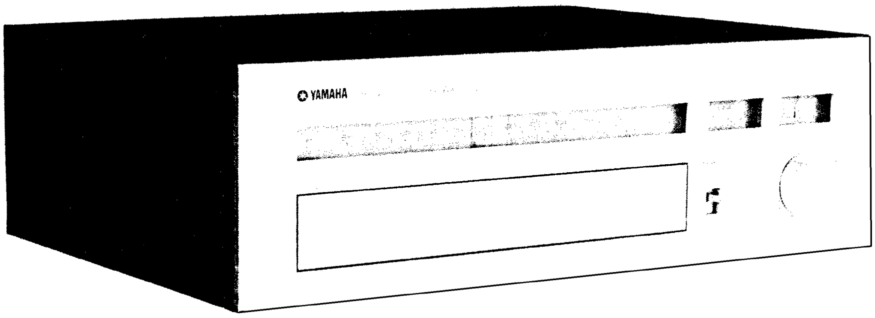
YAMAHA Hi-Fi STEREO
SERVICE MANUAL
FM STEREO TUNER
MODEL CT-7000



ASM-27 ① 10 Printed in Japan 10-74

CONTENTS

SPECIFICATIONS

Tuning Range
88-108MHz

Sensitivity (mono)
IHF Normal: better than 2.5μV
Wide: better than 3.2μV
DIN (40kHz Dev.; S/N 26dB)
Normal: better than 1.6μV
Wide: better than 2.5μV

Sensitivity (stereo)
DIN (40kHz Dev.; S/N 46dB)
50μV

Image Frequency Rejection
Over 120dB

IF Rejection Over 120dB

Spurious Response Rejection
Over 120dB

AM Rejection
IHF Over 60dB

Capture Ratio
1mV Normal: better than 1.3dB
Wide: better than 1.0dB
10μV Normal: better than 2.0dB
Wide: better than 3.0dB
100mV Normal: better than 1.0dB
Wide: better than 1.0dB

Selectivity
IHF (75kHz Dev.)
Normal: over 80dB
Wide: over 18dB
DIN (±300Hz; 40kHz Dev.) ±500kHz
Normal: over 65dB
Wide: over 10dB
Normal: over 90dB
Wide: over 35dB

Signal/Noise Ratio (mono)
IHF (75kHz Dev.)
Over 78dB
DIN (40kHz Dev.)
Over 72dB

Signal/Noise Ratio (stereo)
IHF (75kHz Dev.)
Over 75dB
DIN (40kHz Dev.)
Over 69dB

Total Harmonic Distortion
(antenna level: 1mV)
Mono
IHF (400Hz; 75kHz Dev.)
Normal: less than 0.08%
Wide: less than 0.08%
DIN (1kHz; 40kHz Dev.)
Normal: less than 0.08%
Wide: less than 0.08%
IHF (50-10,000Hz; 75kHz Dev.)
Normal: less than 0.3%
Wide: less than 0.15%
DIN (50-10,000Hz; 40kHz Dev.)
Normal: less than 0.3%
Wide: less than 0.15%
Stereo
IHF (400Hz; 75kHz Dev.)
Normal: less than 0.08%
Wide: less than 0.08%
DIN (1kHz; 40kHz Dev.)
Normal: less than 0.08%
Wide: less than 0.08%
IHF (50-10,000Hz; 75kHz Dev.)
Normal: less than 0.5%
Wide: less than 0.2%
DIN (50-10,000Hz; 40kHz Dev.)
Normal: less than 0.5%
Wide: less than 0.2%

Stereo Separation
IHF (400Hz; 75kHz Dev.)
Normal & wide: 50dB
DIN (1kHz; 40kHz Dev.)
Normal & wide: 50dB
IHF (50-10,000Hz; 75kHz Dev.)
Normal: 35dB
Wide: 40dB
DIN (50-10,000Hz; 40kHz Dev.)
Normal: 35dB
Wide: 40dB

Frequency Response
50-10,000Hz
±0.3dB
30-15,000Hz
+0.5dB, −1.0dB

Sub-Carrier Suppression
Over 70dB

Muting Override Signal Level
3-30μV

Stereo Level 3-30μV

Auto Blend Level
I: 100μV, II: 1mV

GENERAL

Transistors	108	
FETs	12 (dual-gate MOS: 3, junction: 9)	
Diodes	33	
Zener Diodes	9	
ICs	7	
Two-Element Ceramic Filter		1
Four-Element Ceramic Filter		1
Two-Element Ceramic Block Filters		2

Headphone Output
4-16Ω

Fixed Output
775mV

Variable Output
2V ~ 70mV variable

Antenna Input Impedance
300Ω (balanced),
75Ω (unbalanced)

Power Source
110, 117, 130, 220, 240V, 50/60Hz

Power Consumption
23W (illum. off: 13W)

AC Outlet 1 (unswitched, 500W)

Cabinet American walnut

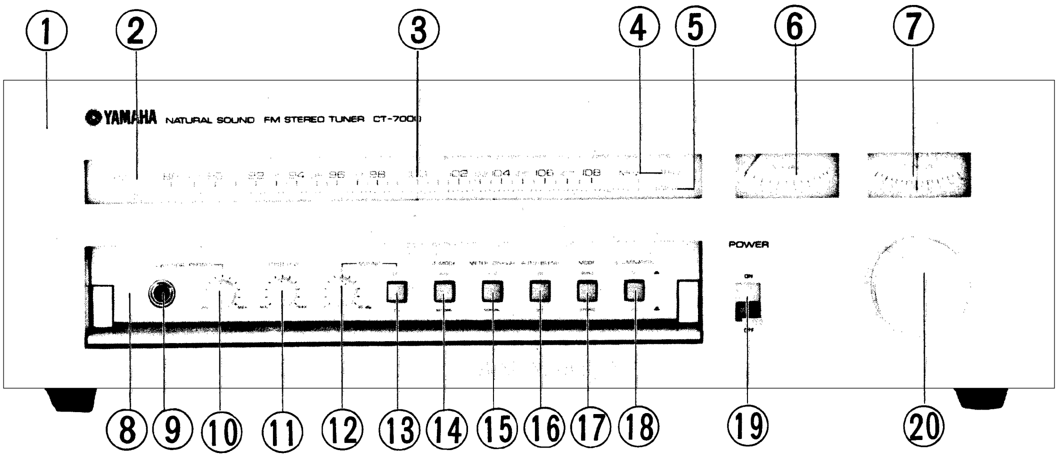
Front Panel Hairline brushed aluminum

Dimensions (WxHxD)
436 x 144 x 352mm
(17.2" x 5.7" x 13.9")

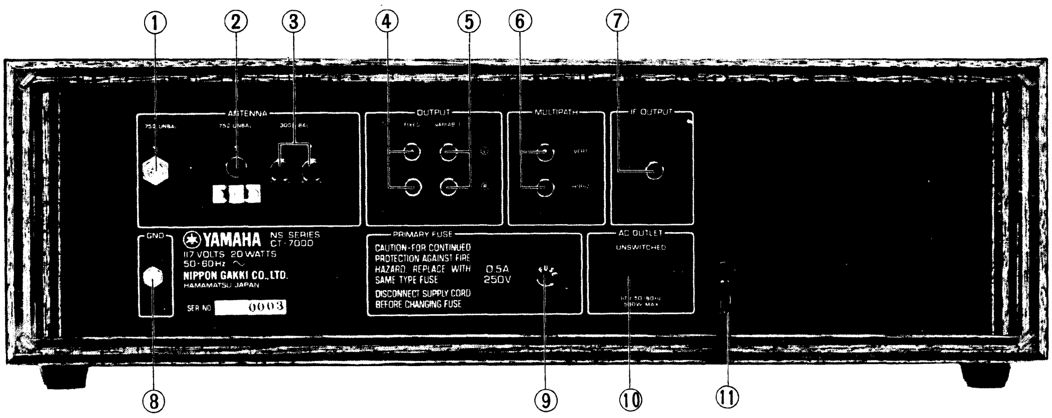
Weight 13kg (28.6 lbs.)

EXTERNAL VIEW

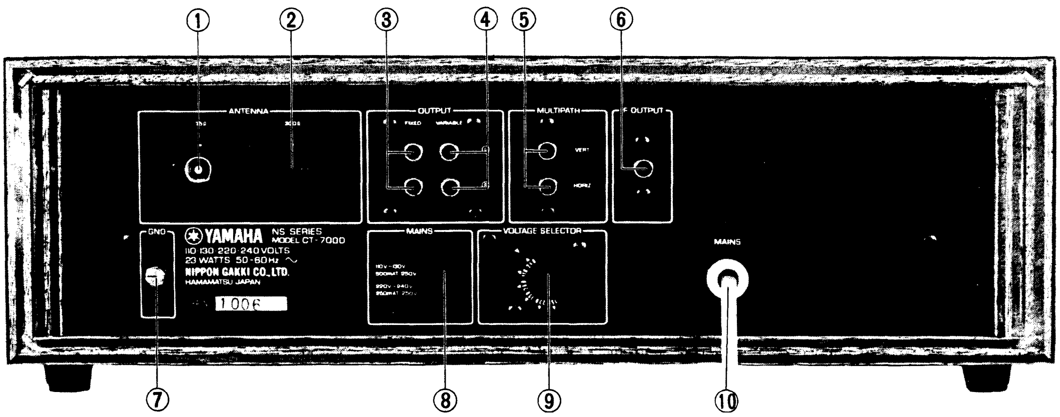
FRONT PANEL



REAR PANEL (U.S.& CANADIAN MODELS)



REAR PANEL (EUROPEAN MODEL)



FRONT PANEL

1. FRONT PANEL
2. DIAL SCALE
3. DIAL POINTER
4. STEREO INDICATOR
5. STATION INDICATOR
6. SIGNAL METER
7. TUNING METER
8. CONTROL PANEL
9. HEADPHONE JACK
10. HEADPHONE VOLUME CONTROL
11. OUTPUT LEVEL CONTROL
12. MUTING LEVEL CONTROL
13. MUTING SWITCH
14. IF MODE SWITCH
15. METER-DISPLAY SWITCH
16. AUTO-BLEND SWITCH
17. MODE SWITCH
18. ILLUMINATION SWITCH
19. POWER SWITCH
20. TUNING KNOB

REAR PANEL (U.S.& CANADIAN MODELS)

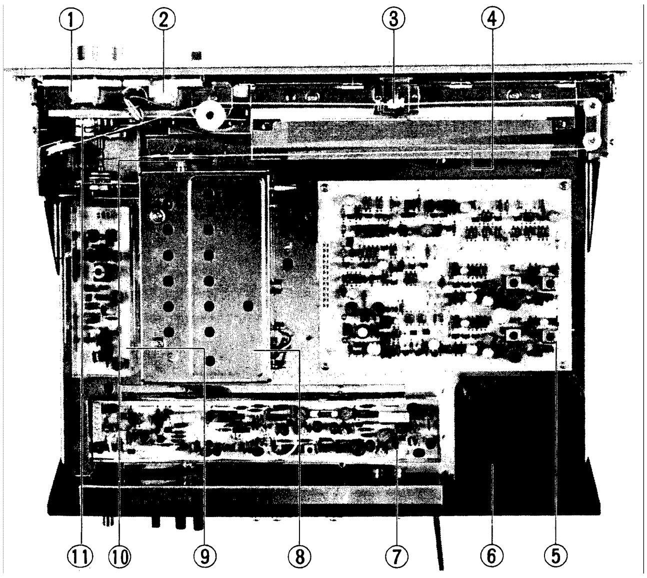
1. F-TYPE RECEPTACLE
2. 75Ω ANTENNA TERMINAL
3. 300Ω ANTENNA TERMINAL
4. FIXED OUTPUT JACKS
5. VARIABLE OUTPUT JACKS
6. MULTIPATH JACKS
7. IF OUTPUT JACK
8. GROUND TERMINAL
9. FUSE HOLDER
10. AC OUTLET (UNSWITCHED)
11. AC CORD

REAR PANEL (EUROPEAN MODEL)

1. ANTENNA SOCKET FOR 75Ω COAXIAL CABLE
2. 300Ω DIN ANTENNA SOCKET
3. FIXED OUTPUT JACKS
4. VARIABLE OUTPUT JACKS
5. MULTIPATH JACKS
6. IF OUTPUT JACKS
7. GROUND TERMINAL
8. FUSE HOLDER
9. VOLTAGE SELECTOR
10. AC CORD

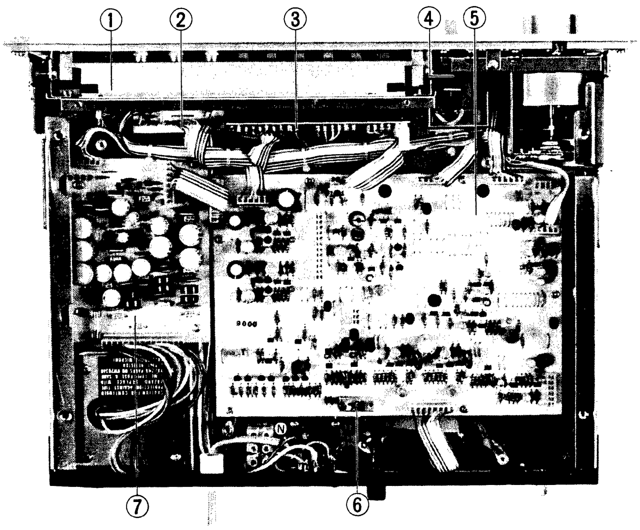
INTERNAL VIEW

TOP VIEW



1. TUNING METER
2. SIGNAL METER
3. DIAL POINTER
4. DIAL LAMP CIRCUIT BOARD
5. MULTIPLEX DEMODULATOR CIRCUIT BOARD
6. POWER TRANSFORMER
7. IF AMPLIFIER CIRCUIT BOARD
8. RF PACK
9. DISCRIMINATOR CIRCUIT BOARD
10. METER LAMP CIRCUIT BOARD
11. PULLEY FOR VARIABLE CAPACITOR

BOTTOM VIEW



1. CONTROL UNIT
2. VOLUME CIRCUIT BOARD
3. SWITCH CIRCUIT BOARD
4. POWER SWITCH
5. CONTROL CIRCUIT BOARD
6. DE-EMPHASIS SWITCH
7. POWER SUPPLY CIRCUIT BOARD

CIRCUIT DESCRIPTION

METER CIRCUIT

This circuit has two functions. One permits almost direct feeding of signals with strengths from 10dBμ to 100dBμ to the Signal meter. The other permits selection of AM components in the FM signal, thus showing the multipath element and displaying it as a Signal-minus-Multipath deflection. This system permits the owner to find the best balance of strong and "clean" signals by switching between the two functions of this meter while experimenting with different antenna locations.

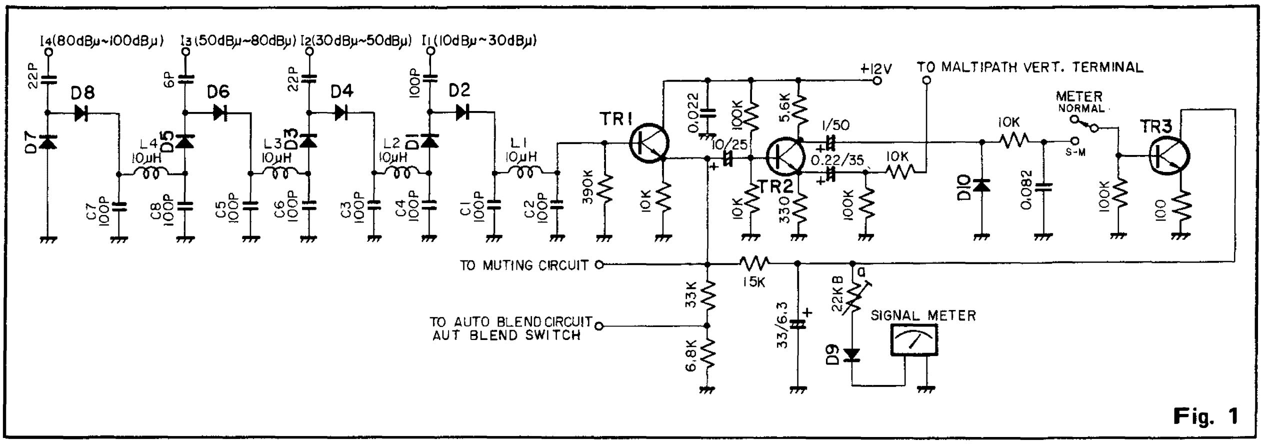


Fig. 1

Operation

1. Signal Display

IF stage signals are detected at terminals I_1~I_4, and each is rectified to double voltage through the actions of two diodes, then sent to Tr1. The signal strength detection circuits are divided into a series of four. For example, when a 10dBμ signal is received, the IF stage amplifier connected to the I_1 terminal generates a signal operating diodes D1 and D2 for the output. That means that the D1, D2, C1, C2, L1 circuit is not operating at this time. When a stronger signal is received, input from I_1 rises above 10dBμ to saturation point (app. 30dBμ), at which time input is transferred to I_2 to cover the 30dBμ-50dBμ range. The I_3 terminal is for signals between 50dBμ and 80dBμ, while I_4 covers the range from 80dBμ and 100dBμ. This assures excellent, linear meter response. These circuits – L1L2L3L4 (C1-C8) are connected with DC current, not AC.

2. Multipath Display

The Signal meter display signal is amplified at Tr1 to operate the meter. At the same time, the AC element in the signal which shows multipath strength is amplified and rectified to a half wave by D10. In this way positive potential is obtained. At this time, if the meter switch is set to S-M, positive potential is fed to Tr3 (in parallel with the signal meter) lowering the impedance of Tr3 and reducing the Signal meter amplification accordingly.

