Studio Standard Series

T-2/T-2L

SOLID STATE AM/FM STEREO TUNER

To match unprecedented, slim and compact front panel of the T-2, totally electronic display is employed by means of LED's for indication of both signal strength and center tuning point.

LUX CORPORATION, JAPAN

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

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Thak you for purchasing the LUXMAN T-2

The T-2 is an AM/FM (LW/MW/FM for the T-2L) stereo tuner, featuring good sonic quality.

The front end employs a distortion free local oscillator and an RF amp stage composed by the combination of MOS FET and a quality variable capacitor, which makes it feasible to realize superb interference and intermodulation rejection characteristics. The IF stage is so designed as to be inherently low in distortion, but to make it perfect, a new quadrature IC and a special detector transformer are combined in the FM detector stage to further reduce distortion and provide high S/N ratio and wider bandwidth.

In the multiplex stage, in addition to the selected P.L.L. IC's offering good separation, 3-pole lowpass filters are placed independently in the left and right channels to improve separation characteristics, especially in the treble range. Further, operational amplifiers are placed at the audio output stage, thus realizing low output impedance, which prevents deterioration of sonic quality.

We recommend that you choose other Hi-Fi components to be used in combination, with care and go through the contents of this owner's manual to make the most of the potential of the T-2.



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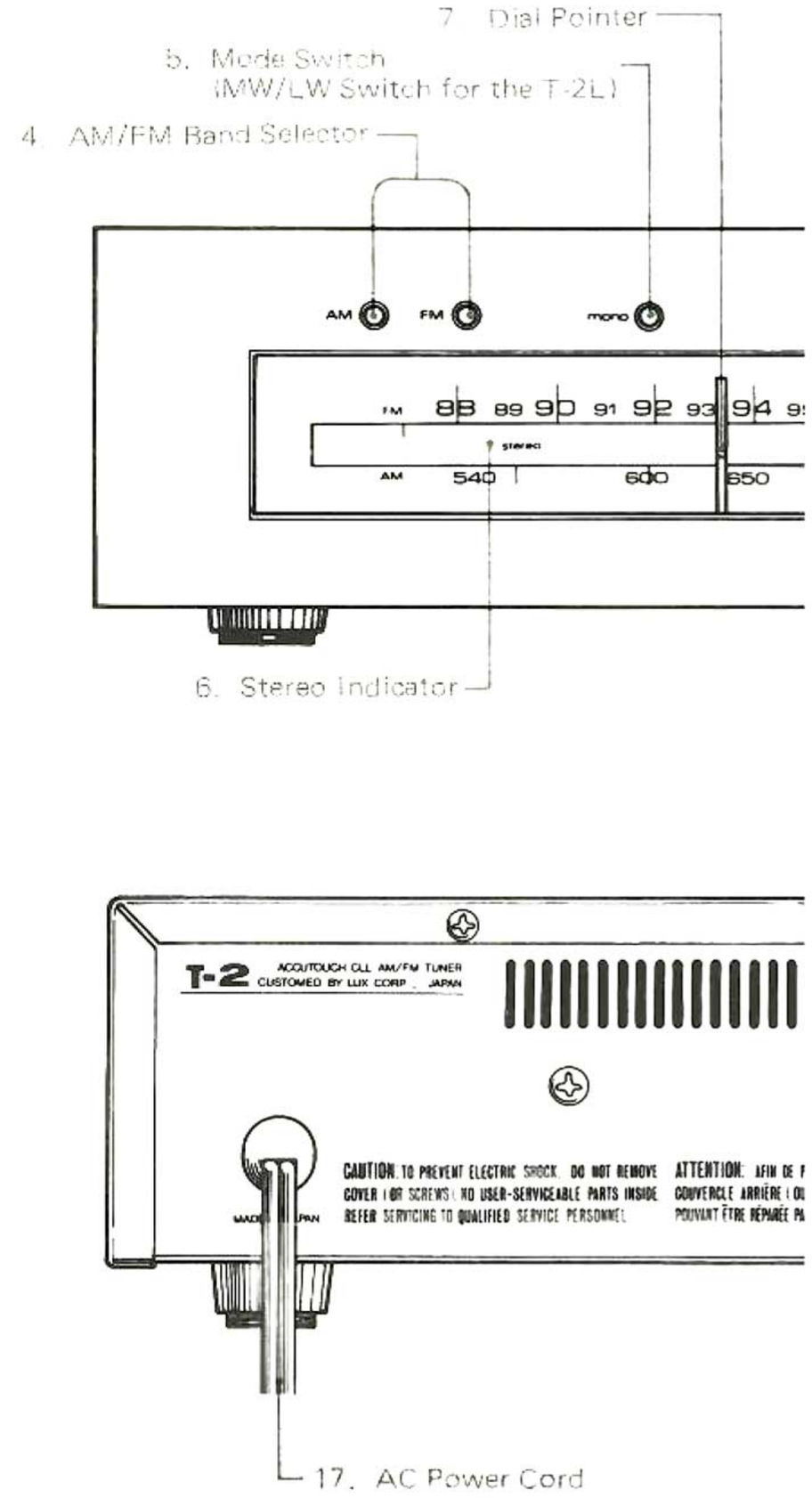
SWITCHES & TERMINALS



1. Tuning Knob

Use this knob to tune to desired stations. The knob will move the Dial Pointer across the dial scale.

2. FM Muting Off Switch

The FM muting circuit is provided to remove the interstation noise peculiar to FM broadcasting which occurs when tuning is shifted out of the correct tuning point. The FM Muting Off Switch is provided to make it feasible to receive broadcasting waves of weak electric field strength. When this switch is kept unpressed, interstation noise possible at the time of some drift occur can be filtered. When it is depressed, the muting circuit is released. Normally, it is advisable to set it in the "protruded" position.

(In the case of the T-2L, this switch operates also as the Mode Switch. When the switch is depressed the reproduction mode is forced to be monaural even if the program is stereo. Of course the FM Muting is released.)

3. Power Switch

The power switch is of an alternating push-on, push-off type. Press in this switch and AC power is supplied to the tuner and the dial scale is illuminated. A time delay muting circuit is integrated to eliminate unpleasant "thump noise" at the time of turning the unit on. Because of this circuit, the tuner is muted for approx. 3 seconds until all circuits are put into stable operational condition.

4. AM/FM Band Selector

This switch selects either of the FM broadcasting or the AM broadcasting. For FM reception, depress the "FM" button, while for AM reception, depress the "AM" button. These two switches are of the see-saw type, and when one of them is pressed-in, the other will protrude. In case both of them are pressed in compulsorily, signals will not be available at the outputs.

5. Mode Switch

Reception mode can be selected by this switch. For normal Reception of the program, set it to the "protruded" position. In this case, the tuner circuit automatically selects stereo or monaural broadcasting. FM broadcasting of impractically low level is automatically received in monaural mode to improve the siganl-to-noise ratio.

6. Stereo Indicator

The indicator lights up to identify stereo FM reception. FM stereo broadcasting of impractically low level is automatically received in monaural mode and accordingly the indicator does not light. When the Mode Switch (5) (MW/LW Switch for the T-2L) is depressed to the "mono" position, or in case such weak station whose electric field strength is below the pre-fixed threshold level is received, the indicator does not light.

7, Dial Pointer

The Dial Pointer is coupled to the Tuning Knob to indicate receiving frequency. Read the frequency on the dial scale that is indicated by the dial pointer.

