

AM/FM STEREO TUNER

# TX-9100

OPERATING INSTRUCTIONS

KUW



WARNING: TO PREVENT FIRE OR SHOCK HAZARD,  
DO NOT EXPOSE THIS APPLIANCE TO RAIN OR  
MOISTURE.

 **PIONEER**

Congratulations upon your selection of the Pioneer AM/FM stereo tuner model TX-9100. Connected to a stereo amplifier it will form a stereo system for years of brilliant AM, FM and FM stereo reception.

Please read the following instructions carefully for maximum performance from this Pioneer hi-fi component.

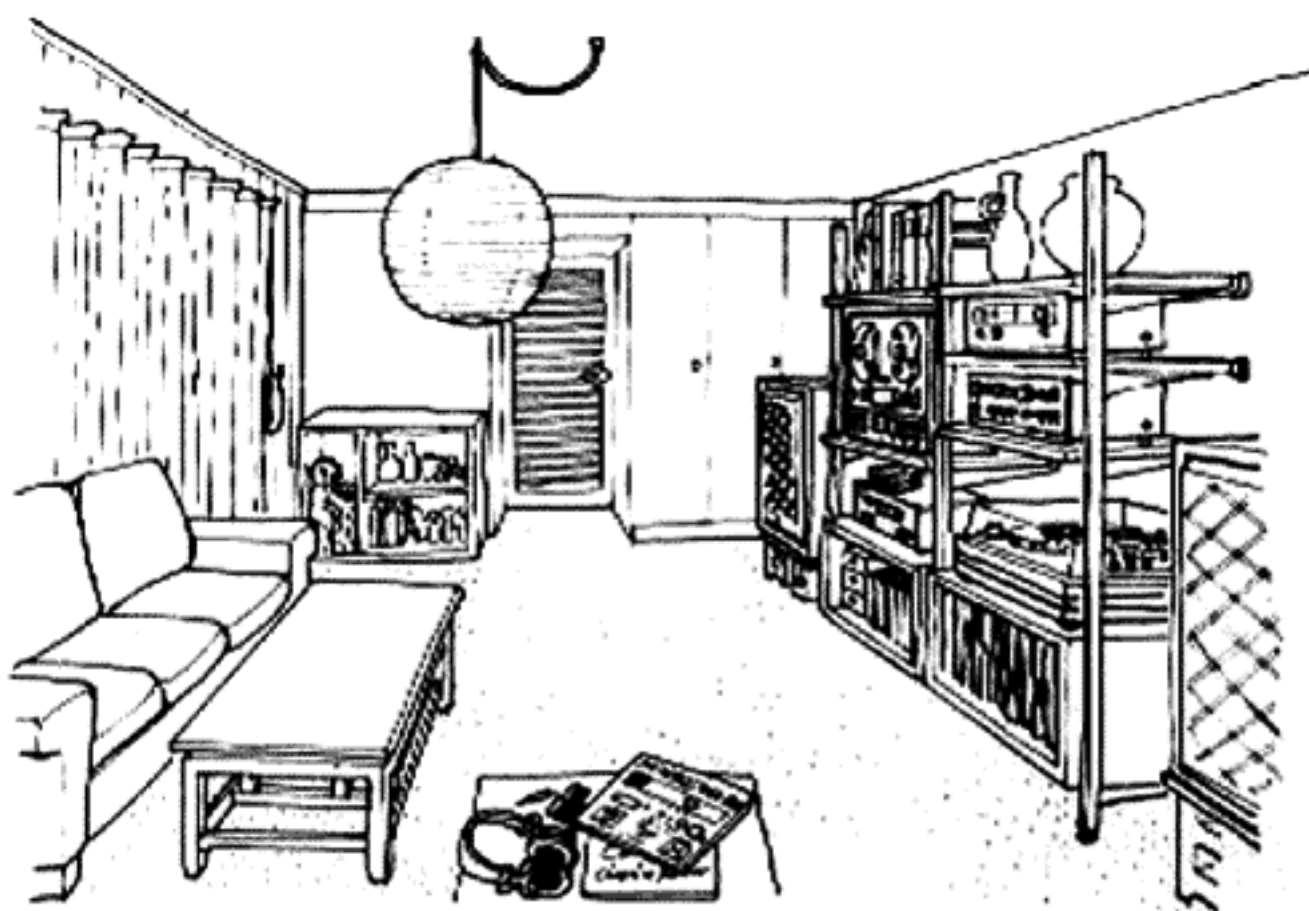
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## TUNER LOCATION

Avoid the following locations:

- A spot receiving direct sunlight, or one exposed to excessive heat, such as a stove, etc.
- On top of or near a power amplifier or transformer which develops noticeable heat. Be especially careful of tube-type units.
- Locations with a great deal of humidity or dust.



## TX-9100 FEATURES

### The FM Front End

From the incoming antenna signal, the desired portion is selected — before the first amplification stage — by a 5-ganged variable capacitor (The tuning dial is of course marked in linear intervals.). 2-stage RF amplification as well as the mixer are equipped with dual-gate metal oxide semiconductor field effect transistors (MOS FET) of special low-noise characteristics, whereby tuner sensitivity, image rejection and spurious rejection are raised to the theoretical limits, and crossmodulation is eliminated.

Between the local oscillator and the mixer circuit, a special buffer amplifier is provided to assure stable operation in very strong as well as extremely weak signal areas.

### The IF Stages

All six limiter stages in the intermediate frequency (IF) stretch are equipped with ICs of highly stable operating characteristics. This design accounts for the tuner's outstanding performance in regard to capture ratio (ability to distinguish between wanted and unwanted signals on the same frequency band), signal-to-noise ratio (meaning freedom from noise and hiss) and AM rejection (i.e. suppression of noise signals from motors, etc.).

Filters are not of the conventional IC type, but are specially developed "phase linear" ceramic components which provide sharp, stable cutoff characteristics without causing any phase distortions. Adjacent-channel selectivity of this tuner is so sharp that even the best laboratory instruments can hardly measure it.

### The FM MPX Decoder

The design principle of the "phase lock loop" is applied in this circuit — it has no inductances or capacitances which could cause phase shifts and distortions. Any phase dislocation that might occur is automatically detected and compensated by a loop circuit. This results in an unprecedented high degree of stability irrespective of temperature or humidity changes. FM stereo channel separation always remains sharp and clear-cut, throughout the audio frequency range (in conventional tuners, separation often deteriorates at the higher frequencies).

Also, great care has been taken to eliminate SCA interferences, beat, and leakage of the 38kHz switching carrier.

### Pulse Noise Suppressor

Irritating pulse noise, mostly caused by automobile ignitions, cannot be completely eliminated in the limiter stages if the signal received is weak. Therefore model TX-9100 is equipped with a special pulse noise suppressor circuit which detects the presence of (frequency- and/or amplitude modulated) pulse noise and eliminates it from the audio signal, without however affecting the wanted signal in any way.

### MPX Noise Filter

High-frequency noise sometimes present in weak FM stereo reception can be somewhat reduced by the MPX noise filter.

### Auxiliary Controls and Facilities

These include a signal strength tuning meter (for FM and AM), a center-zero tuning meter (for FM), separate output level controls for AM and FM, and a built-in headphone amplifier, headphone jack and headphone volume control. On the rear panel, you find a swivel-type ferrite bar antenna for AM reception, variable and fixed output jacks, FM antenna connectors for 300Ω feeder wire and 75Ω coaxial cable, and a pair of FM multipath detector outputs which, when connected to an oscilloscope or the Pioneer Stereo Display unit SD-1100, permit visual detection of multipath conditions.

### The AM Section

Please note that the AM tuning dial, too, is marked in linear intervals for easy tuning. A large scale integrated circuit is used in the AM section, giving stable reception under all conditions. To apply a generous amount of feedback for the automatic gain control, a special "remote cutoff" transistor is used. AM output level remains constant regardless of incoming signal strength. For sharp selectivity, ceramic filters are used in the AM IF section. The TX-9100 is one of the very few tuners that deliver hi-fi-acceptable sound quality on AM, too.

### Positively Functioning Muting Circuit, Two Threshold Levels

The FM muting circuit is an advanced design employing one MOS IC and one large scale IC. Muting of interstation noise is quick and responsive, even if you twirl the tuning knob rapidly. When the tuner picks up a station, however, the signal will not appear abruptly but will "fade in" quite naturally. This effect is achieved by using a semiconductor switch in combination with a relay.

With the switch on the front panel, the muting threshold level — the minimum signal strength that the muting circuit will let pass — can be adjusted in two stages.

### Outward Appearance Matches Technical Excellence

The easy-to-read and at the same time elegant tuning dial and front panel, the natural-grain walnut cabinet — the Pioneer TX-9100 looks as good as it sounds. Its styling matches that of other Pioneer hi-fi components so that you can assemble a stereo system of unified elegance.

# STEREO SYSTEM SET-UP

When combined with a stereo amplifier and two speaker systems as shown in Fig. 1, the TX-9100 will form the core of a complete stereo system, providing superb AM, FM and FM stereo reception. With stereo headphones the same listening pleasure is yours even without an amplifier, and you can connect a tape deck directly for recording, thanks to the output terminals.

