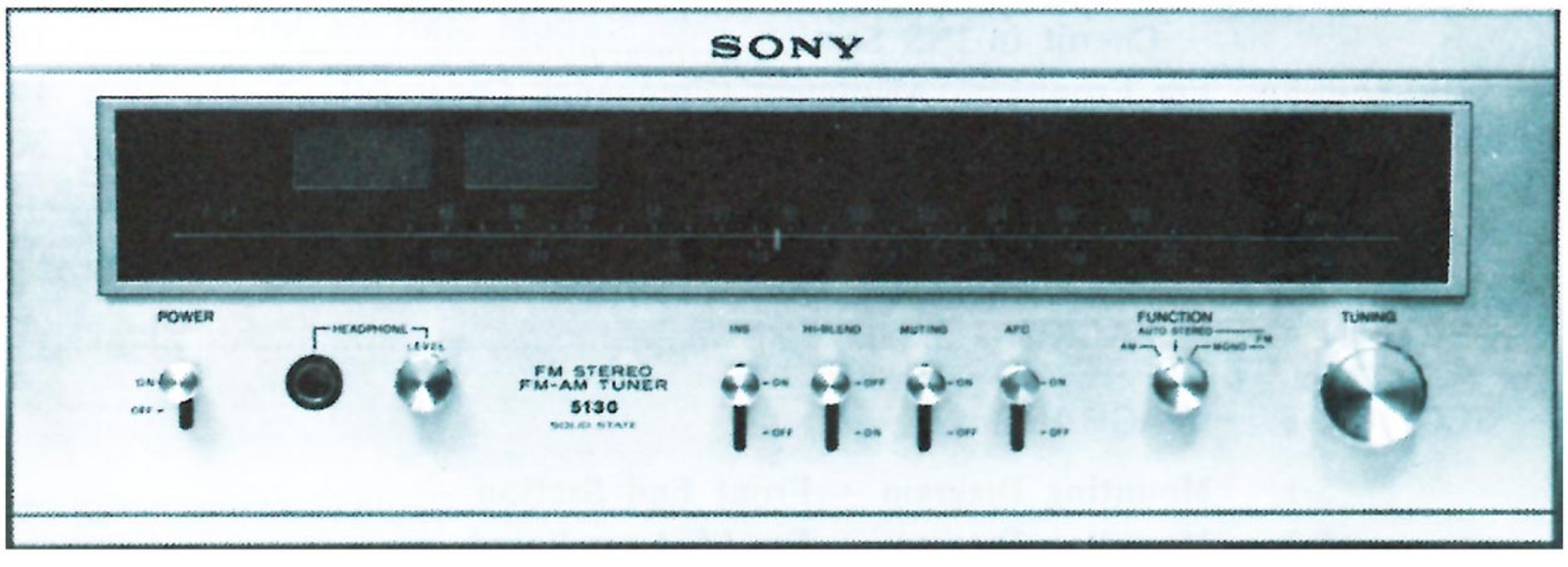
Set using ISO screws

ST-5130

USA, GEP and NEP Model



SONY®

SERVICE MANUAL

TABLE OF CONTENTS

SECTION 1
TECHNICAL DESCRIPTION

1-1. TECHNICAL SPECIFICATIONS

Technical specifications for the ST-5130 are given in Table 1-1.

TABLE 1-1. TECHNICAL SPECIFICATIONS

Fm Tuner Section

Antenna:	300 ohms balanced, 75 ohms unbalanced.
Tuning range:	87.5 to 108 MHz
Sensitivity:	1.5 μV (IHF usable sensitivity) 1.2 μV (S/N 30 dB)
S/N ratio:	72 dB
Capture ratio:	1 dB
Selectivity:	90 dB
Image rejection:	100 dB
I-f rejection:	100 dB
Spurious rejection:	100 dB
A-m suppression:	60 dB
Frequency response:	20 Hz to 15 kHz ± 1 dB
Separation:	42 dB at 400 Hz
Harmonic distortion:	Mono: 0.2%, IHF (400 Hz 100% Mod) Stereo: 0.3%, IHF (400 Hz 100% Mod)
19 kHz, 38 kHz suppression:	60 dB
Muting level:	less than 5 μV

A-m Tuner Section

Antenna:	Built-in ferrite bar antenna with external antenna terminal
Tuning range:	530 to 1,605 kHz
Sensitivity:	50 dB/m, built-in antenna 30 μV, external antenna
I-f rejection:	41 dB at 1,000 kHz
Harmonic distortion:	0.6%
Image rejection:	45 dB at 1,000 kHz
S/N ratio:	50 dB

Outputs

Fixed:	750 mV, 10 k
Variable:	0 ~ 2 V, 1.8 k
Multipath:	150 mV, 18 k (Vertical/Horizontal)

General

Power consumption:	Approx. 25 watts
Power requirement:	100, 120, 220, 240 volts ac, 50/60 Hz (GEP, NEP Model) 120 volts ac, 50/60 Hz (USA Model)
Dimensions:	400 mm (width) x 149 mm (height) x 344 mm (depth) 15 3/4" (width) x 5 7/8" (height) x 13 9/16" (depth)
Net weight:	7.5 kg (16 lb 8 oz)
Shipping weight:	10.2 kg (22 lb 4 oz)

1-2. TECHNICAL FEATURES

NEW FM FRONT END

* Dual gate MOS FET's are employed in the rf and mixer stages.
* Five-gang variable capacitor upgrades image rejection.
* Newly-developed local oscillator circuit for stable reception (Initial frequency drift is 10 kHz or less).

FM I-F SECTION

* 8 ceramic filters ensure selectivity (90 dB or more).
* Input signal level detectors for INS (Impulse Noise Suppressor) and tuner input meter.
* Muting circuit by using FET switch.

INS (Impulse Noise Suppressor) SECTION

The INS circuit consists of a noise-level selector, high-pass filter, noise amplifier, monostable multivibrator, schmitt trigger, FET gate and delay line. This circuit effectively eliminates unwanted impulse noises without degrading original signal sources.

FM MULTIPATH OUTPUT

This outputs is provided for multipath display. By using a conventional oscilloscope or multipath indicator, the condition of the received signal can be displayed.

AM TUNER

* Forward agc circuit
* New antenna circuit and CFT (ceramic filter unit) eliminate beat interference.

HEADPHONE OUTPUT (for monitoring)

1-3. CIRCUIT ANALYSIS DIGEST

The following description of newly-adapted or complicated circuits might help you in your repair work. Since stages are listed by transistor reference designation, refer to the block diagram and the schematic diagram on page 10 and 33 ~ 35.

Front End Section

(RF Amp)

Input signal is coupled to the rf amplifier Q101 through antenna tank circuit. MOS FET is employed in this stage as it has a low noise figure, wide dynamic range and large input impedance.

A triple-tuned circuit is employed between the rf amplifier and mixer. This passive coupling circuit contains no active amplifiers, so it is perfectly linear and cannot produce distortion and overload components.

(Mixer)

Rf signals and local-oscillator voltage are heterodyned in Q102 to produce the 10.7 MHz i-f output signal. A dual-gate MOS FET is well suited for this job, since gate-1 and gate-2 are isolated each other.

Input signal is applied to the gate-2, while the injection voltage of local oscillator is applied to the gate-1. As a result the effect upon local oscillator due to strong input signal is eliminated while the mixer operates at its highest conversion point of operation.

Notice that gate-1 and gate-2 are biased nearly zero voltage. Transformer IFT101 and capacitors C114 and C115 form a high "C" pi-network bandpass filter, which passes the i-f output and provides a path to ground for the other heterodyne products and oscillator harmonics.

(I-f preamplifier/limiter)

Q105 and Q106 act as an i-f preamplifier but also achieve a limiter circuit which is equivalent to 15 V peak-to-peak limiter.

Notice that the Q106 is an emitter follower and has little effect upon following ceramic filter's operation. This stage achieves a favorable signal-to-noise ratio before application to the filters in the i-f strip.

(Local Oscillator)

Q103, Q104 and oscillator tank circuit form a modified Colpitts oscillator circuit and supplies heterodying voltage to the mixer through C113.

Fig. 1-1 shows the simplified circuit and operates as follows:

Q1 accepts restored signal at the tank circuit T with high-input impedance and delivers it to the Q2 (grounded base circuit) with low output impedance, while Q2 performs phase inversion and some amplification, and then its output is fed back to the tank circuit T. Thus Q1 and Q2 form a positive feedback chain oscillating stable and clean signal. Note that its initial frequency drift is 10 kHz or less.

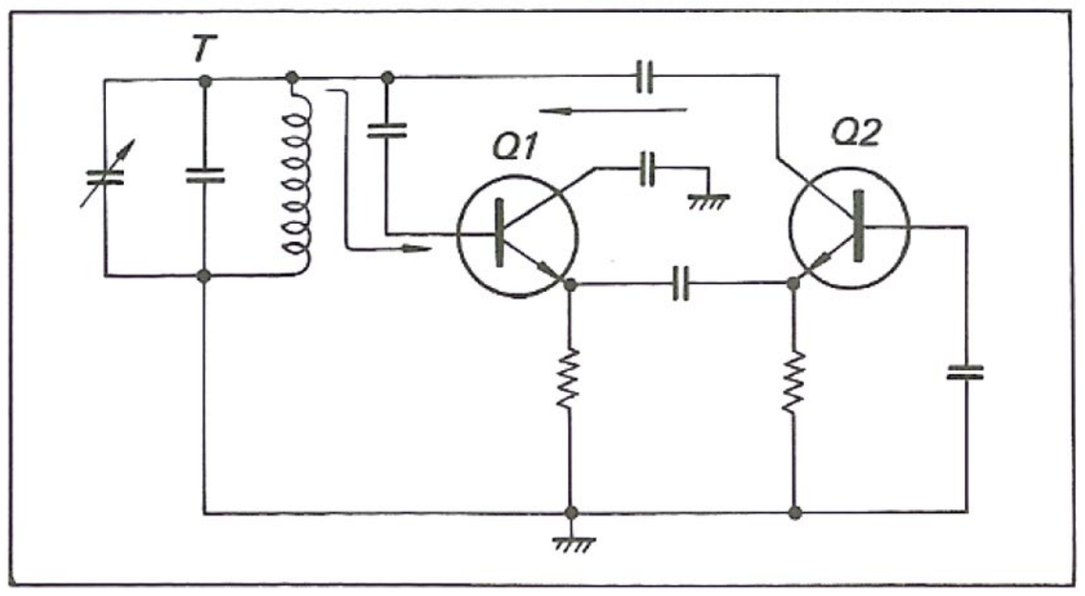


Fig. 1-1. Partial oscillator circuit

An automatic frequency control circuit is also incorporated in the oscillator circuit to eliminate frequency drift completely and the difficulty of exact tuning. Referring to Fig. 1-2, the principle of afc operation is as follows:

When the tuner is correctly tuned, the intermediate frequency is 10.7 MHz and no dc component is porduced by the ratio detector as shown in the "S" curve response. So the voltage applied to diode D102 is determined solely by the positive fixed reverse bias voltage supplied by zener diode D101.

Now, assume that the local oscillator frequency changes by $+\Delta f$. This means that the new intermediate frequency is 10.7 MHz$+\Delta f$. See Fig. 1-2.

As the result a positive dc component is fed back to the anode of D102, decreasing the reverse voltage to it, and making D102's barrier capacitance increase. This decreases the local oscillator's frequency, since the series circuit composed of C124 and D102 is connected in parallel with the tank circuit of the local oscillator. Conversely, if the local oscillator frequency decreases a negative dc voltage is fed back to D102 increasing the local oscillator frequency.

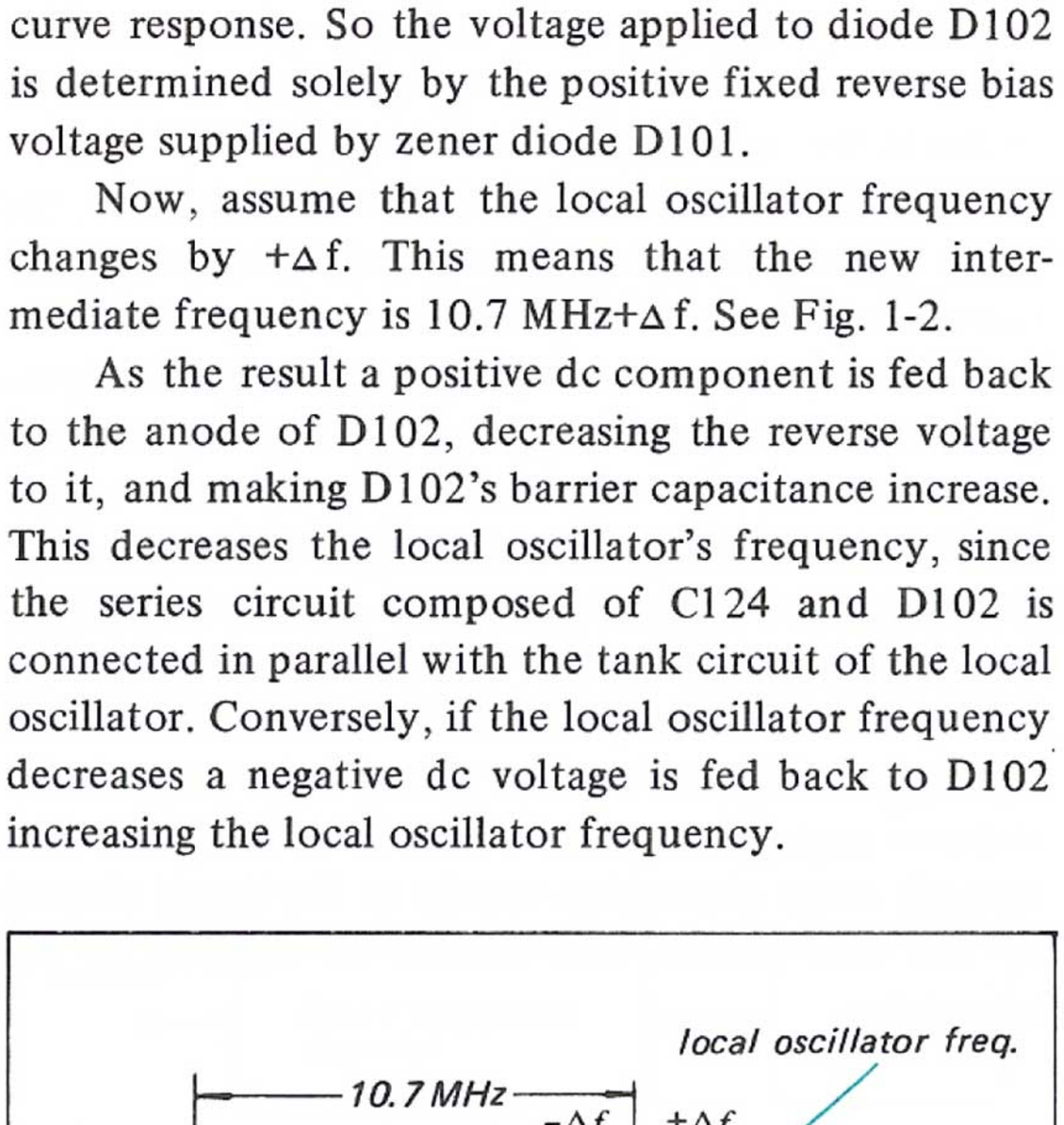


Fig. 1-2. Local oscillator's frequency drift and afc voltage relationship

Fm I-f Strip

The i-f amplifier stages consist of two pairs of direct-coupled amplifiers that provide essentially flat response. The selectivity of this section is determined by four-pairs of filters (CF201 to CF208) in the interstage-coupling path.

An unusual feature of this i-f strip is that i-f signal is extracted from the collector circuit of Q202, Q203 and Q204, and then fed to the rectifier/voltage doublers consisting of D214-D215, D212-D213, D216-D217 and D218-D219 respectively (See Fig. 1-3).

Notice that they provide three dc outputs each of which is related to a transistor's operating point and input signal level. By using the output signal level difference at each transistor, these circuits act as an input level detector for the INS circuit as will be described later.

Notice that the rectified and combined dc voltage at these circuits is proportional to the r-f signal strength for all but very-strong input signals. Therefore, the filtered dc output voltage is used to drive TUNER INPUT meter M802. RT201 calibrates the TUNER INPUT meter.

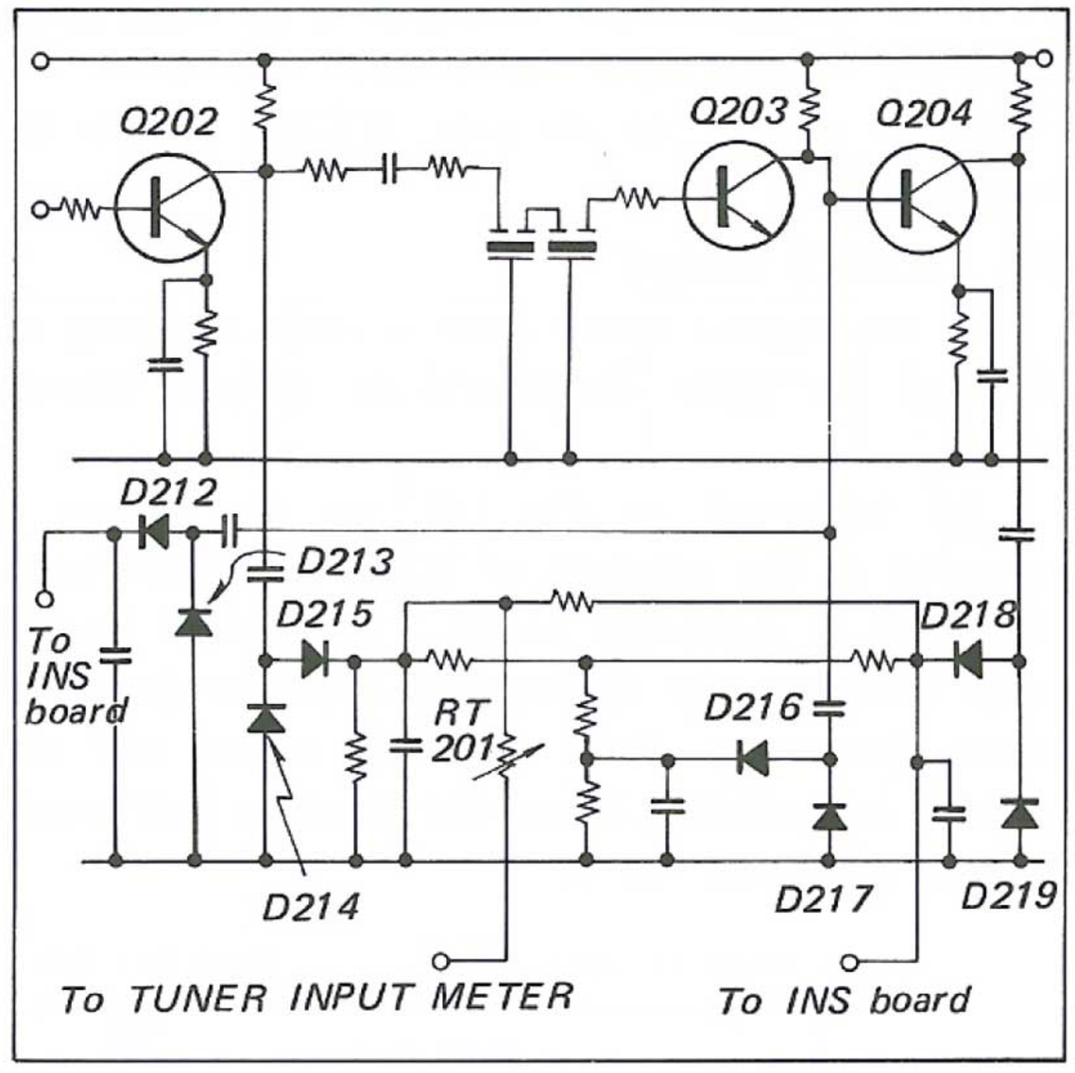


Fig. 1-3. I-f signal detectors

(Muting Circuit)

Referring to Fig. 1-4, it operates as follows:

The i-f signal is extracted from the output circuit of Q204 fed to Q208 through C225. Q208 amplifies the extracted i-f signal large enough to drive voltage doubler D209 and D210 through tuned transformer T202.

Note that D211 simply provides positive fixed bias to Q209 through D209 and D210.

T202 determines the bandwidth (about 150 kHz) necessary to control the muing circuit without generating interstation noise. The output of the voltage doubler is a positive dc voltage proportional to the carrier level of weak rf signals.

Q209 and Q210 form a switching circuit and drive switching transistor Q207 through MUTING switch S4.

Q209 is normally cutoff, thus forcing Q210 into conduction. The collector of Q210 is connected to the gate of FET Q207 through MUTING switch S4. FET Q207 acts as an electronic switch which is inserted between the ratio detector and MPX decoder, and is controlled by the applied gate voltage.

With the MUTING switch ON, fm signals of average strength keep Q209 saturated, thus cutting off Q210. This causes Q207 to conduct and maintain normal operation.

Weak stations and interstation noise cannot produce sufficient dc voltage at the base of Q209 to keep it conducting. As a result, Q209 is cutoff. This saturates Q210 and cuts off Q207. Accordingly, the audio output is muted. With the MUTING switch OFF, Q207 is kept conducting regardless of the input signal since a positive bias voltage is applied to its gate. RT202 adjusts the muting level.

(Fm TUNING Meter)

A center-zero meter assures correct tuning by utilizing the ratio detector's dc output characteristic.

As indicated in Fig. 1-2, no dc voltage is produced at the junction of R242 and R244 when the tuner is correctly tuned. Deflection on the meter indicates the amount of deviation from the carrier frequency. Note that the meter will also indicate zero-reading when the tuner is not receiving any off-the-air signal.

INS (Impulse Noise Suppressor) Section

(Introduction)

Impulse noises are usually generated by means of high-voltage sparks (automobile ignition), lightening, fluorescent lamps, neon-signs, etc., having a wide range of frequency components from medium frequency up to UHF.

As a result, impulse noises having fm band components effect fm signals and are detected as pulses at the output of the tuner.

Although small impulse noise (referred to the input signal level) can be eliminated by a conventional limiter circuit, larger impulse noises cannot be thus eliminated. This is because large impulse noises affect the fm signal's amplitude and phase. Though amplitude changes are eliminated by the limiter stages, phase shift due to impulse noises cannot be eliminated, and therefore it causes audible noise at detector's output.

To solve this problem the INS circuit was developed. Fig. 1-5 shows how the INS circuit removes impulse noises of 1 μsec to 10 μsec duration. Though some aberration results in the signal treated by the INS circuit, this cannot be noticed by the listener.

(Operation)

Referring to Fig. 1-6 (block diagram), it operates as follows:

Impulse noise components in the input signal are detected at both the fm i-f section and ratio detector, and then applied to the noise selector circuit. The

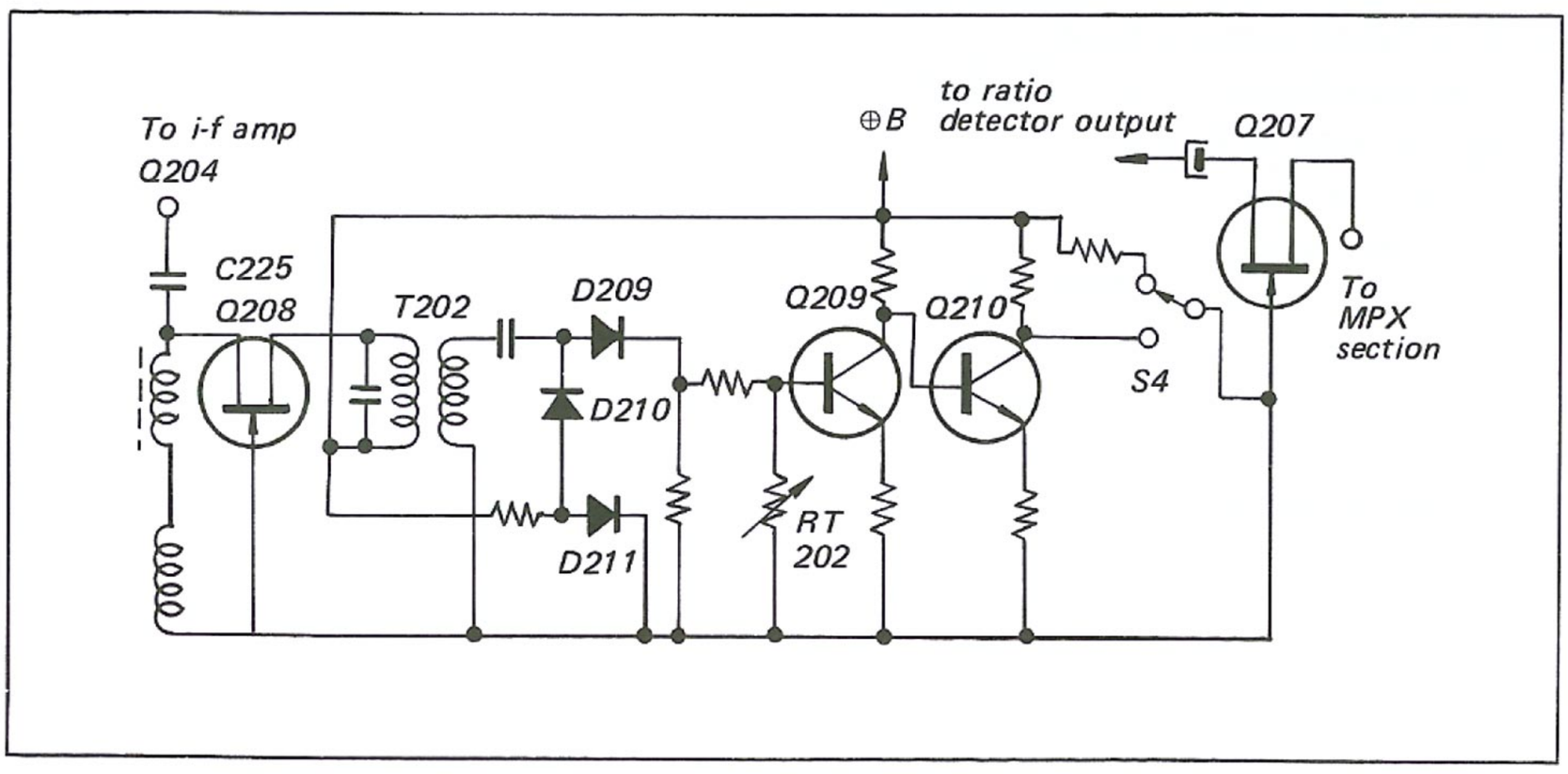


Fig. 1-4. Simplified muting circuit

noise selector circuit selects the impulse noise component in a manner dependent on the input signal level. A-m component detection is useful at low signal levels (35 dB or less), while f-m component detection is useful at strong signal levels.

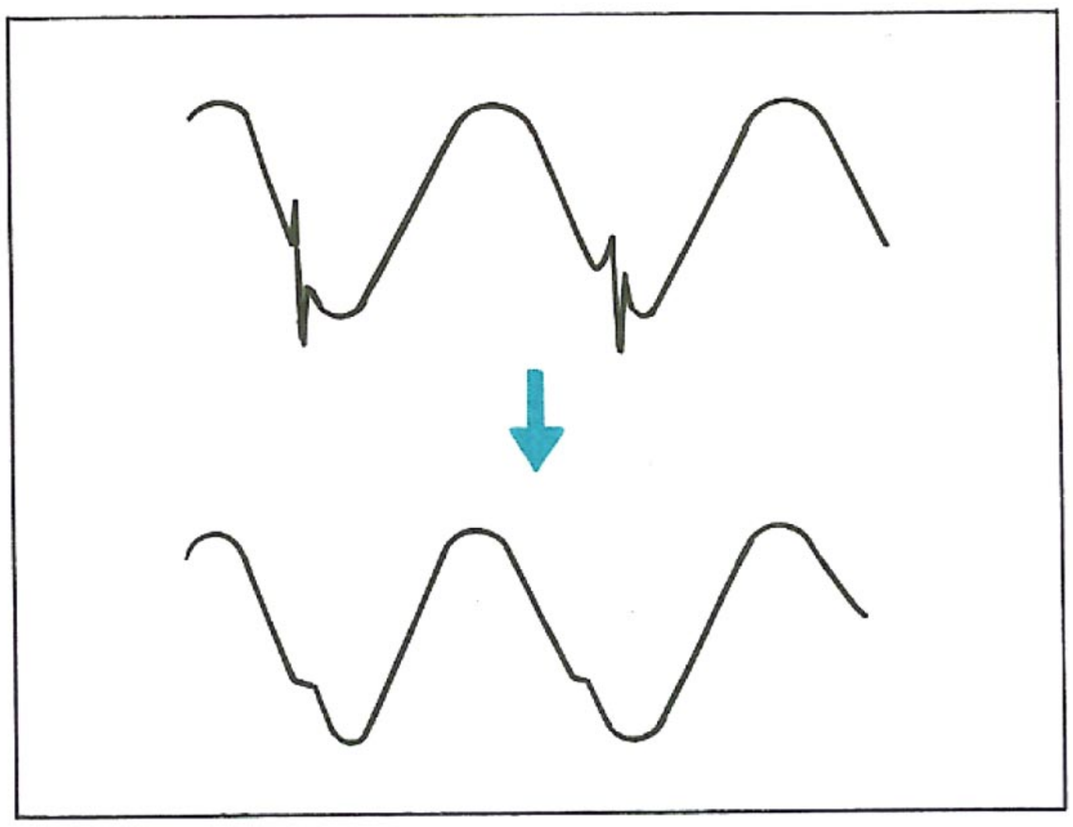


Fig. 1-5. Example of INS operation

The selected impulse noise is fed to the high-pass filter, and only the impulse noise is extracted and amplified at the noise amplifier.

The amplified impulse noise drives the monostable multivibrator, generating one pulse (50 μsec) for one input drive signal.