8. FM Muting Level Adjuster

This adjuster is provided to deter-

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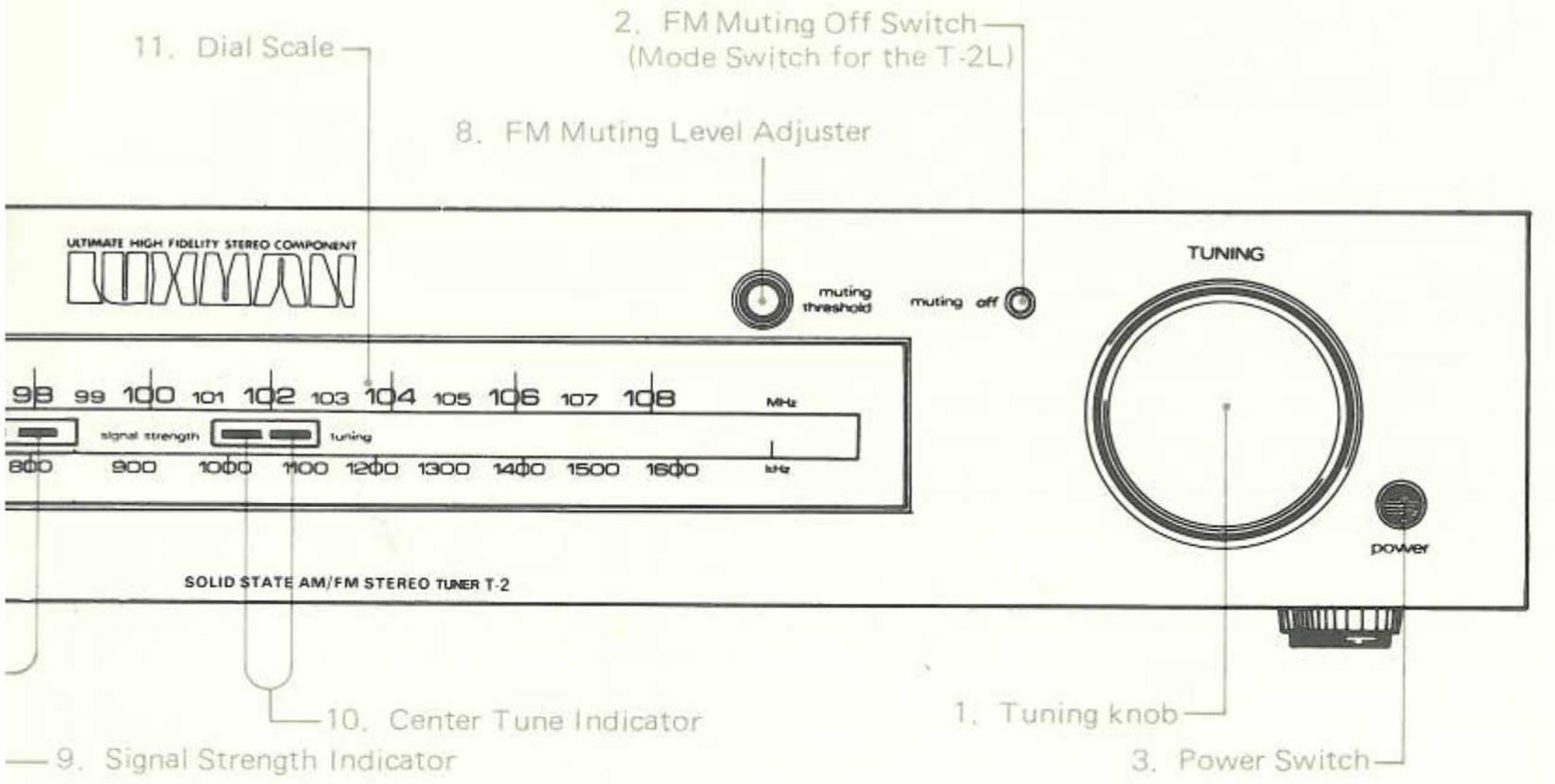

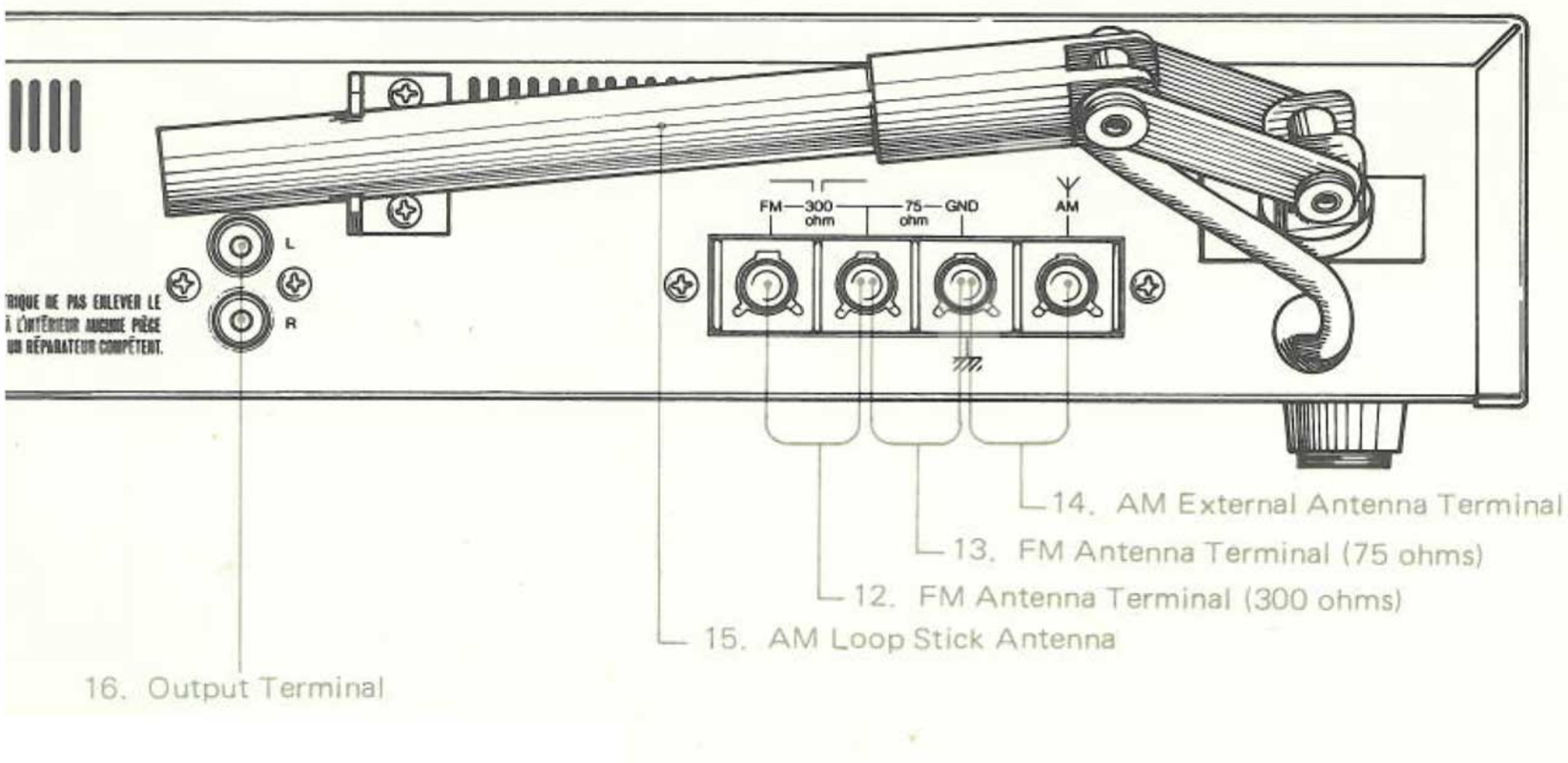

mine the muting threshold level, and is operated when the FM Muting Off Switch is unpressed in the "protruded" position. At this time, the threshold range is variable from approx. 10μV to approx. 300μV.

