STR-6120



Specifications

Frequency range: 87 to 108 MHz
Usable sensitivity: $1.8\mu V$ (± 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: $19'' \text{ (w)} \times 5^{\text{U}_{16}''} \text{ (h)} \times 157_8'' \text{ (d)}$ (483 mm × 145 mm × 405 mm w, h, d)

Weight: 34 lb 3 oz (15.5 kg)



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SECTION 1

GENERAL DESCRIPTION

1-1 Technical Specifications

FM Tuner Section

Frequency

range: 87 to 108 MHz

Usable

sensitivity: $1.8\mu V (\pm 1 dB)$, 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: $3\mu V$ 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% modula-

tion

Stereo 0.35% at 400 Hz, 100%

modulation

Fm stereo

separation: Greater than 40 dB at mid-frequency,

100% modulation

Stereo auto-

switching

level:

 $3\mu V$

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: Less than 0.3% at rated output

(SMPTE) 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: TAPE HEAD Greater than 60 dB

PHONO 1, 2 Greater than 70 dB (IHF)

AUX 1, 2 Greater than 90 dB

TAPE, REC/PB (input)

Greater than 90 dB

 $100Hz \pm 10dB (2dB/step)$ Tone control: BASS

TREBLE $10kHz \pm 10dB (2dB/step)$

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: $19''(w) \times 5^{11}/_{16}''(h) \times 15^{7}/_{8}''(d)$

 $(483 \text{ mm} \times 145 \text{ mm} \times 405 \text{ mm} \text{ w, h, d})$

34 lb 3 oz (15.5 kg) Weight:

Stage/Control

Function

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 interstation noise. An ingenious muting circuit, employing one FET and nine transistors, cuts out interstation noise without killing those weak stations. This combination results "pulling-in" the weak stations while preserving a smooth and quiet opera-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.

TUNER (\mathbf{A})

Front End Section

This is a transformer that matches Balun B1-1 either 75-ohm coaxial cable or 300ohm twin lead to the tuner's input stage.

 Q_{101}, Q_{105}

RF Amplifier 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 crossmodulation products. The stage employs two FETs in a commongate (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 commongate amplifier.

Local Oscillator Q_{104}

 Q_{104} supplies injection signals to the mixer through L₁₀₅. 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. IFT₁₀₁ 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.

 Q_{103}

I.F Amplifier This stage amplifies the output of the mixer to drive the i-f amplifier section that follows.

I-F Amplifier Section

I.F Amplifiers These i-f stages are basically RC coupled amplifiers that provide es- Q_{201} to Q_{203} sentially flat response.

Solid-State Filters

The selectivity of this section is determined by the solid-state filters CF₂₀₁ to CF₂₀₈ in the interstage coupling paths.

 D_{301} to D_{304}

basically two-section They are 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.

 D_{201} to D_{208}

Diode Limiters Limiting is accomplished by these diode pairs, connected in parallel and poled in opposite directions.

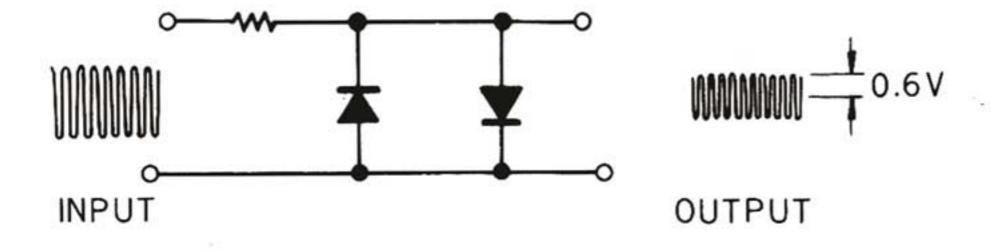


Fig. 1-3-1 Diode Limiter

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. The diode limiters are passive devices and introduce loss. Therefore amplifiers, such as Q₂₀₄ provide additional gain needed to drive the limiters.

Detector

I-F Amplifier

 Q_{204}

Muting Circuit The i-f signal is extracted from the collector of Q204 to drive the muting Q206, D209, D210 circuit detector. Q206 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 Q410 on the Muting Circuit Board.

Tuner Input Meter M-1

An i-f output from the collector circuit of Q₂₀₅ is coupled to D₂₁₁ 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. R₂₅₁ is the calibration adjustment.

Limiter-Detector Circuit Section

I-F Amplifiers These are conventional RC coupled amplifiers that supply the necessary Q_{301}, Q_{302}

I-F Output Q_{303} provides the power to drive the ratio detector. Q_{303} Ratio Detector IFT₃₀₁ and the diodes D₃₀₅ and D₃₀₆ D_{305}, 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.

Diode Limiters interstage gain to drive the diode

limiters.

Tuning Meter A null-type meter connected across M-2

the balanced output of the ratio detector is used as a tuning indicator. C₃₂₃ removes the ac component of the signal.

Emitter Q₃₀₄ supplies demodulated signals to the MPX and Muting circuits, Follower Q₃₀₄

Multiplex Decoder Section

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

This amplifier stage provides two Q_{501} 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 Q₅₀₂ to drive the frequency doubler. Signals developed at the collector of Q₅₀₂ are transformer coupled to the full-wave rectifier D_{501} and D_{502} .

Frequency Doubler D_{501}, D_{502}

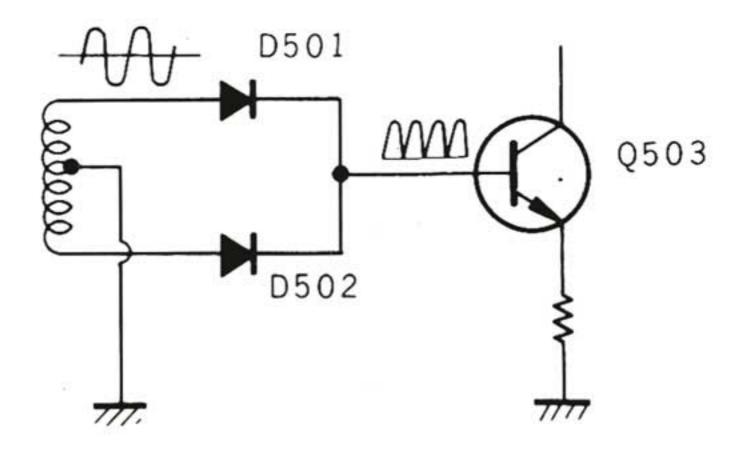


Fig. 1-3-2 Frequency Doubler

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 D₅₀₁ and D₅₀₂. However, the waveform is not sinusoidal at the base of Q_{503} .

Stage/Control		Function	Stage/Control	Function
38 kHz Amplifier Q ₅₀₃	and D ₅₀₂ are tank circuit is tuned to	pulses produced by D ₅₀₁ amplified by Q ₅₀₃ . The at the collector of Q ₅₀₃ 38 kHz to restore the	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.
Pilot and SCA Filters C_{507}/L_{505} and C_{508}/L_{506}	This signal to the brid supply samp modulator. The composition the ensonant circumsonant circums	is transformer coupled ge-type demodulator to bling drive for the desite signal is coupled nitter of Q_{501} to the resits C_{507}/L_{505} and C_{508}/L_{505} irst one of these is tuned	lifier Q504, Q505	Demodulated L and R signals are amplified by these stages. 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.
Multiplex	to 19 kHz carrier. The 67 kHz to eli	to eliminate the pilot e second tank tunes to minate the SCA signal. Iulator circuit employs	Gain Adjustment R ₅₃₁ , R ₅₃₂	These resistors are factory selected to compensate for differences in de- modulator efficiency and provide equal overall gain in both channels.
Demodulator D ₅₀₃ to D ₅₀₆	four diodes arrangement much of the The 38 kHz posite signa- former to p	in a balanced bridge The system cancels ne residual rf products, pulses switch the com- l in the switching trans- roduce L and R signals t when the tuner operates	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
COMPOSITE S MODULATION BY 38 kHz PI	TEREO SAMPLED	LEFT TOME.	Emitter Followers Q506, Q507	true on residual R signals in the L channel. R ₅₃₇ is therefore set the maximum channel separation. Emitter followers are used at this point to provide a low-impedance source of signal for the low-pass filters that follow.
INTERLEAVED 38 kHz PULS			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.
COMPOSITE S MODULATION BY 38 kHz P	SAMPLED	RIGHT	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
INTERLEAVED 38 kHz PULSES			Mode Switch- ing Q ₅₁₂ to Q ₅₁₄	C ₅₂₆ to compensate the loss of high audio frequencies in the low-pass filter. These three transistors operate as direct-coupled switches to establish the operating mode.

Fig. 1-3-3 Stereo Switching Mode

position

Mode Switch When a stereo signal is received, in AUTO ST the dc component of the signal developed by the 38 kHz doubler (D₅₀₁, 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 D₅₀₃ and D₅₀₆ in the multiplex demodulator is removed and the demodulator operates in the multiplex mode.

Function

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 Q₅₁₄. (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.

Interstation Muting Q_{409} , D_{401}, D_{402}

The hiss and static of interstation noise are extracted from the emitter of Q₃₀₄ 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. Q₄₀₉ amplifies the noise component and drives the voltage doubler, D₄₀₁ and D_{402} . When interstation noise is received the dc output of D₄₀₁ and D_{402} brings Q_{406} into conduction. This Muting Relay 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 Q₄₀₈ through the FM MODE Switch S_{14} , when it is in the AUTO ST position. Thus, Q₄₀₈ turns on as Q_{407} turns off. The 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 Relay REL-1

Actuator

 Q_{407} , Q_{408}

Muting for the Detuned Condition Q401 to Q405

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 Q405 and Q406 share a common load. They act as an OR gate. If either Q₄₀₅ or Q₄₀₆ 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, Q₄₀₁. The FET conducts more heavily, its drain voltage drops and Q_{402} cuts off. This makes Q₄₀₄ cut off since Q₄₀₄ can conduct only when Q402 is on and Q_{403} is off.

If the set is detuned to produce a negative output, Q401 conducts less and both Q_{402} and Q_{403} come into conduction. In this case, as noted above, Q₄₀₄ cuts off. Thus, Q₄₀₄ cuts off if the output of the ratio detector is near its positive or negative peak. When Q₄₀₄ cuts off, Q₄₀₅ 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

In addition to interstation and detune-muting, the muting relay is also actuated if the signal level is D_{209} , D_{210} , Q_{410} below the value specified. This system operates from the dc output of the carrier level detector D₂₀₉ and D_{210} . When the input signal is strong enough for operation in the stereo mode $(20 \text{ db}/\mu \text{ or more})$ the positive voltage developed by D₂₀₉ 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 D₂₁₀ swings positive enough, Q₄₁₀ conducts and makes Q405 cut off. The latter results in the release of the muting relay.

MUTING Switch S₁₃

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 Q₄₀₇ through R₄₁₆. This turns on Q₄₀₇ and keeps Q_{408} off. As the result the muting relay REL-1 is kept open.

plifier which amplifies the small

ST ONLY

Muting in the When the FM Mode switch is in the ST ONLY position, Q408 is controlled by Q514. The latter is on when 19 kHz pilot signal is detected in the D_{501} , D_{502} circuit. When Q₅₁₄ is on, Q₄₀₈ the muting relay is off. If the level of the pilot signal should drop so that Q₅₁₄ turns off, Q408 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 Q₅₁₄ is on. Q₅₁₄ 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} , R₅₁₇ and R₅₁₅ according to the trigger voltages that are supplied to its base. Q₅₁₅ receives positive voltages from the emitter of Q_{408} , the muting relay driver and MODE switch S₄ through R₅₇₂.

When Q_{515} conducts, the forward bias for D_{503} and D_{506} is reduced to zero, blocking composite signals electronically, while C₅₃₁ is discharged through Q_{515} . C_{531} acts to delay the voltage change of bias voltage for D₅₀₃ and D₅₀₆ to provide clickless operation when Q_{515} turns off.

AUDIO AMPLIFIER SECTION (\mathbf{B}) Preamplifier Section

Equalizing This stage is a direct coupled amAmplifier Q_{601} to Q_{603}

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 Q₆₀₃ 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} through the combination of C₆₀₅ and R₆₁₃ 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 equaliz-

 R_{620} , to R_{622} C₆₀₈, C₆₀₉

 C_{605} and R_{613}

RIAA equalization is accomplished by the negative feedback loop containing these components.

ing curves, are employed.

R₆₂₃, C₆₁₀, C₆₁₁ 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 S₃

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.

							The production works the		
RECEIVER OUTPUTS MODE SELECTOR SWITCH POSITION	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

04	
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 Q606	Q ₆₀₆ acts as a buffer between high and low filters. The emitter follower provides high input impedance and

low output impedance.

High-pass filter cuts out unwanted

low frequency components from the

input signal. These unwanted low

frequencies include rumble created

Low Filter

Switch S₉

Stage/Control **Function** 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 Flat Amplifier This is a conventional amplifier to power the driver stage Q₈₀₂ to which it is directly coupled. R₈₀₉ acts as an ac load resistance. Driver Q₈₀₂ Q₈₀₂ acts as a driver for the complementary circuit that follows. It provides sufficient positive and nagative voltage swings for generating the required output power. R₈₁₄ is an ac load resistance. Complementa- 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. The small amount of voltage across Supply Q₈₀₃ Q₈₀₃ emitter to collector adds to the voltage drop across D₈₀₂ and D₈₀₁ to supply the correct operating voltages to forward bias Q₈₀₇ and Q₈₀₈. DC Bias Adj. R₈₁₃ is employed to control the base bias of Q_{803} , thus determining the impedance between emitter and collector of Q₈₀₃ and so the voltage of the dc bias supply. The negative temperature coefficient of D_{802} allows thermal compensation Compensator of the complementary circuit by controlling its bias voltage. Driver Limiter Q₈₀₄ limits the positive-going half cycle of the drive voltage applied to the base of Q_{809} when power consumption at the Q₈₀₉ 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 Q₈₀₄ is taken from

the collector and emitter of Q₈₀₉.

Q₈₀₄ 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 R₈₂₃ to CS₁.

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 Q_{801}

ry Circuit

 Q_{807}, Q_{808}

DC Bias

 R_{813}

Thermal

 $(1) Q_{804}$

 D_{802}

Function

Emitter voltage is determined by the current that flows in R₈₃₃. During normal operation Q₈₀₄ 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, Q₈₀₄ turns on and limits the input drive voltage to the power transistor.

Function

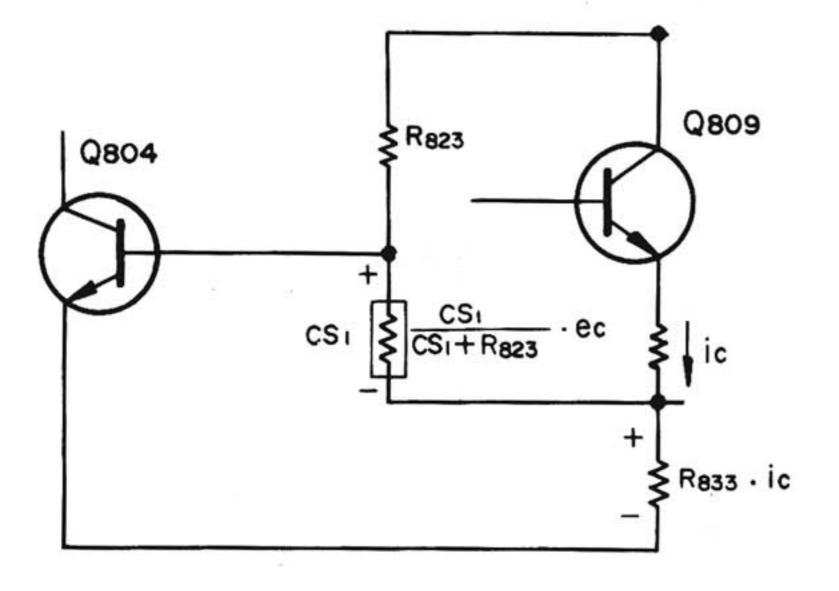


Fig. 1-3-4 Driver Limiter

Heat Wave Sensor CS₁

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 Q₈₀₄ into saturation. This reduces the driving voltage to the power transistor.

Driver Limiter Q₈₀₅ and Q₈₀₆ limit the negative-(2) Q₈₀₅, Q₈₀₆ going half cycle of the signal applied to the base of Q₈₁₀ when power dissipation at the Q₈₁₀ 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}

R₈₀₅ determines the center-line voltage to obtain the minimum harmonic distortion at the rated output.

Power Supply Section

Regulated Q_2 , to Q_4

Dc output from the rectifier is filt-Power Supply ered by C₁₅ and and applied to the series regulator Q2. Transistor Q4 compares a sample of the output voltage, picked off at R₁₀, with a reference voltage supplied by the zener diode D₃. A change in output voltage, detected by Q4, results in a change in conduction of Q3 and Q2 that offsets the original voltage shift. The stable 24V dc voltage is supplied to the tuner section.

for Audio

Power Supply A full-wave bridge rectifier provides a positive de 93 volts across filtercapacitor C_5 (2000 μ F).

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. Q₁ serves as an electronic filter to supply well filtered 87V and 57V power to the preamplifier and power amplifier sections. R₁ and R₂ determine the conduction of Q₁ and, therefore, the output voltage. The filter capacitor in the base circuit of Q1 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.