The output pulse is fed to the schmitt trigger circuit through an integrator. The schmitt trigger circuit generates both negative and positive pulses which are used to eliminate the impulse noise appearing at the MPX decoder output. The FET gate circuit at the MPX decoder output is controlled by the negative schmitt trigger pulse. The positive schmitt trigger pulse is fed to the 19 kHz amp gate circuit to reduce impulse noise effect on the 19 kHz signal.

Notice that a delay line is employed in the audio signal path, compensating for the time delay of the gate pulse due to INS processing. A 16 kHz low-pass filter smooths the edge of the gated signal.

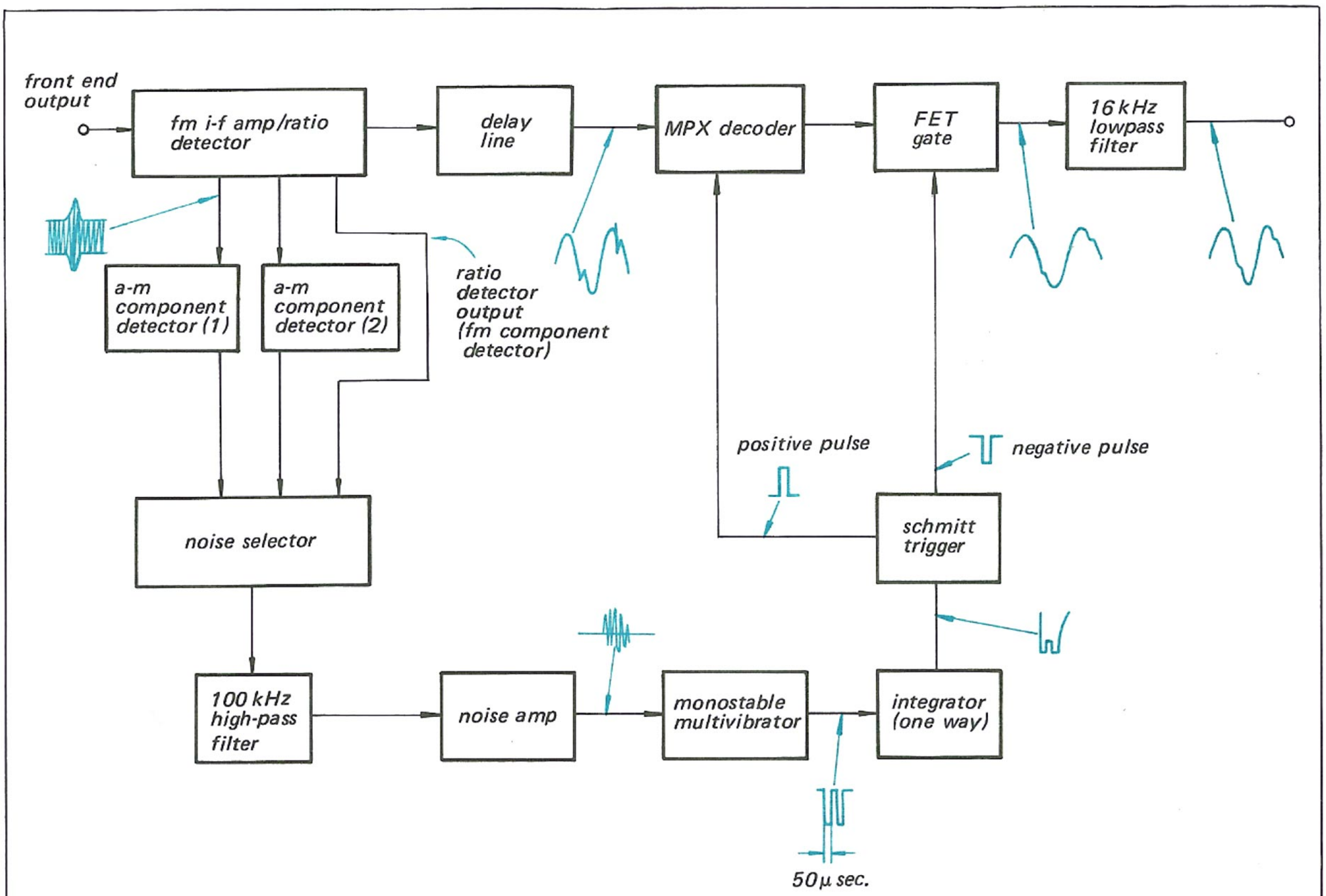


Fig. 1-6. Block diagram of INS circuit

(Noise Selector Circuit)

Q501-Q505 select the impulse noises to be amplified and used to make gate pulses in the following stages.

Two kinds of noise detectors, one for a-m components and the other for fm components, are employed. The a-m component detector (D212, D213) detects the amplitude changes in the i-f amplifier signal due to impulse noises. The fm component detector (ratio detector) detects the phase changes in the i-f amplifier signal due to impulse noises.

Notice that the a-m component detector connot detect the noise when the input signal level is higher than the value where the limiter operation removes all the amplitude components in the fm i-f signals, while the fm component detector detects all except weak noise signals.

Q502 and Q503 form a schmitt trigger driven by Q501. The input signal levels are detected by voltage doublers (D214, D215, and D216, D217, and D218 and D219) in the fm i-f section, and applied to the base circuit of Q501, thus determining the triggering level of the schmitt trigger.

Q504 and Q505 act as gate circuit controlled by the schmitt trigger (Q503), selecting the noise components to be amplified at following stages.

Q504 gates a-m component noise, while Q505 gates fm component noise.

Note that Q504 is a PNP type transistor and Q505 is an NPN type transistor. This means that when Q504 is ON, Q505 is OFF and vice versa, since the output of the schmitt trigger is applied to their base circuit.

The operation of the schmitt trigger and gate circuits is as follows:

Input signal level	Q503	Q504	Q505
High	ON	OFF	ON
Low	OFF	ON	OFF

(Buffer amp and Noise filter)

Q506 acts as a buffer amplifier for the noise selector circuit. Q506's gain compensates for the insertion loss of the following sharp-cutoff high-pass filter which separates noise components from the selected noise signals. (100 kHz or more)

Fig. 1-7 shows the characteristics of this high-pass filter.

(Noise Amp)

Q507, Q508 and Q509 form a noise amplifier.

Q507 and Q508 are basically RC coupled amplifiers and Q509 is an emitter follower.

This amplifies the input noise signals to the level required for triggering the following mono-stable multivibrator.

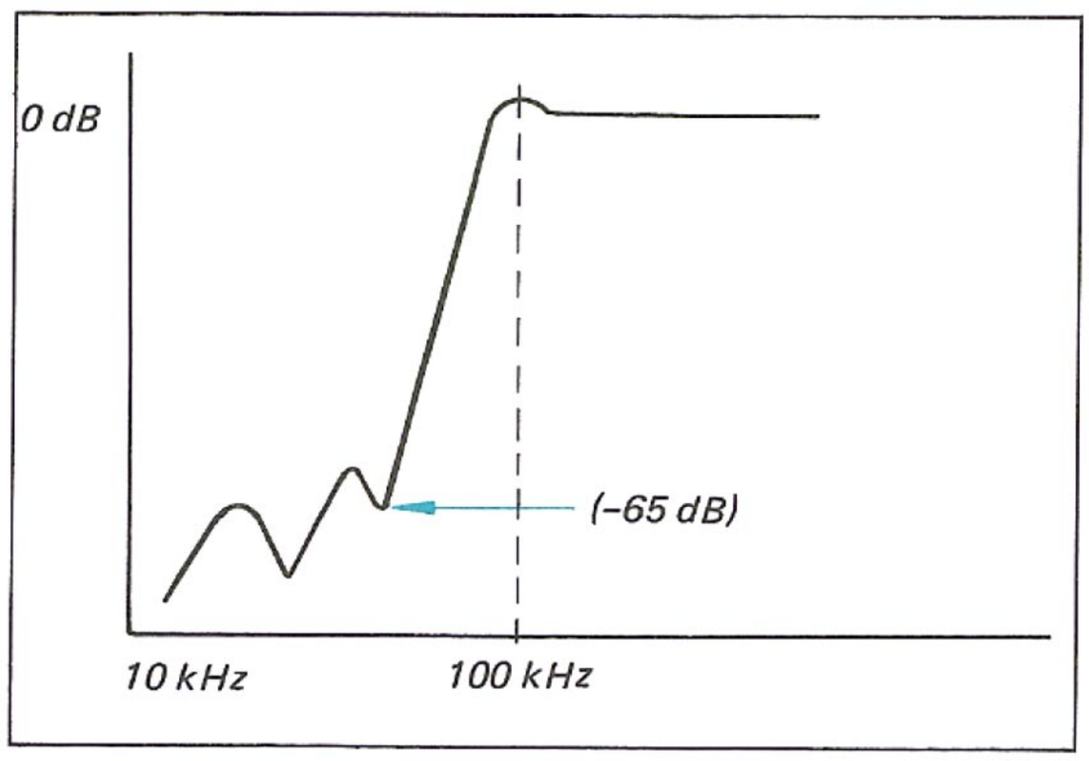


Fig. 1-7. Characteristic of 100 kHz high-pass filter

(Monostable multivibrator)

Q510 and Q511 generate negative pulses only when a trigger pulse is applied to the collector circuit of Q510 through diode D502. D502 supplies only negative going pulse to the Q510. The approximately 50 μs pulse width is determined by the RC time constant of R537 and C519.

(Schmitt Trigger Circuit)

Q512 and Q513 form a schmitt trigger circuit generating gate pulses to control the FET gate at the MPX decoder in accordance with the trigger pulses generated by the monostable multivibrator circuit.

Q512 is normally ON and Q513 is normally OFF. The input trigger pulse reverses this ON/OFF condition during its pulse duration. To ensure operation for impulse noise having a rather long pulse width (such as noises generated by a dc motor or generator commutator) integration circuit (R541 and C521) is employed. Therefore, various kinds of gate pulses meeting with the input noise pulses are generated at schmitt trigger circuit as shown in Fig. 1-8.

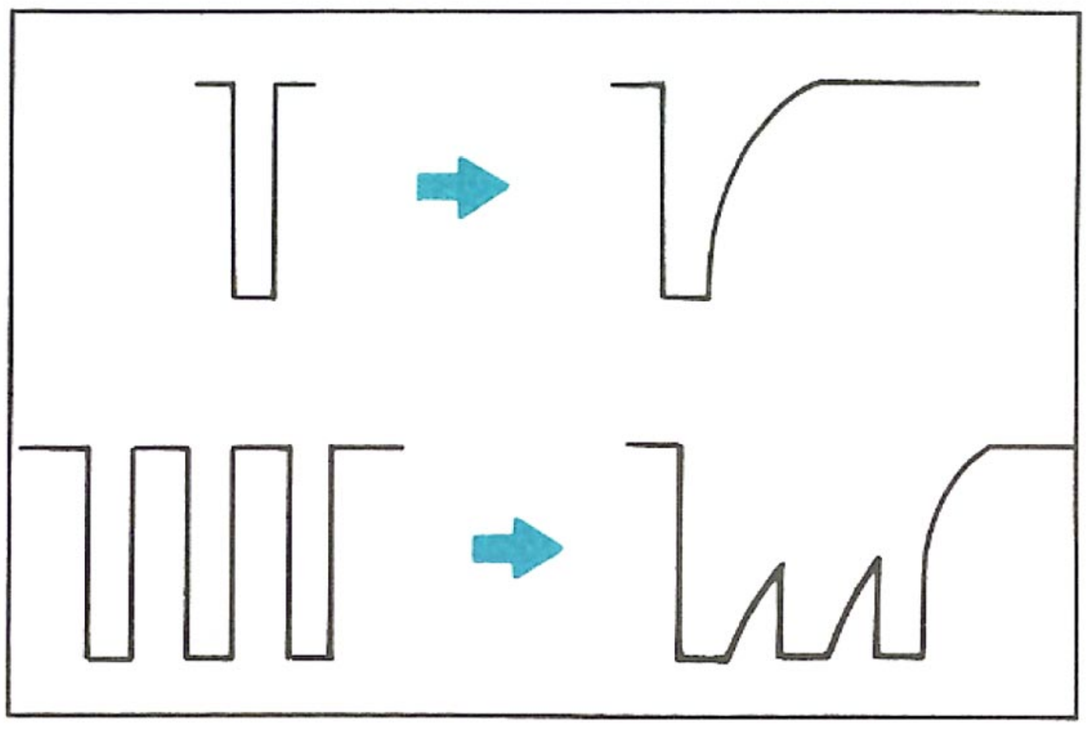


Fig. 1-8. Effect of integrator circuit

Notice that two gate pulses are generated by the schmitt trigger circuit. One is a positive pulse at D504, the other is a negative pulse at series diode D505/D506. The positive pulse is used to control the gate transistor Q402 at the source circuit of Q401 (19 kHz amplifier). The negative pulse is used to control the FET gate as previously described.

(Gate Circuit)

Q405 (Q406) is an FET gate which is controlled by the negative-going pulse generated by the schmitt trigger. The gate circuit removes impulse noise from the audio signal as shown in Fig. 1-9. Normally, positive bias voltage is applied to the gate circuit of Q405 (Q406), keeping it in conduction so it has no effect on audio signals. When impulse noise appears, a gate pulse whose width is the same as the impulse noise is applied to the gate circuit of Q405 (Q406), cutting off the impulse noise.

Note that C415 (C416) acts as a memory capacitor which maintaining the dc conditions prevailing before gate pulse was applied, as shown in Fig. 1-9.

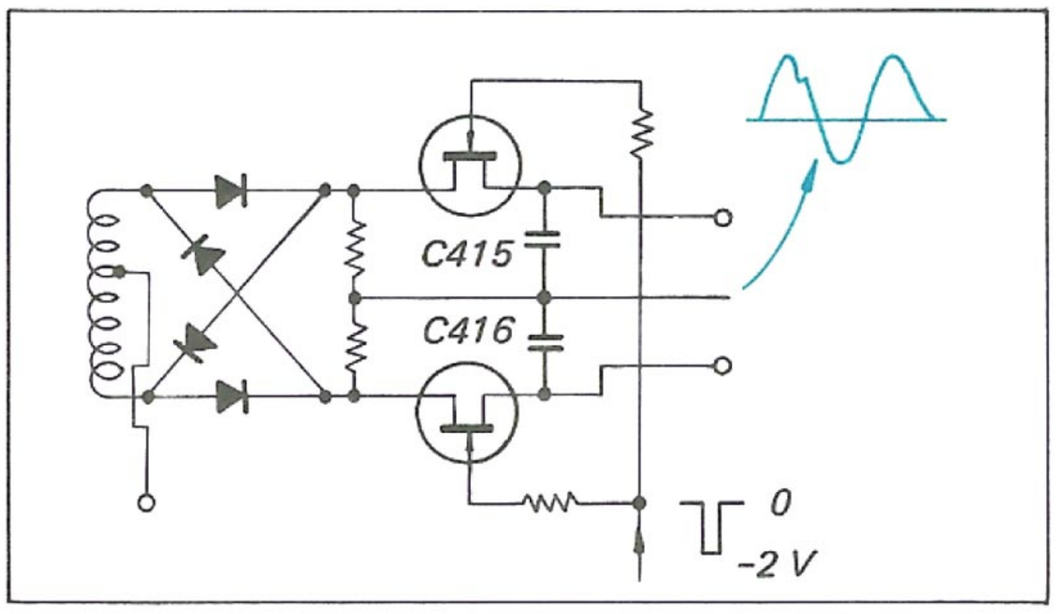


Fig. 1-9. FET gate circuit

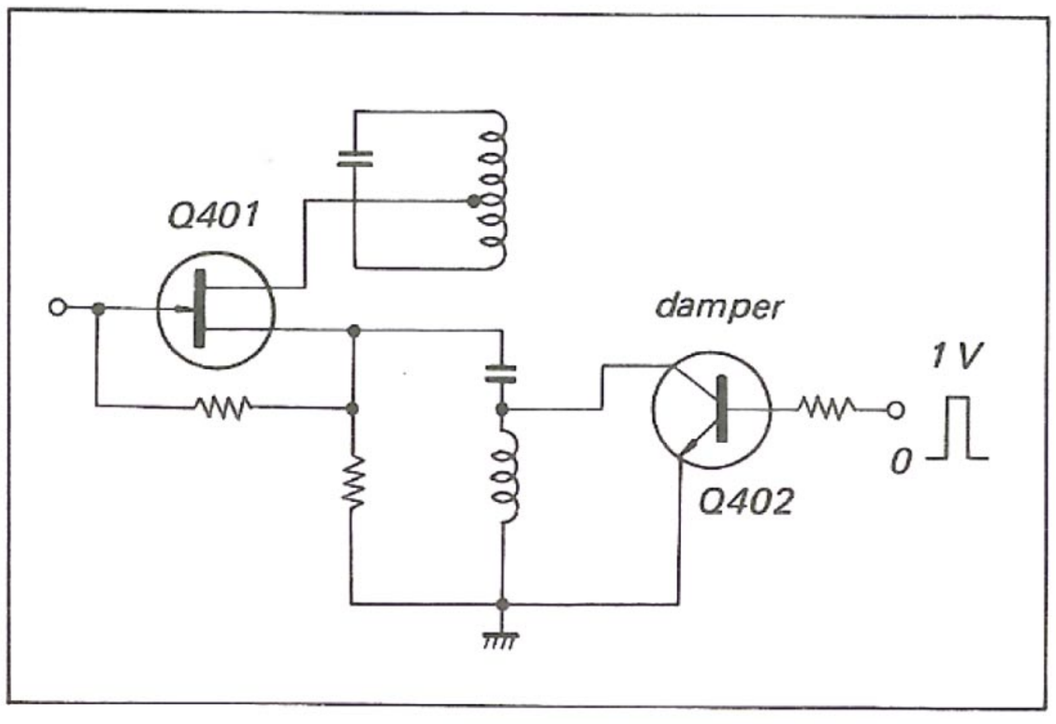


Fig. 1-10. 19 kHz damper circuit

Q402 shorts the source circuit of Q401 (19 kHz amp) during the duration of the positive gate pulse applied to the base circuit by the schmitt trigger circuit, reducing the 19 kHz amp gain. (See Fig. 1-10) This prevents ringing of the 19 kHz amp due to impulse noise, and interference caused by this ringing.

(Delay Line)

Though the audio signal and INS signals take different routes, they must arrive coincident in time at the FET gate of the MPX decoder. Since the INS circuit causes a time delay, the audio signal must be delayed by means of the delay line.

MPX Decoder Section

STEREO Lamp circuit

The STEREO lamp lights when an fm-stereo signal is received. The emitter of Q403 is connected to the base of Q404, which is normally cut-off.

When a composite stereo signal is applied to the multiplex decoder, the 38-kHz pulses produced at the output of the frequency doubler yield a higher average current flow through Q403. This forces Q404 into conduction, lighting the STEREO lamp.

(Multiplex Demodulator)

T401 (switching transformer) and four diodes form a balanced bridge arrangement. This system has the advantage of cancelling residual rf components (38-kHz signal, some 19-kHz signal, and higher-order harmonics of these frequencies). Notice that the 38-kHz switching signal is transformer-coupled to the diode bridge to supply sampling drive for the demodulator, while a composite stereo signal is applied to the center tap of the secondary winding of T401. "L" and "R" components are developed at each side of the bridge as the result of demodulation, see Fig. 1-11.

In the monaural mode, diodes D405 and D406 are forward biased by supply voltage through R415, STEREO lamp, R414, R413 and R420 so these diodes merely act as small resistances. Under this condition, the monaural signal is applied to both "L" and "R" audio amplifiers.

Multipath Output

Multipath reception will be displayed on the CRT connecting the conventional oscilloscope or multipath indicator to these outputs. Multipath reception causes the increase in back-ground noise level, distortion at high frequency, or stereo separation reduction. The a-m component of the

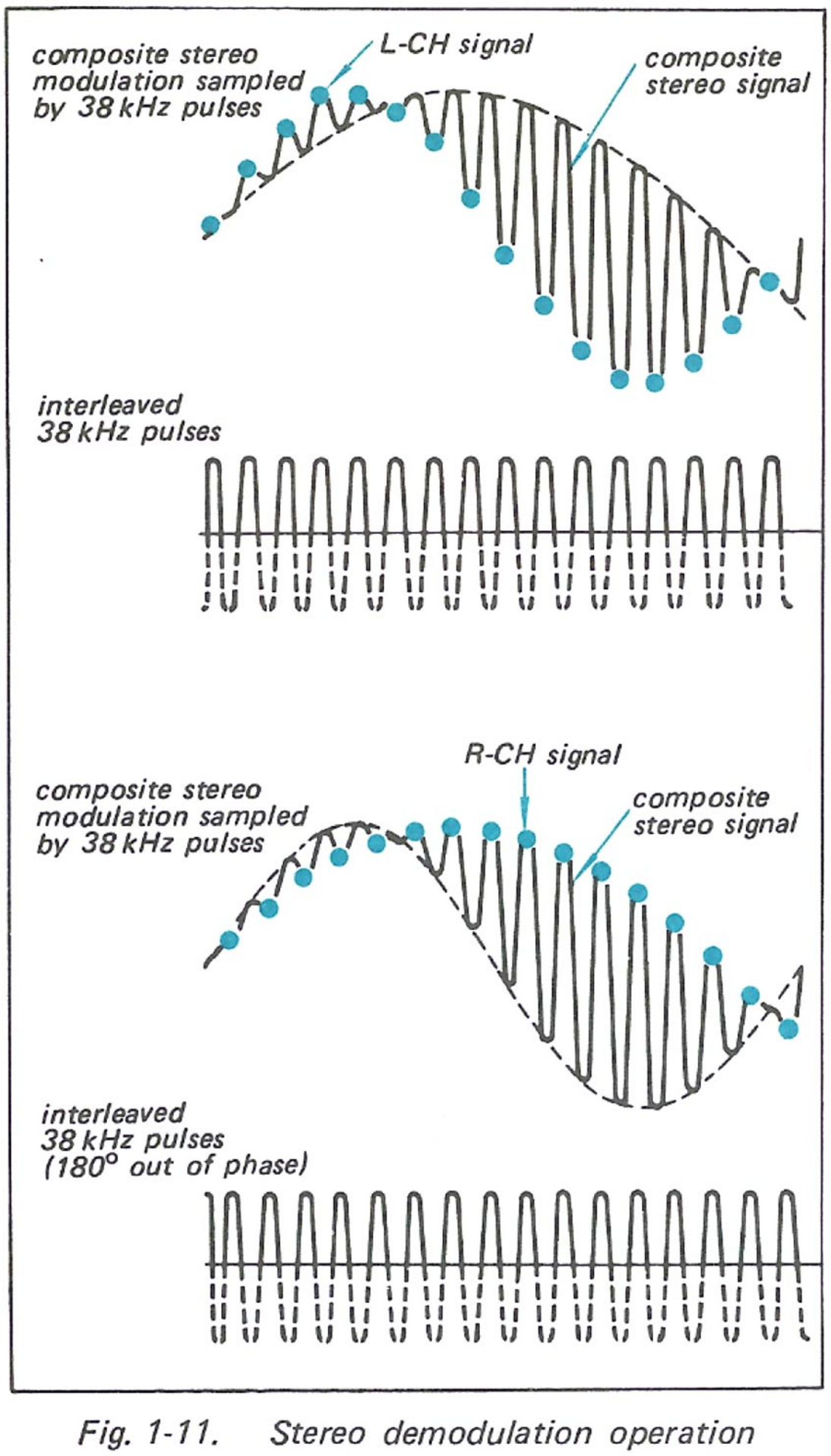


Fig. 1-11. Stereo demodulation operation

fm i-f signal detected by voltage doublers is extracted, and then applied to the VERTICAL terminal, while the audio signal is extracted from the ratio detector output, and fed to the HORIZONTAL terminal. Fig. 1-12 shows typical CRT displays.

Multipath reception will be corrected by using a directional fm antenna or coaxial cable. Rotating the antenna is very effective.

A-M Tuner Section

(A-m I-f Strip)

The CFT (combination IFT with ceramic filter) and low Q IFT are employed to obtain sharp selectivity (35 dB at 455 kHz ± 10 kHz) causing superior spurious response.

Note that no adjustment is required for the CFT and IFT in the field even if they are replaced.

(AGC circuit)

There are two feedback loops ensuring proper agc operation. Referring to Fig. 1-13, it works as follows:

The a-m i-f signal is extracted from the collector circuit of Q304 through C314 and rectified by diode D301. The output of diode D301 is a positive dc voltage roughly proportional (not exactly due to agc action) to the carrier levels of the input signal. This is fed to the base circuit of Q304 through a filter circuit controlling the bias current of Q304 and thereby its emitter voltage. The emitter voltage of Q304 is fed back to the base circuit of Q302 through a filter

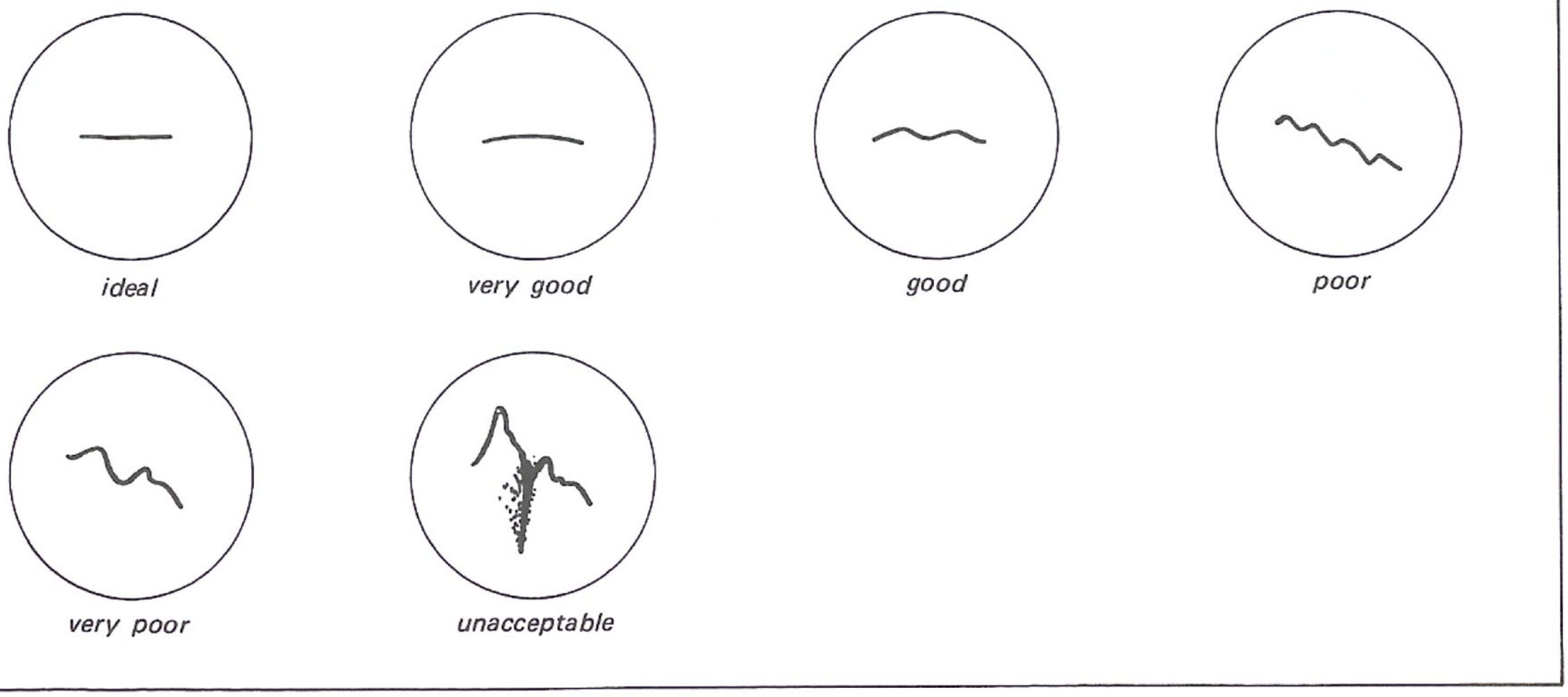


Fig. 1-12. Typical multipath display

circuit. As the Q302 is in series with the emitter resistor of mixer Q301, it controls the emitter current of Q301. The emitter current vs. hfe characteristic of Q301 is such that current gain (hfe) decreases due to current flow increase.

Thus a strong signal increases the current flow at the mixer stage, thereby decreasing the overall gain and vice versa.