However, it may be possible that the electric field fluctuates according to the transmission path of the broadcasting wave even at the time of receiving the broadcasting station of strong electric field strength. In this case, when the muting level is pre-fixed within the range of this fluctuation, sound reproduction is intermittently feasible. This phenomenon is caused because the muting level is pre-fixed a little high, therefore turn the FM Muting Level Adjuster knob counter-clockwise to realize stable reception.

Such functions as center tune indicator, and signal strength indicator are controlled within the range. That is to say, when the threshold level is set to the maximum (300μV) position, all above functions become uneffective against such station whose electric field strength is 100μV. In this case turn the Adjuster knob counter-clockwise to set it to the optimum level.

(Note that, with the T-2L, this FM Muting Level adjustment is feasible only in the monaural reproduction mode.)

9. Signal Strength Indicator

This indicator shows the electric field strength of a broadcasting station. This indicator operates both for FM and AM. When a station is tuned in, the electric field strength is displayed in three points. The greater the number of indicator light, the stronger the electric field strength.

This indicator does not operate against such station whose electric field strength is below the level prefixed by the Muting Level Adjuster.

10. Center Tune Indicator

This indicator is consisted of two LED's. When the tuning is getting

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closer to the precise tune-in point, one of the two LED's lights up, and when the precise center frequency point is obtained the other LED lights up. Thus, when the center frequency of an FM broadcasting station is tuned in, both of these LED's light up.

11. Dial Scale

Turn the Tuning Knob (1) and the dial pointer moves to indicate the receiving frequency. The calibration for FM broadcast frequencies is from 88MHz to 108MHz, while that for AM is from 525Hz to 1605kHz. (In the case of the T-2L the LW can be received ranging from 160kHz to 330kHz.)

12. FM Antenna Terminal (300 ohms)

Connect the attached Dipole Antenna or an FM antenna of 300 ohms to this terminal. There is no polarity on this type of cable.

13. FM Antenna Terminal (75 ohms)

Many FM antennas are provided with the 75-ohm terminal. Use this terminal for connection of an FM antenna with 75-ohm coaxial cable as lead-in wire.

Connect the inner conductor to the 75-ohm terminal (left) and the outer shield wires to the GND terminal (right).

14. AM External Antenna Terminal

Normally, it is not necessary to connect an AM external antenna to this terminal since the T-2 is provided with the loop-stick antenna (15). Especially when reception of weak electric field strength is required, connect an AM outdoor antenna to this terminal.

As for the grounding, it is not always necessary to ground since it may deteriorate the sensitivity. In case the outdoor antenna is used, grounding can improve the signal-to-noise ratio.

15. AM Loop Stick Antenna

This antenna is for receiving of AM broadcasting waves. In strong electric field area, this antenna is practically enough. Adjust it so that the Signal Strength Indicator lights up as much as possible.

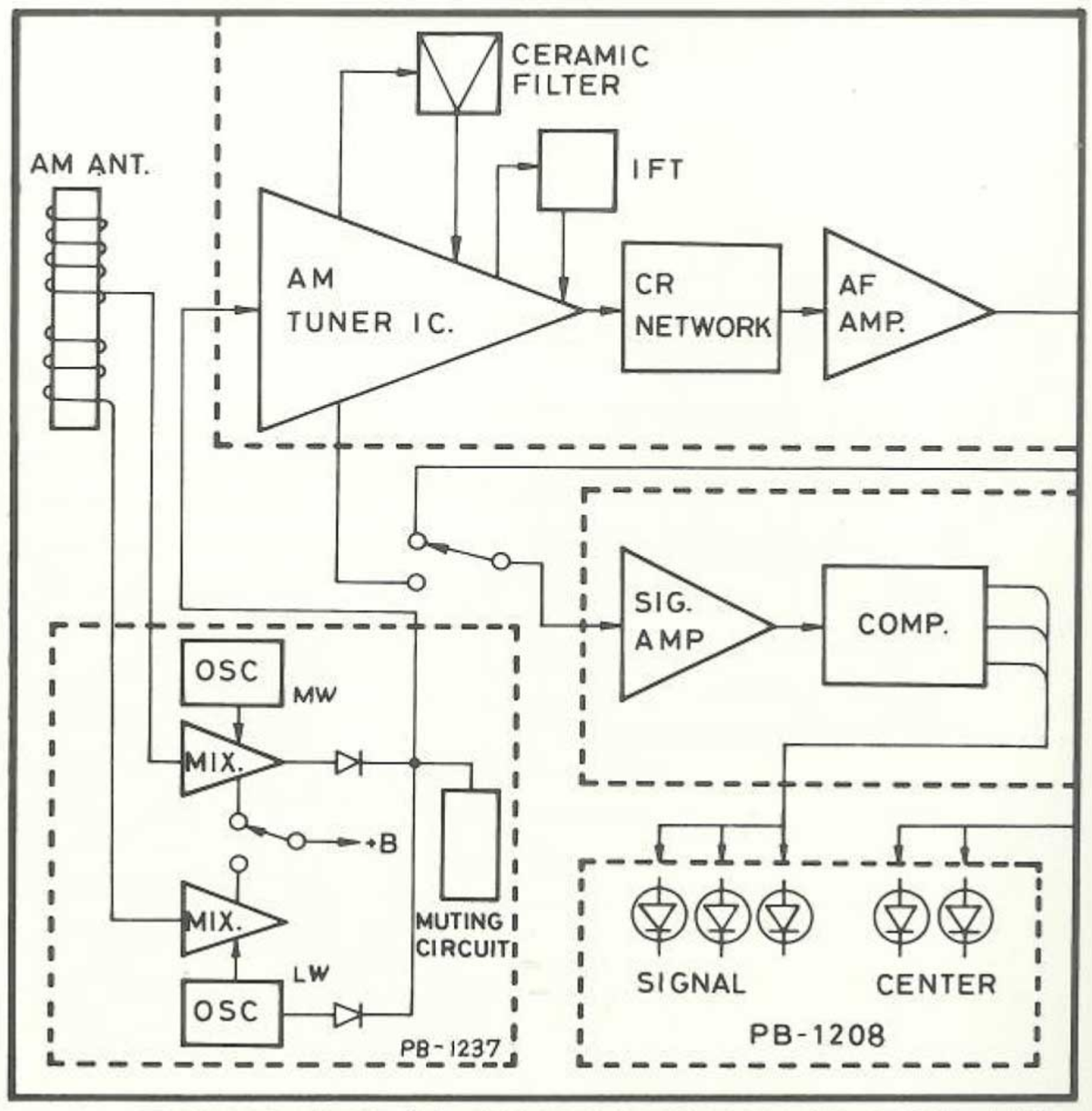
Note that modulation hum will be caused at the time of tuning-in when AC power cord is in the vicinity of this antenna.

16. Output Terminal

The output signals of the T-2 can be taken from this terminal. Connect the terminal to the "TUNER" terminal or to the "AUX" terminal of an audio amplifier.

17. AC Power Cord

Plug the power cord into an appropriate AC outlet in your listening room, or into an extra AC Outlet (SWITCHED) of an amplifier. In the latter case, switching ON or OFF of the T-2 can be made by the power switch of the amplifier. The power consumption of the T-2 is 10W.