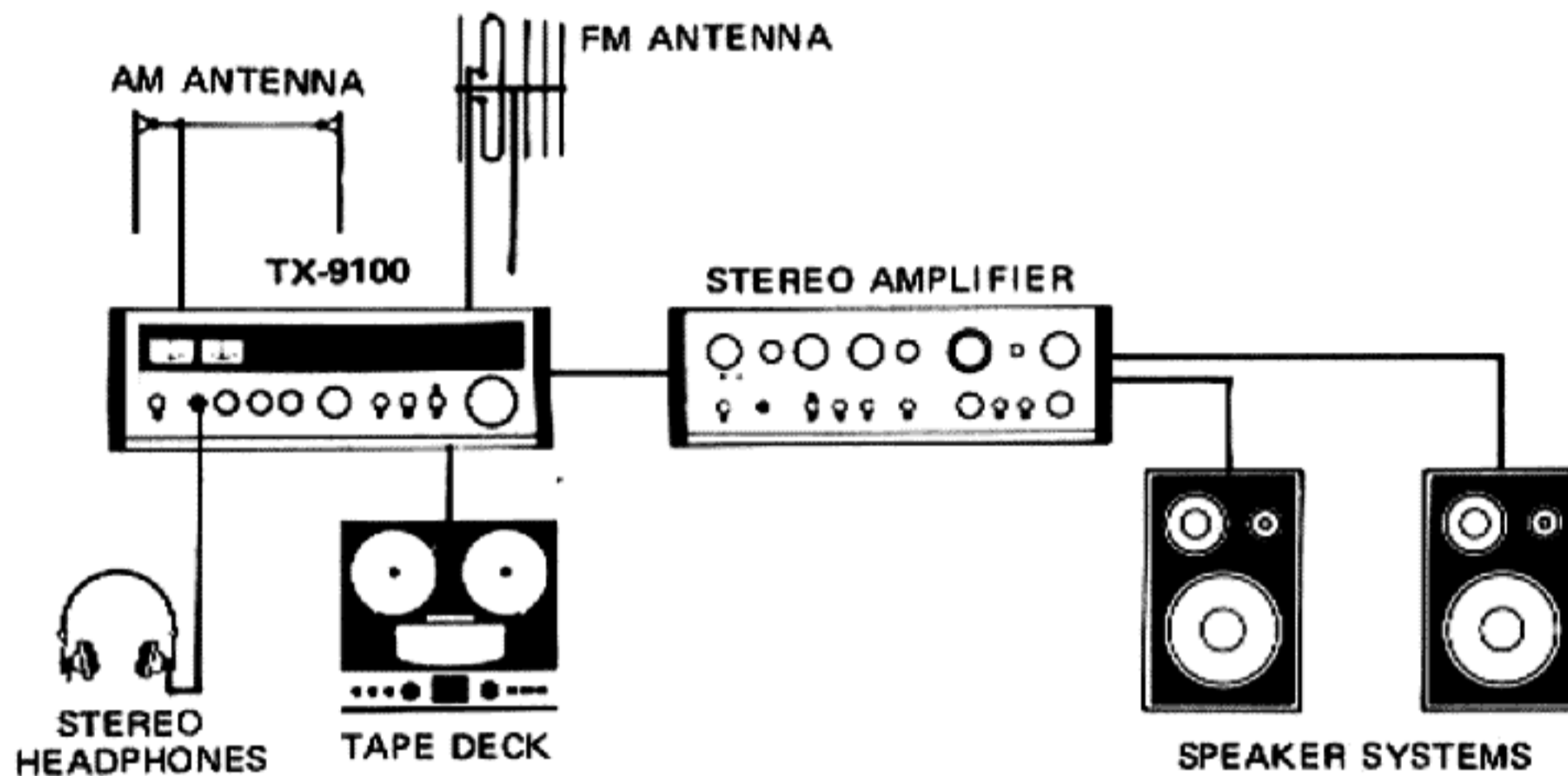


Fig. 1

## CONNECTIONS

### STEREO AMPLIFIER

Use the furnished cord to connect the TX-9100 OUTPUT (VARIABLE) terminals and the stereo amplifier's TUNER or AUX input terminals, as shown in Fig. 2.

These terminals are spaced out rationally with the left (L) above and the right (R) below. Make sure to connect each to the proper terminal on the amplifier.

**NOTE:**

The level of these OUTPUT (VARIABLE) terminals is controlled by the Output Level knobs on the front panel.

### TAPE DECK (Reel-to-Reel or Cassette)

Connect the OUTPUT (FIXED) terminals on the rear of the TX-9100 to the tape deck Line Input terminals. The upper TX-9100 terminal is (L), the lower (R); be sure to connect each to the proper tape deck terminal. Use the connection cord supplied with the deck.

**NOTE:**

The signal level from the OUTPUT (FIXED) terminals cannot be controlled from the TX-9100; this must be done with the tape deck input level controls.

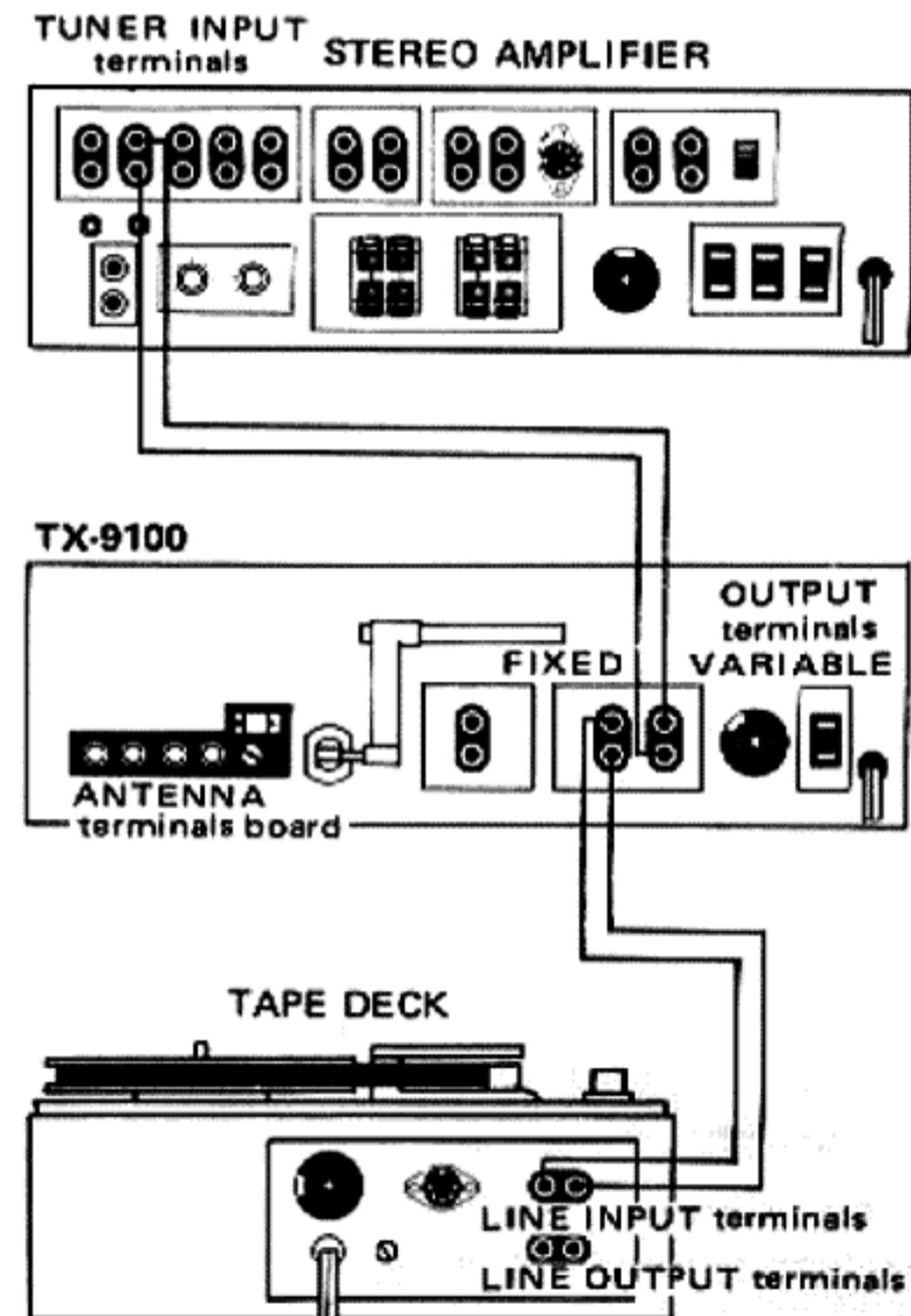
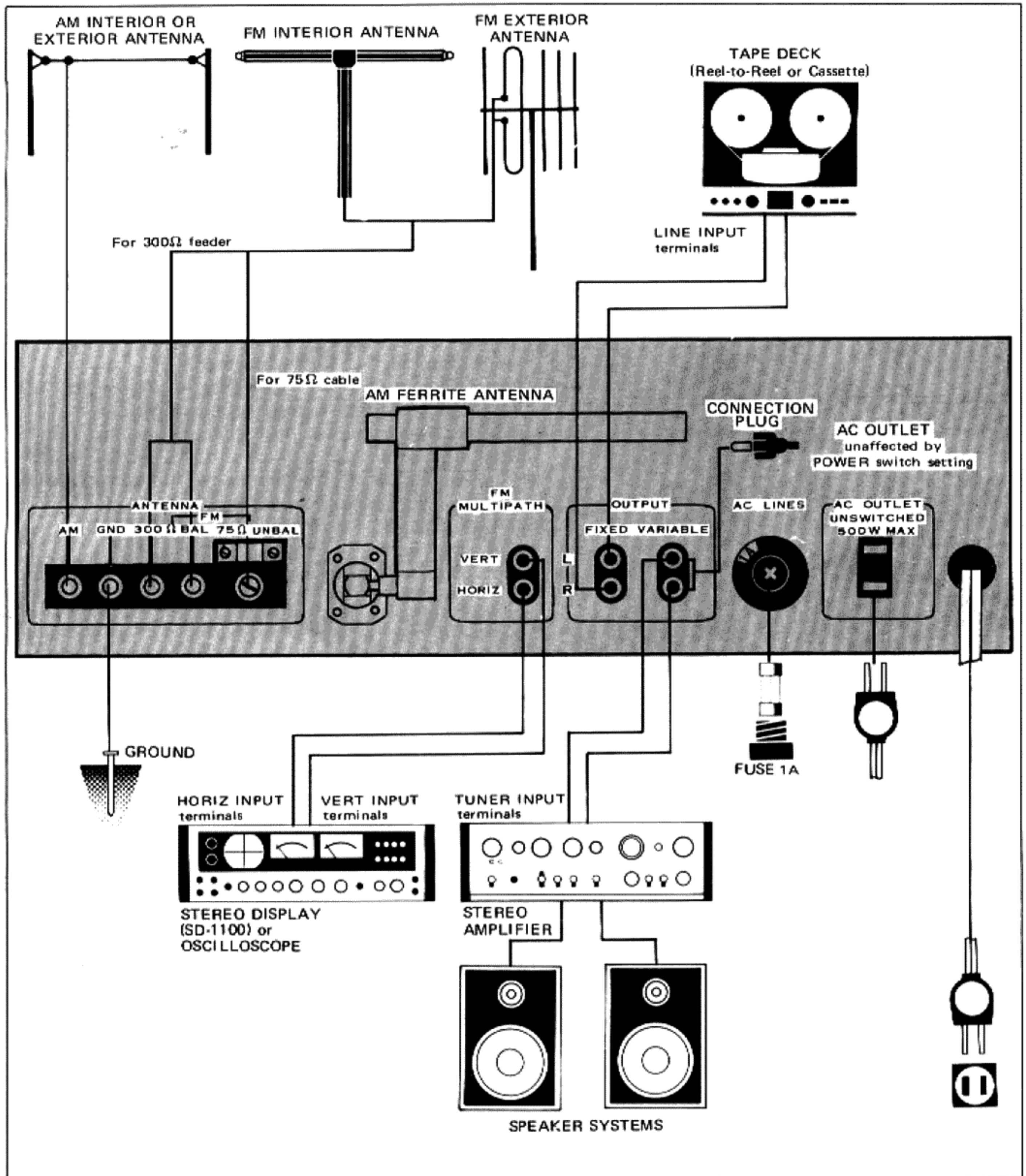