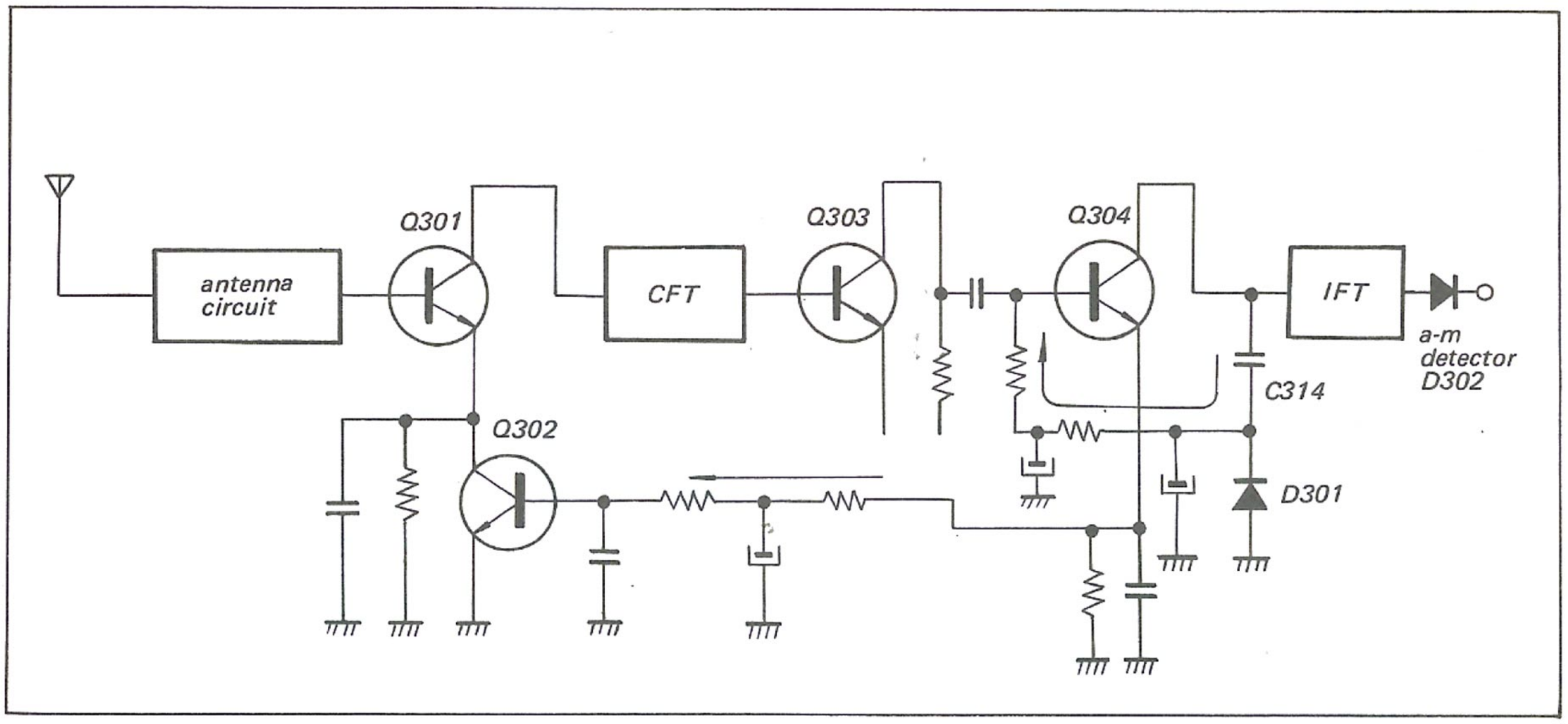
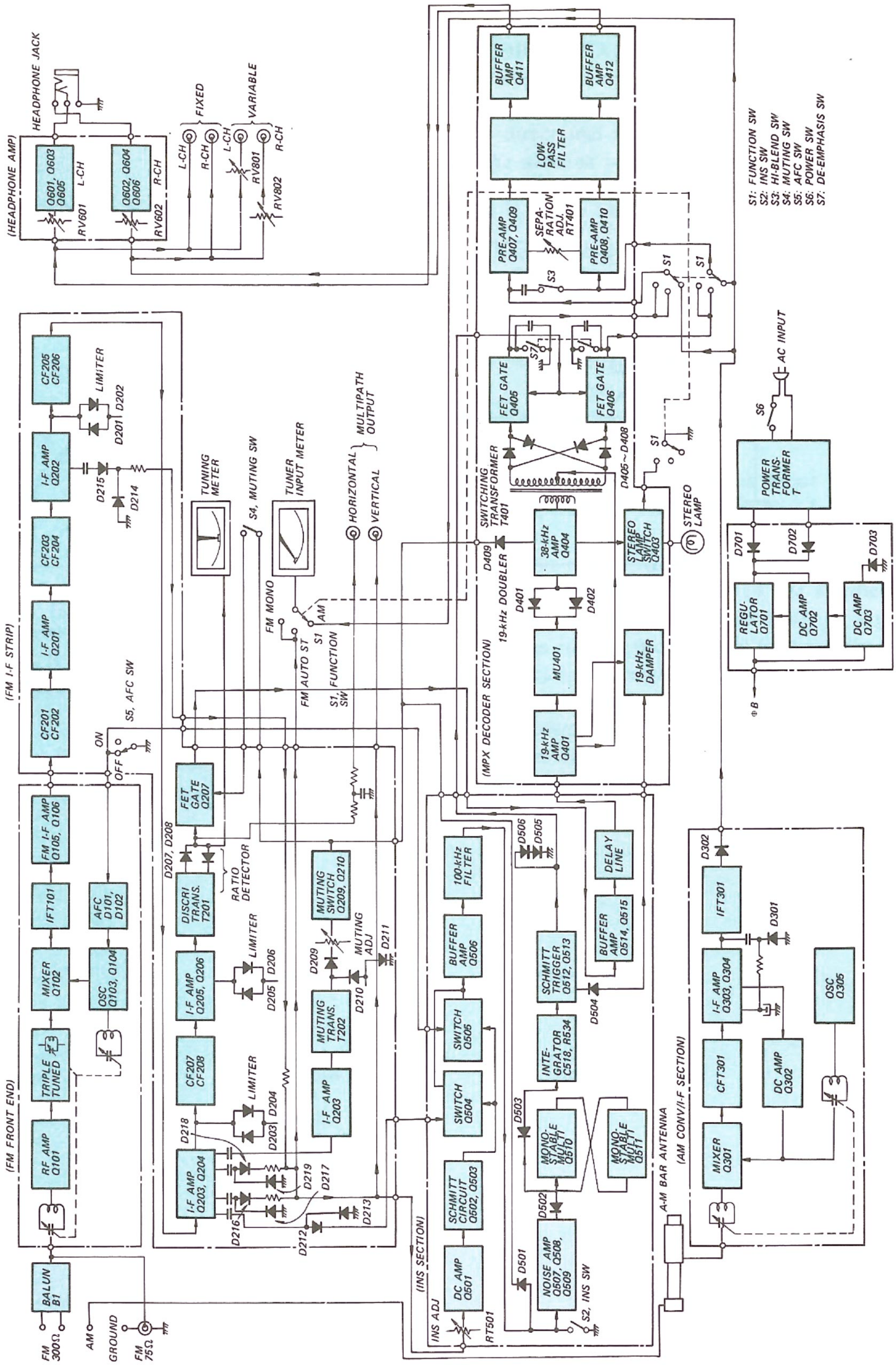


Fig. 1-13. Simplified AGC circuit

1-4. BLOCK DIAGRAM



SECTION 2
DISASSEMBLY

WARNING

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

2-1. TOOLS REQUIRED

The following tools are required to perform disassembly and replacement procedures on the ST-5130.

1. Screwdriver, Phillips-head
2. Screwdriver, 1/8″ blade (3 mm)
3. Pliers, long-nose
4. Diagonal cutters
5. Wrench, adjustable
6. Tweezers
7. Electric drill
8. Drill bits
9. Prick punch
10. Hammer, ball-peen
11. Soldering iron, 40 ~ 150 watts
12. Solder, rosin core
13. Cement solvent
14. Cement, contact

2-2 HARDWARE IDENTIFICATION GUIDE

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

Note: All screws in the ST-5130 are manufactured to the specifications of the International Organization for Standardization (ISO). This means that the new and old screws are not interchangeable because ISO screws have a different number of threads per mm compared to the old ones. The ISO screws have an identification mark on their heads as shown in Fig. 2-1.

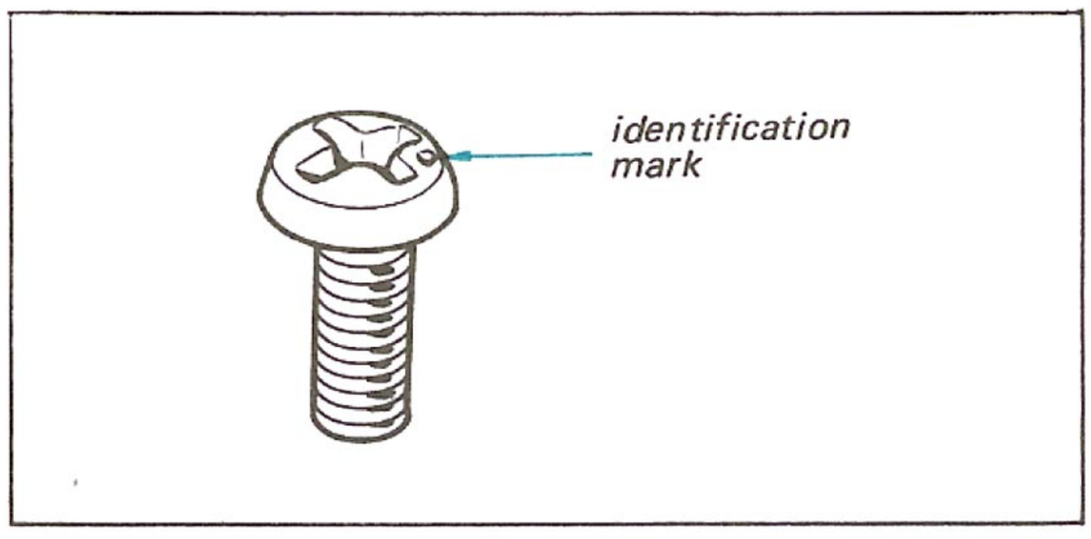
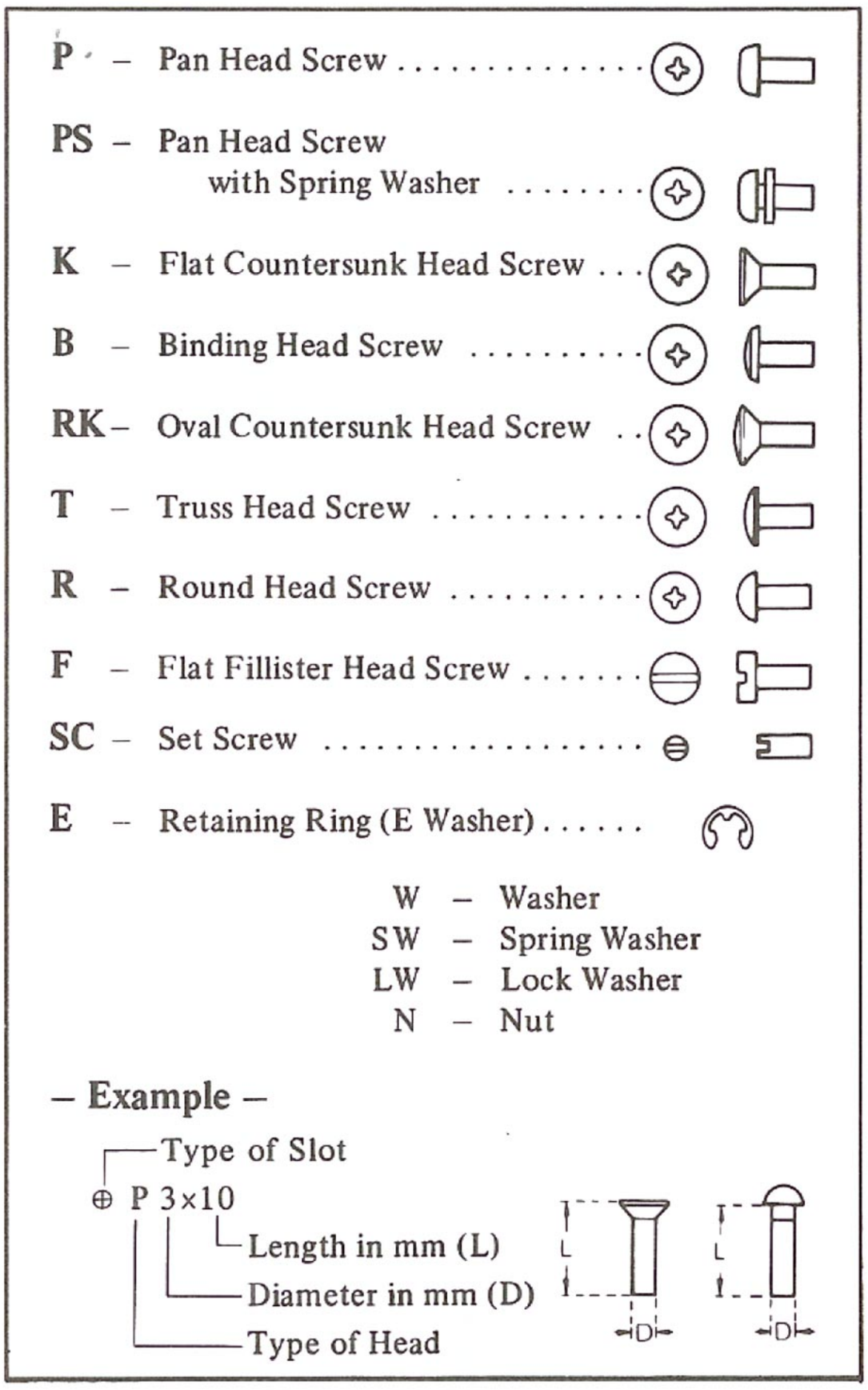


Fig. 2-1. ISO screw

– Hardware Nomenclature –



2-3 TOP COVER AND BOTTOM PLATE REMOVAL

1. Top cover can be freed by removing two machine screws at both sides.
2. Bottom plate can be freed by removing the five self-tapping screws as shown in Fig. 2-2.

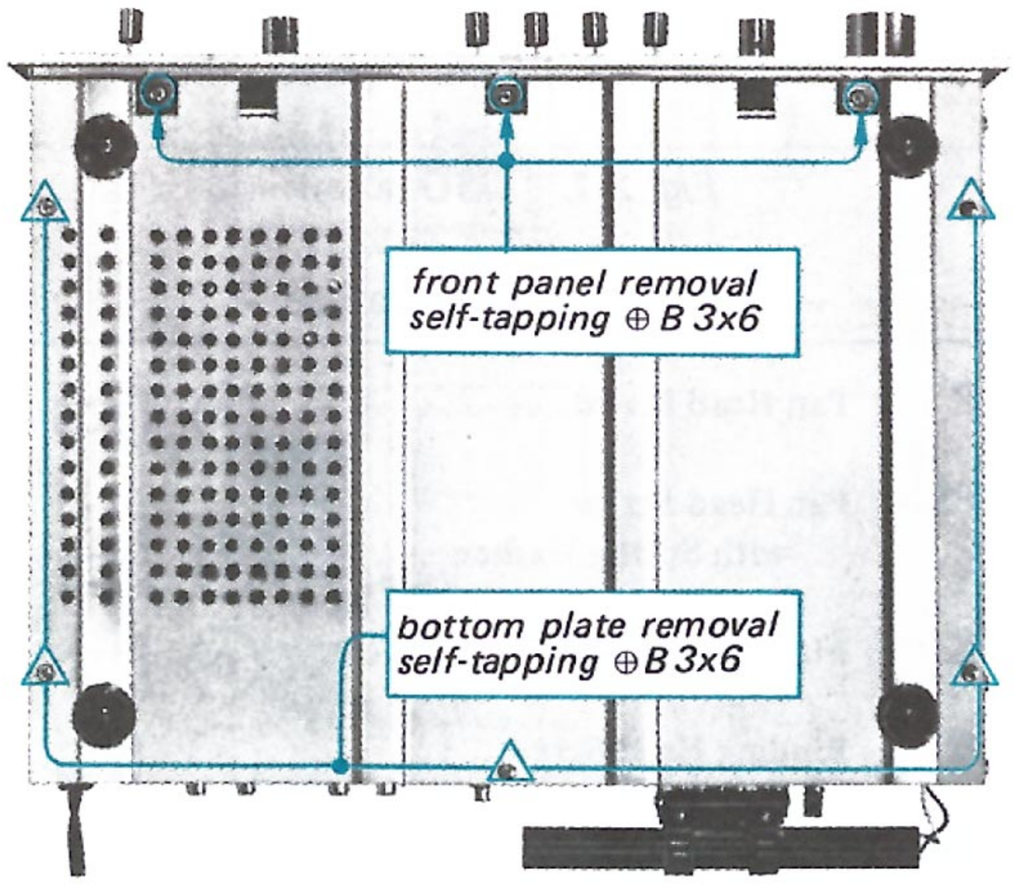


Fig. 2-2. Bottom view

2-4. FRONT PANEL REMOVAL

1. Remove all the control knobs by pulling them off.
2. Remove the three self-tapping screws at the front bottom of the chassis as shown in Fig. 2-2.
3. Remove the three screws securing the front panel to the front subchassis from the back as shown in Fig. 2-3. This frees the front panel.

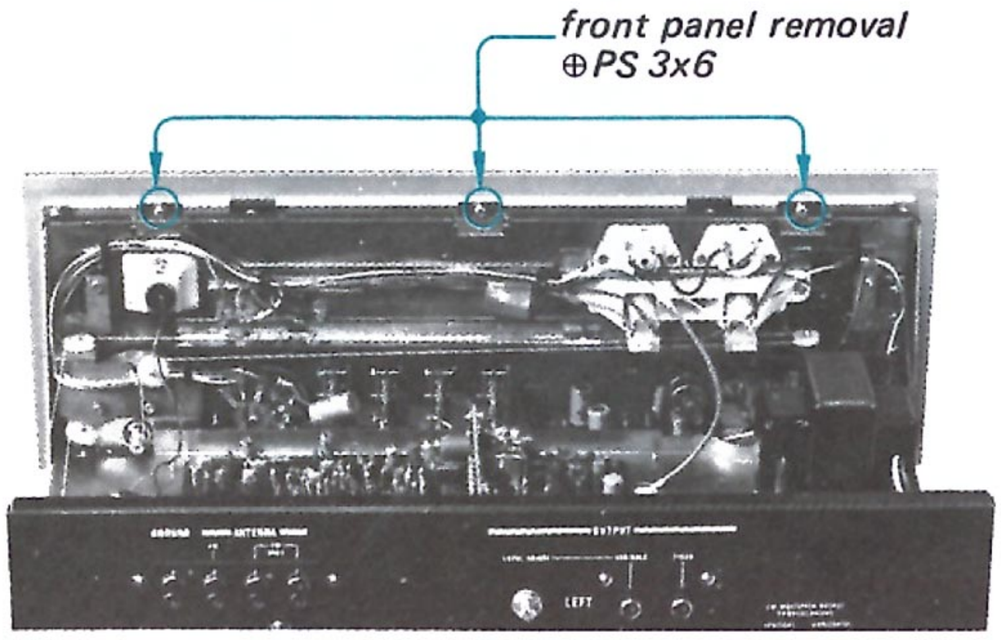


Fig. 2-3. Front panel removal

2-5. DIAL CORD RESTRINGING

Preparation

1. Cut a 1,700 mm (70 inch) length of 0.3 mm (1/64 inch) diameter dial cord.
2. Tie one end of the cord to the coil spring as shown in Fig. 2-4.
3. Rotate the tuning-capacitor drive drum fully clockwise (minimum capacitance position).

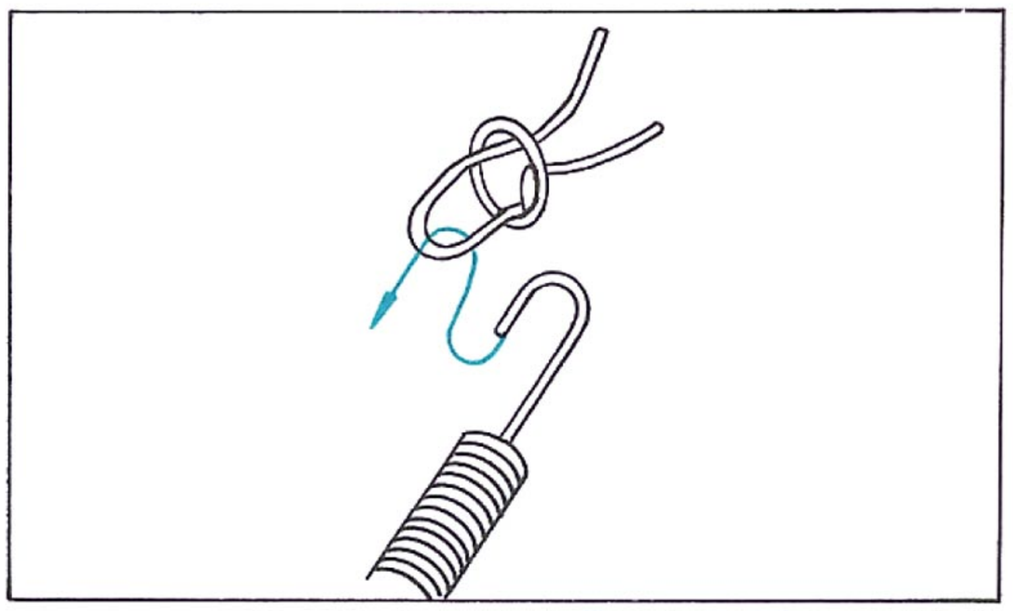


Fig. 2-4. Tying square knot to the coil spring

Procedure

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

1. Hook the spring to one hole of the drum as shown in Fig. 2-6.
2. Run the cord through the slot in the rim of the drum and wrap clockwise turn as shown in Fig. 2-7.
3. Run the cord over pulley "A", and then wrap two counterclockwise turns around the tuning shaft.
4. Run the cord over pulleys "B", "C" and "D", then wrap two clockwise turn around the drum from outer groove to inner groove as shown in Fig. 2-7.
5. Pass the doubled end of the cord through the eyelet, then hook it to the spring as shown in Fig. 2-8.
6. Tighten the cord, then squeeze the eyelet so that the spring is under tension. Make a knot in the cord end to keep it from slipping out of the eyelet. See Fig. 2-9.

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

8. Put the dial pointer on the cord as shown in Fig. 2-10, and then tune the set to the local fm station. Move the dial pointer to the position where the pointer indicates the local station's carrier frequency. Apply a drop of contact cement to it.