AM SECTION BLOCK DIAGRAM FOR THE T-2L

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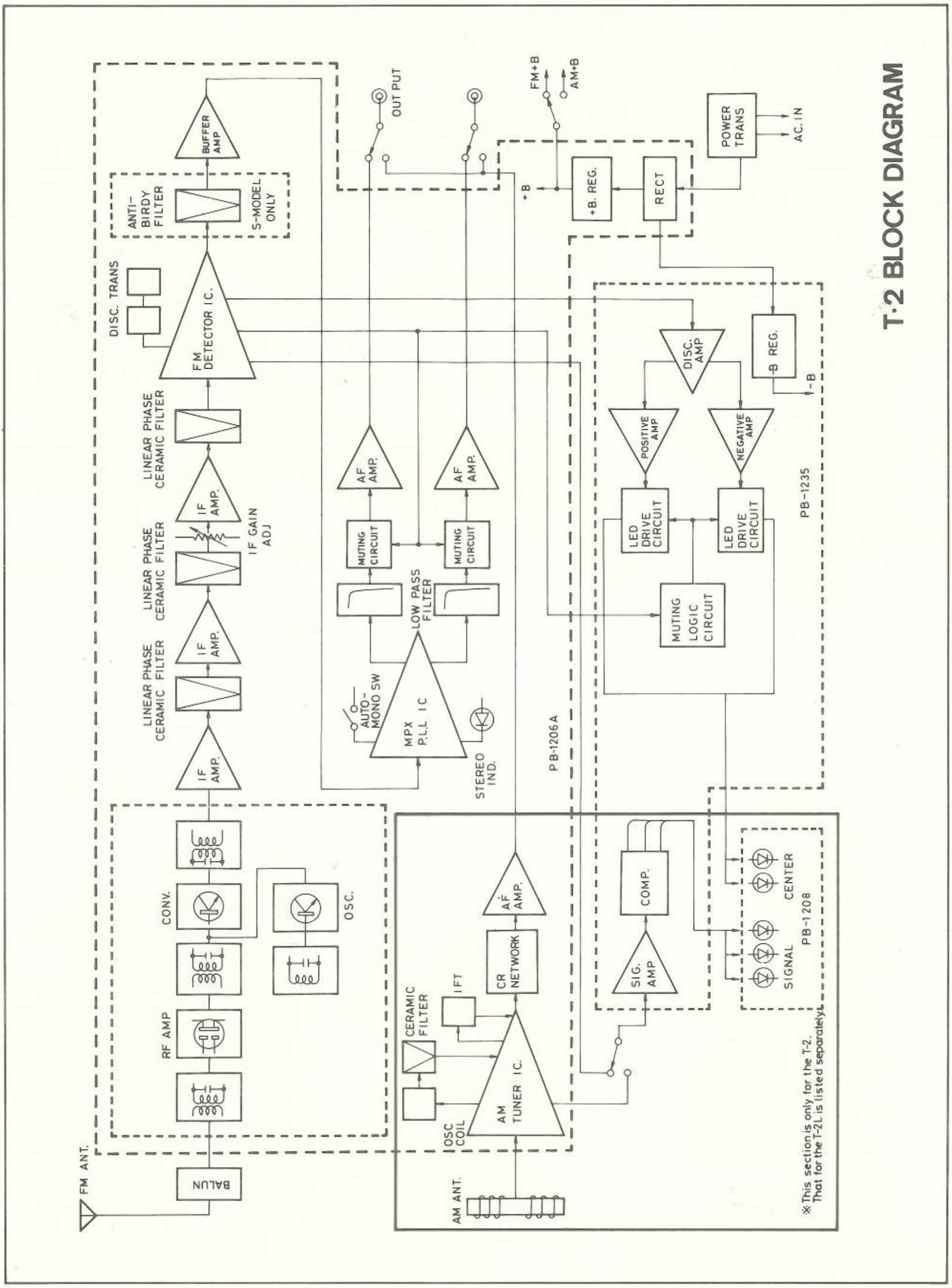
BLOCK DIAGRAM



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CONNECTION PROCEDURE

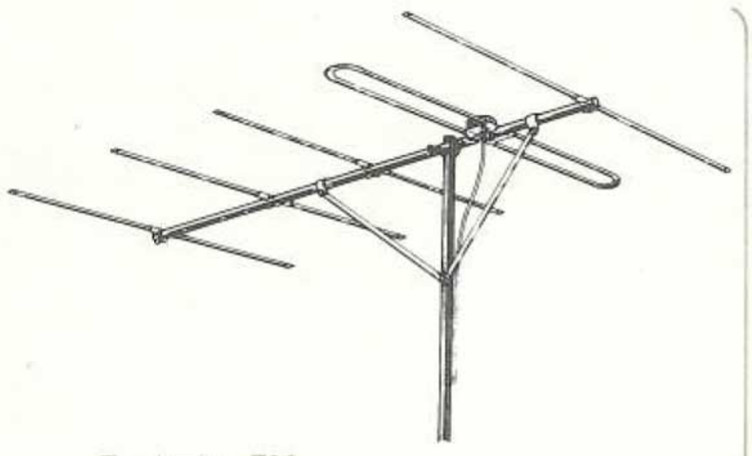
Connection of FM Antenna to Antenna Terminals

2 different Antenna Terminals are provided; the Antenna Terminal (75-ohm) (13) and the Antenna Terminal (300-ohm) (12). Select an appropriate terminal, considering the impedance of the antenna connected and that of the lead-in cable. In case the impedance of the FM antenna is 300 ohms, use 300-ohm feeder cable, and connect it to the FM Antenna Terminal (300-ohms) (14). This type of cable has no polarity, therefore connection can be made in either way. When the FM antenna is 75-ohms, use coaxial cable of 75-ohm type, and connect it to the antenna terminal (15). In this case the core leads should be connected to the 75-ohm terminal (left), and the shield wire to the GND terminal (right).

When the impedance of the FM antenna is selectable between 300 ohms and 75 ohms, it is advisable to use 75-ohms coaxial cable as much as possible since its insertion loss is small and it is less influcenced by noises.

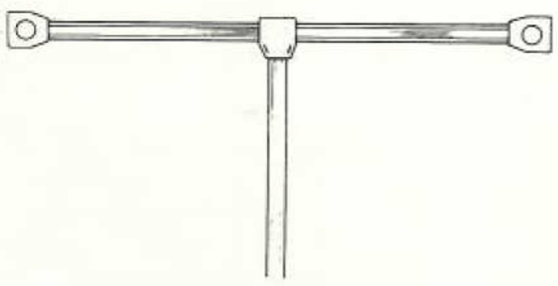
Connection of AM Antenna to Antenna Terminal

The T-2 is provided with an AM loop stick antenna (15), therefore it is not necessary to connect an AM outdoor antenna in such location