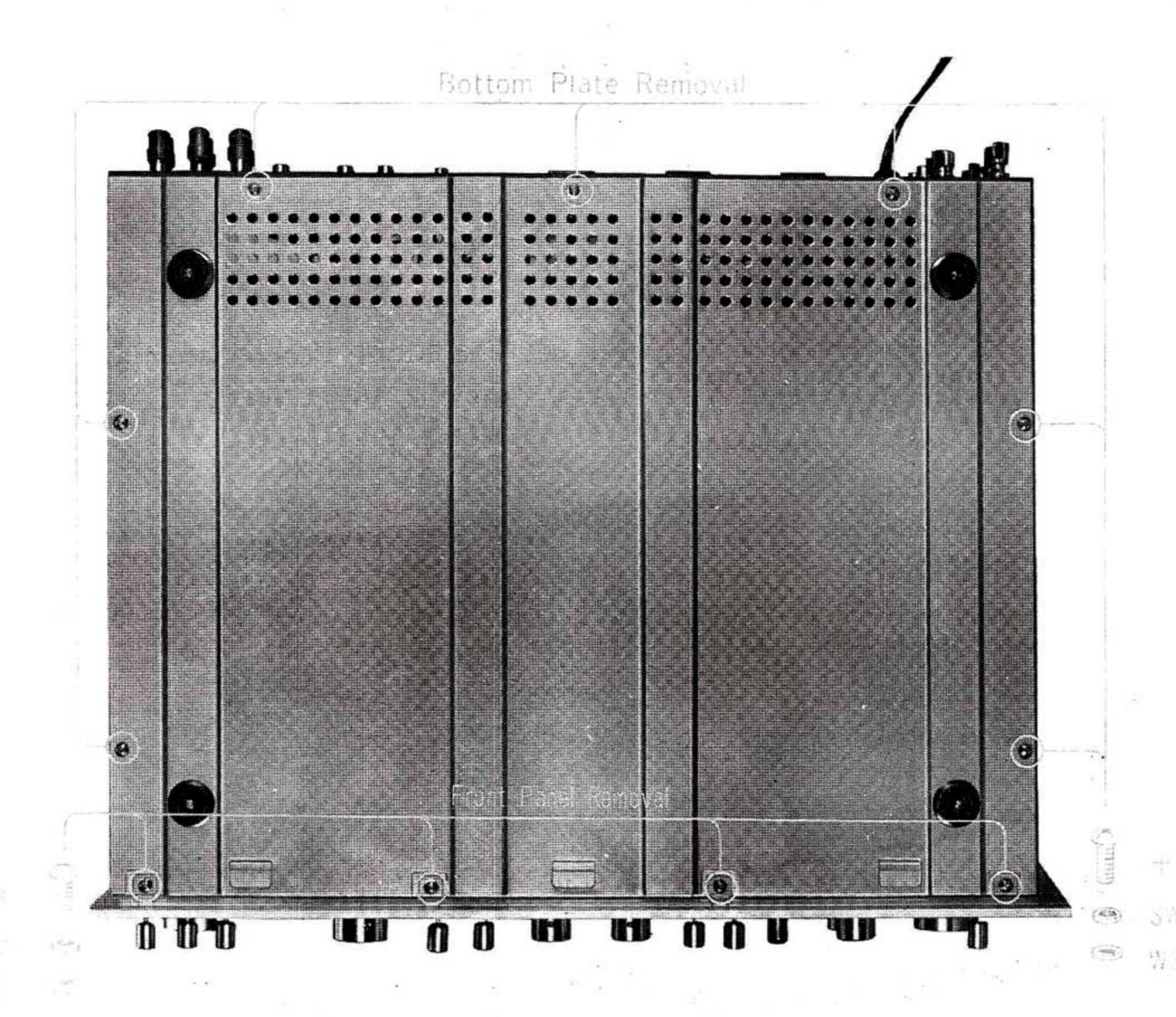


Fig. 2-1-1 Bottom Plate and Front Panel Removal

2-2 Front Panel Removal

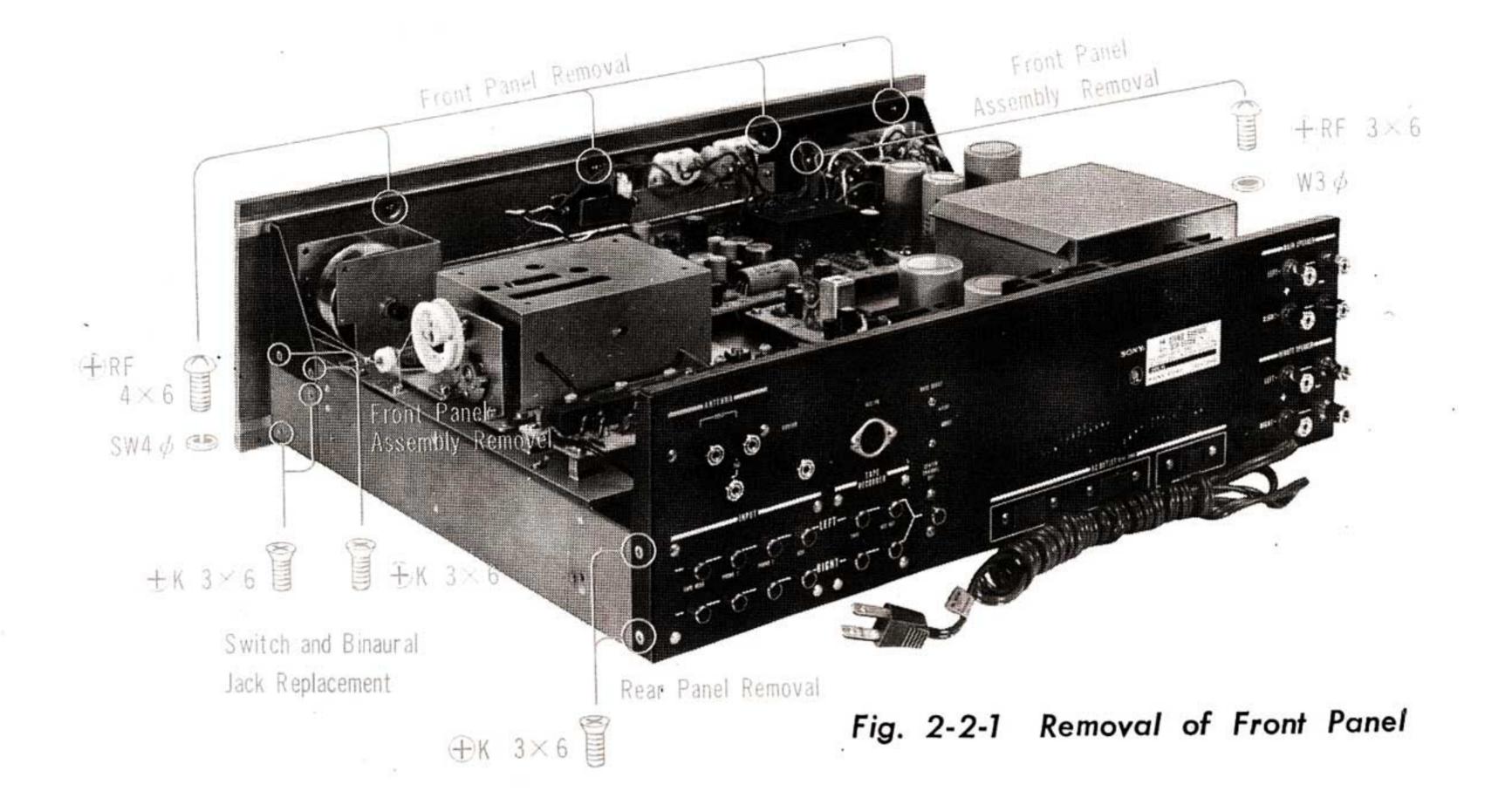
- (a) Remove the top cover.
- (b) Remove all control knobs and levers. The knobs can be removed by loosening the slotted set screws and pulling the knobs straight out. The levers are simply pulled off.
- (c) Loosen off four Phillips-Head screws (+RF $4\phi \times 6$) behind the top edge of the Front 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 (+RF3φ×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 (+K3φ×6) at each side of the chassis and one screw (+RF3φ ×6) that secures the sub-pannel to the volume control and mode switch bracket. See Fig. 2-2-1 on next page.



- (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.

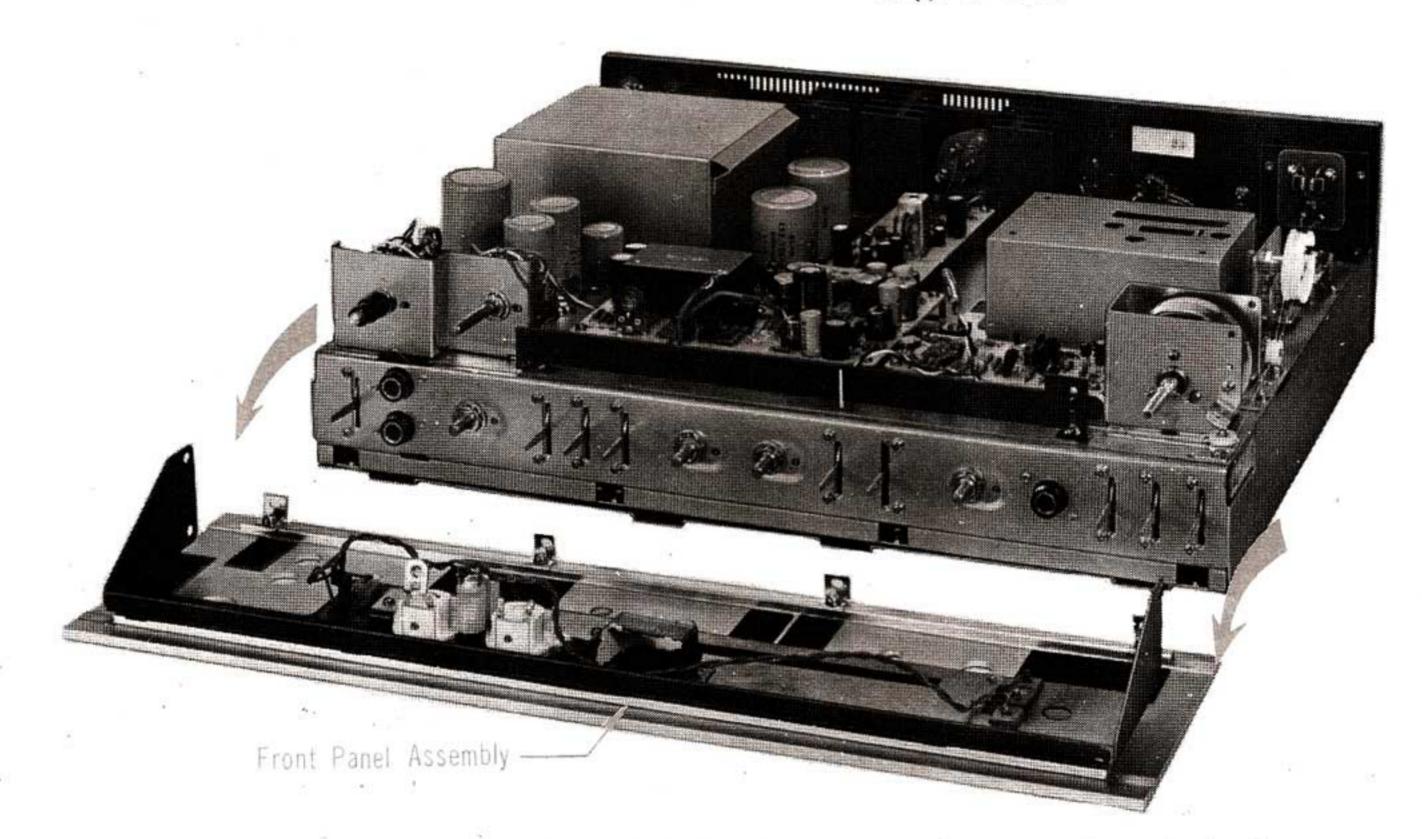


Fig. 2-3-1 Removal of Front Panel Ass'y

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 CS₁ (Ceramistor) Replacement

- (a) Remove the bottom plate. See Section 2-1.
- (b) Loosen off two machine screws $(+K3\phi \times 6)$ 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 CS₁ mounting base. See Fig. 2-6-1.
- (e) Unsolder the leads of CS₁. Remove it and install the new one.
- (f) To reassemble, reverse the foregoing procedure. Be sure that CS₁ 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 $(+K3\phi \times 6)$ 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 $(+RF3\phi \times 14)$ 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 $(+RF2.6\phi \times 5)$ that secures the dial glass bracket to the sub chassis as shown in Fig. 2-8-1.
- (3) Install the new dial glass.

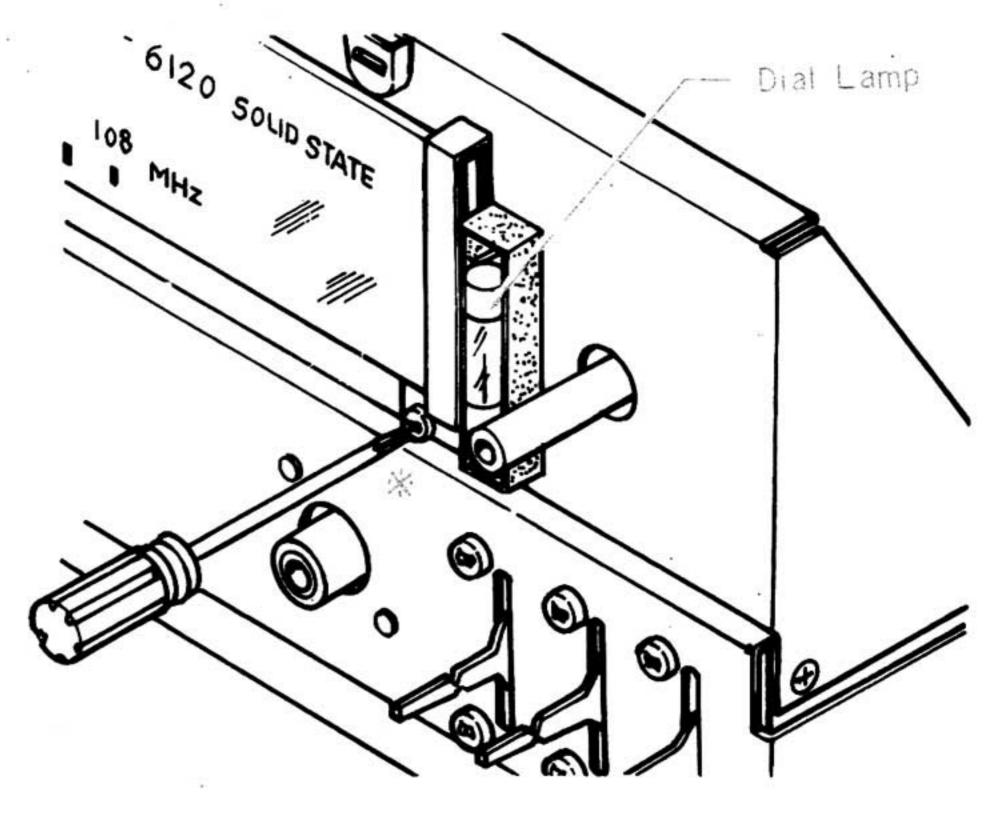


Fig. 2-8-1 Dial Glass Replacement

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 (B) and (B), measure a resistance between terminals (A) and (C) 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.

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(3) Install the new one.

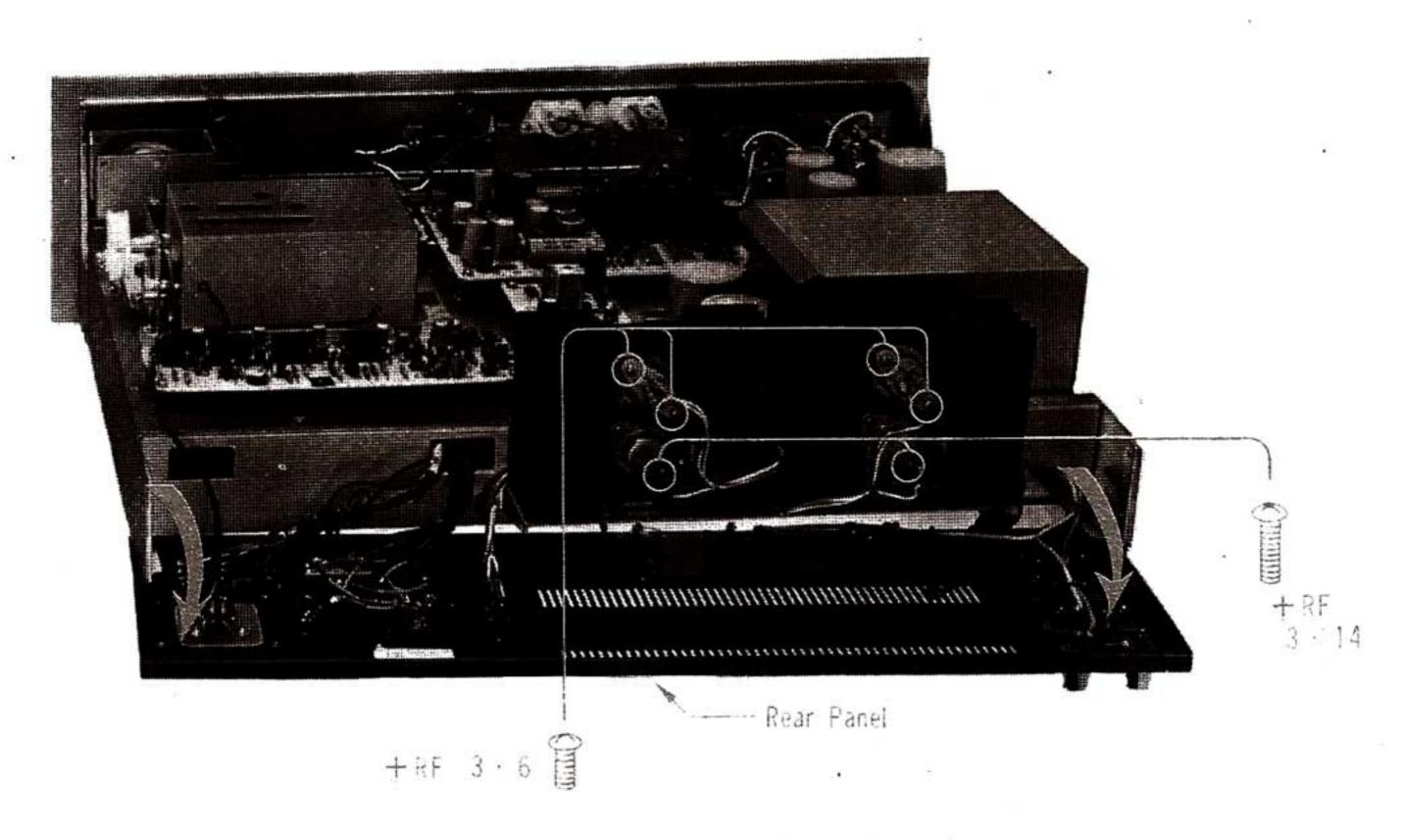


Fig. 2-6-1 Removal of Rear Panel

(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.

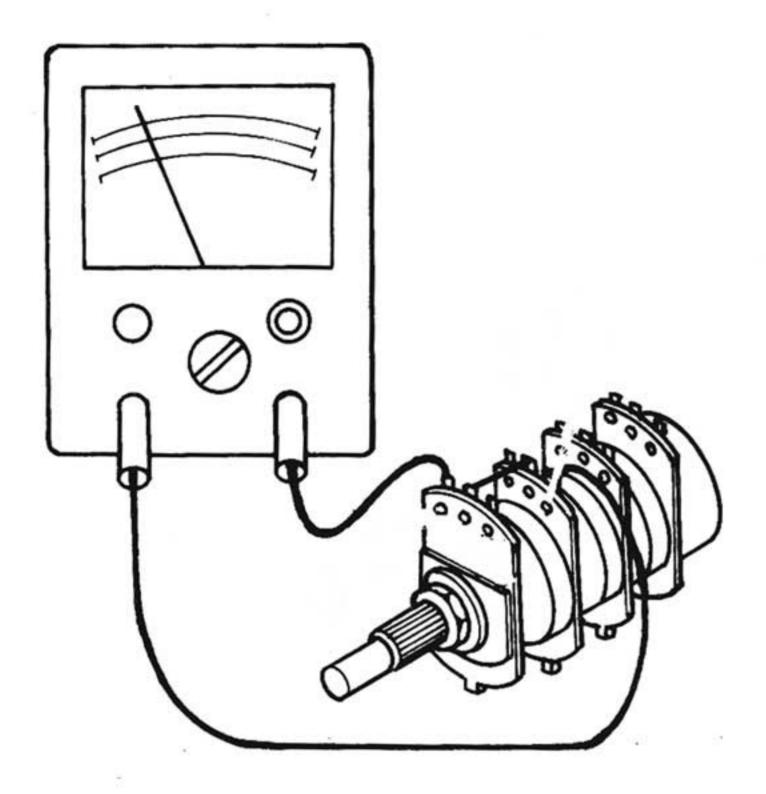


Fig. 2-9-1 BALANCE Control Setting

2-10 Power Transistor Replacement

- Loosen off two screws $(+K3\phi\times6)$ at each side of the chassis to tilt the rear panel. See Fig. 2-6-1.
- Loosen off two screws $(+RF3\phi \times 4)$ securing the transistor to the heat sink.
- Install the replacement. (3)
- 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.

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.

- Cut a 61-inch (1,550 mm) length of dial cord.
- 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.

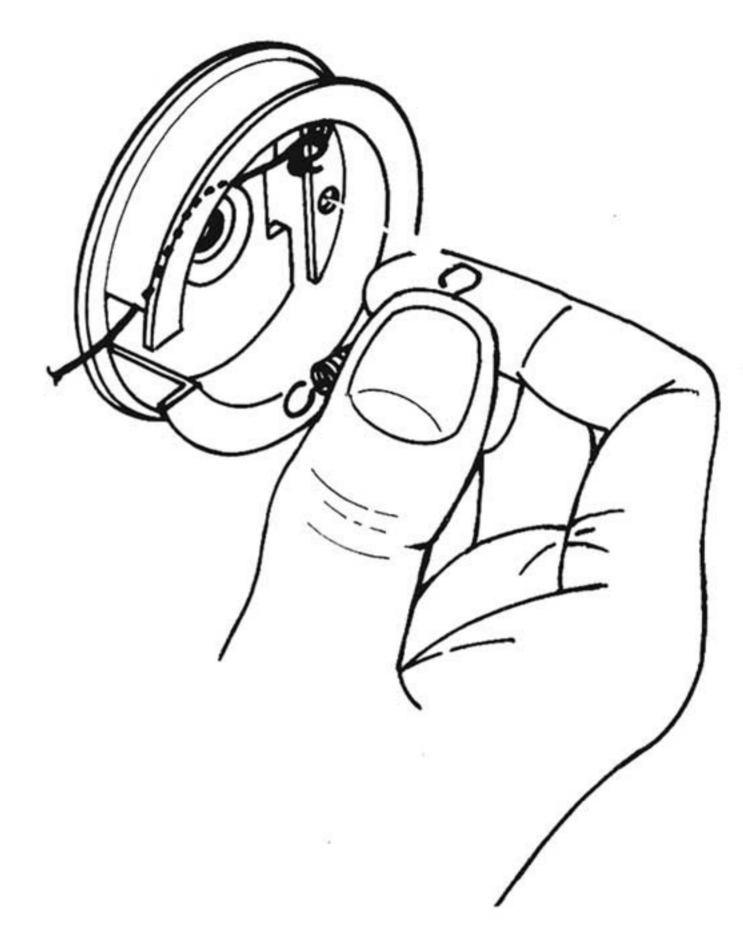


Fig. 2-11-1 Dial Cord Stringing Start and Finish Point

- (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.
- Pull the cord taut and wrap three clockwise turns around the tuning shaft.
- (h) Run the cord over pulleys (E) and (F).