Fig. 2

# CONNECTION DIAGRAM



# ANTENNAS AND GROUND CONNECTIONS

## FM ANTENNA

FM broadcast signals are considerably weakened by intervening mountains, buildings, etc., or if the antenna is inside a concrete building. This should be considered when deciding upon the type and location of the FM antenna.

### Connection and Location

For areas with a strong signal, especially in wooden houses, use the T-type interior antenna (supplied).

- As shown in Fig. 3, first connect the antenna leads to the proper terminals on the rear of the TX-9100. Then spread out the cross section and attach it to a wall, etc. after deciding the best location by listening to an FM broadcast and watching the TUNING and SIGNAL meters (see the explanation on p.8).

When a special FM exterior antenna is required.

- If there is a great deal of noise during FM reception using this antenna, replace it with a special FM exterior antenna (or a combination FM/TV antenna) connected to the proper terminal(s), as shown in Fig. 4.

### NOTES:

1. FM antennas are available in any type. Select the best type after securing the advice of your audio dealer.
2. In heavy traffic areas, industrial zones or near high voltage electrical equipment a great deal of interference may enter despite careful antenna selection. In such a case, talk things over with your audio dealer. It may be advisable to use a 75Ω coaxial cable between the antenna and the TX-9100. If so, connect to the cable terminal as shown in Fig. 5.
3. In some countries, model TX-9100 is delivered with a selector switch for adjusting the FM de-emphasis from 50 to 75μsec. If your unit is equipped with such a switch at the lower side of the chassis, and if the high sound range gives an impression of sharpness or hissing, move the de-emphasis switch to its other position.

## AM ANTENNA

First tune in an AM station (see the explanation on p.8). Then, while watching the SIGNAL meter, adjust the AM ferrite antenna on the rear panel for the best signal (see Fig. 6).

1. If the ferrite antenna does not provide satisfactory AM reception, connect the vinyl-sheathed AM lead antenna to the proper terminal. Stretch it out with the other end as high as possible (see Fig. 3).
2. If reception is still poor, construct an exterior antenna between two poles, etc., as shown in Fig. 4. Use vinyl-sheathed lead, and connect to the TX-9100 AM antenna terminal.

## GROUND

For optimum safety and noise-free performance be sure the GND terminal is connected to a good ground (see Fig. 4).

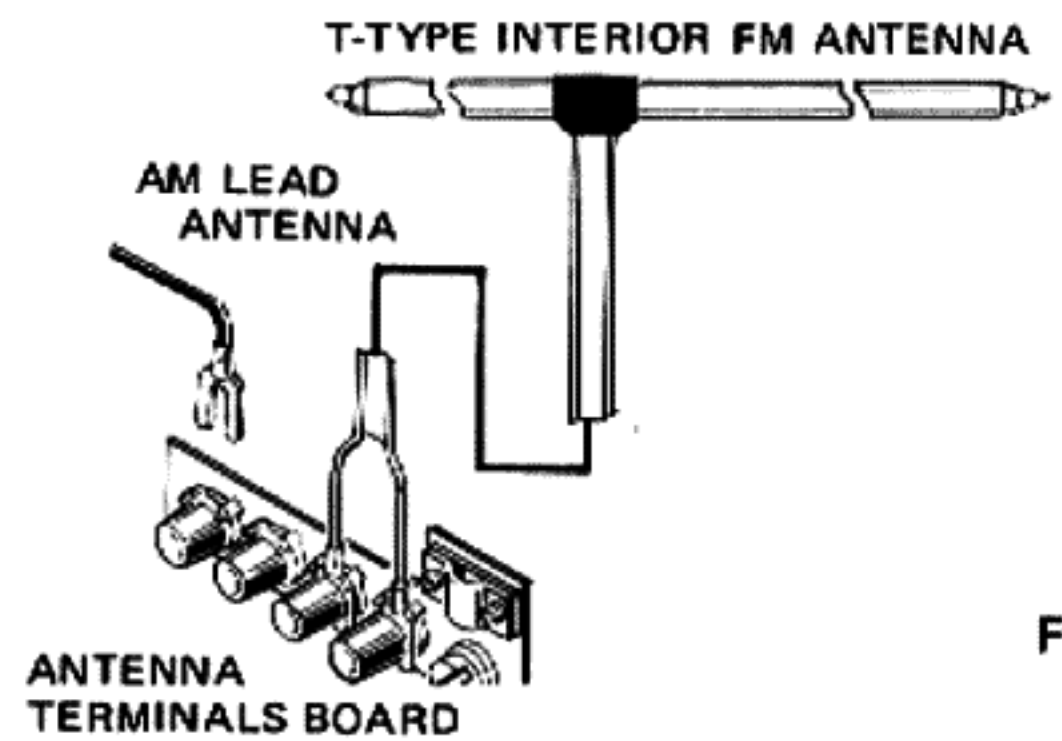


Fig. 3

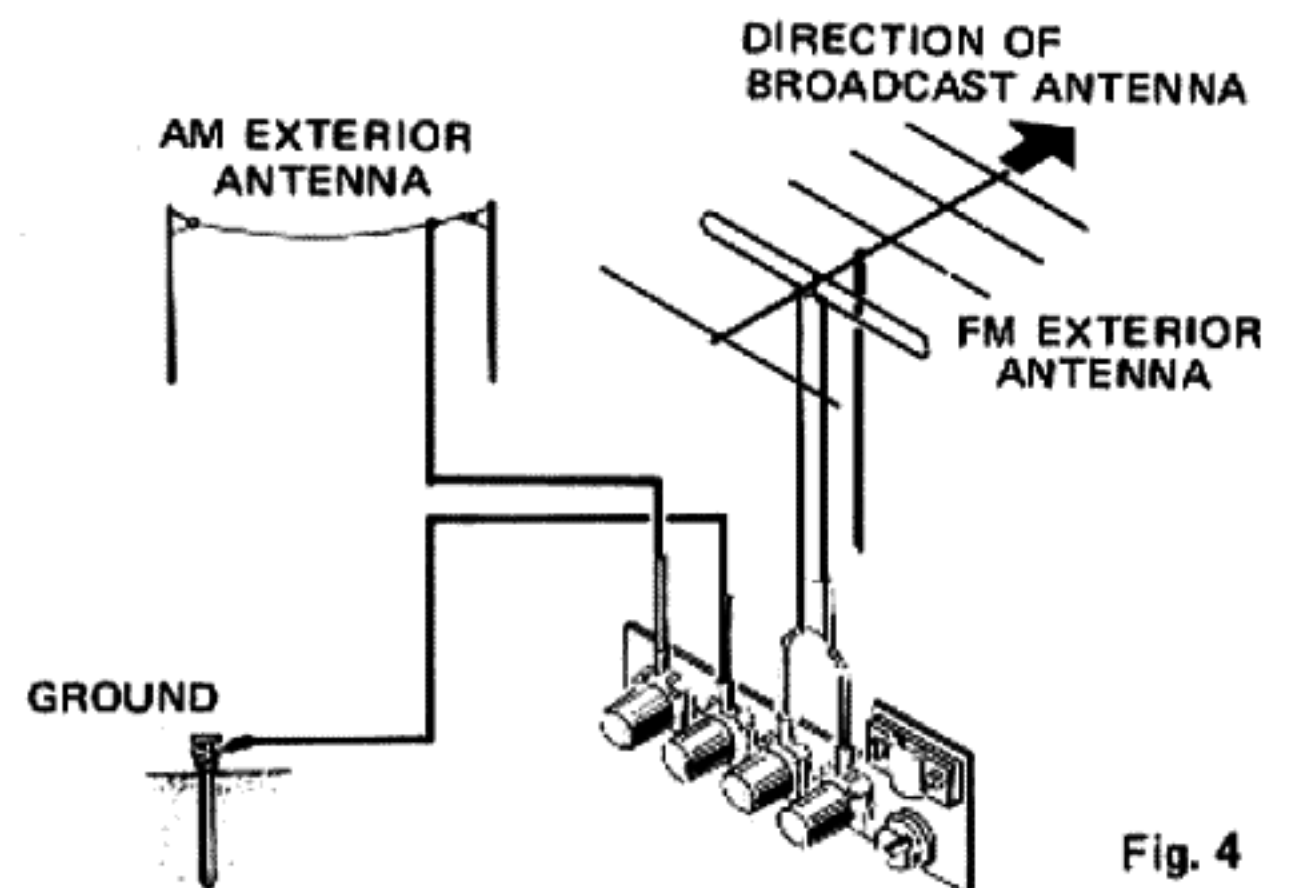
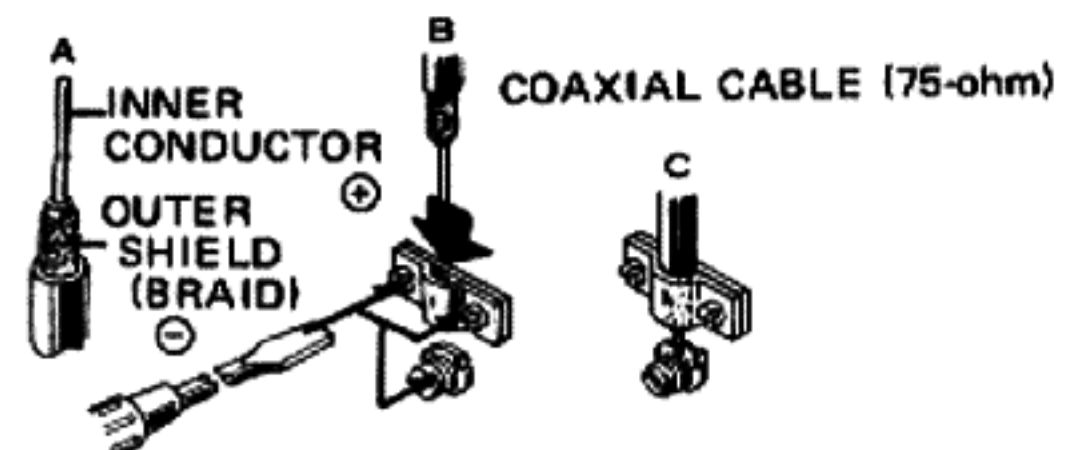