AUTO BLEND CIRCUIT

A weak stereo signal is accompanied by noticeably more noise than a monophonic signal of the same strength. The phase of such noise is opposed in the right and left channels, so it is possible to cancel it, at least in part, through mixing the channels, without losing frequency response. The mixing is done automatically by this circuit, in two stages: for signals below 60dBμ and below 40dBμ. Naturally, the stronger the blend effect, the less stereo separation is available. (Separation 40dBμ 1KHz = 8dB, 60dBμ 1KHz = 14dB)

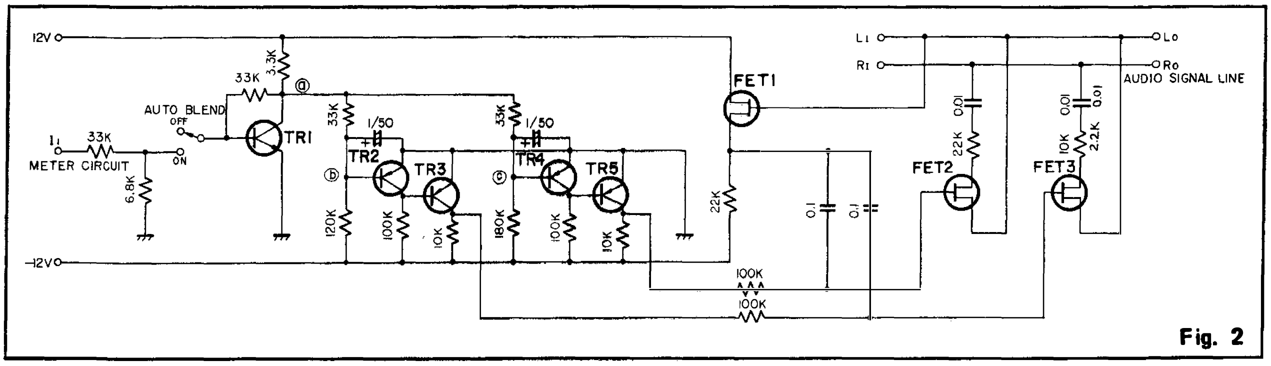


Fig. 2

Operation

1. With the Auto Blend Switch Off

Since the Tr1 bias is positive, Tr1 switches on and E potential at point ⓐ is zero. Potentials at points ⓑ and ⓒ are below −0.5V, so Tr2 and Tr4 are on, Tr3 and Tr5 off. In addition −12V is fed to the gates of FET1 FET2, so there is no blend effect.

2. With the Auto Blend Switch On

a. If the strength of the received signal is less than 40dBμ, potential present at input terminal I_1 is low, so that the output impedance from Tr1 is high, raising the potentials at points ⓑ and ⓒ to more than −0.5V. This switches Tr2 and Tr4 off, and Tr3 and Tr5 on, and potential almost the value of E is fed to FET2 and FET3 gates. In addition, the left channel audio signal is fed from FET1 to the FET2 and FET3 gates for a steady blend effect in both stages.

b. When the strength of the received signal is below 60dBμ but over 40dBμ, Tr1 impedance lowers and potential at point ⓐ is enough to cause the potential at points ⓑ and ⓒ to drop, below −0.5V, so that the blend effect is available, but only via FET3.

c. When the strength of the received signal is over 60dBμ Tr1 is almost switched on, which is the same condition as that described in (1) above. This cancels the blend effect.

AUTO TOUCH AFC OFF CIRCUIT & STATION/AFC INDICATOR CIRCUIT

These circuits turn the AFC off when a station is being tuned, and also indicate when tuning is in the reception area of a station, showing that the AFC is off at the same time. This gives rise to the following merits:

1. If the AFC is constantly operating in the tuner then, assuming that AFC-caused frequency drift is 1/n, the apparent selection zone is increased n times. In such a case, if there is a powerful station nearby on the dial, the tuning is apt to be pulled off, even during station selection, which will make it impossible to tune the nearby station. To avoid this problem the AFC goes off automatically when the tuning knob is touched.

2. More recent tuners tend to do away with the AFC function altogether, depending upon advanced circuit technology to suppress drift. In these tuners, circuits are designed to resist the affect of temperature fluctuations, so that drift can be forgotten as a serious problem.

In such a tuner, the addition of AFC will of course provide extra protection against drift — and this is the superior feature of the Yamaha system.

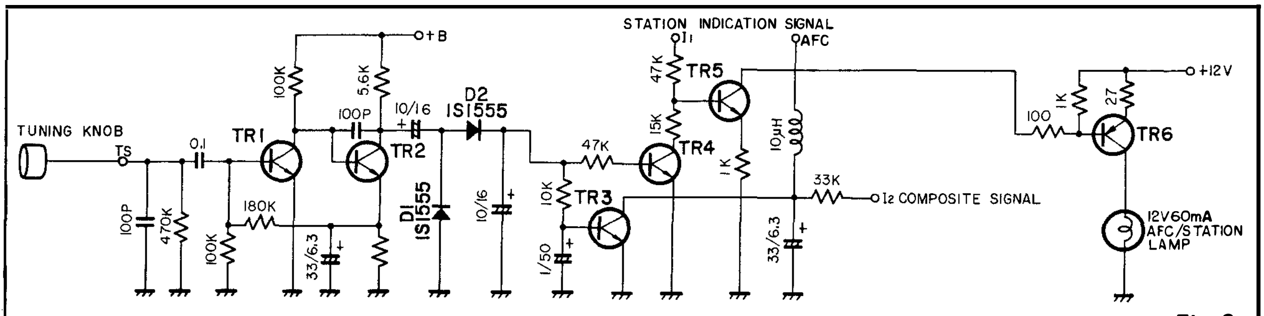


Fig. 3

Operation

1. Touching the tuning knob with your finger passes the electric potential in the human body to the TS terminal, and it is amplified by Tr1 and Tr2, then rectified by D1 and D2 diodes for (+) potential.

2. This potential is added to the base of Tr3, switching it on and grounding the AFC terminal (i.e., canceling the AFC effect).

3. At the same time, this potential is fed to the base of Tr4, so that that transistor comes on and grounds Tr5 with 15kΩ.

4. When the station display signal is fed to the I1 terminal, Tr5 comes on and switches Tr6 on. This lights the AFC/Station lamp. At this time, if operation (3) above is added, Tr5 output voltage drops and Tr6 output impedance rises, so that the AFC/Station lamp dims to show that the AFC is off.

TRANSIENT NOISE CANCELATION CIRCUIT

This circuit serves to cancel the noise and distortion caused by turning the Power switch on and off.

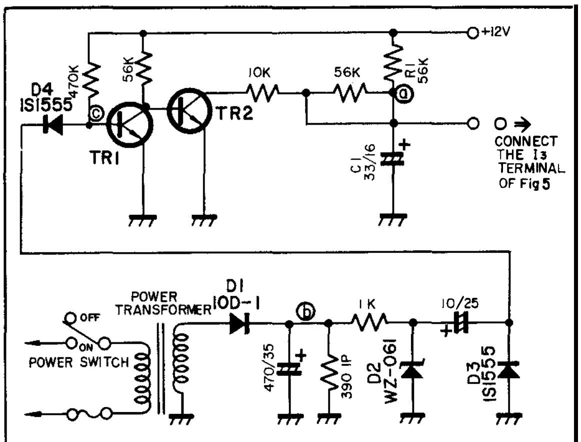


Fig. 4

Operation

1. When the Power switch is turned on

When the power is switched on, potential at point ⓐ is equal to E, and rises to +12V according to a time constant decided by C1R1. When this +12V is added to the base of Tr1 this transistor switches on and shuts Tr2 off, so that the difference in voltage obtained by C1R1 appears as it is at terminal O. This switches Tr7 (previous diagram) on, and the same condition continues until the voltage at point ⓐ reaches +11.5V, thus cancelling unwanted signals at the time power is switched on.

2. When the Power switch is turned off

When the power is switched off voltage at point ⓑ changes from 12V to E potential. This change is rectified to couple voltage by D3D4, and negative load potential is obtained at point ⓒ. This switches Tr1 off and Tr2 comes on, so that E potential is present at the collector of Tr2 and the negative potential change is available at terminal O, providing a muting effect at the instant the power is switched off.

D2 removes the ripple in the negative voltage at point ⓑ which means it cancels the operation of this circuit, which works via ripples when the power switch is turned on.

MUTING CIRCUIT

This circuit eliminates weak signals and inter-station noise during tuning, or in case of station drift. This circuit also functions to cut transient noises, a function which will be explained in another section.

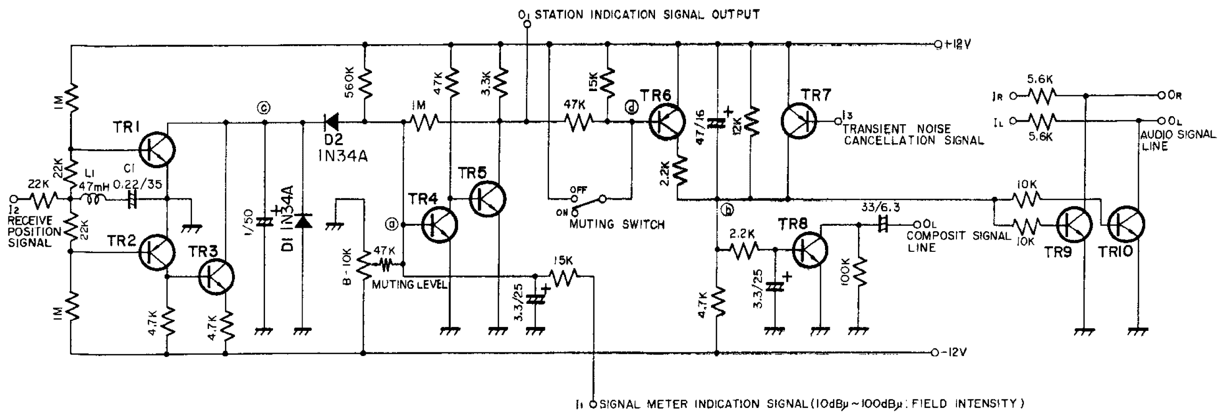


Fig. 5

Operation

1. Muting operation due to a signal from terminal I_1.
a. DC voltage $e1$, which shows the strength of the received signal between 10dBμ and 100dBμ is fed to the I_1 terminal and passes to the base of Tr4, which has had its bias adjusted by VR1.
b. If $e1$, is less than the set bias value, Tr4 switches off, switching Tr5 and Tr6 on. This makes the voltage at point ⓑ sufficient to turn on Tr8, Tr9 and Tr10, grounding the composite signal via Tr8 and the audio signal via Tr9 and Tr10.
c. On the other hand, if $e1$ is greater than the set bias value, the Tr4 switches on, thus switching off Tr5 and Tr6. This means that the voltage at point ⓑ will switch off Tr8, Tr9 and Tr10, thus passing the composite and audio signals.

2. Muting operation due to a signal from terminal I_2.
a. Signal $e2$, which contains a DC component showing the tuning aberration, is fed to the I_2 terminal. This is potential which can be obtained by the discriminator S curve. When the received signal is lower than the correct tuning point, negative voltage is contained in $e2$; when it is higher, positive voltage is present.
b. When the received signal is lower than the correct tuning point, Tr1 is continually off, but Tr2 can be switched on by voltage of below −0.5V, and at this time Tr3 comes on. In this case potential at point ⓒ becomes zero due to diode D1, while point ⓐ is grounded by D2, thus switching on the muting.
c. When the signal is higher than the muting point, Tr2 and Tr3 are continually off. Tr1 comes on when it receives more than −0.5V, creating E potential at point ⓒ. D2 thus grounds point ⓐ switching on the muting.
d. In addition to selecting DC voltage, this circuit works in the same way to block unwanted signals of below 20Hz and over 50kHz through the actions of C1 and L1. This cuts the noises normally heard when the tuning knob is turned quickly and passes one or more stations.
e. When the muting effect is not desired it can be bypassed by raising voltage at point ⓓ to +12V via the Muting switch, thus turning Tr6 off.

PHASE LOCKED LOOP CIRCUIT

This circuit accurately creates a switching signal which divides the stereo components of the FM signal. It is divided into two parts: an oscillator and a section to match the oscillator 19kHz pilot signal to the broadcast pilot signal.

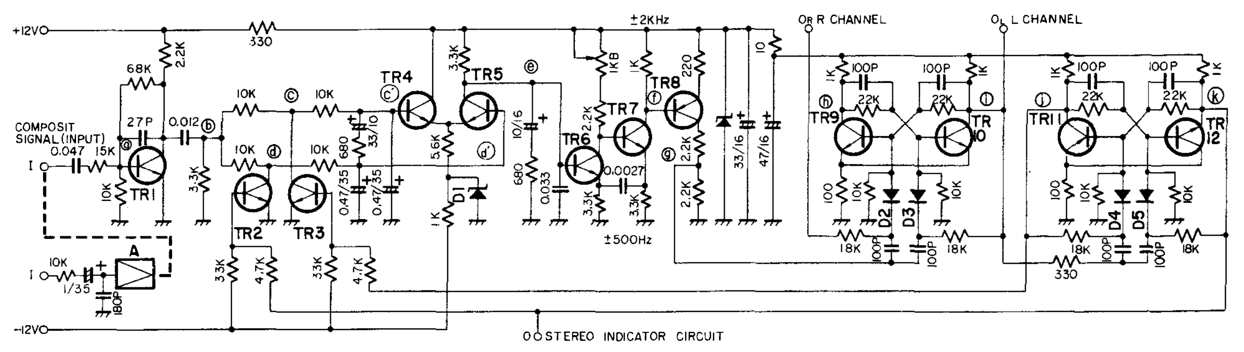


Fig. 6

Operation

1. Oscillator Section

a. A 76kHz sine wave is obtained from the VCO formed by Tr6 and Tr7. It is changed into a square wave at Tr8 and then fed to the doubled multivibrator formed by Tr9 and Tr10. Thus at OR and OL 38kHz square waves of opposite phase are obtained.
At the same time this 38kHz signal is fed to the doubled multivibrator formed by Tr11 and Tr12, creating 19kHz square waves of opposed phase at points Ⓙ and Ⓚ. Waveforms and phase relations at each time point are as shown below:

b. As a principle of operation, the oscillation frequency (phase) of the VCO rises (advances) as the Tr6 potential becomes more positive, and drops (retards) as it becomes more negative.

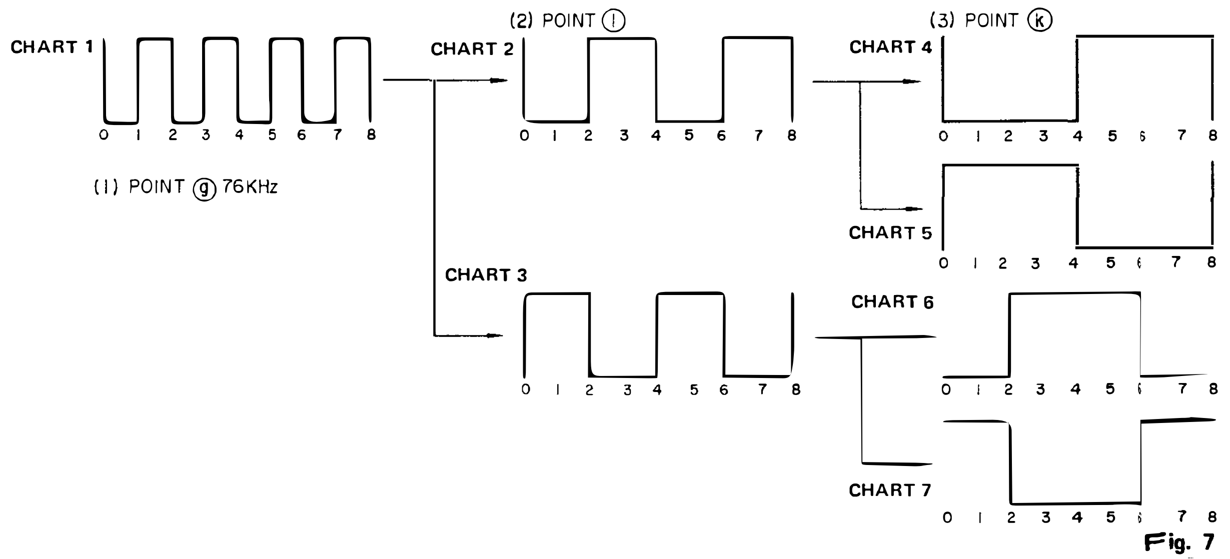


Fig. 7

Notes:

1. Waveforms at point ⓗ are the same square wave as at point Ⓘ, but phasing is opposite.
2. The waveform at point Ⓙ is the same square wave as that at point Ⓚ, but the phase is opposite.

2. Phase Comparison and Detection Section

a. The 19kHz pilot signal, a composite signal necessary for phase comparison and detection, is selected by the band pass filter composed of the circuit from the I' terminal to point ⓐ.

b. This selected 19kHz pilot signal is amplified by Tr1 and fed to points ⓒ and ⓓ, connected to Tr2 and Tr3 respectively. To these transistors the 19kHz square wave from the oscillation section points ⓙ and ⓚ are also fed.

c. In this way the phase comparison and detection circuit is formed, and output Vc' and Vd' can be obtained. Since the 19kHz square wave signals driving Tr2 and Tr3 are in opposite phase, Vc' and Vd' are activated alternately. This phenomenon is then amplified by the differential amplifier formed of Tr4 and Tr5.

d. The phase relations between the pilot signal and the signals at points ⓙ and ⓚ, as well as the potential at points ⓒ' and ⓓ', are shown below:

The figure to the left shows the point ⓐ input waveform. The one on the right shows that for point ⓑ.