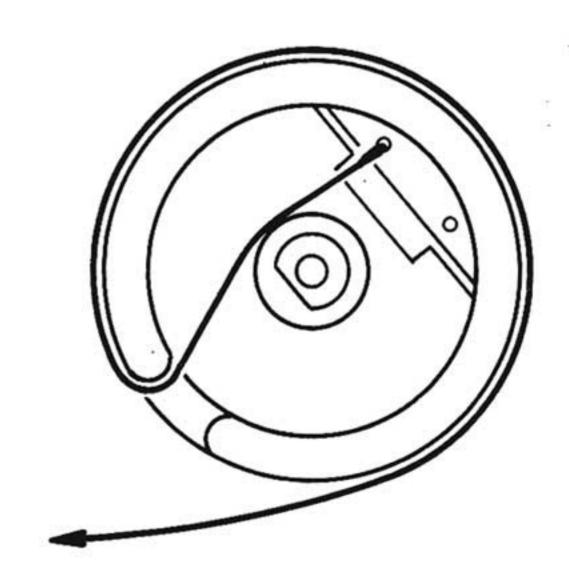


Fig. 2-11-2 Dial Cord Stringing

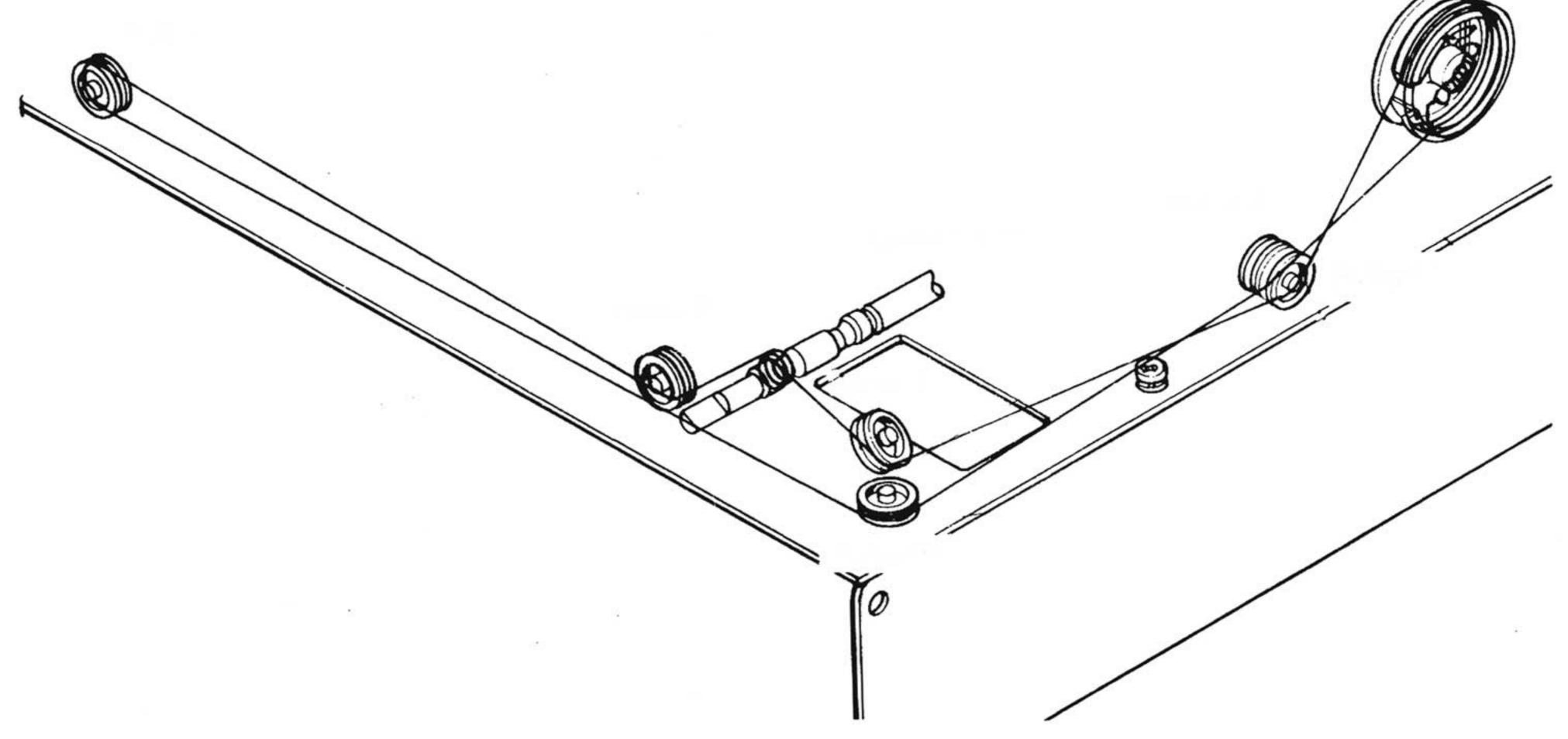


Fig. 2-11-3 Complete Dial Cord Stringing

- (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.
- (1) 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.

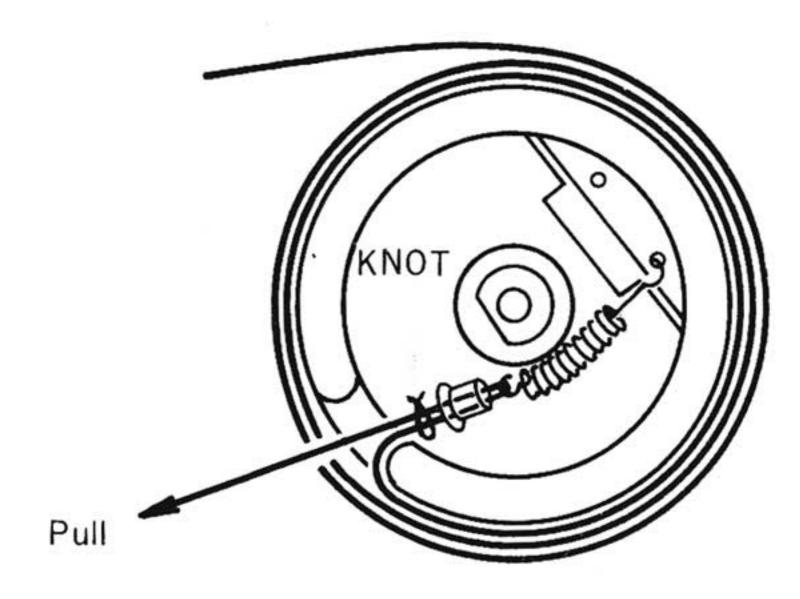


Fig. 2-11-4 Dial Cord Finish Point Detail

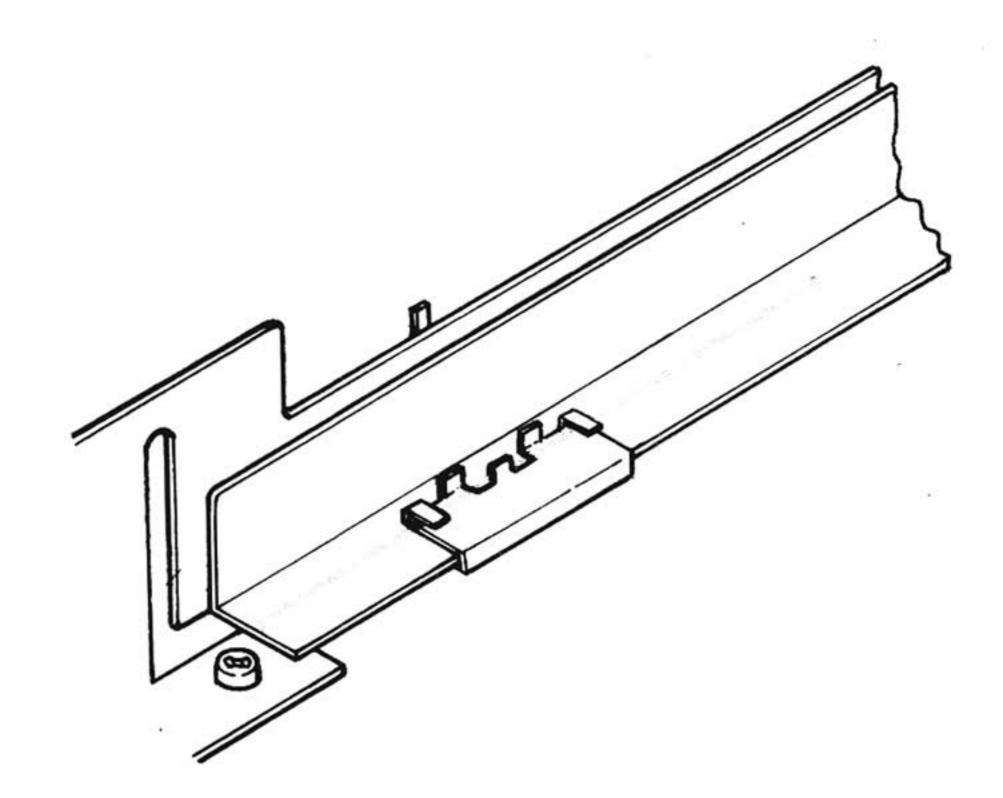


Fig. 2-11-5 Dial Pointer Detail

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

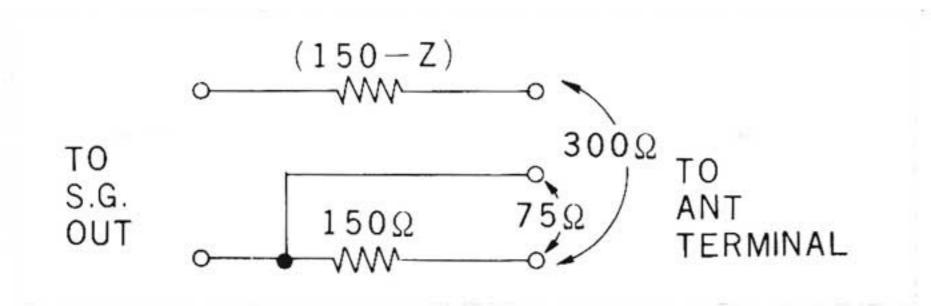


Fig. 3-1-1 Dummy Antenna

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.

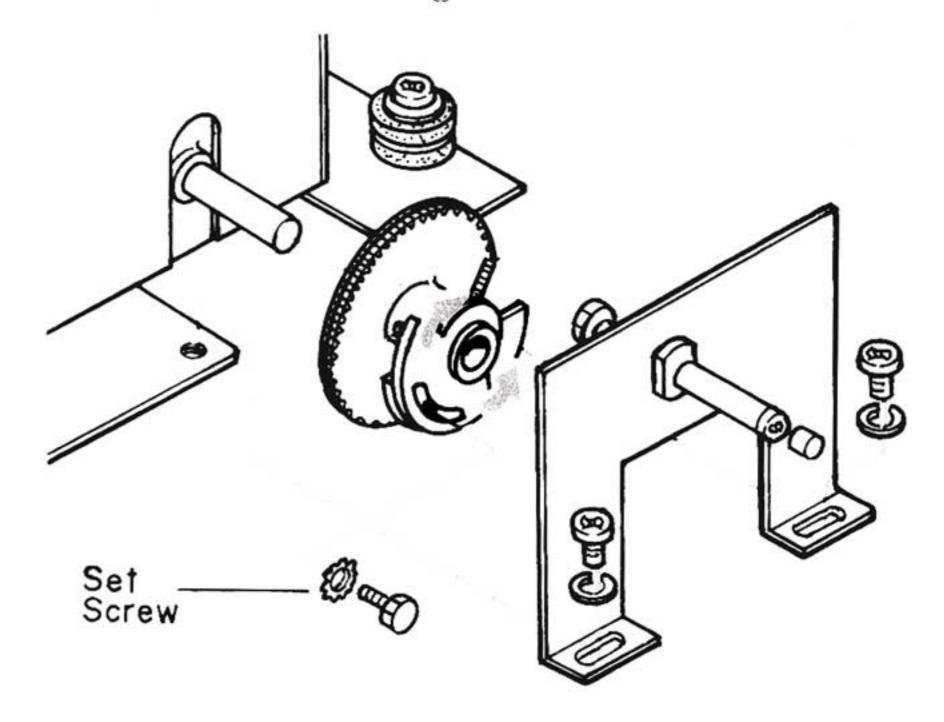


Fig. 3-1-3 Stopper Mechanism Detail

- (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.

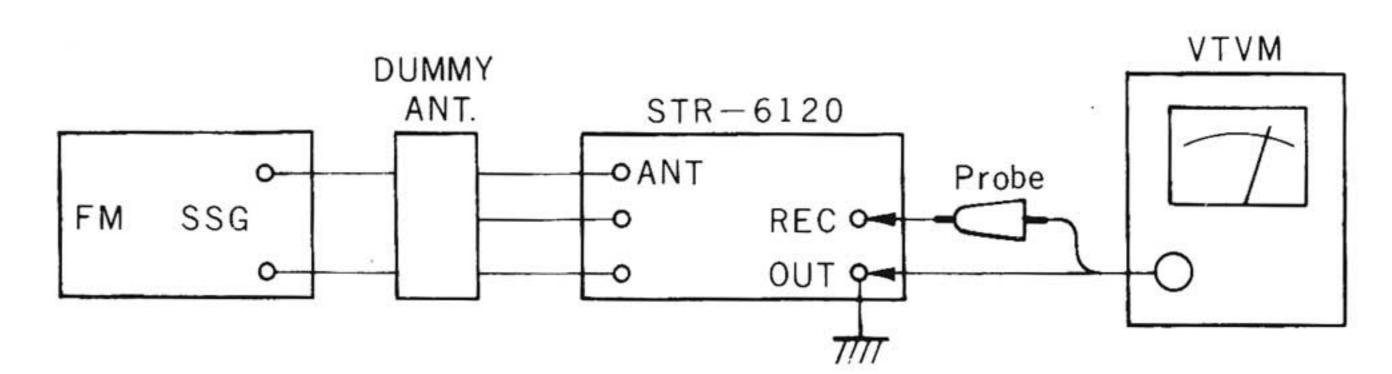


Fig. 3-1-2 Front End Alignment Test Set-up

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.

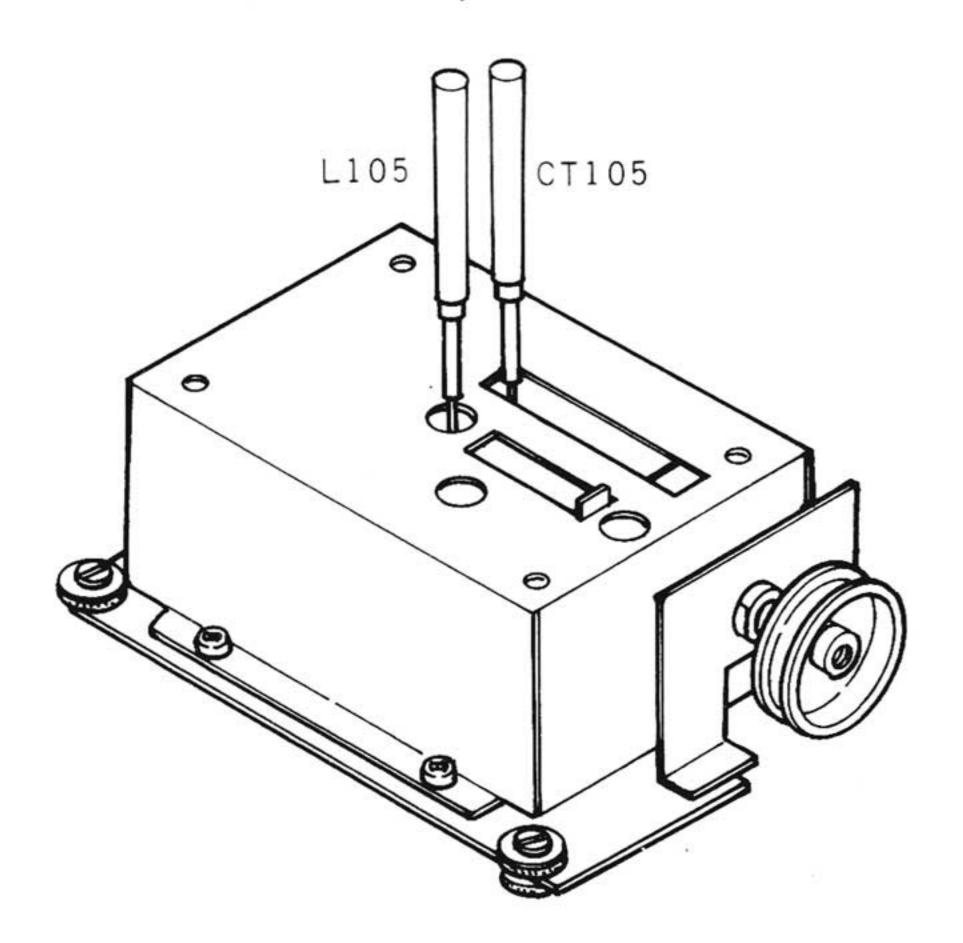


Fig. 3-1-4 Front End Alignment

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 frequency8 to 12 MHz (variable)
 Sweep width1 MHz or more
 Output impedance50 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 0.02 \(\mu\)F 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	$10~\mathrm{dB}/\mu$
VOLUME Control	Minimum
FUNCTION Selector	TUNER
MODE Selector	STEREO

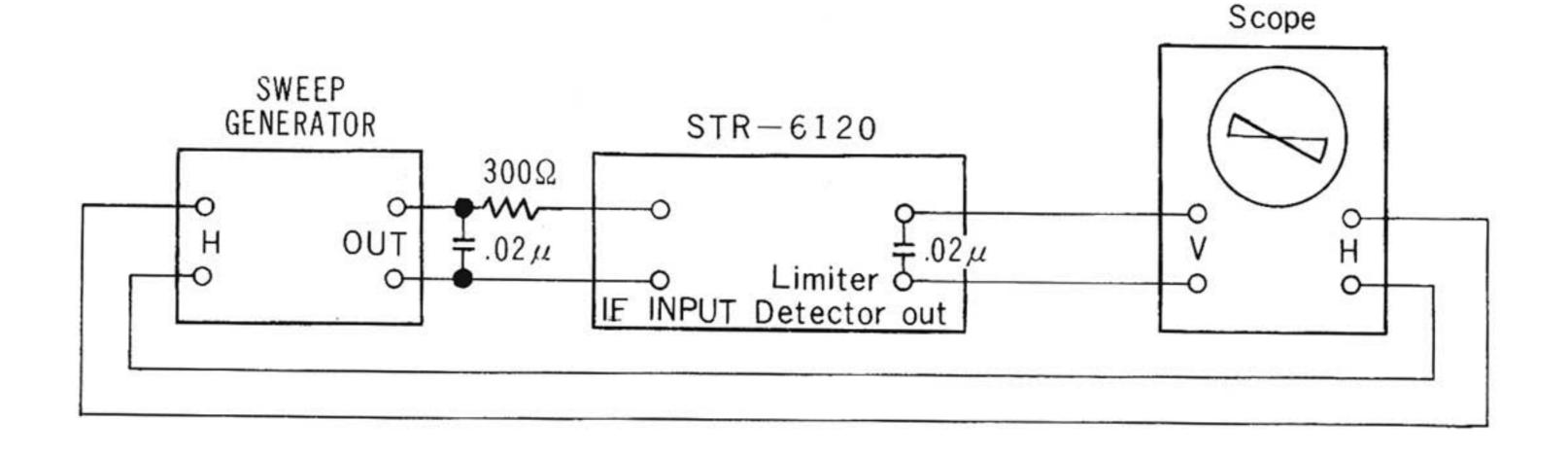


Fig. 3-2-1 FM Discriminator Adjustment Test Set-up

(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 hexagonalhead alignment tool to obtain an "S" curve response as shown in Fig. 3-2-2.

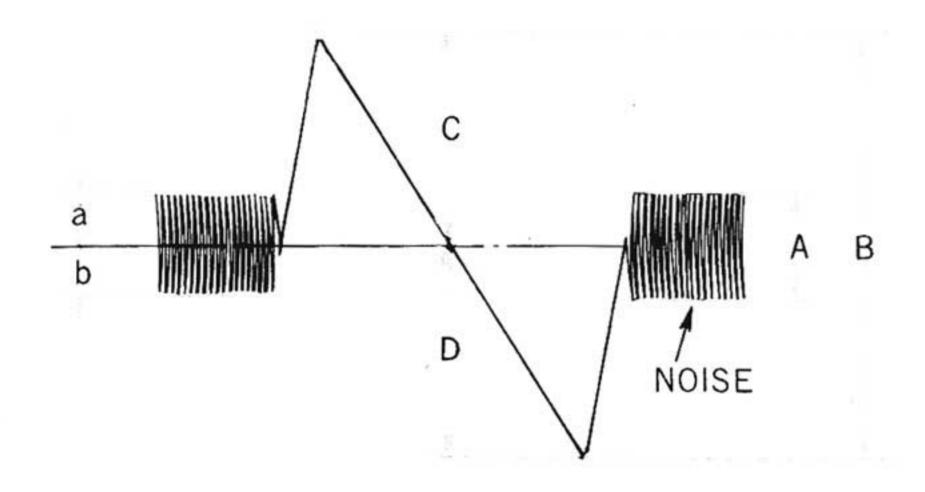


Fig. 3-2-2 "S" Curve Response

- (4) Turn the bottom core of IFT₃₀₁ 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 R₃₁₉ (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 IFT₃₀₁ 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).