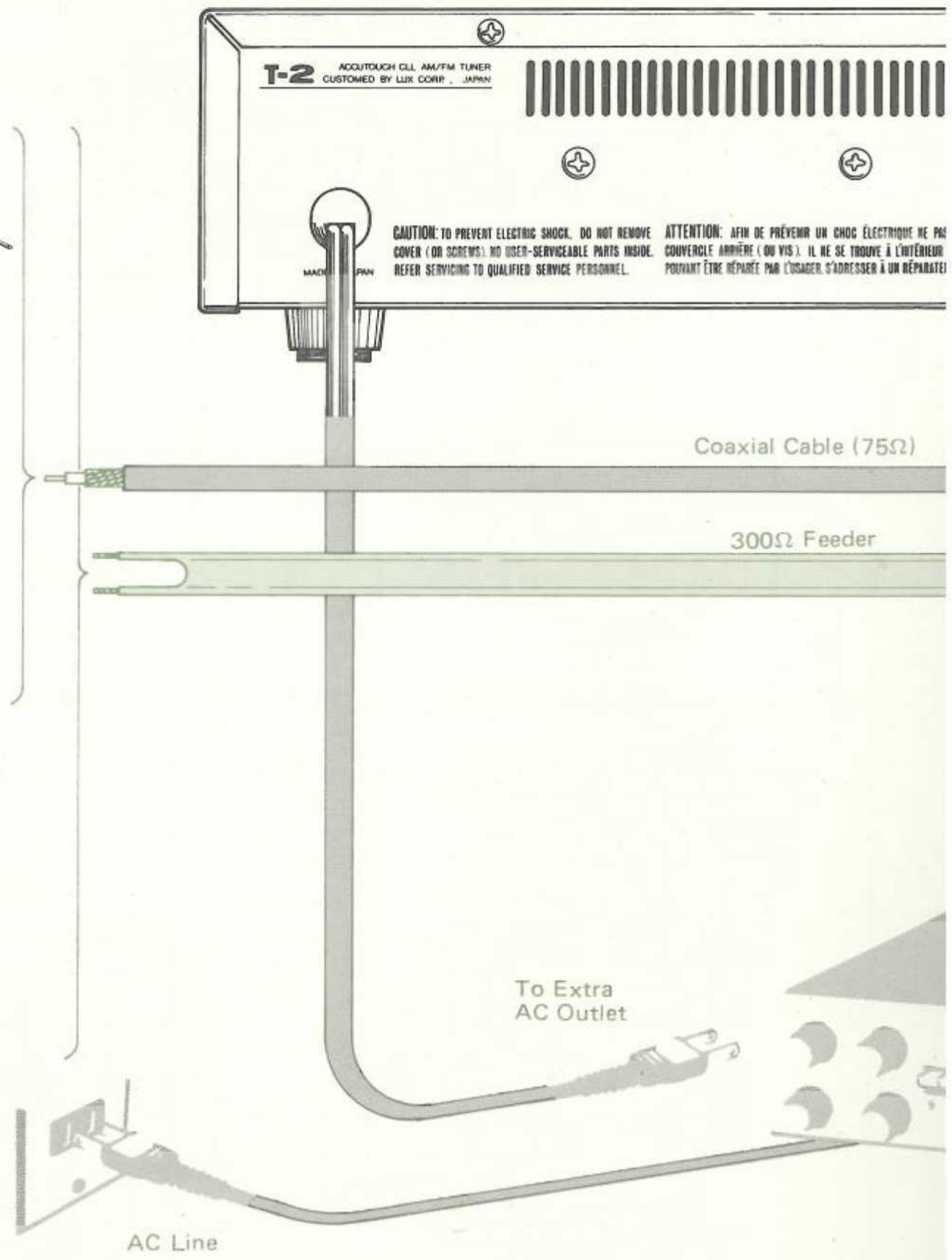


Exclusive FM
Outdoor Antenna





T-type Feeder Di-pole
Antenna



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where the electric field strength is strong. However, the outdoor antenna is required in case the T-2 is located in the weak electric field area or in the ferro-concrete house. In such case, connect the antenna lead to the AM External Antenna Terminal (14).

Connection of Outputs to Audio Amplifier

Connect the output terminals (16) to the TUNER or AUX terminals of an audio amplifier by means of pin jack cord. Left channel output must be connected to left channel input, and so with the right channel.

AC Power Cord

Plug the AC Power Cord (17) into an appropriate AC wall socket, or the AC outlet of an audio amplifier. Switch on the AC Power Switch (3) and the dial scale lights up. Then in about 3 seconds, the T-2 is put into the operational condition, since a time-delay muting circuit is provided to prevent the unwanted switching thumps.

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TO MAKE THE MOST OF THIS TUNER

FM ANTENNA

The greatest advantage of FM broadcasting is that playback sound is superior to that of AM. However, because of the inherent characteristics of FM broadcast frequencies (VHF band), even when a high quality tuner is used, incorrect selection of antenna and its feeder cable may easily impair the advantage of FM. The FM antenna system must be set up taking into account the electric field strength, multi-path problems, noise sources, tuner location and so forth.

SELECTION OF FM ANTENNA

[Field Strength]

When receiving FM broadcasts from distant stations, it is necessary to use a highly sensitive tuner to improve S/N ratio. However, if the FM antenna was inadequately selected, a user cannot take the advantage of such high sensitive tuner. For instance, a comparison of the following tuner/antenna combination was made:

(1) a tuner having IHF sensitivity of 1.7μV plus a simple single feeder antenna (a type of whip antenna).
(2) a tuner having IHF sensitivity 2.5μV plus an exclusive 3-element FM antenna.

Results showed that the latter combination gave better reception. This is because such a simple single feeder antenna has a negative gain while an exclusive FM antenna has a positive gain. The gain factors of such exclusive FM antenna are, 3-4dB with 2 elements, 4-5dB, 3 elements, 5-7dB 5 elements and 6-8dB, 7 elements.

As the antenna gain is increased in proportion to the number of antenna elements, selection of optimum FM antenna can be determined by consideration of field strength of FM wave where the tuner is installed. Needlees to say, your audio shop will gladly assist you for optimum selection of the antenna.

In summary, where far from broadcast stations, high gain antennas are needed. If field strength is sufficiently strong, good reception is possible with the di-pole antenna (T-type) provided.

[Multipath Measures]

The terms multi-path refers to the multiple paths of FM radio waves reflected by mountains, buildings, etc. that are received by an antenna besides the waves arriving directly from broadcast stations. This phenomenon is inevitable because of the inherent nature of VHF (very high frequency) transmission waves. In the case of a television receiver, presence of multipath is visibly recognized by socalled "ghost" phenomenon and everyone is aware of the importance of proper setting of TV antenna. However in the case of FM reception, multipath problems may only be perceived as deteriorated playback of stereo sound. Very frequently, such deterioration is attributed to the program source. Correction of multipath problems can sometimes be made by use of an FM tuner having excellent limiter characteristics, but normally there would be no other measures than to provide an optimum FM receiving condition by selection of antenna, location, direction, height, etc. An effective way to filter harmful multipath waves coming from all conceivable directions by reflection, and to catch the direct wave only, is a use of directional FM antenna as explained in the "Field Strength" of this manual.

Since such antennas not only possesses gain but also directivity when it is directed to broadcast stations, it filters out waves coming from other directions. The directivity sharply increases as the number of antenna element increases. When sharp cut-off of multipath waves is desired, use of an antenna having more elements is necessary. The standard di-pole antenna (T-type) has such directivity as may be described by the numeral "8". This means when multipath waves come from the opposite direction of broadcast stations it is subjected to multipath influence. To the horizontal direction (parallel to antenna leads), since gain is lowered, multipath waves coming from that direction can be filtered. With this knowledge, the di-pole antenna may be very useful.

The whip antenna which is provided for portable transistor radios has no directivity. This means where multipath is present, it is completely subjected to its influence.

Measures against multipath trouble must be taken after verifying the cause of multipaths occurrence by which optimum measures can be known - - - use of directional antenna such as exclusive FM antenna, standard di-pole antenna, etc. and also its correct placement and setting up. If multipath problems are present at a place close to broadcast stations (sufficient field strength), it is suggested that you procure a 2 element compact FM antenna at an audio shop. This antenna has little or no gain but has very good directivity and is optimum for reducing multipath measures at a location having strong field strength. When using a standard di-pole antenna (provided as accessory), it is also recommended to set it outdoors in order to avoid possible influence of metallic accessories such as curtain rods, etc., not to speak of steel used in ferro-concrete structure.

LOCATION OF FM ANTENNA

Any good FM antenna cannot exhibit its designed performance if it is erected incorrectly - - - too low or hindered by surroundings. The FM antenna must be at least 4 meters (14 feet) high from the ground level and clear of surrounding obstacles for 3 meters (10 feet) or more. To prevent possible pick-up of car ignition noise, or any other high frequency noises, the antenna must be set up as far as possible from such noise generating sources.

