the transistor is switched into conduction.
Click Suppressor Q_{515}	Transistor Q_{515} is a click suppressor. It acts to mute click noises that occur at the moment of switching the FM mode switch or fm broadcast turns its signal from mono to stereo or vice versa. Q_{515} varies the dc bias which is applied to the diodes D_{503} and D_{506} through R_{577}, R_{517} and R_{515} according to the trigger voltages that are supplied to its base. Q_{515} receives positive turn-on voltages from the emitter of Q_{408}, the muting relay driver and MODE switch S_4 through R_{572}. When Q_{515} conducts, the forward bias for D_{503} and D_{506} is reduced to zero, blocking composite signals electronically, while C_{531} is discharged through Q_{515}. C_{531} acts to delay the voltage change of bias voltage for D_{503} and D_{506} to provide clickless operation when Q_{515} turns off.

(B) AUDIO AMPLIFIER SECTION

Preamplifier Section

Stage/Control	Function
Equalizing Amplifier Q_{601} to Q_{603}	This stage is a direct coupled amplifier which amplifies the small signal produced by a magnetic cartridge or tape head to the level required at the input of the flat amplifier. In addition, RIAA and NAB equalization is achieved in conjunction with the settings of function switches S_1 and S_2. Q_{601}, Q_{602} and Q_{603} form a three-stage direct-coupled amplifier having a voltage gain of 41 dB at 1 kHz. Negative feedback is applied from the collector of Q_{603} to the emitter of Q_{601}
C_{605} and R_{613}	through the combination of C_{605} and R_{613} to improve frequency response and minimize harmonic distortion. Since the frequency response of this stage is determined by frequency characteristics of the feedback loop, two feedback loops, designed to satisfy the record and tape equalizing curves, are employed.
R_{620}, to R_{622} C_{608}, C_{609}	RIAA equalization is accomplished by the negative feedback loop containing these components.
R_{623}, C_{610}, C_{611}	NAB equalization is accomplished the negative feedback loop containing these components. When the Function Switch is set to FM or AUX-1, -2 input signals are connected directly to the flat amplifier of Q_{604} and Q_{605}.
Monitor Switch S_3	Selects the signals from TAPE IN (TAPE position) or equalizer output (SOURCE position).
Mode Switch S_4	Selects the desired mode of operation. This switch may also be used for test purposes. The relation between the positions of the Mode Selector Switch and the outputs of the Receiver are summarized in the table below.

MODE SELECTOR SWITCH POSITION \ RECEIVER OUTPUTS	SPEAKER OUT; LEFT	SPEAKER OUT; RIGHT	CENTER CHANNEL OUT	HEAD-PHONE OUT; LEFT	HEAD-PHONE OUT; RIGHT	LINE OUT; LEFT	LINE OUT; RIGHT	REC OUT; LEFT	REC OUT; RIGHT
CHECK L	L+R	—	L+R	L+R	—	L+R	—	L+R (L)	L+R (R)
CHECK R	—	L+R	L+R	—	L+R	—	L+R	L+R (L)	L+R (R)
REVERSE	R	L	L+R	R	L	R	L	L	R
STEREO	L	R	L+R	L	R	L	R	L	R
L+R	L+R	L+R	L+R	L+R	L+R	L+R	L+R	L+R	L+R
LEFT	L	L	L	L	L	L	L	L	R
RIGHT	R	R	R	R	R	R	R	L	R

Note: When the MONITOR switch is set to the TAPE, the REC OUT outputs provide the signals shown in parenthesis.

Stage/Control	Function
Flat Amplifier Q_{604}, Q_{605}	This two-stage amplifier provides a 18 dB voltage gain to increase the signal to the level required at the input of the power amplifier.
Loudness Switch S_5	This switch compensates for the characteristics of the human ear which vary according to the loudness of the sound being heard. When this switch is set to the "IN" position, high and low frequency components are increased in conjunction with decreasing volume control setting, as follows. S_5 OUT { Flat response at 500 mW output S_5 IN { 6.4 dB up at 40 kHz, 2.8 dB up at 10 kHz, 6.0 dB up at 50 Hz at 500 mW output
Volume Control R_{629}	The level of the signal applied to the flat amplifier is determined by the setting of R_{629}, an audio taper control.
Balance Control R_{628}	Employed to optimize stereo reproduction. To get rid of insertion loss at the mechanical center, a special potentiometer, having conductor coating at the midrange setting, is used.
Treble Control S_6	Increases or decreases the prominence of high frequencies by switching the filter resistors in steps. Each switch step changes treble response approximately 2 dB at 10,000 Hz. This is accomplished by negative feedback from the output of Q_{605} to the emitter of Q_{604}.
Bass Control S_7	Similar to treble control except for filter components and frequency characteristics. Each step of this switch changes base response approximately 2 dB at 100 Hz.
High Filter Switch S_8	Eliminates unwanted high-frequency components from the input signal (12 dB/oct above 9 kHz) in the IN position.
Emitter Follower Q_{606}	Q_{606} acts as a buffer between high and low filters. The emitter follower provides high input impedance and low output impedance.
Low Filter Switch S_9	High-pass filter cuts out unwanted low frequency components from the input signal. These unwanted low frequencies include rumble created by the turntable, record changer, or the record itself. The amount of drop in signal strength is 12 dB/oct below 50 Hz when the low filter switch is set to the IN position.

Power Amplifier Section

Stage/Control	Function
Flat Amplifier Q_{801}	This is a conventional amplifier to power the driver stage Q_{802} to which it is directly coupled. R_{809} acts as an ac load resistance.
Driver Q_{802}	Q_{802} acts as a driver for the complementary circuit that follows. It provides sufficient positive and nagative voltage swings for generating the required output power. R_{814} is an ac load resistance.
Complementary Circuit Q_{807}, Q_{808}	These transistors operate as emitter followers to provide the current swings demanded of the output stages and also provide the necessary phase inversion. Phase inversion is performed by using PNP and NPN type transistors.
DC Bias Supply Q_{803}	The small amount of voltage across Q_{803} emitter to collector adds to the voltage drop across D_{802} and D_{801} to supply the correct operating voltages to forward bias Q_{807} and Q_{808}.
DC Bias Adj. R_{813}	R_{813} is employed to control the base bias of Q_{803}, thus determining the impedance between emitter and collector of Q_{803} and so the voltage of the dc bias supply.
Thermal Compensator D_{802}	The negative temperature coefficient of D_{802} allows thermal compensation of the complementary circuit by controlling its bias voltage.
Driver Limiter (1) Q_{804}	Q_{804} limits the positive-going half cycle of the drive voltage applied to the base of Q_{809} when power consumption at the Q_{809} 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 Q_{804} is taken from the collector and emitter of Q_{809}. Q_{804} is forced to conduct when the voltage applied across its base and emitter exceeds its barrier voltage. Base voltage is determined by the ratio of resistance of R_{823} to CS_1.

Stage/Control	Function
	Emitter voltage is determined by the current that flows in R_{833}. During normal operation Q_{804} is cut off. When excessive current flows in a power transistor or power dissipation at the collector of the power transistor exceeds the transistor's safety margin, Q_{804} turns on and limits the input drive voltage to the power transistor.

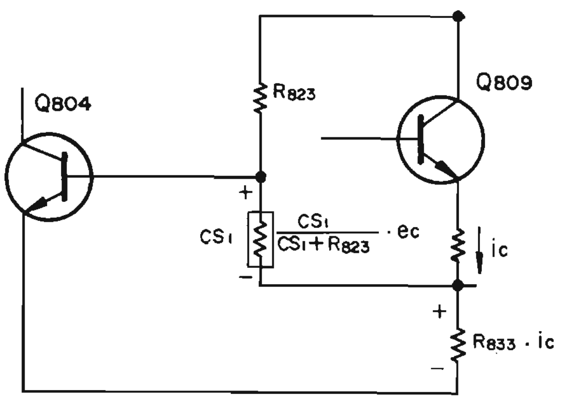


Fig. 1-3-4 Driver Limiter

Stage/Control	Function
Heat Wave Sensor CS_1	This electronic device is called "ceramistor". It senses the heat generated by the output transistors. The resistance of the "ceramistor" increases due to its positive temperature coefficient and forces Q_{804} into saturation. This reduces the driving voltage to the power transistor.
Driver Limiter (2) Q_{805}, Q_{806}	Q_{805} and Q_{806} limit the negative-going half cycle of the signal applied to the base of Q_{810} when power dissipation at the Q_{810} collector exceeds its safety margin. The basic principle involved is the same as described in the Driver Limiter (1) except for polarity.
AC Balance Adj. R_{805}	R_{805} determines the center-line voltage to obtain the minimum harmonic distortion at the rated output.

Power Supply Section

Stage/Control	Function
Regulated Power Supply Q_2, to Q_4	Dc output from the rectifier is filtered by C_{15} and and applied to the series regulator Q_2. Transistor Q_4 compares a sample of the output voltage, picked off at R_{10}, with a reference voltage supplied by the zener diode D_3. A change in output voltage, detected by Q_4, results in a change in conduction of Q_3 and Q_2 that offsets the original voltage shift. The stable 24V dc voltage is supplied to the tuner section.
Power Supply for Audio	A full-wave bridge rectifier provides a positive dc 93 volts across filter-capacitor C_5 (2000μF).
Ripple Filter Q_1, R_1, R_2, C_7	To improve the signal-to-noise ratio in the audio amplifiers, ripple components in the amplifier dc supply should be reduced as much as possible. Q_1 serves as an electronic filter to supply well filtered 87V and 57V power to the preamplifier and power amplifier sections. R_1 and R_2 determine the conduction of Q_1 and, therefore, the output voltage. The filter capacitor in the base circuit of Q_1 acts as an equivalent of a much larger capacitor across the output.

SECTION 2
DISASSEMBLY

2-1 Removal of Top Cover and Bottom Plate

(a) Remove two machine screws at each side of the receiver and lift the top cover straight up.

(b) Loosen off seven Phillips-Head screws (+RF $3\phi \times 6$) at the bottom of the receiver and pull the bottom plate towards the rear of the receiver. See Fig. 2-1-1.

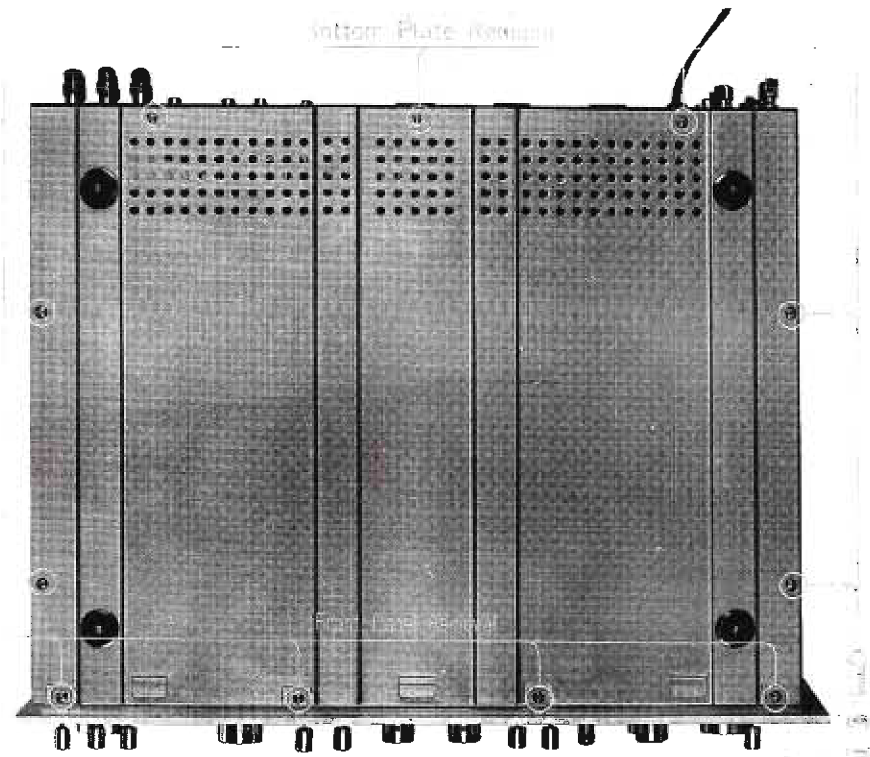


Fig. 2-1-1 Bottom Plate and Front Panel Removal

2-2 Front Panel Removal

(a) Remove the top cover.

(b) Remove all control knobs and levers. The knobs can be removed by loosening the slotted set screws and pulling the knobs straight out. The levers are simply pulled off.

(c) Loosen off four Phillips-Head screws (+RF $4\phi \times 6$) behind the top edge of the Front Panel Assembly (the vertical bracket that mounts the dial and tuning meters). See Fig. 2-2-1 on next page.

(d) Turn the receiver over and loosen off four Phillips-Head screws (+RF$3\phi \times 6$) at the front bottom edge of the chassis. See Fig. 2-1-1. This frees the front panel.

2-3 Removal of the Front Panel Assembly

The Front Panel Assembly is the vertical member on which the glass dial, tuning meters and pilot lamps are attached. The Front Panel Assembly must be removed to re-string the dial cord.

Follow this procedures:

(a) Remove the cover, all knobs and the front panel. See Section 2-1 and 2-2.

(b) Loosen off two flat head screws (+K$3\phi \times 6$) at each side of the chassis and one screw (+RF$3\phi \times 6$) that secures the sub-pannel to the volume control and mode switch bracket. See Fig. 2-2-1 on next page.

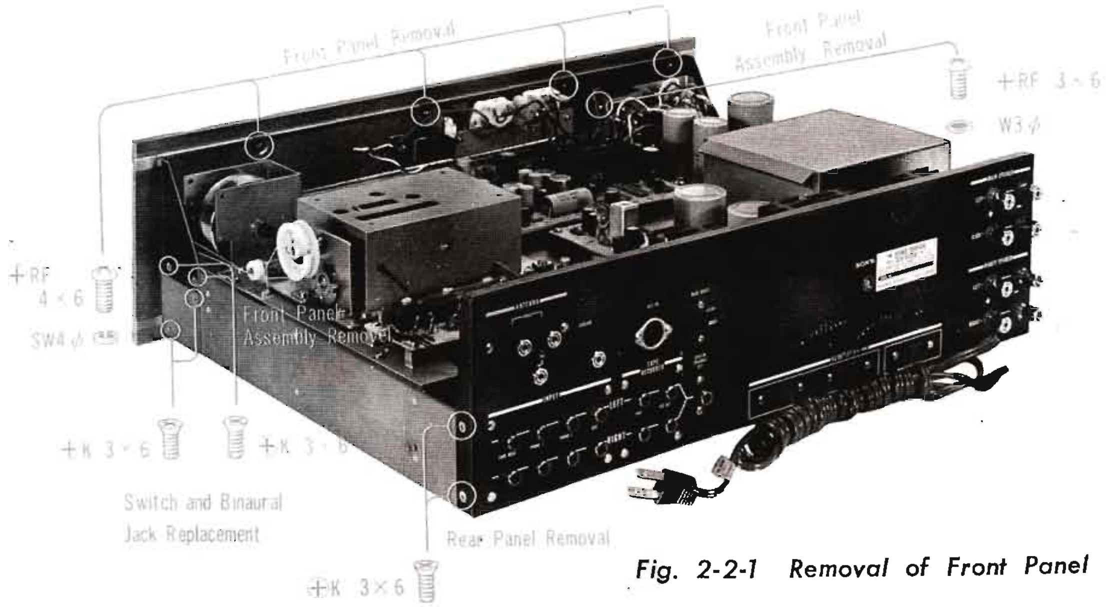


Fig. 2-2-1 Removal of Front Panel

(c) Unsolder the lead wire from the dial lamp.
(d) Take out the stereo lamp.
(e) The Front Panel Assembly is now free, and can be tilted forward and down as shown in Fig. 2-3-1.

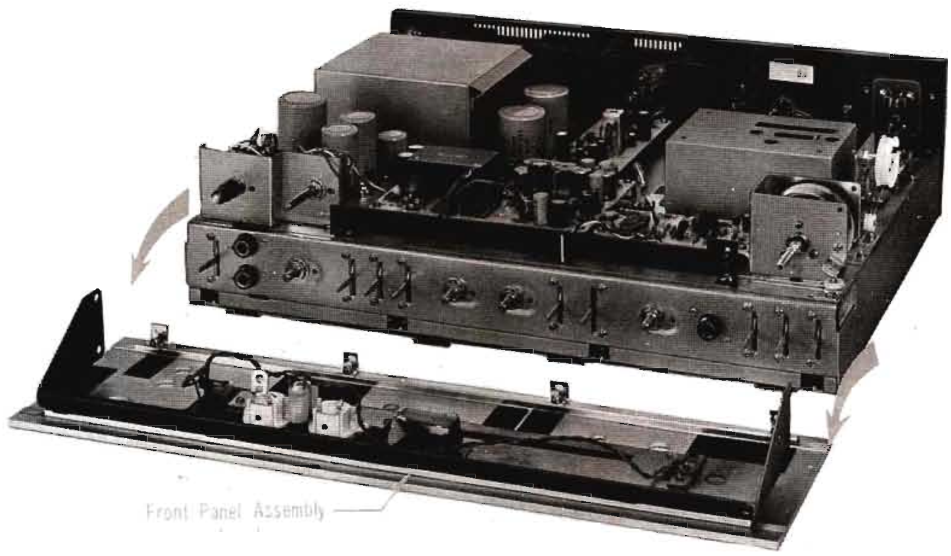


Fig. 2-3-1 Removal of Front Panel Ass'y

2-4 Switch and Binaural Jack Replacement

(a) Remove the cover, bottom plate and front panel. See Sections 2-1 and 2-2.
(b) All switches except for the mode switch and volume control now can be removed by loosening screws and nuts.
(c) To take the binaural jacks out, remove the switch and control assembly by loosening the two screws (+K3ϕ×6) at each side of the chassis as shown in Fig. 2-2-1. Now tilt the assembly forward and down. The jacks can now be removed by loosening the screws that secure them to the chassis.

2-5 Pilot Lamp Replacement

(a) Unplug the ac cord.
(b) Remove the top cover. See Section 2-1.

Meter Lamp

(a) Straighten the tab of lamp socket bracket to permit removal of the lamp.
(b) Pull out the socket.
(c) Unscrew the lamp from the socket and install the replacement.
(d) Insert the socket into the bracket and bend the tab to hold the socket in place.

Stereo Lamp

(a) Push the stereo lamp out from the inside of the bracket.
(b) Unscrew the lamp from the socket and install the replacement.
(c) Insert the socket into the bushing.

Dial Lamps

(a) Remove the front panel. See Section 2-2.
(b) Pry out the lamp. Push the replacement lamp into the clip.

2-6 CS_1 (Ceramistor) Replacement

(a) Remove the bottom plate. See Section 2-1.
(b) Loosen off two machine screws (+K3φ×6) securing the rear panel at each side of the chassis as shown in Fig. 2-2-1.
(c) Pull the rear panel forward and down. See Fig. 2-6-1.
(d) Loosen off two machine screws (+RF3φ×6) that hold the CS_1 mounting base. See Fig. 2-6-1.
(e) Unsolder the leads of CS_1. Remove it and install the new one.
(f) To reassemble, reverse the foregoing procedure. Be sure that CS_1 is attached to the power transistor. Add silicone grease if necessary.

2-7 Thermo-compensator Diode (SV31) Replacement

(a) Remove the bottom plate. See Section 2-1.
(b) Loosen off two machine screws (+K3φ×6) at each side of the chassis as shown in Fig. 2-2-1.
(c) Pull the rear panel forward and down. See Fig. 2-6-1.
(d) Loosen off a screw (+RF3φ×14) securing terminal strip to heat sink. Take out the terminal strip with SV-31.
(e) Unsolder the defective SV-31 and install the replacement.
(f) When securing the terminal strip, make sure SV-31 is attached to the heat sink and add silicone grease if necessary.

2-8 Dial Glass Replacement

(1) Remove the front panel. See Section 2-2.
(2) Remove the screw (+RF2.6φ×5) that secures the dial glass bracket to the sub chassis as shown in Fig. 2-8-1.
(3) Install the new dial glass.

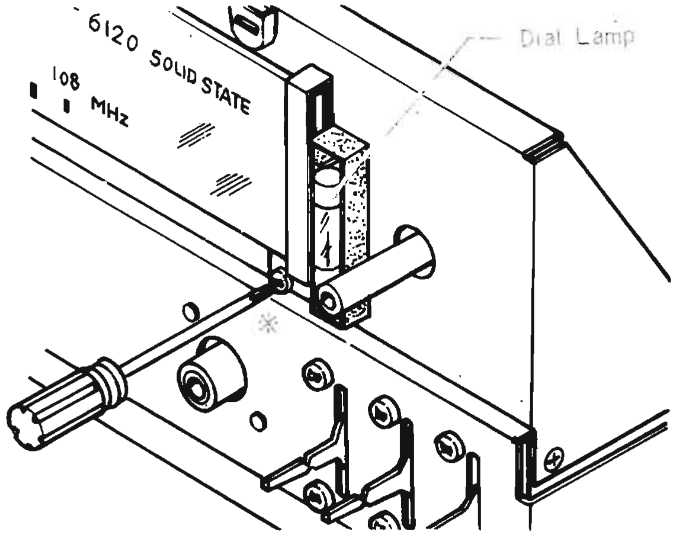


Fig. 2-8-1 Dial Glass Replacement

2-9 MODE Switch and VOLUME/BALANCE Control Replacement

Preparation: Set the new BALANCE control to its electrical center as follows.