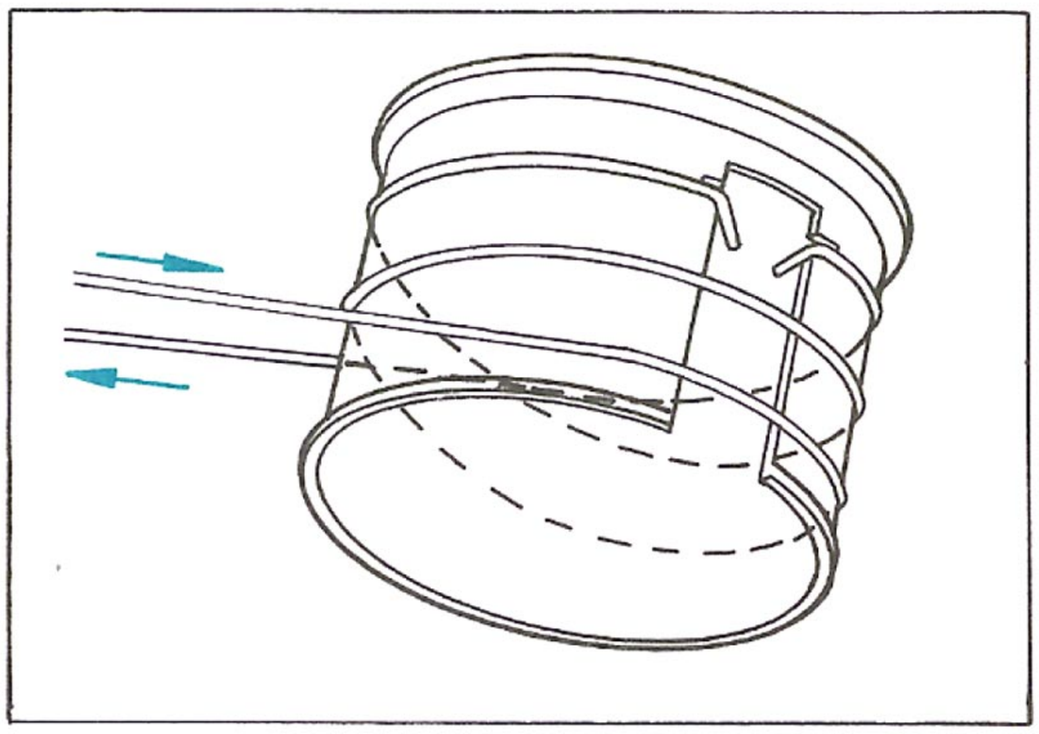


Fig. 2-7. Wrapping the dial cord

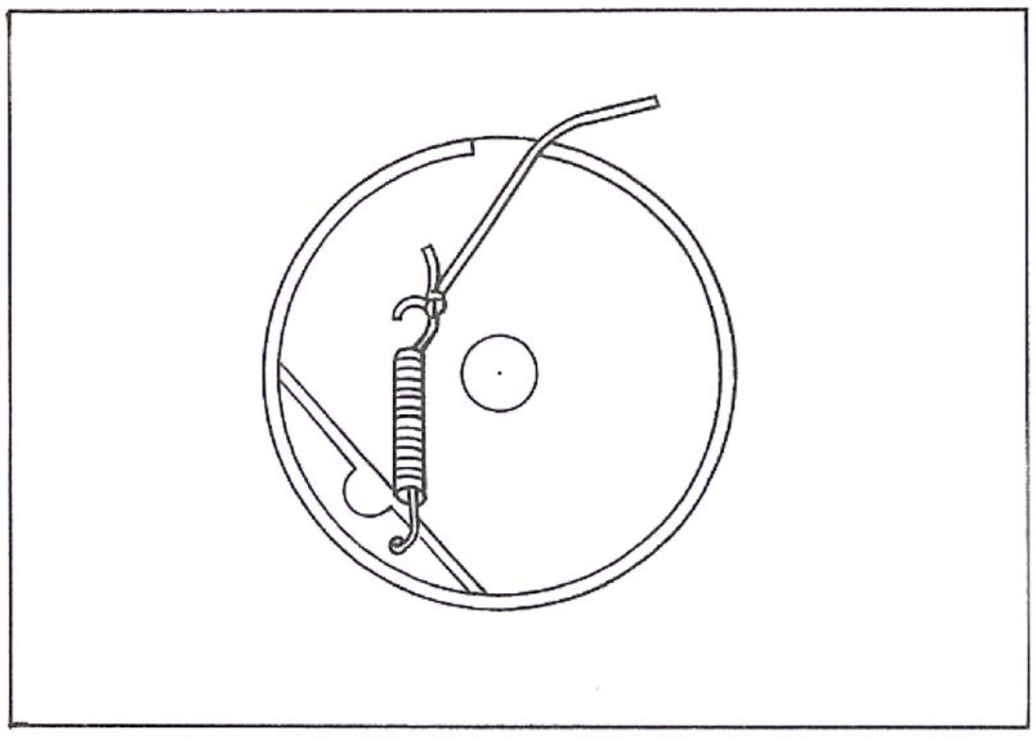


Fig. 2-6. Coil spring installation

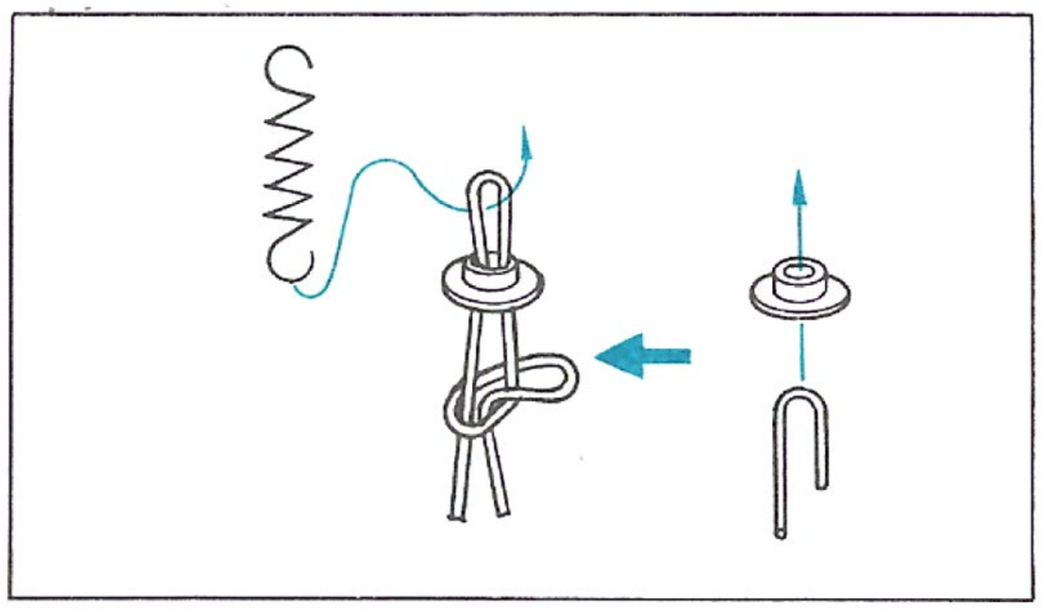


Fig. 2-8. Finishing dial cord stringing

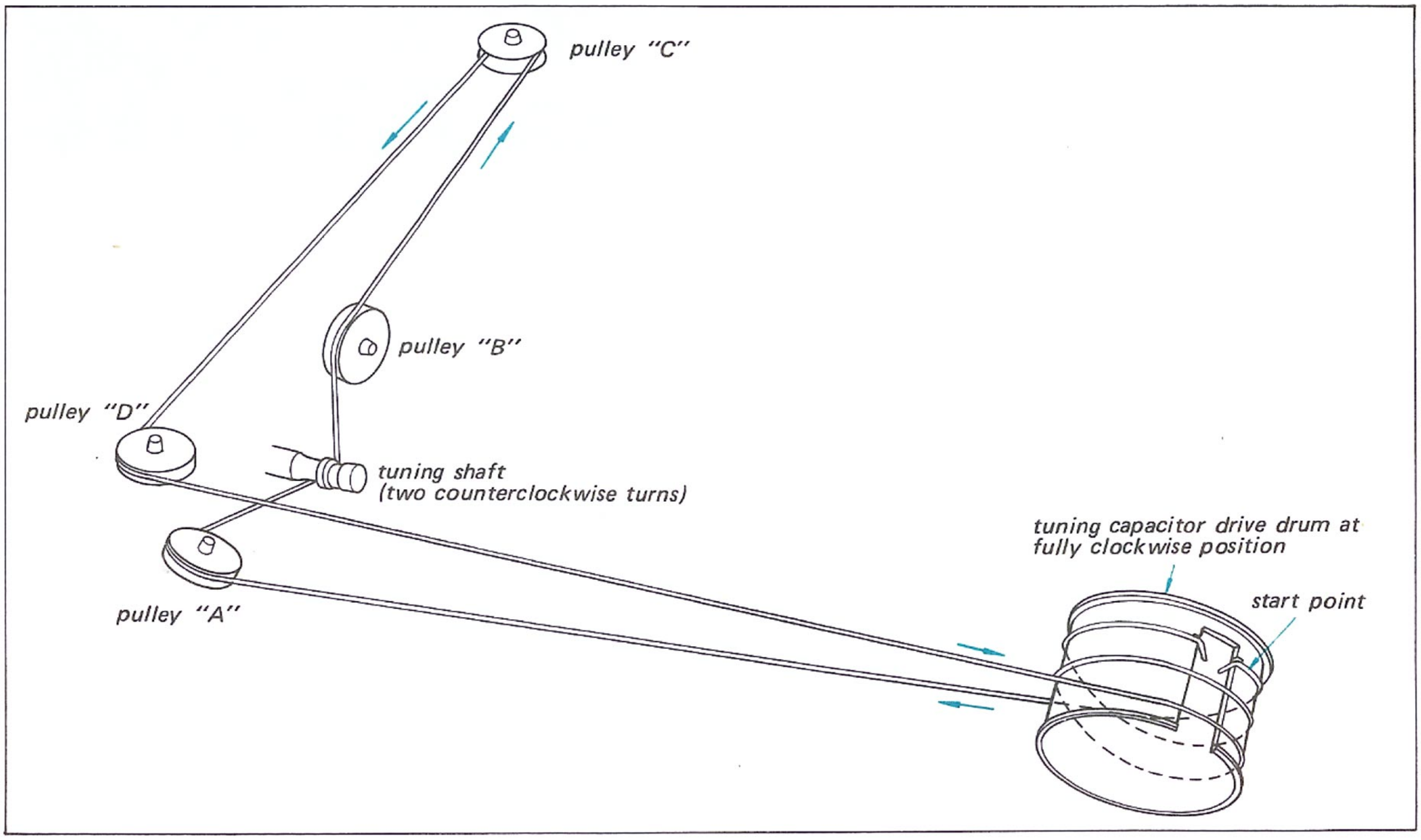


Fig. 2-5. Dial cord stringing

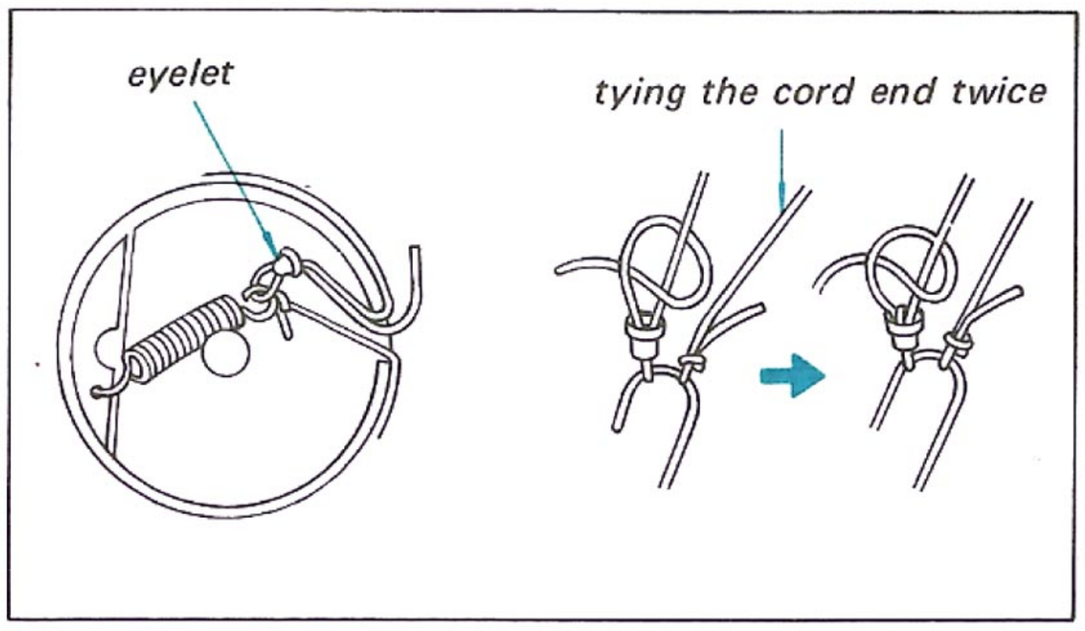


Fig. 2-9. Detail of the cord end

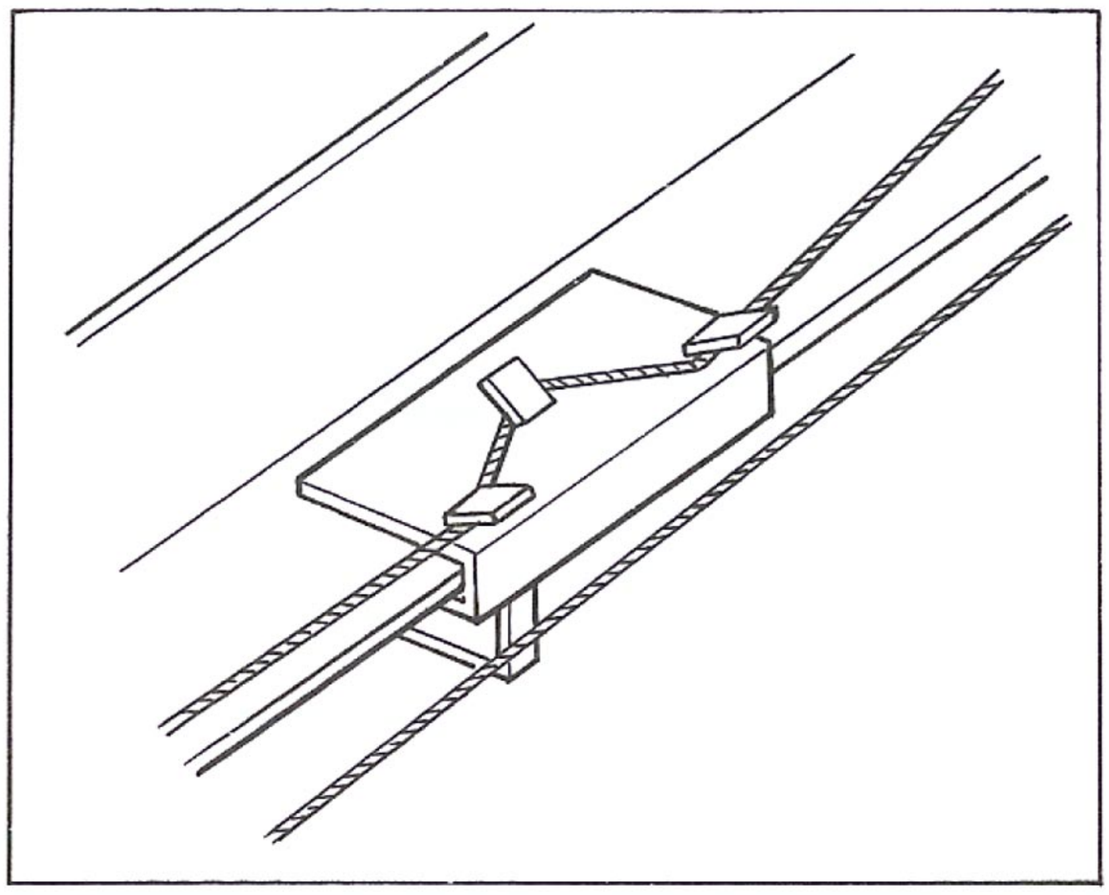


Fig. 2-10. Dial pointer installation

2-6. PILOT LAMP REPLACEMENT

Prepare for replacing any of the pilot lamps by removing the top cover as described in Procedure 2-3.

Stereo Lamp

1. Pull the lamp from its rubber holder.
2. Unsolder the defective lamp leads from the connecting terminals as shown in Fig. 2-11, and then install a new one.

Meter Lamp

1. Remove the meter-lamp sockets by pulling them off, and then install the replacement lamp.

Dial Lamp

1. Remove the front panel as described in Procedure 2-4.
2. Pry out the defective dial lamp as you would do a cartridge fuse.
3. Install the replacement dial lamp.

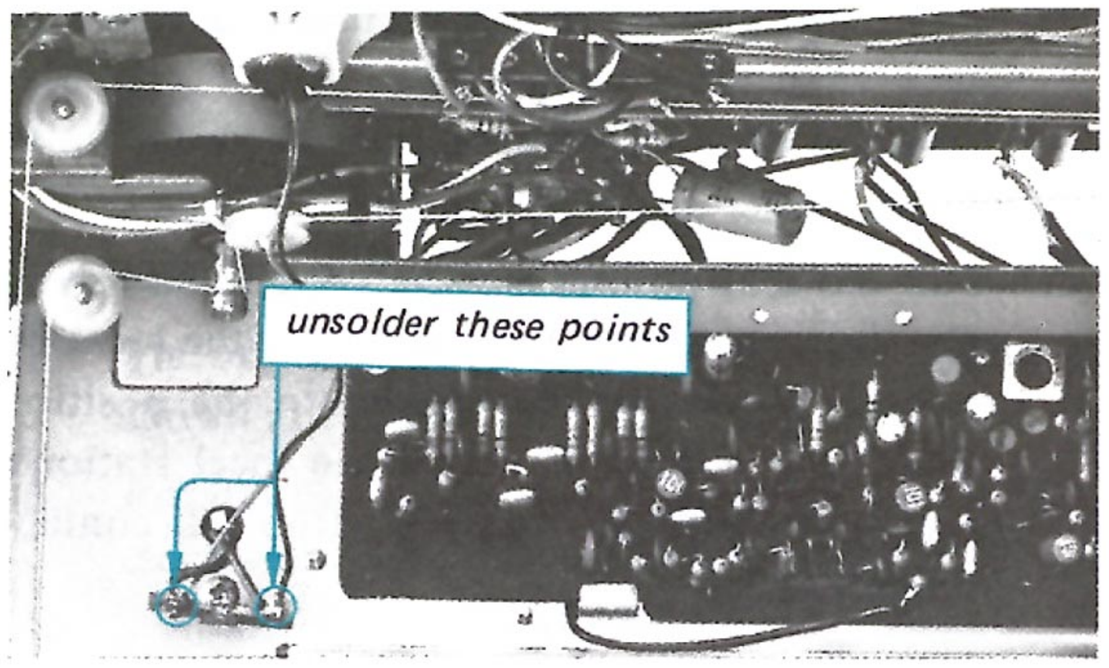


Fig. 2-11. Stereo lamp replacement

2-7. METER REPLACEMENT

1. Remove the two screws securing the meter lamp shade as shown in Fig. 2-12.
   This frees the shade and the meters.
2. Unsolder the leads from the defective meter, and then install a new one.

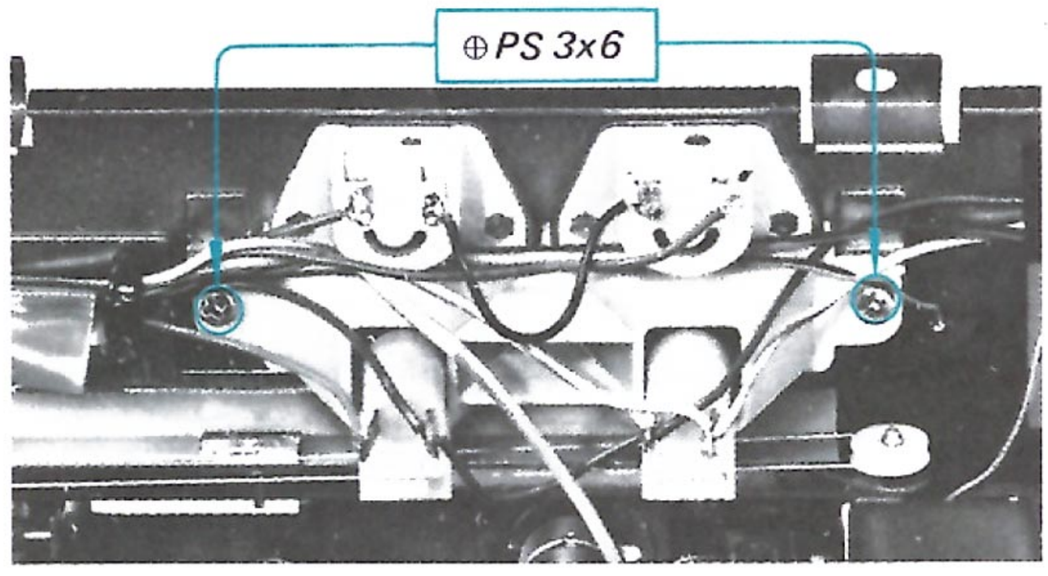


Fig. 2-12. Meter replacement

2 8. DIAL GLASS REPLACEMENT

1. Remove the front panel as described in Procedure 2-4.
2. Remove the six screws securing the front glass holder to the dial glass escutcheon as shown in Fig. 2-13.
   This frees the dial glass.
3. Install the replacement dial glass.

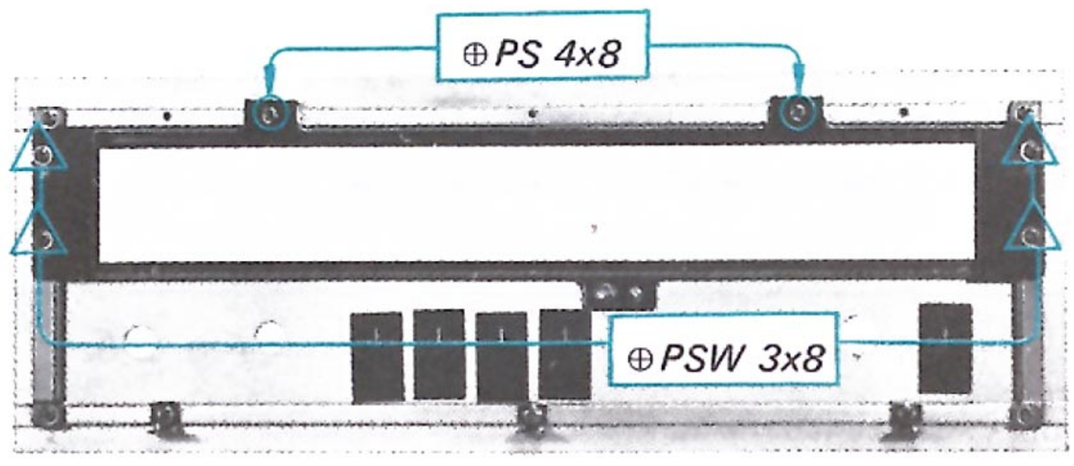


Fig. 2-13. Dial glass replacement

2-9. DIAL SCALE REPLACEMENT

1. Remove the front panel as described in Procedure 2-4.
2. Remove the screws securing the dial scale holder at both sides of the front subchassis as shown in Fig. 2-14. This frees the dial scale.
3. Install the replacement dial scale.

2-10. SWITCH AND CONTROL REPLACEMENT

Prepare for replacing any switches or controls by removing the front panel as described in Procedure 2-4.

1. Remove the hex nuts or the screws securing the defective components to the front subchassis as shown in Fig. 2-14.
2. Install the replacement components.

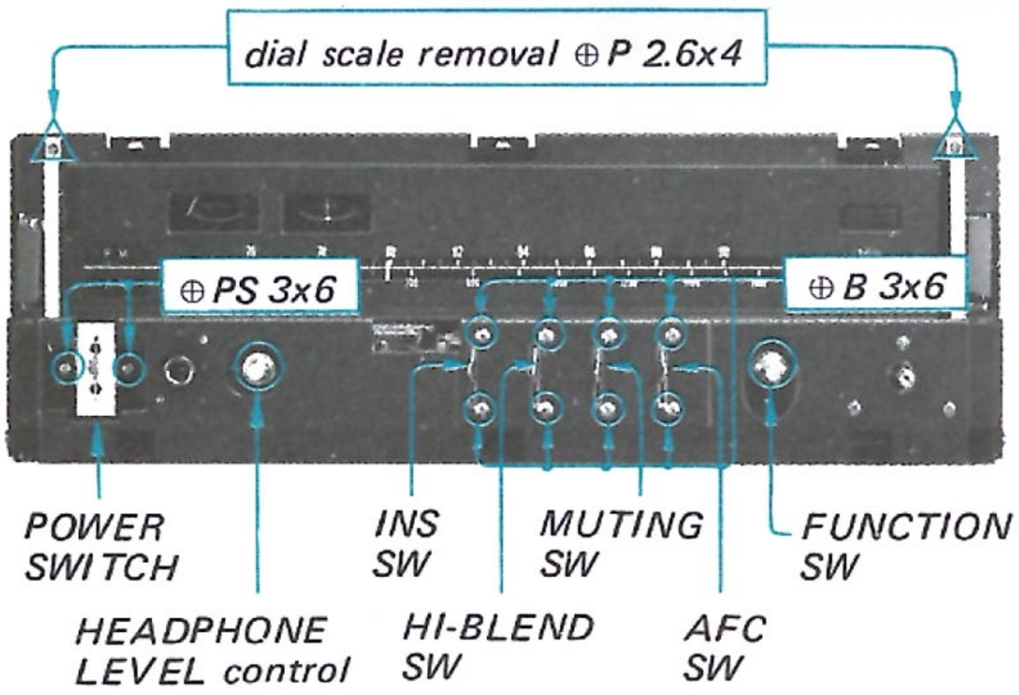


Fig. 2-14. Dial scale, switch and control replacement

2-11. REAR PANEL REMOVAL

1. Remove the two self-tapping screws at each side of the rear panel securing it to the chassis as shown Fig. 2-15.

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

1. Remove the rear panel as described in Procedure 2-11.
2. Bore out the rivets using a drill bit slightly larger in diameter than the rivet. See Fig. 2-16.
3. Punch out the remainder of the rivet with a nail set or prick punch.
4. Remove the defective component, and then install a new one.
5. Secure the new component with a suitable screw and nut, or repair rivet screw (Part Number 3-701-402).

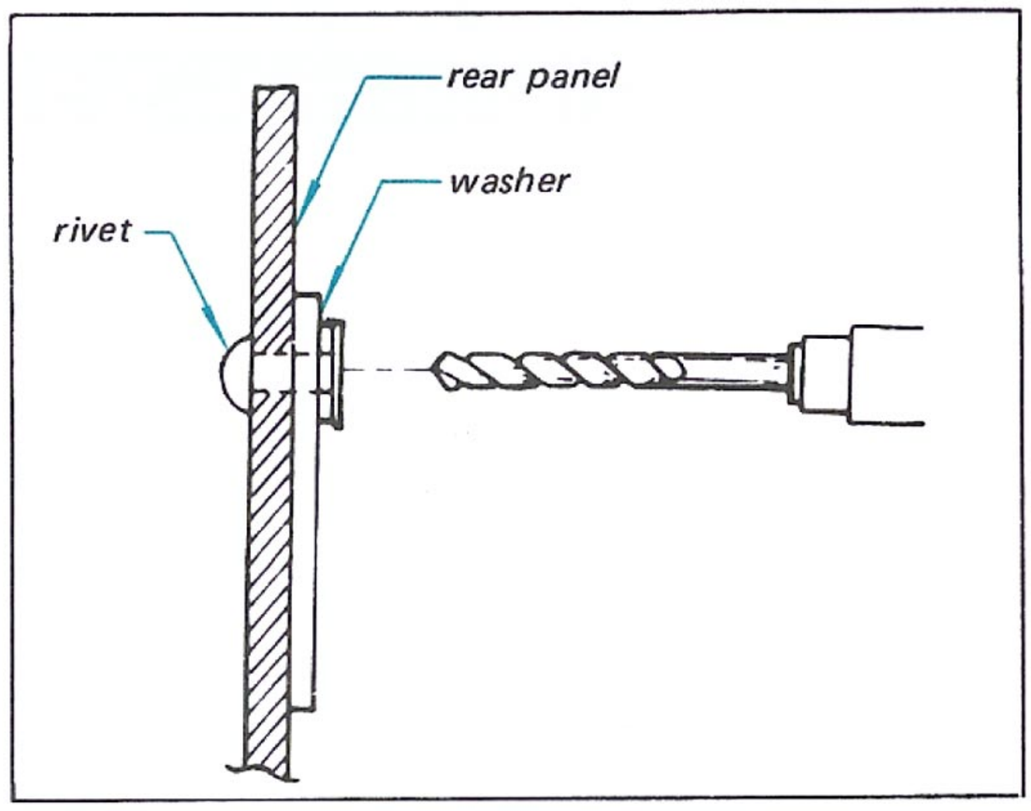


Fig. 2-16. Rivet replacement

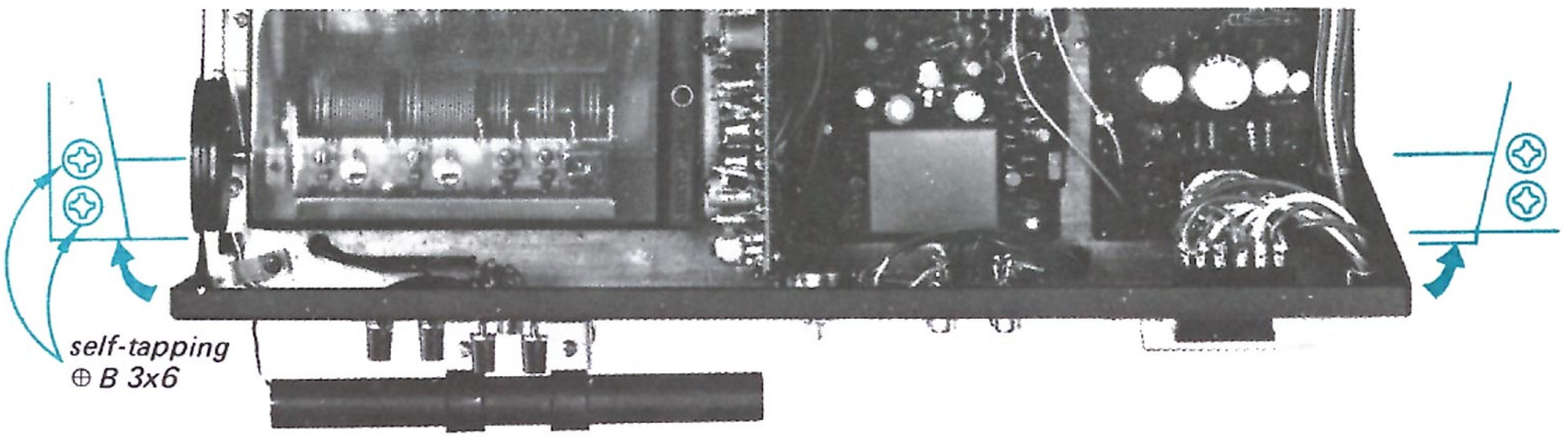
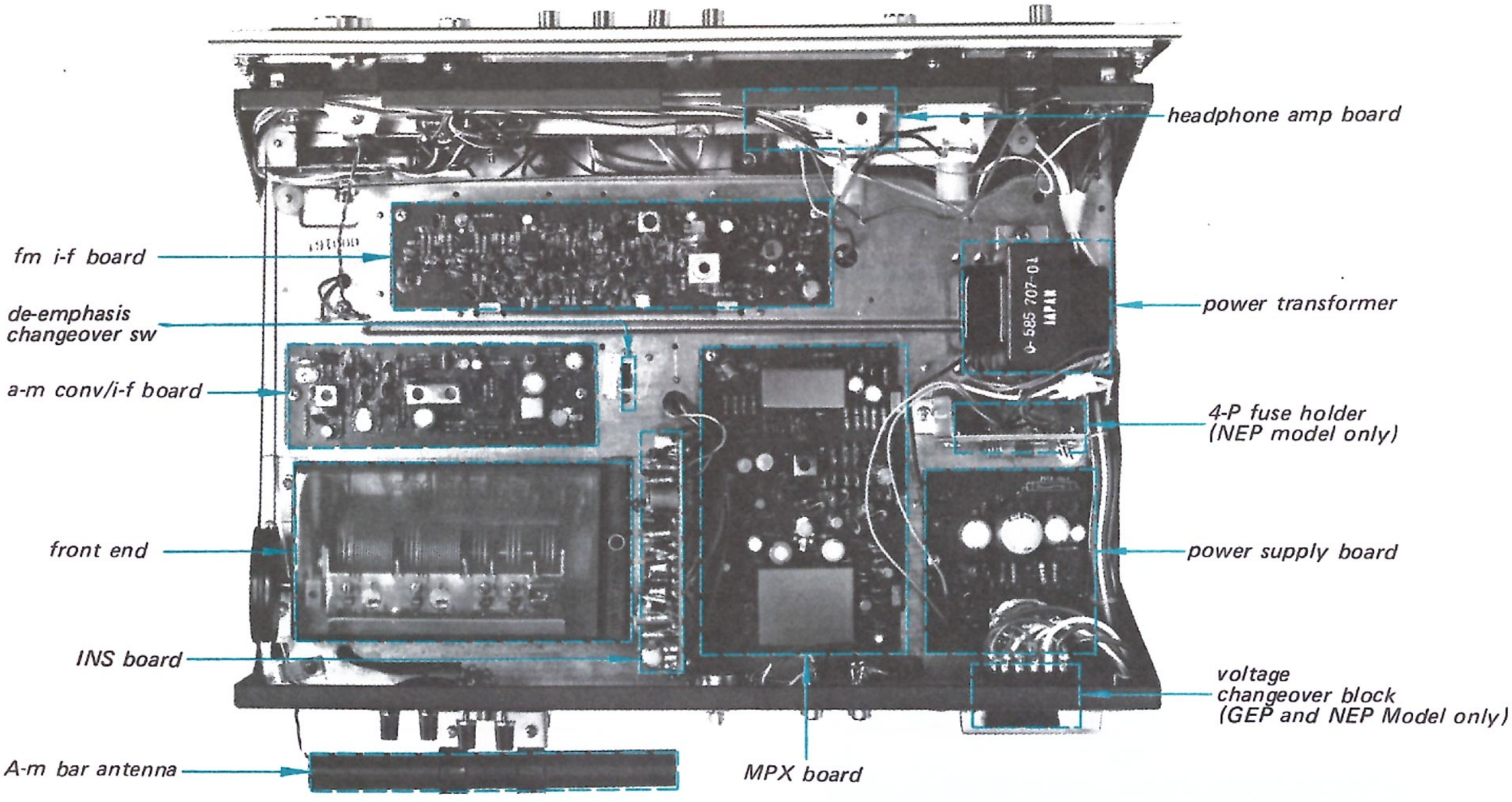


Fig. 2-15. Rear panel removal

2-13. CHASSIS LAYOUT



SECTION 3
ALIGNMENT AND ADJUSTMENT PROCEDURES

3-1. FM I-F STRIP ALIGNMENT

CAUTION

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

TABLE 3-1.

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

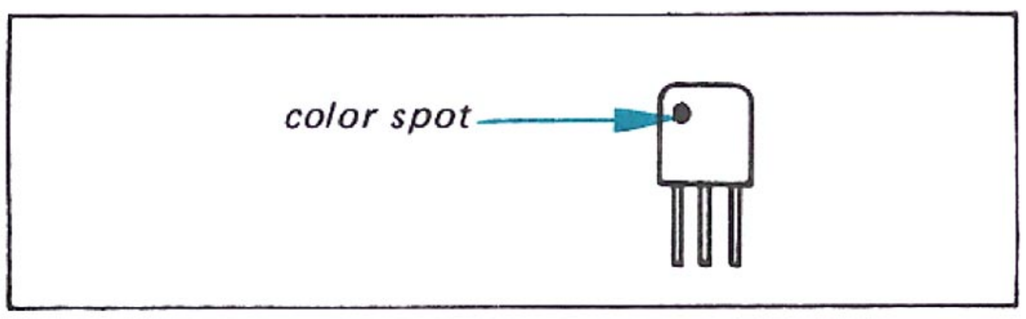


Fig. 3-1. Fm i-f ceramic filter

Test Equipment Required

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

Note: Fm i-f strip alignment should be performed only after replacing IFT101 in the front end.

Procedure

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

   Carrier frequency ..... 98 MHz
   Modulation ..... Fm, 400 Hz, 100%
   Output level ..... 30 μV (30 dB)

2. Set the tuner's controls as follows:

   FUNCTION switch ..... FM AUTO STEREO
   AFC switch ..... OFF

3. Turn the core of transformer IFT101 (See Fig. 3-5) with the alignment tool to obtain maximum output.

3-2. FM DISCRIMINATOR ALIGNMENT

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

Test Equipment Required

1. Oscilloscope
2. Alignment tools

Procedure

1. With the equipment connected as shown in Fig. 3-3, set the tuner's control as follows:

   FUNCTION switch ..... FM AUTO STEREO
   AFC switch .....OFF

   No signal should be received.

2. Adjust the controls of the oscilloscope to provide a visible indication of noise.
   Always watch the oscilloscope to confirm that the tuner is not receiving any off-the-air signal.