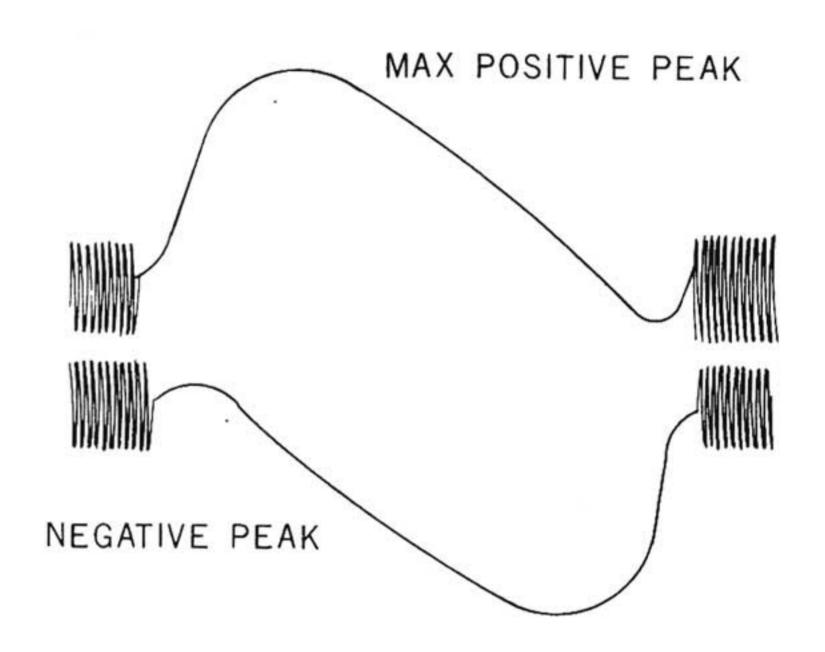


Fig. 3-2-3 "S" Curves at Peak

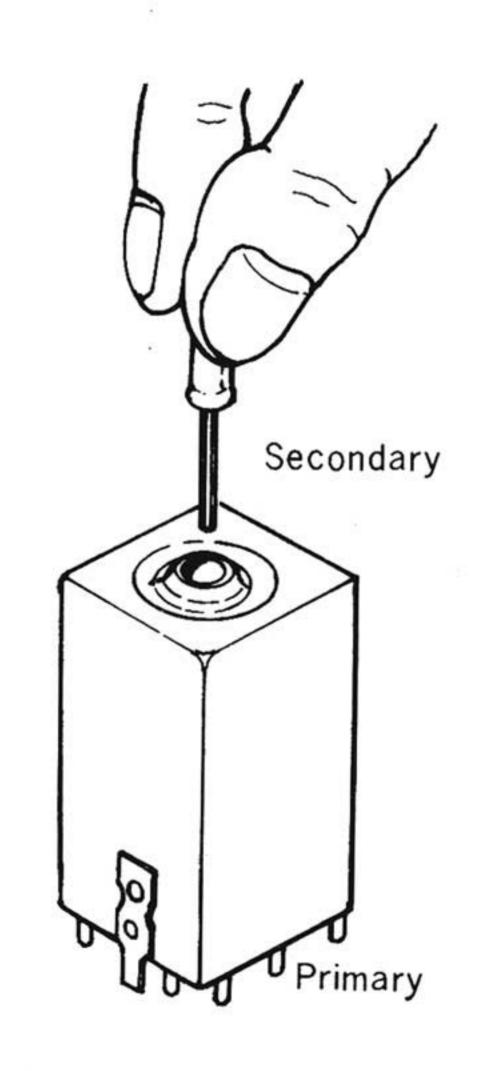


Fig. 3-2-4 FM Discriminator Transformer

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 IFT₃₀₁, 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.

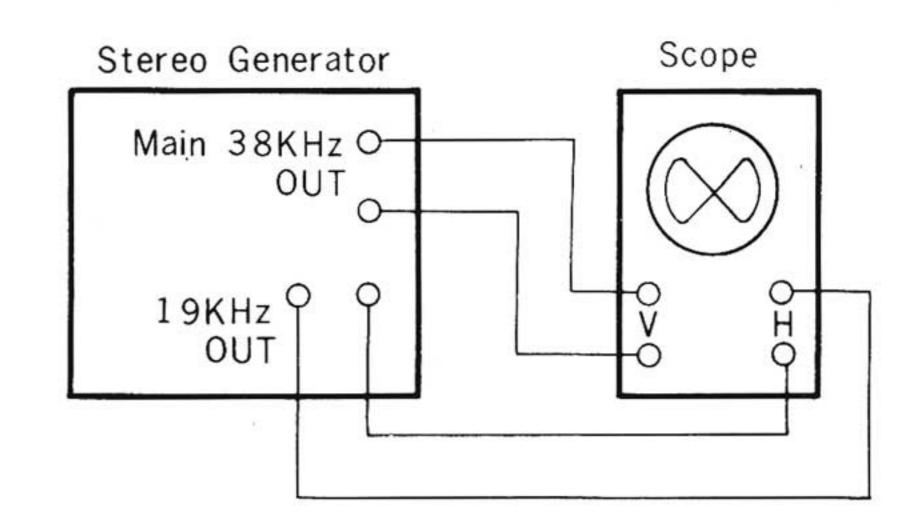


Fig. 4-2-1 Stereo Generator Phase Check Test

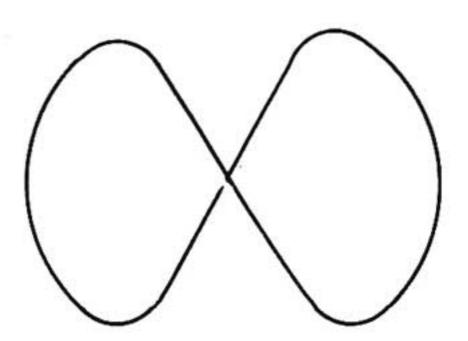
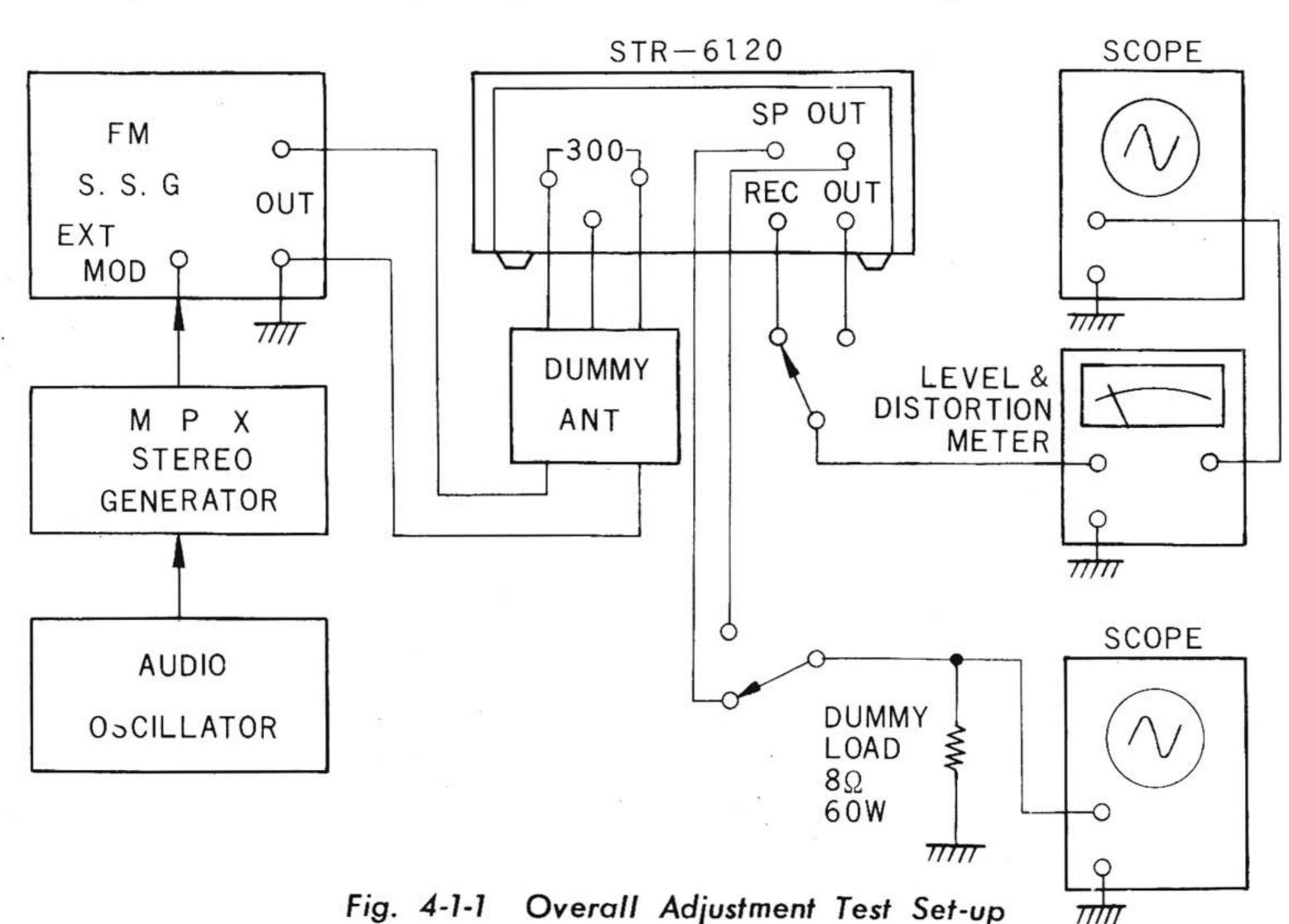


Fig. 4-2-2 Lissajous Pattern

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



(1) Connect the equipment as shown in Fig. 4-1-1; set the FM signal generator as follows:

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.

- (b) Adjust the MPX generator output level to obtain a 7.5 kHz deviation on the FM SSG modulation meter.

SUB CHANNELOFF
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.

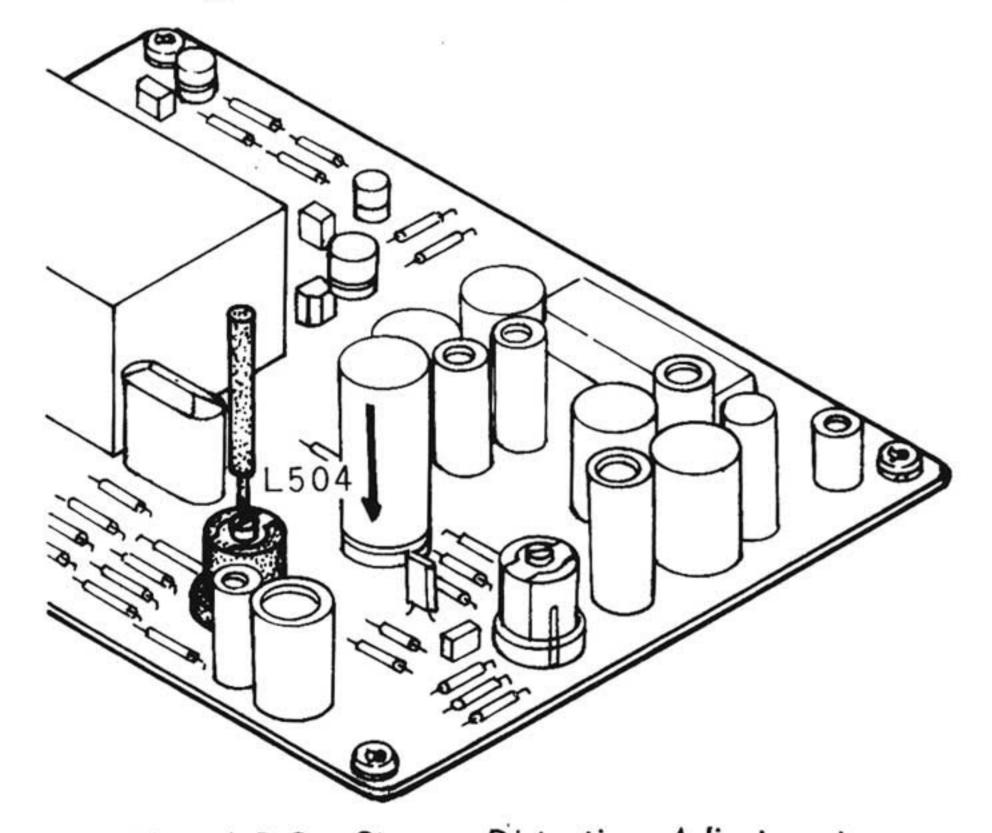


Fig. 4-2-3 Stereo Distortion Adjustment

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 R₅₃₇ for minimum difference between left and right separation.

Note: The output level changes according to the setting of R₅₃₇.

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 Frequency98 MHz
Output Level........20 dB/μ
Modulation (400 Hz)100% (75 kHz)

- (b) Tune the set and adjust the semifixed resistor R_{211} (330 Ω) on the I-F board until the output is muted when the signal output level is decreased to $15\pm3\,\mathrm{dB}/\mu$. 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 $+\triangle f$, $-\triangle f$ 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)

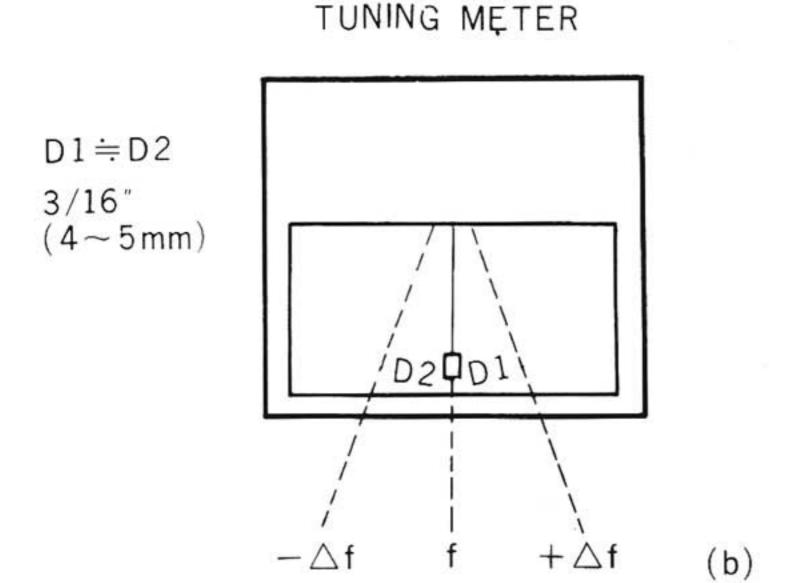
 VOLUME Control
 Minimum

 FUNCTION Selector
 TUNER

 MODE Selector
 STEREO

 MUTING Switch
 IN

 MONITOR Switch
 SOURCE



"S"CURVE

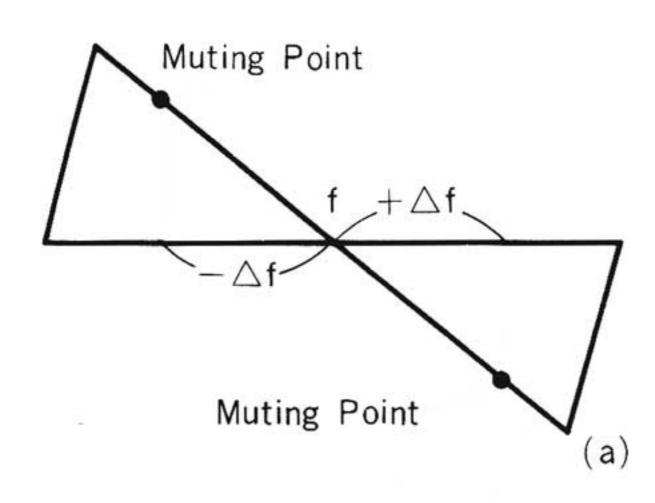


Fig. 4-4-1 Relation between "S" Curve, muting level and tuning meter deflection

(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.

Proceed as follows:

- (c) In case D₁≫D₂ Increase the value of R₄₀₃ (turn it counterclockwise) 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.

(1) With the equipment connected as shown in

4-5 Tuner Input-Meter Calibration

(2) Tune the set and adjust R251 $(1 \,\mathrm{k}\Omega)$, the Meter Calibration, to get the meter pointer to 1/16'' $(2 \,\mathrm{mm})$ left of its maximum indication. See Fig. 4-5-1.

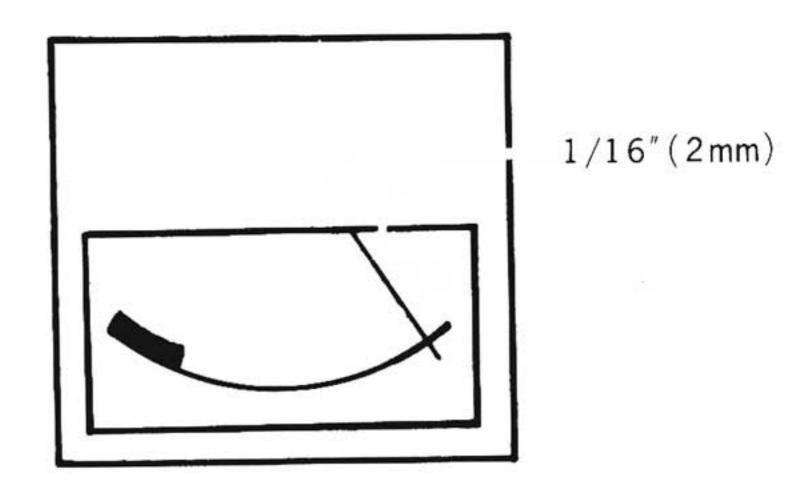


Fig. 4-5-1 Tuner Input Meter Calibration

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 Q₈₀₈ and ground. Check the reading does not exceed 0.6 volts.

Preparation:

(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} (10K Ω -B) to obtain a 12 mV reading on the meter.

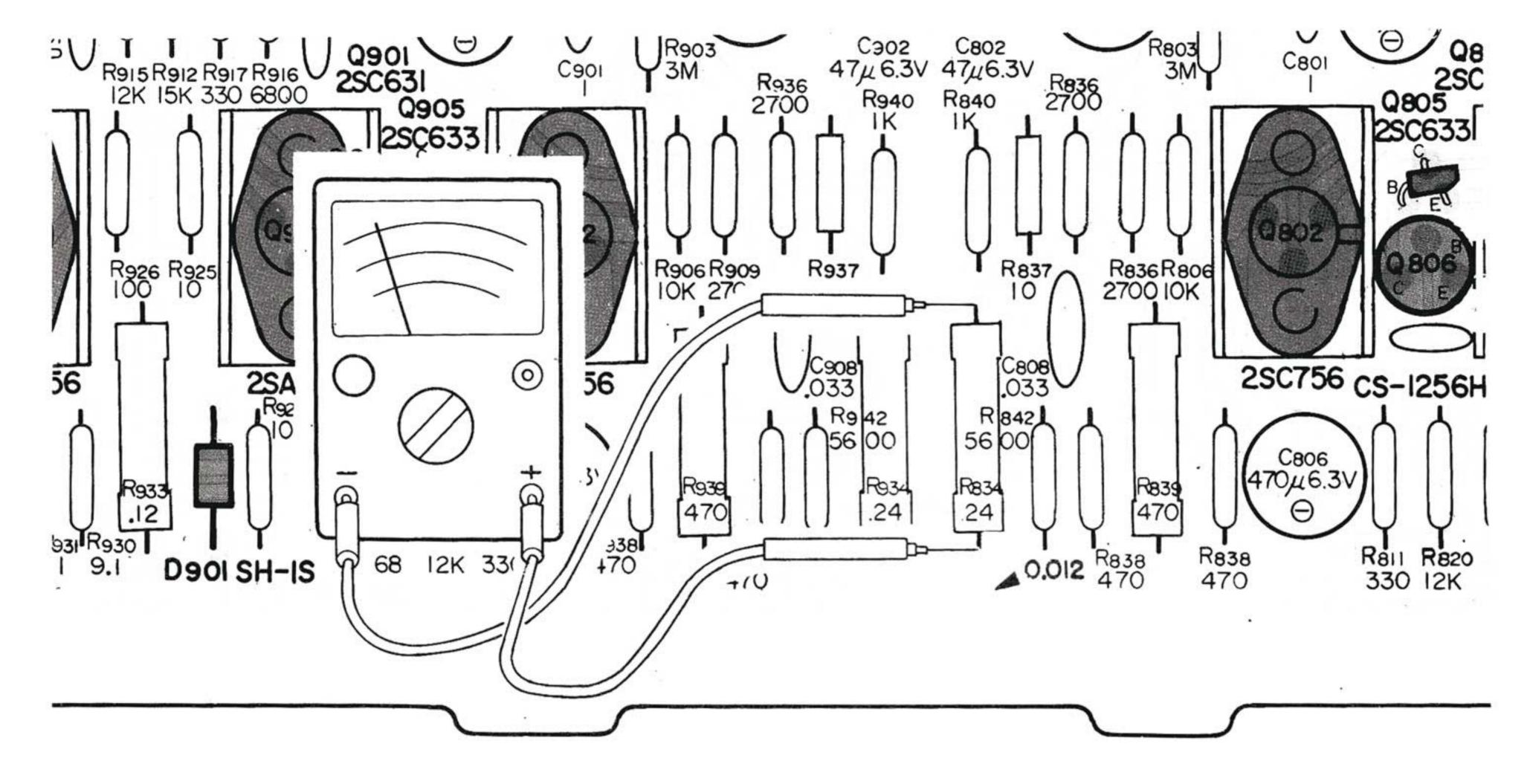


Fig. 4-7-1 DC Bias Adjustment Test Set-up

(B) Ac Balance Adjustment

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

- 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 R₈₀₅ (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.

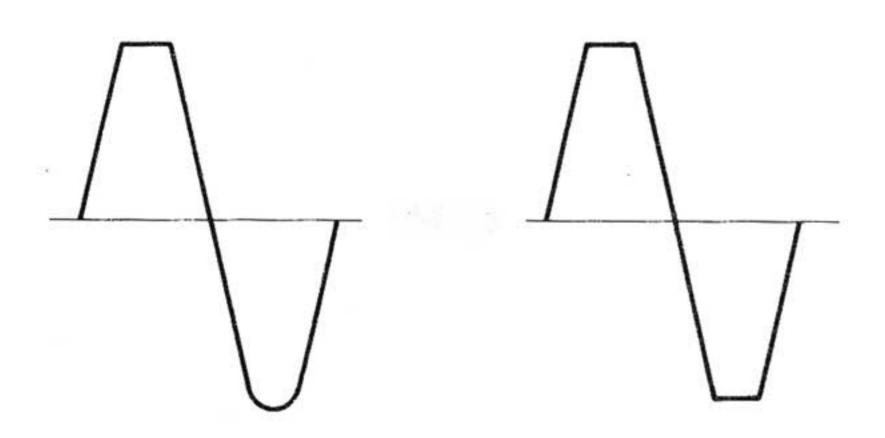


Fig. 4-7-2 AC Balance Adjustment

(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 CS₁. Heat the power transistor and CS₁ gradually using a heat blower, as shown in Fig. 4-7-3.