(a) With a piece of hook-up wire, solder between center terminals Ⓑ and Ⓑ', measure a resistance between terminals Ⓐ and Ⓒ' by an ohmmeter. See Fig. 2-9-1 on next page.
(b) Turn the BALANCE control shaft, outer one, to obtain a minimum reading on the ohmmeter. Now the BALANCE control is set to its electrical center. Unsolder the hook-up wire.

Procedures:

(1) Remove the front panel assembly. See Section 2-3.
(2) The MODE switch and VOLUME/BALANCE control can be removed by the loosening out hexnuts that secure them to the mounting bracket.
(3) Install the new one.

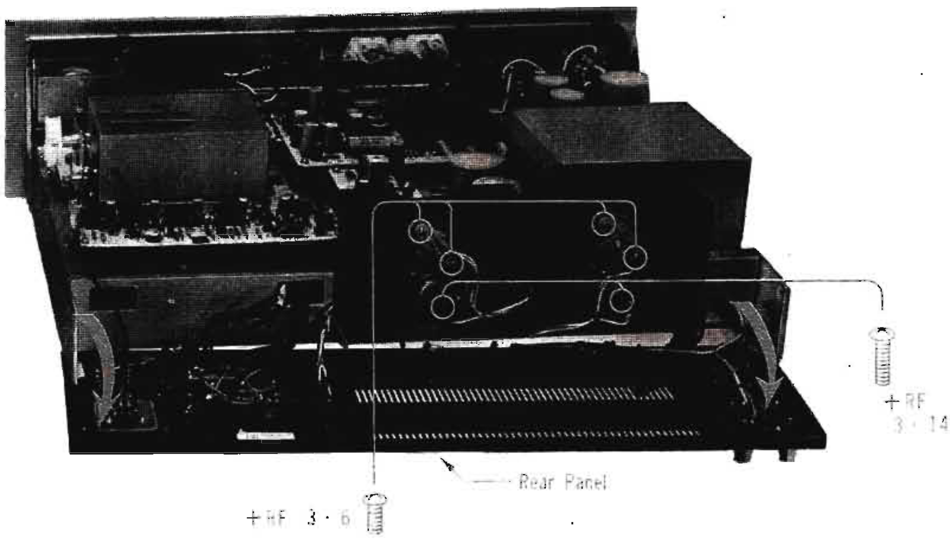


Fig. 2-6-1 Removal of Rear Panel

(4) Insert the spacer in order that the BALANCE control swings away from the BALANCE mark on the front panel the same amount in either direction. Take care that the spacer for the BALANCE control is in place so that its lugs line up with the horizontal line at its electrical center set already.

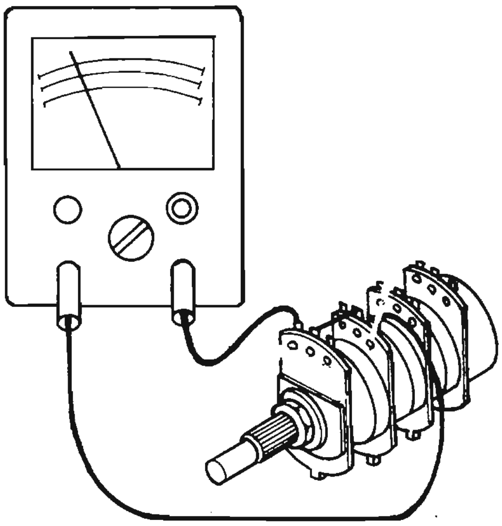


Fig. 2-9-1 BALANCE Control Setting

2-10 Power Transistor Replacement

(1) Loosen off two screws $(+K3\phi\times6)$ at each side of the chassis to tilt the rear panel. See Fig. 2-6-1.
(2) Loosen off two screws $(+RF3\phi\times4)$ securing the transistor to the heat sink.
(3) Install the replacement.
(4) When replacing a power transistor, apply a coat of heat-transferring silicone grease to both sides of the mica insulation.
The grease fills the tiny dents in the mating surfaces, thereby improving heat transfer to the heat sink.
(5) Any excess grease, that is squeezed out when the mounting bolts are tightened, can be wiped off with a clean cloth, to prevent it from attracting conductive dust particles that would eventually short out the insulation.

2-11 Dial Cord Stringing

Preparation: Remove the Front Panel Assembly. See Section 2-3.

(a) Cut a 61-inch (1,550 mm) length of dial cord.
(b) Slowly rotate the tuning capacitor drive drum fully clockwise (minimum capacitance position).
(c) Apply solvent to the Phillips head screw holding the tuning capacitor drive drum to its shaft and remove the screw and flatwasher. Pull the drive drum straight off its shaft.
(d) Tie one end of the cord to one of the holes in the drive drum and hook the spring onto the other hole, See Fig. 2-11-1. Install the drum and tighten its holding screw.

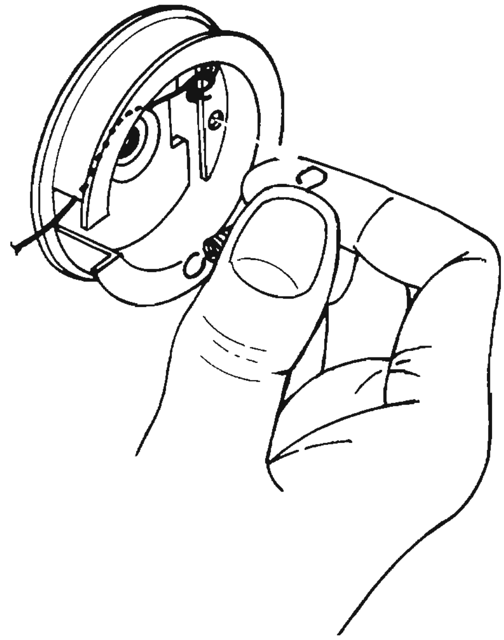


Fig. 2-11-1 Dial Cord Stringing Start and Finish Point

(e) Run the cord through the slot in the rim of the drive drum and position the cord close to the rear edge of the drum.
(f) Wrap the cord clockwise around the drum as shown in Fig. 2-11-2 and run the cord around the pulleys (A), (B), (C) and (D). See Fig. 2-11-3.
(g) Pull the cord taut and wrap three clockwise turns around the tuning shaft.
(h) Run the cord over pulleys (E) and (F).

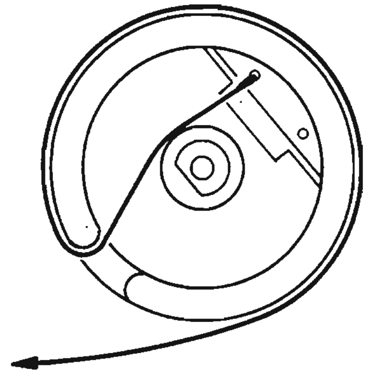


Fig. 2-11-2 Dial Cord Stringing

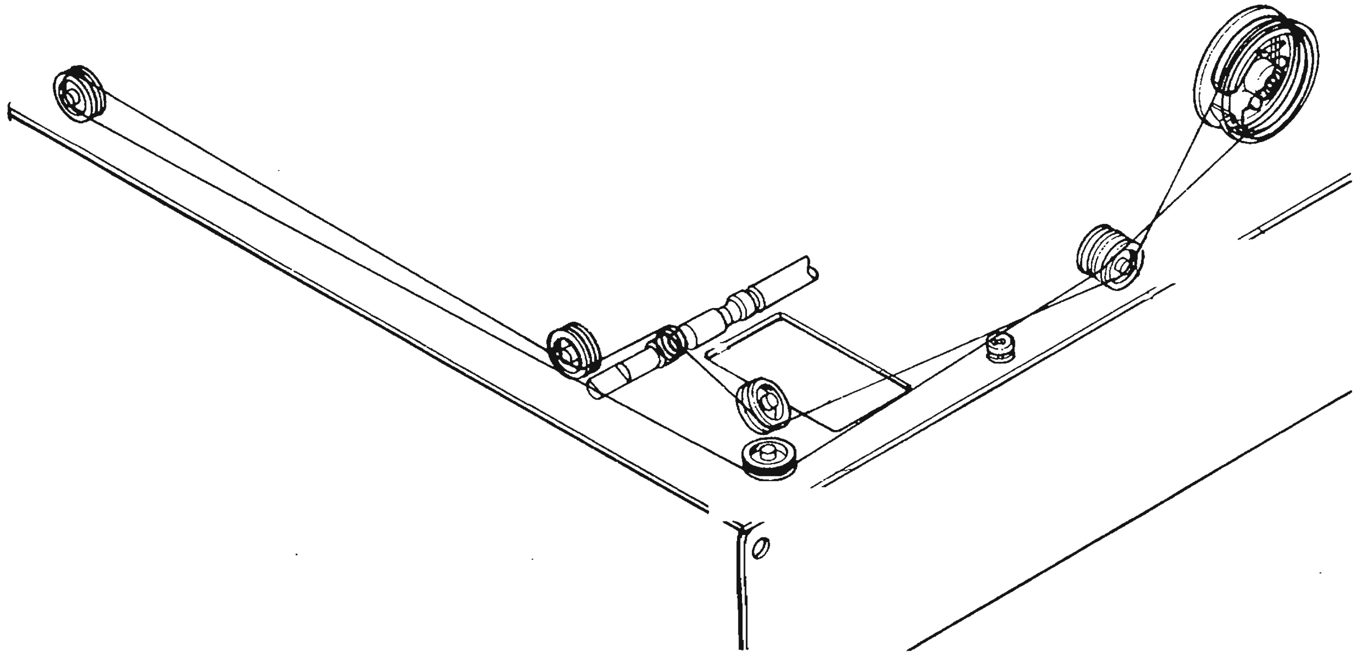


Fig. 2-11-3 Complete Dial Cord Stringing

(i) Make three clockwise turns around the drive drum and pass the cord through the slot of the drive drum. Hook the cord to the spring, using an eyelet, as shown in Fig. 2-11-4.

(j) Pull the cord to give it a tension and squeeze the eyelet. Make a knob to keep the spring under tension. See Fig. 2-11-4.

(k) Put the dial pointer in place and run the dial cord under and through the tabs at the rear of the dial pointer. See Fig. 2-11-5.

(l) After completing dial cord threading, and making sure the tuning system works properly, put a drop of contact cement on the eyelet, at the place where the cord runs under the tabs of the dial pointer, and on the screw holding the tuning capacitor drive drum to its shaft. See SECTION 4, OVERALL ADJUSTMENT for the method of accurate locating the dial pointer.

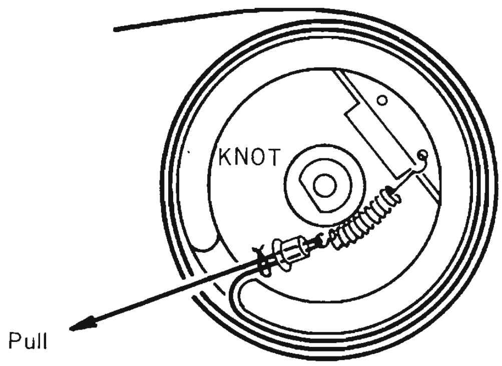


Fig. 2-11-4 Dial Cord Finish Point Detail

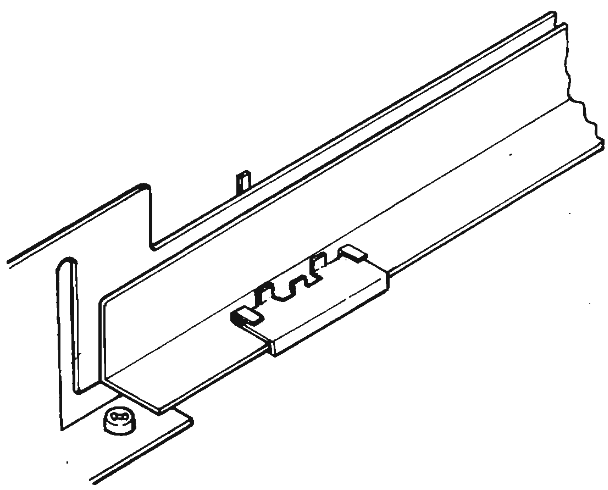


Fig. 2-11-5 Dial Pointer Detail

SECTION 3
TEST AND ALIGNMENT

FM Section

Caution: Never attempt alignment of the Front End section except for the frequency coverage and dial calibration adjustments.
Factory adjustments are extremely stable and should not be reset except in unusual condition.
The alignment should not be performed when the Front End FET s have been replaced as changes in FET parameters have little effect upon tuning. In case an rf stage adjustment is required, ask your nearest SONY Service Station for the complete Front End alignment to be performed at the Factory Service Center.
Exercise caution when returning the faulty unit so that it is not damaged in transit. SONY cannot assume liability in the event of such damage.

3-1 Front End Alignment

Note: Discriminator alignment should be performed first.

Test Equipments Required:
(1) FM Standard Signal Generator (SSG).
If such a generator is unavailable, an off-the-air signal at the lowest and highest ends of the band will be acceptable.
(2) Dummy Antenna See Fig. 3-1-1.
(3) AC VTVM
(4) Alignment Tools

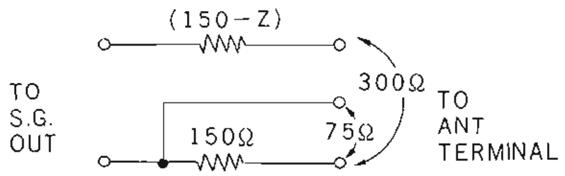


Fig. 3-1-1 Dummy Antenna

Preparation
(1) Remove the chassis cover.
(2) Connect the equipment as shown in Fig. 3-1-2.
(3) Loosen the set screw on the mechanical stopper mechanism at the front end shaft of the tuning capacitor. See Fig. 3-1-3.

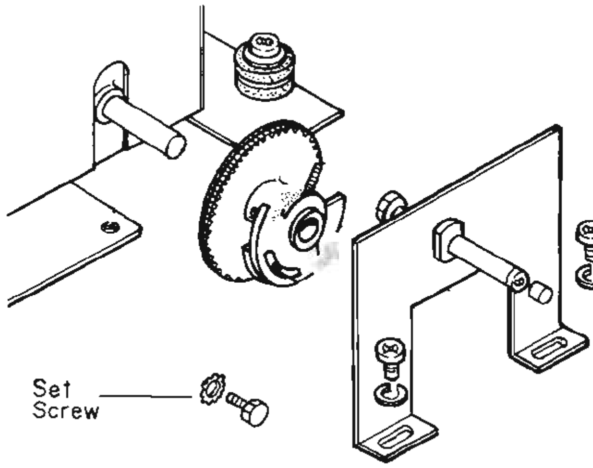


Fig. 3-1-3 Stopper Mechanism Detail

(4) After the frequency coverage adjustment is completed, adjust the mechanical stopper so that the pointer does not move more than 1/8 inches to the left of the 87 MHz mark. The hex-head screw on the stopper can be turned with a pair of long-nosed pliers.
(5) Set the controls as follows:
FUNCTION Selector..................TUNER
VOLUME Control ....MIN
MODE Switch ....STEREO
MONITOR Switch....................SOURCE
Follow the procedures given in Table 1 on next page.

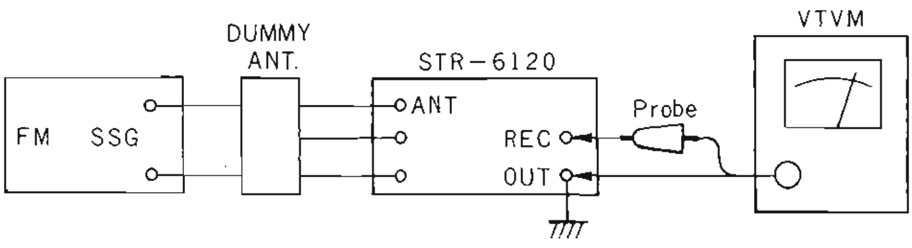


Fig. 3-1-2 Front End Alignment Test Set-up

TABLE 1

Frequency Coverage and Dial Calibration

Coupling between Front End and SSG	SSG Frequency and output level	Tuning Capacitor	AC VTVM connection	Adjust	Indication
Dummy Antenna Fig. 3-1-1	86 MHz 400 Hz, 30% Mod 20 dB/μ	Maximum Capacitance position	REC OUT J 103	OSC Coil L 105 Fig. 3-1-4	Maximum VTVM reading
Same as above	109.5 MHz 400 Hz, 30% Mod 20 dB/μ	Minimum Capacitance position	Same as above	OSC Trimmer CT 105 Fig. 3-1-4	Same as above

Note: Repeat the foregoing procedures several times until an accurate dial calibration is obtained

Suggestion:

Accurate dial calibration or frequency coverage can be performed also by utilizing off-the-air local FM stations as follows.

Procedure:

(1) Tune the set to the lowest-frequency station..
(2) Check that the pointer stays on the dial within a limit of ±100 kHz from the carrier frequency of that station. If the dial deviation exceeds the above mentioned limit, adjust the local oscillator coil L105 slightly until optimum dial calibration is obtained.
(3) Tune the set to the highest-frequency station. If the dial calibration error is excessive, adjust local oscillator trimmer CT105 to obtain minimum dial deviation.

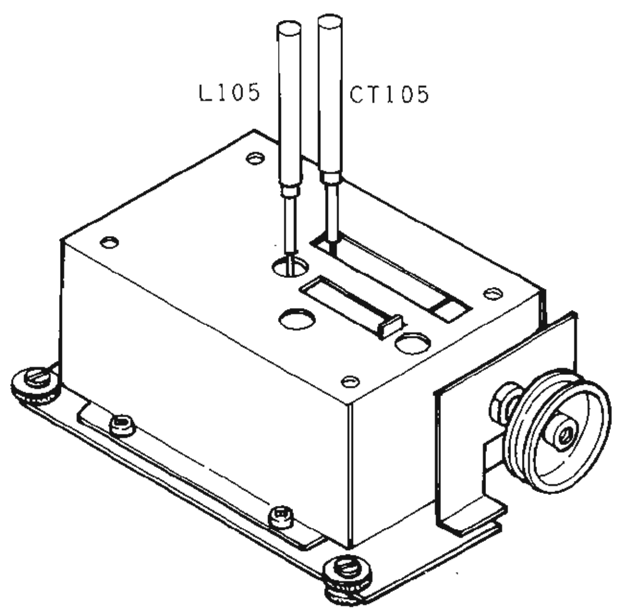


Fig. 3-1-4 Front End Alignment

3-2 FM Discriminator Adjustment

Caution: This is a preadjustment procedure for the discriminator section. To obtain optimum operation of the discriminator, follow the OVERALL ADJUSTMENT procedure Section 4-1 Monaural Distortion described on page 19.

Test Equipments Required:

(1) 10.7 MHz Sweep Generator
  Center frequency ....8 to 12 MHz (variable)
  Sweep width ....1 MHz or more
  Output impedance ....50 or 75 ohms
(2) Oscilloscope
  Vertical sensitivity.........at least 10 mV/cm
  CRT diameter ....5″ or more
(3) Alignment Tools

Preparation:

(1) Remove the chassis cover.
(2) Unsolder the coaxial cable from the input terminal of the I-F section.
(3) Unsolder the coaxial cable from the output terminal of the Limiter and Detector section.
(4) Connect 0.02μF ceramic capacitors across the input terminal of the I-F section and the output terminal of the Limiter and Detector section.

Procedures:

(1) With the equipment connected as shown in Fig. 3-2-1, set the 10.7-MHz Sweep Generator and receiver controls as follows:
  Center Frequency ....10.7 MHz
  Sweep Width ....1.0 MHz
  Output Level ....10 dB/μ
  VOLUME Control ....Minimum
  FUNCTION Selector..................TUNER
  MODE Selector ....STEREO

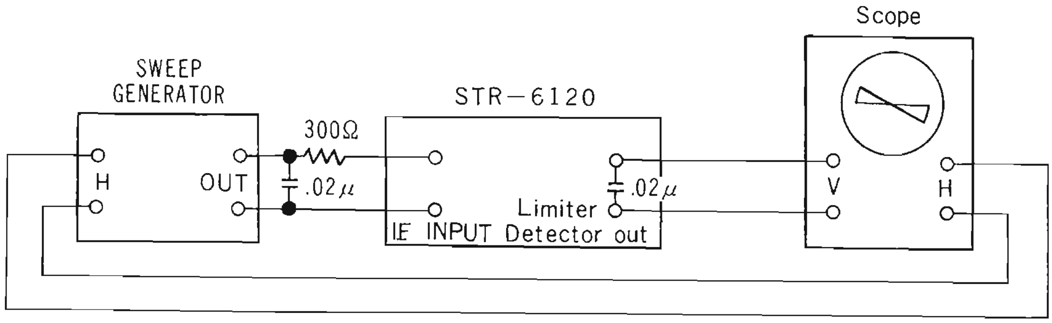


Fig. 3-2-1 FM Discriminator Adjustment Test Set-up

(2) Adjust the scope controls to provide a visible indication.

Caution: Two or three outputs will be observed on the scope as the center frequency of the sweep generator varies ±1 to 2 MHz. The output you are looking for has the largest amplitude. Once you get this curve, decrease the sweep generator output as low as possible.

(3) Turn the top core of IFT301 with the hexagonal-head alignment tool to obtain an "S" curve response as shown in Fig. 3-2-2.

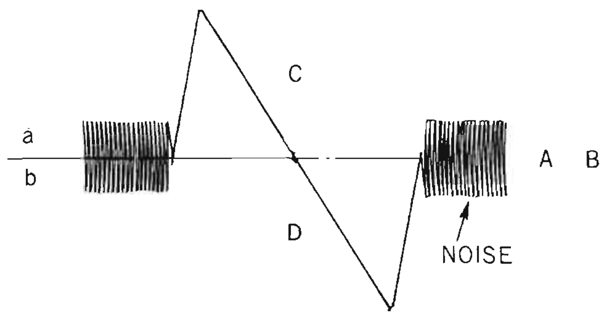


Fig. 3-2-2 "S" Curve Response

(4) Turn the bottom core of IFT_{301} to obtain maximum response.