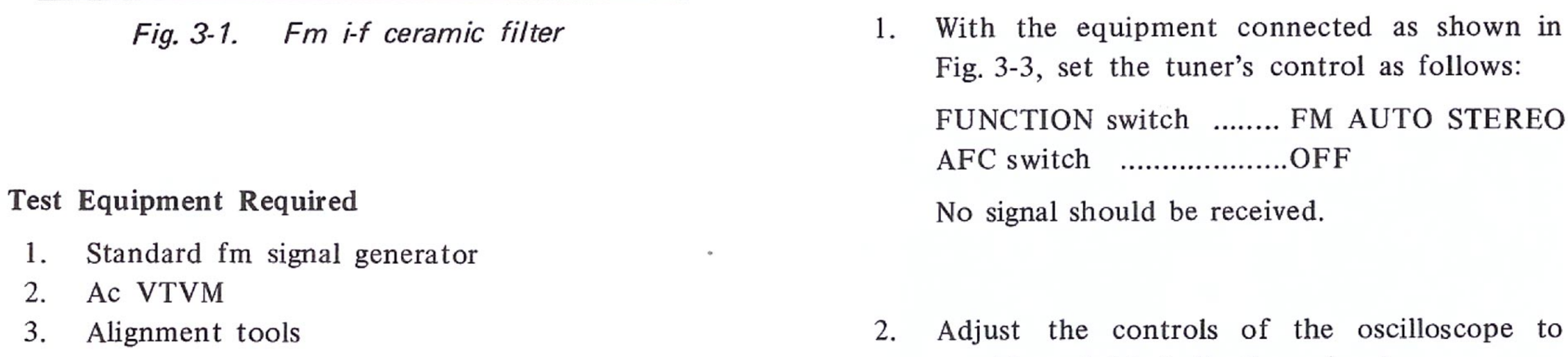


Fig. 3-2. I-f, muting and front-end alignment test setup

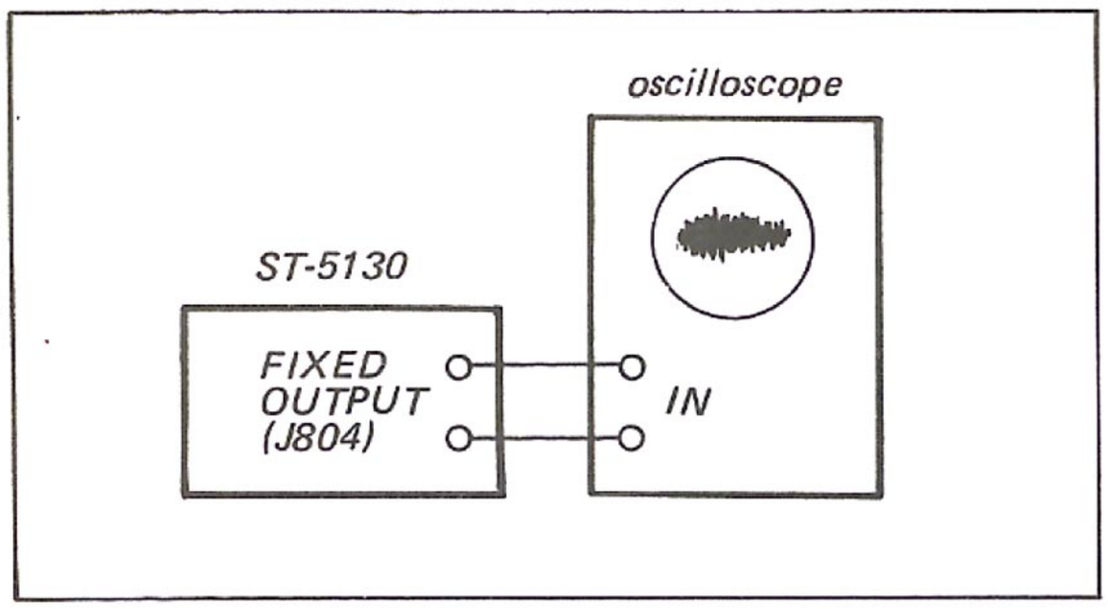


Fig. 3-3. Discriminator alignment test setup

3. Turn the top core (secondary side) of discriminator transformer T201 (see Fig. 3-4) with a hex-head alignment tool to obtain a null-point reading on the tuning meter.
   If the discriminator transformer (T201) is not aligned correctly, some deviation on the tuning meter will be observed.

   Note: Turn the core carefully and slowly. At both extreme positions of the top core, a null point will be observed. The real null point should be obtained in the middle of the core thread length.

Fig. 3-4. Adjusting parts location

3-3. MUTING ADJUSTMENT

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

Signal Generator Alignment

Test Equipment Required

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

Preparation

1. Turn the knob of RT202 (see Fig. 3-4) fully clockwise on the fm i-f and discriminator board.

Procedure

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

   FUNCTION switch ..... FM AUTO STEREO
   AFC switch ..... OFF
   MUTING switch ..... ON

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

Off-the-Air Signal Alignment

Accurate muting circuit adjustment can also be performed by utilizing off-the-air local fm signals instead of the fm SSG.
Note that a weak signal is best for this purpose.

3-4. SWITCHING LEVEL ADJUSTMENT OF NOISE SELECTOR CIRCUIT IN INS SECTION

Test Equipment Required

Same as muting adjustment

Procedure

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

   FUNCTION switch ..... FM AUTO STEREO
   INS switch ..... ON

2. Set the SSG's controls as follows:

   Frequency ..... 98 MHz
   Modulation ..... fm, 400 Hz, 100%
   Output level ..... 60 dB (1,000 μV)

3. Precisely tune to the SSG signal, and then decrease the output level of SSG to obtain 35 dB at antenna terminal of ST-5130, while watching the collector voltage of Q503 (1.5 V).

Set the RT501 (see Fig. 3-5) to the position where the Q503 collector voltage changes from 1.5 V to 14 V.

4. Check the collector voltage of Q503 corresponding with the input signal level as follows:

Input signal level	Q503 collector voltage
30 dB	14 V
40 dB	1.5 V

3-5. FM FRONT-END ALIGNMENT (Frequency coverage)

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

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

Signal Generator Alignment

Test Equipment Required

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

Preparation

1. Connect the equipment as shown in Fig. 3-2.
2. Set the tuner's controls as follows:

   FUNCTION switch ..... FM
   MODE switch ..... MONO
   AFC switch ..... OFF

Procedure

Follow the procedures given in Table 3-3, when performing this alignment with an fm signal generator.

Off-the-Air Alignment

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

TABLE 3-2. MUTING ADJUSTMENT

SSG Frequency and Output Level	Tuner Dial Indication	Scope Connection	Adjust	Remarks
98 MHz 400 Hz. 30% Mod. 30 μV (30 dB)	98 MHz	FIXED (J804)	T202	Turn the core of T202 (See Fig. 3-4) to obtain proper muting operation.

TABLE 3-3. FM FREQUENCY COVERAGE

Step	Coupling Between Tuner and SSG	SSG Frequency and Output Level	Tuner Dial Indication	Adjust	Indication
1.	Direct coupling	87.5 MHz 400 Hz 100% mod. 10 μV (20 dB)	lowest position	OSC coil L105 See Fig. 3-5	Maximum VTVM reading
2.	Same as above	108.4 MHz 400 Hz 100% mod. 10 μV (20 dB)	highest position	OSC trimmer CT105 See Fig. 3-5	Same as above

Adjusting Parts Location

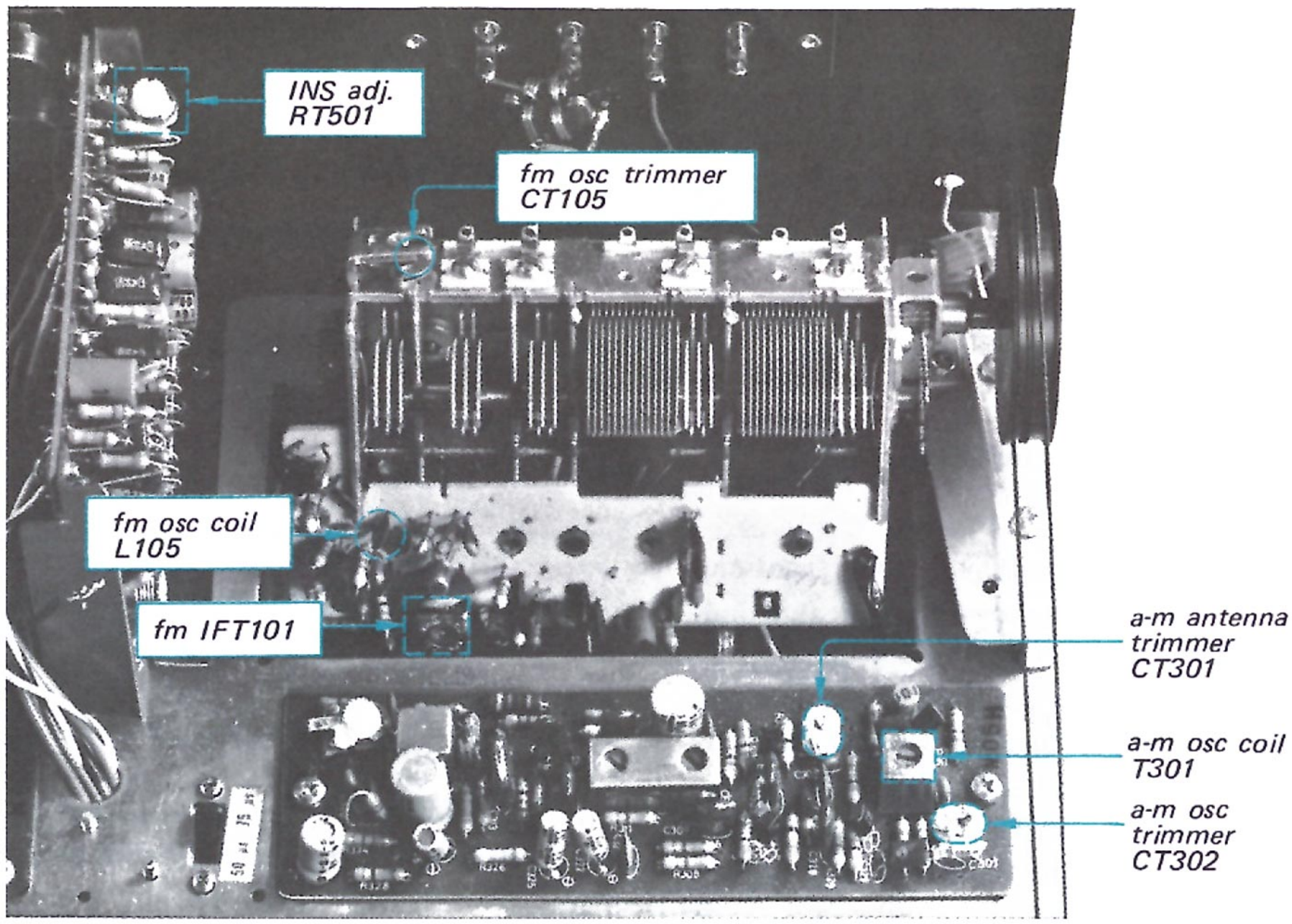


Fig. 3-5. Adjusting parts location

3-6. FM STEREO SEPARATION ADJUSTMENT

Test Equipment Required

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

Preparation

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

   (a) With the equipment connected as shown in Fig. 3-6, set the MPX and audio signal-generator's controls as follows:

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

   (b) Adjust the oscilloscope controls to obtain a visible indication. Be sure the scope's horizontal display switch is set for external input.

   (c) Turn the pilot-signal (19 kHz) phase control to obtain an in-phase and stable lissajous pattern as shown in Fig. 3-7.

2. Connect the input cable of ac VTVM or oscilloscope to the FIXED output terminal.

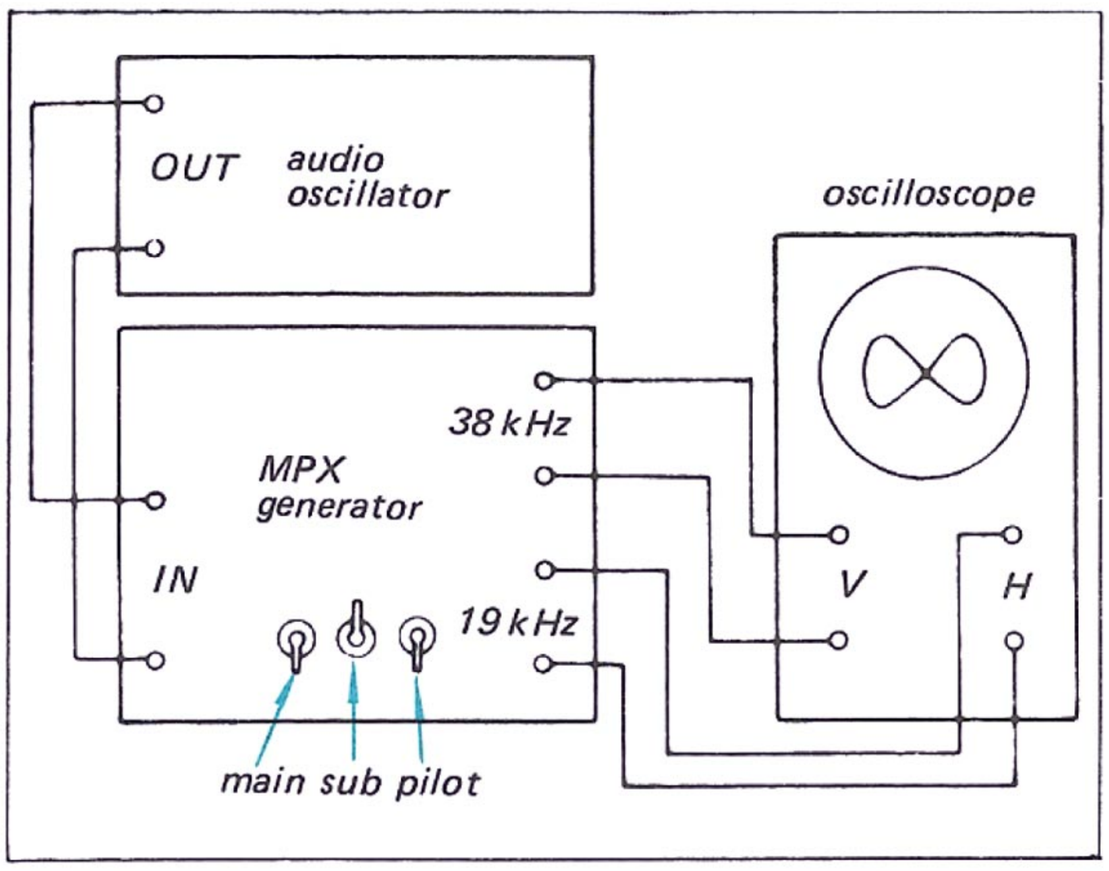


Fig. 3-6. MPX generator preadjustment

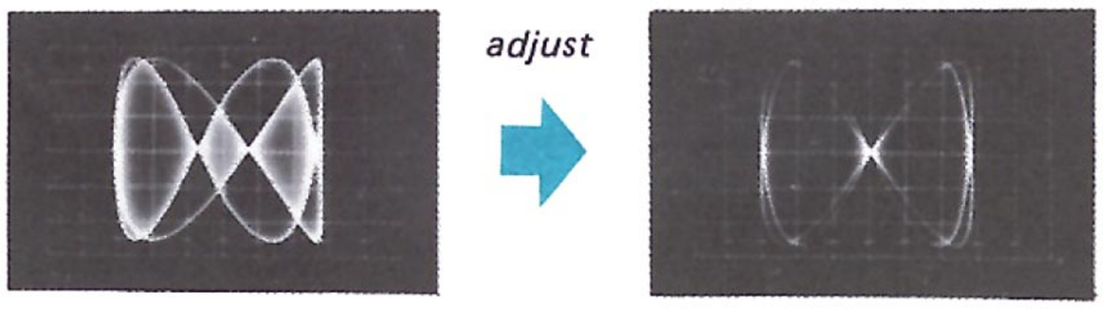


Fig. 3-7. Lissajous pattern

Procedure

1. Connect the equipment as shown in Fig. 3-8. Set the fm signal-generator's control as follows:

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

   The above mentioned modulation levels can be set as follows:

   (a) With the equipment connected as shown in Fig. 3-8 set the MPX stereo generator controls as follows:

   MAIN CHANNEL ..... OFF
   SUBCHANNEL ..... OFF
   19 kHz (PILOT) ..... ON

   (b) Adjust the 19-kHz signal level to obtain a 7.5-kHz deviation on the FM SSG modulation indicator.

   (c) Reset the MPX stereo-generator's control as follows:

   MAIN CHANNEL ..... ON
   SUB CHANNEL ..... OFF
   19-kHz (PILOT) ..... OFF
   INPUT SELECTOR ..... L-CH

   (d) Adjust the audio-oscillator output (400 Hz) to obtain a 33.75-kHz deviation on the FM SSG modulation indicator.

   (e) Set all controls to the ON position.

2. Precisely tune the set to the SSG's carrier frequency, then turn the top core of switching transformer T401 (see Fig. 3-9) to obtain maximum output at the left channel. Note that this adjustment has a close relationship with stereo distortion.

3. Record the output level of the left channel when the MPX generator input selector is set to the left channel.

4. Switch the input selector to the right channel and read the residual signal level in the left channel.

5. The output-level to residual-level ratio represents the separation. Adjust separation adj. control RT401 (see Fig. 3-9) for minimum residual level. Check the right channel for separation. Usually, about an 8 to 9 dB difference in channel separation exists. Readjust RT401 for minimum difference between left- and right-channel separation. While doing this, remember that the output level also changes according to the setting of RT401.

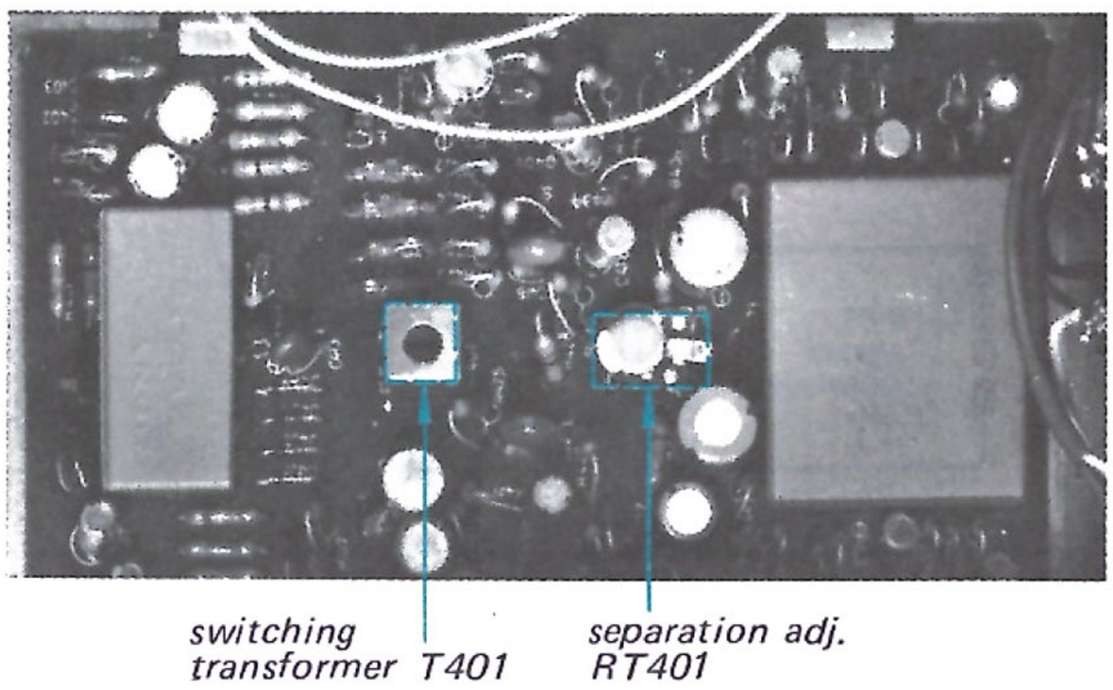


Fig. 3-9. Adjusting parts location

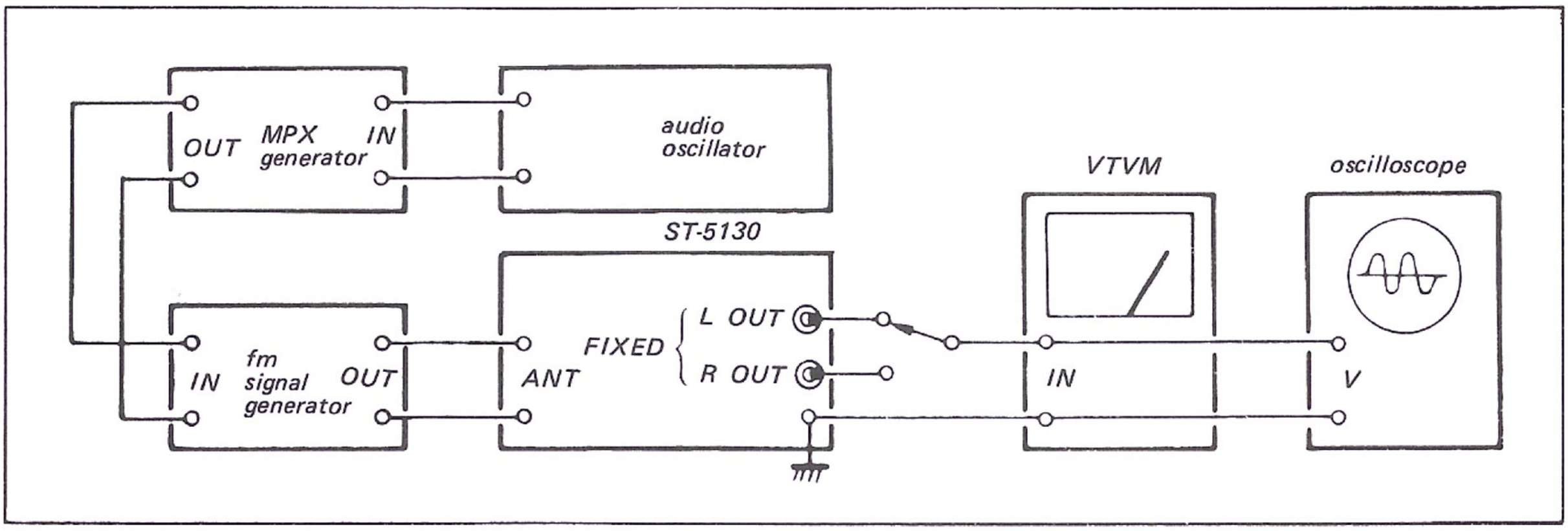


Fig. 3-8. Fm stereo separation adjustment test setup

3-7. A-M I-F STRIP ALIGNMENT

Note: The i-f transformers (CFT301 and T301) in the a-m i-f amplifier circuit are adjusted at the factory, so very little adjustment is necessary in the field even if replacing any of these i-f transformers.

3-8. A-M FREQUENCY COVERAGE AND TRACKING ALIGNMENT

Preparation

Connect the input cable of ac VTVM or oscilloscope to the output terminal as shown in Fig. 3-10.

Signal Generator Alignment

Test Equipment Required

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

Procedure

With the equipment connected as shown in Fig. 3-10 follow the procedures given in Table 3-4 when performing this alignment with an a-m signal generator.

Off-the-Air Signal Alignment

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

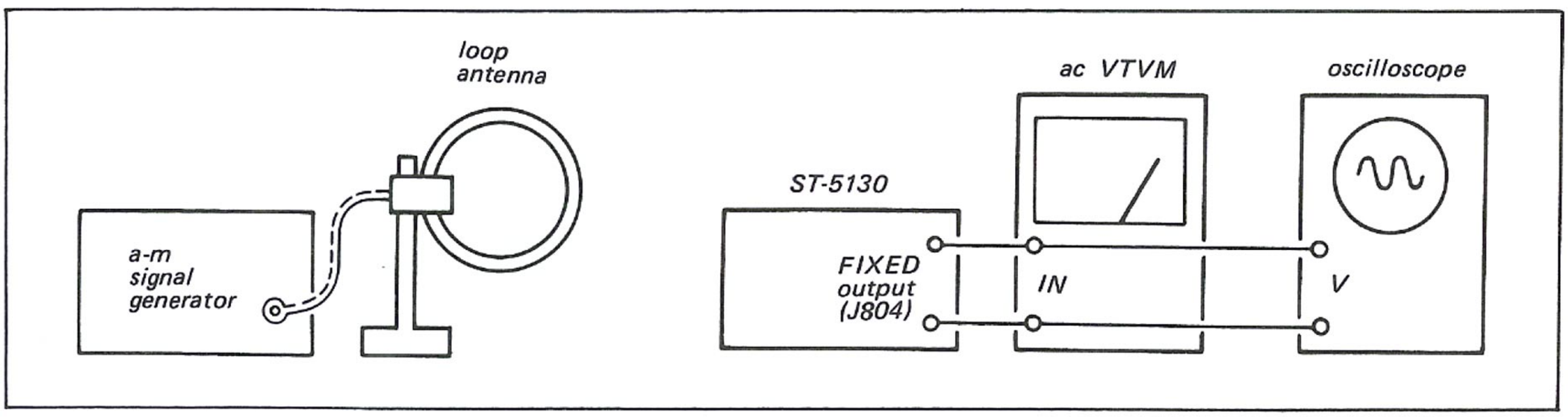


Fig. 3-10. A-m frequency coverage and tracking adjustment

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

Step	Coupling Between Tuner and SSG	SSG Frequency and Output Level	Tuner Dial Indication	Adjust	Indication
Frequency Coverage					
1.	Loop antenna	530 kHz (400 Hz, 30% mod) 1,000 μV (60 dB)	530 kHz	OSC coil T301 See Fig. 3-5	Maximum VTVM reading
2.	Same as above	1,600 kHz Same as above	1,600 kHz	OSC trimmer CT302 See Fig. 3-5	Same as above
Tracking					
1.	Loop antenna	620 kHz (400 Hz, 30% mod) Output level: as low as possible	Tune to the SSG signal	Antenna coil L801 (bar antenna)	Maximum VTVM reading
2.	Same as above	1,400 kHz Same as above	Same as above	Antenna trimmer CT301 See Fig. 3-5	Same as above

SECTION 4
REPACKING

The ST-5130's original shipping carton and packing materials are the ideal containers for shipping the unit. However to secure the maximum protection, the ST-5130 must be repacked in these materials precisely as before. The proper repacking procedures are shown in Fig. 4-1.