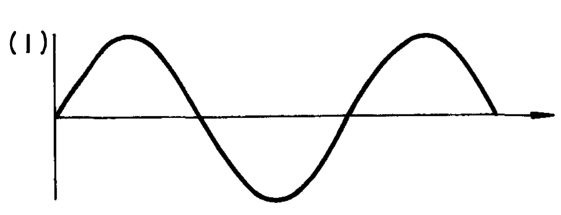


CHART 8

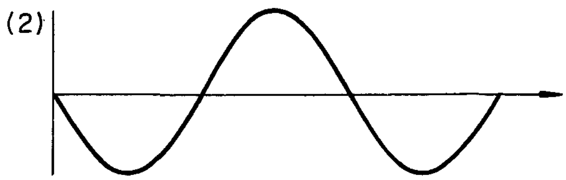


CHART 9

2-1. To detect the waveform in chart 9 above according to chart 4 and chart 5 (previous page),
10-a. Output at (d) when chart 4 is added to Tr2.
10-b. Output at (c) when chart 5 is added to Tr3.
At the same time, these also show the outputs at point ⓒ (in the condition seen in chart 10-ⓐ) when chart 4 is set to Tr3, also show the output at the point ⓓ in chart 10-ⓑ when chart 5 set to Tr2.

2-2. To detect the waveform in chart 9 above using chart 6 and chart 7 shown on the previous page:
11-d. Output at (d) when chart 6 is added to Tr2.
11-d. Output at (o) when chart 7 is added to Tr3.
At the same time, these also show the outputs at point ⓒ (in the condition seen in chart 11-ⓒ) when chart 6 is set to Tr3, also show the output at the point ⓓ in chart 11-ⓓ when chart 7 set to Tr2.

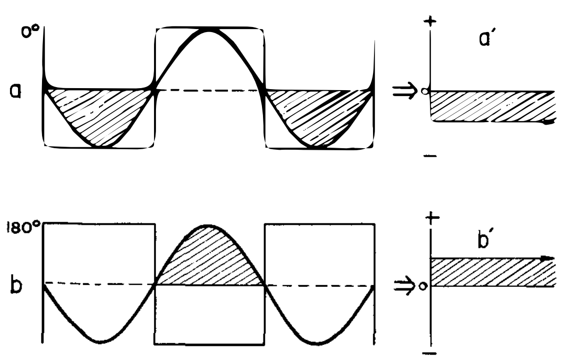


CHART 10

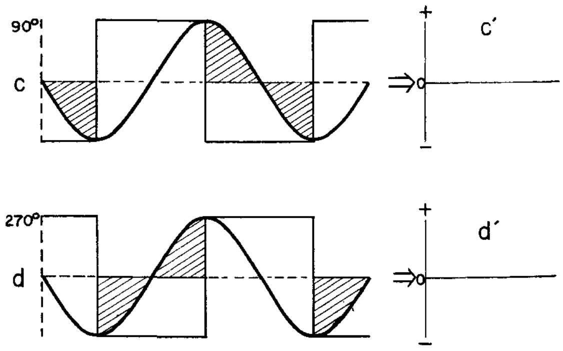


CHART 11

2-3. Potential at points ⓒ' and ⓓ' becomes that shown at a' b' c' and d' in the chart 10 and 11. Phase differences and output relations between pilot signal and detection signal are as shown in the following chart 12.

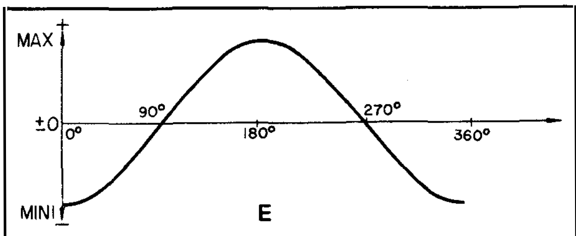


CHART 12

2-4. Since points ⓒ' and ⓓ' are connected to the differential amplifier, its operation creates the following relations. Let the potential at ⓒ' be Eⓒ', at ⓓ', Eⓓ' and at ⓔ, Eⓔ. Then Eⓔ=K(Eⓒ' − Eⓓ'). Furthermore K>O. The output potential at e undergoes the change shown in chart 12, also due to the phase difference between the pilot signal and detection signal j added to Tr3.

3. Oscillation Section and Phase Comparison Detection Section

The output potential of the phase comparison detection section is added to the base of Tr6 in the VCO, so that by examining 1.b and 2-4 one can see that a locked condition is possible only when the phase difference is either 90° or 270°, and the following conditions hold:

a zone: VCO works for phase retard.
b zone: VCO works for phase advance.
c zone: VCO works for phase advance.
d zone: VCO works for phase retard.

Therefore the only stable, locked condition is 270° phase difference (with a 90° difference, even a tiny retard will cause an automatic shift to 270°).

Therefore, according to the charts in the Oscillator Section discussions, what leads to stability are ⓙ terminal output (chart 7), ⓚ terminal output (chart 6), ⓘ terminal output (chart 3) and ⓗ terminal output (chart 2).

Even if a locked condition arises at 90° phase difference, it will be due to ⓘ terminal output (chart 3) and ⓗ terminal output (chart 2), so that switching will not be affected at all.

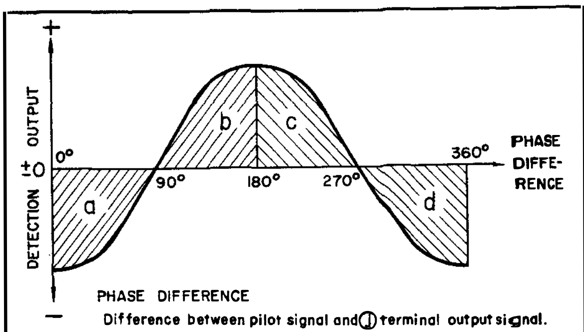


CHART 13

STEREO/MONO DRIVE AND STEREO INDICATOR CIRCUIT

This circuit receives stereo FM signals strong enough for stereo reception. When the PLL circuit is phase locked the demodulator operates and the stereo indicator lamp lights, which is this circuit's function.

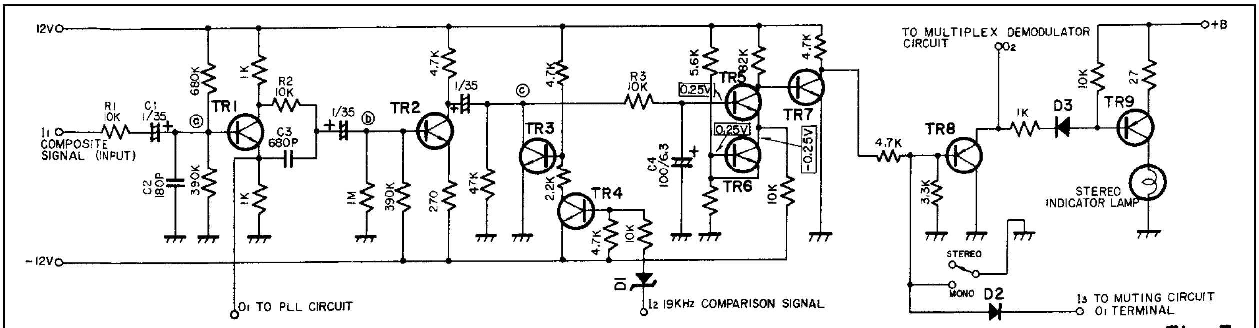


Fig. 7

Operation

1. The composite signal is fed from the I_1 terminal and undergoes a high cut due to R1, C1 and C2. It is added to the 19kHz 90° phase shifter composed of Tr1, R2 and C3. In this way the 19kHz pilot signal leads by 90° and is amplified at Tr2 (only during stereo broadcast reception, of course).

2. At the same time, the PLL circuit D terminal output (7) enters via I_2 and the phase detector Tr3 is operated by Tr4.

3. Using the phase difference between the pilot signal and signal, Fig. 7 to see the potential at point ⓒ (i.e., the phase detector output, the following points become clear. See chart 14.

The operation to the detector when the PLL circuit is phase locked is shown by the chart 15. At this time the phase difference is zero, and maximum positive output is obtained.

4. The potential change is integrated by R3 and R4, and when it is more than 0.25V, Tr5 goes on and Tr7 goes off, which switches Tr8 on. In this way the multiplex demodulator begins to operate and at the same time the stereo indicator lamp lights, driven by Tr9.

However, if the station display signal is not received via I_3, i.e., if the strength of the received signal is below the muting level, the base of Tr8 will be grounded through D2, keeping it off and keeping the stereo indicator lamp from lighting. The multiplex demodulator will also fail to be activated.

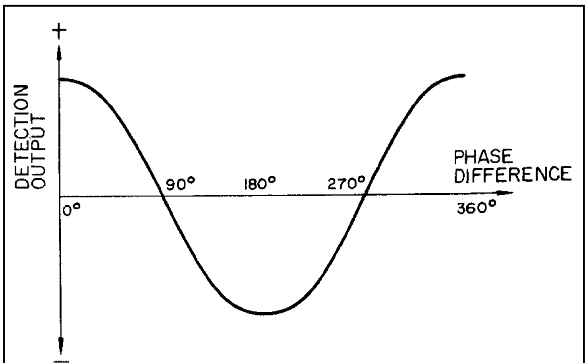


CHART 14

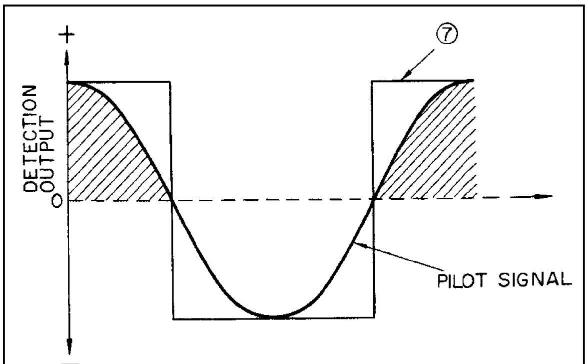


CHART 15

MULTIPLEX DEMODULATOR CIRCUIT

This circuit double tunes the composite signal by a switching method, thus separating out the left and right channel audio signals.

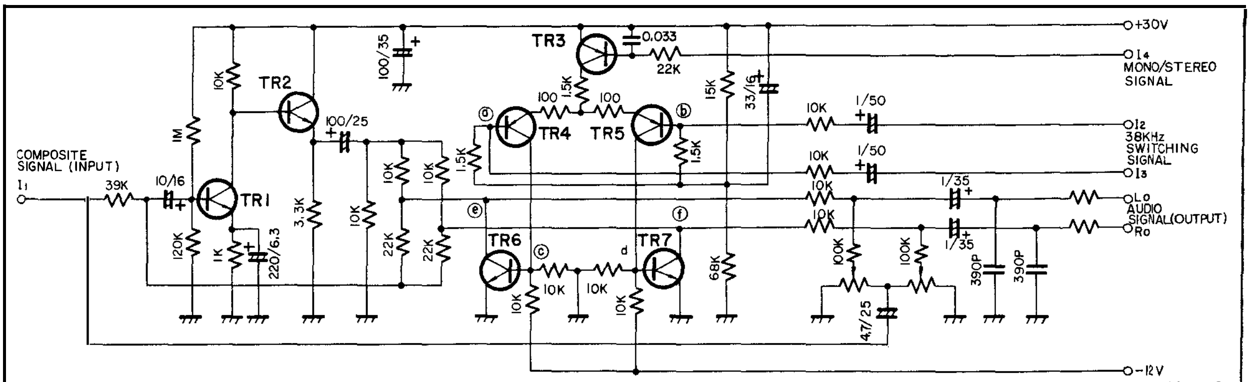


Fig. 8

Operation

The composite signal entering at I_1 is amplified by Tr1 and becomes output due to the low impedance of the Tr2 emitter-follower circuit.

Also, via the I_2 and I_3 terminals a 38kHz square wave is constantly received from the PLL circuit. At terminal I_4 a minus potential is received only when the signal is in stereo.

Therefore, when a stereo signal is received Tr3 comes on. Tr4 and Tr5 repeat seesaw on-off motions at the 38kHz frequency, which drives Tr6 and Tr7. When Tr4 is on, Tr6 comes on (at the same time Tr5 is off, switching Tr7 off). When Tr4 turns off, it switches off Tr6 (at this time Tr5 is on and thus so is Tr7). In this way the grounded-open movement is repeated between points ⓔ and ⓕ at the 38kHz rate, permitting the right and left audio signals to be obtained from the composite signal. One part of the audio signal is fed back through terminal I_1 for more perfect separation characteristics. In addition, when a monophonic signal is being received, Tr3 shuts off, and this turns off Tr4, Tr5, Tr6 and Tr7, so that the audio signal obtained at terminals Lo and Ro are monophonic.

PARTIAL DISASSEMBLY

1. Cabinet Removal

1-1. Turn the unit over and remove screws (1~4). See Photo 1.

1-2. With the unit as shown in Photo 2, remove the chassis from the cabinet.

2. Control Circuit Board Removal

2-1. Remove the cabinet.

2-2. Remove the screws (1~5) shown in Photo 3, then take off the cover.

3. Power Supply Circuit Board Removal

3-1. Follow steps 2-1 and 2-2.

3-2. Remove connectors (8~10) and screws (7~10) shown in Photo 4, then remove the power circuit board.

4. Power Transformer Removal

4-1. Follow steps 2-1 and 2-2.

4-2. Take off connector (10) shown in Photo 4, then remove the primary side leads.

4-3. Remove screws (11~14) shown in Photo 4, while pressing on the top of the transformer, then remove the transformer.

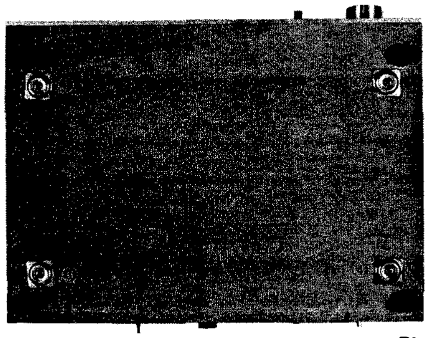


Photo 1

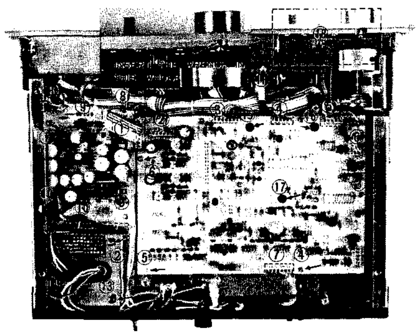


Photo 4

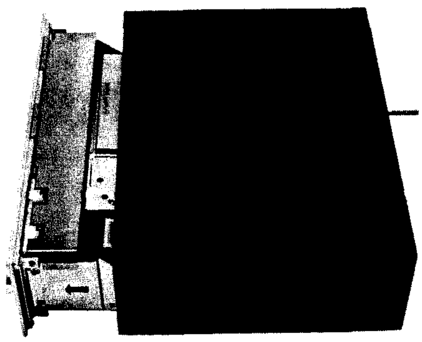


Photo 2

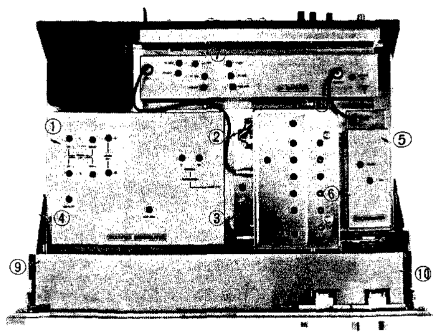


Photo 5

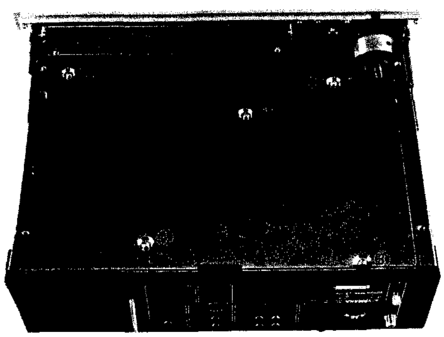


Photo 3

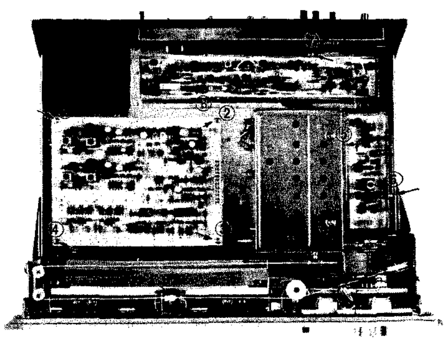


Photo 6

5. Multiplex Demodulator Circuit Board Removal

5-1. Remove the cabinet.

5-2. Remove screws (1~4) shown in Photo 5, then take off the shield cover.

5-3. Remove screws (1~4) shown in Photo 6, then take out the MPX circuit board.

6. Discriminator Circuit Board Removal

6-1. Remove the cabinet.

6-2. Disconnect the input pin plugs.

6-3. Remove screws (5) and (6) shown in Photo 5, then take off the shield cover.

6-4. Remove screws (5) and (6) shown in Photo 6, then take out the discriminator circuit board.

7. Amplifier Circuit Board Removal

7-1. Remove the cabinet.

7-2. Pull out the input and output pin plugs.