(5) Detune the top core in both directions to obtain maximum positive and negative output as shown in Fig. 3-2-3. Adjust R_{319} (5k-B), the DC Balance, to obtain equal response when the core is peaked to provide either maximum negative or maximum positive output as shown in Fig. 3-2-3.

(6) Reset the top core of IFT_{301} to equalize negative and positive peaks, as shown in Fig. 3-2-2 (C=D=1/2B)

(7) Make sure that the "S" curve does not change when the shunting capacitor is removed from the input of the I-F section.

(8) Disconnect the sweep generator and make sure that the scope displays only noise.

(9) Turn IFT301 top core slightly to make the tuning meter indicate the null point (center scale).

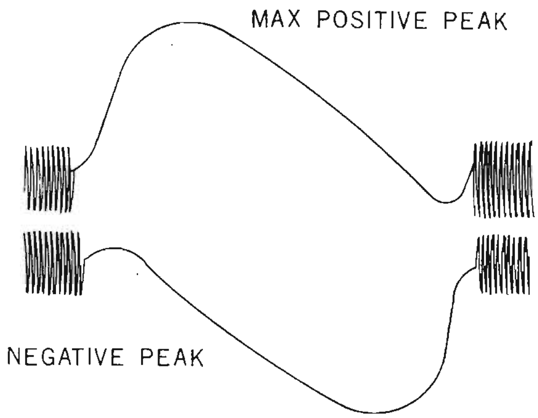


Fig. 3-2-3 "S" Curves at Peak

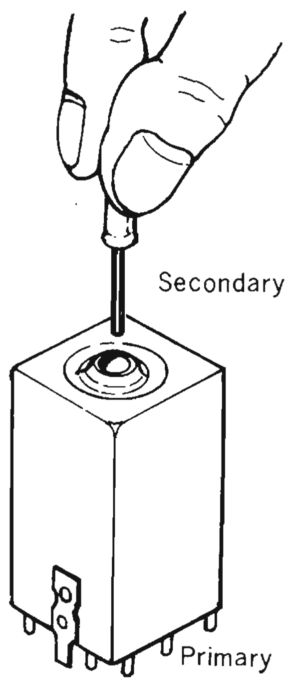


Fig. 3-2-4 FM Discriminator Transformer

SECTION 4
OVERALL ADJUSTMENTS AND TESTS

These "touch-up" adjustments ensure optimum performance.
They also assist in locating troubles.

Test Equipments Required:

(1) Standard FM Signal Generator (SSG).
(2) MPX Stereo Signal Generator
(3) Audio Oscillator
(4) Distortion Meter with AC VTVM
(5) Dummy Antenna (See Fig. 3-1-1).
(6) Oscilloscope
(7) Alignment Tools

Caution: Discriminator Transformer Adjustment should come to first before performing any adjustments.

4-1 Monaural Distortion

(1) Connect the equipment as shown in Fig. 4-1-1.
(2) Set the FM Signal Generator Frequency to 98 MHz, 400Hz, 100% modulation.
Output level: 60 dB/μ
(3) Tune the receiver to 98 MHz and adjust the bottom core of IFT_{301}, the Discriminator Transformer, slightly for minimum distortion.

4-2 Stereo Distortion

Note: Before starting MPX decoder check and adjustment, check the phase between the pilot signal (19 kHz) and sub carrier (38 kHz) signal, as follows:

(a) Connect the MPX Stereo Generator and oscilloscope as shown in Fig. 4-2-1.

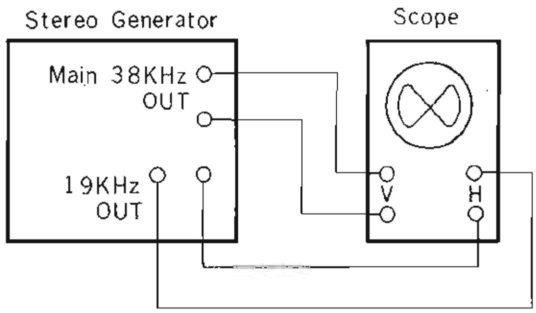


Fig. 4-2-1 Stereo Generator Phase Check Test

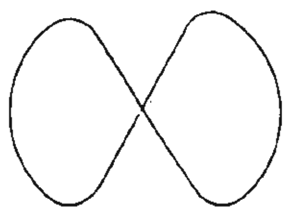


Fig. 4-2-2 Lissajous Pattern

(b) Adjust the output phase of the 19 kHz pilot signal to obtain the stable Lissajous pattern shown in Fig. 4-2-2.

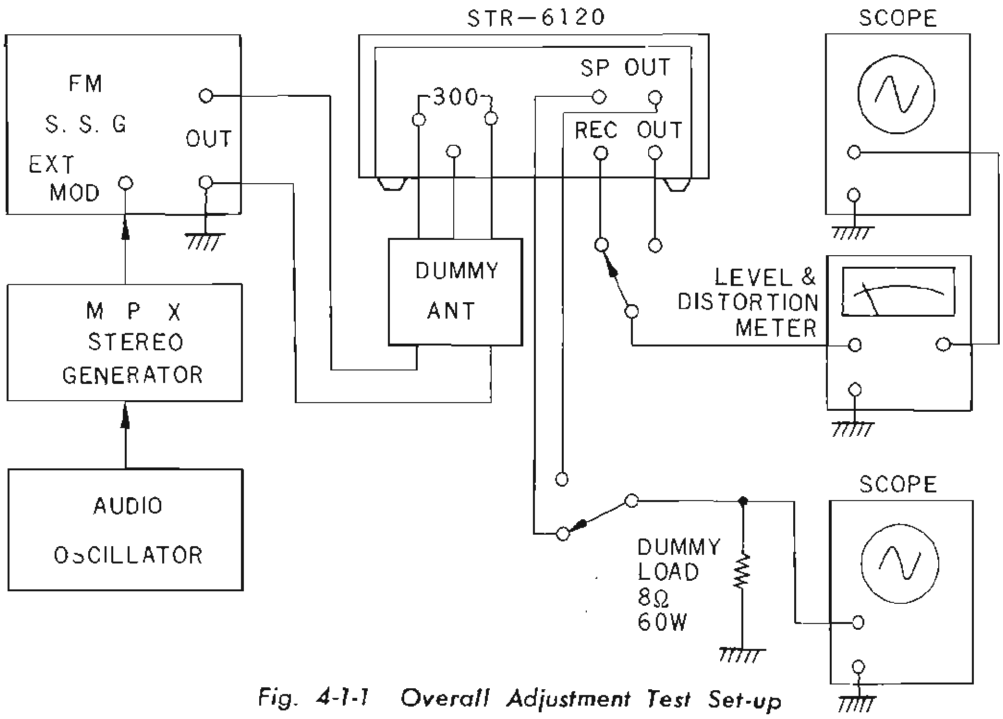


Fig. 4-1-1 Overall Adjustment Test Set-up

(1) Connect the equipment as shown in Fig. 4-1-1; set the FM signal generator as follows:
Carrier Frequency ....98 MHz
Output Level........................60 dB/μ
Modulation:
Main Channel (400 Hz) ....45% (33.75 kHz)
Sub Channel (38 kHz) ....45% (33.75 kHz)
Pilot Signal (19 kHz) ....10% (7.5 kHz)
Above mentioned modulation can be set up as follows:
(a) With the equipment connected as shown in Fig. 4-1-1, set the MPX stereo generator controls as follows.
MAIN CHANNEL ....OFF
SUB CHANNEL ....OFF
19 kHz (PILOT)...........................ON
(b) Adjust the MPX generator output level to obtain a 7.5 kHz deviation on the FM SSG modulation meter.
(c) Reset the MPX stereo generator controls as follows:
MAIN CHANNEL ....ON
SUB CHANNEL ....OFF
19 kHz (PILOT)...........................OFF
(d) Adjust the audio oscillator output control to obtain a 33.75 kHz deviation on the FM SSG modulation meter.
(e) Set all the controls to the ON position.

(2) Check the distortion in each channel.
Adjust L504, the switching transformer, in the MPX Decoder section with a non-metalic alignment tool to obtain minimum distortion. See Fig. 4-2-3.
Note: Transformer Cap can be removed by softening the cement at its base.

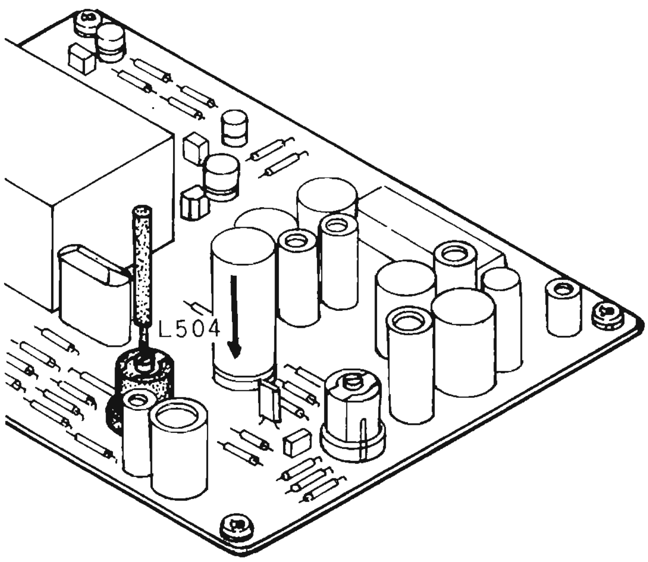


Fig. 4-2-3 Stereo Distortion Adjustment

4-3 Channel Separation

(1) With the equipment connected as shown in Fig. 4-1-1, set the signal generator's controls to the same positions as described in the Stereo Distortion check.
(2) Check channel separation as follows:
Record the output level of the left channel when the MPX generator input selector is set to the left channel. Switch the input selector to the right channel, and check the residual signal in the left channel. The residual signal ratio represents the separation. Adjust R537 (5k-B), the Separation Adj., to obtain minimum residual level on the MPX Decoder board. Check the right channel separation.
Usually there exisists about an 8 to 9 dB difference after performing above mentioned procedures. Re-adjust the R_{537} for minimum difference between left and right separation.
Note: The output level changes according to the setting of R_{537}.

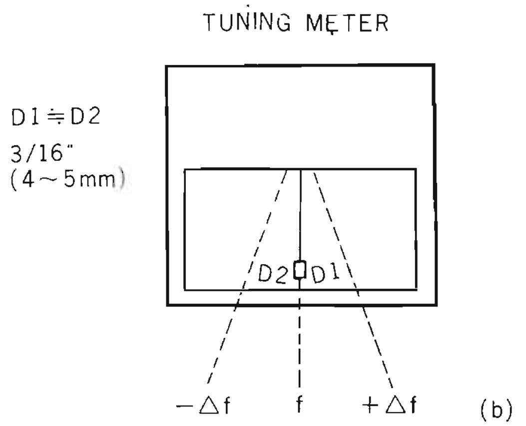
4-4 Muting Circuit Adjustment

Adjustment Procedure:

(1) Muting Level Adjustment
(a) With the equipment connected as shown in Fig. 4-1-1, set the FM signal generator as follows:
Carrier Frequency ....98 MHz
Output Level.....................20 dB/μ
Modulation (400 Hz) ....100% (75 kHz)
(b) Tune the set and adjust the semifixed resistor R_{211} (330Ω) on the I-F board until the output is muted when the signal output level is decreased to 15±3 dB/μ. Normally R_{211} is turned fully clockwise.
(c) If the muting circuit does not operate properly, check the related circuitries.
(2) Muting Level Calibration in the Detuned Condition
Readjustment is necessary after replacing Q_{401} (FET) or if the tuning meter deflection is unblanced when detuning +△f, −△f respectively. The relations between the "S" curve, muting level and tuning meter deflection are shown in Fig. 4-4-1.

Adjustment Procedure:

(a) With the equipment connected as shown in Fig. 4-1-1, set the FM signal generator and receiver controls as follows:
Carrier Frequency ....98 MHz
Output Level..........................60 dB/μ
Modulation (400 Hz) ....100% (75 kHz)
VOLUME Control ....Minimum
FUNCTION Selector ....TUNER,
MODE Selector........................STEREO
MUTING Switch ....IN
MONITOR Switch ....SOURCE



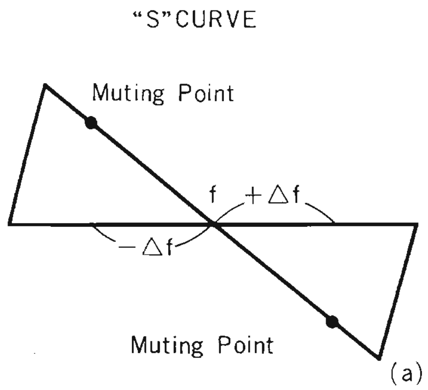


Fig. 4-4-1 Relation between "S" Curve, muting level and tuning meter deflection

(b) Tune the set and shift the tuning frequency higher and lower respectively until the muting circuit begins to operate and note the deflection of the tuning meter. Deflection of the tuning meter should be within a limit of 3/16″(4-5mm) off position from the tuning meter's null point. In case the difference between D_1 and D_2 is too great, the adjustment is required.

Procced as follows:

(c) In case $D_1 \gg D_2$
Increase the value of R_{403} (turn it counter-clockwise) to obtain a proper response on the tuning meter. See Fig. 4-4-1.

(d) In case $D_1 \ll D_2$
Decrease the value of R_{403} (turn it clockwise) to obtain a proper response on the tuning meter.

4-5 Tuner Input-Meter Calibration

(1) With the equipment connected as shown in Fig. 4-1-1, set the FM signal generator and receiver's controls as follows:

Carrier Frequency ....98 MHz
Output Level ....60 dB/μ
Modulation (400 Hz) ....100% (75 kHz)
VOLUME Control ....Minimum
FUNCTION Selector ....TUNER
MODE Selector.........................STEREO
MONITOR Switch ....SOURCE

(2) Tune the set and adjust R251 (1 kΩ), the Meter Calibration, to get the meter pointer to 1/16″ (2 mm) left of its maximum indication. See Fig. 4-5-1.

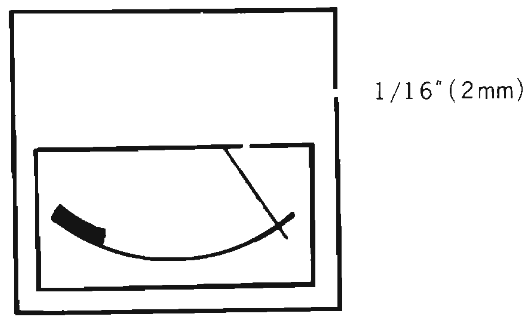


Fig. 4-5-1 Tuner Input Meter Calibration

4-6 Dial Pointer Adjustment

(1) Under the same conditions as described in Section 4-5, except that the carrier frequency is crystal calibrated and output level is 20 dB/μ, tune the set precisely to the 98 MHz signal.

(2) Set the pointer to 98 MHz on the dial.
Apply a drop of contact cement to the tabs on the rear of the dial pointer.

4-7 Power Amplifier Adjustment

Note: To simplify the following description, only the left channel and its related circuitries are described. The right channel is identical except for reference symbol numbers (See schematic diagram).

This adjustment should be done each time after replacing any transistors removed from the Power Amplifier section.

Caution: To avoid accidental transistor damage, increase the ac line voltage gradually, using the variable transformer, while checking the voltage between the collector of Q_{808} and ground. Check the reading does not exceed 0.6 volts.

Preparation:

Set the controls as follows:

VOLUME Control .... Fully counterclockwise
MODE Switch .... STEREO
SPEAKER Switch .... MAIN
LOUDNESS Switch .... OUT
TONE Controls .... 0 dB
MONITOR Switch .... TAPE

(A) Dc Bias Adjustment

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

1. Connect the dc volt meter between the emitter of Q_{810} and ground as shown in Fig. 4-7-1.
2. Turn on the power switch. Then, adjust R_{813} (10KΩ-B) to obtain a 12 mV reading on the meter.

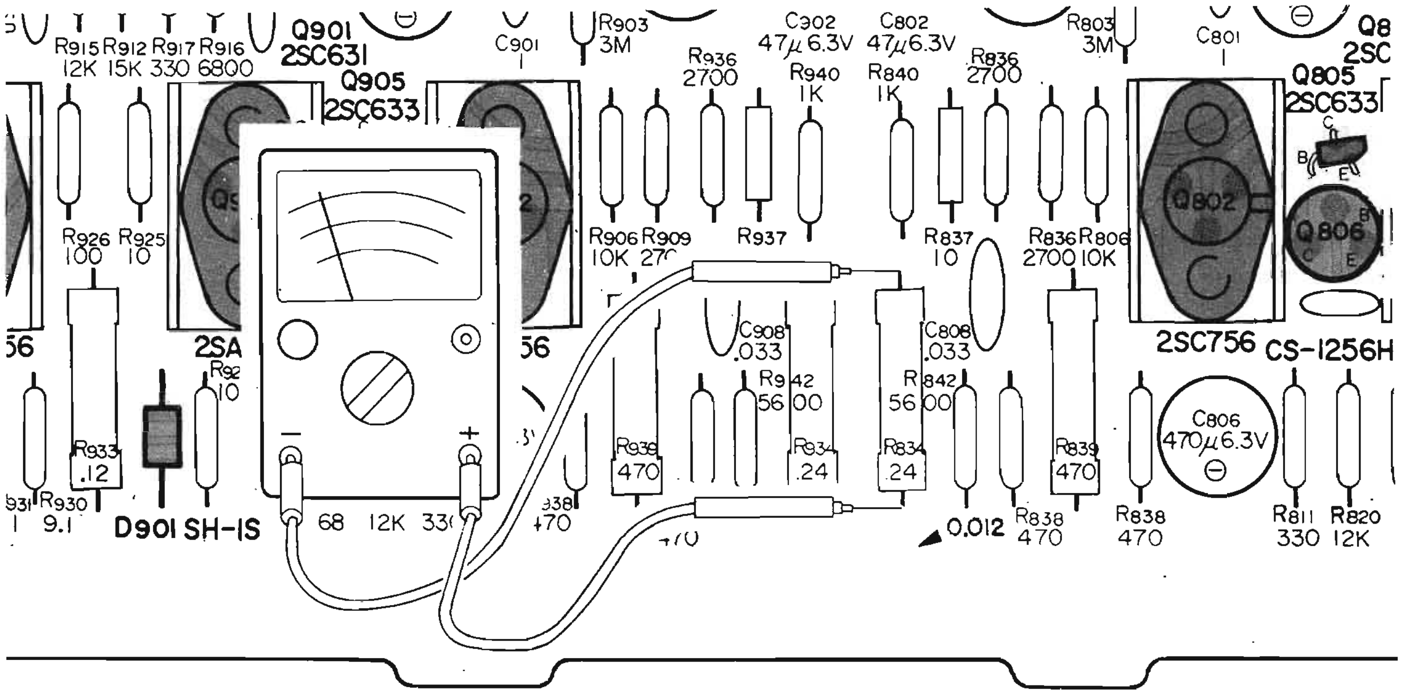


Fig. 4-7-1 DC Bias Adjustment Test Set-up

(B) Ac Balance Adjustment

Caution: Serious deficiencies in harmonic distortion at high levels will result if this adjustment is set improperly.

1. With the equipment connected as shown in Fig. 4-1-1 and the power switch is in the ON position, feed a 1 kHz 0 dB signal to the TAPE input terminal through the attenuator.
2. Turn the volume control gradually and watch the waveform on the oscilloscope. Adjust R_{805} (50 kΩ-B) to obtain an output waveform such as the positive and negative peaks are clipped at the same time when increasing the volume control. See Fig. 4-7-2.

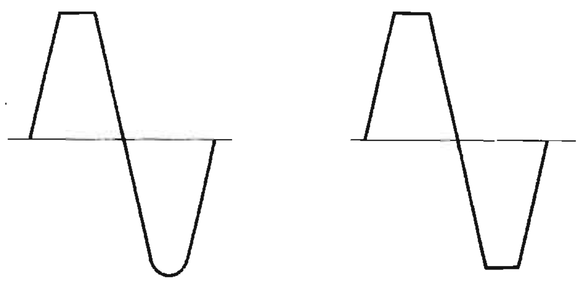


Fig. 4-7-2 AC Balance Adjustment

(C) Thermal Sensitivity Protection Circuit Check

Step 1: With the equipment connected as shown in Fig. 4-1-1. Feed a 1 kHz signal to the TAPE input terminal through the attenuator.

Step 2: Increase signal level to obtain 500 mW output (2.0 Vrms across an 8 ohm load).

Step 3: Insert a thermometer between the power transistor and CS_1. Heat the power transistor and CS_1 gradually using a heat blower, as shown in Fig. 4-7-3.
A conventional hair dryer is acceptable.