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ANTENNA CABLE

[Selection of Cable and Connection]

Selection of cable and its connection is important as well. There are two types of FM antenna cables, one is the ribbon feeder antenna having 300-ohm impedance and other is the coaxial cable having 75-ohm impedance.

The 300-ohm ribbon feeder cable is identical to what is used for the standard di-pole antenna provided, and it can be used for extension of the di-pole antenna for connection to the 300-ohm FM antenna terminals.

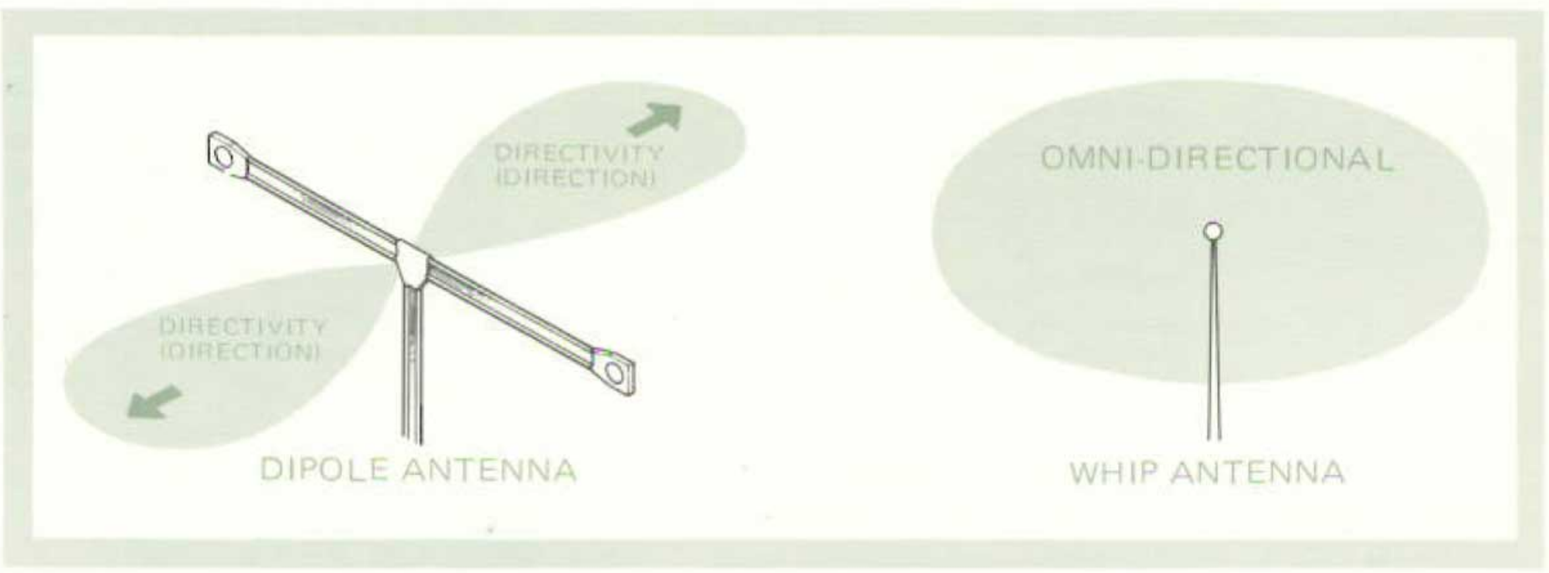
In case 75-ohm coaxial cable is used, use the exclusive terminals for coaxial cable of the FM antenna.

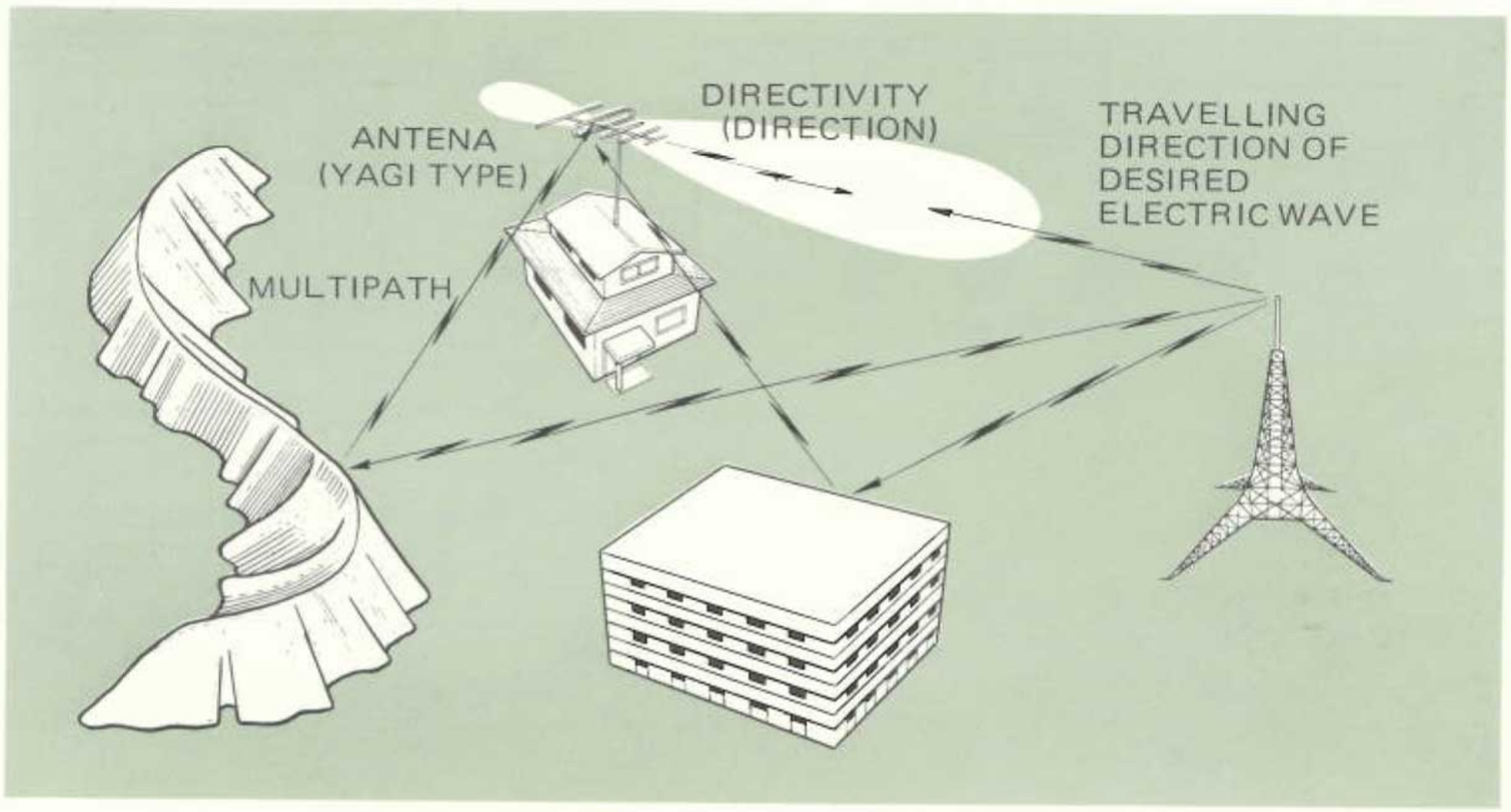
The 75-ohm coaxial cable is more stable than the 300-ohm ribbon feeder against environmental (weather) conditions. Also, it is less influenced by external electrical noise, and the impedance is quite stable even if it is located in the vicinity of metallic obstacles. Therefore, we recommend that you use this coaxial cable in case you think the ribbon feeder type is inadequate.