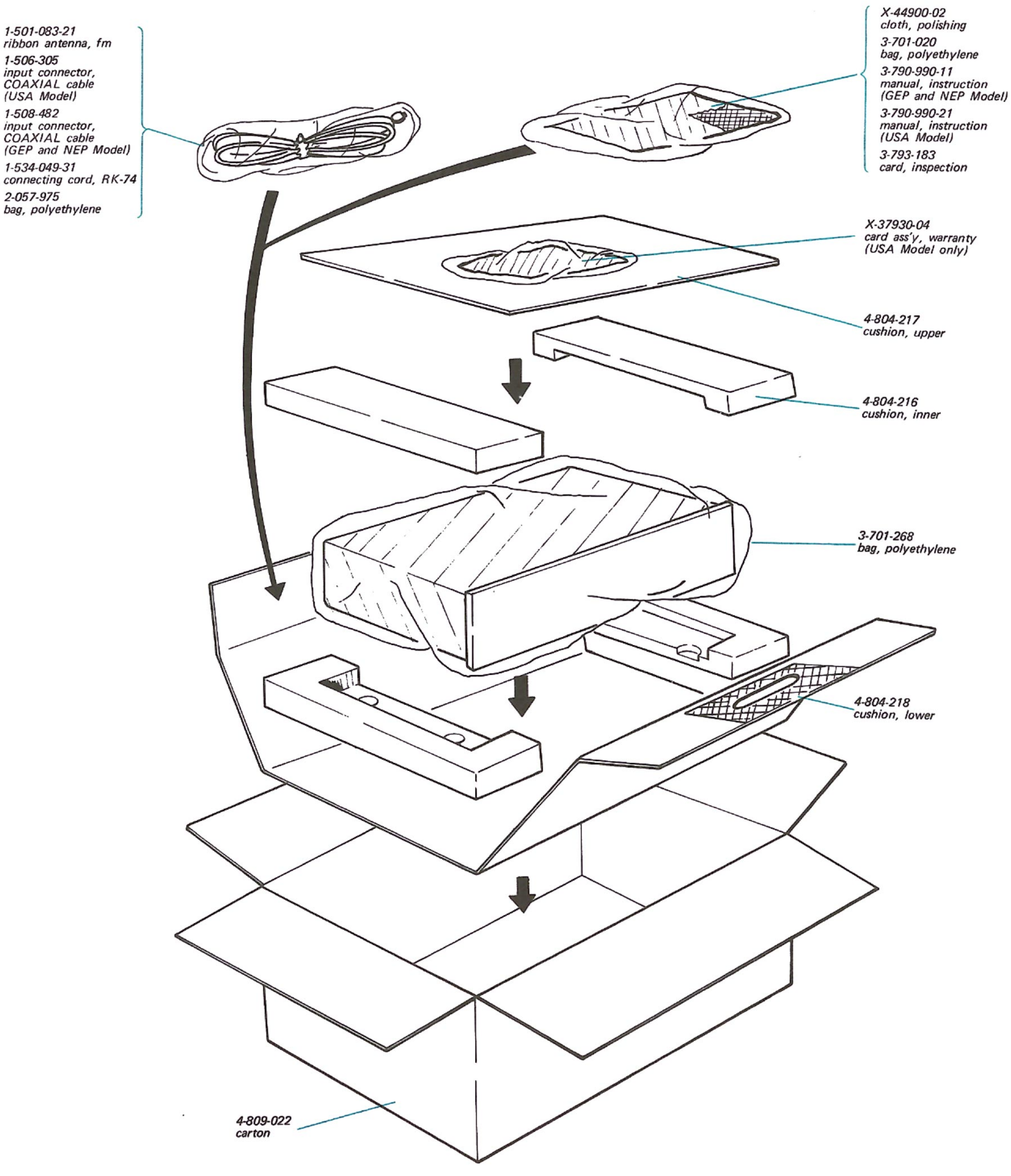
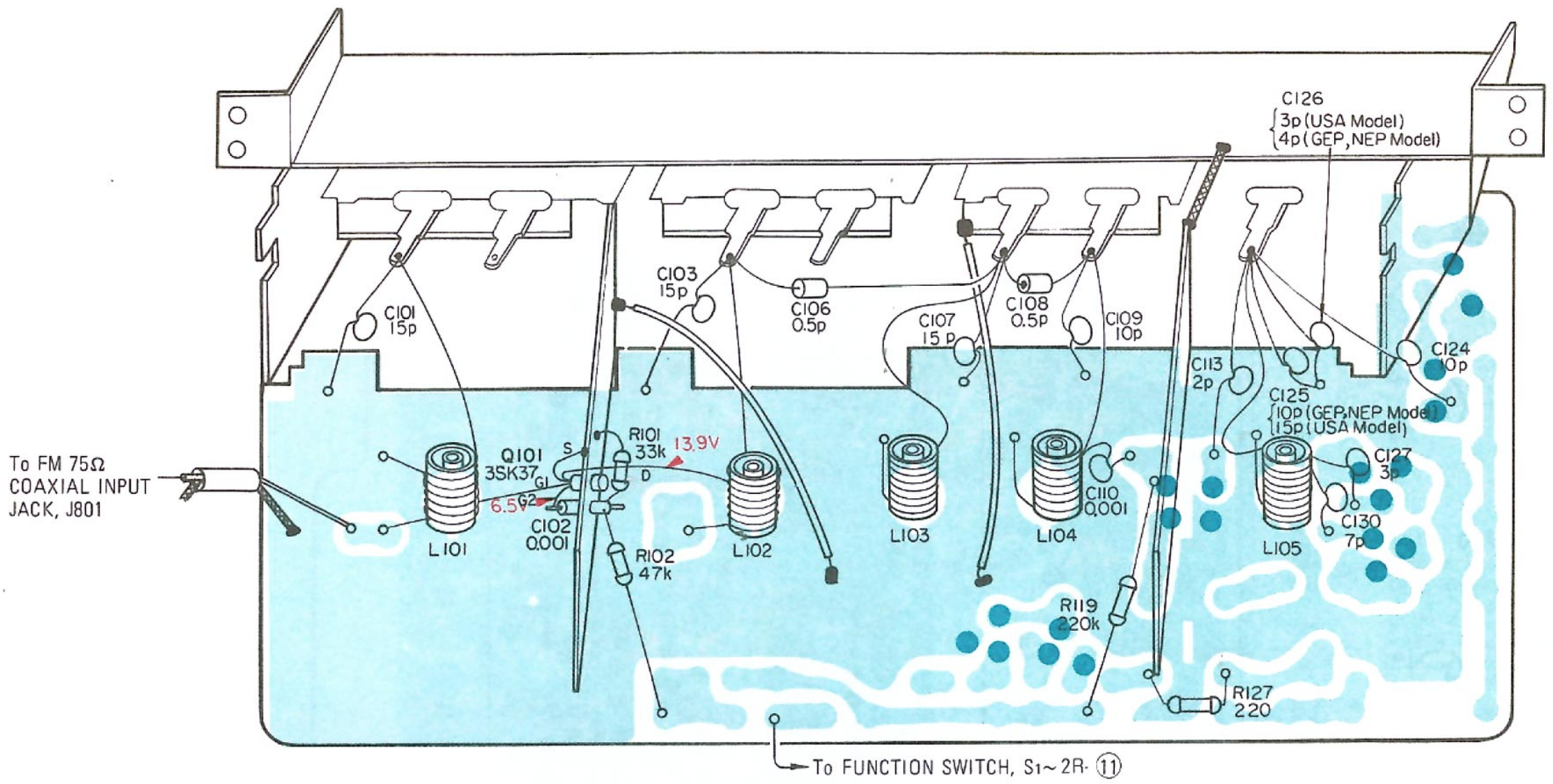


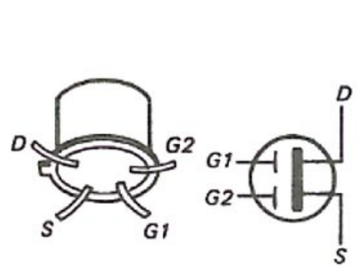
Fig. 4-1. Repacking

SECTION 5
DIAGRAMS

5-1. MOUNTING DIAGRAM — Front End Section —

— Conductor Side —





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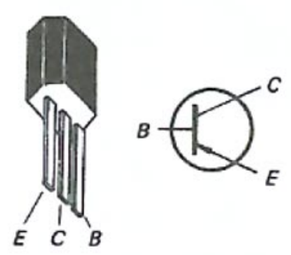
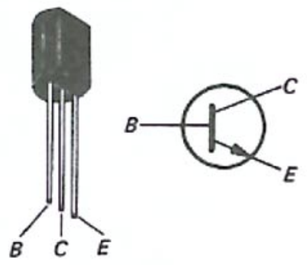
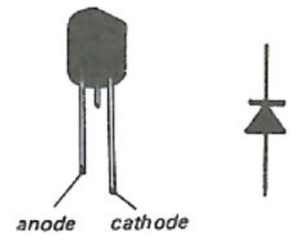


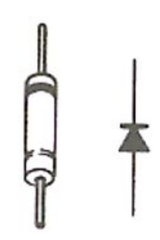
2SA677



2SC710

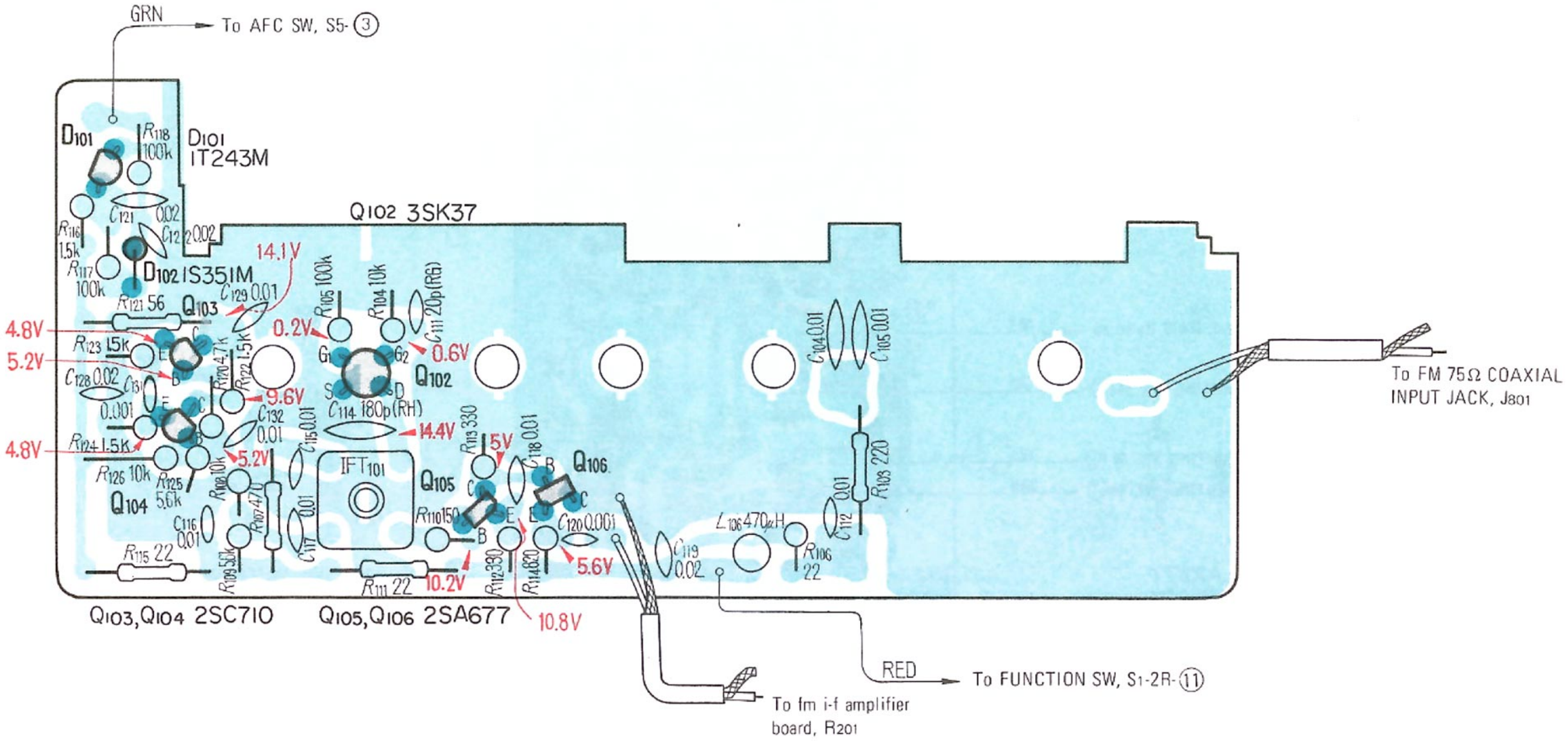


1T243M



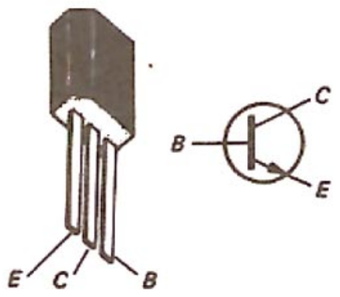
1S351M

— Component Side —

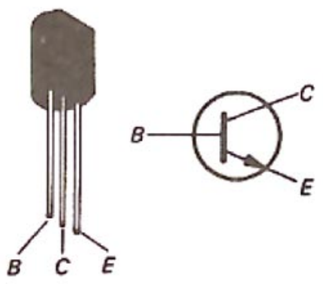


5-2. MOUNTING DIAGRAM – Fm I-f Amp Board –

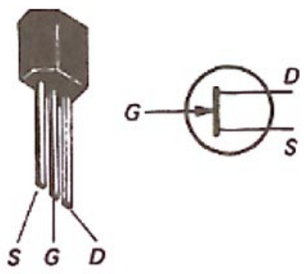
– Conductor Side –



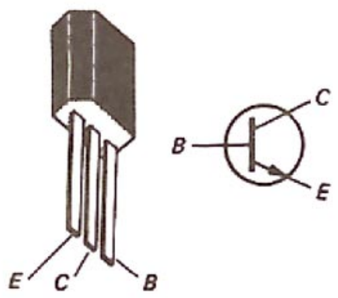
2SC403A



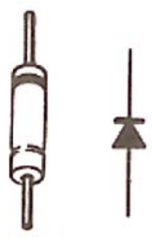
2SC710



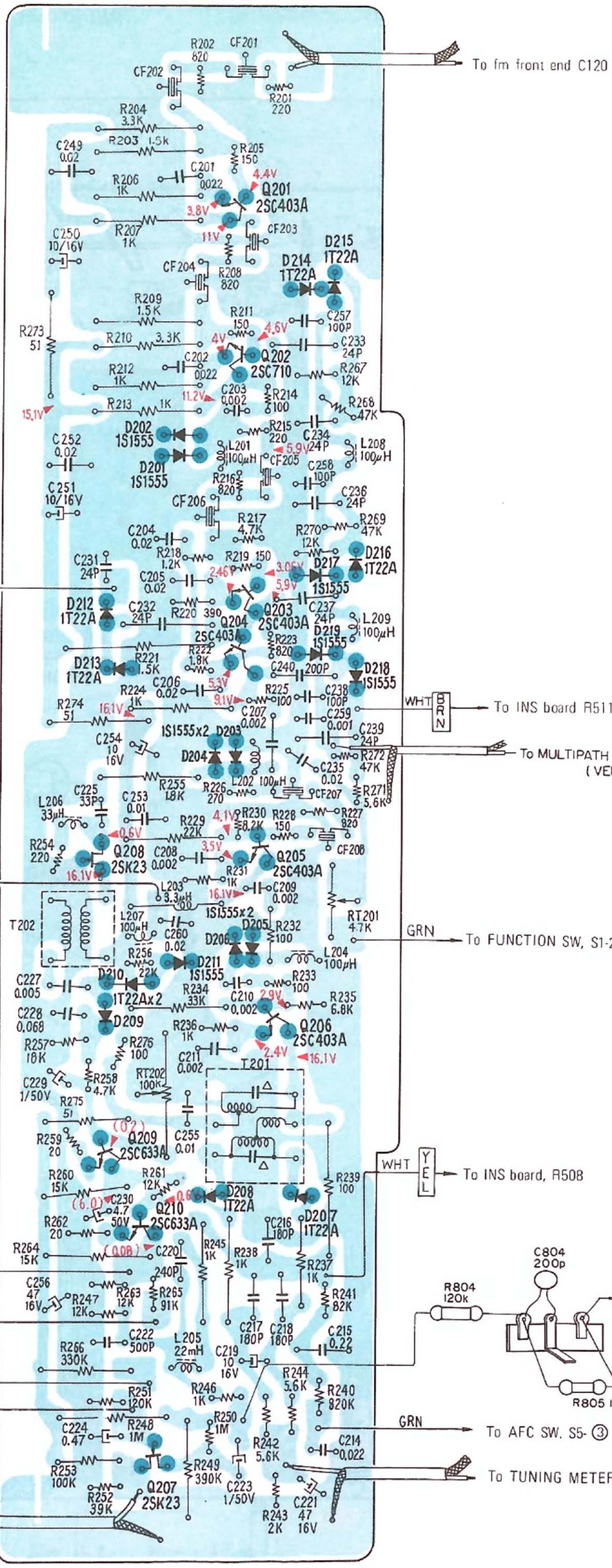
2SK23



2SC633A

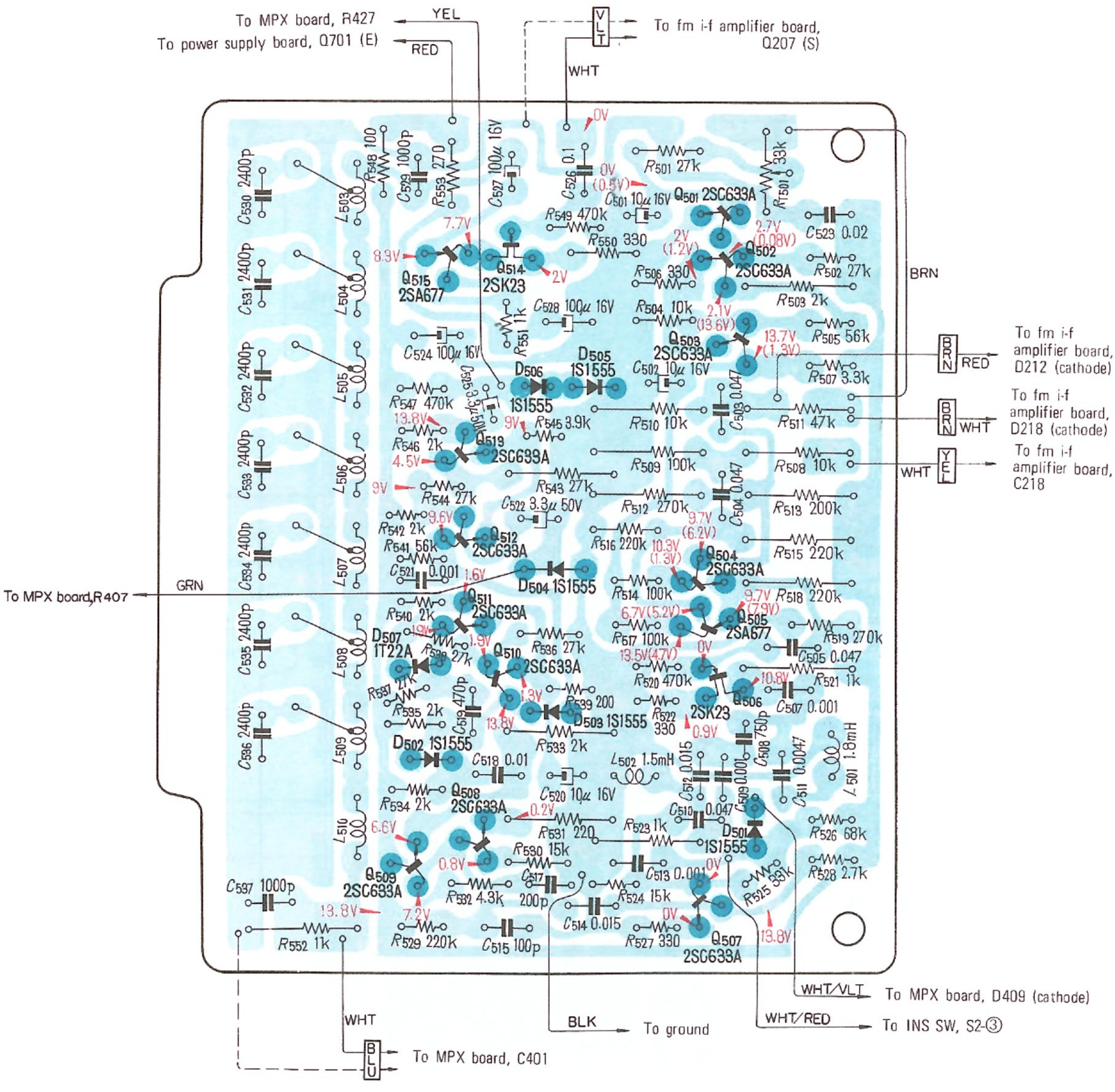


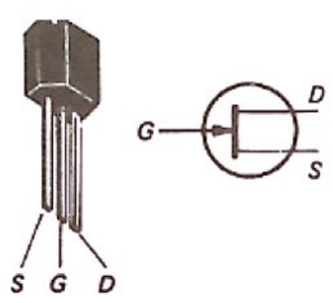
1T22A
1S1555



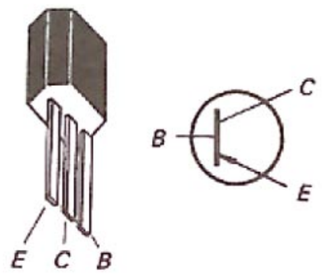
5-3. MOUNTING DIAGRAM — INS Board —

— Conductor Side —

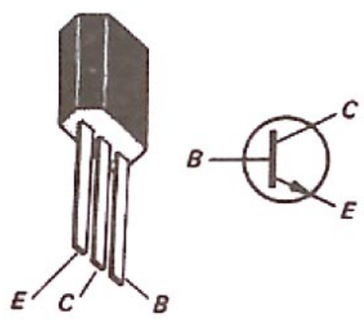




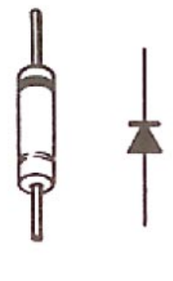
2SK23



2SA677



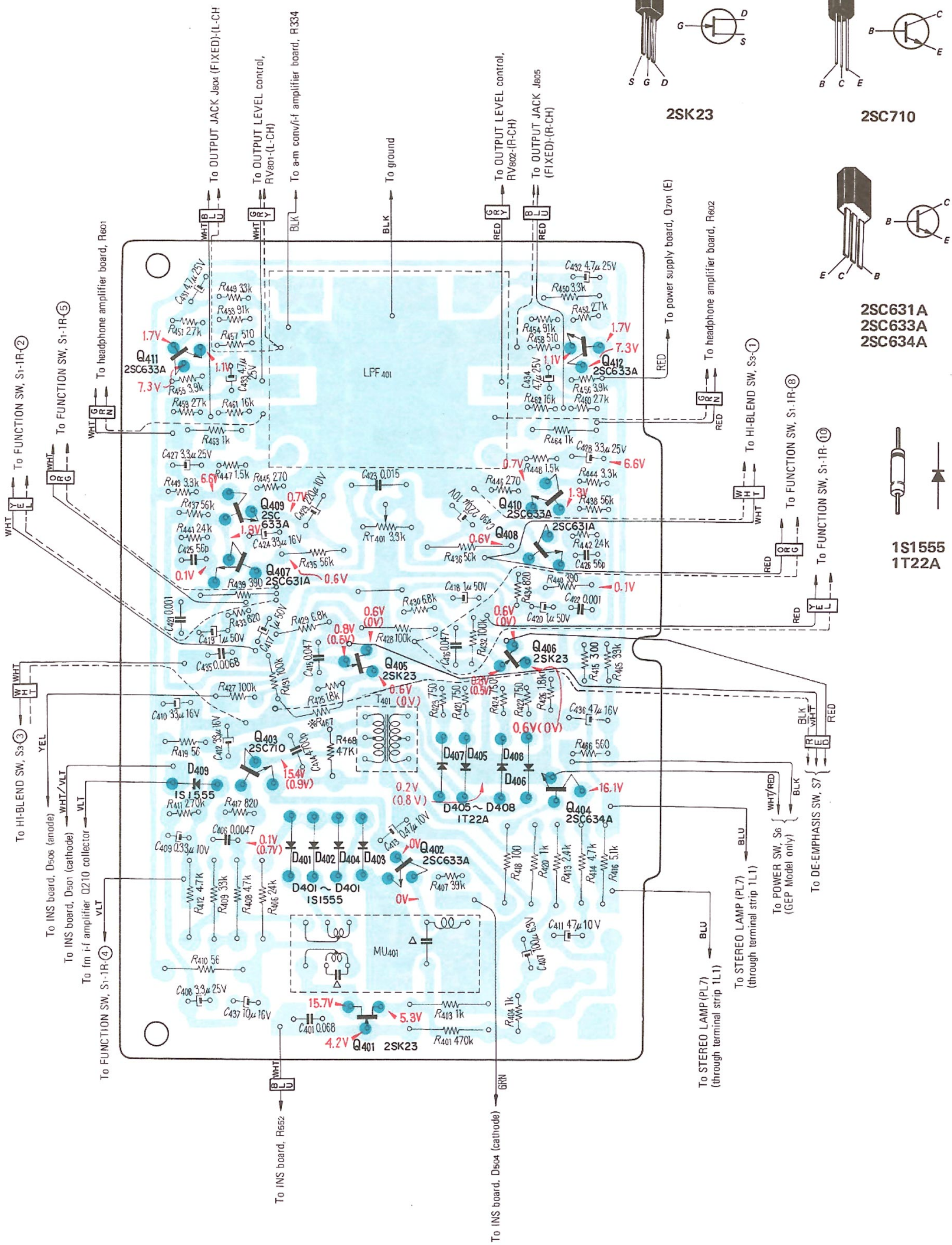
2SC633A



1T22A
1S1555

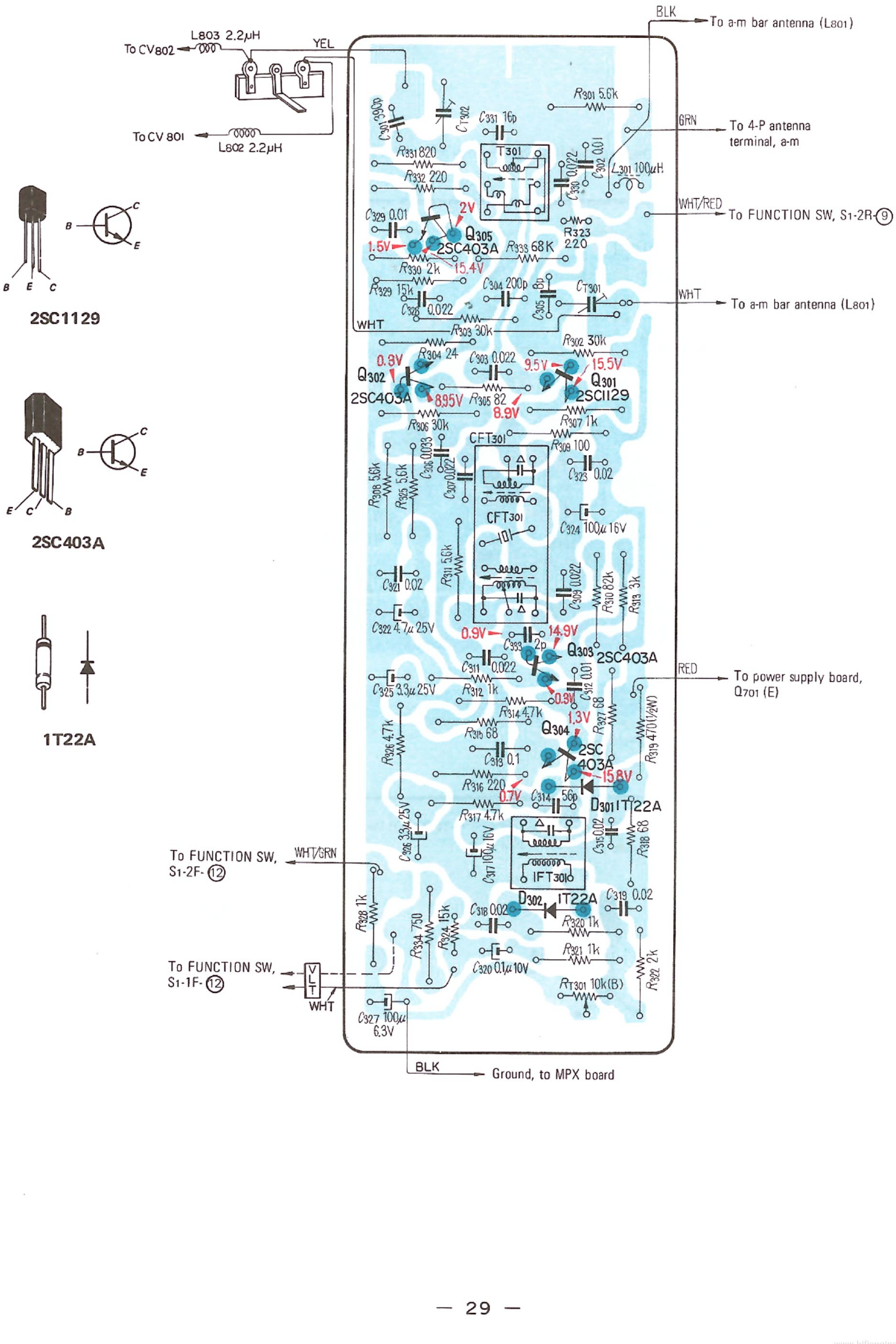
5-4. MOUNTING DIAGRAM — MPX Board —

— Conductor Side —



5-5. MOUNTING DIAGRAM — A-m CONV/I-f Amp Board —

— Conductor Side —



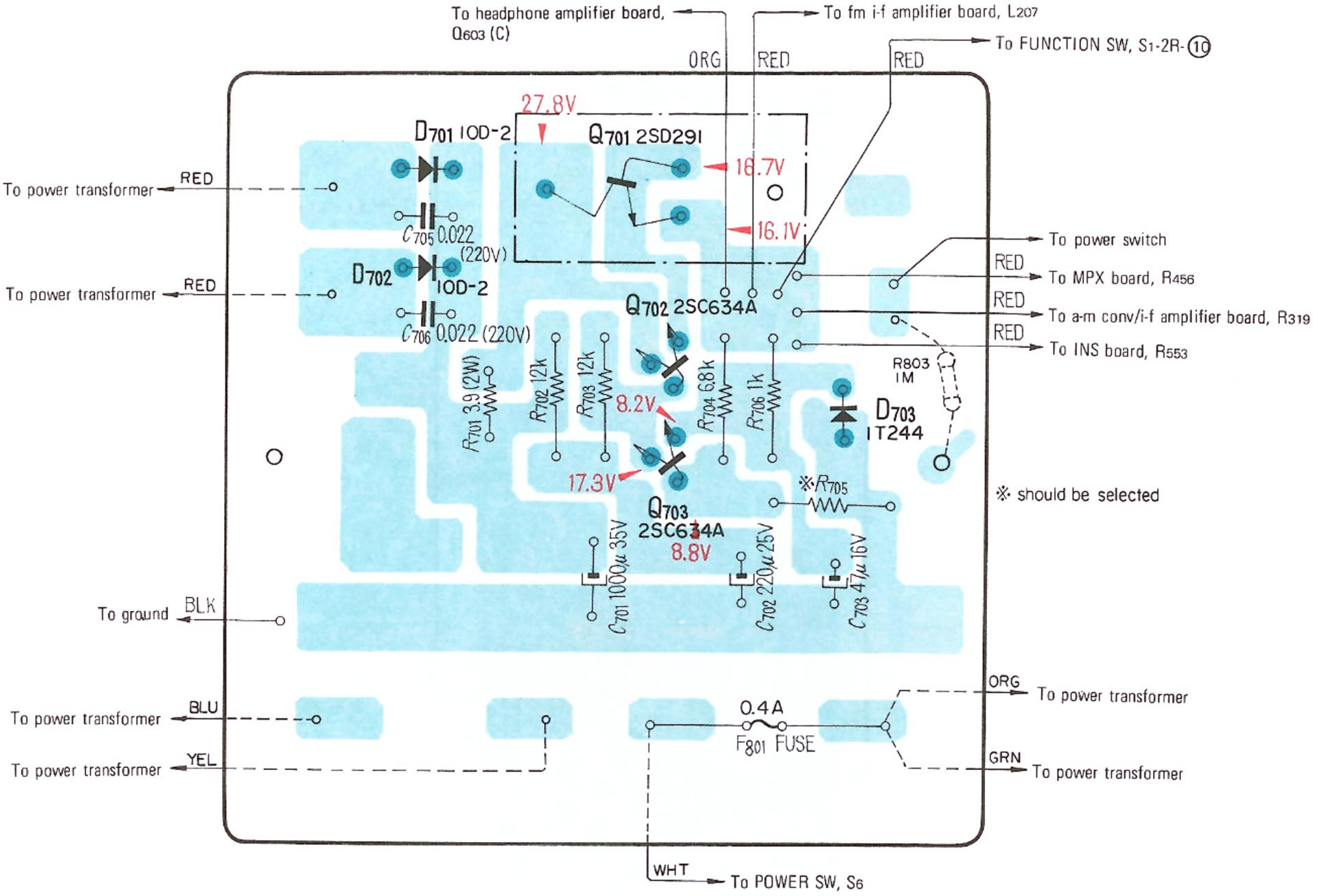
2SC1129

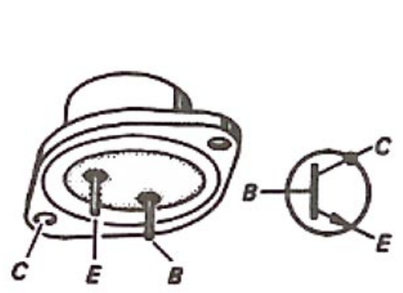
2SC403A

1T22A

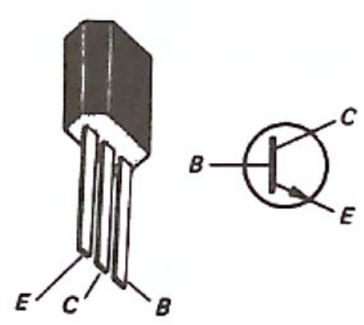
5-6. MOUNTING DIAGRAM — Power Supply Board —