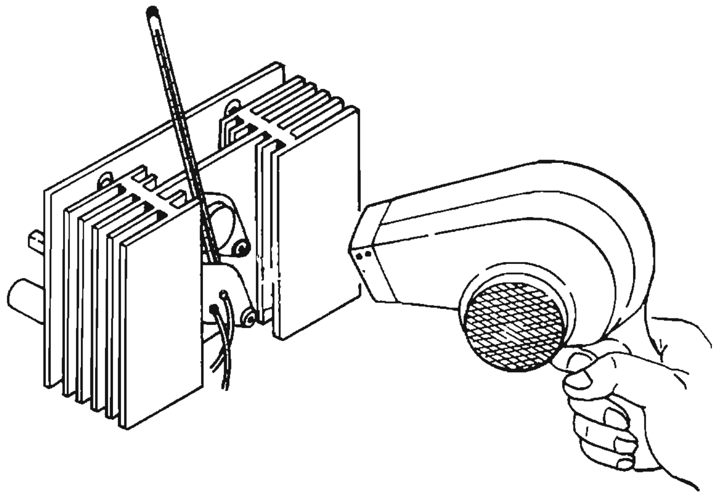


Fig. 4-7-3 Thermal Sensitive Protection Check

Step 4: Confirm that the output of the amplifier is decreased when temperature reaches 158°±9°F. (70±5°C) See Fig. 4-7-4.
If the protection circuit does not operate properly, check the related circuitry.

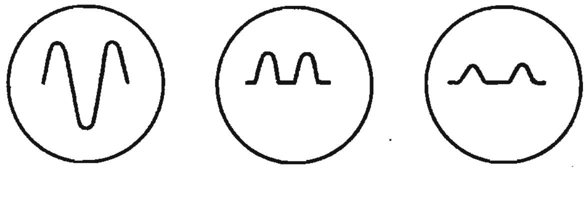
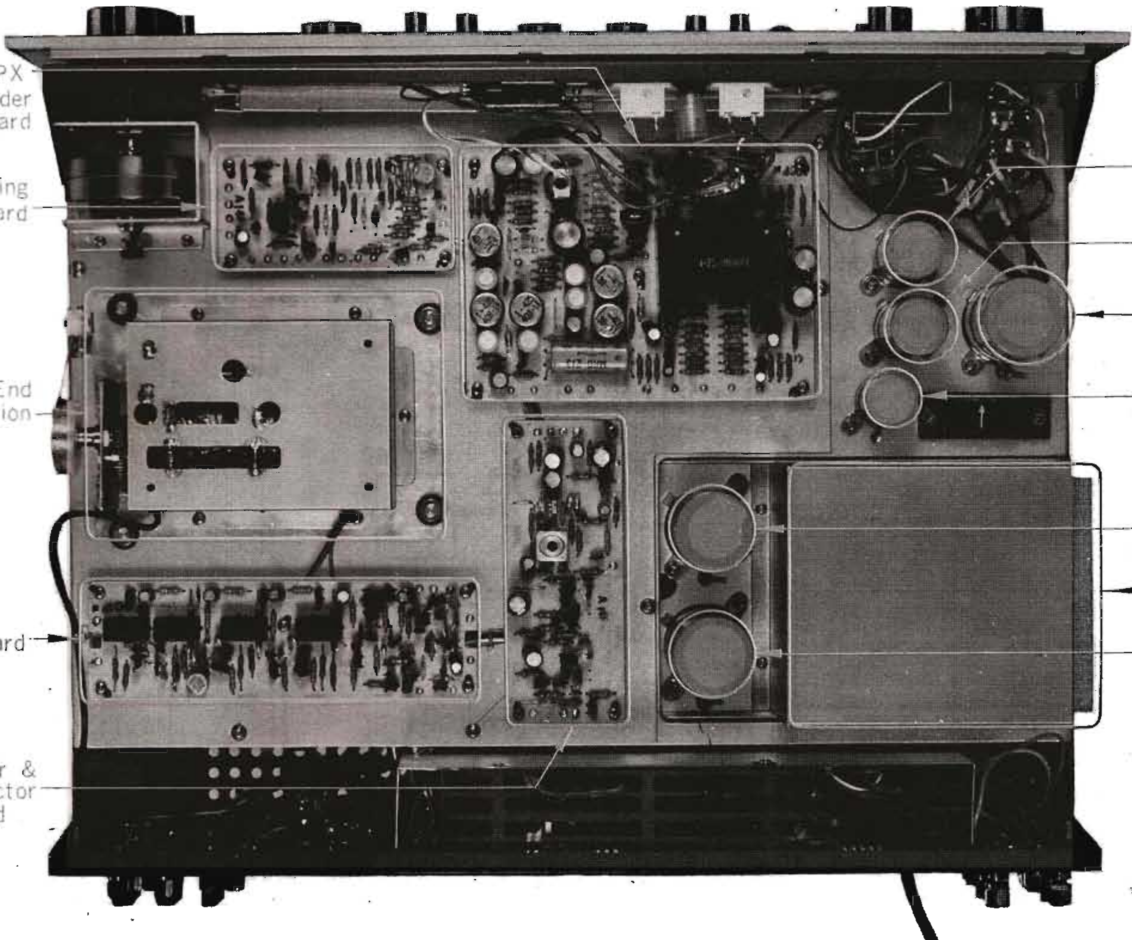


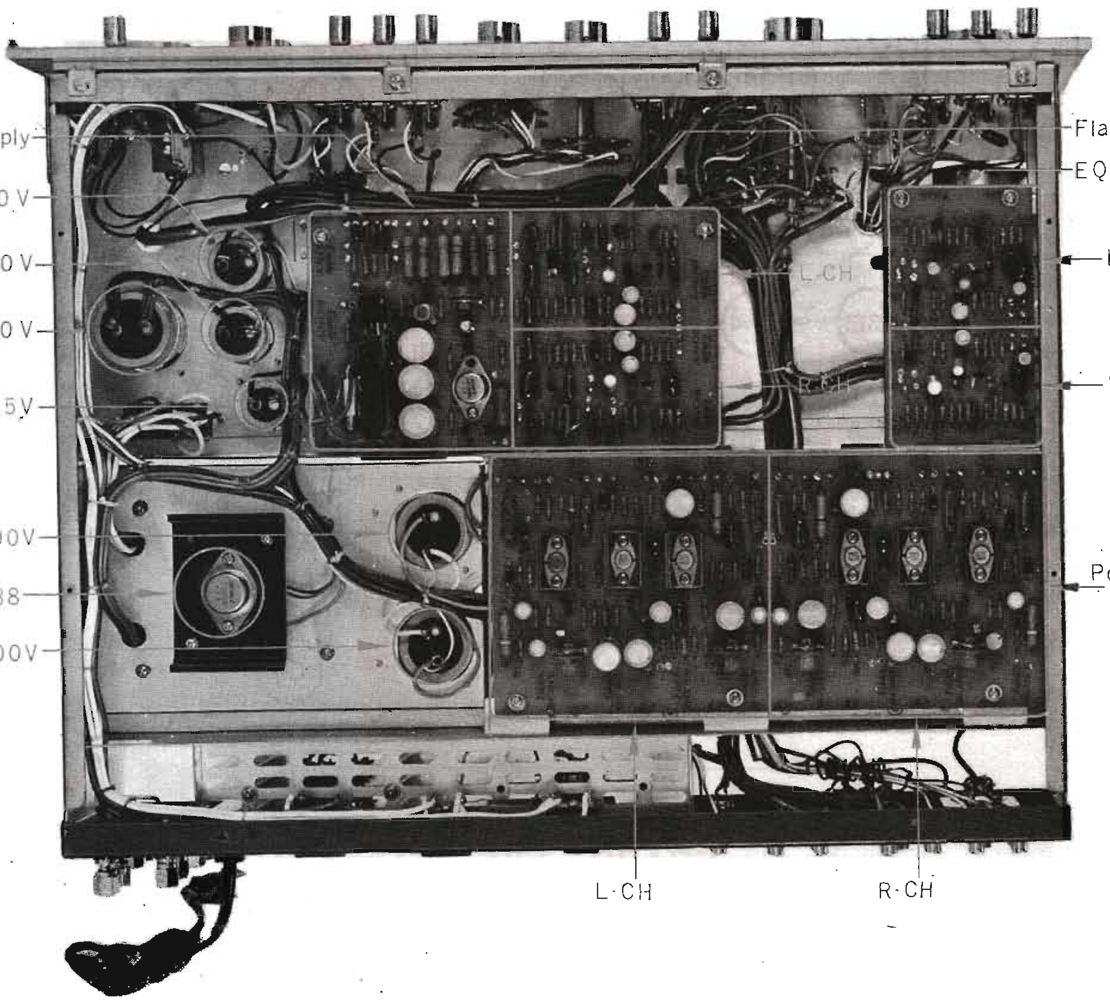
Fig. 4-7-4 Output Wave Forms when thermal protection circuit is actuated