A conventional hair dryer is acceptable.

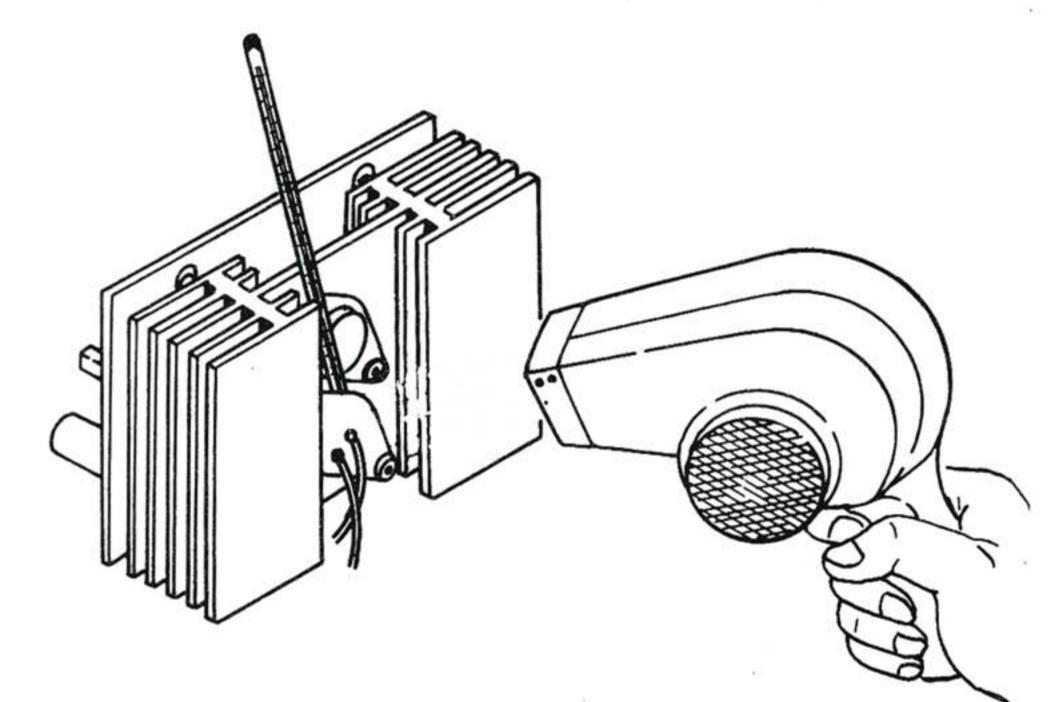


Fig. 4-7-3 Thermal Sensitive Protection Check

Step 4: Confirm that the output of the amplifier is decreased when temperature reaches $158^{\circ}\pm9^{\circ}F$. $(70\pm5^{\circ}C)$ See Fig. 4-7-4. If the protection circuit does not operate properly, check the related circuitry.

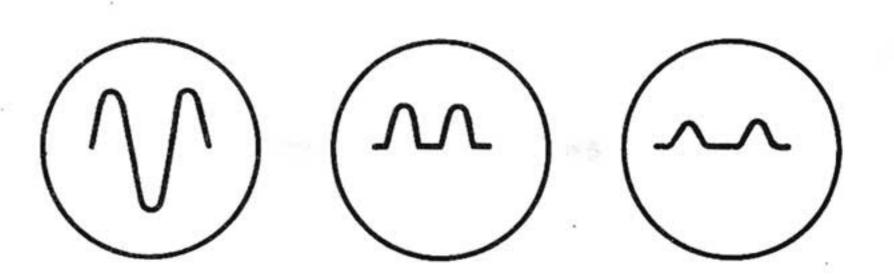
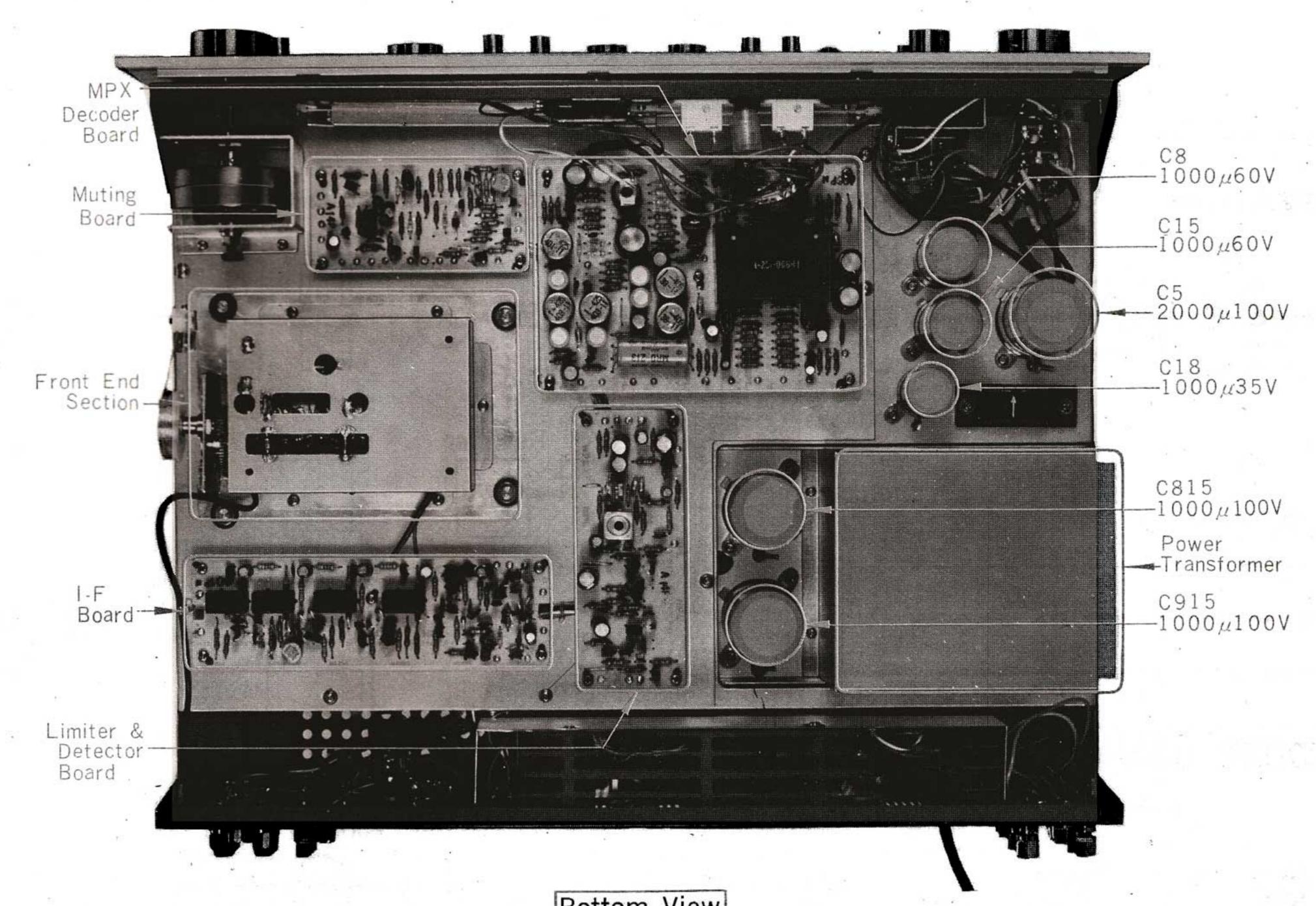
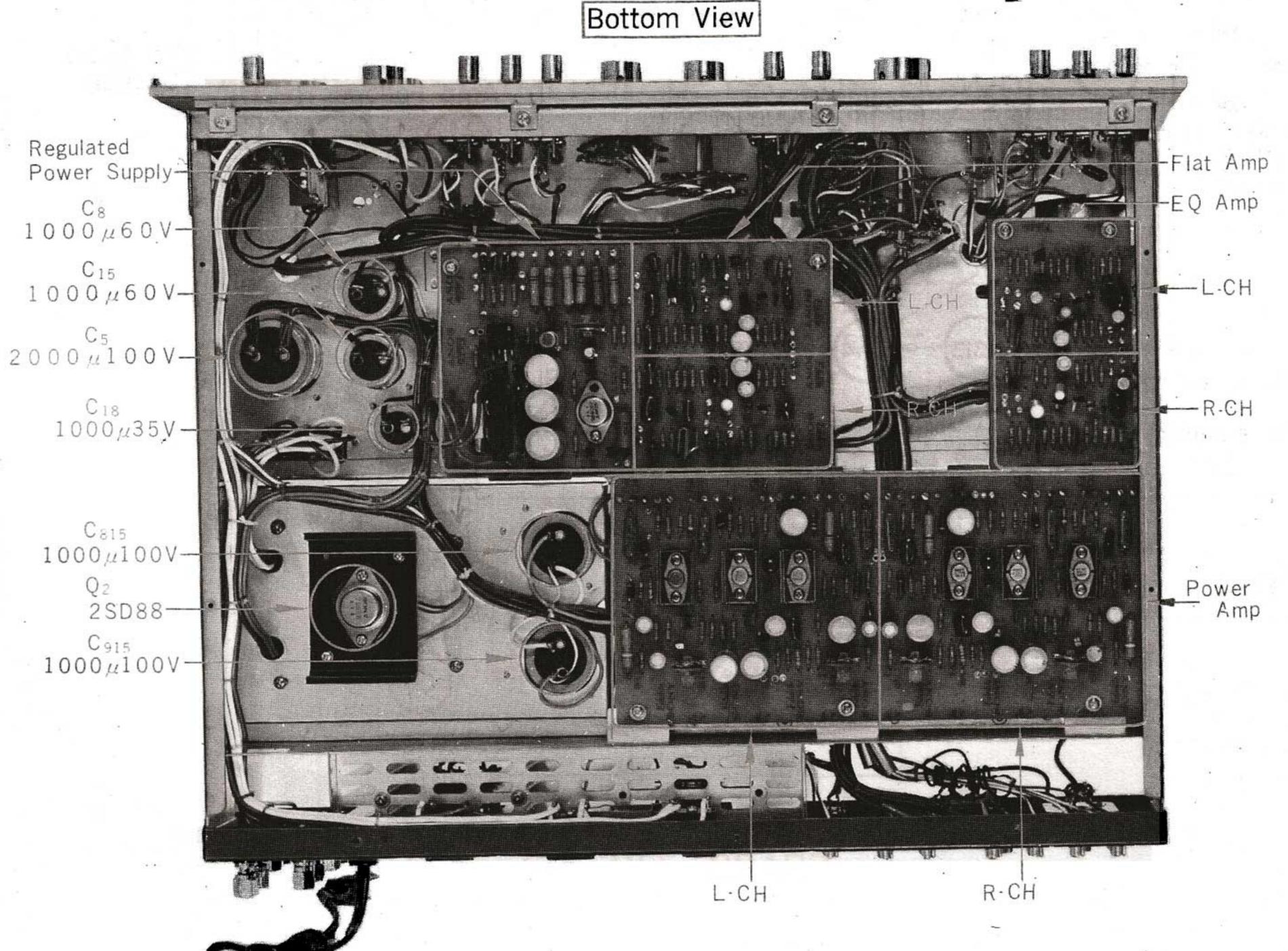
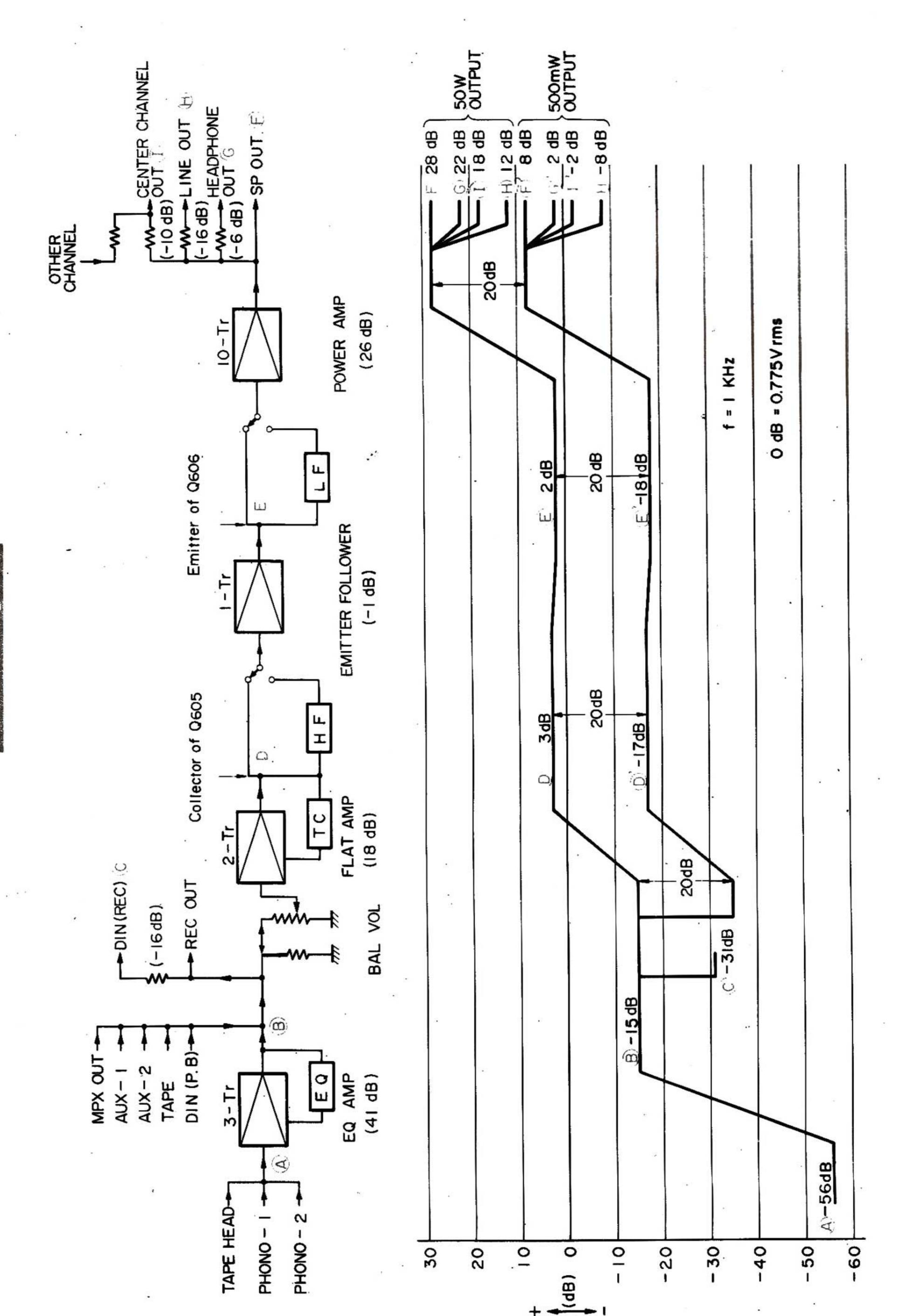
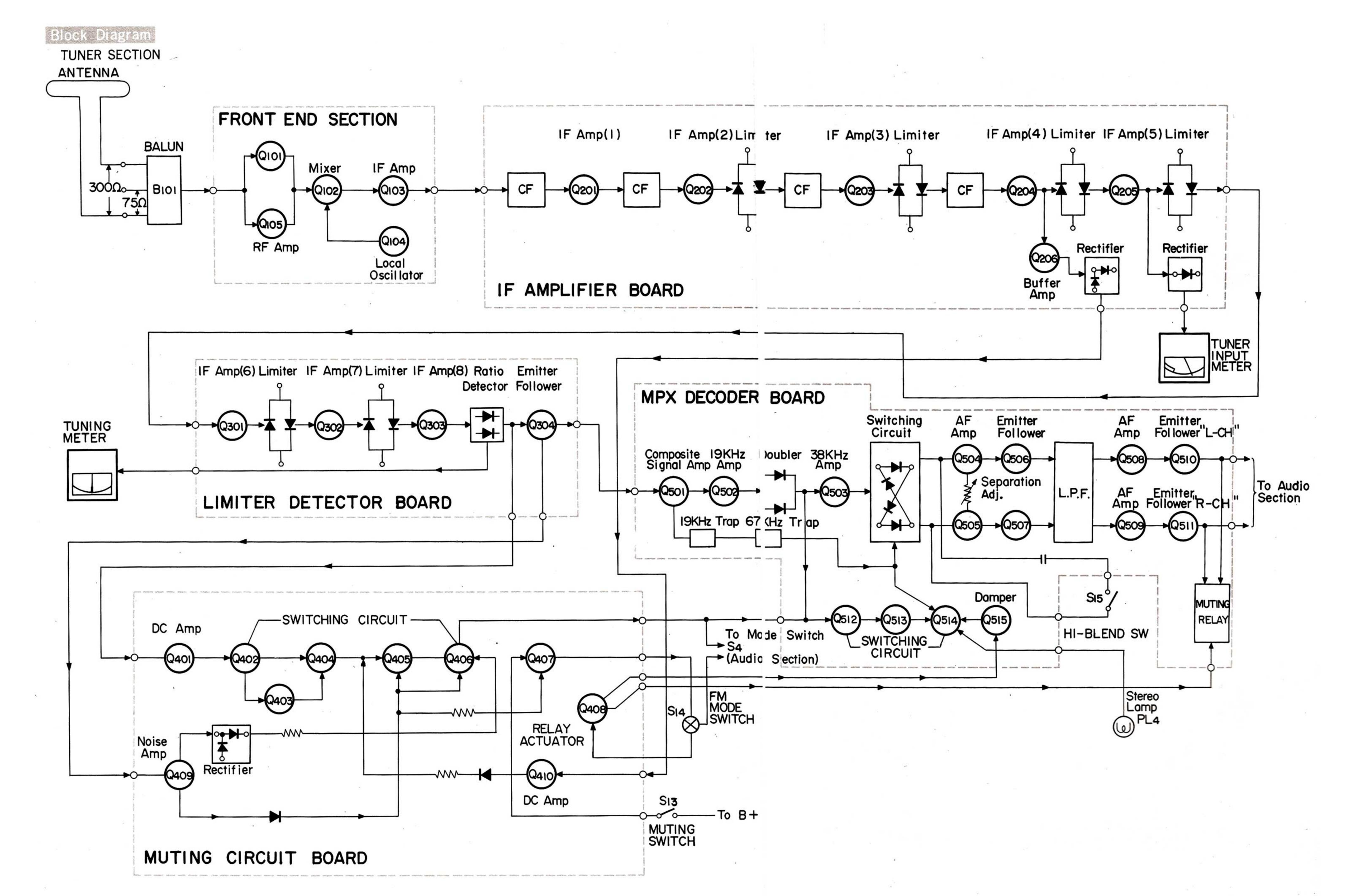