Coaxial cable is normally supplied in two different impedance types: 75-ohm and 50-ohm. For use with a 50-ohm cable, a special matching transformer is necessary. Impedance matching between the antenna, cable and antenna terminals is very important. When mismatched, it will cause generation of standing waves which presents similar problems as that of multipath, resulting in deterioration of sound.

[Cable Wiring]

The antenna cable must be placed carefully. Avoid placing it near or in parallel to conductive substance as this causes the cable impedance to vary. Coaxial cable has more stable characteristics against various environmental conditions inclusive of weather and it is less influenced by external noise sources. The insertion loss of the ribbon feeder is 0.45dB per 10 meters (33 feet) for the FM band, while the coaxial cable, type 3C2V which is most commonly used, is 1.35dB. Therefore, the shorter the cable length, the better the result.





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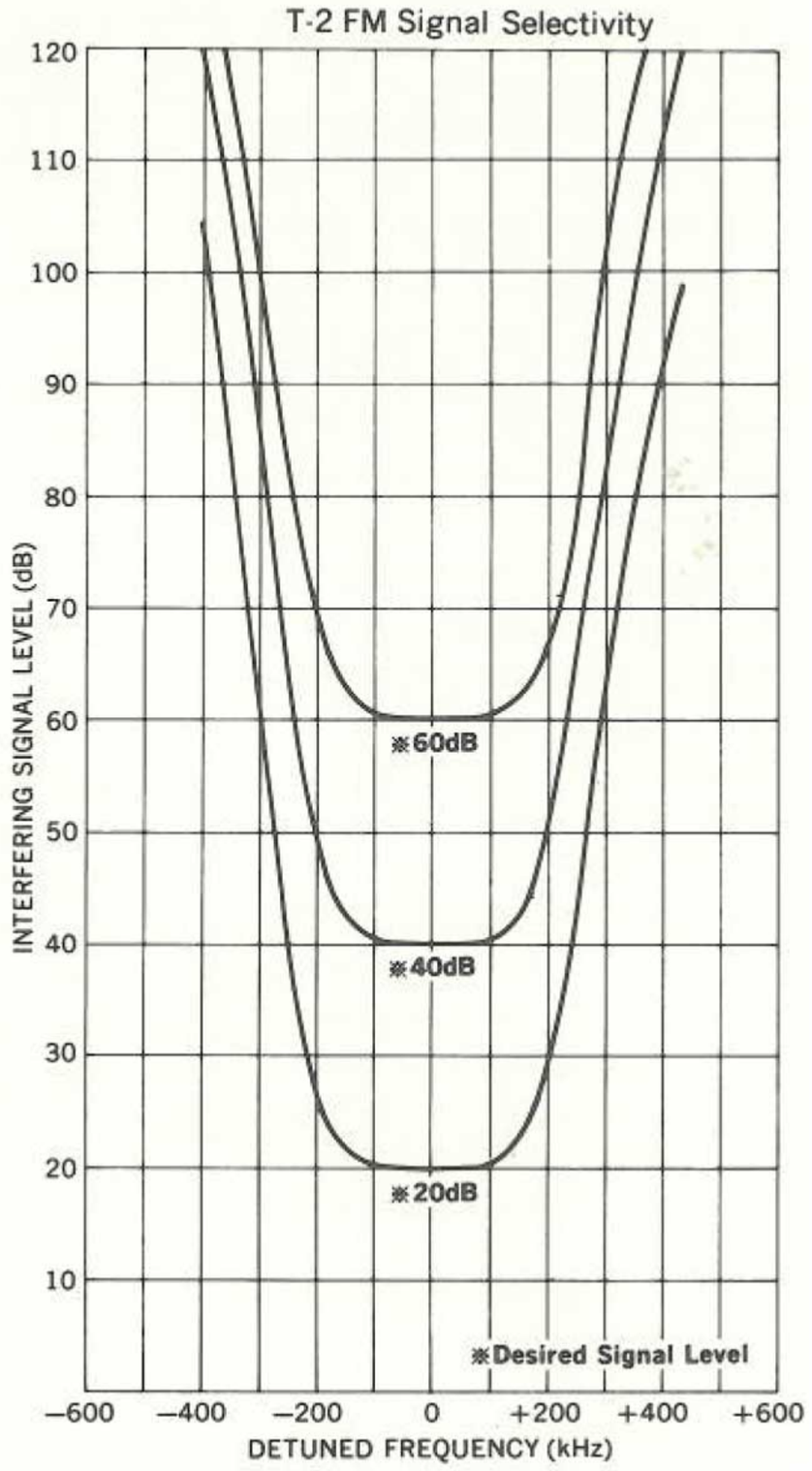
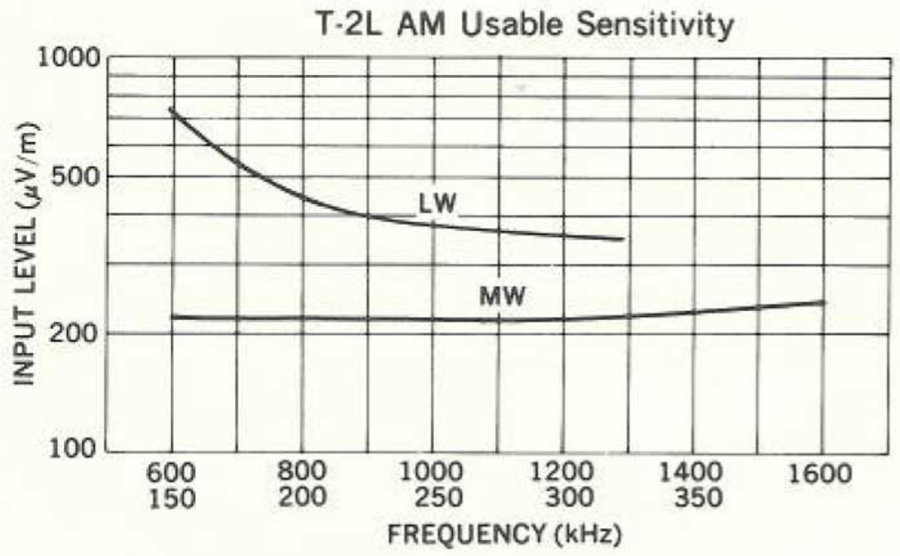
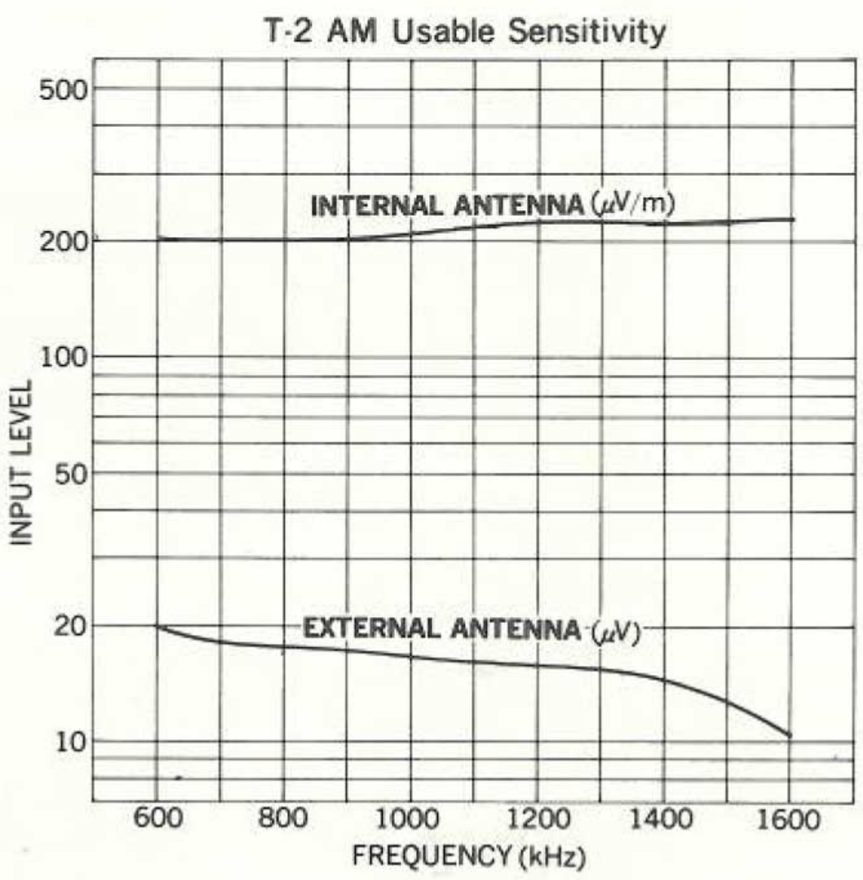
STANDARD CURVES