Chassis Layout

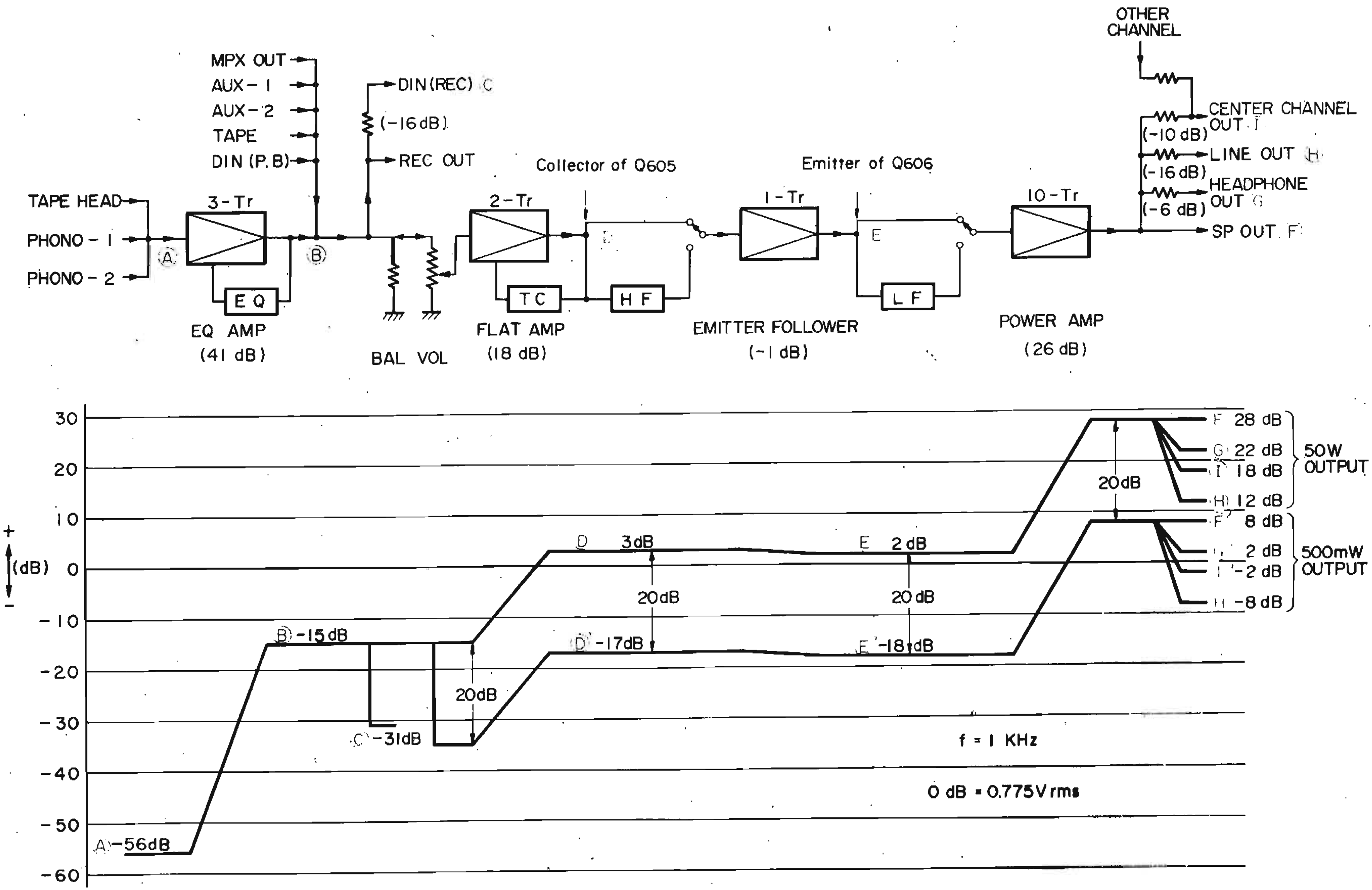
Top View



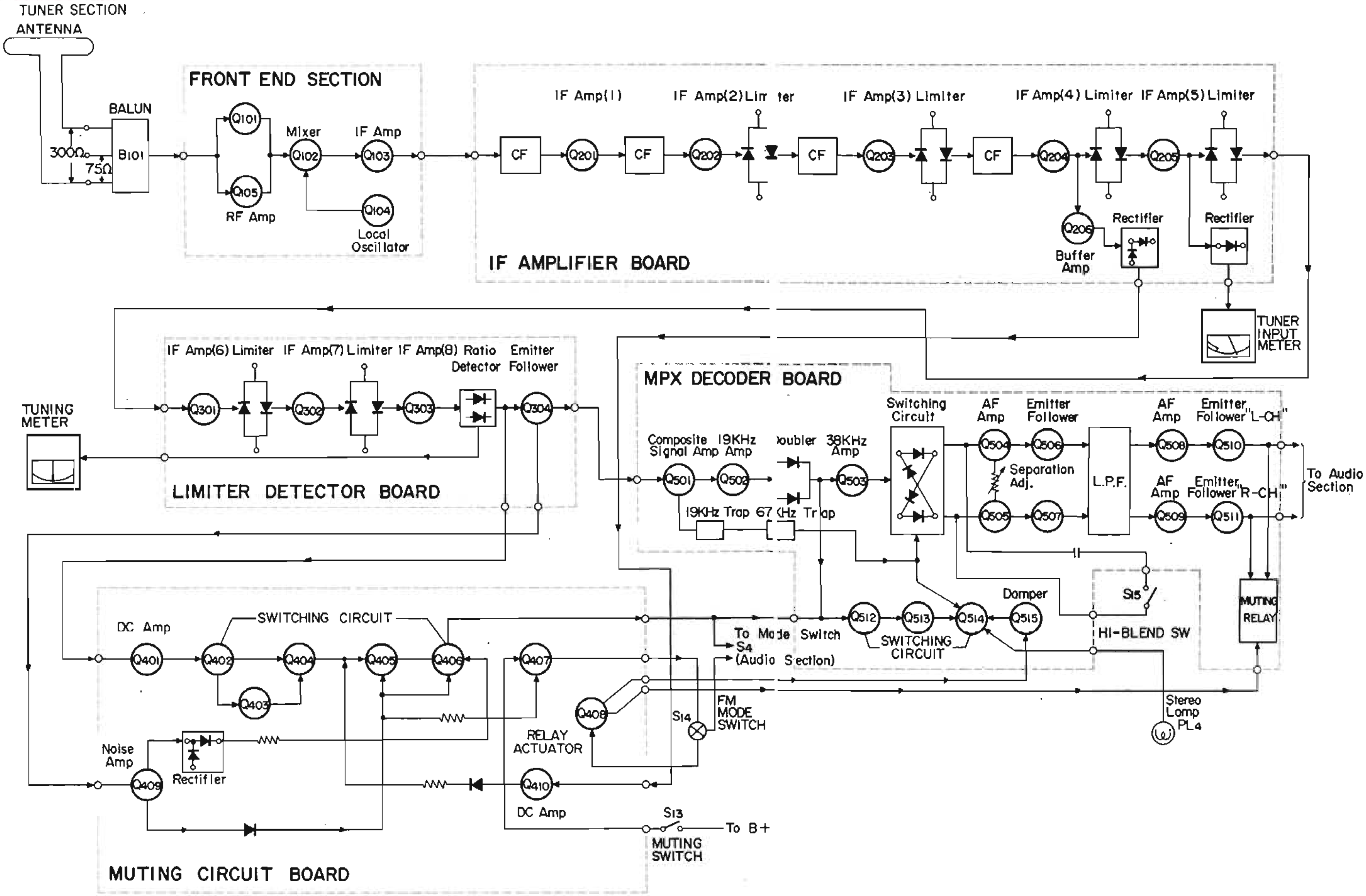
Bottom View



Level Diagram

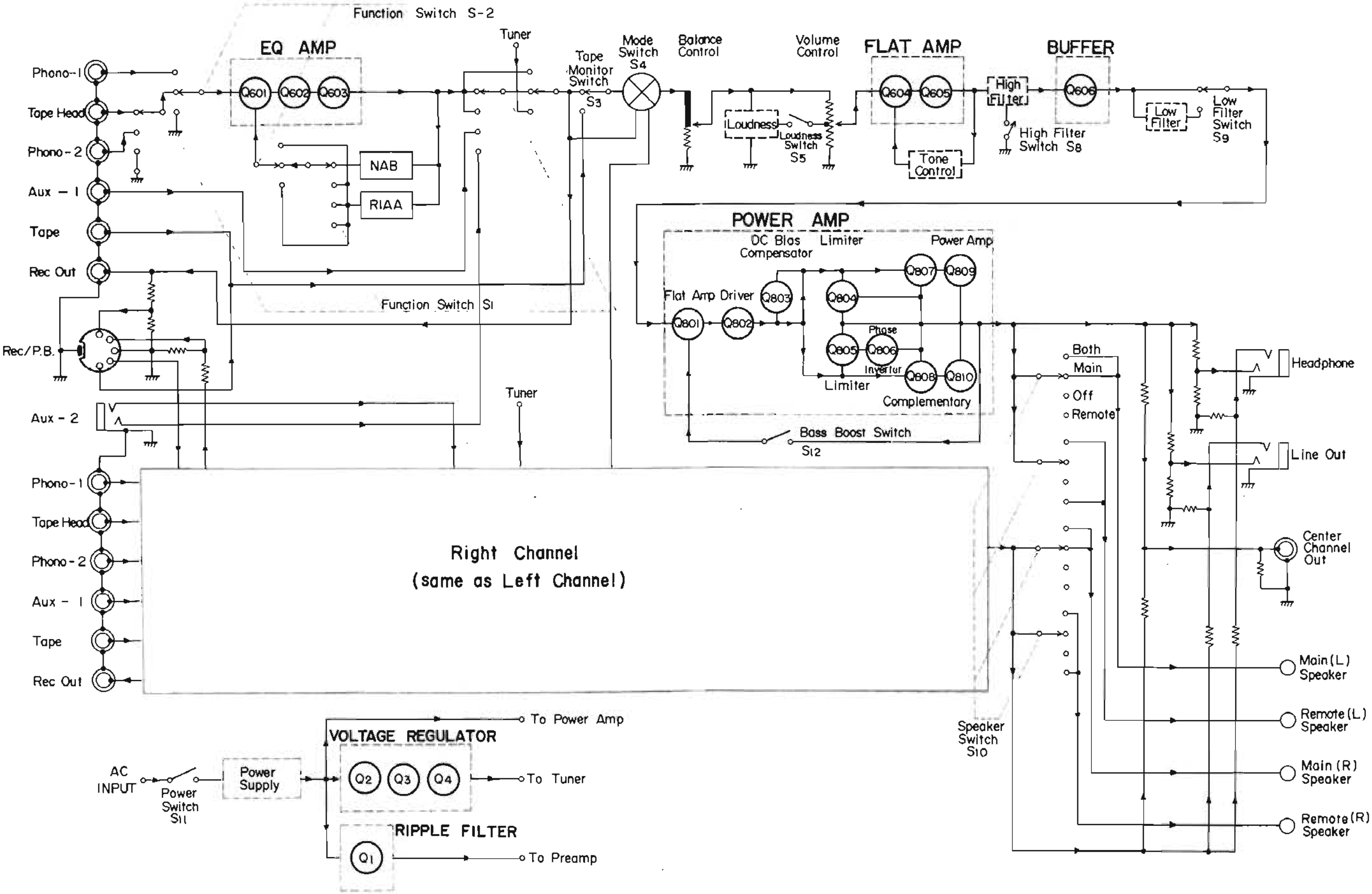


Block Diagram



Block Diagram

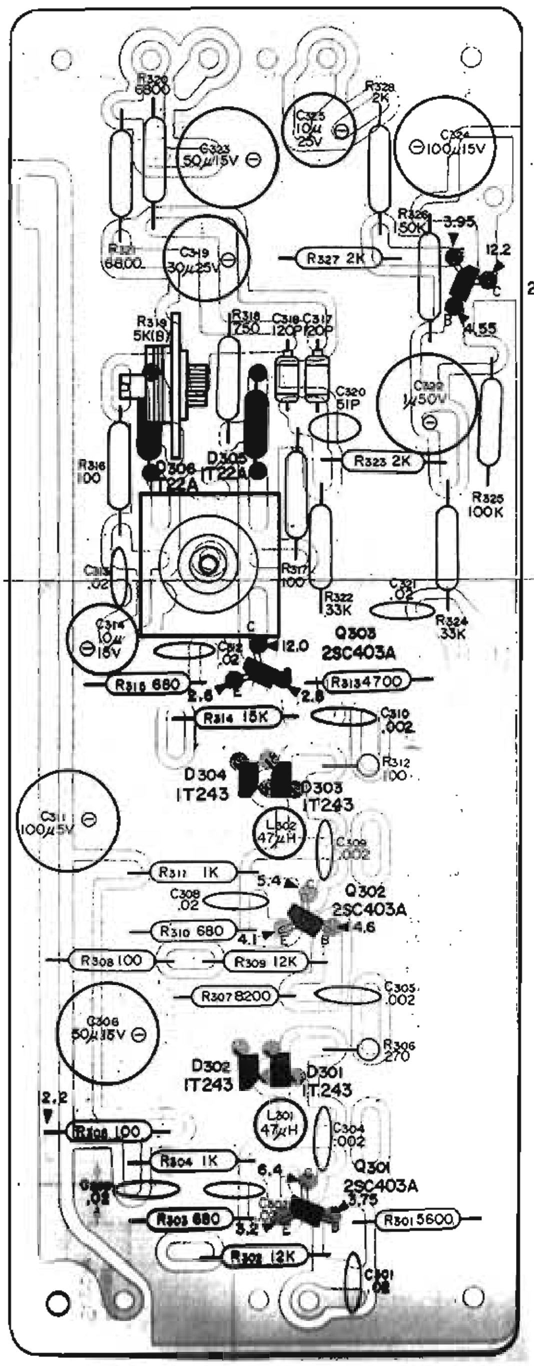
AUDIO AMPLIFIER SECTION



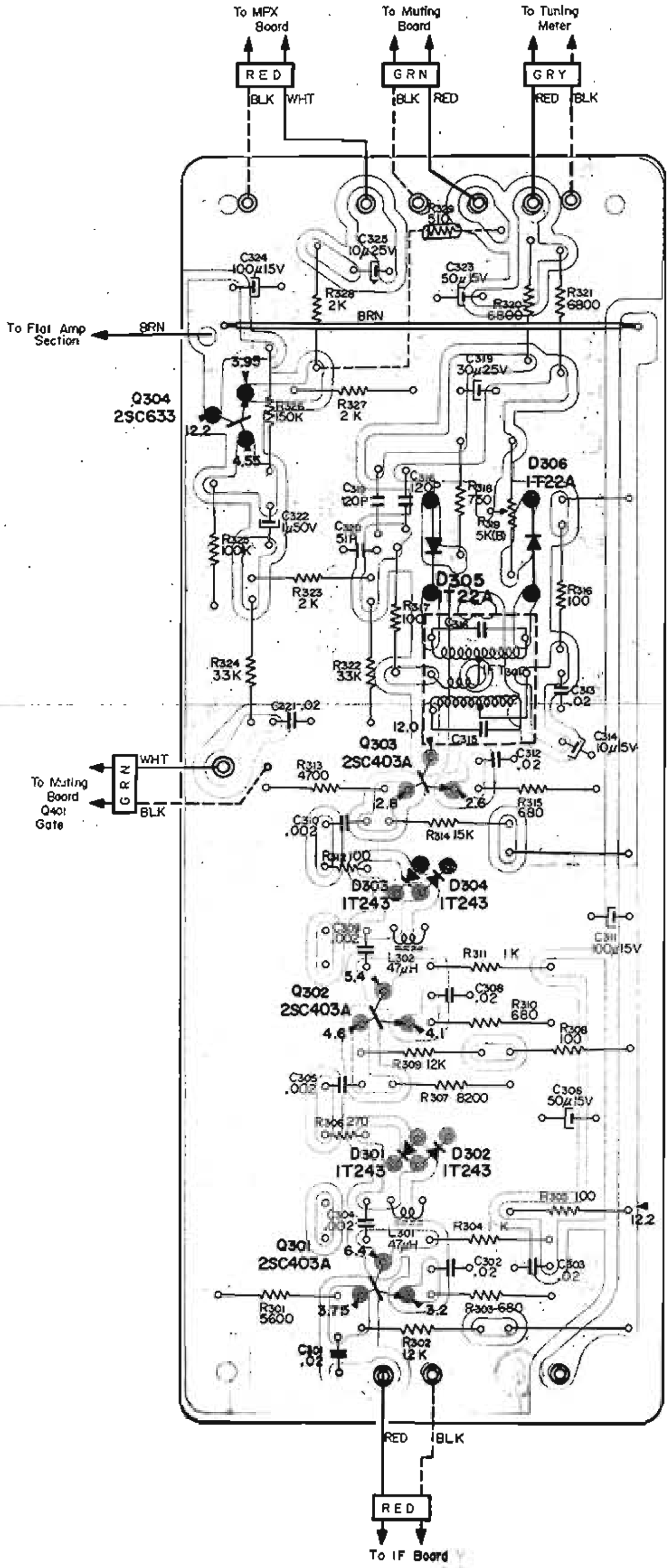
Mounting Diagram

Limiter and Detector Section

Component Side



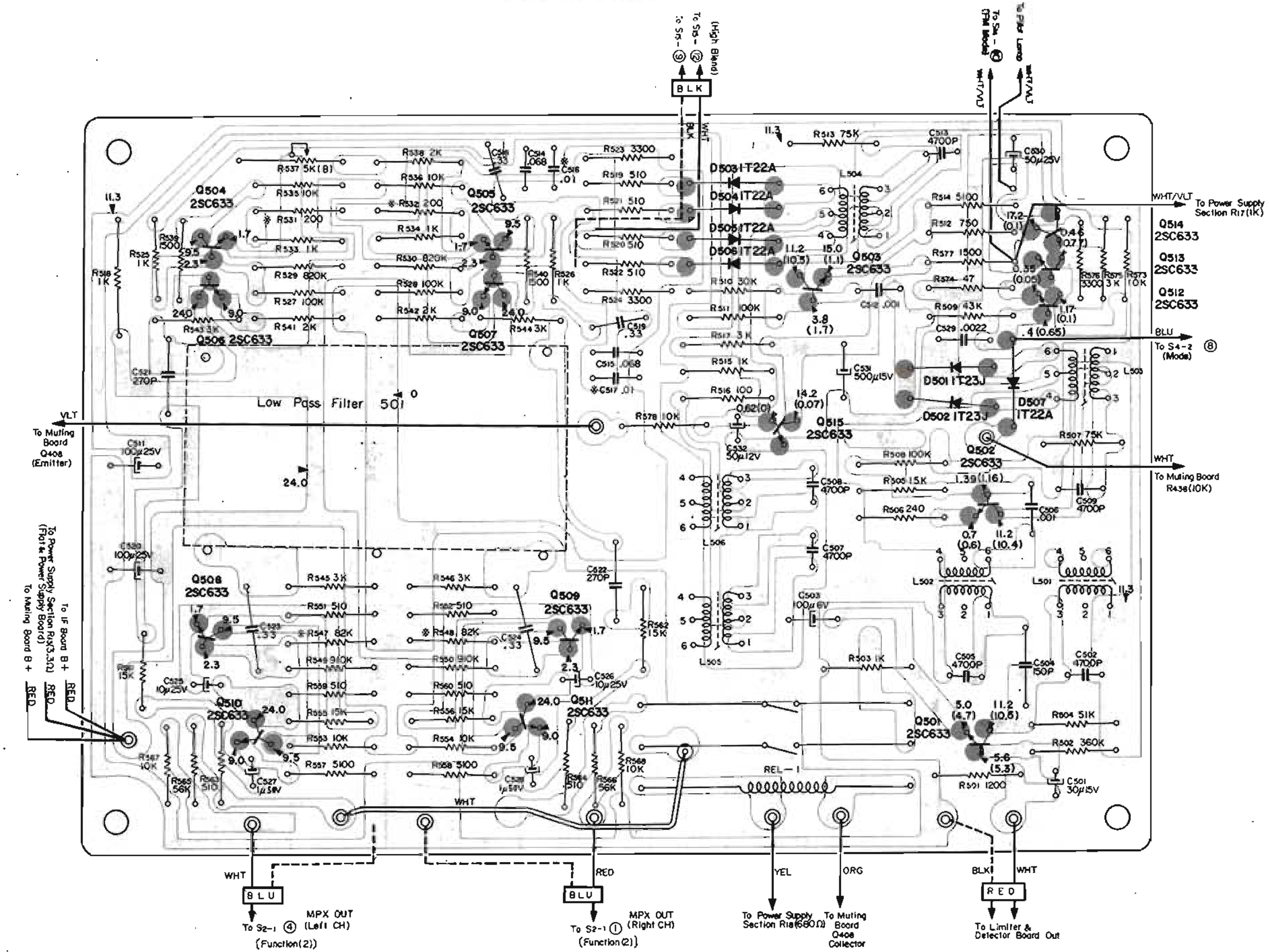
Conductor Side



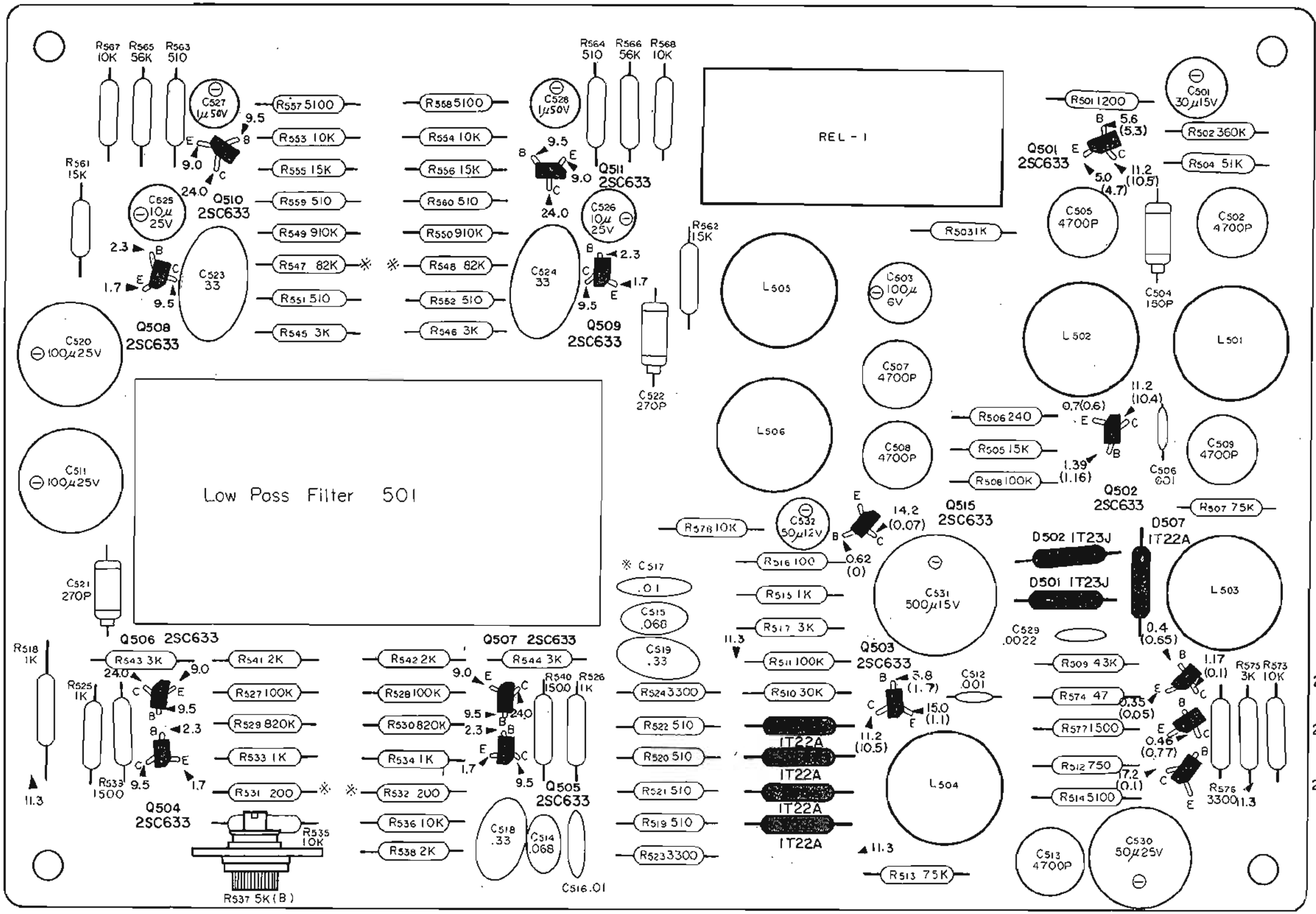
Mounting Diagram

MPX Decoder Section

Conductor Side



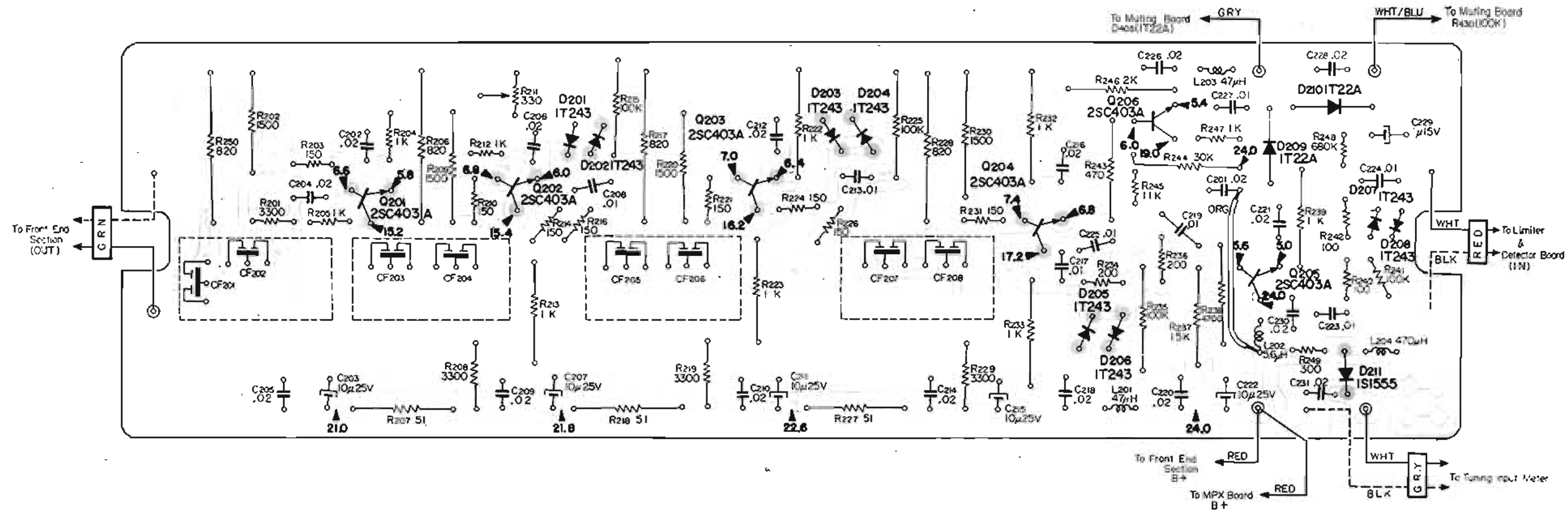
MPX Decoder Section

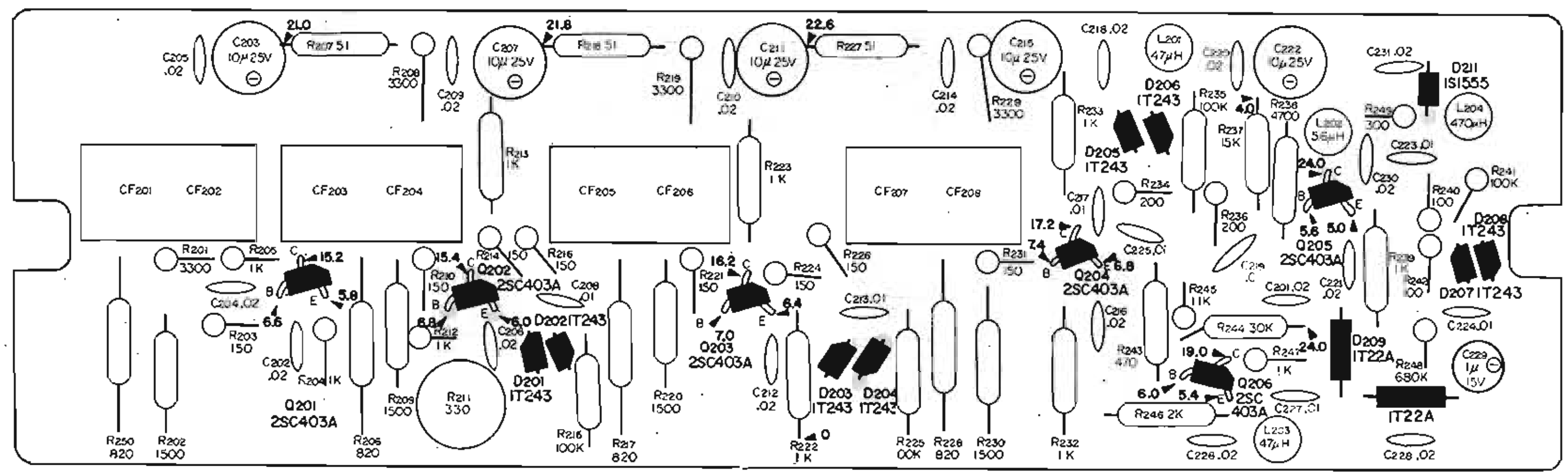


※ To be Selected

Mounting Diagram

I-F Amplifier Section

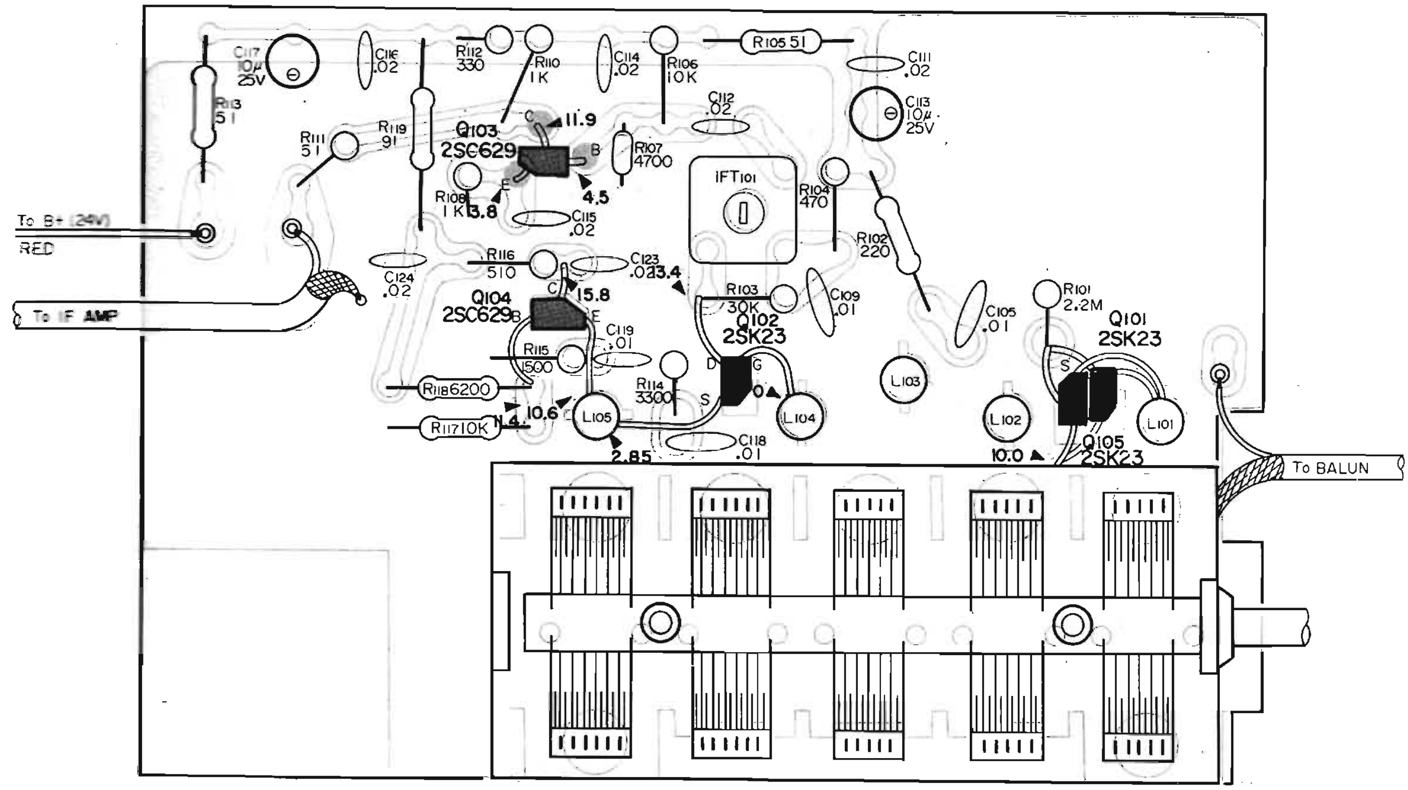




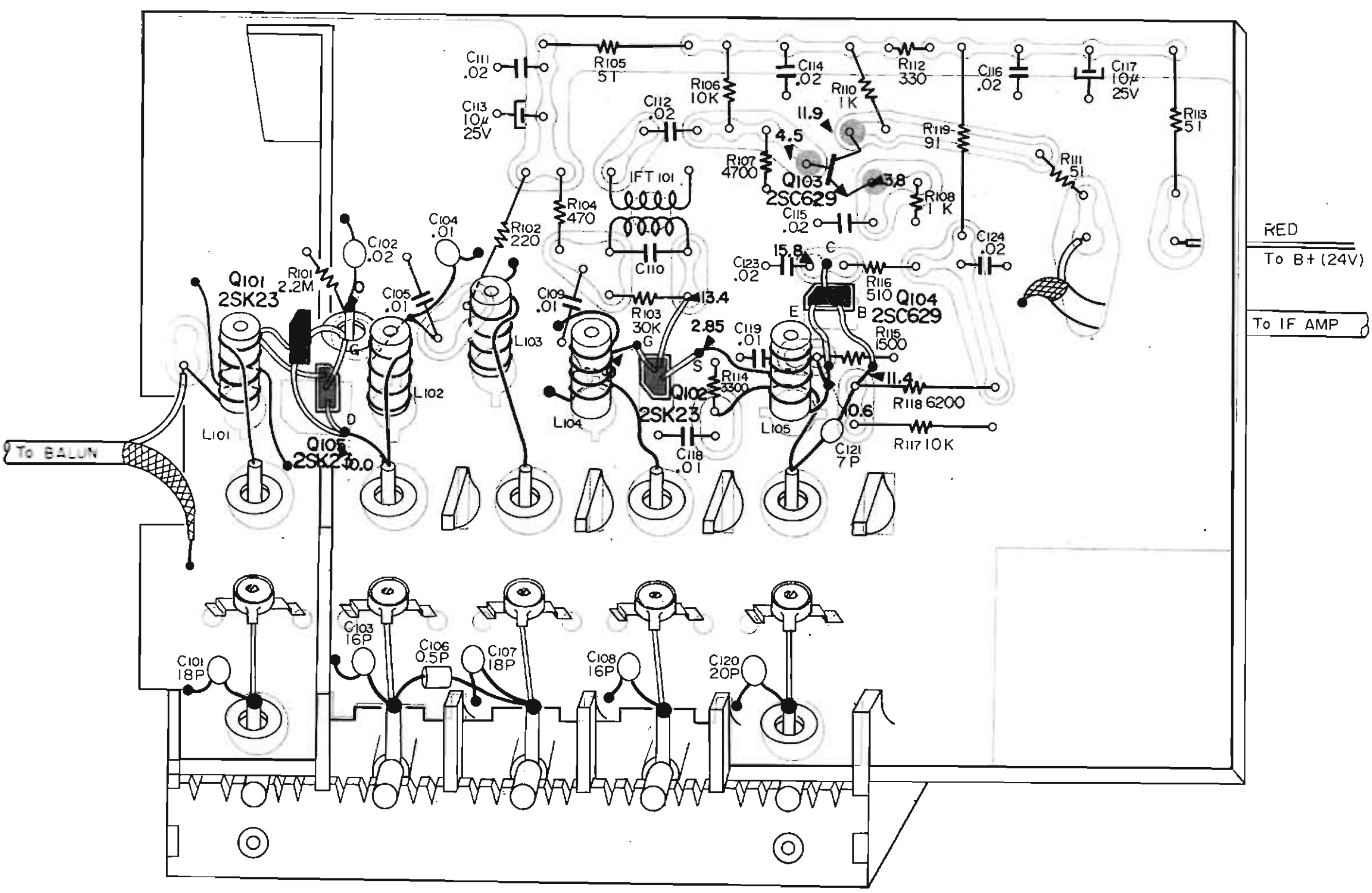
Mounting Diagram

Front End Section

Conductor Side

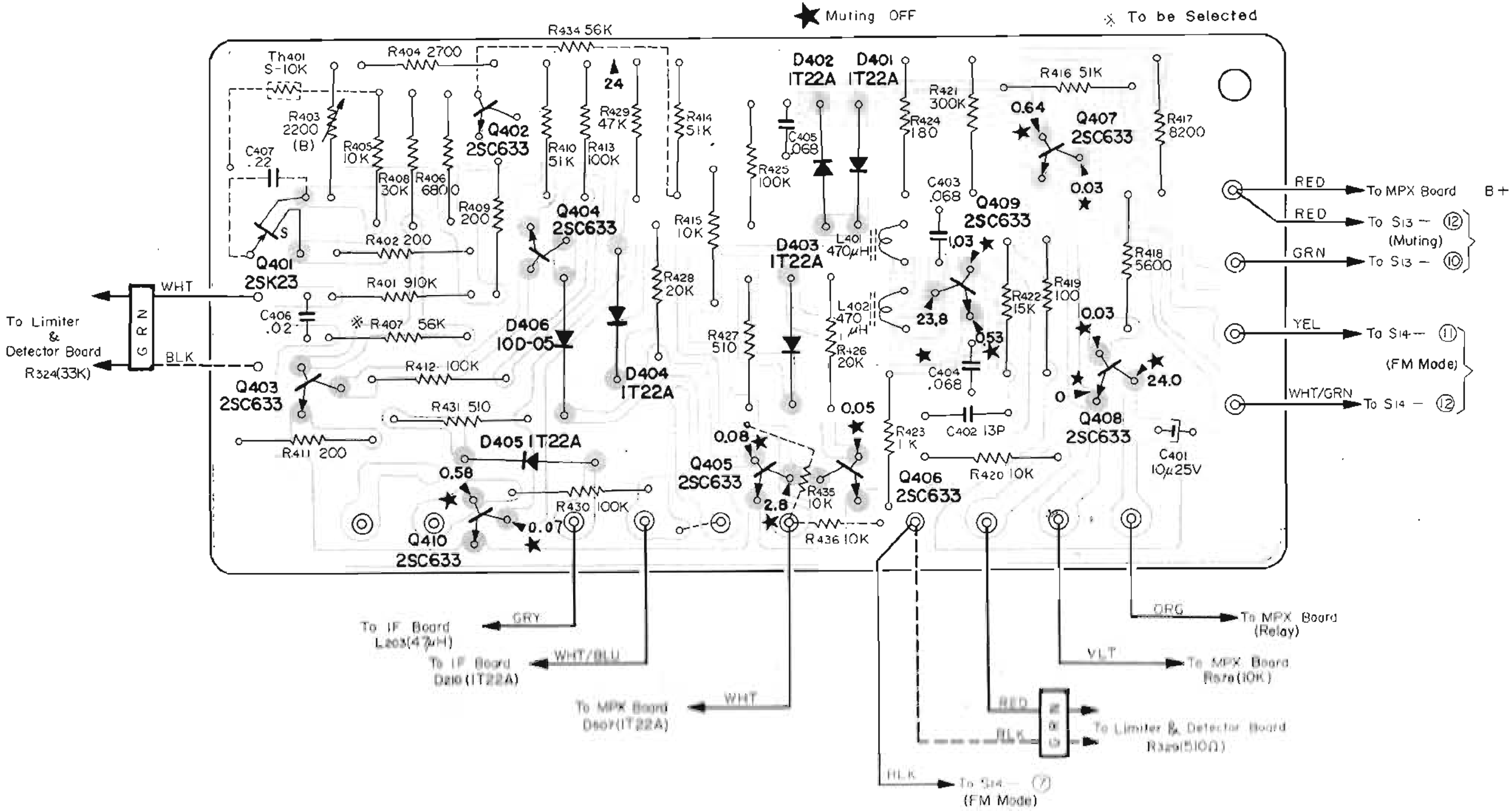


Component Side



Mounting Diagram

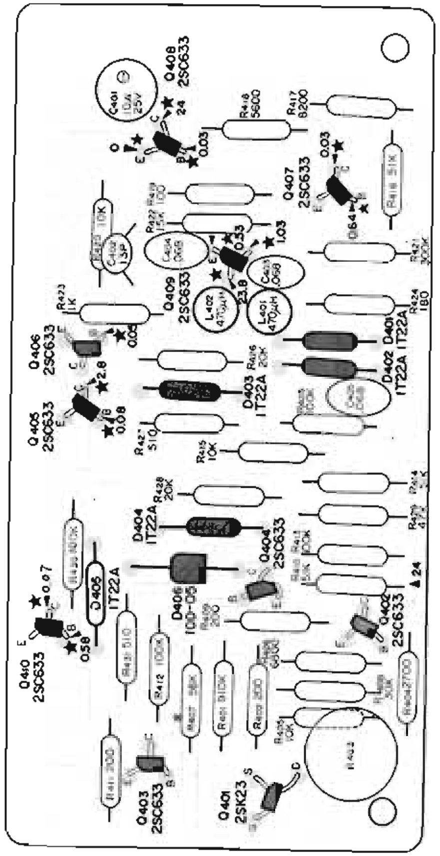