Fig. 4



Strip the coaxial cable as shown in (A). Loosen the screws and connect the cable as shown in (B). Then tighten all screws for a connection like (C). Fig. 5

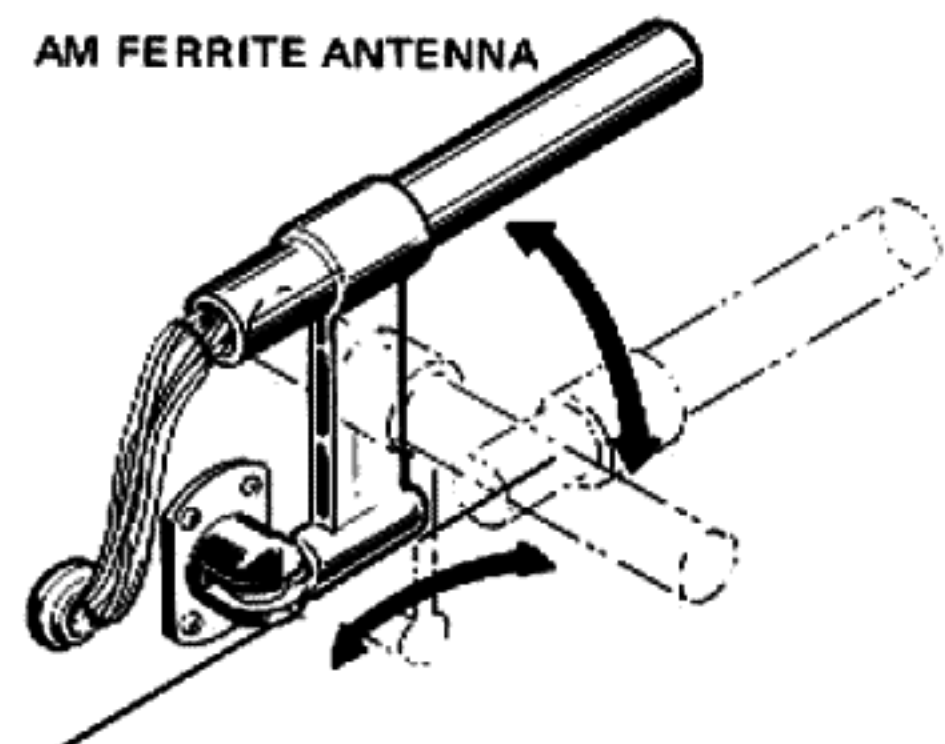


Fig. 6

# FRONT PANEL FACILITIES

## POWER SWITCH

Move up to ON to power the set, down to turn it OFF.

## SIGNAL METER

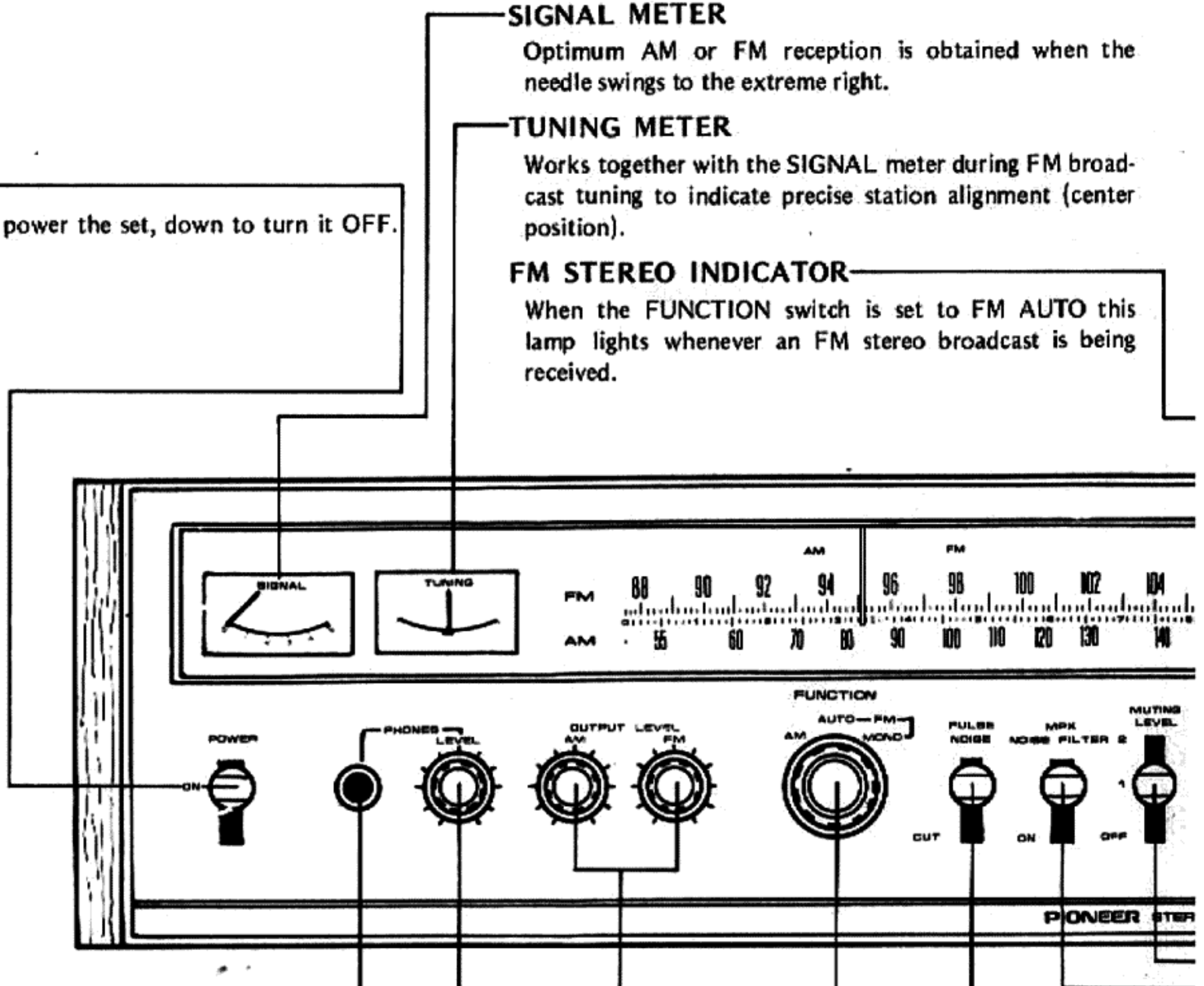
Optimum AM or FM reception is obtained when the needle swings to the extreme right.

## TUNING METER

Works together with the SIGNAL meter during FM broadcast tuning to indicate precise station alignment (center position).

## FM STEREO INDICATOR

When the FUNCTION switch is set to FM AUTO this lamp lights whenever an FM stereo broadcast is being received.



## HEADPHONE JACK

Accepts stereo headphones connection cord. Useful for listening without disturbing others.

## HEADPHONE OUTPUT LEVEL KNOB

Regulates the volume heard through the headphones. Turn to the right to increase the volume.

## FUNCTION SWITCH

Used to select the type of broadcast reception.

AM . . . . . For AM broadcast reception.

FM AUTO . . . For normal FM reception. Provides automatic switchover to stereo when a stereo signal is received.

FM MONO . . . For monophonic reception of both mono and stereo FM signals.

## AM AND FM OUTPUT LEVEL KNOBS

Control the volume of the signal from the OUTPUT (VARIABLE) terminals on the rear panel.

Separate controls for AM and FM signals. Turn to the right to increase the volume. For the explanation on use of the OUTPUT LEVEL KNOBS, see the facing page.