7-3. Remove screws (7) and (8) shown in Photo 5, then take off the shield cover.

7-4. Remove screws (7) and (8) shown in Photo 6, then take out the IF circuit board.

8. RF Pack Removal

8-1. Remove the cabinet.

8-2. Loosen screws (9) and (10) shown in Photo 5, screw (3) shown in Photo 11 and screw (3) shown in Photo 12, then take off the shield cover.

8-3. Loosen the two variable capacitor pulley fixing screws, then remove the VC pulley.

8-4. Unplug the input and output pin plugs, then disconnect the connector.

8-5. Remove screws (15~17) shown in Photo 4, then take out the RF pack.

9. Meter Lamp Circuit Board Removal

9-1. Remove screw (1) shown in Photo 7, then remove the meter lamp circuit board.

10. Dial Lamp Circuit Board Removal

10-1. Remove screws (1) and (2) shown in Photo 8, then remove the dial string cover.

10-2. Remove screws (1) and (2) shown in Photo 9, then remove the dial lamp circuit board cover.

10-3. Remove screws (1) and (2) shown in Photo 10, then take out the dial lamp circuit board.

11. Dial Pointer Removal

11-1. Follow step 10-1.

11-2. Remove screws (3) and (4) shown in Photo 8, then separate the guide rail from the pointer.

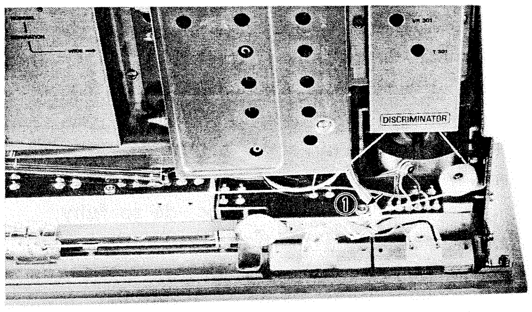


Photo 7

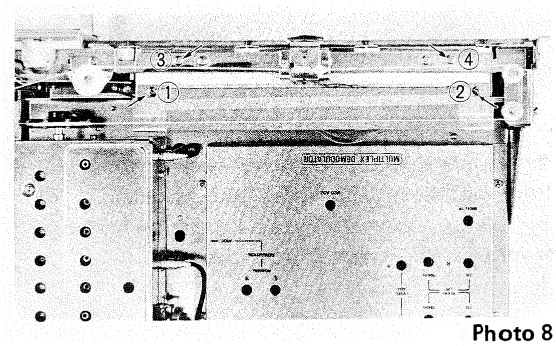


Photo 8

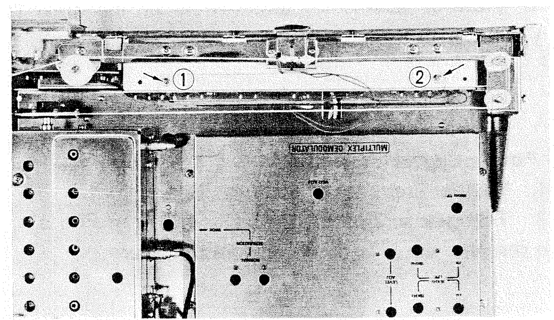


Photo 9

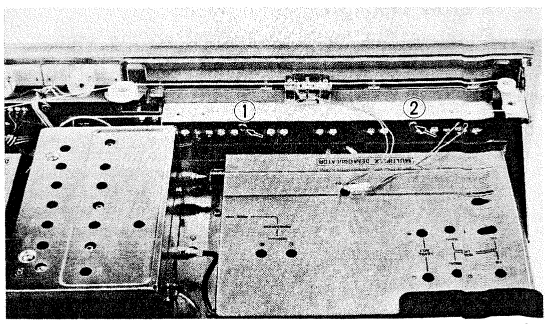


Photo 10

12. Front Panel Removal

12-1. Follow steps 2-1 and 2-2.

12-2. Remove connectors (2~5), (8) and (11) shown in Photo 4, then remove the switch circuit board.

12-3. Loosen the two tuning knob fixing screws shown in Photo 4 in the direction of the arrow, using a hexagonal wrench. Remove the tuning knob.

Note: The shaft can be loosened; do so fully.

12-4. Remove screw (18) shown in Photo 4.

12-5. Remove screws (1) and (2) shown in Photo 11, and screws (1) and (2) shown in Photo 12.

12-6. Remove the front panel and control unit without separating them. Remove screws (1~4) shown in Photo 13, then separate the front panel and control unit.

13. Volume Circuit Board Removal

13-1. Follow steps 12-1 through 12-5.

13-2. Remove the headphone volume, output level and muting knobs with a hexagonal wrench.

13-3. Remove screws (1) and (2) shown in Photo 14, then remove the volume circuit board.

14. Switch Circuit Board Removal

14-1. Follow steps 12-1 through 12-5.

14-2. Remove screws (3) and (4) shown in Photo 14, then remove the switch circuit board.

15. Power Switch Removal

15-1. Follow steps 12-1 through 12-4.

15-2. Remove screws (1) and (2) shown in Photo 15, then remove the power switch circuit board.

16. Meter Removal

16-1. Follow steps 12-1 through 12-4.

16-2. Follow step 8-2.

16-3. Remove the leads connected to the meter.

16-4. Remove screws (3) and (4) shown in Photo 15, then remove the meter cover.

16-5. Take out the meter.

17. Dial Scale Removal

17-1. Follow steps 12-1 through 12-4.

17-2. Remove screws (5~12) shown in Photo 15, then remove the dial scale.

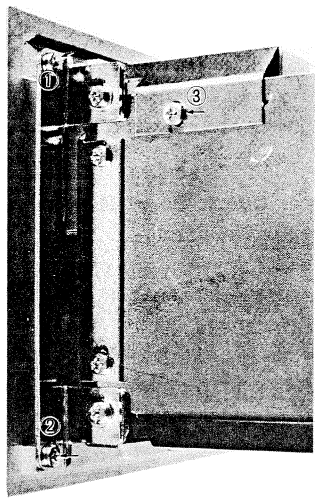


Photo 11

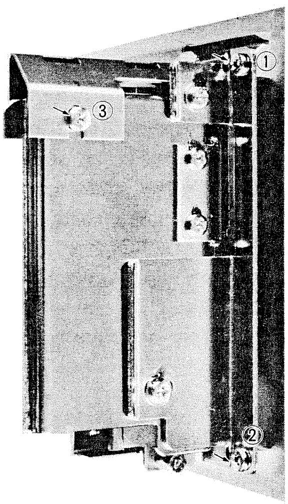


Photo 12

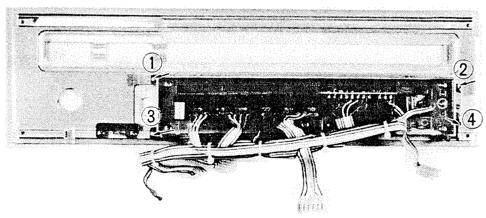


Photo 13

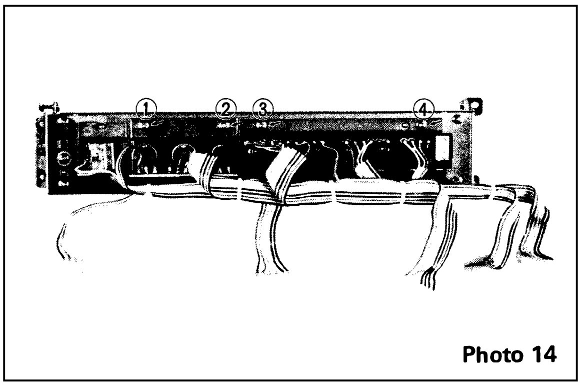


Photo 14

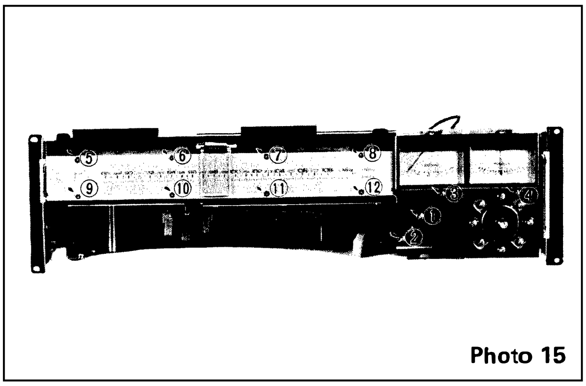
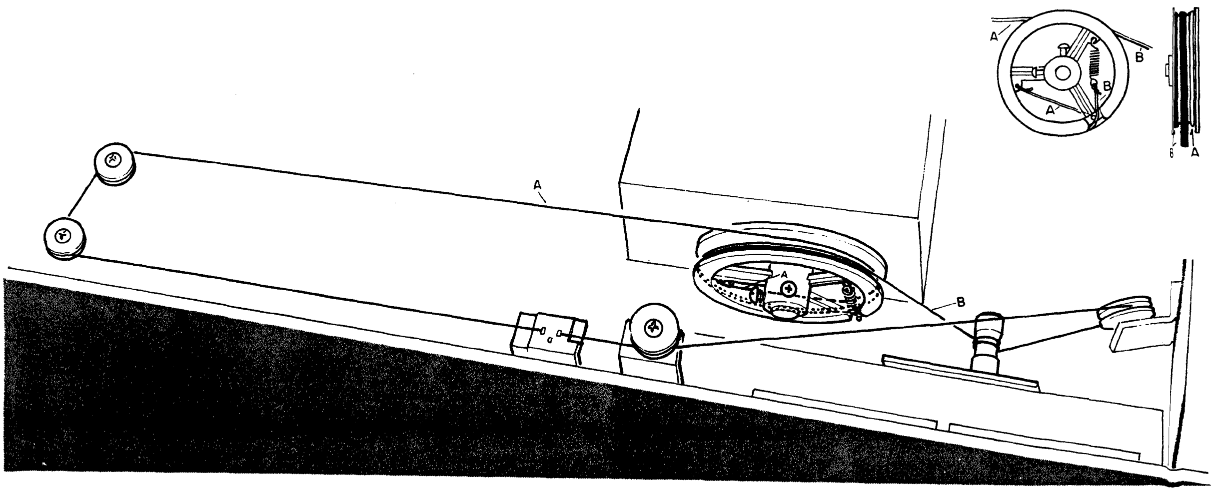


Photo 15

DIAL MECHANISM



MEASUREMENT AND ADJUSTMENT

1. TUNER SECTION

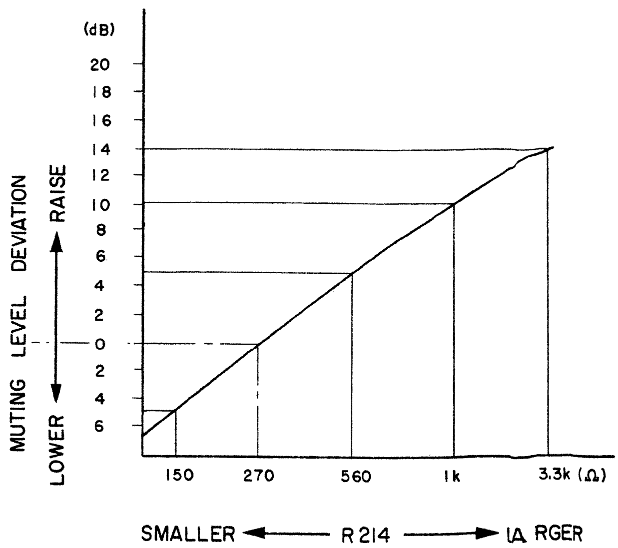
Before Adjustment . . . . . After 30 minutes aging with power switch on and each circuit board cover removed.

STEP	ADJUSTMENT ITEM	TERMINAL TO BE CONNECTED & INSTRUMENT REQUIRED	ADJUSTMENT	HOW TO ADJUST	RATING OR STANDARD	REMARKS
1	Discriminator Balance (Normal)	Received signal frequency near center, antenna unconnected.	T301: discriminator coil Secondary side (upper) core	Move the core from left to right until the center meter indicates "O", then fix it in place.	 INSIDE THIS MARK	When the power switch is turned off be sure the meter reading mechanical indicates "O". See Note 3.
2	IF Core Preset	Antenna Terminal (300Ω) FM signal generator 98MHz/60dBμ	RF Pack IF core	Move the core to the right and left to find the location which affords maximum signal meter needle deflection.		Set at the same location which causes the center meter to indicate "O".
3	Monaural Distortion Ratio	Antenna terminal (300Ω) FM signal generator 98MHz/60dBμ Modulation: 400Hz/100% mono Fixed output jacks (L, R) Oscilloscope, Electronic voltmeter, Distortion ratio meter	T301: discriminator coil Primary side (lower) core IF MODE switch: Test at both Normal and Wide modes.	Move the core to the left and right and set at the location affording minimum distortion.	−62dB (0.08%)	If Normal and Wide different, adjust balance.
4	VCO Adjustment	Antenna terminal (300Ω) FM signal generator 98MHz/60dBμ Unmodulated MPX circuit board 19kHz T.P Frequency Counter	MPX circuit board VCO adjustment	Set to 19kHz.	19.000kHz± 20Hz (5Hz)	
5	Stereo Distortion Ratio I (Normal)	Antenna terminal (300Ω) FM signal generator 98MHz/60dBμ, 100dBμ Modulation 400Hz/100% stereo Fixed output jack (L, R) Oscilloscope, Electronic voltmeter, Distortion ratio meter	IF circuit board VR201, 202 TC201, 202	Set for minimum distortion.	**60dBμ, −62dB (0.08%) IF MODE = NORMAL 100 dBμ, −57dB (0.14%)** 60dBμ : adjustment required 100dBμ : check only acceptable	
6	Stereo Distortion Ratio II (Wide)	Same as Step 5	RF pack IF core, RF2~5 core If standards not met, repeat Step 5.	Adjust for minimum distortion within limits that signal meter indication does not drop (with 60dBμ antenna input).	**60dBμ −62dB, (0.08%) 100dBμ −57dB, (0.14%)**	Carry out this step if the Step 5 check does not fall within the 100dBμ limits.
7	Stereo Distortion Ratio III (Wide)	Same as Step 6	IF circuit board VR203, 204 TC203	Set for minimum distortion.	−62dB (0.08%)	
8	Wide Balance	Same as Step 1	IF circuit board T201 coil	Set for "O" center meter reading.	Same as Step 1.	Repeat the check in Step 7. If the reading is off considerably, repeat Steps 7 & 8.
9	Separation I (Normal)	Same as Step 6.	MPX circuit board Separation Adj. Normal L, R	Set L & R for maximum separation. (both L & R)	55dB	
10	Output Level	Same as Step 6.	MPX circuit board Level Adj. L, R	Set for limits shown at right.	−1dBm ± 0.3dB	
11	Separation II (Normal)	Check whether Step 10 has caused a change in the Step 9 values; if so, repeat Step 9.				
12	Separation III (Wide)	Same as Step 6.	Control circuit board Separation Adj. Wide	Set for maximum separation.	55dB	Adjust for balance if difference between L & R.