Muting Circuit Section

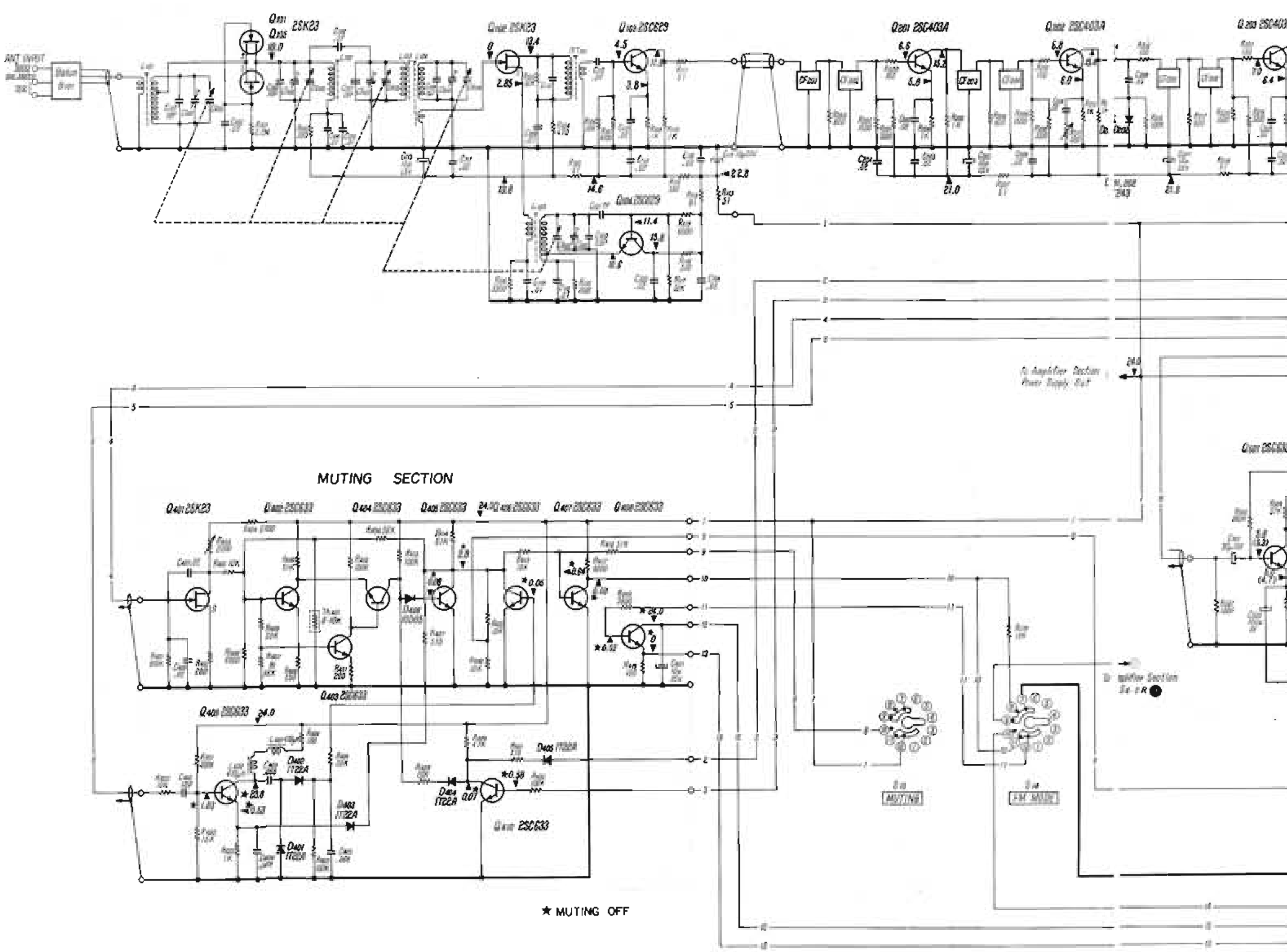


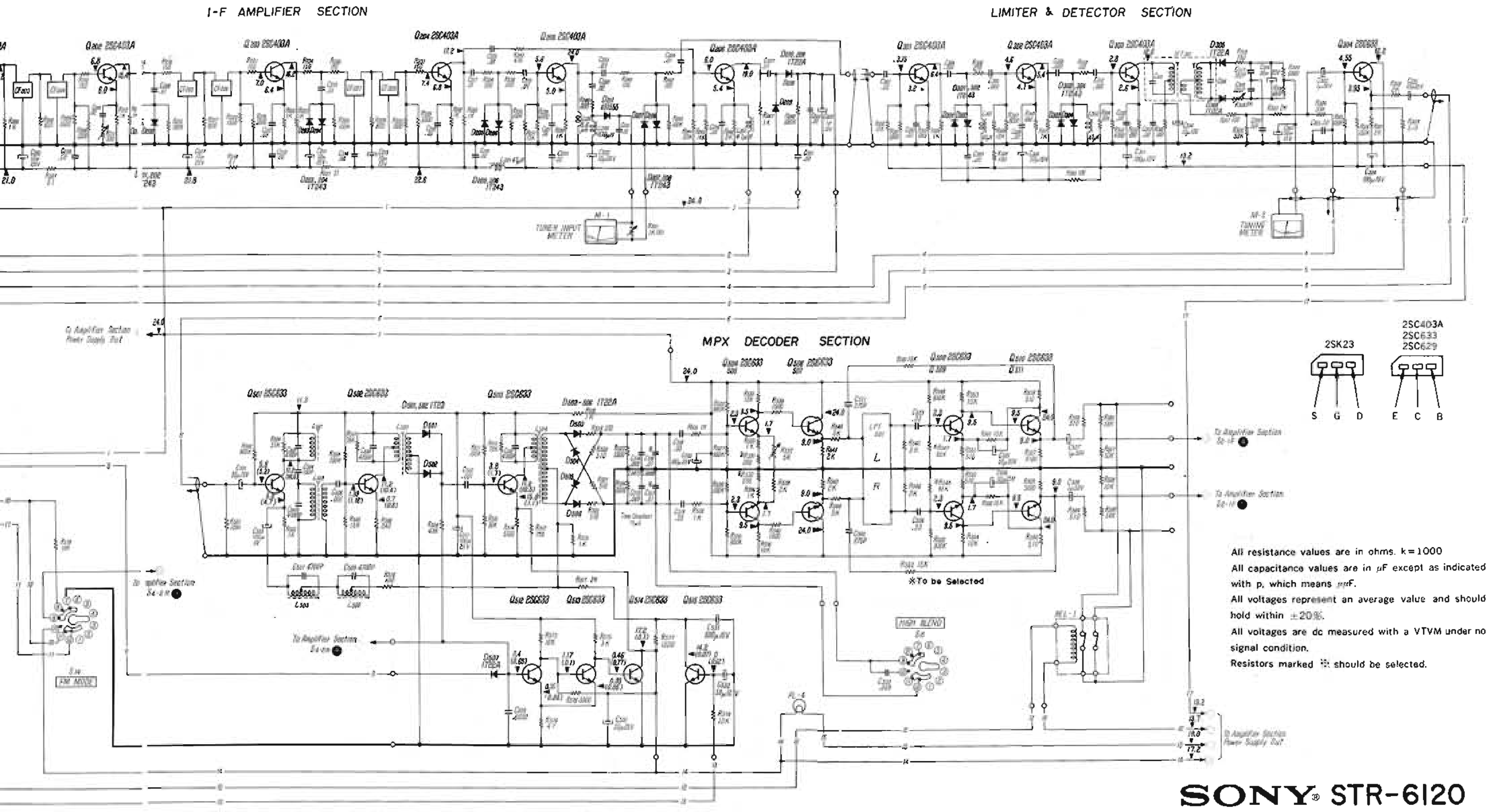
Muting Circuit Section

★ Muting OFF

* To be Selected



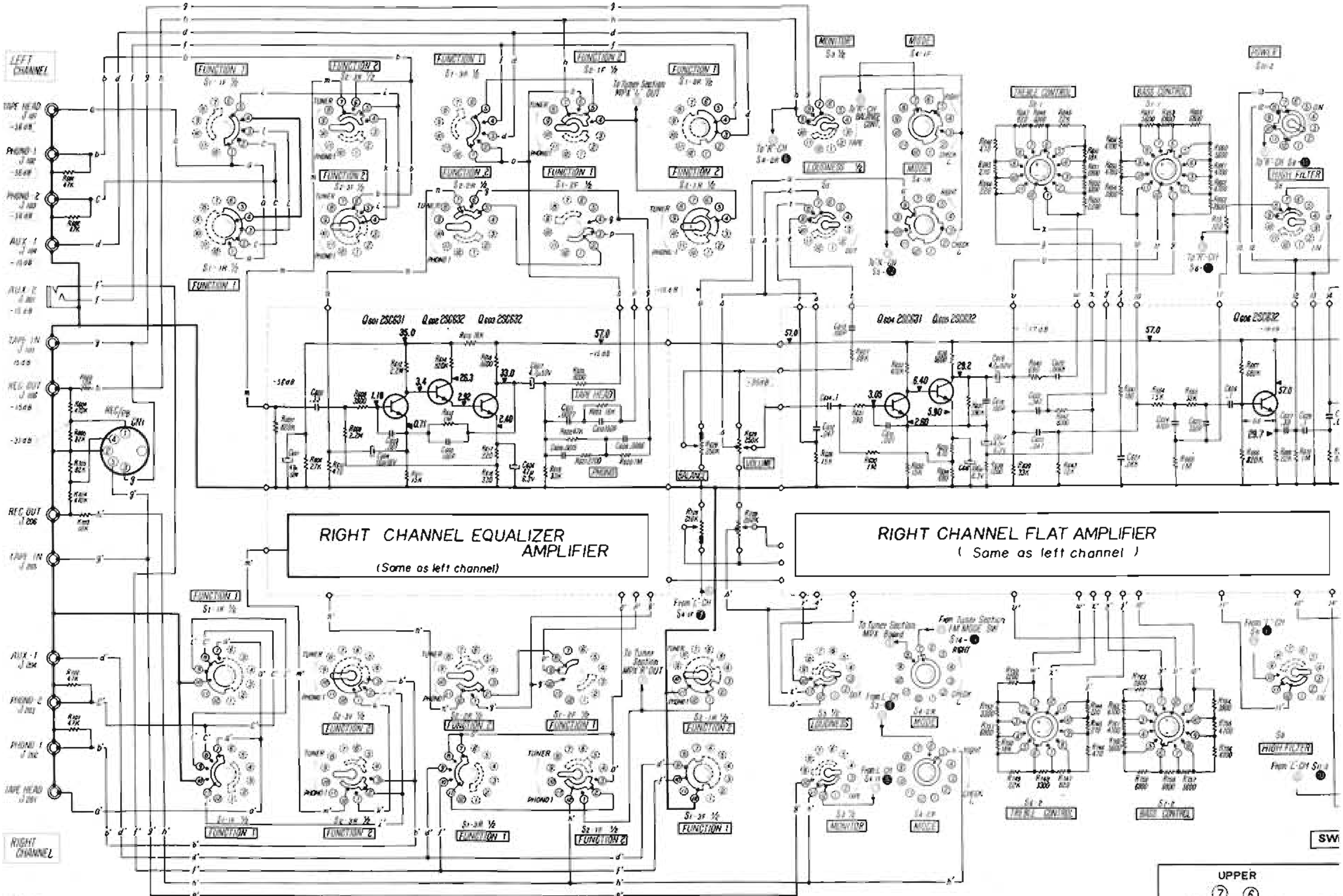




STEREO OPERATION

All resistance values are in ohms. k=1000
All capacitance values are in μF except as indicated with p, which means μμF.
All voltages represent an average value and should hold within ±20%.
All voltages are dc measured with a VTVM under no signal condition.
Resistors marked ※ should be selected.

SONY STR-6120
SCHEMATIC DIAGRAM
TUNER & MPX SECTION



Note:

All resistance values are in ohms. k=1000

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

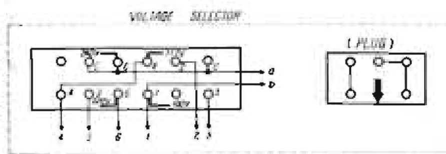
All voltages represent an average value and should hold within ±20%.

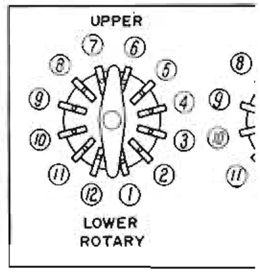
All voltages are dc measured with a VTVM under no signal condition.

Resistors marked ※ should be selected.