# FM AND AM RECEPTION

## FM RECEPTION

1. Set the FUNCTION switch to FM AUTO.
2. Set the MUTING LEVEL switch to OFF.  
This switch cuts FM noise between stations with an efficiency that varies according to 1 (weak) or 2 (strong) settings. But it also affects reception of weak FM signals, and should therefore be left off except when tuning. For details, see the facing page.
3. Turn the TUNING knob to select a station. First tune so that the SIGNAL meter needle (Fig. 7) swings as far to the right as possible, then finish the precise tuning by centering the TUNING meter needle. If the FM STEREO indicator lamp lights, the broadcast is in stereo; if not, it is monophonic.
4. Set the FM OUTPUT LEVEL knob to its central position. For details, see the facing page.
5. If you are using a stereo amplifier, set its controls for the desired volume level and tone quality.
6. If pulse noise from an automobile ignition, etc. occurs during the broadcast, set the PULSE NOISE switch to position CUT. If continuous high-frequency noise occurs during FM stereo listening, set the MPX NOISE FILTER switch to position ON.

### NOTE:

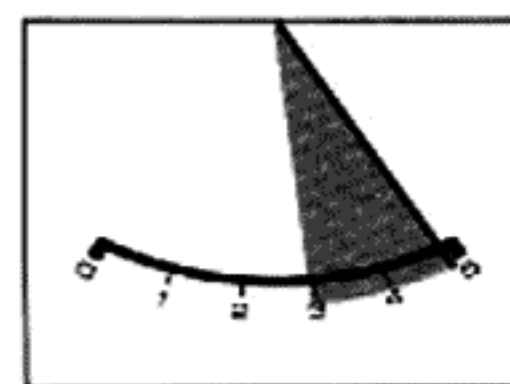
*It may be impossible to eliminate noise from an FM stereo broadcast if the signal is extremely weak. In such a case the relative signal strength can be improved by switching to FM MONO with the FUNCTION switch. While the stereo effect will be lost somewhat, a great deal of the noise can be substantially eliminated in this way. Note that the FM STEREO indicator lamp will still stay lit in such a case.*

## AM RECEPTION

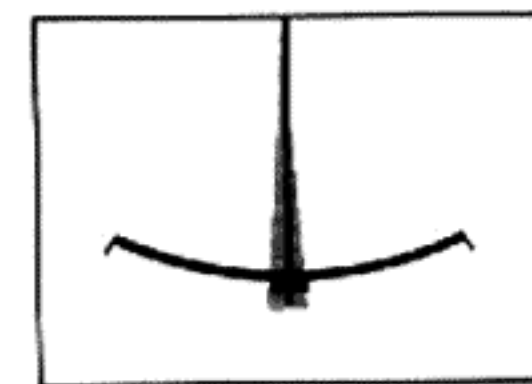
1. Set the FUNCTION switch to position AM.
2. Turn the tuning knob to select a station. Tune in so that the SIGNAL meter needle (Fig. 7) swings as far to the right as possible.
3. Set the AM OUTPUT LEVEL knob to its central position. For details, see the facing page.
4. If you are using a stereo amplifier, set its controls for the desired volume level and tone quality.

### NOTE:

*If excessive noise occurs during AM or FM reception and cannot be cured by the above methods, re-read the section "ANTENNAS AND GROUND CONNECTIONS" (see p. 6) for optimum reception.*



SIGNAL METER

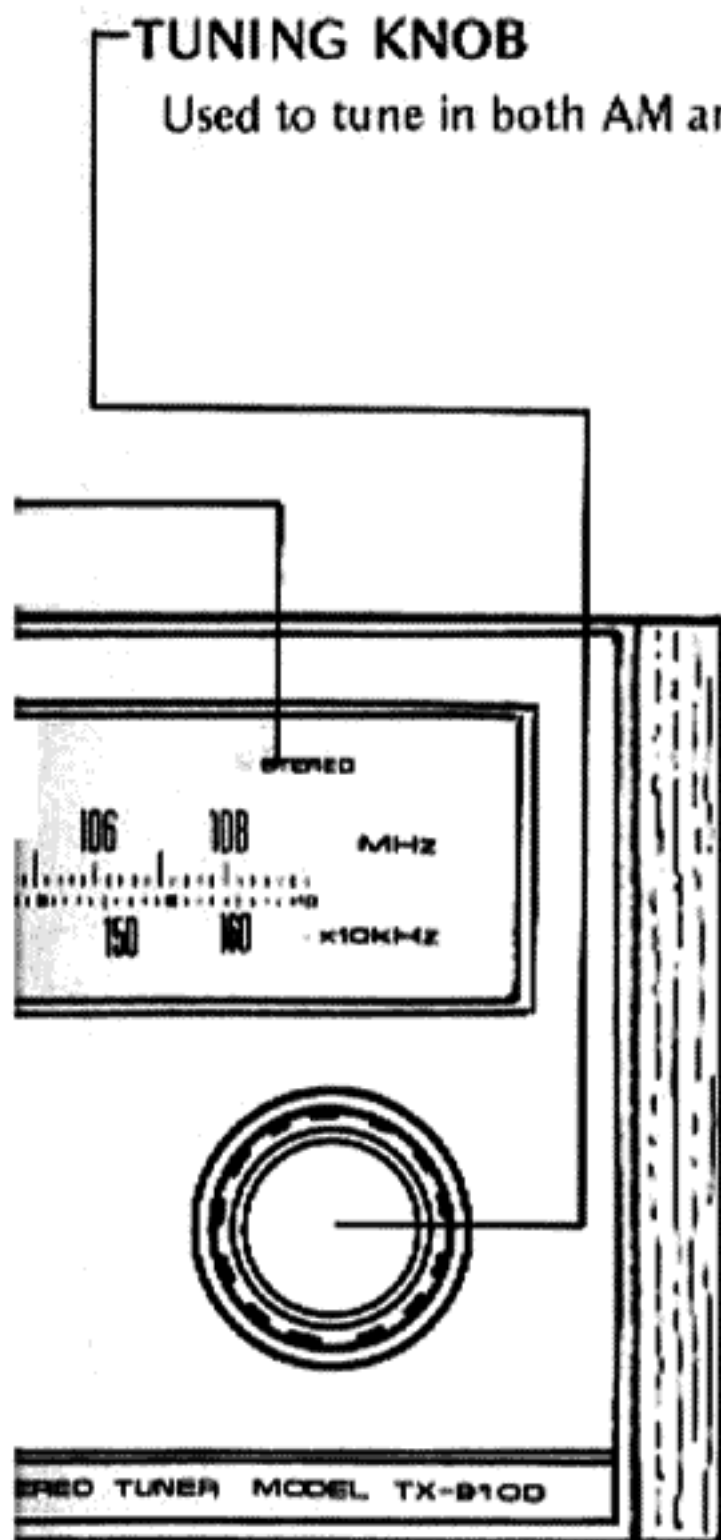


TUNING METER (does not work for AM reception)

Fig. 7

### TUNING KNOB

Used to tune in both AM and FM stations.



### FM MUTING LEVEL SWITCH

In general, used to cut out unpleasant noise between stations when tuning in an FM broadcast.

- 2: To tune in a strong signal station.
- 1: Use this setting when the (2) setting cancels the desired station along with the noise.

OFF: Switch off once the station is found.

For a full explanation concerning the use of this switch, see the facing page.

### MPX NOISE FILTER SWITCH

Switch on to cut high-frequency noise during FM stereo broadcast reception.

### PULSE NOISE SWITCH

Cuts pulse noise, such as that from automobile ignitions, etc., without affecting the FM broadcast signal.



## USEFUL HINTS FOR OPTIMUM OPERATION

### USE OF THE AM/FM OUTPUT LEVEL KNOBS

The signals passing from the OUTPUT (VARIABLE) terminals can be controlled by the AM and FM OUTPUT LEVEL knobs. Use the controls in the following situations:

- When the TX-9100 is connected to a stereo amplifier and the signal is too strong for the input terminals (causing distortion), or too low (requiring excessive amplification).
- When the tuner output level does not match that of other units (turntable, tape deck, etc.) connected to the amplifier.

When there is a difference in output levels between AM performance and FM performance.

### USE OF THE MUTING LEVEL SWITCH

The muting circuit works to cut out the hiss and other noise between FM stations for more enjoyable tuning.

- When tuning to a weak signal station, turn the MUTING switch off. This will not affect the noise, etc., but such interference usually disappears when you are near or right on the station at any rate.

### USE OF THE MPX NOISE FILTER

In a weak FM signal area, or if the FM antenna is not of sufficient sensitivity, high-frequency noise will be heard during the broadcast. In such a case switch on the MPX NOISE FILTER. This will reduce the noise, but also adversely affects channel separation characteristics, so the switch should be off whenever the noise level is low.

### USE OF THE PULSE NOISE SWITCH

In a weak FM signal area with heavy traffic, automobile ignition noise will cause difficulties no matter how efficient an antenna you install. In such a situation set the PULSE NOISE switch to position CUT and these noises will be reduced while the signal-to-noise ratio is improved — all without affecting the signal's tone quality.

### FM MULTIPATH

As shown in Fig. 8, an FM antenna picks up not only the direct signal from the broadcast antenna, but also the same signal reflected off mountains, because the reflected signals suffer a time lag due to the more circuitous route they travel, causing distortion which affects the channel separation and signal-to-noise characteristics. To cope with this problem, special attention must be paid when tuning in a station, as well as to the height and direction of the antenna.

### Use of the FM Multipath Terminals

If you have a stereo display (e.g. Pioneer model SD-1100) or an oscilloscope, it will serve effectively to find out the presence of multipath signal reception for optimum antenna location and height.