Fig. 4-7-4 Output Wave Forms when thermal protection circuit is actuated

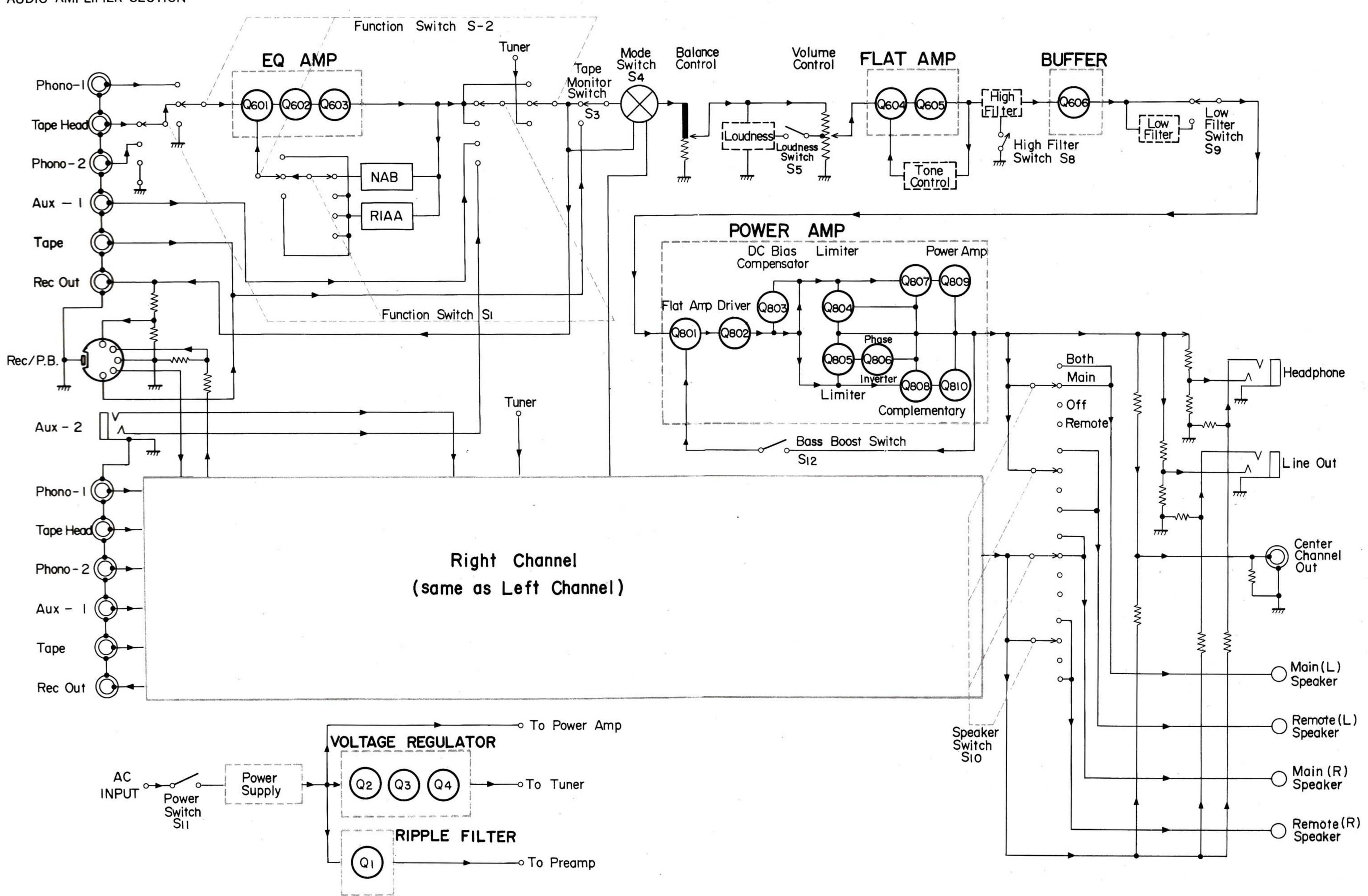


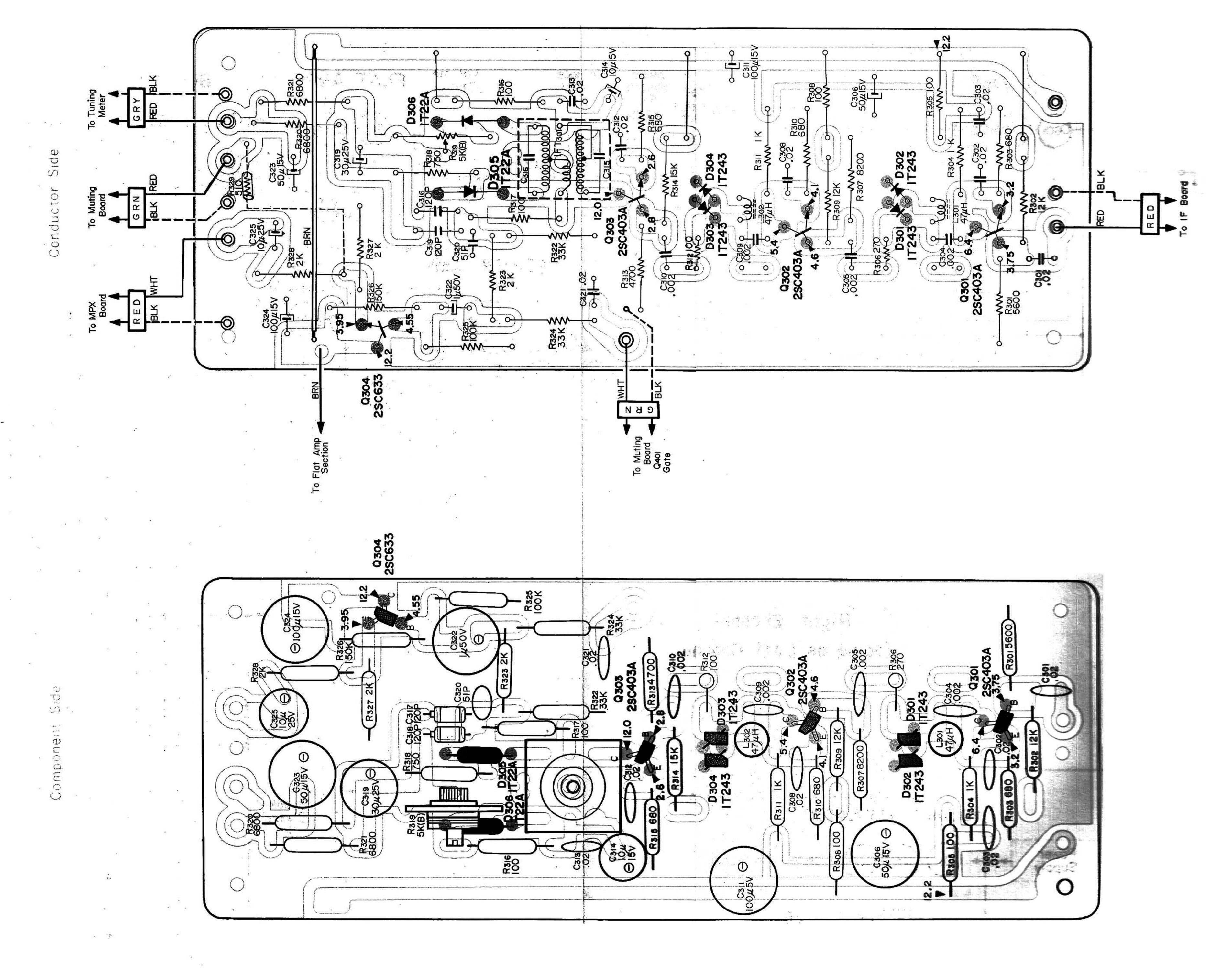






AUDIO AMPLIFIER SECTION



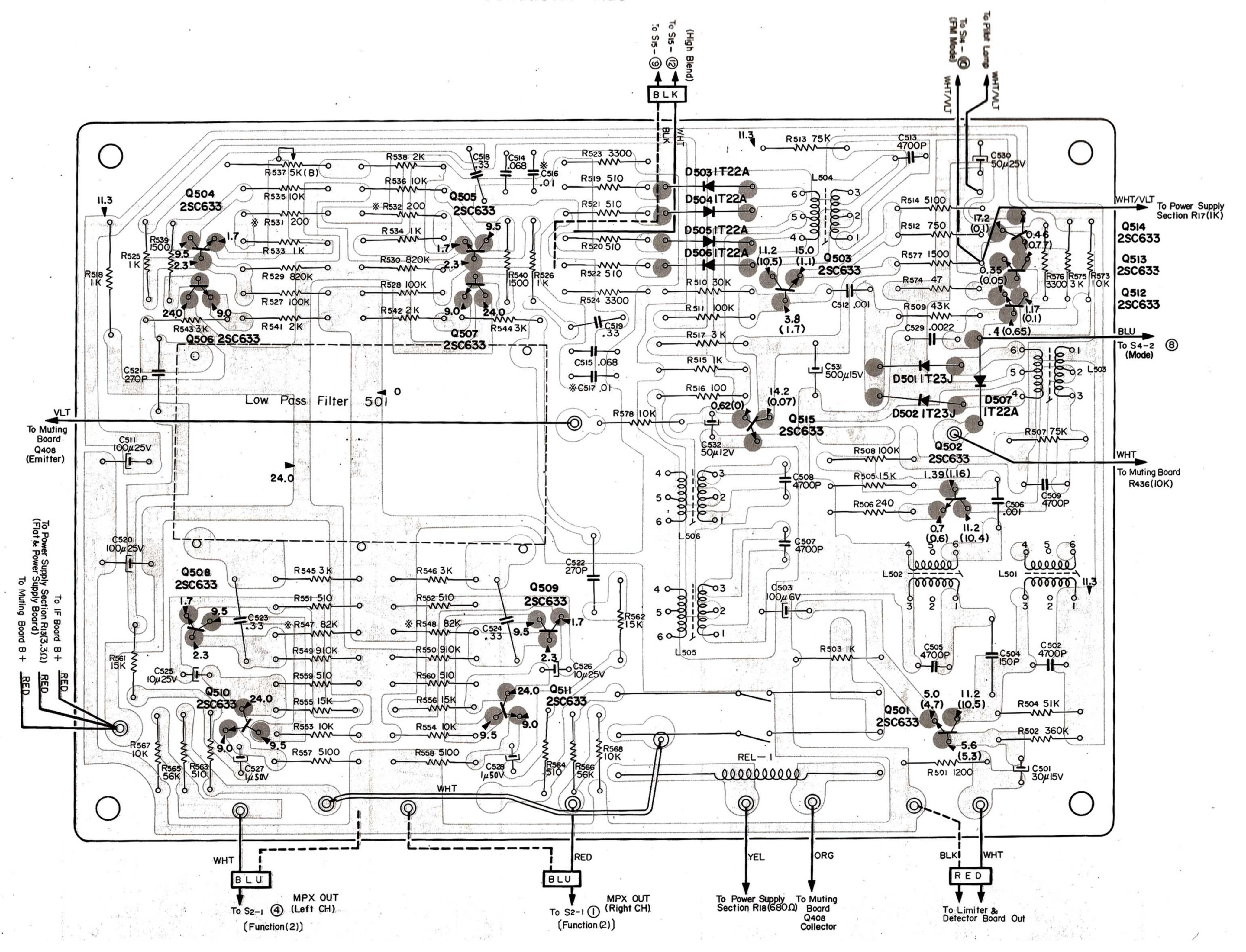


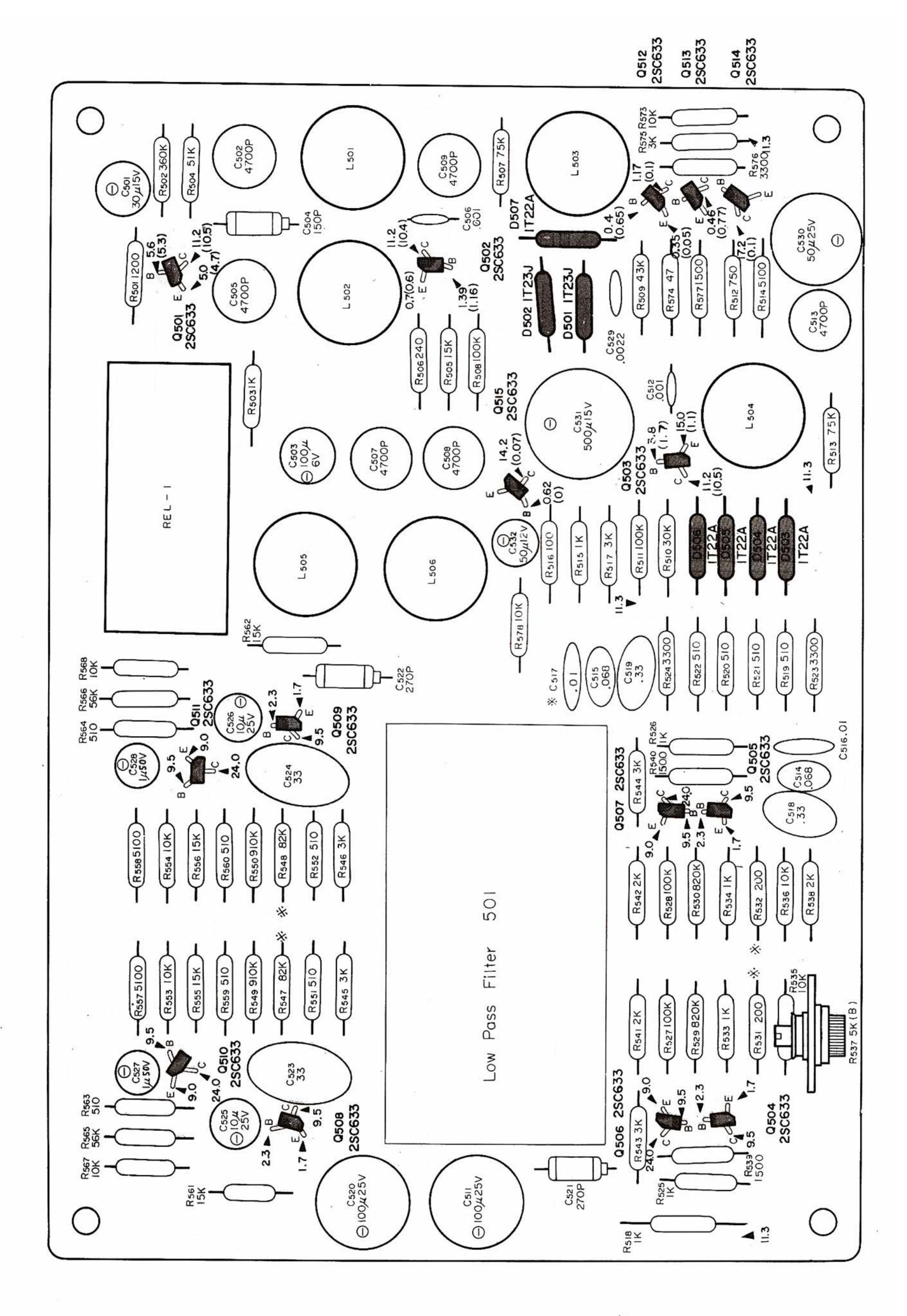
- 29 -

Mounting Diagram

MPX Decoder Section

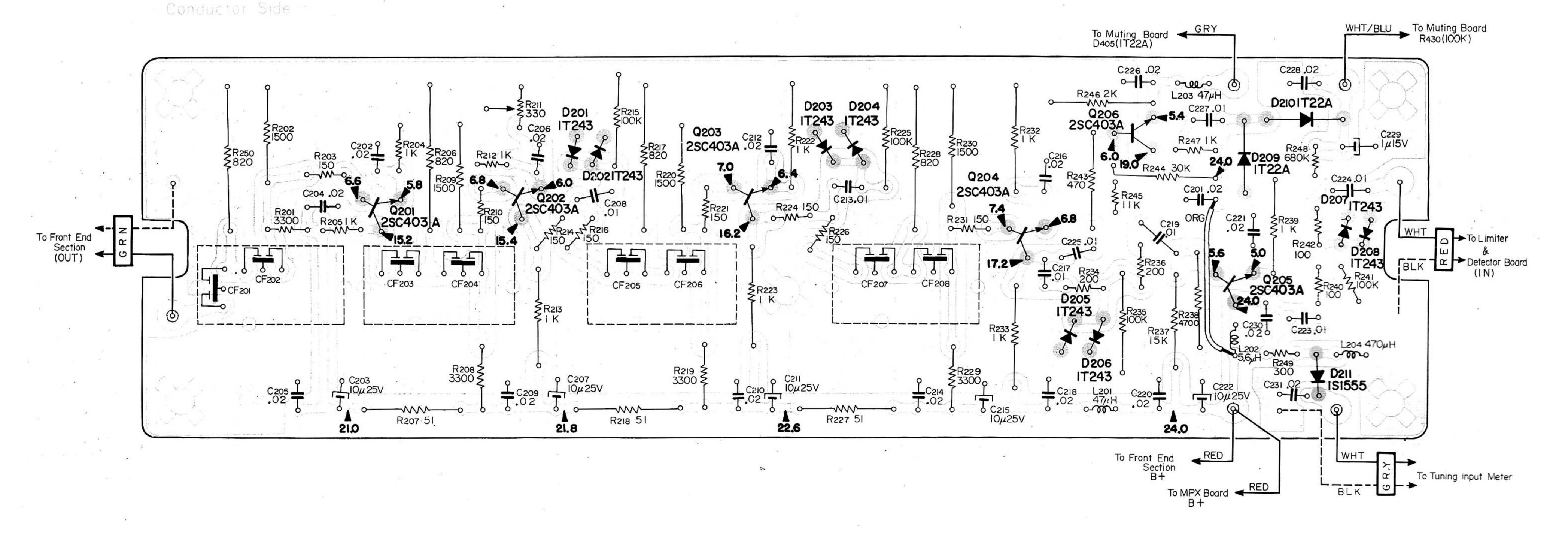
Conductor Side

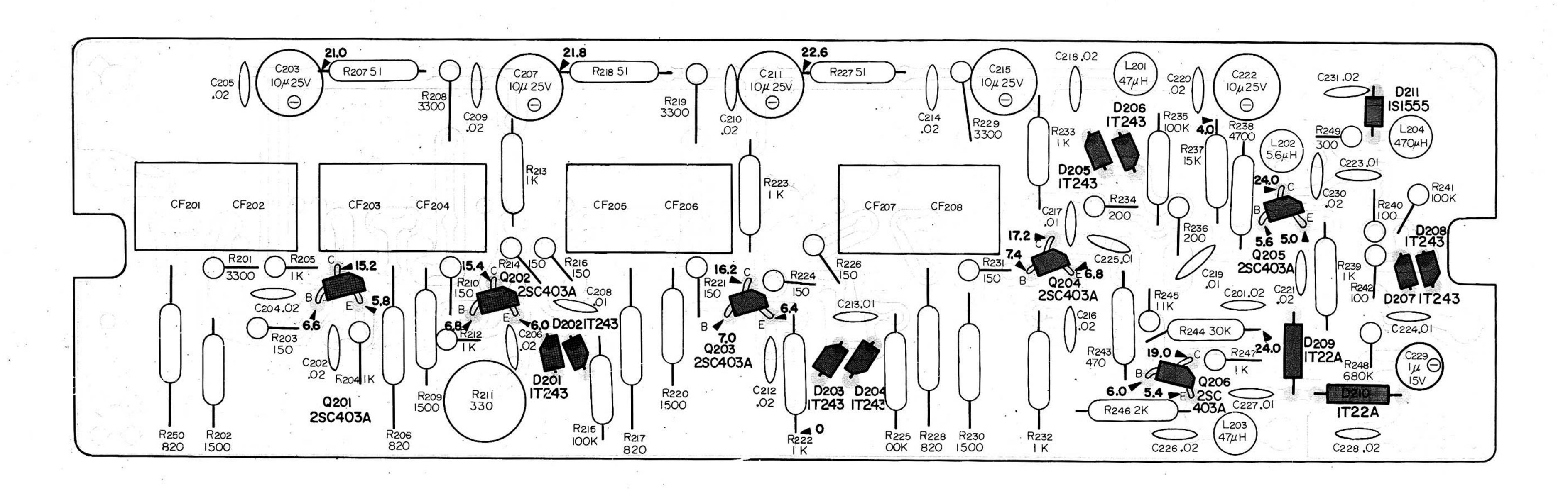




* To be Selected

1-F Amplifier Section