— Conductor Side — (USA)

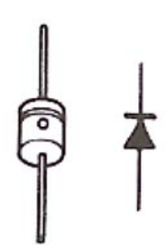




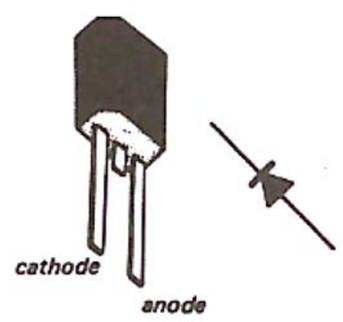
2SD291



2SC634A



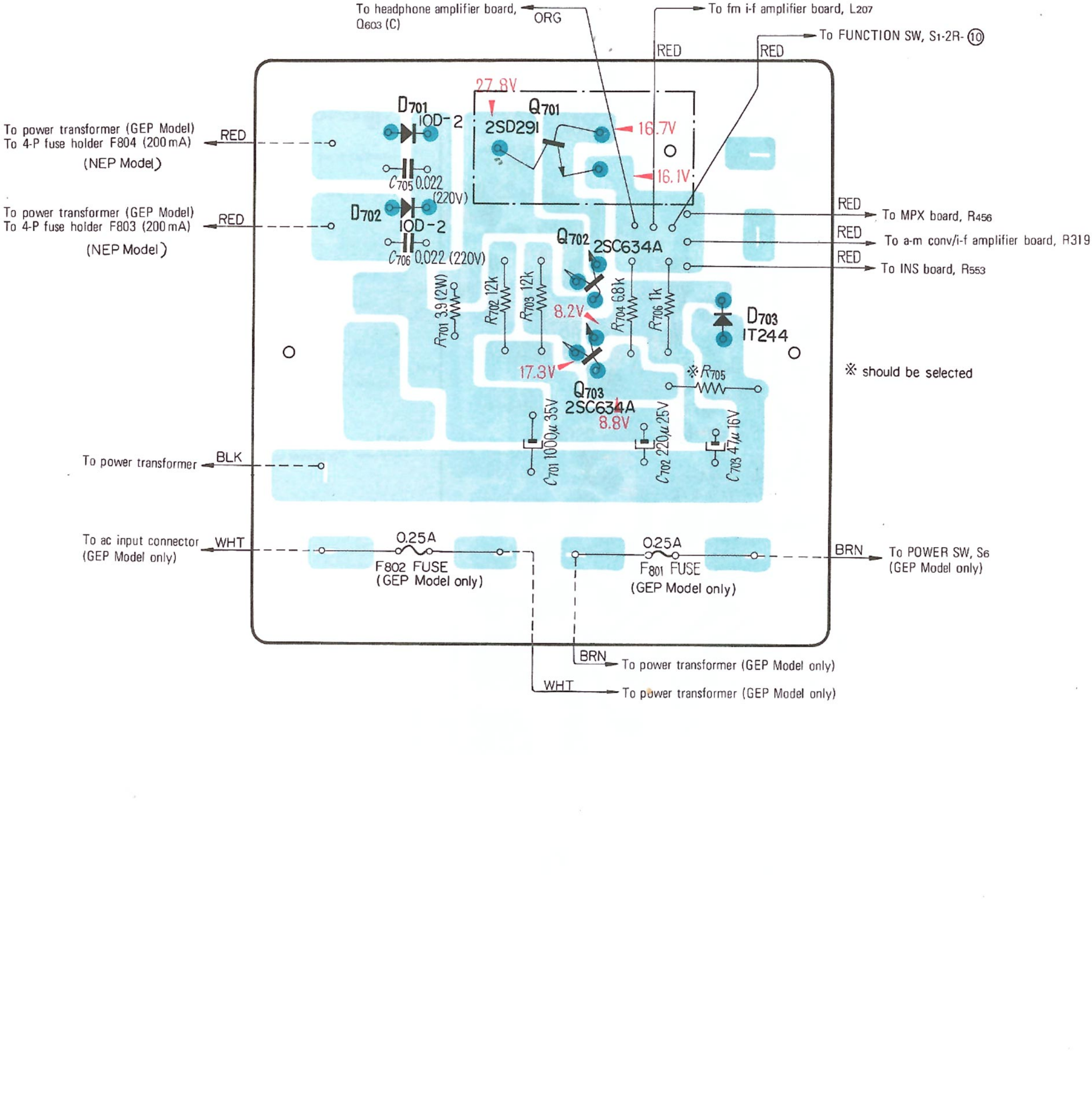
10D-2



1T244

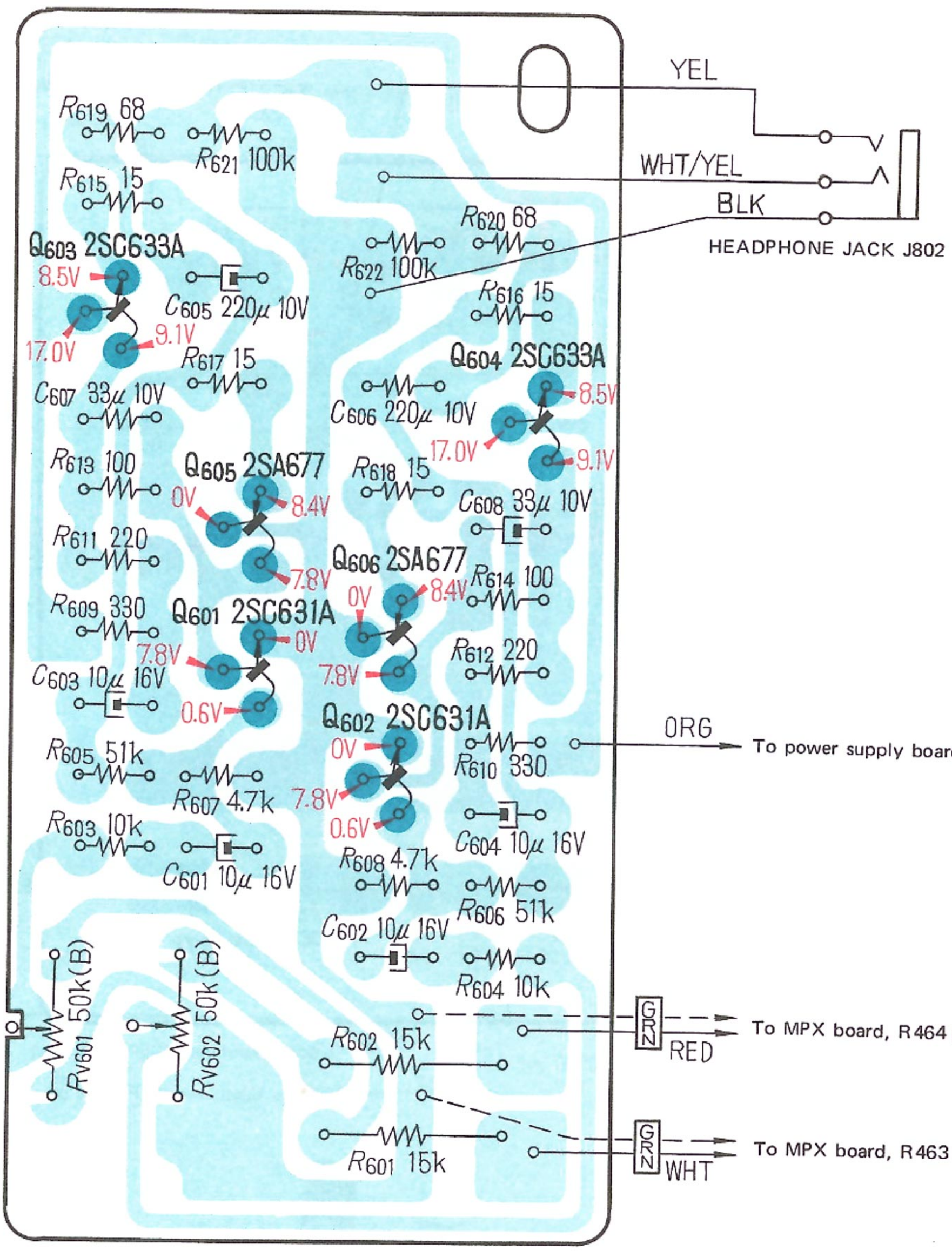
5-7. MOUNTING DIAGRAM — Power Supply Board —

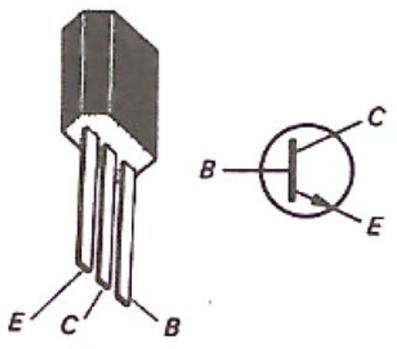
— Conductor Side — (GEP & NEP)



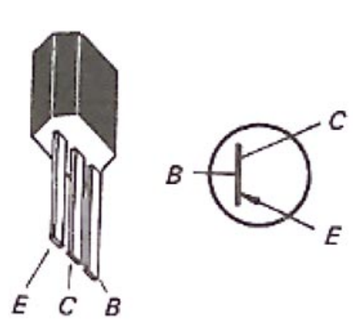
5-8. MOUNTING DIAGRAM — Headphone Amp Board —

— Conductor Side —

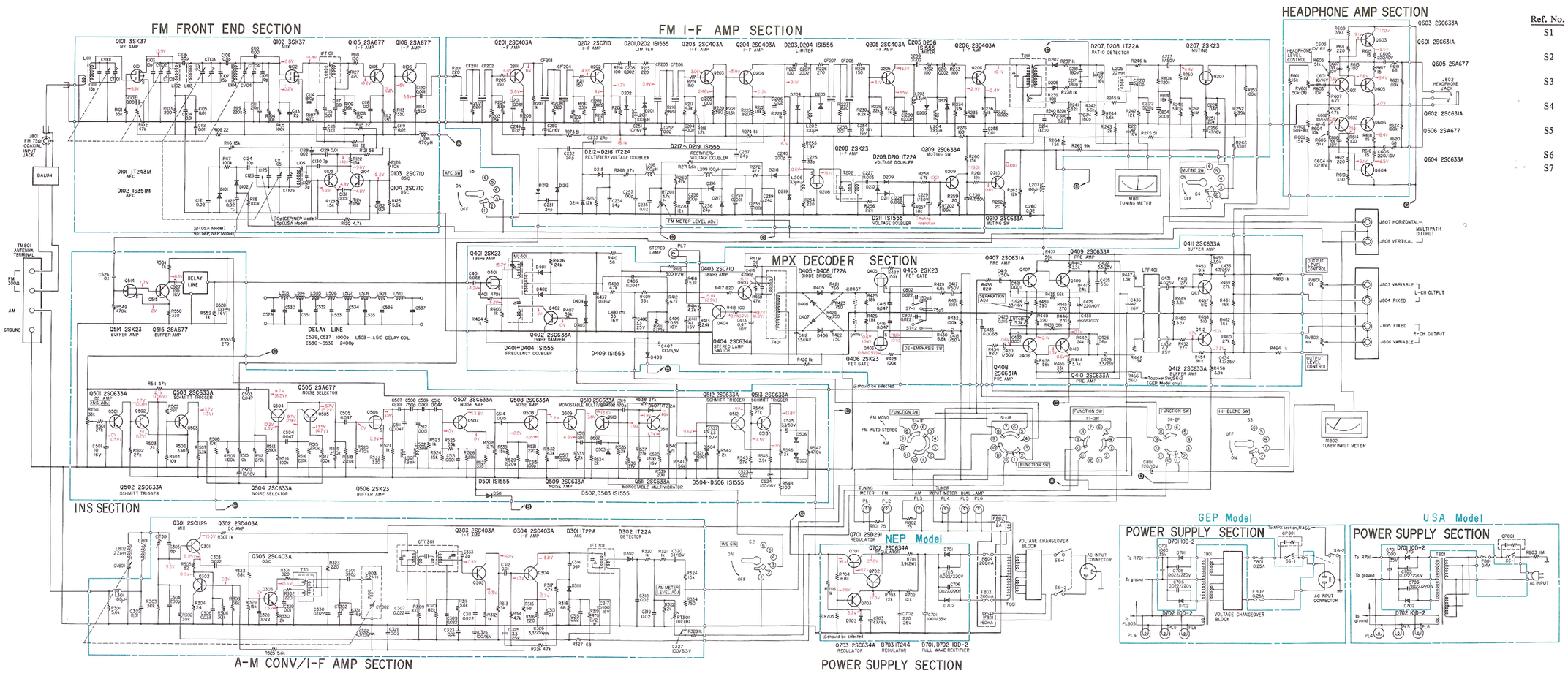




2SC631A
2SC633



2SA677



Ref. No.	Description	Position
S1	FUNCTION SW (AM-FM AUTO STEREO-FM MONO)	AM
S2	INS SW (ON-OFF)	ON
S3	HI-BLEND SW (ON-OFF)	OFF
S4	MUTING SW (ON-OFF)	ON
S5	AFC SW (ON-OFF)	ON
S6	POWER SW	OFF
S7	DE-EMPHASIS SW (50μs - 75μs)	50μs

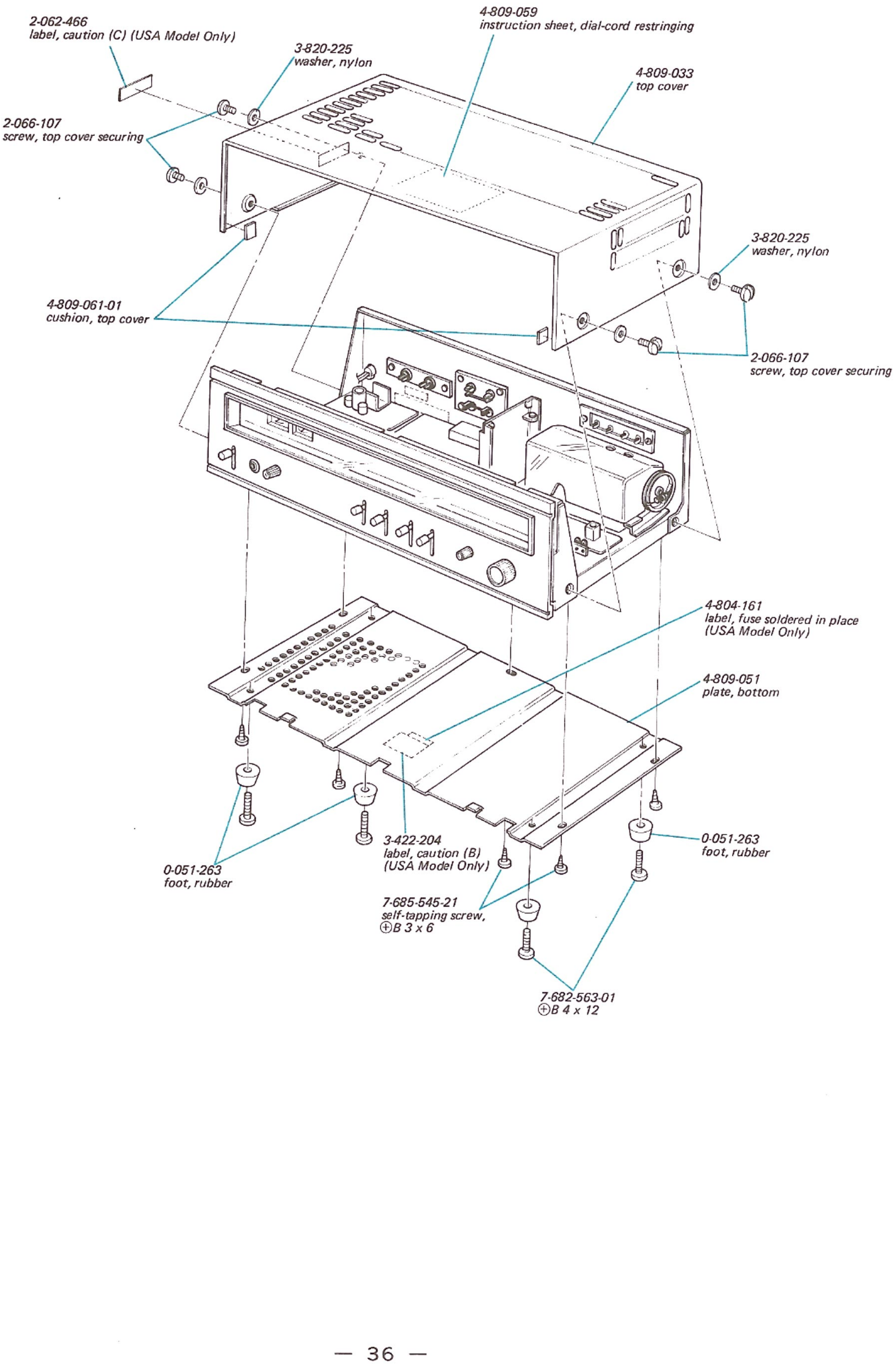
Note:

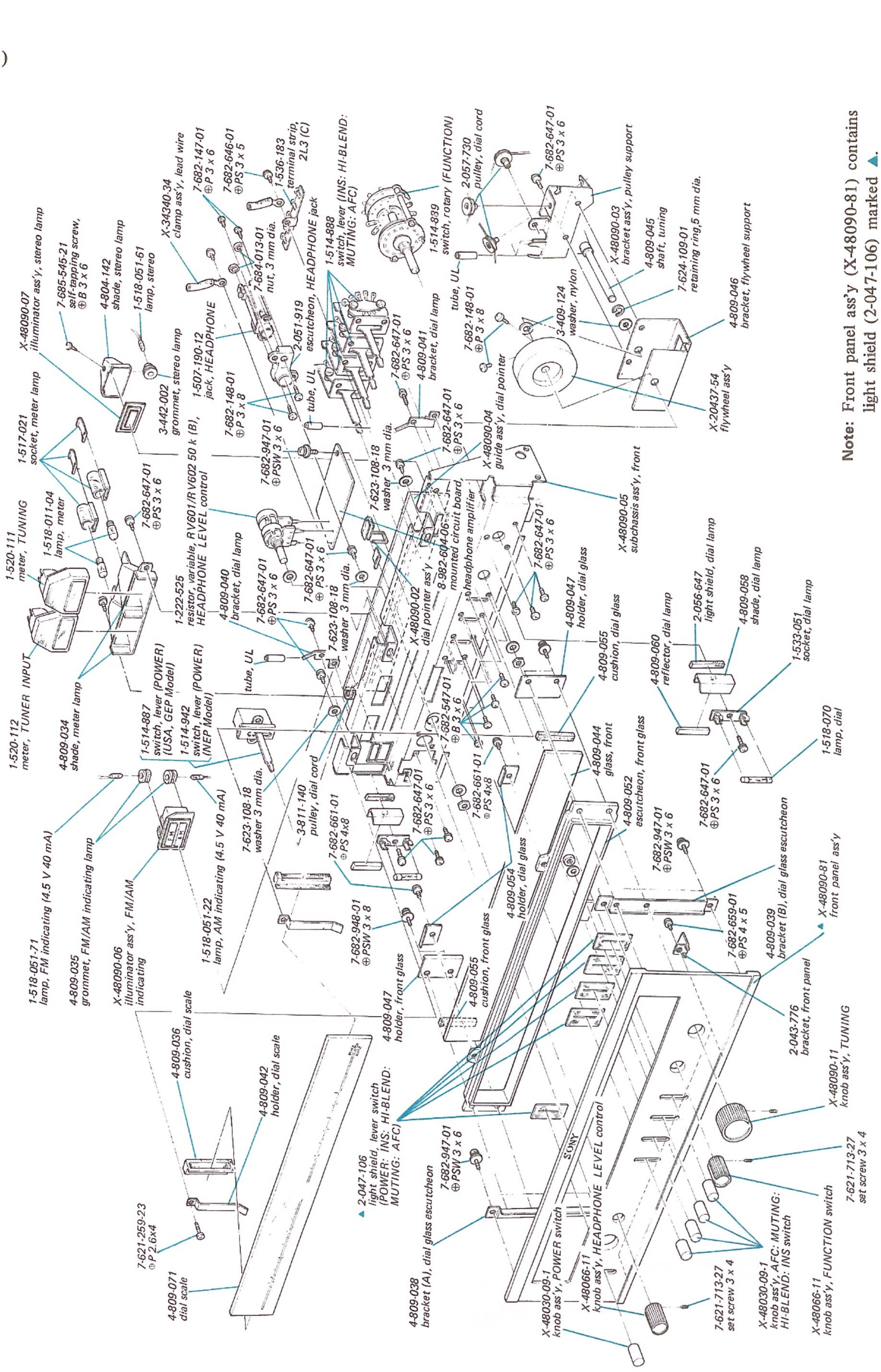
All resistance values are in ohms. k = 1,000, M = 1,000 k.
All capacitance values are in μF except as indicated with p, which means μμF.
All voltages represent an average value and should hold within ±10%.
All voltages are dc measured with a VOM which has an input impedance of 20 kohms/volt. No signal in.

SONY
ST-5130

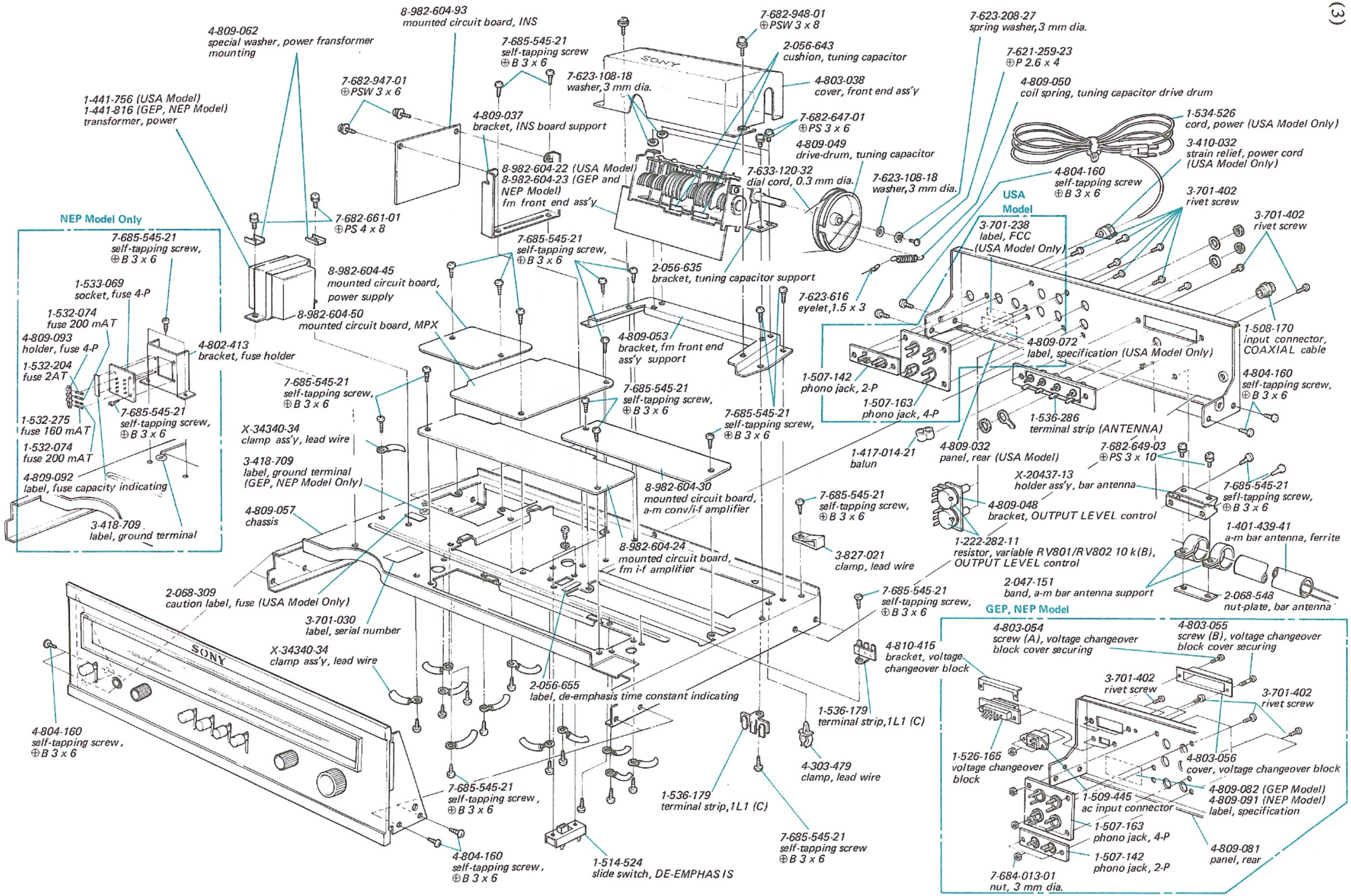
SECTION 6
EXPLODED VIEW

(1)





Note: Front panel ass'y (X-48090-81) contains light shield (2-047-106) marked ▲.