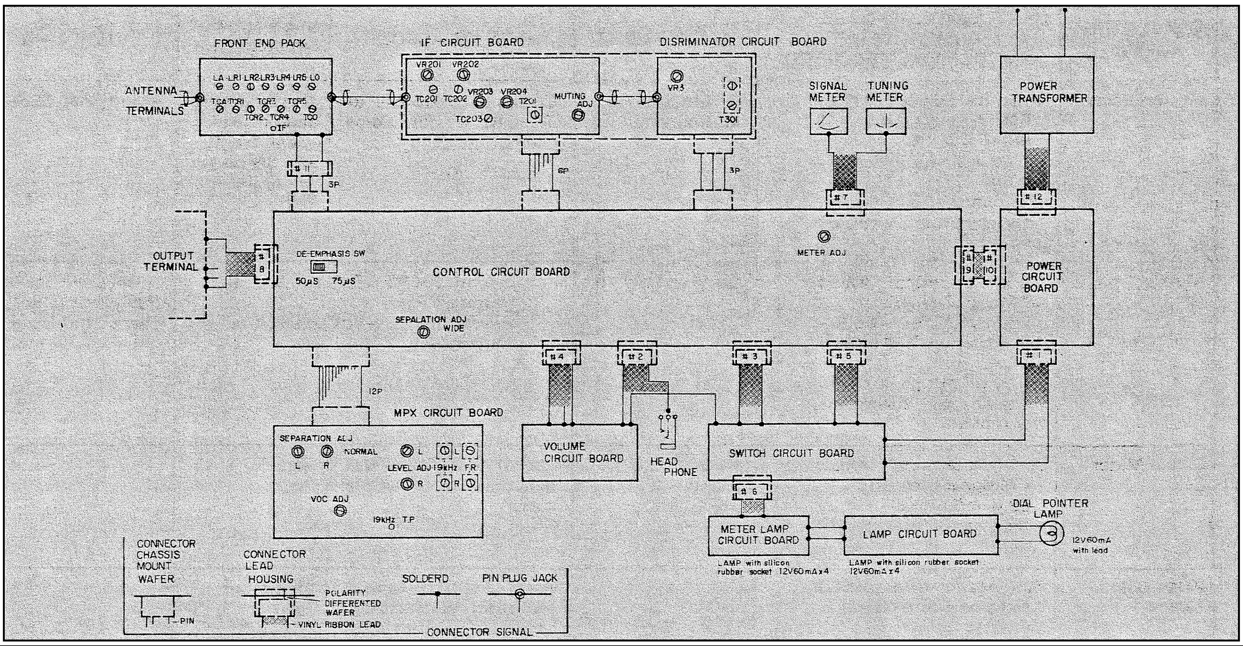
STEP	ADJUSTMENT ITEM	TERMINAL TO BE CONNECTED & INSTRUMENT REQUIRED	ADJUSTMENT	HOW TO ADJUST	RATING OR STANDARD	REMARKS
13	Muting Level I	Antenna terminal (300Ω) FM signal generator 98MHz/30dBμ Modulation 400Hz/30% mono Fixed output jacks (L, R) Oscilloscope, Electronic voltmeter	IF circuit board Muting Adj.	Turn slowly from L to R and set at point where output begins.	Once set, difference from signal fed by FM SG must be 30dBμ ± 6dBμ	Muting VR=30dBμ
14	Muting Level II	Antenna terminal (300Ω) FM signal generator 98MHz/30dBμ, 10dBμ Modulation 400Hz/30% mono Fixed output jacks (L, R) Oscilloscope, Electronic voltmeter	Same as Step 13.	Set for 30dBμ ± 6dBμ at 30dBμ Muting VR. Set for 11dBμ ± 5dBμ at 10dBμ Muting VR.		If these values cannot be obtained, check the Note 1.
15	Signal Meter Set	Antenna terminal (300Ω) FM signal generator 98MHz/60dBμ Modulation 400Hz/30% mono	Control circuit board Meter Adj.	Set so that the needle deflects to "60" on the meter.	60 ± 5	
16	Auto Blend Check	Antenna terminal (300Ω) FM signal generator 98MHz Modulation 1kHz/100% stereo Fixed output jacks (L, R) Oscilloscope, Electronic voltmeter		After FM SG output reduced, check change in separation and final separation.	Operation Level I: 60dBμ ± 10dBμ II: 40dBμ ± 10dBμ Separation I: 14dB ± 3dB II: 8dB ± 3dB	
17	IHF Sensitivity Check	Antenna terminal (300Ω) FM signal generator 98MHz Modulation 400Hz/100% mono		Check antenna input when distortion ratio is −30dB (3.2%).	8dBμ (2.5μV) (6dBμ (2.0μV))	If these values cannot be met, see Note 2.
18	Dial Pointer Set	Antenna terminal (300Ω) FM signal generator 90, 98, 106MHz	Dial pointer	Set the dial pointer so that it is at the correct dial location for each frequency.	± 1mm	98MHz standard

NOTES

1. If the required values in Step 14 cannot be met after the muting level is set to 10dBμ, correct by changing R214 & 270 in the IF circuit board as shown in the figure to the right. Then carry out all steps after Step 15.
2. When carrying out the IHF sensitivity check in Step 17, if the results do not satisfy the requirements adjust each RF pack core (LA & LR1~5), and each trimmer (TCA & TCR1~5) for maximum sensitivity. For this adjustment, however, first repeat the adjustments and checks beginning with Step 1.
3. When the power switch is off, if the center meter does not indicates "O", adjust it mechanically to this point via the adjustment hole on the back of the meter. Then carry out the check in Step 1 again.



ADJUSTMENT POINT



2. PRECAUTIONS AND STEPS IN CORRECTING FAULTS

1. Replacing Parts

1-1. When it is necessary to replace any parts in the RF pack, or an IC, transistor or discriminator coil in the discriminator circuit board, change the whole unit, not the individual part.

1-2. When adjustable parts other than those mentioned in 1-1 above are replaced, such adjustable parts (variable resistors, adjustable trimmers and inductors) must be readjusted as explained in part 2 below.

1-3. When non-adjustable parts other than those mentioned in 1-1 and 1-2 above are replaced, no adjustment is necessary. Be sure, however, to replace only with parts meeting required specifications whenever such specifications are listed.

2. Unit Replacement

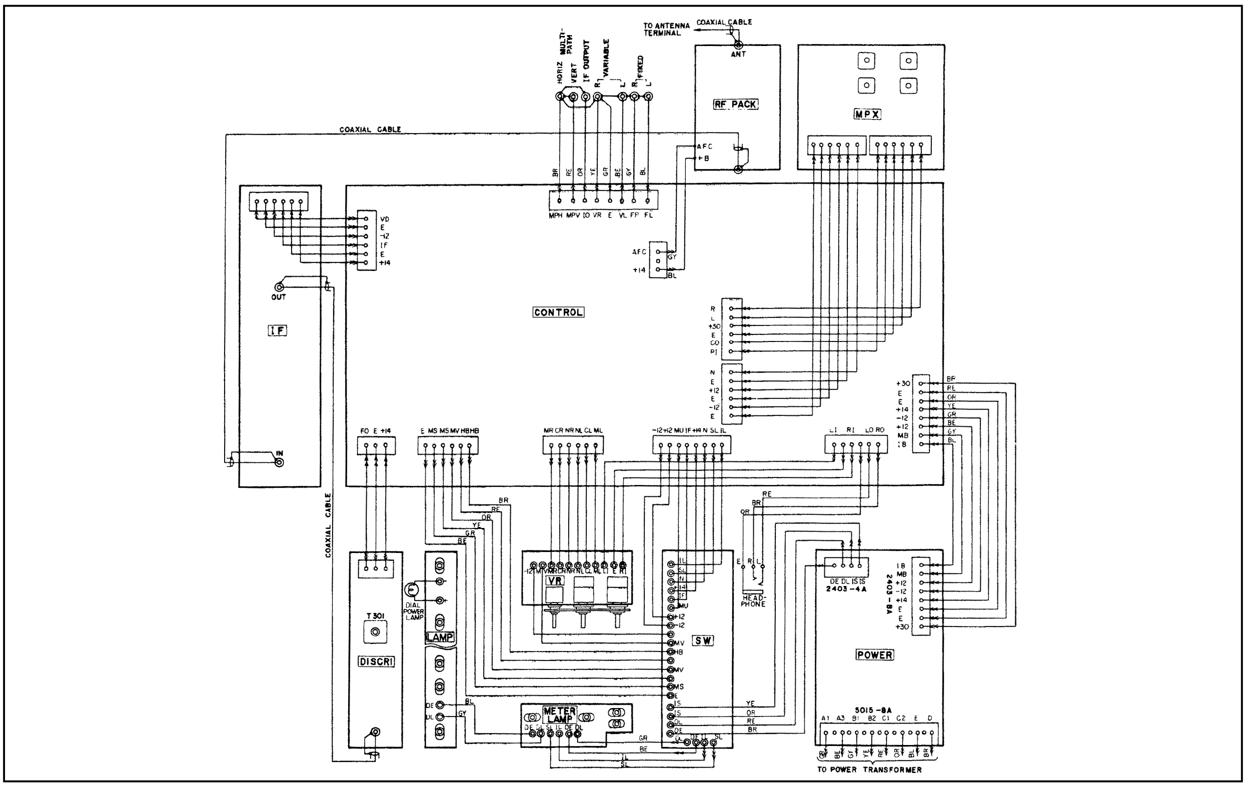
UNIT NAME	ADJUSTMENT ITEM	REQUIRED MEASUREMENT INSTRUMENT
RF Pack	Overall adjustment (only when indicator set point is out of adjustment)	Ultra-low distortion FM signal generator Standard signal generator Distortion meter Oscilloscope Electronic Voltmeter
IF Circuit Board	Overall adjustment	
Discriminator Circuit Board	Overall adjustment	
MPX Circuit Board	1. VCO Adjust : 19 kHz 2. Separation Adjust (Normal) 3. Output Level Adjust 4. Separation Adjust (Wide)	Ultra-low distortion FM signal generator Standard signal generator Oscilloscope Electronic Voltmeter Frequency Counter
Control Circuit Board	1. Separation Adjust (Wide) 2. Signal Meter Adjust	Ultra-low distortion FM signal generator Standard signal generator Oscilloscope Electronic Voltmeter
Power Circuit Board	VCO Adjust : 19 kHz	Frequency counter
Tuning Meter	Correct off-center reading with power switch off.	Unnecessary

3. SPECIFICATION ASSURANCE CONDITIONS

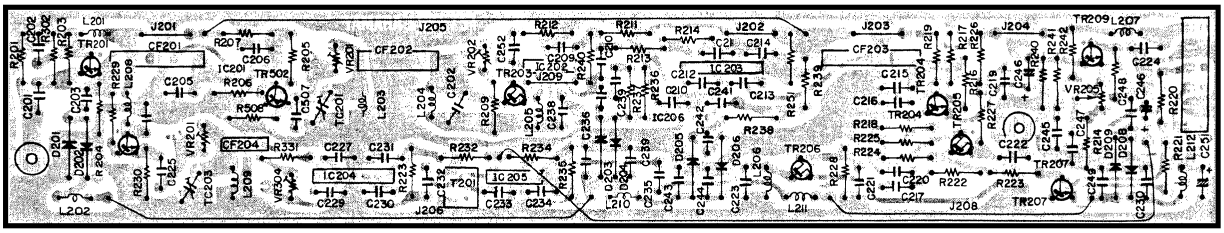
ITEM	MEASUREMENT CONDITION		VALUE
Test Temperature			25 ± 10°C
Test Humidity			65 ± 20°C
AC Input Voltage/Frequency	U.S.	117V	105 ~ 135V 45 ~ 65Hz
	Europe	110V	90 ~ 115V 45 ~ 65Hz
		130V	110 ~ 135V 45 ~ 65Hz
		220V	200 ~ 240V 45 ~ 65Hz
		240V	220 ~ 260V 45 ~ 65Hz
Vibration Noise			Low enough to be no test influence.
Aging Time	At standard condition before test		more than 30 minutes.
Test System Performance	Audio System Level Accuracy, Deviation and Precision 400Hz 30 ~ 15,000Hz		 Within ± 0.3dB Within ± 0.1dB
	Test System Distortion 100 ~ 3,000Hz 50 ~ 10,000Hz		 Within 0.02% Within 0.05%
	Test System Separation 400Hz 50 ~ 10,000Hz Pilot Signal Phase		 Within 60dB Within 50dB Within ± 0.5°
	Overall Test System S/N Ratio Monaural Stereo		 Within 80dB at 30 ~ 15,000Hz/50μS Within 75dB at 30 ~ 15,000Hz/50μS
	Signal Generator Output Level Accuracy		Within ± 0.5dB
	Modulation Degree Accuracy (75kHz deviation)		Within ± 3kHz
	Signal Generator Spurious		Within −100dB at ± 300kHz ~ ± 5MHz
	Residual FM factor at AM		Within −70dB at FM ± 75kHz/AM 30%
Radio Frequency Noise	300Ω Antenna terminal Equivalent		Within −10dBμ

PRINTED CIRCUIT BOARD

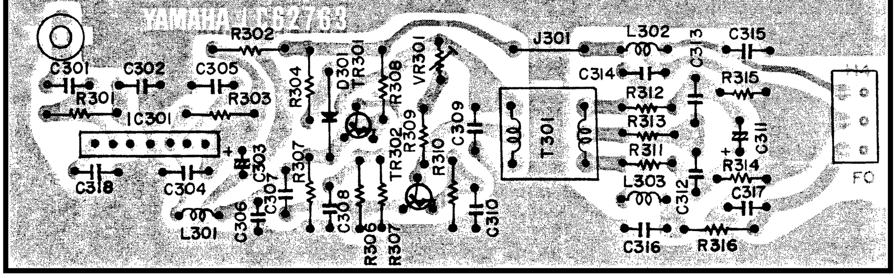
WIRING CONNECTION DIAGRAM



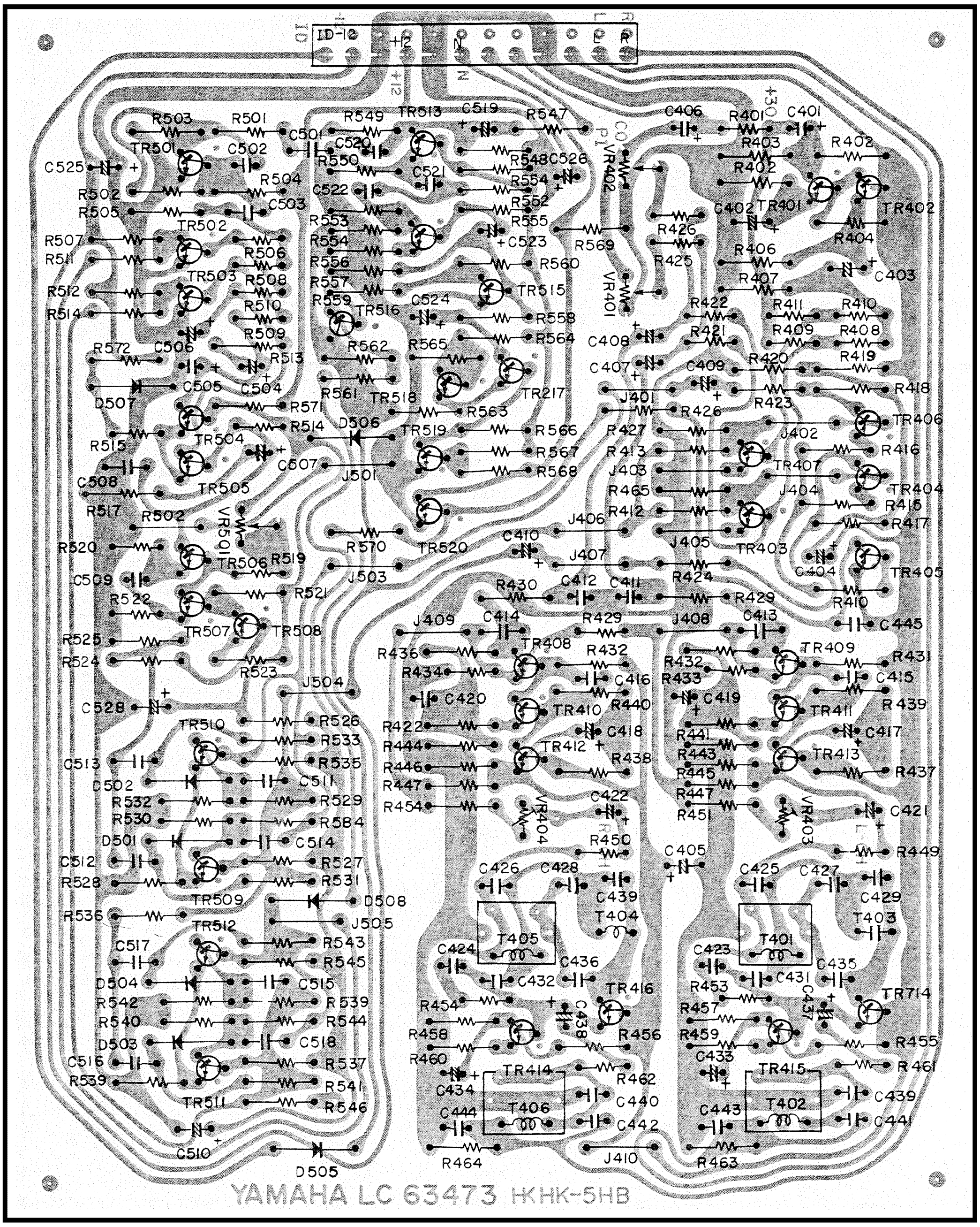
IF CIRCUIT BOARD NA06480



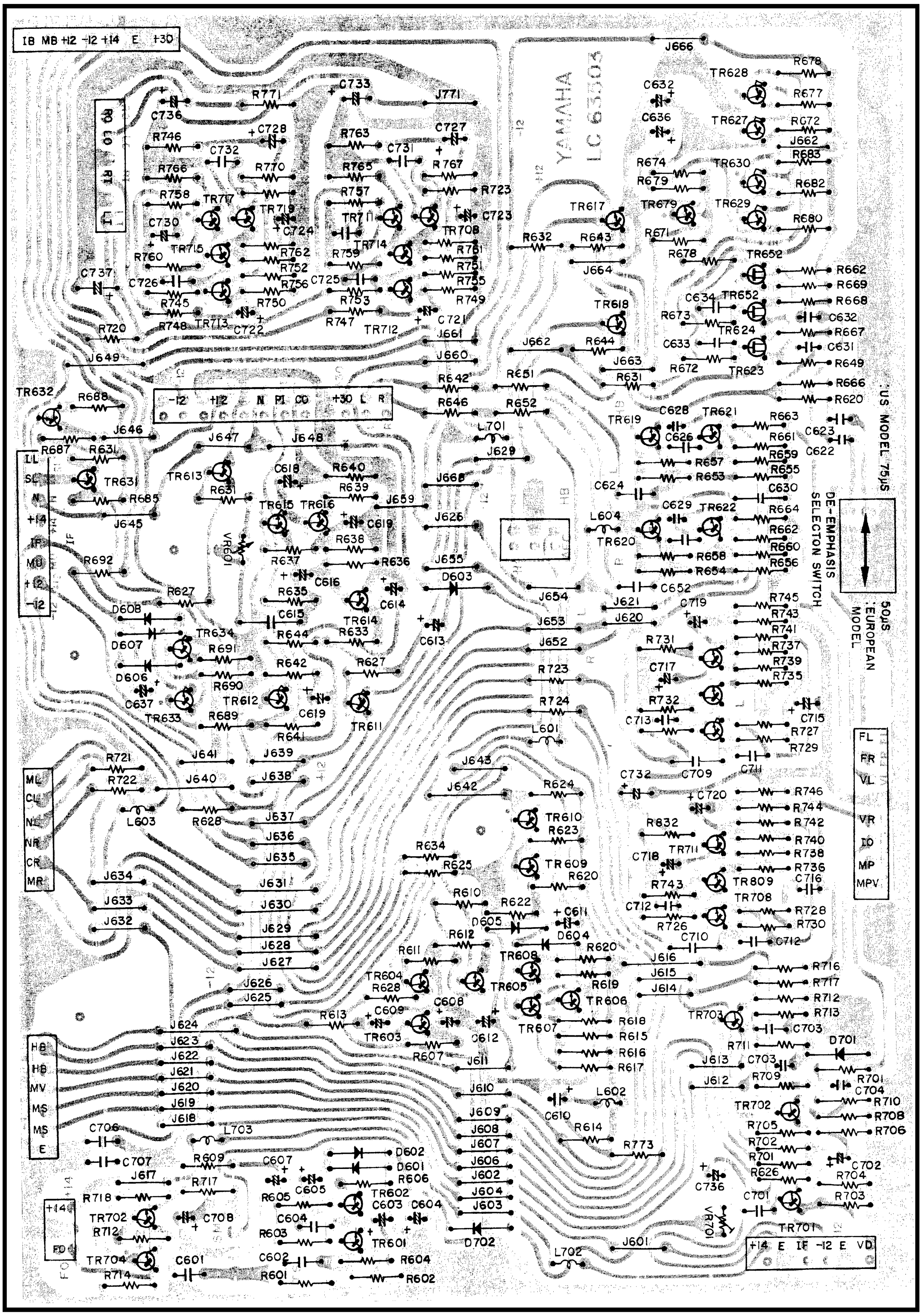
DISCRIMINATOR CIRCUIT BOARD NA06482: U.S.& CANADIAN MODELS
NA06481: EUROPEAN MODEL