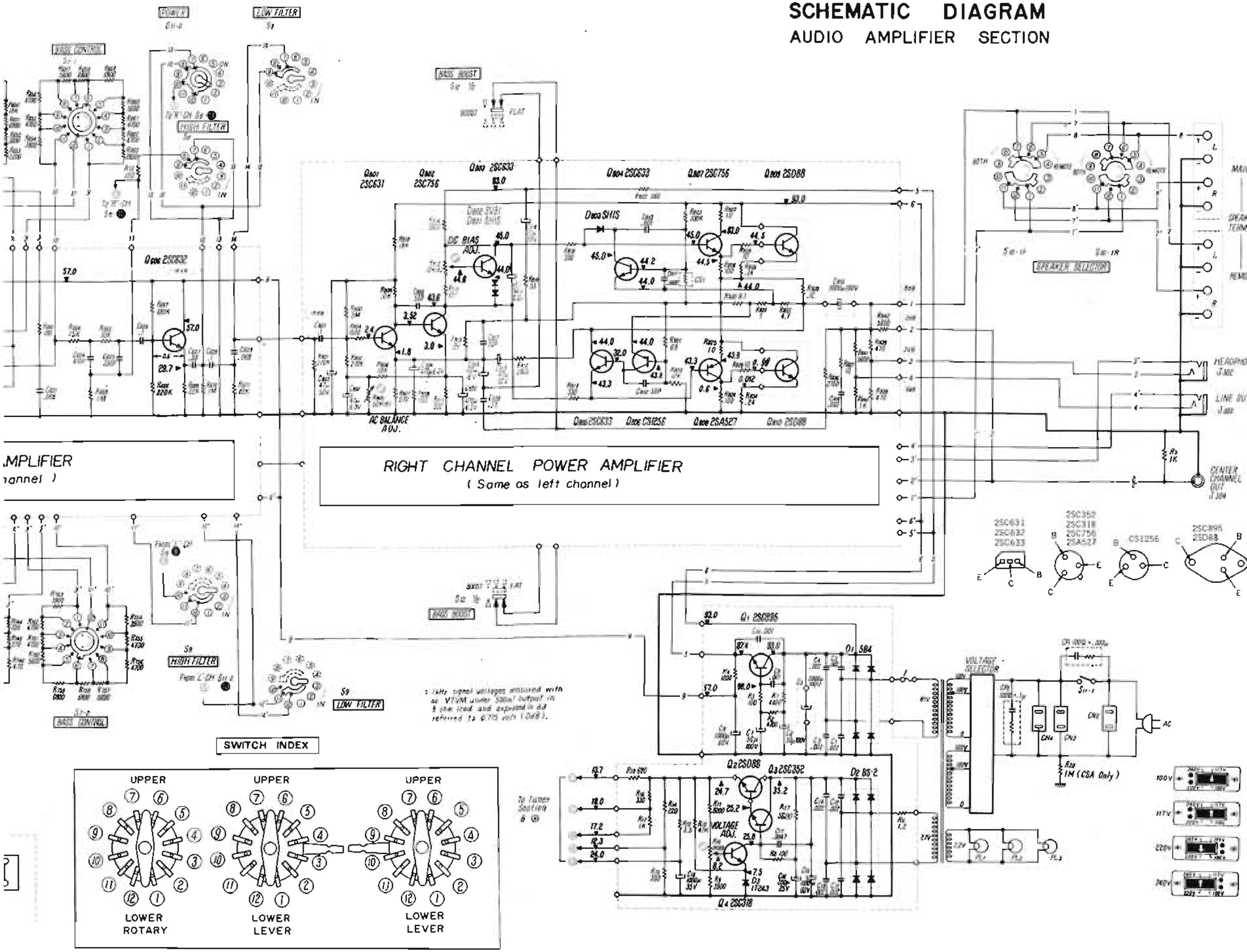
Ref. No.	SWITCH	POSITION
S1	FUNCTION - 1	TAPE HEAD
S2	FUNCTION - 2	FUNCTION - 1
S3	MONITOR	SOURCE
S4	MODE	STEREO
S5	LOUDNESS	IN
S6	TREBLE CONTROL	0 dB

Ref. No.	SWITCH	POSITION
S7	BASS CONTROL	0dB
S8	HIGH FILTER	OUT
S9	LOW FILTER	OUT
S10	SPEAKER SELECTOR	MAIN
S11	POWER ON-OFF	OFF
S12	BASS BOOST	FLAT





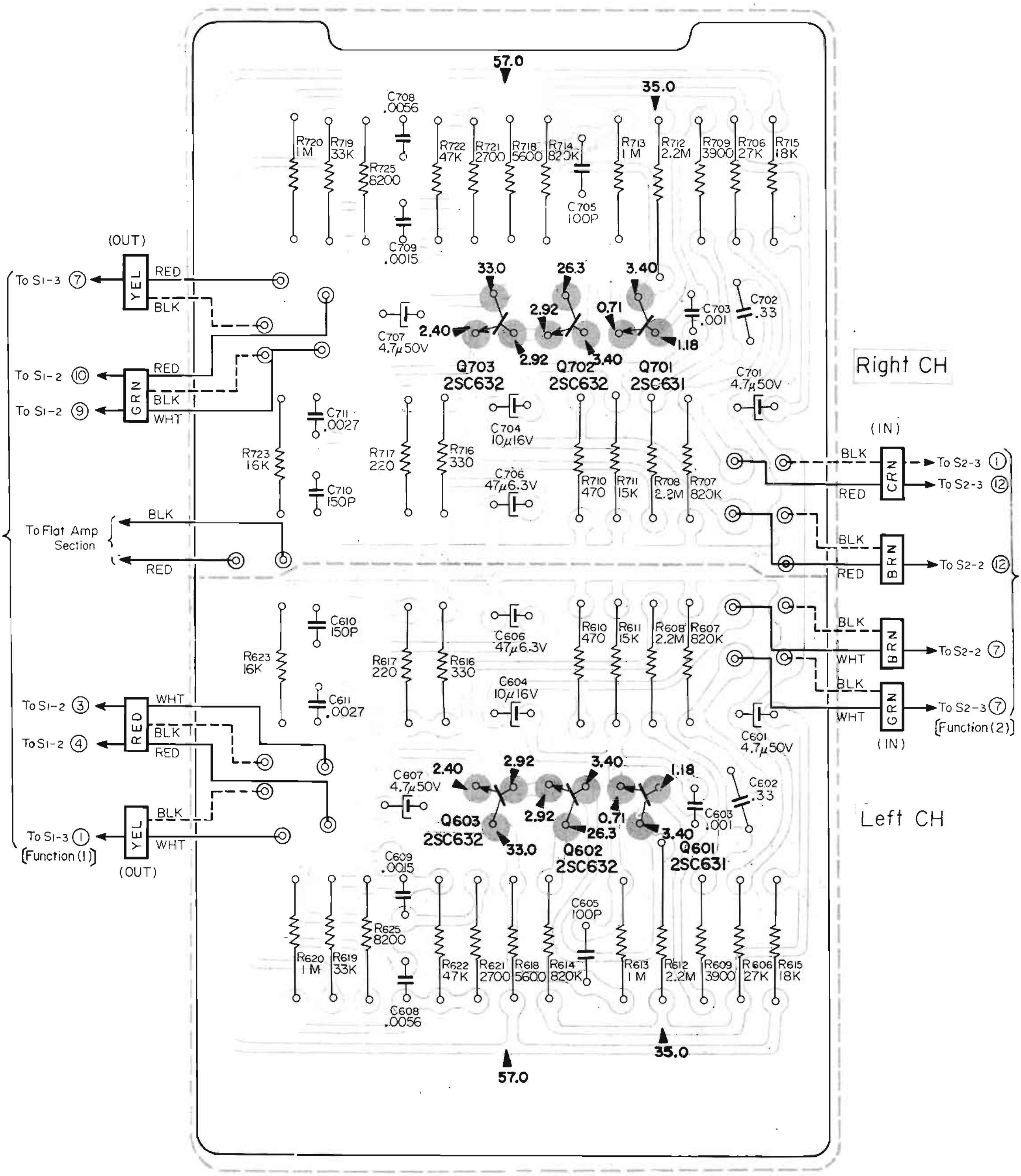
SONY STR-6120
SCHEMATIC DIAGRAM
AUDIO AMPLIFIER SECTION