If model SD-1100 or an oscilloscope is available, operate as follows:

1. Connect the TX-9100 FM MULTIPATH VERT (vertical) and HORIZ (horizontal) output terminals to the respective inputs on the SD-1100 or the oscilloscope.
2. Tune in an FM broadcast on the TX-9100; the signal waveform will appear on the screen of the SD-1100 or oscilloscope.

Then adjust the antenna height and direction for least multipath reception. This will be indicated by a waveform similar to the one on the left in Fig. 9. The more multipath signals enter, the more the waveform will be distorted as shown on the right in the figure.

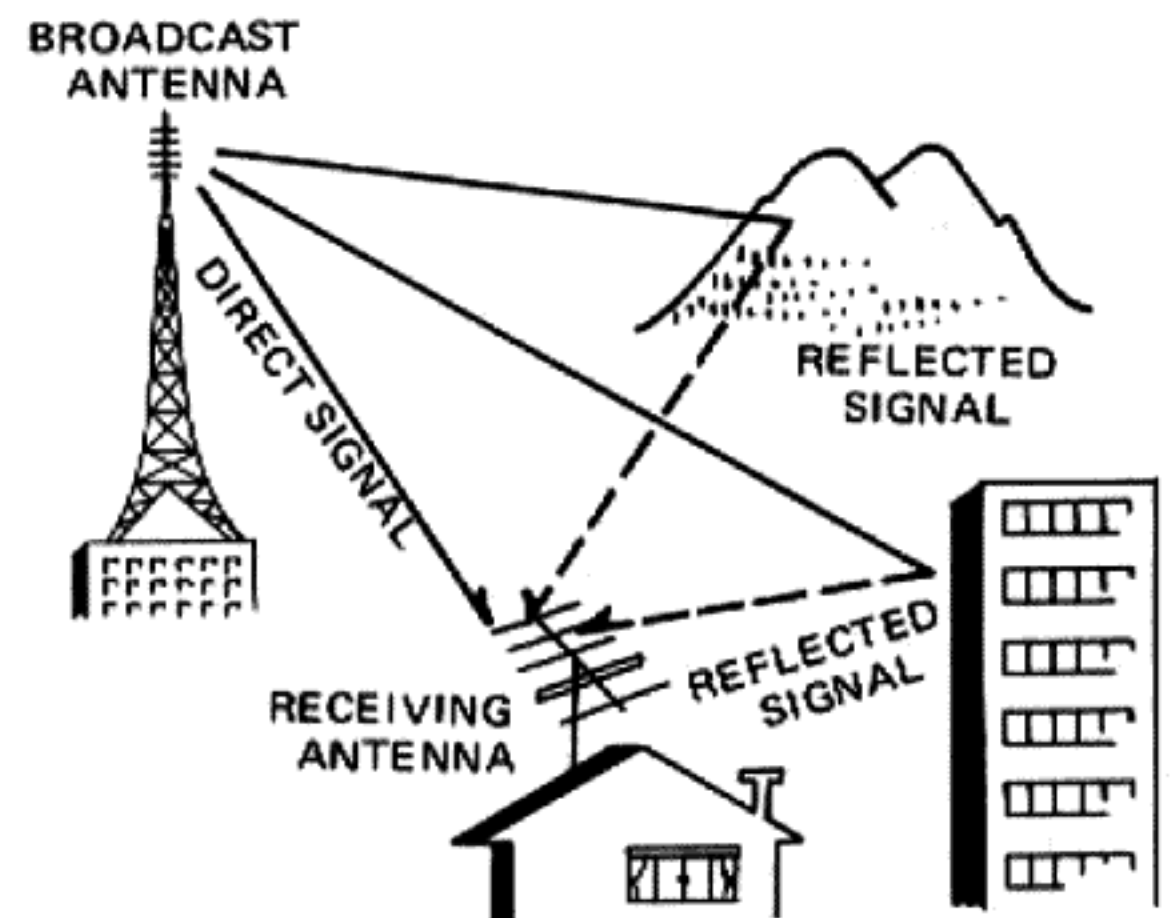
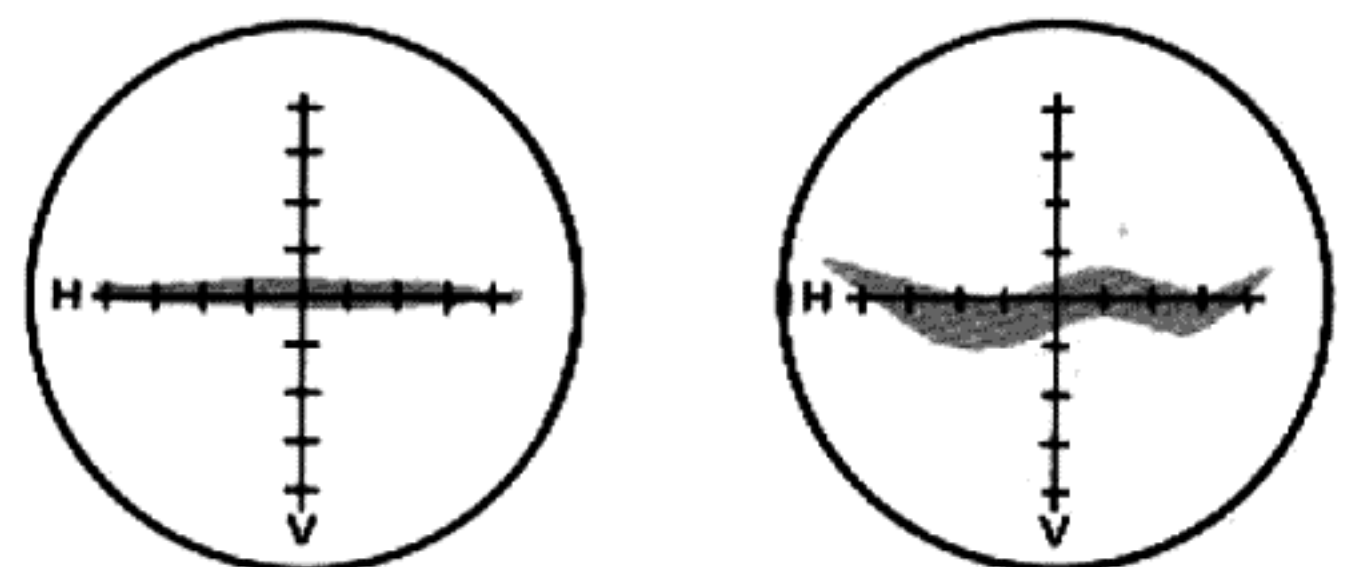


Fig. 8



H: HORIZONTAL  
V: VERTICAL

Fig. 9

# SPECIFICATIONS

## Semiconductor

FETs	6
ICs	9
Transistors	35
Diodes	27

## FM Tuner Section

Circuitry	3 MOS FETs 2-stage RF Amplifier 5-gang Variable Capacitor, 6-stage Limiter PLL MPX Circuit.	
Usable Sensitivity (IHF)	1.5 $\mu$ V	
Capture Ratio (IHF)	1dB	
Selectivity (IHF)	90dB	
Signal-to-Noise Ratio	75dB	
Image Rejection (98MHz)	More than 110dB	
IF Rejection (98MHz)	More than 110dB	
Spurious Rejection	More than 110dB	
AM Suppression	65dB	
Harmonic Distortion Mono	Less than 0.2%	
Stereo	Less than 0.3%	
Frequency Response Stereo	20Hz~15kHz <sup>+0.2</sup> <sub>-2.0</sub> dB	
Stereo	50Hz~10kHz <sup>+0.2</sup> <sub>-0.5</sub> dB	
Stereo Separation		
1kHz	More than 40dB	
50Hz to 10kHz	More than 30dB	
Sub Carrier Suppression	65dB	
Antenna Input	300 $\Omega$ Balanced 75 $\Omega$ Unbalanced	
Muting	2-step Level Switch	
MPX Noise Filter	ON-OFF	
De-emphasis Switch	50 $\mu$ S $\leftrightarrow$ 75 $\mu$ S	
(except FTZ approved and 120V models.)		

## AM Tuner Section

Circuitry	1-stage RF Amplifier, 3-gang Variable Capacitor	
Sensitivity		
(IHF, Ferrite antenna)	300 $\mu$ V/m	
(IHF)	15 $\mu$ V	
Selectivity	40dB	
Signal-to-Noise Ratio	50dB	
Image Rejection	More than 65dB	
IF Rejection	More than 85dB	
Antenna	Built-in Ferrite Loopstick Antenna	

## Audio Section

Output (Level/Impedance)	
FIXED	650mV/4.7k $\Omega$
VARIABLE	70mV~2V/300 $\Omega$
HEADPHONE	150mV (8 $\Omega$ )

## Miscellaneous

Power Requirements	AC 120V 60Hz or AC 110V, 120V, 130V, 220V and 240V 50/60Hz
Power Consumption	30W
AC Outlet	Unswitched 1
Dimensions	430(W) x 138(H) x 345(D)mm 16-15/16(W) x 5-7/16(H) x 13-9/16(D) in.
Weight Without Package	8.9 kg 19 lb 10oz
With Package	10.9 kg 24 lb