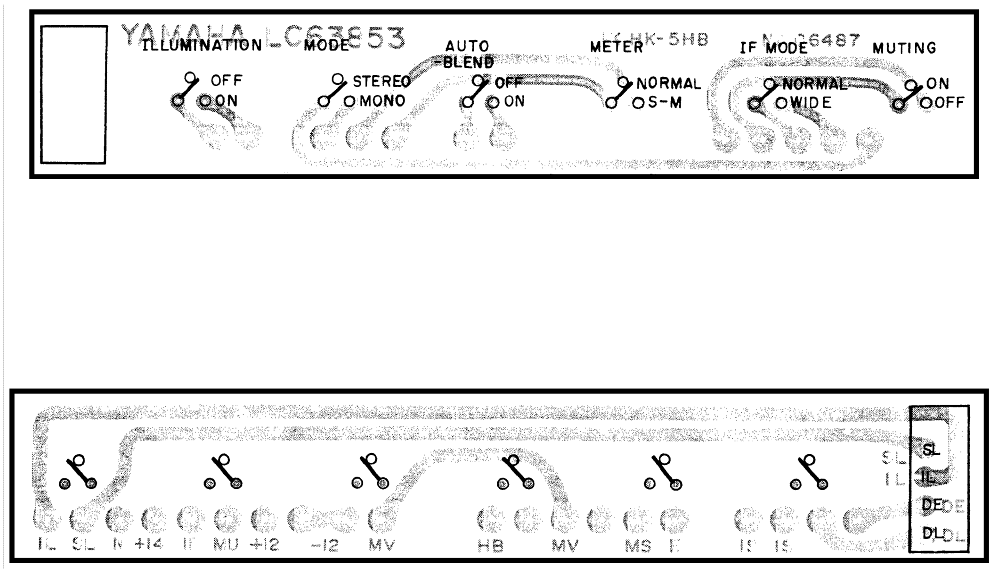
MPX CIRCUIT BOARD NA06483



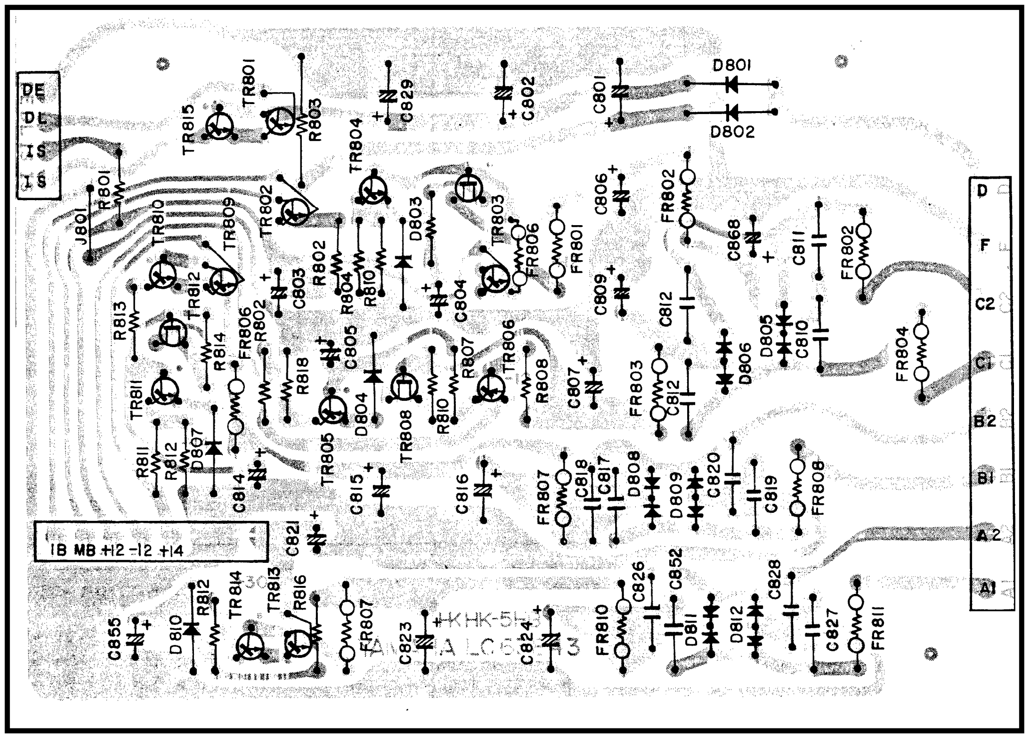
CONTROL CIRCUIT BOARD NA06484



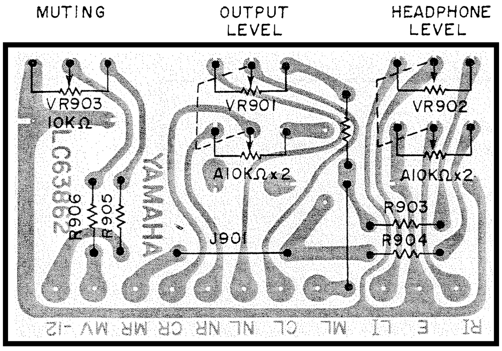
SWITCH CIRCUIT BOARD NA06487



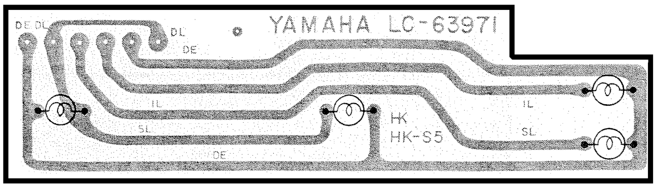
POWER CIRCUIT BOARD NA06485



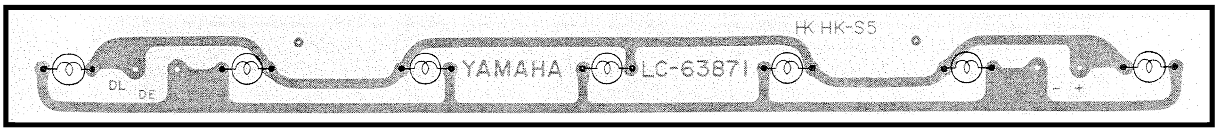
VOLUME CIRCUIT BOARD NA06488



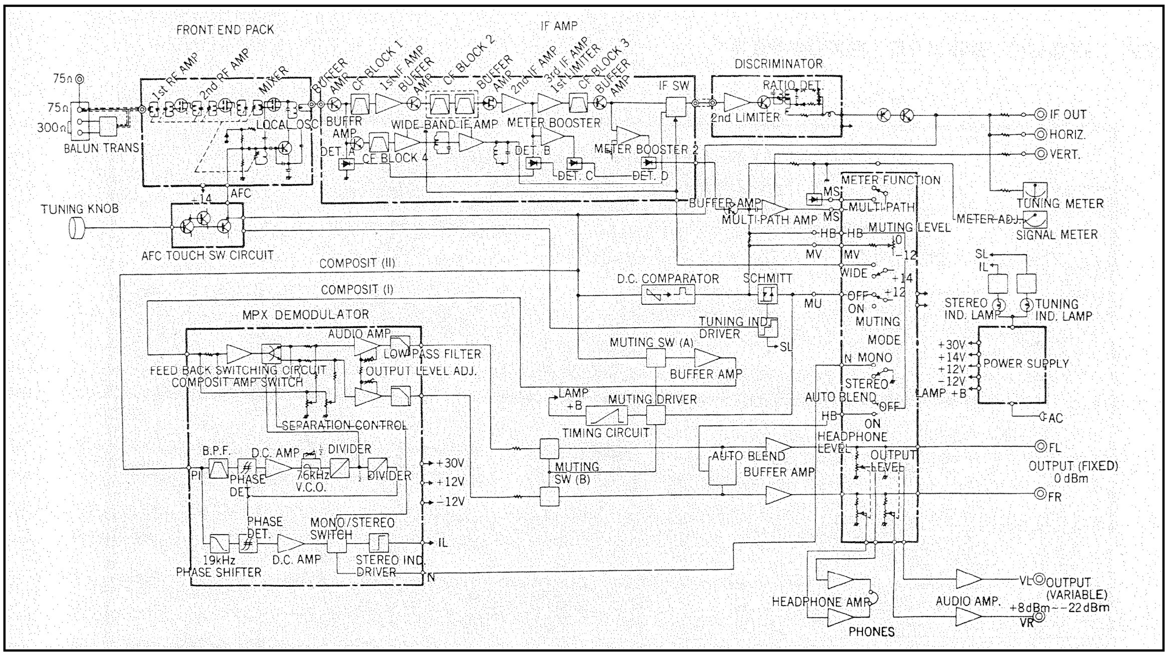
METER LAMP CIRCUIT BOARD NA06490



LAMP CIRCUIT BOARD NA06489



BLOCK DIAGRAM



- **RESISTOR**

SYMBOL	PART NAME
o—WW—o	FUSE RESISTOR
△	METALIZED OXIDATION RESISTOR
□	CEMENT RESISTOR
NO MARK	CARBON RESISTOR
⊠	CEMENT MOLDED RESISTOR
▲	METALIZED FILM RESISTOR

- **CAPACITOR**

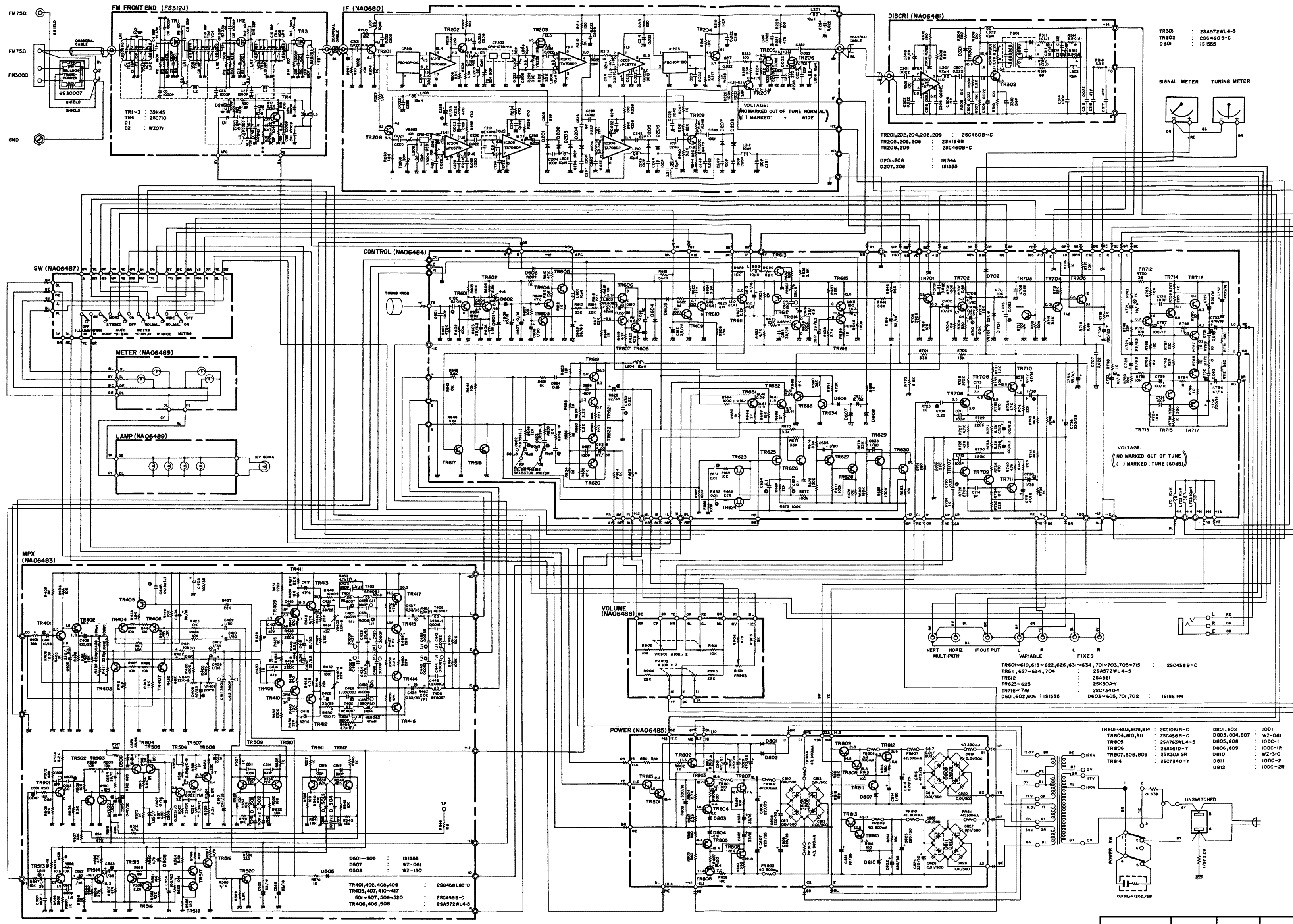
SYMBOL	PART NAME	REMARKS
◎	MYLAR CAPACITOR	—‖—
NO MARK	CERAMIC CAPACITOR	
○	POLYSTYRENE CAPACITOR	
NO MARK	(BI-POLAR) ELECTROLYTIC CAPACITOR	—‖—
●	LOW-NOISE ELECTROLYTIC CAPACITOR	
⊗	TANTALUM CAPACITOR	

- **WIRE COLOR ABBREVIATIONS**

BL ▶ Black
BR ▶ Brown
RE ▶ Red
OR ▶ Orange
YE ▶ Yellow
GR ▶ Green
BE ▶ Blue
VI ▶ Violet
GY ▶ Gray
WH ▶ White
GG ▶ Light Green
SB ▶ Light Blue
PK ▶ Pink

CT-7000

OVERALL SCHEMATIC DIAGRAM

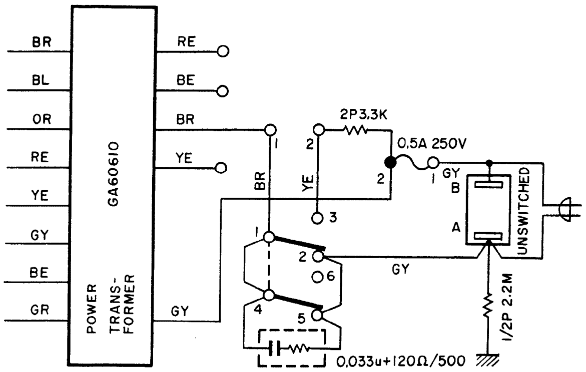


SYMBOL	K	J	G	F	D	B
ERROR (%)	±10	±5	±2	±1.0	±0.5	±0.1

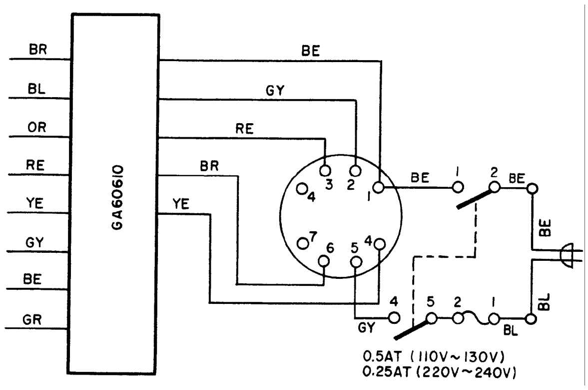
PARTIAL CHANGES MADE ACCORDING TO DESTINATION