SECTION 7
ELECTRICAL PARTS LIST

Ref. No.	*Part No.*	*Description*
MOUNTED CIRCUIT BOARDS		
	8-982-604-22	fm front-end ass'y (USA Model)
	8-982-604-23	fm front-end ass'y (GEP and NEP Model)
	8-982-604-24	fm i-f amplifier circuit board
	8-982-604-30	a-m conv/i-f amplifier circuit board
	8-982-604-50	MPX circuit board
	8-982-604-93	INS circuit board
	8-982-604-45	power supply circuit board
	8-982-604-06	headphone amplifier circuit board
SEMICONDUCTORS		
D101		diode 1T243M
D102		diode 1S351M
D201		diode 1S1555
D202		diode 1S1555
D203		diode 1S1555
D204		diode 1S1555
D205		diode 1S1555
D206		diode 1S1555
D207		diode 1T22A
D208		diode 1T22A
D209		diode 1T22A
D210		diode 1T22A
D211		diode 1S1555
D212		diode 1T22A
D213		diode 1T22A
D214		diode 1T22A
D215		diode 1T22A
D216		diode 1T22A
D217		diode 1S1555
D218		diode 1S1555
D219		diode 1S1555
D301		diode 1T22A
D302		diode 1T22A
D401		diode 1S1555
D402		diode 1S1555
D403		diode 1S1555
D404		diode 1S1555
D405		diode 1T22A
D406		diode 1T22A
D407		diode 1T22A
D408		diode 1T22A
D409		diode 1S1555
D501		diode 1S1555
D502		diode 1S1555
D503		diode 1S1555
D504		diode 1S1555
D505		diode 1S1555
D506		diode 1S1555
D507		diode 1T22A
D701		diode 10D-2
D702		diode 10D-2
D703		diode 1T244
Q101		FET 3SK37
Q102		FET 3SK37
Q103		transistor 2SC710
Q104		transistor 2SC710
Q105		transistor 2SA677
Q106		transistor 2SA677
Q201		transistor 2SC403A
Q202		transistor 2SC710
Q203		transistor 2SC403A
Q204		transistor 2SC403A
Q205		transistor 2SC403A
Q206		transistor 2SC403A
Q207		FET 2SK23
Q208		FET 2SK23
Q209		transistor 2SC633A
Q210		transistor 2SC633A
Q301		transistor 2SC1129
Q302		transistor 2SC403A
Q303		transistor 2SC403A
Q304		transistor 2SC403A
Q305		transistor 2SC403A
Q401		FET 2SK23
Q402		transistor 2SC633A
Q403		transistor 2SC710
Q404		transistor 2SC634A
Q405		FET 2SK23
Q406		FET 2SK23
Q407		FET 2SK23
Q408		transistor 2SC631A
Q409		transistor 2SC633A
Q410		transistor 2SC633A
Q411		transistor 2SC633A
Q412		transistor 2SC633A
Q501		transistor 2SC633A
Q502		transistor 2SC633A
Q503		transistor 2SC633A
Q504		transistor 2SC633A
Q505		transistor 2SA677
Q506		FET 2SK23

Ref. No.	*Part No.*	*Description*
Q507		transistor 2SC633A
Q508		transistor 2SC633A
Q509		transistor 2SC633A
Q510		transistor 2SC633A
Q511		transistor 2SC633A
Q512		transistor 2SC633A
Q513		transistor 2SC633A
Q514		FET 2SK23
Q515		transistor 2SA677
Q601		transistor 2SC631A
Q602		transistor 2SC631A
Q603		transistor 2SC633A
Q604		transistor 2SC633A
Q605		transistor 2SA677
Q606		transistor 2SA677
Q701		transistor 2SD291
Q702		transistor 2SC634A
Q703		transistor 2SC634A

TRANSFORMERS, COILS AND INDUCTORS

B1	1-417-014	balun	
CFT301	1-403-150	CFT	
IFT101	1-403-295	IFT, fm	
IFT301	1-403-149	IFT, a-m	
L101	1-401-483	coil, fm antenna	
L102	1-425-712	coil, fm (RF1)	
L103	1-425-676	coil, fm (RF2)	
L104	1-425-713	coil, fm (RF3)	
L105	1-405-505	coil, fm osc	
L106	1-407-177	inductor, micro	470μH
L201	1-407-169	inductor, micro	100μH
L202	1-407-169	inductor, micro	100μH
L203	1-407-184	inductor, micro	3.3μH
L204	1-407-169	inductor, micro	100μH
L205	1-407-408	inductor, micro	22 mH
L206	1-407-163	inductor, micro	33μH
L207	1-407-169	inductor, micro	100μH
L208	1-407-169	inductor, micro	100μH
L209	1-407-169	inductor, micro	100μH
L301	1-407-169	inductor, micro	100μH
L501	1-407-197	inductor, micro	1.8 mH
L502	1-407-213	inductor, micro	1.5 mH
L503	1-415-044	delay coil (B)	
L504	1-415-044	delay coil (B)	
L505	1-415-044	delay coil (B)	
L506	1-415-044	delay coil (B)	
L507	1-415-044	delay coil (B)	
L508	1-415-044	delay coil (B)	
L509	1-415-044	delay coil (B)	
L510	1-415-043	delay coil (A)	
L801	1-401-439	bar antenna (a-m)	
L802	1-407-182	inductor, micro	2.2μH
L803	1-407-182	inductor, micro	2.2μH
MU401	1-425-548	MPX unit	
T201	1-403-291-13	transformer, discriminator	10.7 MHz
T202	1-403-299	IFT, fm	10.7 MHz
T301	1-405-459	coil, a-m osc	
T401	1-425-260	transformer, switching	
T801	1-441-756	transformer, power (USA Model)	
	1-441-816	transformer, power (GEP, NEP Model)	

CAPACITORS

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

C101	1-102-668	15p	±5%	50V	ceramic
C102	1-102-217	0.001	$\pm^{100}_{0}$%	50V	ceramic
C103	1-102-668	15p	±5%	50V	ceramic
C104	1-101-118	0.01	±20%	50V	ceramic
C105	1-101-118	0.01	±20%	50V	ceramic
C106	1-101-936	0.5p	±10%	500V	ceramic
C107	1-102-668	15p	±5%	50V	ceramic
C108	1-101-936	0.5p	±10%	500V	ceramic
C109	1-102-858	10p	±5%	50V	ceramic
C110	1-101-918	0.001	$\pm^{100}_{0}$%	25V	ceramic
C111	1-102-991	20p	±5%	50V	ceramic
C112	1-101-923	0.01	$\pm^{80}_{20}$%	25V	ceramic
C113	1-102-023	2p	±0.25p	50V	ceramic
C114	1-102-848	180p	±5%	50V	ceramic
C115	1-101-923	0.01	$\pm^{80}_{20}$%	25V	ceramic
C116	1-101-923	0.01	$\pm^{80}_{20}$%	25V	ceramic
C117	1-101-923	0.01	$\pm^{80}_{20}$%	25V	ceramic
C118	1-101-923	0.01	$\pm^{80}_{20}$%	25V	ceramic
C119	1-101-924	0.02	$\pm^{80}_{20}$%	25V	ceramic
C120	1-101-918	0.001	$\pm^{100}_{0}$%	25V	ceramic
C121	1-101-924	0.02	$\pm^{80}_{20}$%	25V	ceramic
C122	1-101-924	0.02	$\pm^{80}_{20}$%	25V	ceramic
C124	1-101-978	10p	±5%	50V	ceramic
C125	1-102-022	10p	±0.5p	50V	ceramic (GEP, NEP Model only)
	1-102-855	15p	±5%	50V	ceramic (USA Model only)

Ref. No.	Part No.	Description			
C126	1-102-882	4p	±5%	50V	ceramic
		(GEP, NEP Model only)			
	1-102-011	3p	±0.25p	50V	ceramic
		(USA Model only)			
C128	1-101-924	0.02	$\pm^{80}_{20}$%	25V	ceramic
C129	1-101-923	0.01	$\pm^{80}_{20}$%	25V	ceramic
C130	1-102-875	7p	±0.5p	50V	ceramic
C131	1-101-918	0.001	$\pm^{100}_{0}$%	25V	ceramic
C132	1-101-923	0.01	$\pm^{80}_{20}$%	25V	ceramic
C201	1-102-100	0.022	±20%	50V	ceramic
C202	1-102-100	0.022	±20%	50V	ceramic
C203	1-101-919	0.002	$\pm^{80}_{20}$%	25V	ceramic
C204	1-101-924	0.02	$\pm^{80}_{20}$%	25V	ceramic
C205	1-101-924	0.02	$\pm^{80}_{20}$%	25V	ceramic
C206	1-101-924	0.02	$\pm^{80}_{20}$%	25V	ceramic
C207	1-101-919	0.002	$\pm^{80}_{20}$%	25V	ceramic
C208	1-101-919	0.002	$\pm^{80}_{20}$%	25V	ceramic
C209	1-101-919	0.002	$\pm^{80}_{20}$%	25V	ceramic
C210	1-101-919	0.002	$\pm^{80}_{20}$%	25V	ceramic
C211	1-101-919	0.002	$\pm^{80}_{20}$%	25V	ceramic
C214	1-105-837-12	0.022	±20%	50V	mylar
C215	1-105-689-12	0.22	±10%	50V	mylar
C216	1-102-848	180p	±5%	50V	ceramic
C217	1-102-848	180p	±5%	50V	ceramic
C218	1-102-848	180p	±5%	50V	ceramic
C219	1-121-471	10	$\pm^{100}_{10}$%	16V	electrolytic
C220	1-107-140	240p	±10%	50V	silvered mica
C221	1-121-409	47	$\pm^{100}_{10}$%	16V	electrolytic
C222	1-101-424	500p	±20%	50V	ceramic
C223	1-121-912	1	$\pm^{100}_{10}$%	50V	electrolytic
C224	1-127-022	0.47	±20%	10V	solid, aluminum
C225	1-102-963	33p	±5%	50V	ceramic
C227	1-101-922	0.005	$\pm^{80}_{20}$%	50V	ceramic
C228	1-105-683-12	0.068	±10%	50V	mylar
C229	1-121-391	1	$\pm^{150}_{10}$%	50V	electrolytic
C230	1-121-396	4.7	$\pm^{150}_{10}$%	50V	electrolytic
C231	1-102-960	24p	±5%	50V	ceramic
C232	1-102-960	24p	±5%	50V	ceramic
C233	1-102-960	24p	±5%	50V	ceramic
C234	1-102-960	24p	±5%	50V	ceramic
C235	1-101-924	0.02	$\pm^{80}_{20}$%	25V	ceramic
C236	1-102-960	24p	±5%	50V	ceramic
C237	1-102-960	24p	±5%	50V	ceramic
C238	1-102-973	100p	±5%	50V	ceramic
C239	1-102-960	24p	±5%	50V	ceramic
C240	1-102-977	200p	±5%	50V	ceramic
C249	1-101-924	0.02	$\pm^{80}_{20}$%	25V	ceramic
C250	1-121-471	10	$\pm^{100}_{10}$%	16V	electrolytic
C251	1-121-471	10	$\pm^{100}_{10}$%	16V	electrolytic
C252	1-101-924	0.02	$\pm^{80}_{20}$%	25V	ceramic
C253	1-101-118	0.01	±20%	50V	ceramic
C254	1-121-471	10	$\pm^{100}_{10}$%	16V	electrolytic
C255	1-101-118	0.01	±20%	50V	ceramic
C256	1-121-409	47	$\pm^{100}_{10}$%	16V	electrolytic
C257	1-102-973	100p	±5%	50V	ceramic
C258	1-102-973	100p	±5%	50V	ceramic
C259	1-105-661-12	0.001	±10%	50V	mylar
C260	1-101-924	0.02	$\pm^{80}_{20}$%	25V	ceramic
C301	1-103-715	390p	±5%	50V	styrol
C302	1-105-673-12	0.01	±10%	50V	mylar
C303	1-105-677-12	0.022	±10%	50V	mylar
C304	1-102-977	200p	±5%	50V	ceramic
C305	1-102-945	8p	±0.5p	50V	ceramic
C306	1-105-679-12	0.033	±10%	50V	mylar
C307	1-105-677-12	0.022	±10%	50V	mylar
C309	1-105-677-12	0.022	±10%	50V	mylar
C311	1-105-677-12	0.022	±10%	50V	mylar
C312	1-105-673-12	0.01	±10%	50V	mylar
C313	1-105-685-12	0.1	±10%	50V	mylar
C314	1-101-884	56p	±5%	50V	ceramic
C315	1-101-924	0.02	±20%	25V	ceramic
C317	1-121-415	100	$\pm^{100}_{10}$%	16V	electrolytic
C318	1-101-924	0.02	±20%	25V	ceramic
C319	1-101-924	0.02	±20%	25V	ceramic
C320	1-127-019-11	0.1	±20%	10V	solid, aluminum
C321	1-101-924	0.02	±20%	25V	ceramic
C322	1-121-395	4.7	$\pm^{150}_{10}$%	25V	electrolytic
C323	1-101-924	0.02	±20%	25V	ceramic
C324	1-121-415	100	$\pm^{100}_{10}$%	16V	electrolytic
C325	1-121-456	3.3	$\pm^{150}_{10}$%	25V	electrolytic
C326	1-121-456	3.3	$\pm^{150}_{10}$%	25V	electrolytic
C327	1-121-413	100	$\pm^{100}_{10}$%	6.3V	electrolytic
C328	1-105-677-12	0.022	±10%	50V	mylar
C329	1-105-673-12	0.01	±10%	50V	mylar
C330	1-105-677-12	0.022	±10%	50V	mylar
C331	1-102-952	16p	±5%	50V	ceramic
C333	1-102-935	2p	±0.25p	50V	ceramic
C401	1-105-683-12	0.068	±10%	50V	mylar
C406	1-105-669-12	0.0047	±10%	50V	mylar
C407	1-121-413	100	$\pm^{100}_{10}$%	6.3V	electrolytic
C408	1-121-344	3.3	$\pm^{150}_{10}$%	25V	electrolytic
C409	1-127-021-11	0.33	±20%	10V	solid, aluminum
C410	1-121-403	33	$\pm^{100}_{10}$%	16V	electrolytic
C411	1-121-409	47	$\pm^{100}_{10}$%	16V	electrolytic
C412	1-121-403	33	$\pm^{100}_{10}$%	16V	electrolytic
C413	1-127-022-11	0.47	±20%	10V	solid, aluminum
C414	1-103-575	4,700p	±5%	50V	styrol
C415	1-106-041-12	0.047	±5%	50V	mylar
C416	1-106-041-12	0.047	±5%	50V	mylar
C417	1-121-391	1	$\pm^{150}_{10}$%	50V	electrolytic
C418	1-121-391	1	$\pm^{150}_{10}$%	50V	electrolytic

Ref. No.	Part No.		Description		
C419	1-121-391	1	$\pm^{150}_{10}$%	50V	electrolytic
C420	1-121-391	1	$\pm^{150}_{10}$%	50V	electrolytic
C421	1-105-661-12	0.001	±10%	50V	mylar
C422	1-105-661-12	0.001	±10%	50V	mylar
C423	1-105-675-12	0.015	±10%	50V	mylar
C424	1-121-403	33	$\pm^{100}_{10}$%	16V	electrolytic
C425	1-101-884	56p	±5%	50V	ceramic
C426	1-101-884	56p	±5%	50V	ceramic
C427	1-121-344	3.3	$\pm^{150}_{10}$%	25V	electrolytic
C428	1-121-344	3.3	$\pm^{150}_{10}$%	25V	electrolytic
C429	1-121-420	220	$\pm^{100}_{10}$%	10V	electrolytic
C430	1-121-420	220	$\pm^{100}_{10}$%	10V	electrolytic
C431	1-121-395	4.7	$\pm^{150}_{10}$%	25V	electrolytic
C432	1-121-395	4.7	$\pm^{150}_{10}$%	25V	electrolytic
C433	1-121-395	4.7	$\pm^{150}_{10}$%	25V	electrolytic
C434	1-121-395	4.7	$\pm^{150}_{10}$%	25V	electrolytic
C435	1-105-671-12	0.0068	±10%	50V	mylar
C436	1-121-409	47	$\pm^{100}_{10}$%	16V	electrolytic
C437	1-121-471	10	$\pm^{100}_{10}$%	16V	electrolytic
C501	1-121-471	10	$\pm^{100}_{10}$%	16V	electrolytic
C502	1-121-471	10	$\pm^{100}_{10}$%	16V	electrolytic
C503	1-105-841-12	0.047	±20%	50V	mylar
C504	1-105-841-12	0.047	±20%	50V	mylar
C505	1-105-841-12	0.047	±20%	50V	mylar
C507	1-105-821-12	0.001	±20%	50V	mylar
C508	1-103-722	750p	±5%	50V	styrol
C509	1-105-821-12	0.001	±20%	50V	mylar
C510	1-105-841-12	0.047	±20%	50V	mylar
C511	1-105-829-12	0.0047	±20%	50V	mylar
C512	1-105-835-12	0.015	±20%	50V	mylar
C513	1-105-821-12	0.001	±20%	50V	mylar
C514	1-105-835-12	0.015	±20%	50V	mylar
C515	1-101-973	100p	±5%	50V	ceramic
C517	1-101-977	200p	±5%	50V	ceramic
C518	1-105-833-12	0.01	±20%	50V	mylar
C519	1-103-717	470p	±5%	50V	styrol
C520	1-121-471	10	$\pm^{100}_{10}$%	16V	electrolytic
C521	1-105-821-12	0.001	±20%	50V	mylar
C522	1-121-393	3.3	$\pm^{150}_{10}$%	50V	electrolytic
C523	1-101-924	0.02	$\pm^{80}_{20}$%	25V	ceramic
C524	1-121-415	100	$\pm^{100}_{10}$%	16V	electrolytic
C525	1-121-393	3.3	$\pm^{150}_{10}$%	50V	electrolytic
C526	1-105-845-12	0.1	±20%	50V	mylar
C527	1-121-415	100	$\pm^{100}_{10}$%	16V	electrolytic
C528	1-121-415	100	$\pm^{100}_{10}$%	16V	electrolytic
C529	1-103-725	1,000p	±5%	50V	styrol
C530	1-103-734	2,400p	±5%	50V	styrol
C531	1-103-734	2,400p	±5%	50V	styrol
C532	1-103-734	2,400p	±5%	50V	styrol
C533	1-103-734	2,400p	±5%	50V	styrol
C534	1-103-734	2,400p	±5%	50V	styrol
C535	1-103-734	2,400p	±5%	50V	styrol
C536	1-103-734	2,400p	±5%	50V	styrol

Ref. No.	Part No.		Description		
C537	1-103-725	1,000p	±5%	50V	styrol
C601	1-121-471	10	$\pm^{100}_{10}$%	16V	electrolytic
C602	1-121-471	10	$\pm^{100}_{10}$%	16V	electrolytic
C603	1-121-471	10	$\pm^{100}_{10}$%	16V	electrolytic
C604	1-121-471	10	$\pm^{100}_{10}$%	16V	electrolytic
C605	1-121-420	220	$\pm^{100}_{10}$%	10V	electrolytic
C606	1-121-420	220	$\pm^{100}_{10}$%	10V	electrolytic
C607	1-121-402	33	$\pm^{100}_{10}$%	10V	electrolytic
C608	1-121-402	33	$\pm^{100}_{10}$%	10V	electrolytic
C701	1-121-388	1,000	$\pm^{100}_{10}$%	35V	electrolytic
C702	1-121-422	220	$\pm^{100}_{10}$%	25V	electrolytic
C703	1-121-409	47	$\pm^{100}_{10}$%	16V	electrolytic
C704	1-121-422	220	$\pm^{100}_{10}$%	25V	electrolytic
C705	1-105-757-12	0.022	±10%	220V	mylar
C706	1-105-757-12	0.022	±10%	220V	mylar
C801	1-121-420	220	$\pm^{100}_{10}$%	10V	electrolytic
C802	1-105-677-12	0.022	±10%	50V	mylar
C803	1-105-677-12	0.022	±10%	50V	mylar
C804	1-102-977	200p	±5%	50V	ceramic
CT301	1-141-095	capacitor, trimmer			
CT302	1-141-095	capacitor, trimmer			

RESISTORS

All resistance values are in Ω, ±5%, ¼W and carbon type, unless otherwise indicated.

R101	1-244-709	33 k
R102	1-244-713	47 k
R103	1-244-657	220
R104	1-242-697	10 k
R105	1-242-721	100 k
R106	1-242-633	22
R107	1-244-665	470
R108	1-242-697	10 k
R109	1-242-691	5.6 k
R110	1-242-653	150
R111	1-244-633	22
R112	1-242-661	330
R113	1-242-661	330
R114	1-242-671	820
R115	1-244-633	22
R116	1-242-677	1.5 k
R117	1-242-721	100 k
R118	1-242-721	100 k
R119	1-244-729	220 k
R120	1-242-689	4.7 k
R121	1-244-643	56
R122	1-242-677	1.5 k
R123	1-242-677	1.5 k
R124	1-242-677	1.5 k

Ref. No.	*Part No.*		*Description*
R125	1-242-691	5.6 k	
R126	1-242-697	10 k	
R127	1-244-657	220	
R201	1-242-657	220	
R202	1-242-671	820	
R203	1-244-677	1.5 k	
R204	1-244-685	3.3 k	
R205	1-242-653	150	
R206	1-244-673	1 k	
R207	1-244-673	1 k	
R208	1-242-671	820	
R209	1-244-677	1.5 k	
R210	1-244-685	3.3 k	
R211	1-242-653	150	
R212	1-244-673	1 k	
R213	1-244-673	1 k	
R214	1-242-649	100	
R215	1-242-657	220	
R216	1-242-671	820	
R217	1-242-689	4.7 k	
R218	1-242-675	1.2 k	
R219	1-242-653	150	
R220	1-242-663	390	
R221	1-244-677	1.5 k	
R222	1-242-679	1.8 k	
R223	1-242-671	820	
R224	1-244-673	1 k	
R225	1-242-649	100	
R226	1-242-659	270	
R227	1-242-671	820	
R228	1-242-653	150	
R229	1-244-705	22 k	
R230	1-242-695	8.2 k	
R231	1-242-673	1 k	
R232	1-242-649	100	
R233	1-242-649	100	
R234	1-244-709	33 k	
R235	1-242-693	6.8 k	
R236	1-242-673	1 k	
R237	1-244-673	1 k	
R238	1-244-673	1 k	
R239	1-244-649	100	
R240	1-242-743	820 k	
R241	1-242-719	82 k	
R242	1-242-691	5.6 k	
R243	1-242-680	2 k	
R244	1-242-691	5.6 k	
R245	1-244-673	1 k	
R246	1-242-673	1 k	
R247	1-242-699	12 k	
R248	1-244-745	1 M	
R249	1-244-735	390 k	
R250	1-242-745	1 M	

Ref. No.	*Part No.*		*Description*
R251	1-242-723	120 k	
R252	1-242-710	39 k	
R253	1-242-721	100 k	
R254	1-242-657	220	
R255	1-244-679	1.8 k	
R256	1-242-705	22 k	
R257	1-242-703	18 k	
R258	1-242-689	4.7 k	
R259	1-242-632	20	
R260	1-244-701	15 k	
R261	1-242-699	12 k	
R262	1-242-632	20	
R263	1-242-699	12 k	
R264	1-244-701	15 k	
R265	1-242-720	91 k	
R266	1-244-733	330 k	
R267	1-242-699	12 k	
R268	1-242-713	47 k	
R269	1-242-713	47 k	
R270	1-242-699	12 k	
R271	1-242-691	5.6 k	
R272	1-242-713	47 k	
R273	1-244-642	51	
R274	1-244-642	51	
R275	1-242-642	51	
R276	1-242-649	100	
R301	1-244-691	5.6 k	
R302	1-244-708	30 k	
R303	1-244-708	30 k	
R304	1-244-634	24	
R305	1-244-647	82	
R306	1-244-708	30 k	
R307	1-244-673	1 k	
R308	1-244-691	5.6 k	
R309	1-244-649	100	
R310	1-244-719	82 k	
R311	1-244-691	5.6 k	
R312	1-244-673	1 k	
R313	1-244-684	3 k	
R314	1-244-689	4.7 k	
R315	1-244-645	68	
R316	1-244-657	220	
R317	1-244-689	4.7 k	
R318	1-244-645	68	
R319	1-202-565	470	±10% ½W composition
R320	1-244-673	1 k	
R321	1-244-673	1 k	
R322	1-244-680	2 k	
R323	1-242-657	220	
R324	1-242-701	15 k	
R325	1-244-691	5.6 k	
R326	1-244-689	4.7 k	
R327	1-244-645	68	

Ref. No.	*Part No.*		*Description*
R328	1-244-673	1 k	
R329	1-244-701	15 k	
R330	1-244-680	2 k	
R331	1-244-671	820	
R332	1-244-657	220	
R333	1-244-717	68 k	
R334	1-244-670	750	
R401	1-244-737	470 k	
R403	1-244-673	1 k	
R404	1-242-673	1 k	
R406	1-244-706	24 k	
R407	1-242-711	39 k	
R408	1-244-689	4.7 k	
R409	1-244-709	33 k	
R410	1-244-643	56	
R411	1-242-731	270 k	
R412	1-244-689	4.7 k	
R413	1-244-682	2.4 k	
R414	1-244-689	4.7 k	
R415	1-202-560	300	±10% ½W composition
R416	1-244-690	5.1 k	
R417	1-242-671	820	
R418	1-244-649	100	
R419	1-242-643	56	
R420	1-244-673	1 k	
R421	1-242-670	750	
R422	1-242-670	750	
R423	1-242-670	750	
R424	1-242-670	750	
R425	1-242-679	1.8 k	
R426	1-242-679	1.8 k	
R427	1-242-721	100 k	
R428	1-242-721	100 k	
R429	1-242-693	6.8 k	
R430	1-242-693	6.8 k	
R431	1-242-721	100 k	
R432	1-242-721	100 k	
R433	1-242-671	820	
R434	1-242-671	820	
R435	1-242-715	56 k	
R436	1-242-715	56 k	
R437	1-242-715	56 k	
R438	1-242-715	56 k	
R439	1-242-663	390	
R440	1-242-663	390	
R441	1-242-706	24 k	
R442	1-242-706	24 k	
R443	1-242-685	3.3 k	
R444	1-242-685	3.3 k	
R445	1-242-659	270	
R446	1-242-659	270	
R447	1-242-677	1.5 k	
R448	1-242-677	1.5 k	

Ref. No.	*Part No.*		*Description*
R449	1-242-685	3.3 k	
R450	1-242-685	3.3 k	
R451	1-242-707	27 k	
R452	1-242-707	27 k	
R453	1-242-720	91 k	
R454	1-242-720	91 k	
R455	1-242-687	3.9 k	
R456	1-242-687	3.9 k	
R457	1-242-666	510	
R458	1-242-666	510	
R459	1-242-707	27 k	
R460	1-242-707	27 k	
R461	1-242-702	16 k	
R462	1-242-702	16 k	
R463	1-242-673	1 k	
R464	1-242-673	1 k	
R465	1-242-709	33 k	
R466	1-242-667	560	
※ R467	1-244-704	20 k	
	1-244-708	30 k	
	1-244-713	47 k	
	1-244-717	68 k	
	1-244-715	82 k	
R468	1-242-713	47 k	
R501	1-242-707	27 k	
R502	1-242-707	27 k	
R503	1-244-680	2 k	
R504	1-242-697	10 k	
R505	1-242-715	56 k	
R506	1-242-661	330	
R507	1-242-685	3.3 k	
R508	1-244-697	10 k	
R509	1-244-721	100 k	
R510	1-244-697	10 k	
R511	1-244-713	47 k	
R512	1-244-731	270 k	
R513	1-244-728	200 k	
R514	1-242-721	100 k	
R515	1-244-729	220 k	
R516	1-242-729	220 k	
R517	1-242-721	100 k	
R518	1-244-729	220 k	
R519	1-242-731	270 k	
R520	1-242-737	470 k	
R521	1-244-673	1 k	
R522	1-242-661	330	
R523	1-244-673	1 k	
R524	1-242-701	15 k	
R525	1-242-709	33 k	
R526	1-242-717	68 k	
R527	1-242-661	330	

※ should be selected

Ref. No.	Part No.		Description
R528	1-242-683	2.7 k	
R529	1-242-729	220 k	
R530	1-242-701	15 k	
R531	1-244-657	220	
R532	1-244-888	4.3 k	
R533	1-244-680	2 k	
R534	1-242-680	2 k	
R535	1-242-680	2 k	
R536	1-242-707	27 k	
R537	1-242-707	27 k	
R538	1-242-707	27 k	
R539	1-242-656	200	
R540	1-242-680	2 k	
R541	1-242-715	56 k	
R542	1-242-680	2 k	
R543	1-244-707	27 k	
R544	1-242-707	27 k	
R545	1-242-687	3.9 k	
R546	1-242-680	2 k	
R547	1-242-737	470 k	
R548	1-242-649	100	
R549	1-242-737	470 k	
R550	1-242-661	330	
R551	1-242-673	1 k	
R552	1-244-673	1 k	
R553	1-242-659	270	
R601	1-244-701	15 k	
R602	1-244-701	15 k	
R603	1-242-697	10 k	
R604	1-242-697	10 k	
R605	1-242-714	51 k	
R606	1-242-714	51 k	
R607	1-242-689	4.7 k	
R608	1-242-689	4.7 k	
R609	1-242-661	330	
R610	1-242-661	330	
R611	1-242-657	220	
R612	1-242-657	220	
R613	1-242-649	100	
R614	1-242-649	100	
R615	1-242-629	15	
R616	1-242-629	15	
R617	1-242-629	15	
R618	1-242-629	15	
R619	1-242-645	68	
R620	1-242-645	68	
R621	1-242-721	100 k	
R622	1-242-721	100 k	
R701	1-207-723	3.9	±10% 2W wire-wound
R702	1-244-699	12 k	
R703	1-244-699	12 k	
R704	1-244-693	6.8 k	

Ref. No.	Part No.		Description
※ R705	1-244-692	6.2 k	
	1-244-693	6.8 k	
	1-244-694	7.5 k	
	1-244-695	8.2 k	
	1-244-696	9.1 k	
	1-244-697	10 k	
R706	1-244-673	1 k	

※ should be selected

R801	1-244-646	75	
R802	1-244-646	75	
R803	1-202-645	1 M	±10% ½W composition (USA Model only)
R804	1-244-723	120 k	
R805	1-244-703	18 k	
RT201	1-221-979	4.7 k (B)	semi-fixed
RT202	1-222-969	100 k (B)	semi-fixed
RT301	1-222-951	10 k (B)	semi-fixed
RT401	1-222-948	3.3 k (B)	semi-fixed
RT501	1-222-984	33 k (B)	semi-fixed
RV601	1-222-588	50 k (B)	variable (HEADPHONE LEVEL control)
RV602	1-222-588	50 k (B)	variable (HEADPHONE LEVEL control)
RV801	1-222-282	10 k (B)	variable (OUTPUT LEVEL control)
RV802	1-222-282	10 k (B)	variable (OUTPUT LEVEL control)

SWITCHES

S1	1-514-889	switch, rotary (FUNCTION)
S2	1-514-888	switch, rotary/lever (INS)
S3	1-514-888	switch, rotary/lever (HI-BLEND)
S4	1-514-888	switch, rotary/lever (MUTING)
S5	1-514-888	switch, rotary/lever (AFC) (USA, GEP Model only)
S6	1-514-887-21	switch, lever (POWER) (USA Model)
	1-514-887-11	switch, lever (POWER) (GEP, NEP Model)
S7	1-514-524	switch, slide (DE-EMPHASIS)

FILTERS

CF201 CF202 CF203 CF204 CF205 CF206 CF207 CF208	1-403-562-11	fm i-f, ceramic 10.70 MHz (red)
	1-403-562-21	fm i-f, ceramic 10.66 MHz (black)
	1-403-562-31	fm i-f, ceramic 10.74 MHz (white)
	1-403-562-41	fm i-f, ceramic 10.62 MHz (green)
	1-403-562-51	fm i-f, ceramic 10.78 MHz (yellow)
LPF401	1-231-088	filter, low-pass

Ref. No.	Part No.	Description
		MISCELLANEOUS
CP801	1-231-057-12	encapsulated component, 120Ω + 0.033μF
J801	1-508-170	plug, COAXIAL cable
J802	1-507-190	jack, HEADPHONE
J803, J804, J805, J806	1-507-163	phono jack, 4-P
J807, J808	1-507-142	phono jack, 2-P
P1	1-509-445	AC input connector, 3-P (GEP, NEP Model only)
	1-517-021	socket, pilot lamp
PL1	1-518-011-04	lamp, meter 8V/150 mA
PL2	1-518-051-71	lamp, 4.5V/40 mA (FM indicating)
PL3	1-518-051-22	lamp, 4.5V/40 mA (AM indicating)
PL4	1-518-011-04	lamp, meter 8V/150 mA
PL5	1-518-070	lamp, dial 8V/300 mA
PL6	1-518-070	lamp, dial 8V/300 mA
PL7	1-518-051-61	lamp, stereo 4.5V/40 mA
M801	1-520-111	meter, TUNING
M802	1-520-112	meter, TUNER INPUT
V.S.	1-526-165	voltage changeover block (GEP, NEP Model only)
F801	1-532-260	fuse, 0.25 A (GEP Model only)
	1-532-275	fuse, 160 mAT (NEP Model only)
	1-532-305	fuse, 0.4A (USA Model only)
F802	1-532-260	fuse, 0.25 A (GEP Model only)
	1-532-204	fuse, 2 AT (NEP Model only)
F803	1-532-074	fuse, 200 mAT (NEP Model only)
F804	1-532-074	fuse, 200 mAT (NEP Model only)
	1-533-051	socket, dial lamp
	1-533-069	socket, fuse; 4-P (NEP Model only)
	1-534-526	cord, power (USA Model only)
	1-536-179	terminal stirp, 1L1
	1-536-183	terminal strip, 2L3
TM801	1-536-286	terminal stirp, 4-P

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