## Furnished Parts

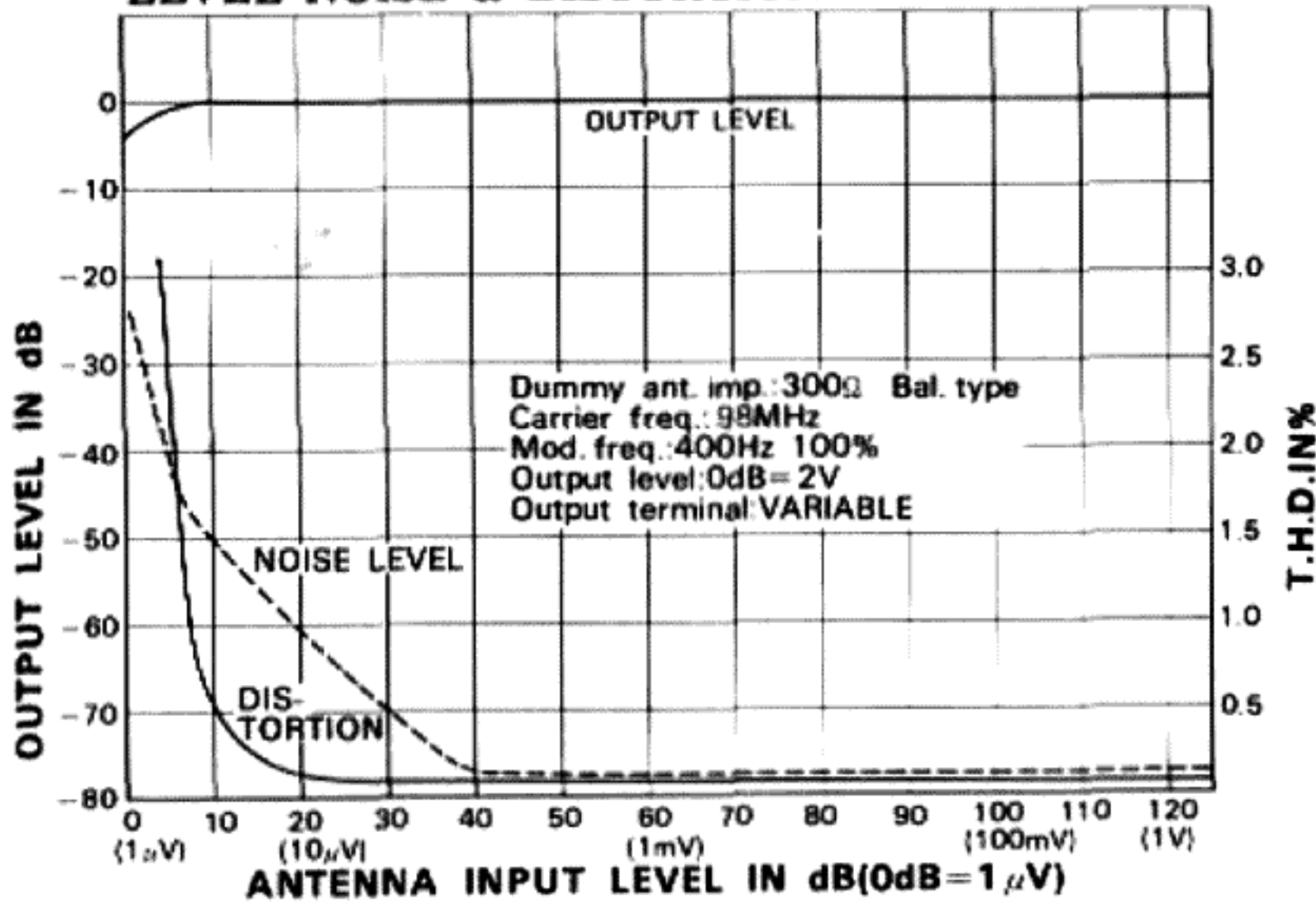
FM T-type Antenna	1
Connection Cord with Pin Plugs	1
Operating Instructions	1

### NOTE:

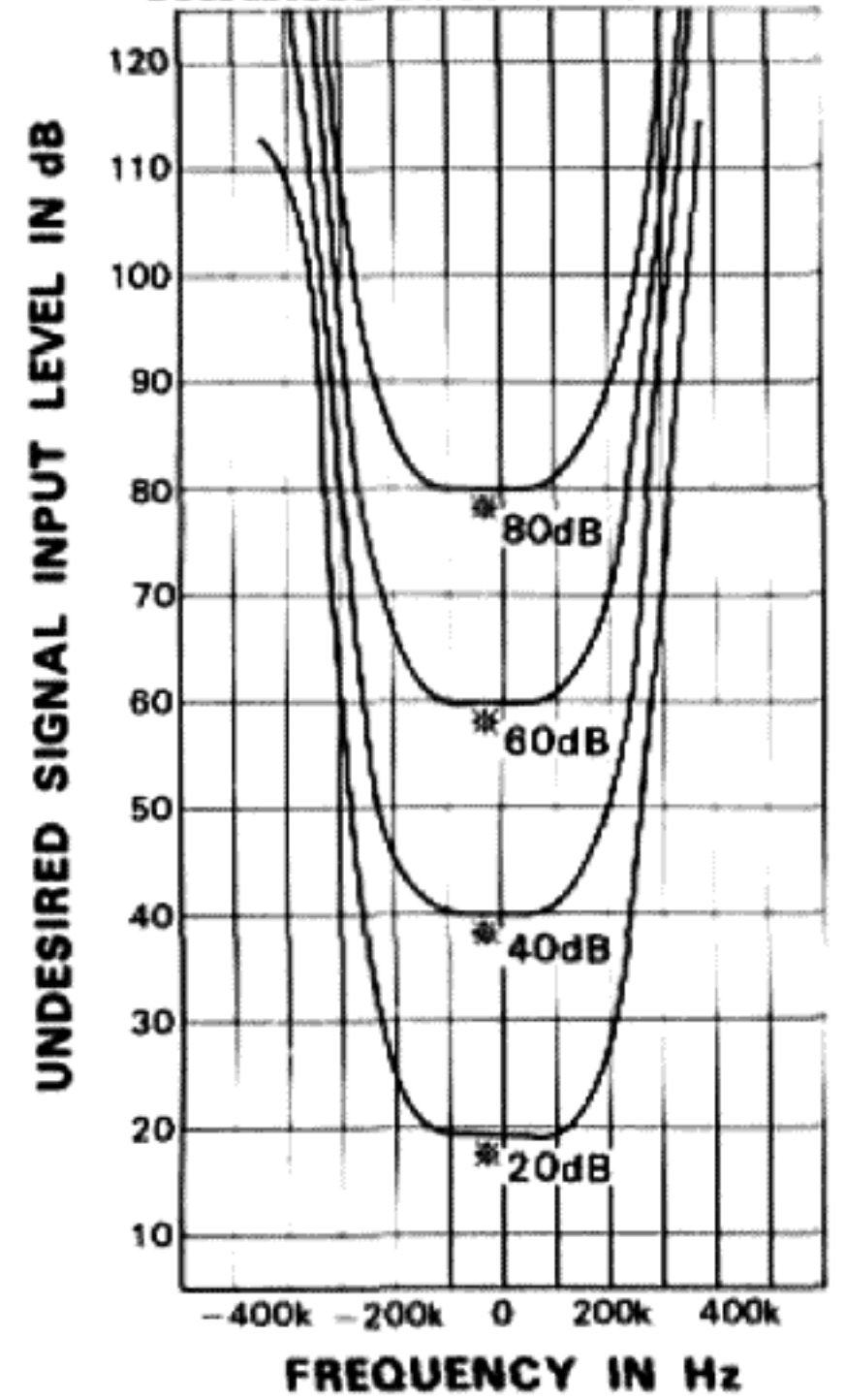
Specifications and the design subject to possible modification without notice due to improvements.

# TUNER CHARACTERISTICS

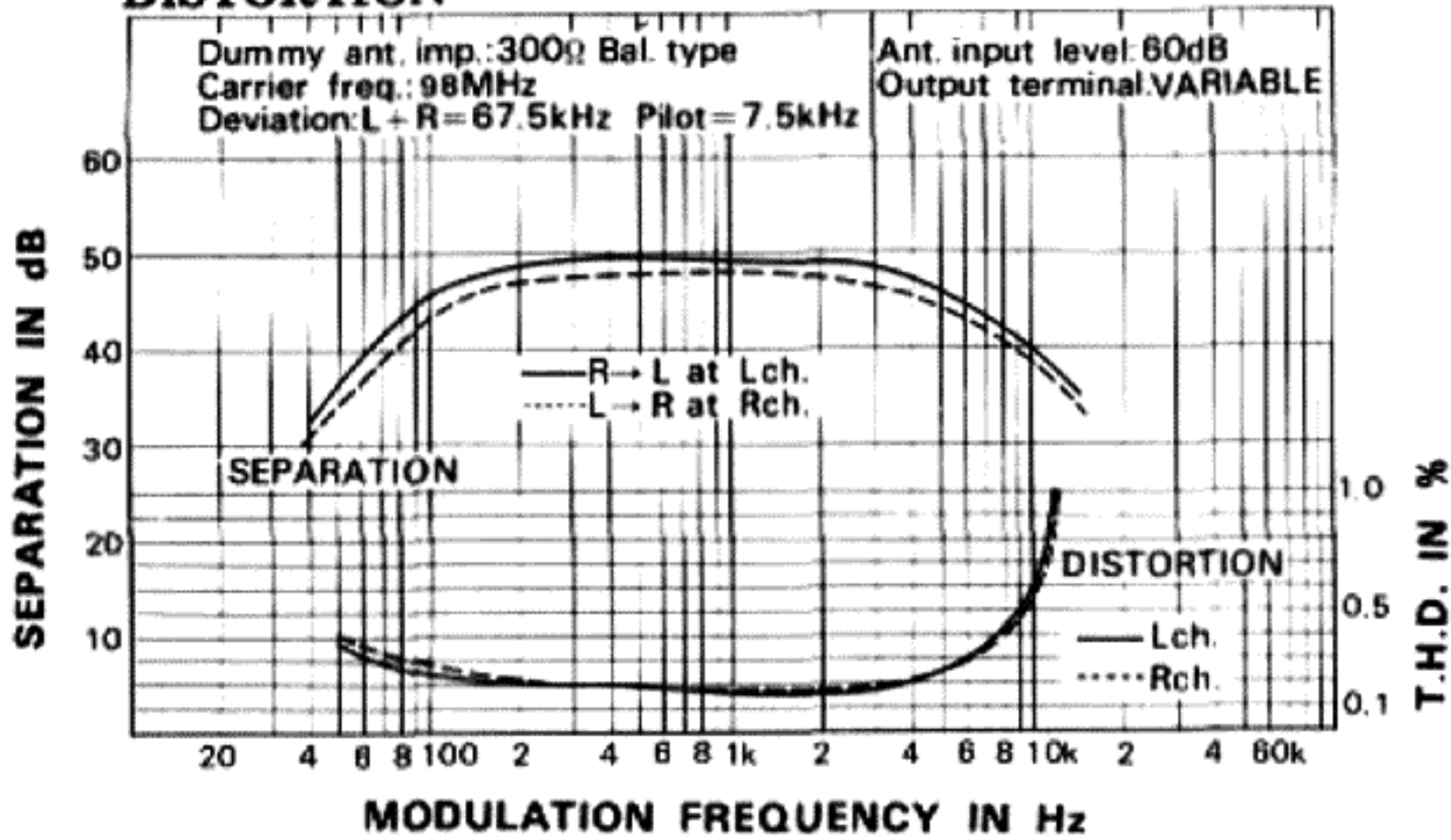
ANTENNA INPUT LEVEL VS. OUTPUT LEVEL NOISE & DISTORTION