▼ POWER

- **U.S. & CANADIAN MODELS**

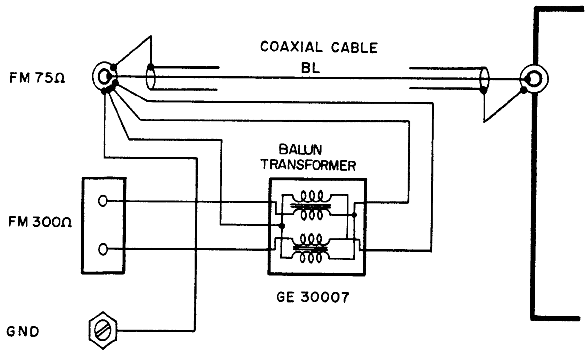


- **EUROPEAN MODEL**



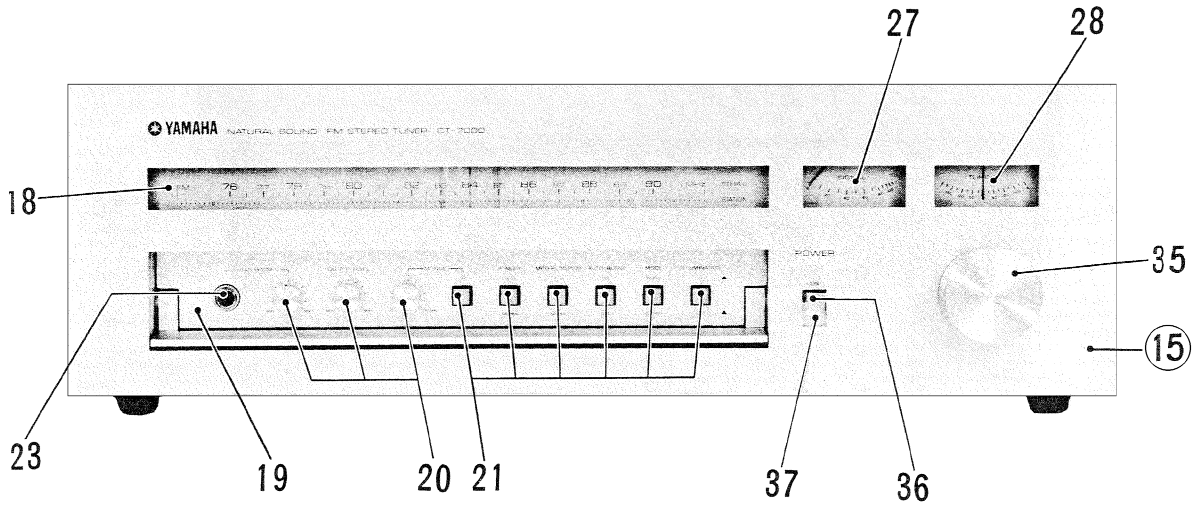
▼ ANTENNA

- **EUROPEAN MODEL**

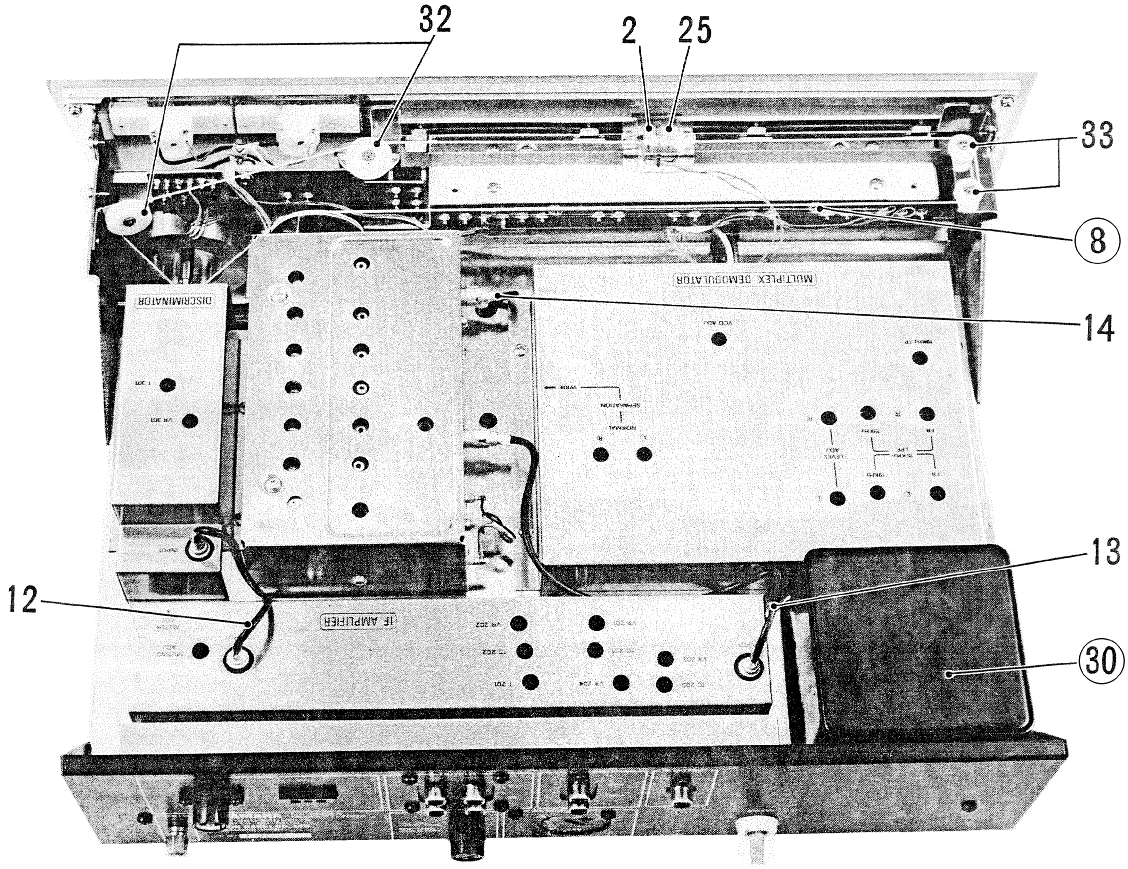


PARTS LIST

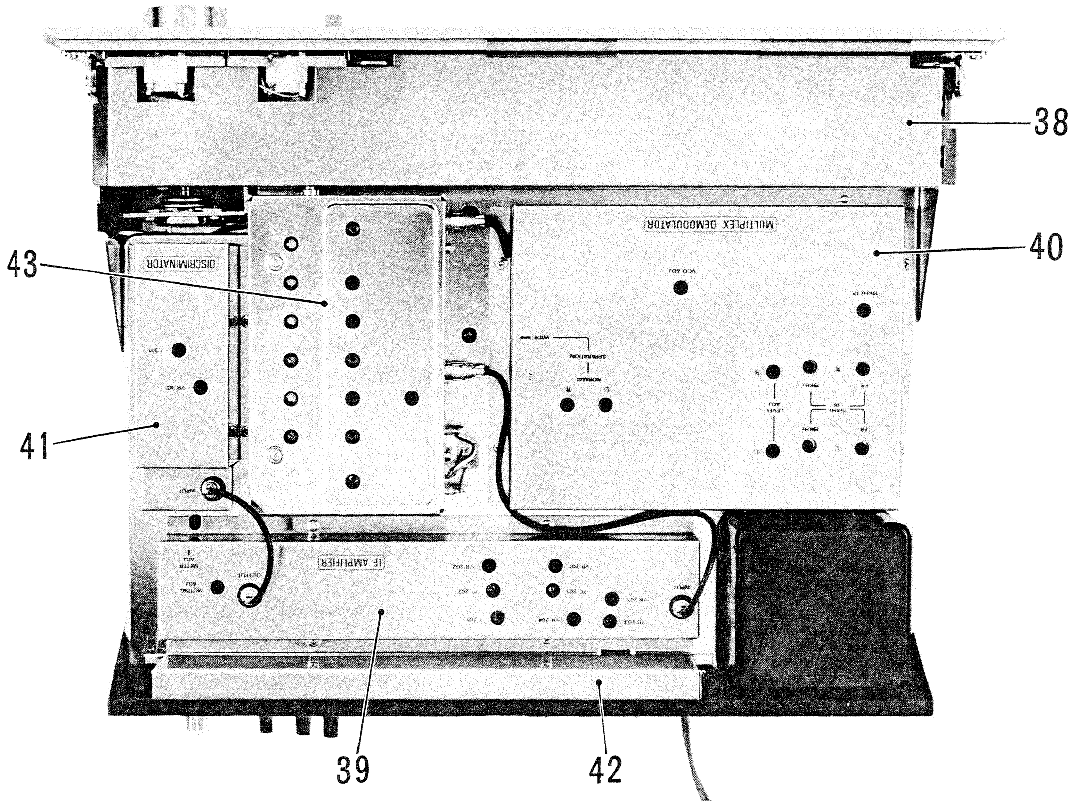
FRONT VIEW



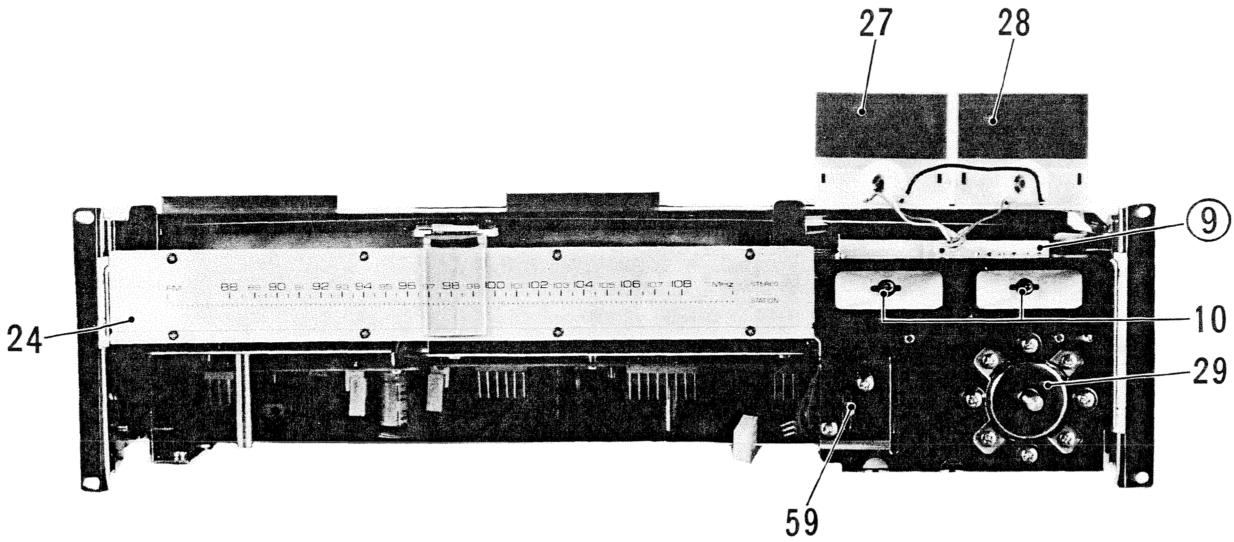
INTERNAL VIEW



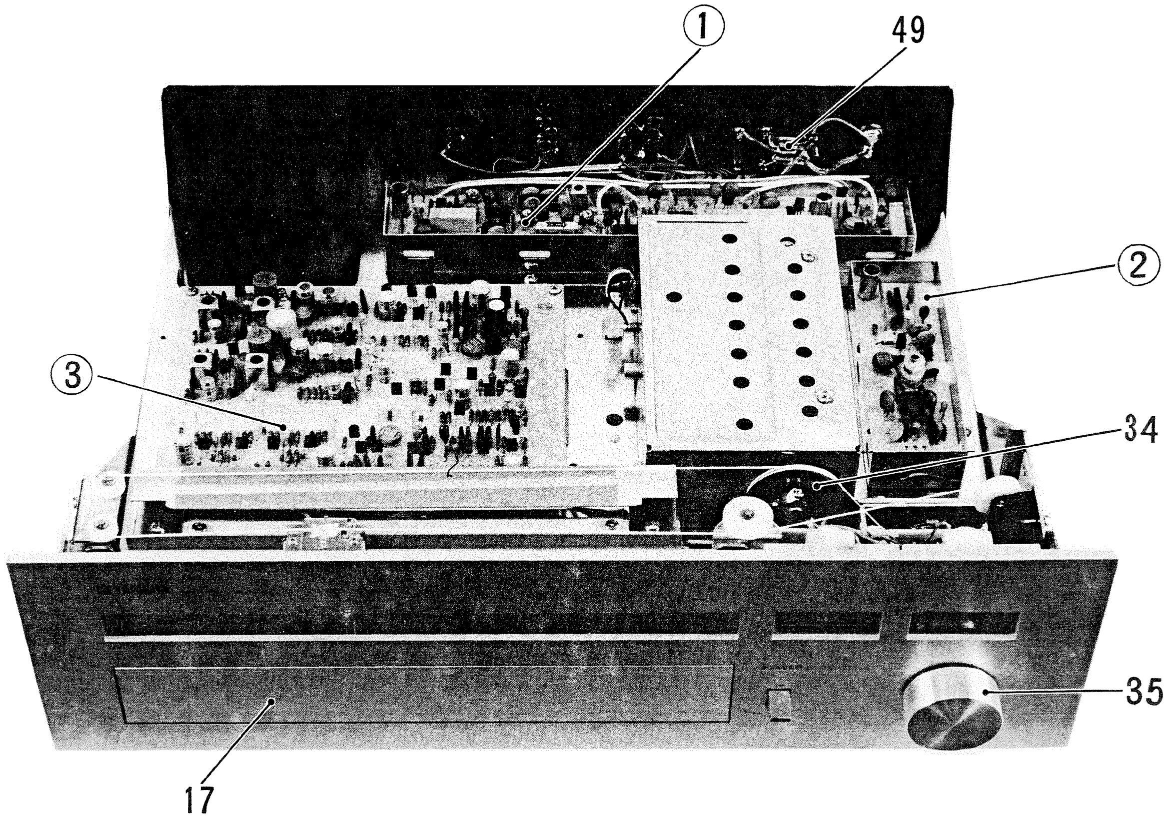
INTERNAL VIEW



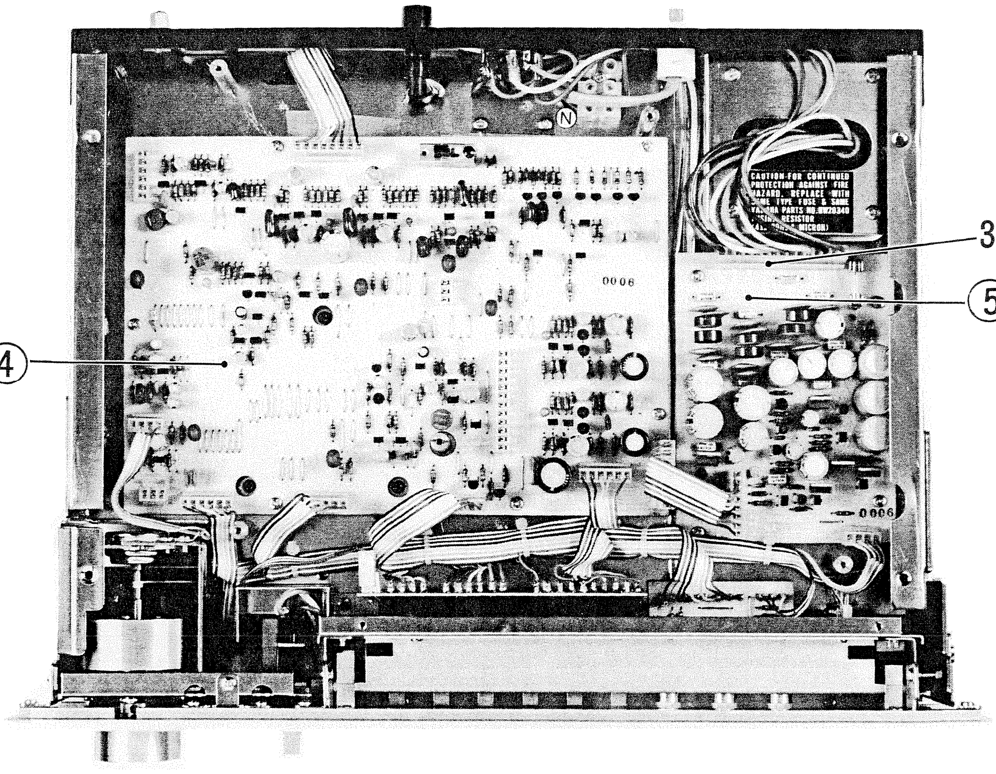
EXPLODED VIEW



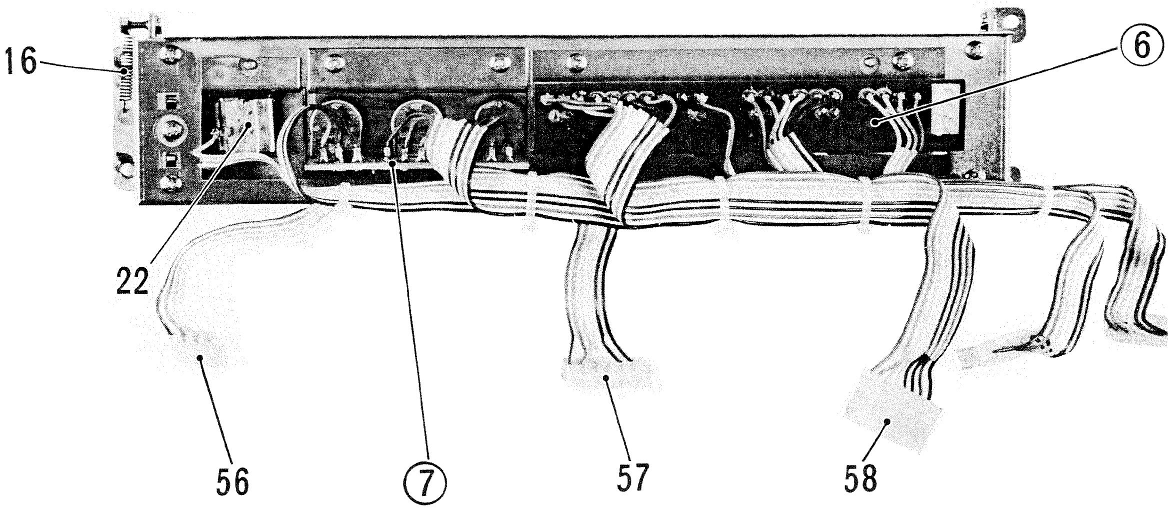
INTERNAL VIEW



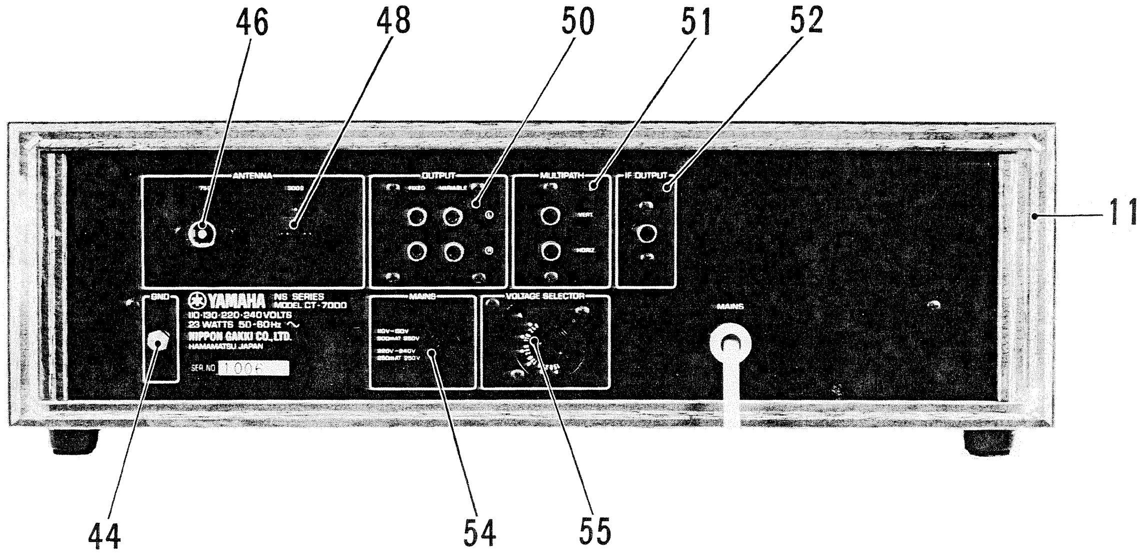
INTERNAL VIEW (BOTTOM)