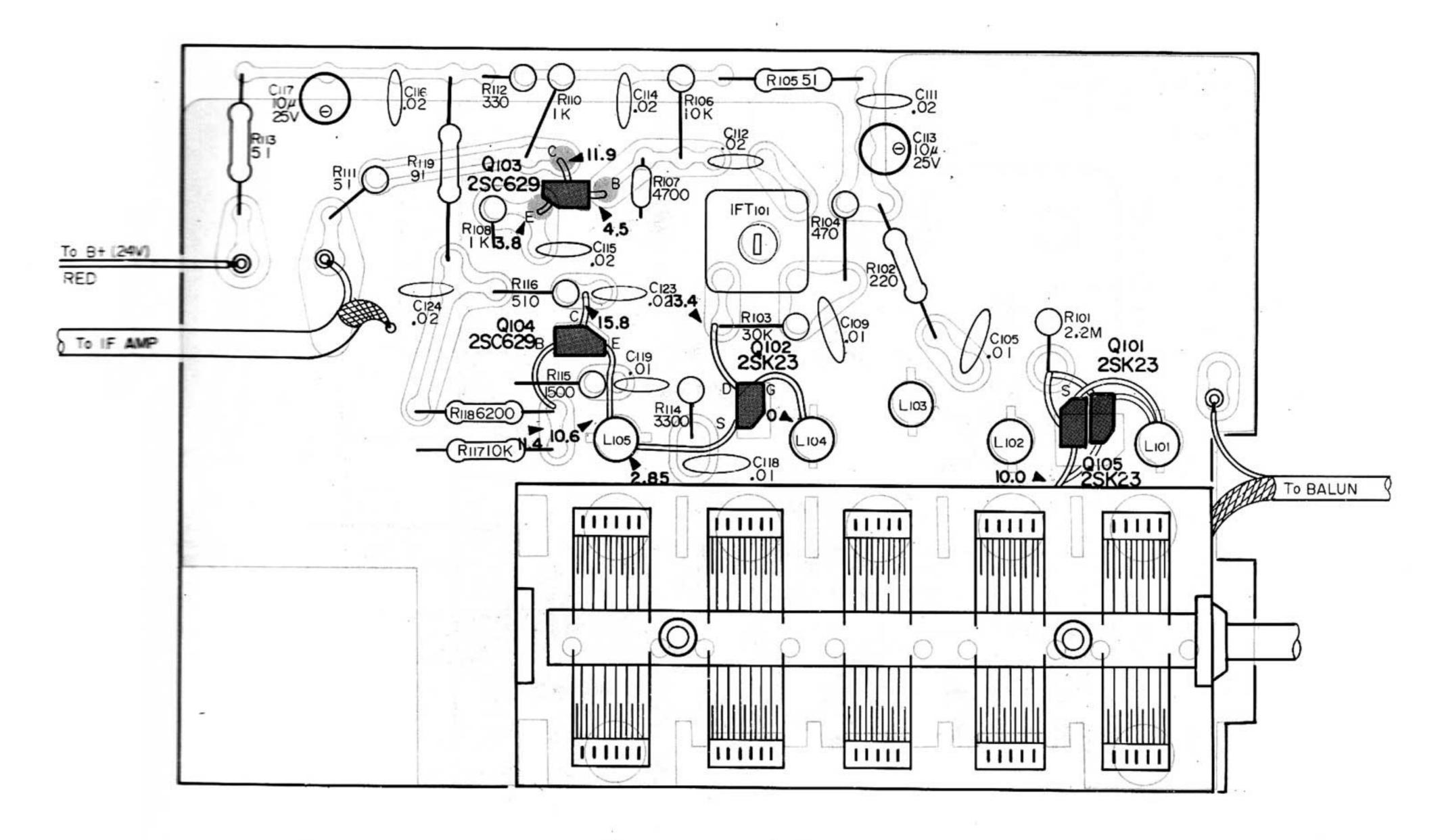




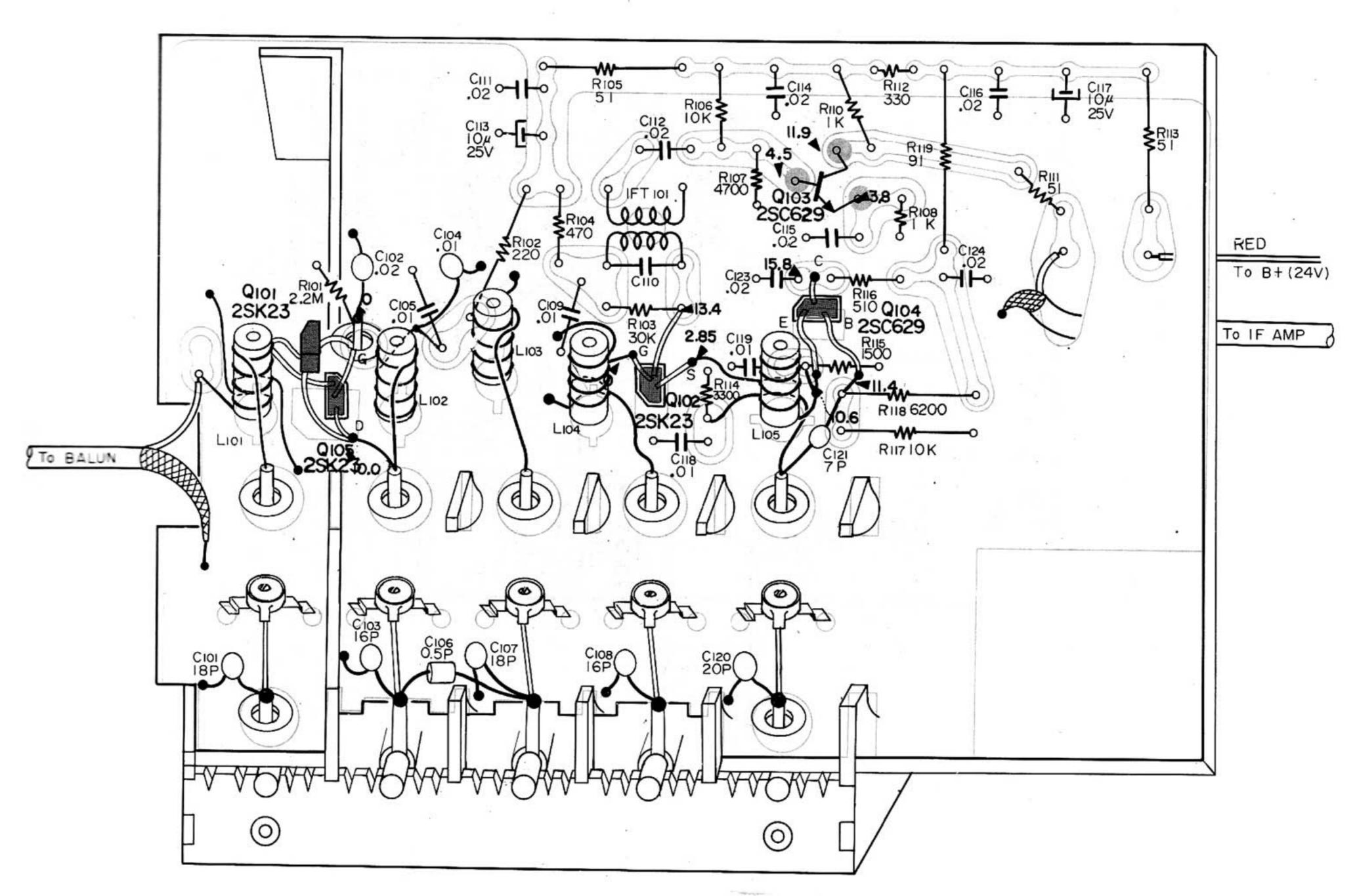
Mounting Diagram

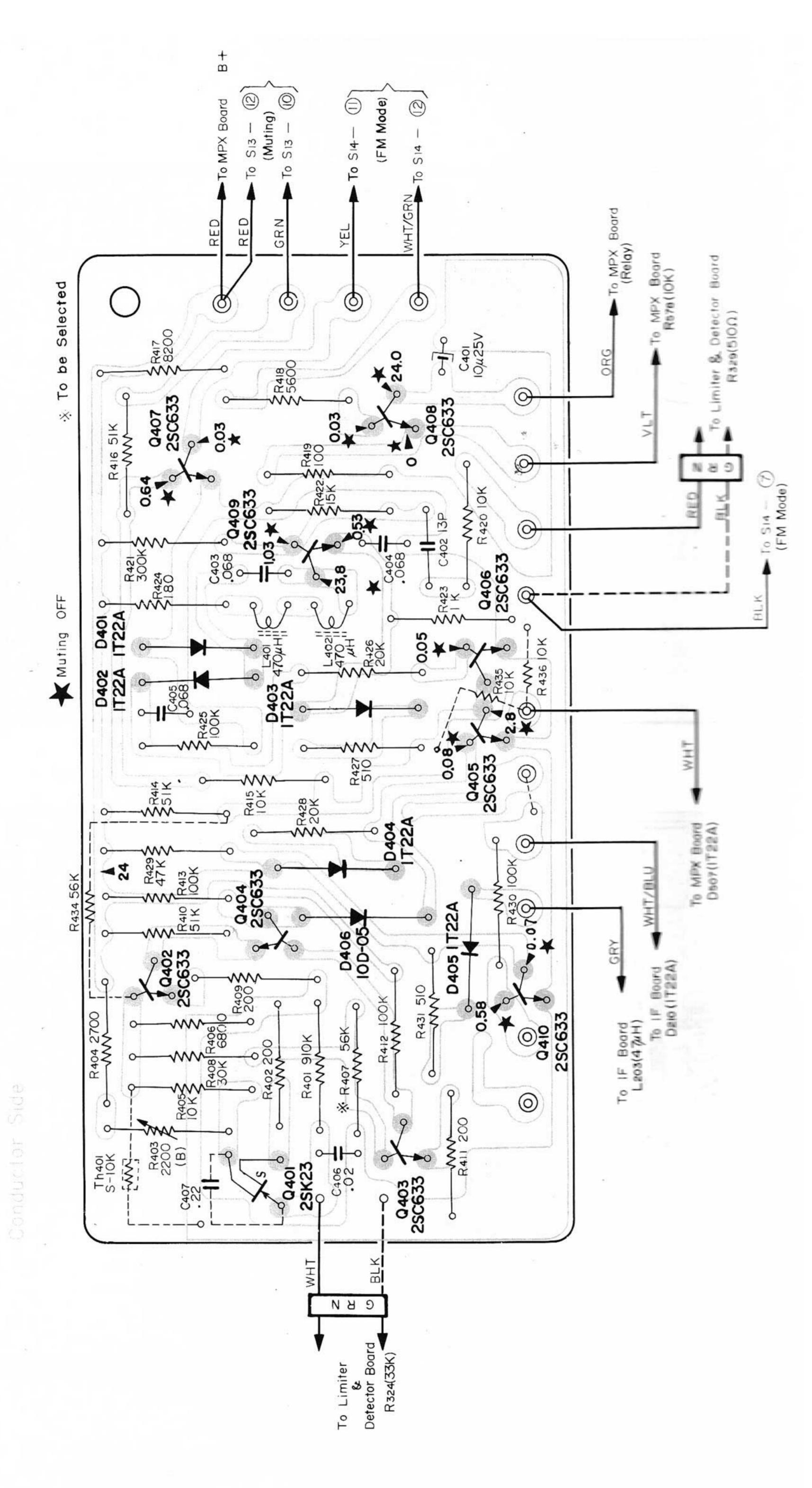
Front End Section

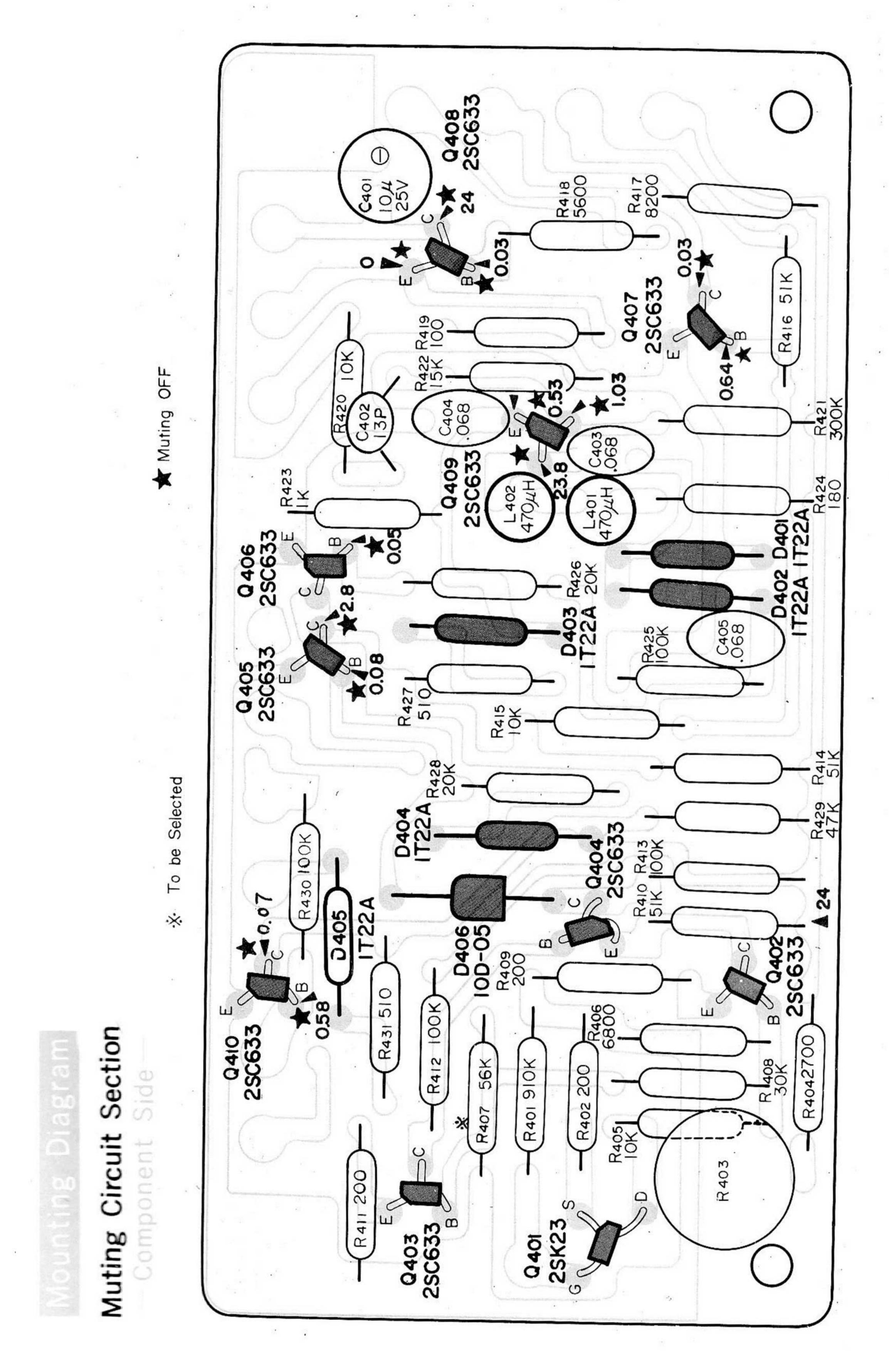
Conductor Side

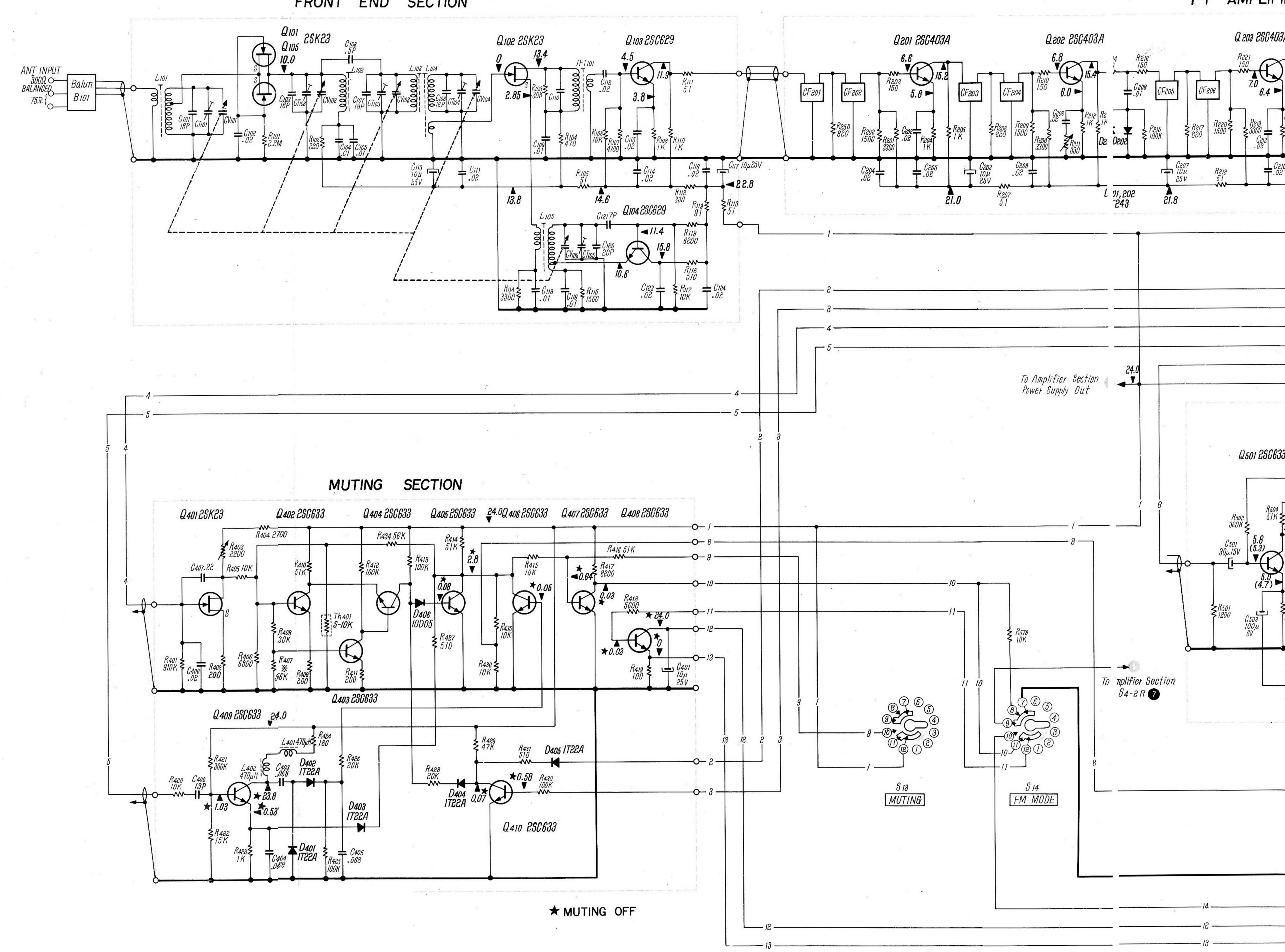


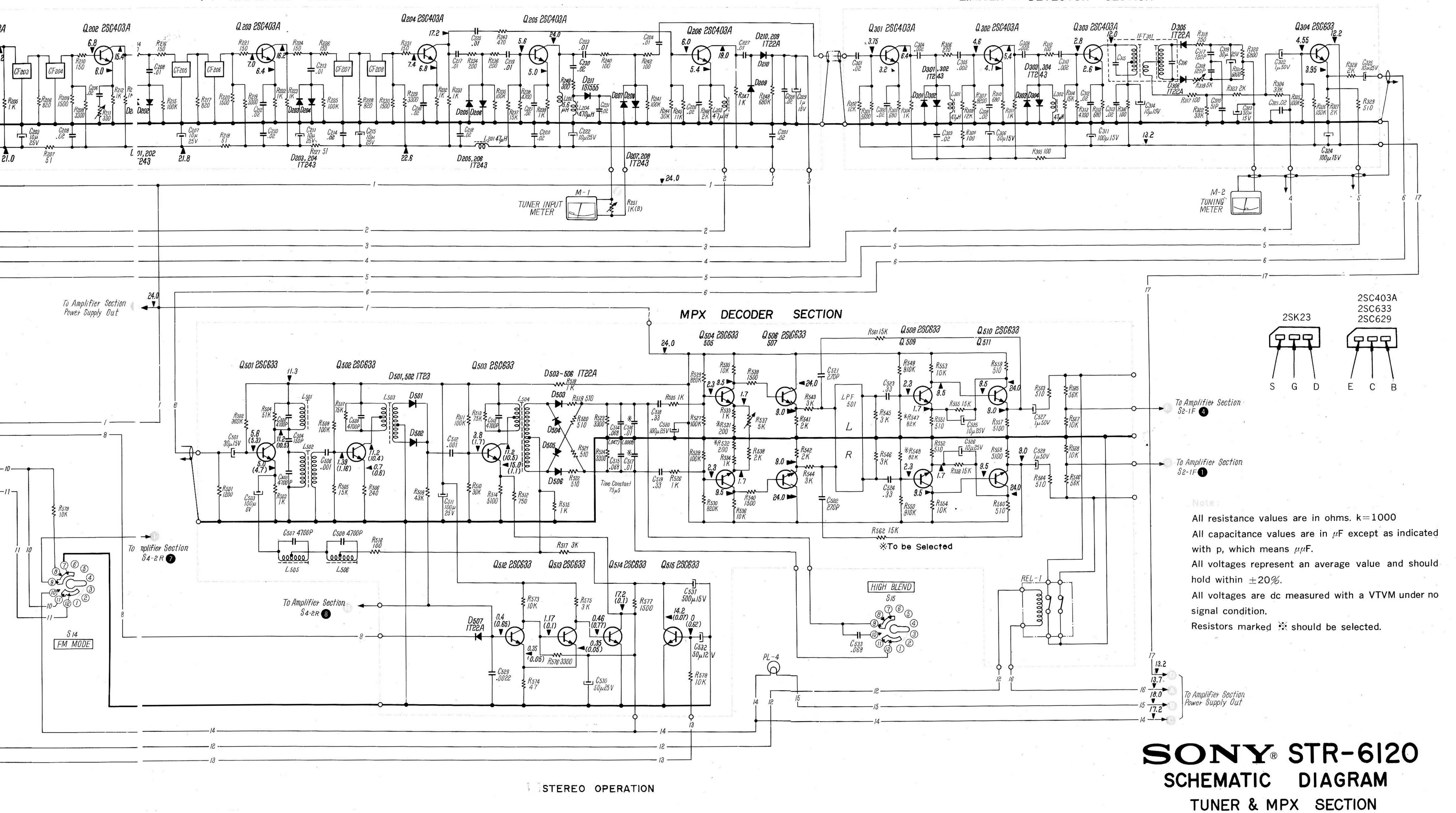
- Component Side -








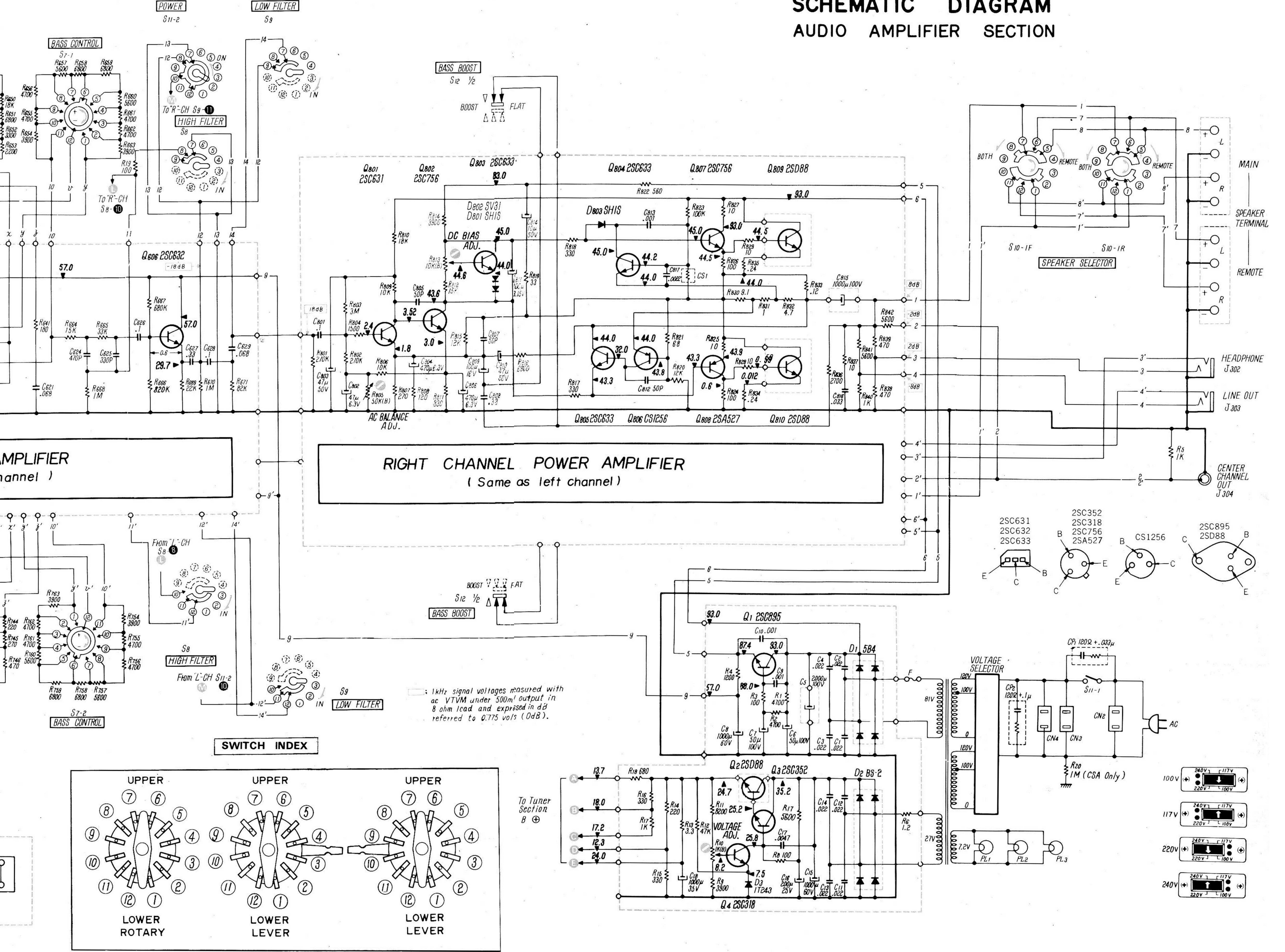






SONY®STR-6120

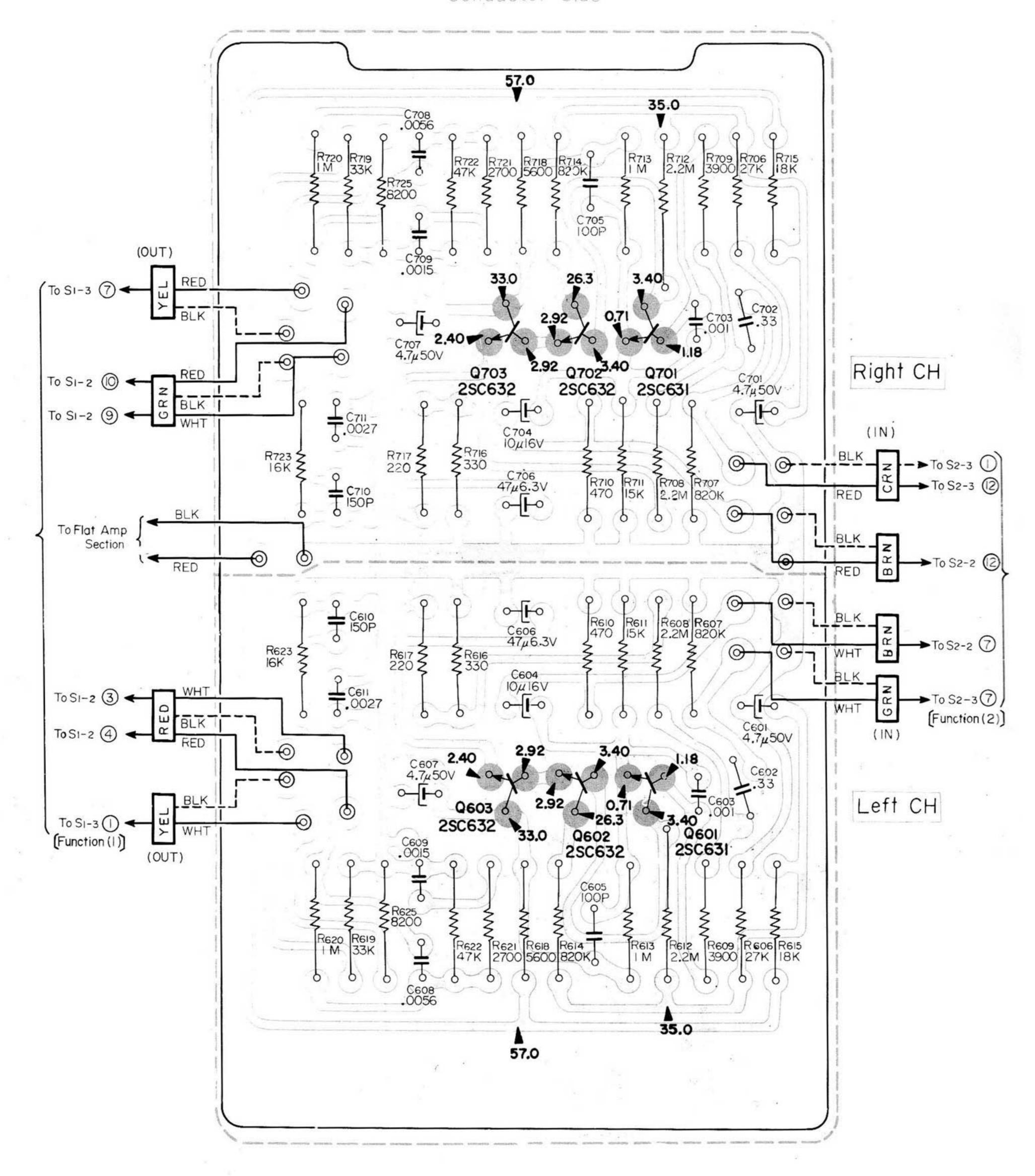
SCHEMATIC DIAGRAM



Mounting Diagram

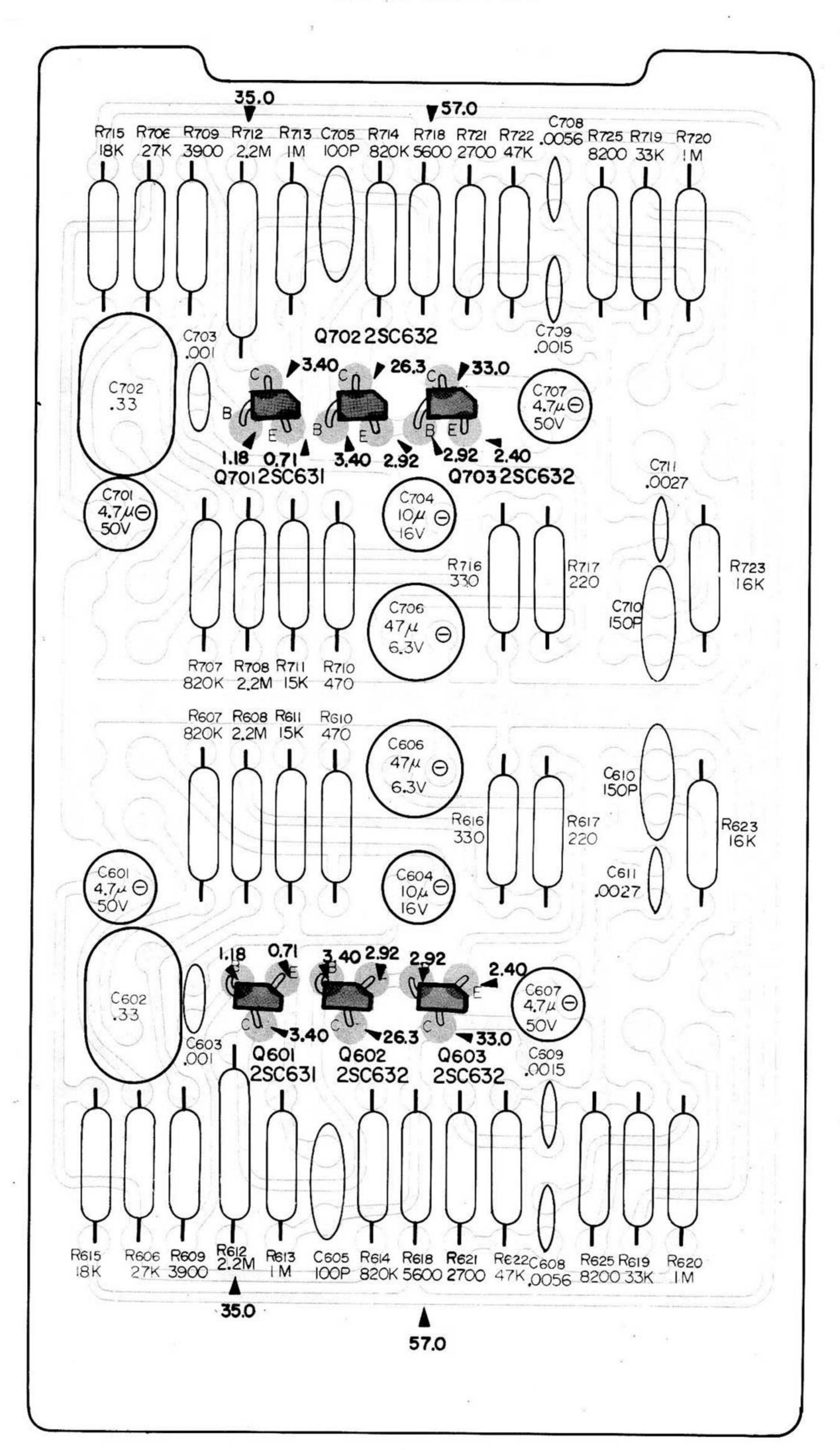