Mounting Diagram

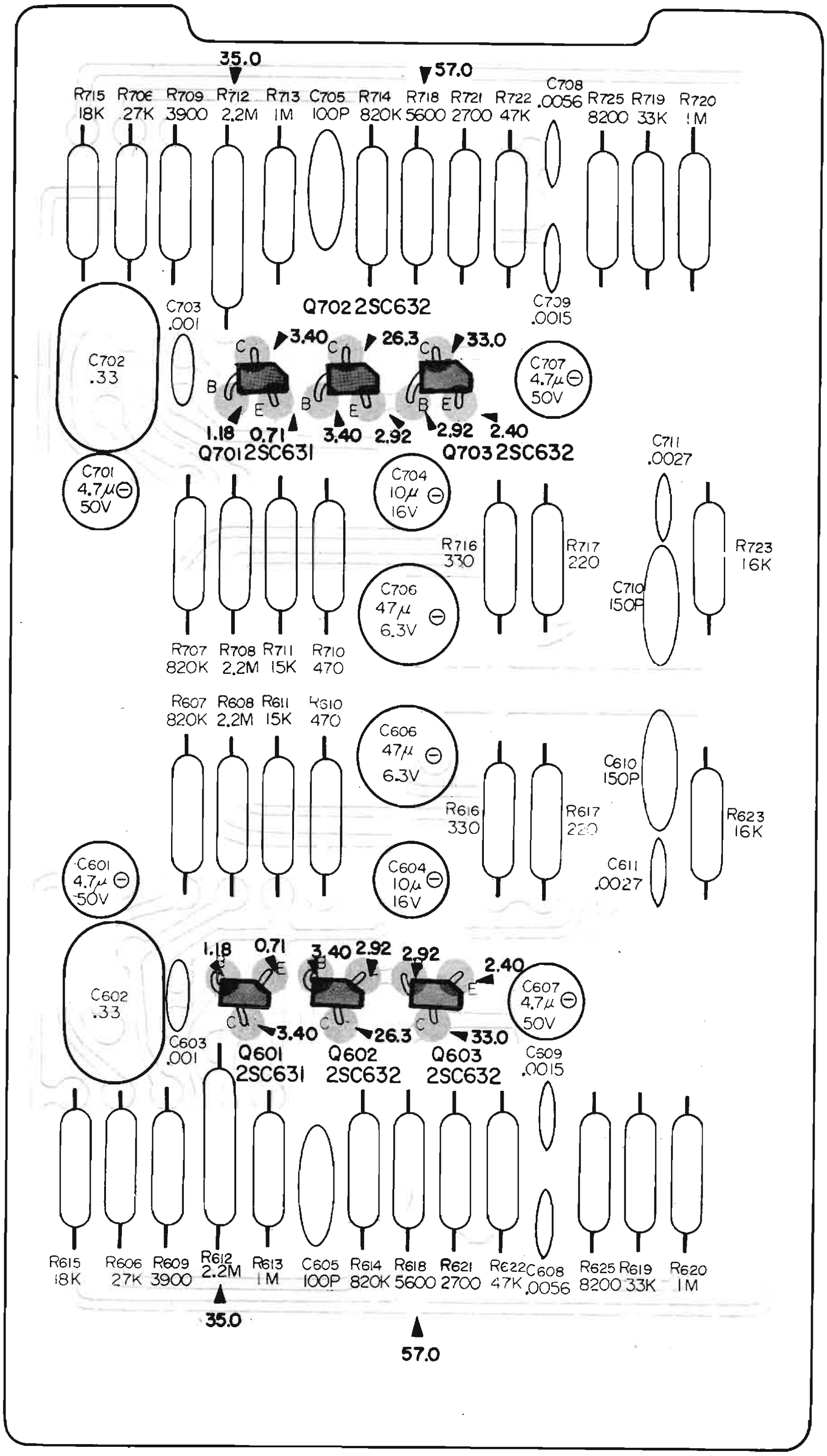
Equalizer Amplifier Section

Conductor Side



Equalizer Amplifier Section

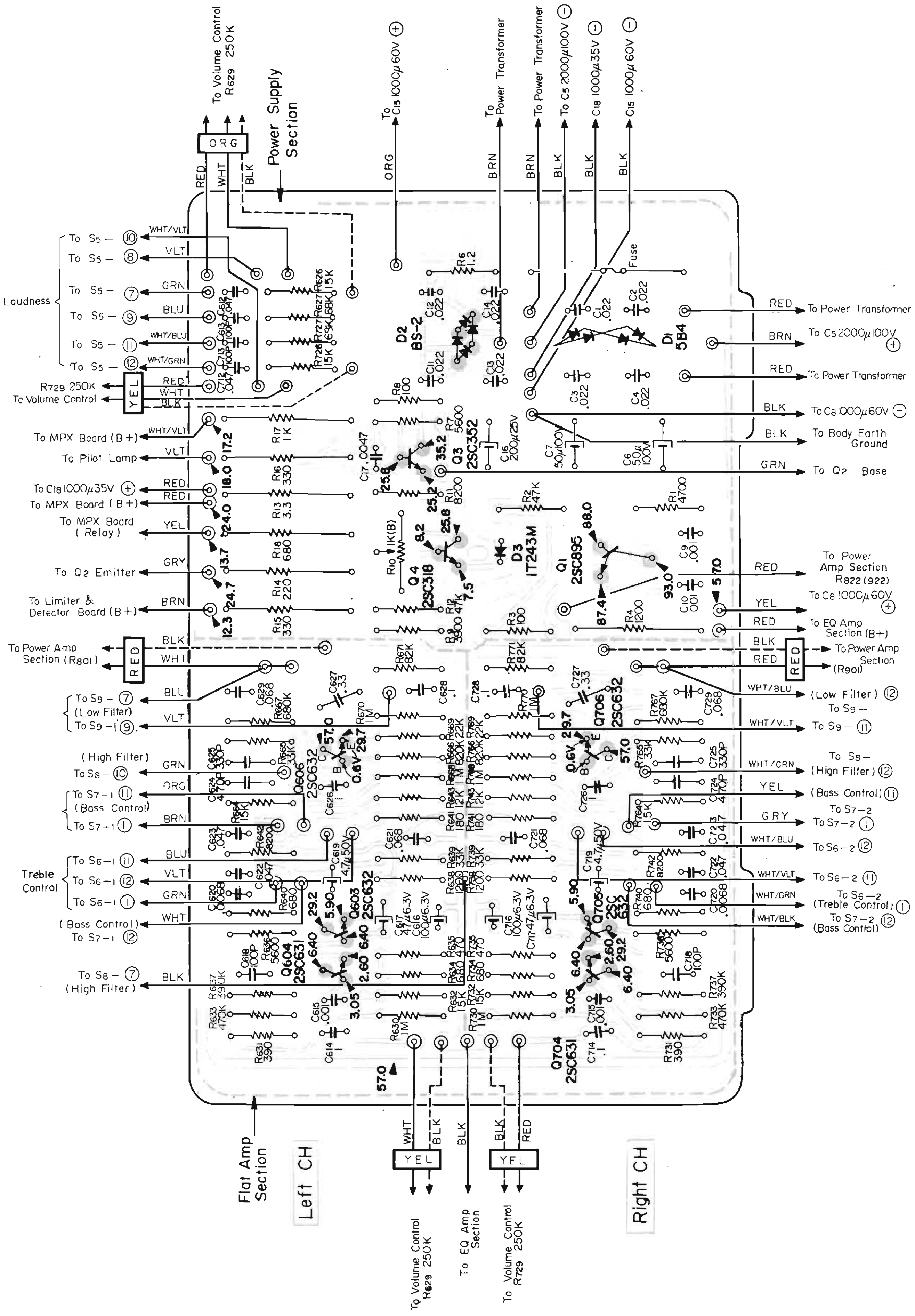
Component Side



Mounting Diagram

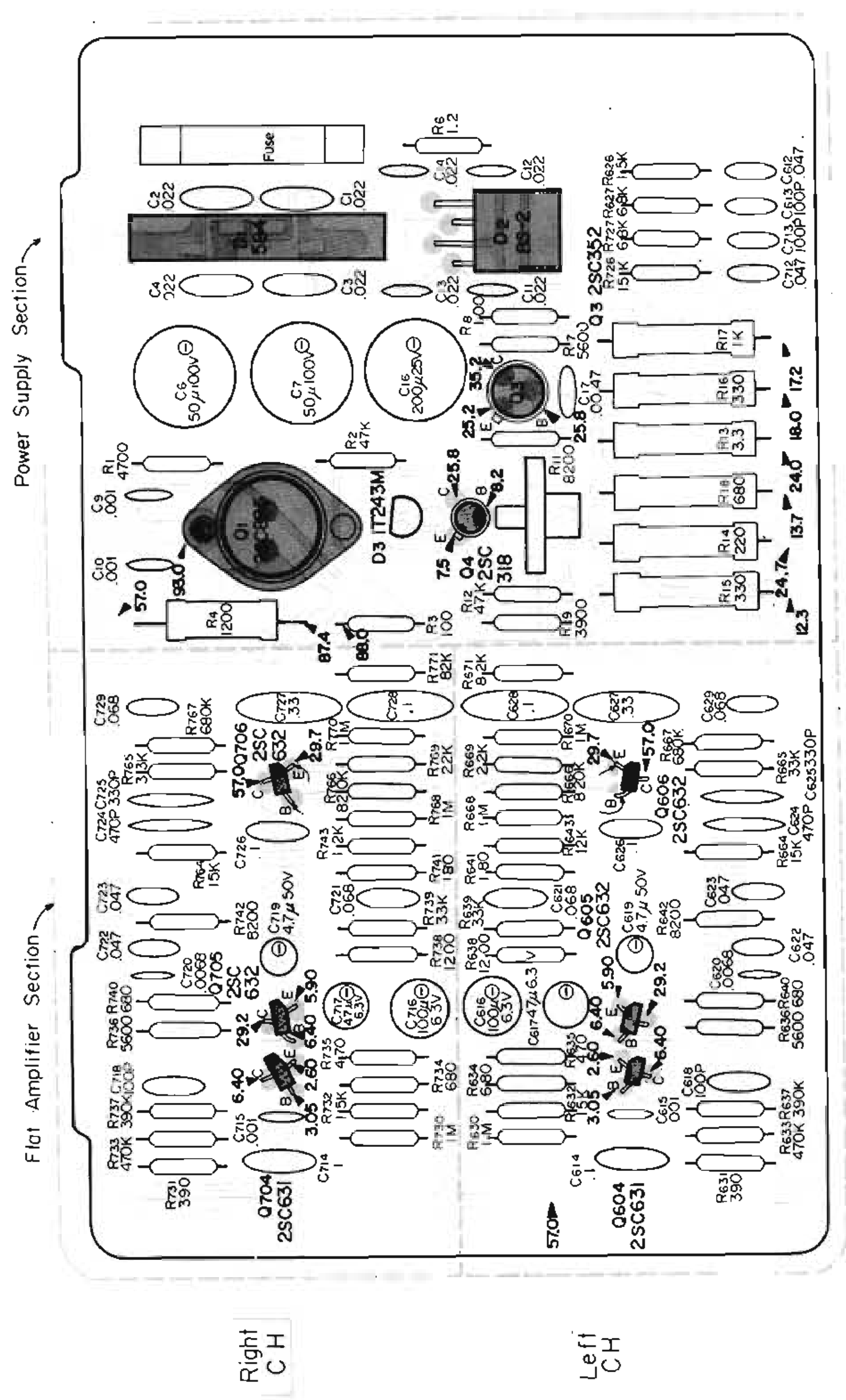
Flat Amplifier & Power Supply Section

Conductor Side

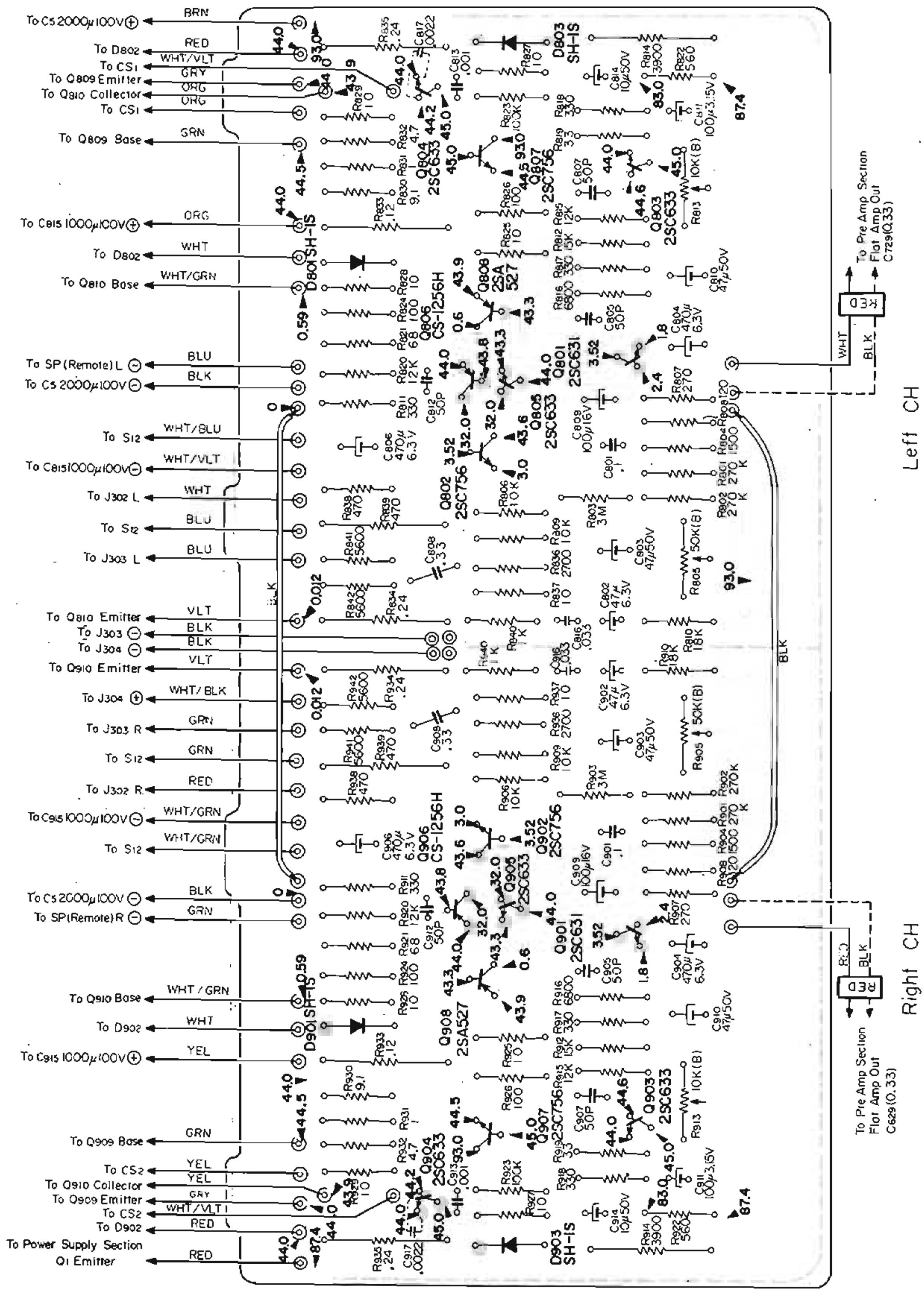


Flat Amplifier & Power Supply Section

Component Side



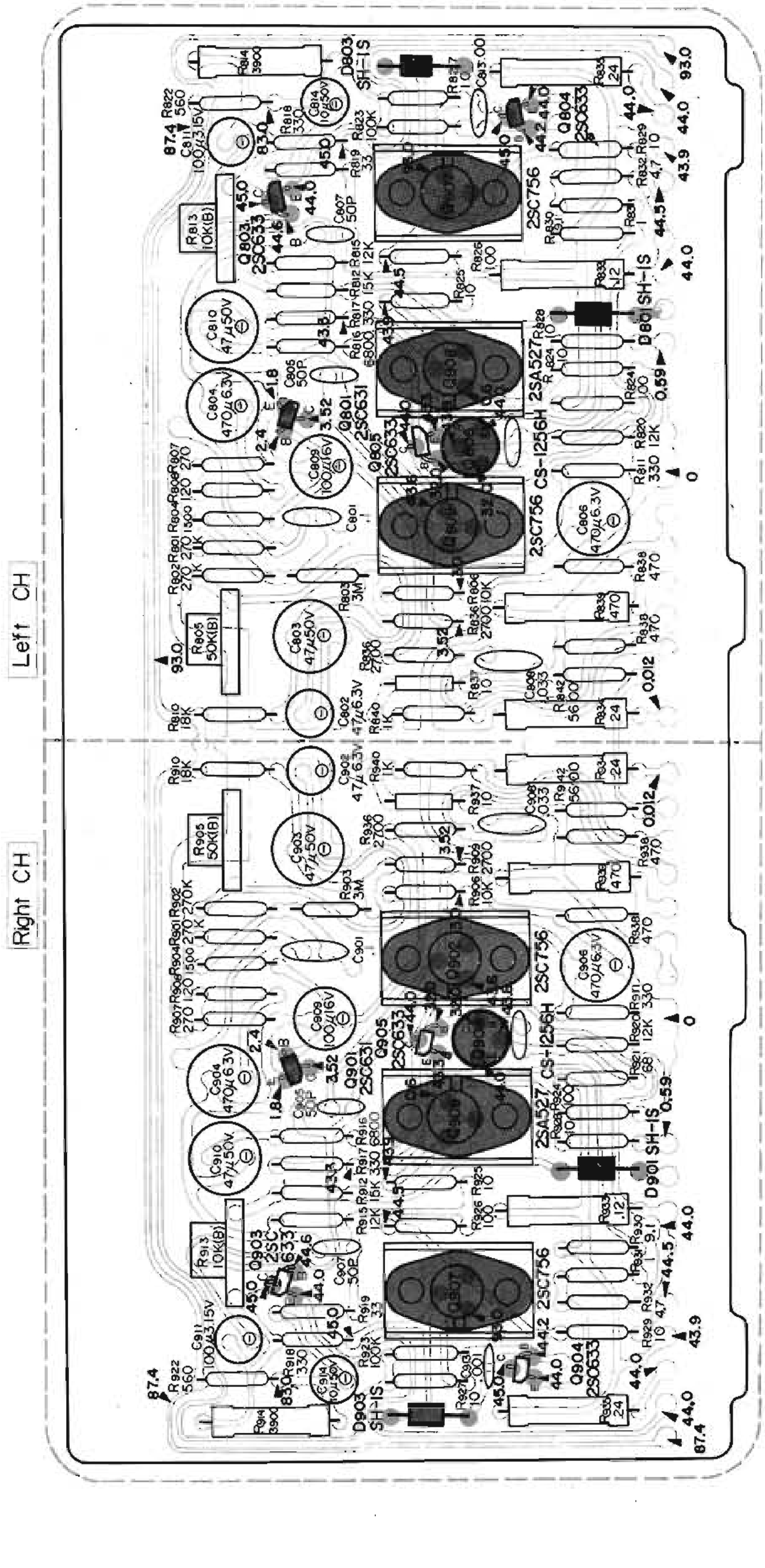
Power Amplifier Section



Mounting Diagram

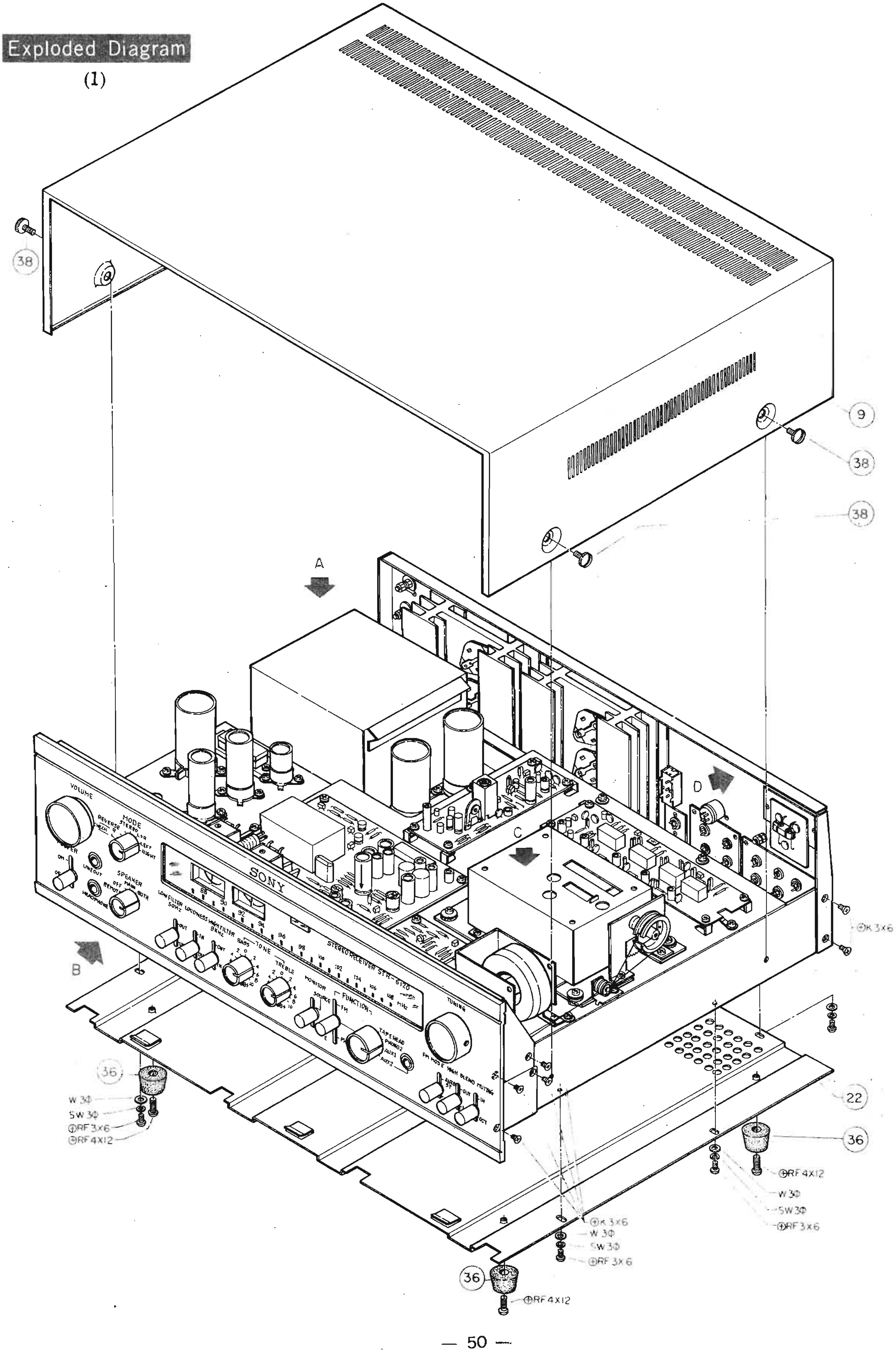
Power Amplifier Section

Component Side



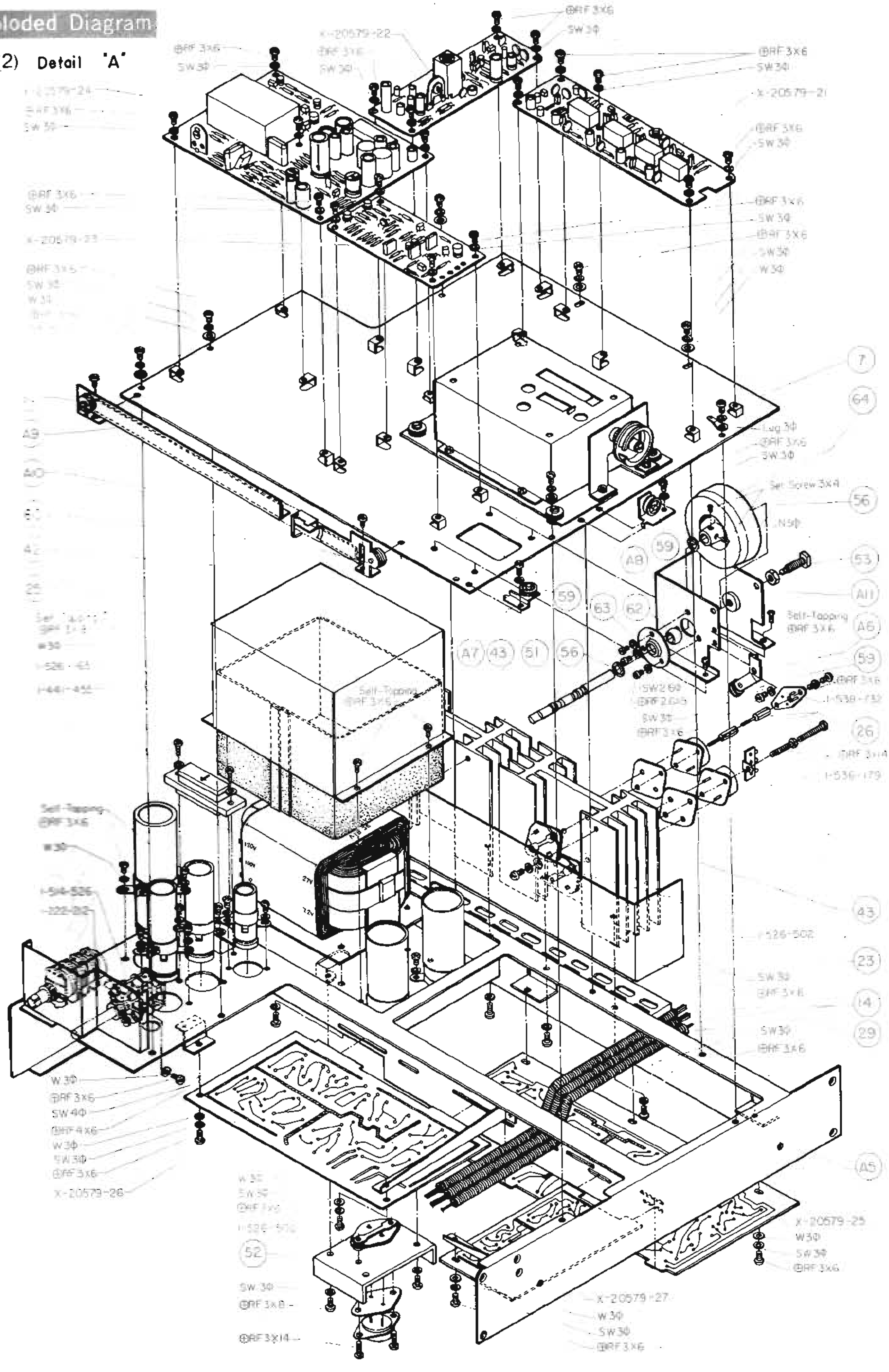
Exploded Diagram

(1)



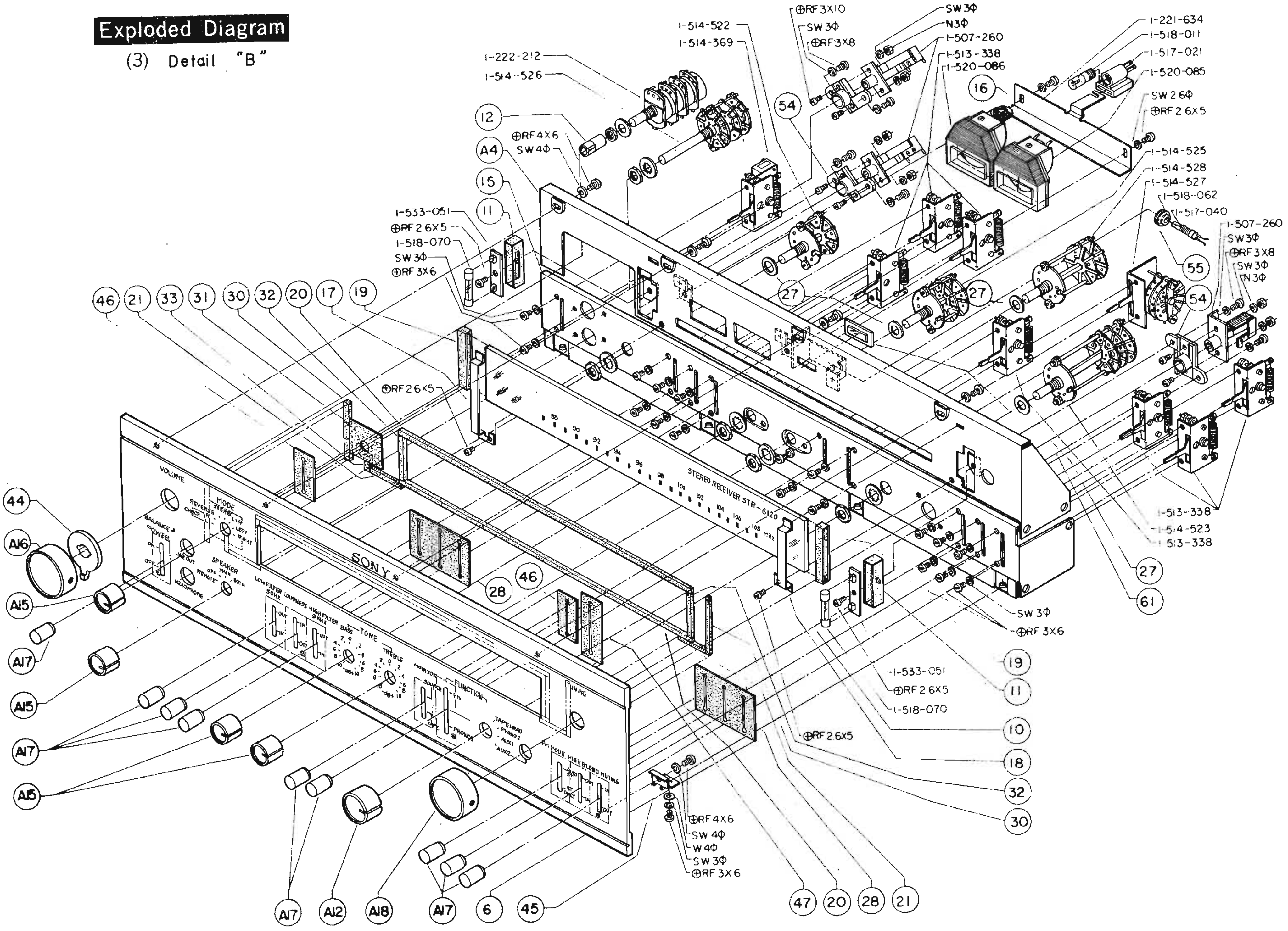
Exploded Diagram

(2) Detail 'A'



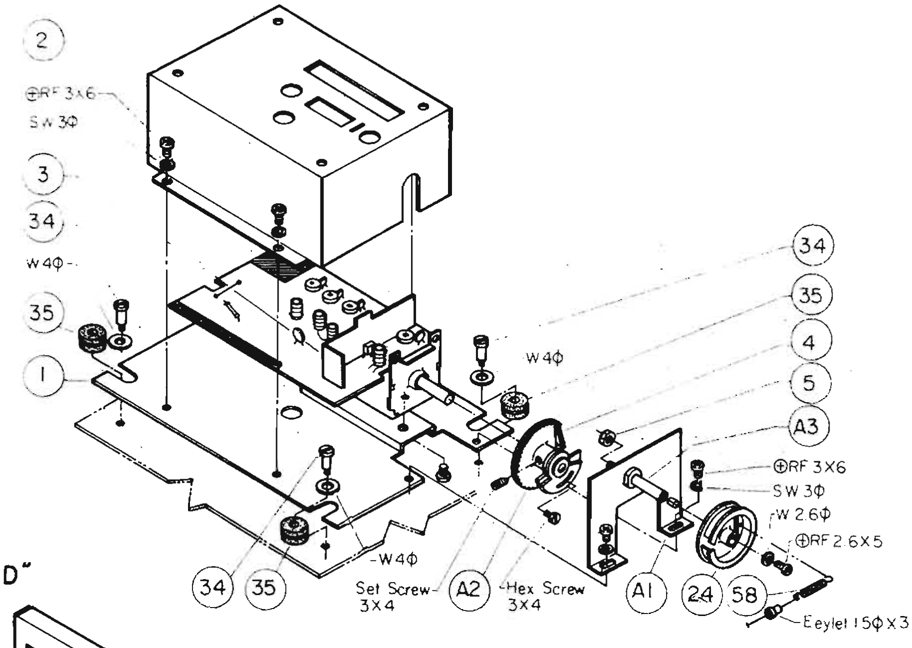
Exploded Diagram

(3) Detail "B"

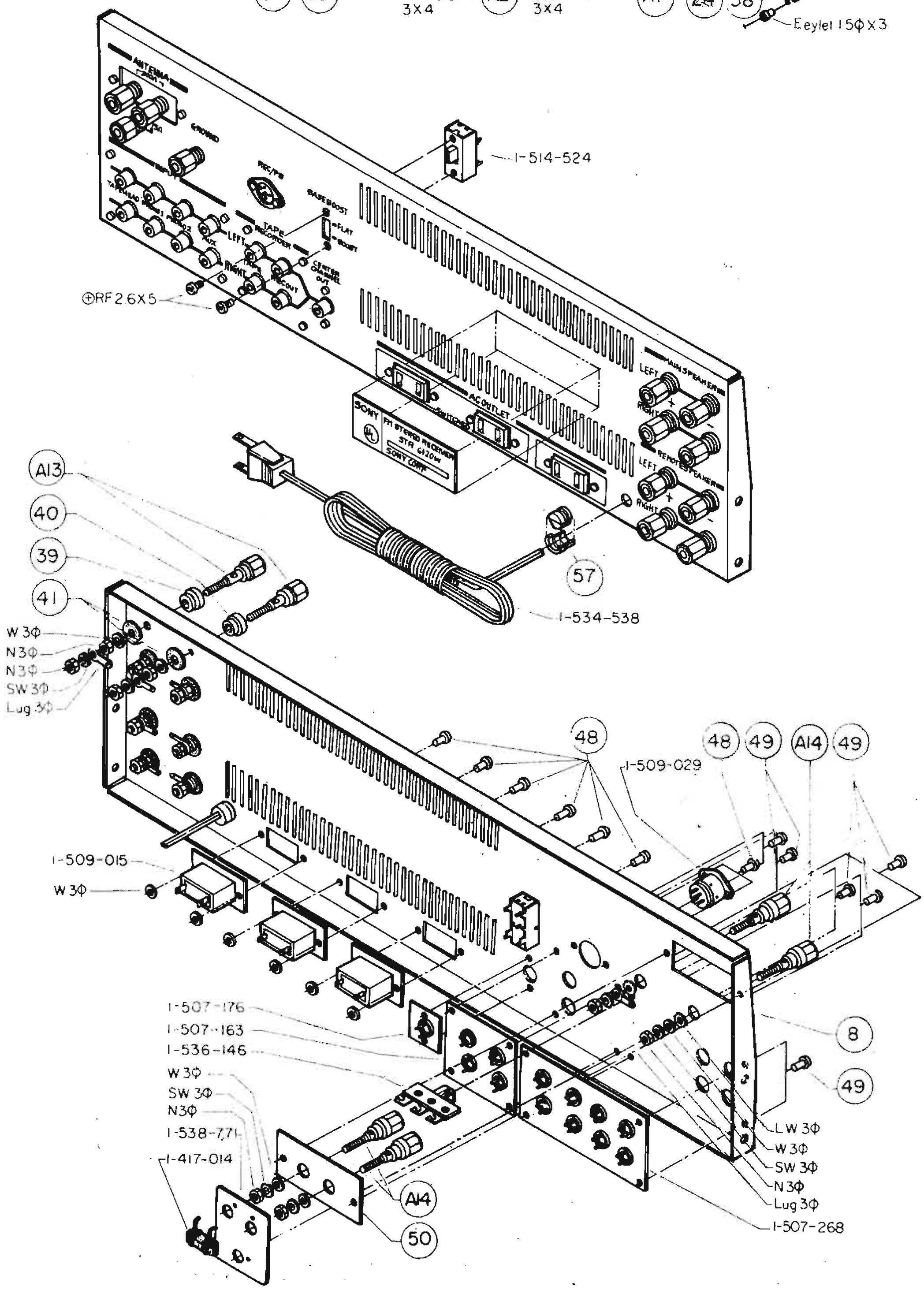


Exploded Diagram

(4) Detail "C"



Detail "D"



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