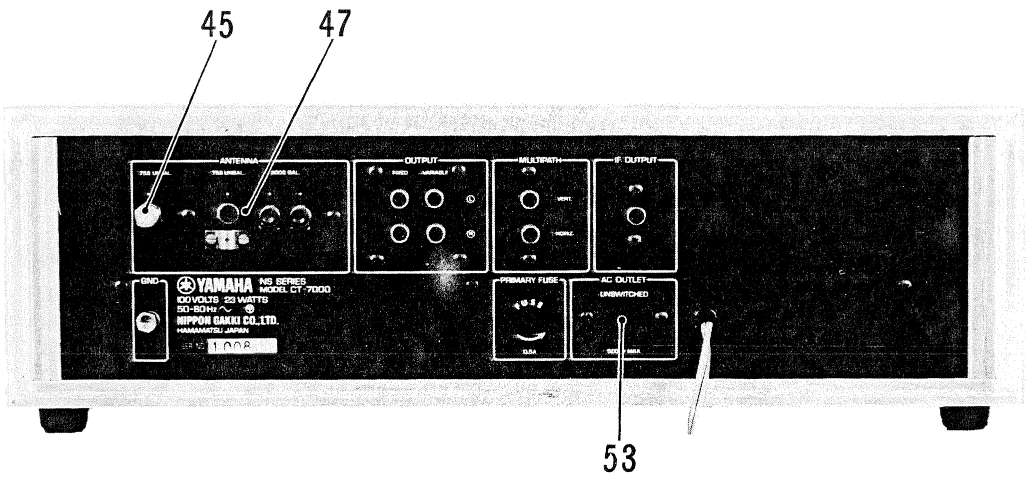
EXPLODED VIEW



BACK VIEW (EUROPEAN MODEL)



BACK VIEW



Ref. No.	Part No.	Descriptions			Remarks	Common Models	
①	NA06480	IF Circuit board	♯62754	ＩＦシート			
	FP14647	Tantalum capacitor	4.7 μF 25V	タンタルコンデンサ			
	GE30013	RF inductor	10 μH	ＲＦインダクター			
	GG00013	Ceramic filter	FBC-10P-01C	セラミックフィルター			
	GG00014	〃	CFM107M-24	〃			
	GG00015	〃	CFM107P-12C	〃			
	FY00004	Ceramic trimmer	30PF	セラミックトリマー			
	HY00019	Metal glaze variable resistor	CR19R B-1K	メタルグレーズＶＲ			
	HT41001	Variable resistor	SV10KR B220Ω	ソリッドＶＲ			
	iC04588	Transistor	2SC458 B or C	トランジスター			
	iC04608	〃	2SC460 B or C	〃			
	iE00009	FET	2SK19 GR	ＦＥＴ			
	iF00033	Diode	1S188 FM1	ダイオード			
	iF00004	〃	1S1555	〃			
	iG00040	IC	TA7060P	ＩＣ			
	iG00039	IC	μPC577H	ＩＣ			
	GE10018	FM IFT	GE10018	ＦＭ ＩＦＴ			
	BB06336	IF shield frame	No. 6336	ＩＦシールド枠			
	LB10009	Pin jack SQ3055		ピンジャック			
	LB60052	Connector housing	No. 2145-6B	コネクトコンハウジング			
②	NA06481	Discriminator circuit board	♯62763	ディスクリシート			
	HU45610	Metal film resistor (J)	1KΩ	金属被膜抵抗(J)			
	HU45622	〃	2.2KΩ	〃			
	HU45639	〃	3.9KΩ	〃			
	FP13710	Tantalum capacitor	10 μF 16V	タンタルコン			
	GE30014	RF inductor	4.7 μH	ＲＦインダクター			
	GE30013	〃	10 μH	〃			

Ref. No.	Part No.	Description		Remarks	Common Models	
	iA07630	Transistor 2SA763 WL 4 or 5	トランジスター			
	iC04608	〃 2SC460 B or C	〃			
	iG00039	IC μPC 577H	I C			
	iF00004	Diode 1S1555	ダイオード			
	HY00016	Metal glaze variable resistor CR19R B-22K	メタルグレーズVR			
	GE10016	Discriminator coil (White marked)	ディスクリコイル	Japanese model		
	GE10017	〃 (Red marked)	〃	U.S. and European models		
	LB10009	1P pin jack SQ3055	1Pピンジャック			
	LB30022	Connector 2145-38	コネクトコン コネクター			
	BB06337	Discriminator shield frame No. 6337	ディスクリシールド枠			
③	NA06483	MPX circuit board #63473	MPXシート			
	HU47620	Metal film resistor (F: ±1%) 2KΩ	金属被膜抵抗			
	HU47633	〃 〃 3.3KΩ	〃			
	HU47622	〃 〃 2.2KΩ	〃			
	HU47647	〃 〃 4.7KΩ	〃			
	HU47656	〃 〃 5.6KΩ	〃			
	HU47710	〃 〃 10KΩ	〃			
	HU47722	〃 〃 22KΩ	〃			
	HU45610	〃 (J: ±5%) 1KΩ	〃			
	HU45633	〃 〃 3.3KΩ	〃			
	HU45710	〃 〃 10KΩ	〃			
	HU45739	〃 〃 39KΩ	〃			
	HU45810	〃 〃 100KΩ	〃			
	FD19330	Polystyrene capacitor (F: ±1%) 3000PF	スチコンタテ型			
	FG10030	Ceramic capacitor 50VSL (F: ±1%) 3PF	セラコン			
	FP12733	Tantalum capacitor 33μF 10V	タンタルコン			
	FP13710	〃 10μF 16V	〃			
	FP14647	〃 4.7μF 25V	〃			
	FP15533	〃 0.33μF 35V	〃			
	FP15547	〃 0.47μF 35V	〃			
	FP15610	〃 1μF 35V	〃			

Ref. No.	Part No.	Description		Remarks	Common Models	
	HY00019	Metal glaze variable resistor CR19R B-1KΩ	メタルグレーズVR			
	HY00016	〃 B-22KΩ	〃			
	GE20008	MPX coil	ＭＰＸコイル	=GE6057		
	GE20011	MPX fixed coil 47mH	ＭＰＸ固定コイル	=GE6062		
	iA07630	Transistor 2SA763 WL4 or 5	トランジスター			
	iC04588	〃 2SC458 B or C	〃			
	iC04589	〃 2SC458LG C or D	〃			
	iF00004	Diode 1S1555	ダイオード			
	iF00027	Zener diode WZ-061	ツェナダイオード			
	iF00035	〃 WZ-130	〃			
	LB60052	Connector housing 6P 2145-6B	コネクトコン ハウジング			
④	NA06484	Control circuit board #63503	コントロールシート			
	HY00016	Metal glaze variable resistor CR19R B22K	メタルグレーズVR			
	FG10030	Ceramic capacitor 50V SL (F: ±1%) 3P	セラコン			
	FP13710	Tantalum capacitor 10 μF 16V	タンタルコン			
	FP15522	〃 0.22 μF 35V	〃			
	FP15610	〃 1 μF 35V	〃			
	FP15622	〃 2.2 μF 35V	〃			
	GE20011	MPX fixed coil 47mH	ＭＰＸ固定コイル	=GE6062		
	GE30013	RF inductor 10 μH	ＲＦインダクター			
	iA05617	Transistor 2SA561 O or Y	トランジスター			
	iA07630	〃 2SA763 WL4 or 5	〃			
	iC04588	〃 2SC458 B or C	〃			
	iC04608	〃 2SC460 B or C	〃			
	iC07343	〃 2SC734 O or Y	〃			
	iE00001	FET 2SK30A Y	ＦＥＴ			
	iF00004	Diode 1S1555	ダイオード			
	iF00033	〃 1S188 FM1	〃			
	iF00032	Zener diode WZ-061	ツェナータイオード			
	KA40006	Slide switch SL222B4	スライドスイッチ			

Ref. No.	Part No.	Description		Remarks	Common Models	
	L840013	Connector 2403-4A	コネクトコン 極性付ウェハー			
	L860053	〃 2403-6A	〃			
	L860054	〃 2403-8A	〃			
	L830022	Connector 2145-38	コネクトコン			
	L860052	〃 2145-68	〃			
⑤	NA06485	Power supply circuit board #63843	電源シート	Japanese and U.S. models		
	NA06486	〃 〃	〃	European model		
	HW20340	Fuse resistor 300mA 4Ω	ヒューズ抵抗			
	iA05612	Transistor 2SA561 O or Y	トランジスター			
	iA07630	〃 2SA763 WL 4 or 5	〃			
	iC04588	〃 2SC458 B or C	〃			
	iC07343	〃 2SC734 O or Y	〃			
	iC10613	〃 2SC1061 B or C	〃			
	iE00002	FET 2SK30A GR	FET			
	iF00032	Zener Diode WZ-061	ツェナーダイオード			
	iF00022	〃 WZ-310	〃			
	iH00003	Diode 10D-1	ダイオード			
	iH00008	〃 10DC-1	〃			
	iH00009	〃 10DC-1R	〃			
	iH00005	〃 10DC-2	〃			
	iH00013	〃 10DC-2R	〃			
	L840013	Connector 2403-4A	コネクトコン 極性付ウェハー			
	L860054	〃 2403-8A	〃			
	L860055	〃 5015-8A	〃			
⑥	NA06487	Switch circuit board #63852	スイッチシート			
	KA90006	Switch SCB 11058	スイッチ			
	L840013	Connector 2403-4A	コネクトコン 極性付ウェハー			
⑦	NA06488	Volume circuit board #63862	VRシート			

Ref. No.	Part No.	Description		Remarks	Common MOdels	
	HR10007	Variable resistor RV16YP15S B-10KΩ	可変抵抗			
	HR10008	〃 RV16YPG15S A-10Kx2	〃			
⑧	NA06489	Lamp circuit board #63870	フンプシート			
	JB00031	Lamp 12V 60mA	パイロットランプ			
⑨	NA06490	Meter lamp circuit board #63970	メーターランプシート			
10	JB00031	Lamp 12V 60mA	パイロットランプ			
11	32007070050000	Outside case (AW)	外装（ウォールナット）	U.S. and European models		
12	MZ06487	Pin-Pin coaxial cable ℓ= 150 mm	両端ピンプラグ付同軸ケーブル			
13	MZ06488	〃 ℓ= 300 mm	〃			
14	MZ06364	Coaxial cable with pin plug ℓ= 570 mm	片端 〃			
⑮	NB06963	Panel unit	パネルユニット			
16	AA07637	Hing spring	ヒンジスプリング			
17	BA06534	Rolling panel	パネル蓋			
18	CG06032	Dial glass	ダイアルガラス			
19	BA06537	Sub-panel	サブパネル			
20	BA06541	Variable resistor knob	VRツマミ			
21	CB07037	Push button	プッシュボタン			
22	LB30007	Headphone jack JH5020K	ホーンジャック			
23	CB06827	Phone nut	ホーンナット			
24	NB06966	Dial scale unit	ダイアルスケールユニット	U.S. and European models		
25	NB06967	Dial pointer unit	ダイアルポインタユニット			
26	JB00009	Lead type lamp 12V 60mA	リ ド式ランプ			
27	Ji00026	Signal meter	シグナルメーター			
28	Ji00027	Tunig meter	チューニングメーター			
29	NB06969	Tuning unit	チューニングユニット			
㉚	MZ06482	Power transformer assembly	電源トランスアッセンブリ	U.S. model		

Ref. No.	Part No.	Description			Remarks	Common Models	
	MZ06483	Power transformer assembly		電源トランスアッセンブリ	European model		
31	LB60059	Connector housing	No. 2139-15	コネクトコン配線用ハウジング			
32	CB07094	Pulley	No. 7094	滑車			
33	CB07034	〃	No. 7034	〃			
34	CB06322	Pulley for variable capacitor		バリコンプーリー			
35	BA06540	Tuning knob	No. 6540	チューニングツマミ			
36	CB06857	Lever knob	No. 6557	レバーツマミ		CA-1000	
	CB06858	Bush for switch		SW用ブッシュ		〃	
37	CB06872	Switch apron		スイッチエプロン		〃	
38	AA07603	Sub cover		サブカバー			
39	AA07618	IF cover		IFカバー			
40	AA07619	MPX cover		MPXカバー			
41	AA07620	Discriminator cover		ディスクリカバー			
42	AA07621	Rear cover		リアーカバー			
43	PA00027	RF pack	FS-312U	RFパック	U.S. and European models		
	LB30023	Connector on shassis	No. 2220-3Y	コネクトコンシャーシーマウント			
	LB60056	〃	No. 2220-6Y	〃			
	LB60057	〃	No. 2220-12Y	〃			
	LA00104	3P connection terminal		3P中継端子台	European model		
44	LA00079	Ground terminal B		アース端子B			
45	LB20016	F type receptacle	F-61A	F型レセプタクル	Japanese and U.S. models		
46	LB20015	75Ω coaxial cable connector socket	L-603	75Ω同軸コネクターソケット	European model		
47	LA00134	Antenna terminal 3P		アンテナ端子	Japanese and U.S. models		
48	LB20007	DIN FM antenna socket	CS-082	DINFMアンテナソケット	European model		
49	GE30007	Balun transformer		バルーントランス			
50	LB40017	Pin jack 4P	JPC-214				
51	LB20079	〃 2P	JPC-096	〃			
52	LB10028	〃 1P	JPC-066	〃			
53	LB20030	AC socket	503B	ACソケット			
	LB20048	Fuse holder UL type	SMK SN-1301	ヒューズホルダー	U.S. model		
54	LB20059	〃	FEB-031-1401	〃	European model		
	KB00101	UL type fuse SS-2	0.5A 250V	ヒューズ	U.S. model		
	KB00064	Miniature fuse	0.25A 250V	sヒューズ	European model		

Ref. No.	Part No.	Description		Remarks	Common Models	
55	LB20025	Voltage selector		European model		
	HL42656	Metal oxid film resistor 5.6KΩ 2W	酸化金属被膜抵抗	Japanese and U.S. models		
	HL42633	〃 3.3KΩ 2W	〃	〃		
56	LB40014	Connector housing No. 2139-4	コネクトコン配線用ハウジング			
57	LB60058	〃 No. 2139-6	〃			
58	LB60040	〃 No. 2139-8	〃			
	LB30024	〃 No. 2139-3	〃			
	LB10024	Contact pin for connector No. 2578-T	コネクトコンターミナル連鎖状			
59	KA20010	Lever switch (Power switch) JL-04	レバースイッチ	Japanese and U.S. models		
	KA20011	〃 JL-08	〃	European model		
	FZ00011	Spark killer 0.033 μF 120Ω	スパークキラー	Japanese and U.S. models		
	MZ06189	Pin-Pin connection cable No. 6189	接続コード			
	KB00031	Fuse 0.1AT 250V	ヒューズ	Japanese model		
	KB00101	〃 0.5A 250V	〃	U.S. model		
	KB00071	Miniature fuse 0.5AT 250V	Ⓢヒューズ	European model		
	KB00064	〃 0.25AT 250V	〃	〃		
	NB06678	Service pad No. 6678	サービスパッド	U.S. and European models		
	MZ06440	FM Q match antenna 5059-01	FMQマッチアンテナ	U.S. model		
	MZ06459	〃 6459	〃	European model		

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