Equalizer Amplifier Section

-Conductor Side -



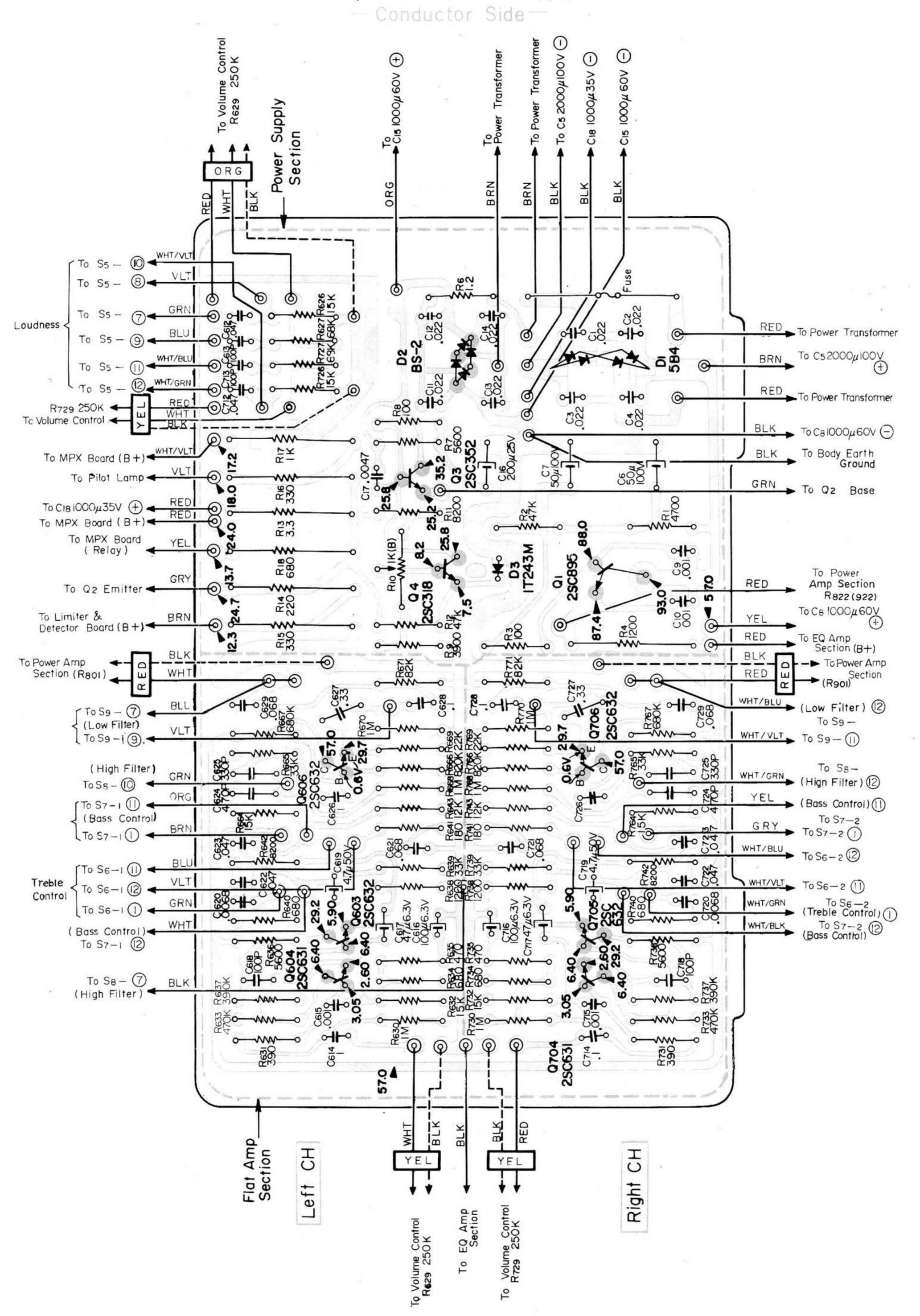
Equalizer Amplifier Section

- Component Side --



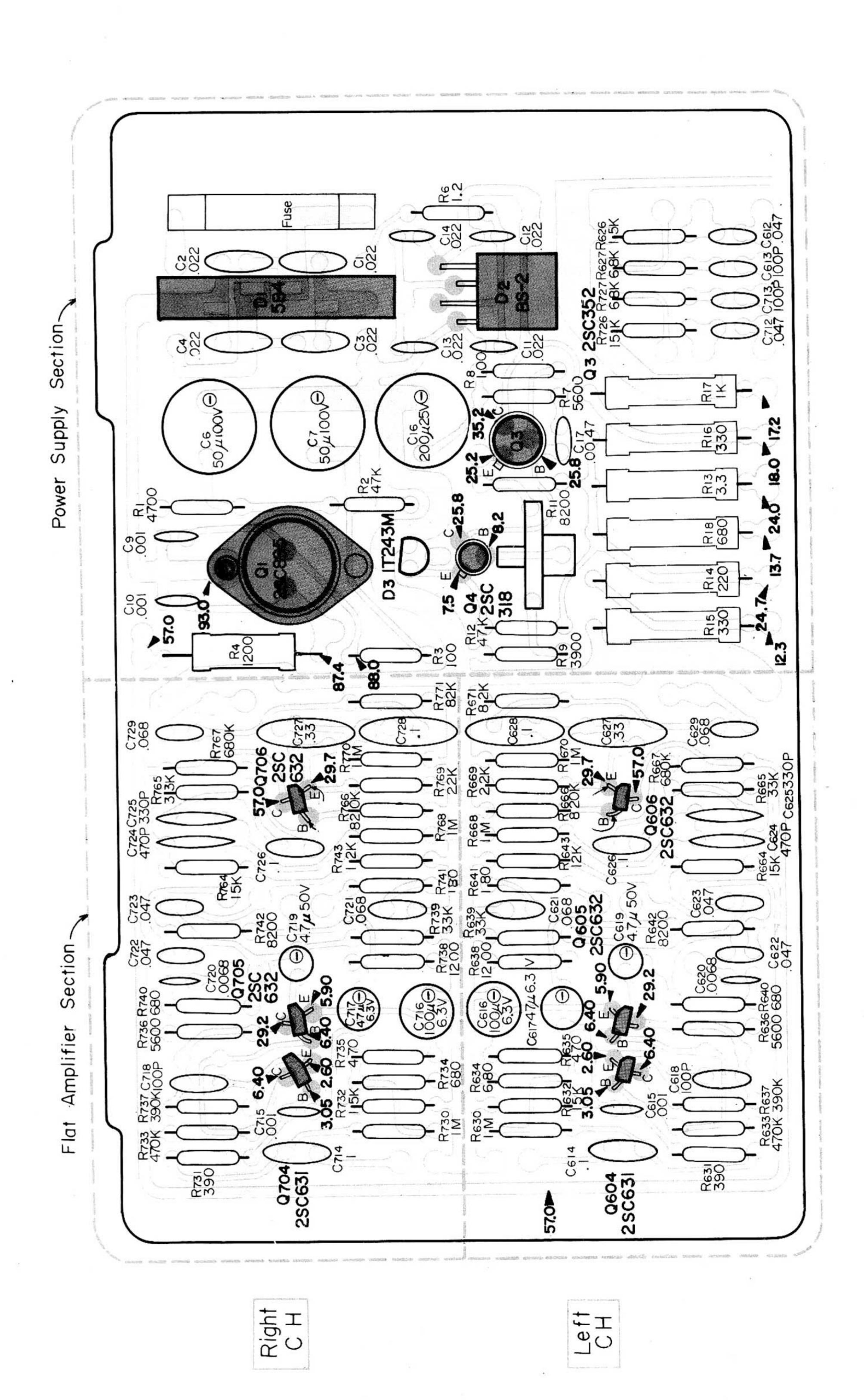
Mounting Diagram

Flat Amplifier & Power Supply Section



Flat Amplifier & Power Supply Section

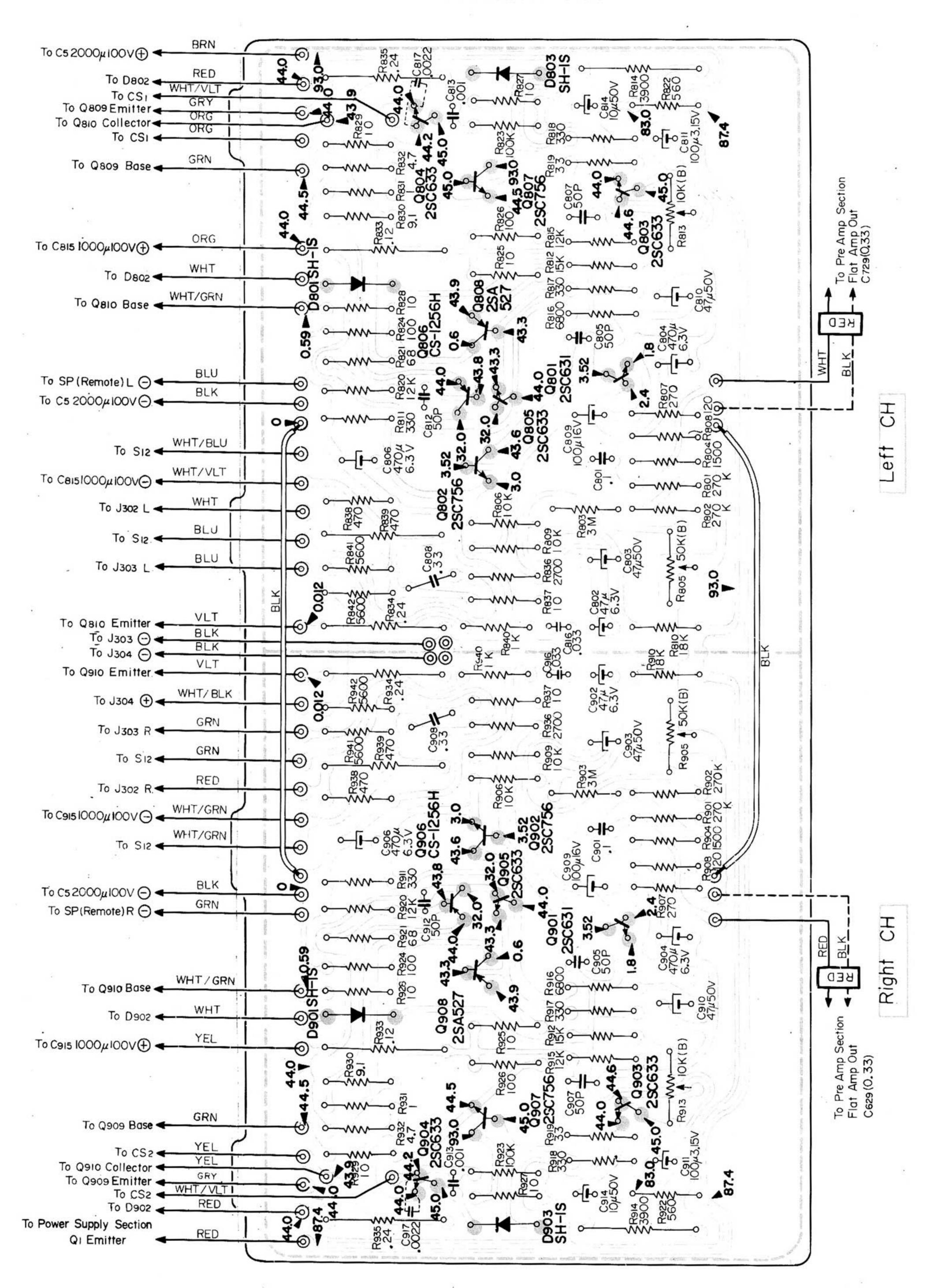
- Component Side -



Mounting Diagram

Power Amplifier Section

Conductor Side



Mounting Diagram

Power Amplifier Section

Component Side.