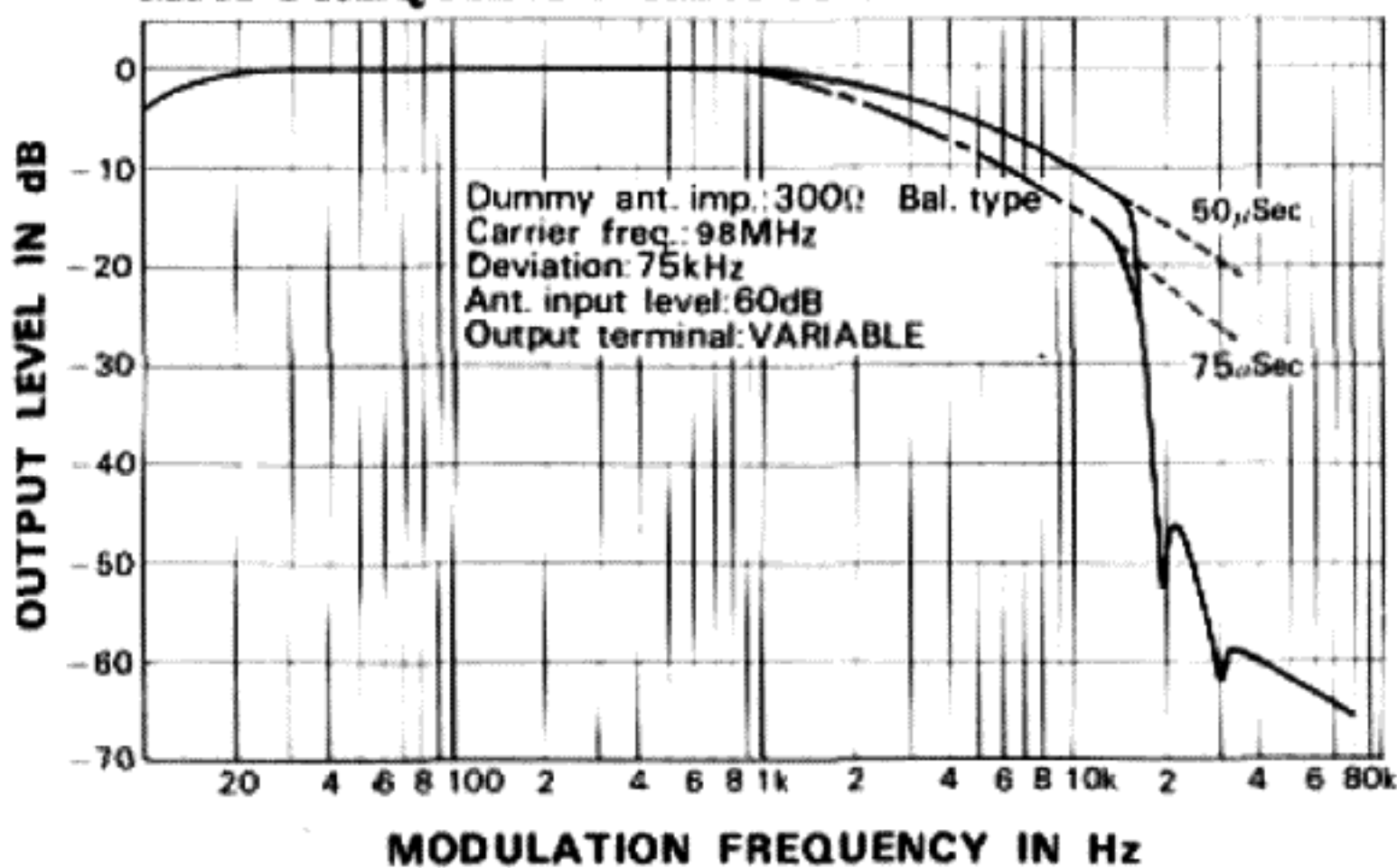
FM USABLE SELECTIVITY CHARACTERISTICS



MPX FREQUENCY VS. SEPARATION & DISTORTION



MPX FREQUENCY RESPONSE



## CONDITIONS FREQUENTLY MISTAKEN FOR MALFUNCTION

If no sound is produced, or if there is too much noise during operation, check for the cause according to the following chart.

- **NO SOUND:** Recheck all connections; be sure they are made according to the explanation in the operating instructions.
- **EXCESSIVE NOISE:** Find the precise symptom in the chart below and check for the cause. If you cannot find or correct it, see your audio dealer.

SYMPTOM	PROBABLE CAUSE	CORRECTION
Continuous or intermittent hissing or noise.	<ul style="list-style-type: none"> <li>• Interrupted power, lightning.</li> <li>• Nearby fluorescent lights, motor, automatic (thermostat-controlled) equipment, electric tools, etc.</li> </ul>	Since it is often difficult to remove these causes, it is best to move the set and the antenna so that the input signal becomes stronger in comparison to the noise. Be sure to install the best possible external antenna and connect a good ground.
A low "boom" (tuning hum) is heard during broadcast reception.	<ul style="list-style-type: none"> <li>• Defective fluorescent light, motor or electric heater nearby.</li> </ul>	Pull out the power plug, reverse it and reinsert. Move the set and antenna as far from the source of noise as possible.
Various noises occur (especially at night) during AM reception.	<ul style="list-style-type: none"> <li>• A nearby station interferes with the desired station signal (10kHz beat interference).</li> <li>• Television set being used at same time.</li> </ul>	For the first cause there is little that can be done. If the cause is a TV set used at the same time, separate them as much as possible.
Intermittent or steady interference during FM listening, especially when a car passes by.	<ul style="list-style-type: none"> <li>• Automobile ignition noise.</li> <li>• High-frequency machine or welder in use nearby.</li> </ul>	Set the PULSE NOISE switch to position CUT whereby such noises will probably be cut. Nevertheless if noises still remain in reception, replace the supplied T-type antenna with a multi-element exterior FM antenna.
Noise worse on FM stereo than with mono listening.	<ul style="list-style-type: none"> <li>• The good reception area for FM stereo is only half that for mono.</li> </ul>	If you are using the simple antenna (included) only, replace it with a special FM antenna for increased antenna input.

## FM TUNER TRACKING ALIGNMENT

Set is factory adjusted, no re-adjustments should normally be required. If re-adjustment is required, observe following steps.

### Connections

Connect FM signal generator to FM antenna terminals. Connect V.T.V.M. to FIXED outputs. Adjust signal generator output level at 8dB, apply 400Hz, 100% modulation.

### Procedure

1. Turn tuning knob to extreme left and confirm that pointer is at scale end.
2. Set signal generator frequency at 87.4MHz. Adjust oscillator coil in figure to obtain maximum output reading on V.T.V.M.
3. Turn tuning knob to 106MHz, adjust signal generator for 106MHz. Adjust oscillator trimmer capacitor to obtain maximum output reading. Repeat steps 2 ~ 3.
4. Adjust receiver and signal generator at 90MHz. Adjust RF and antenna coils core to obtain maximum output reading.
5. Return to 106MHz setting. Adjust RF and antenna trimmer capacitors to obtain maximum output reading.
6. Repeat steps 2 ~ 5 to optimum output alignment.

## ABSTIMMUNG DES FM-EMPFANGSTEILS

Nachjustierungen dürften normalerweise nicht erforderlich sein. Gegebenenfalls wie folgt vorgehen, um die FTZ-Bestimmungen zu erfüllen.

### Anschlüsse

Testgenerator an UKW-Antennenanschlüsse, Röhrenvoltmeter an FIXED Ausgänge anschliessen. Testgenerator auf 8dB Ausgangspegel, 400Hz, 100% Modulation einstellen.

### Abgleichverfahren.

1. Sendereinstellung auf extrem links drehen. Zeiger muss am Skalende stehen.
2. Testgeneratorfrequenz auf 87.4MHz einstellen. Oszillatorkapule in Abbildung so justieren, dass maximaler Ausgangspegel am Voltmeter abgelesen wird.
3. Sendereinstellung und Testgenerator auf 106MHz einstellen. Trimmer-Kondensator des Lokaloszillators wiederum auf maximalen Ausgangspegel einstellen. Schritte 2 ~ 3 wiederholen.
4. Empfänger und Testgenerator auf 90MHz einstellen. Kerne der HF- und Antennenspulen auf maximalen Ausgangspegel abgleichen.
5. Wieder auf 106MHz übergehen. Trimmer-Kondensatoren im HF-Abstimmkreis und Antennenkreis auf maximalen Ausgangspegel justieren.
6. Schritte 2 ~ 5 wiederholen, bis bestmögliche Abstimmung erzielt ist.