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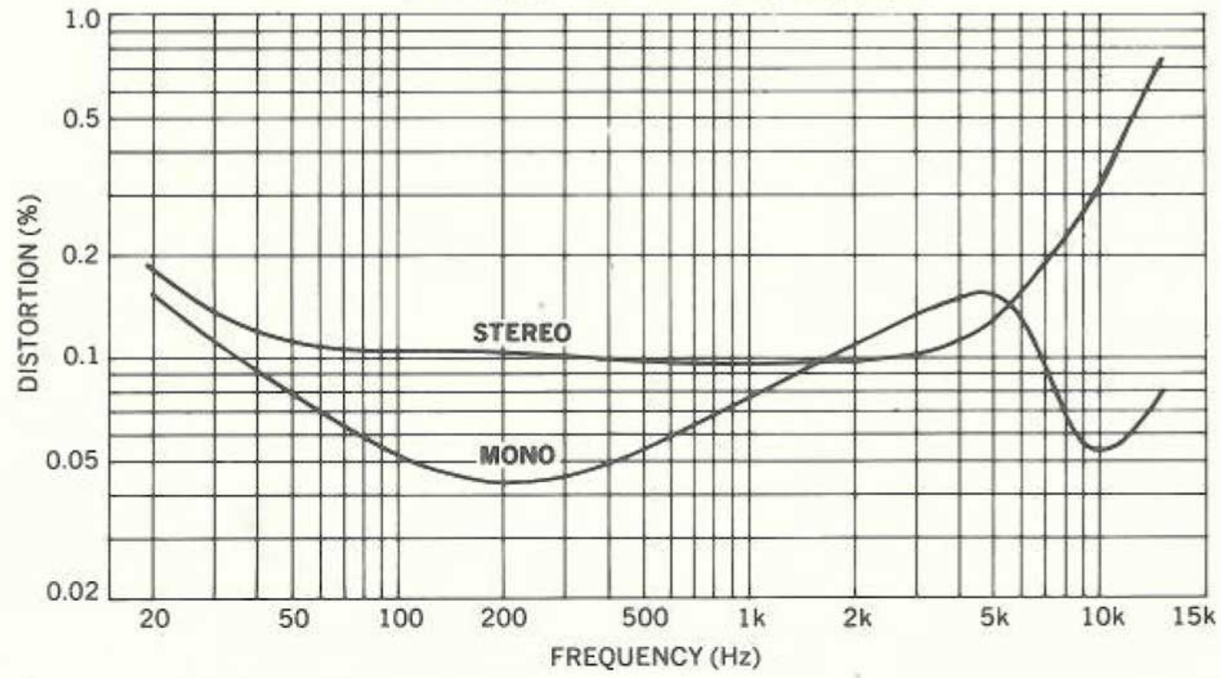
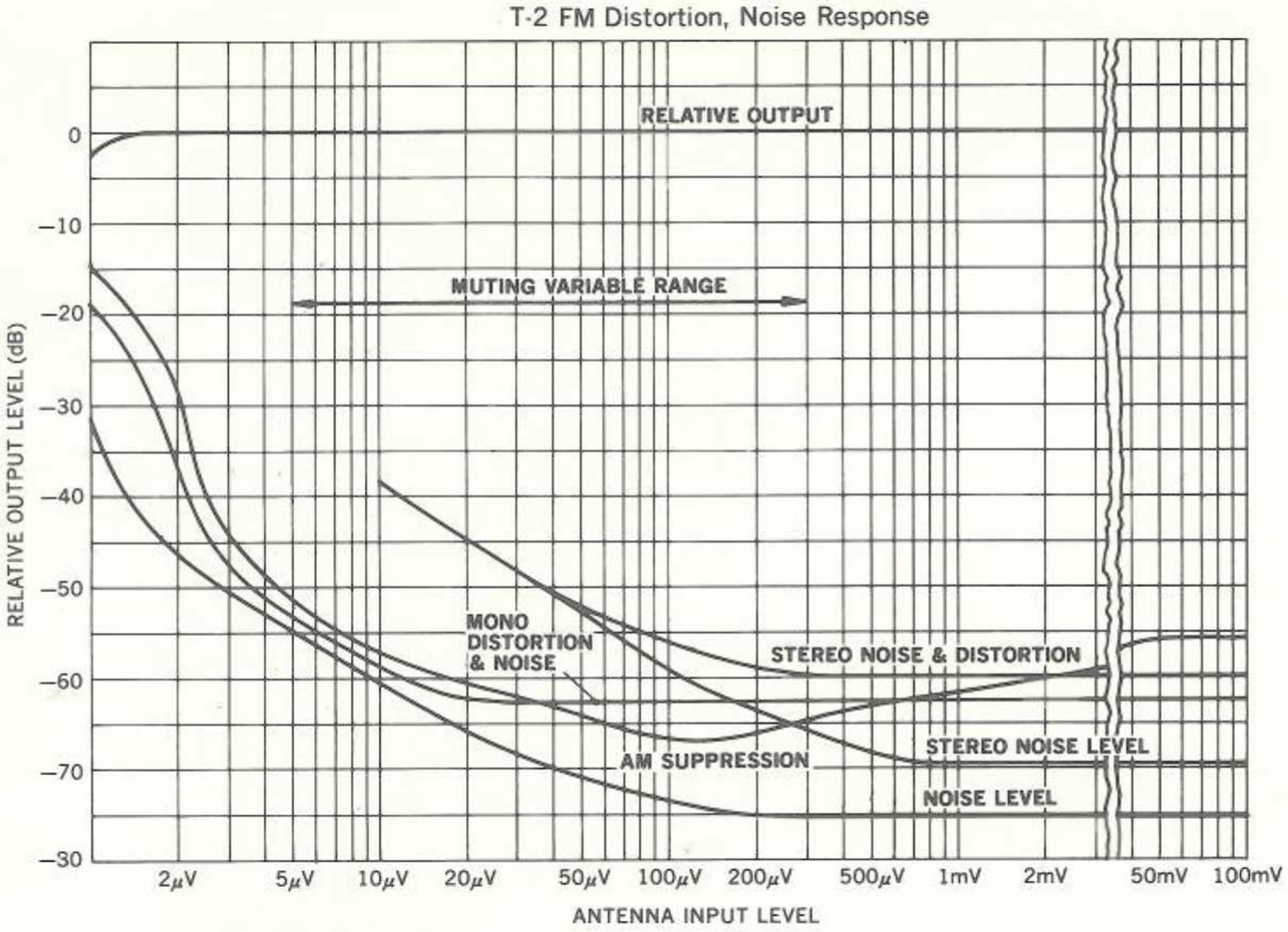
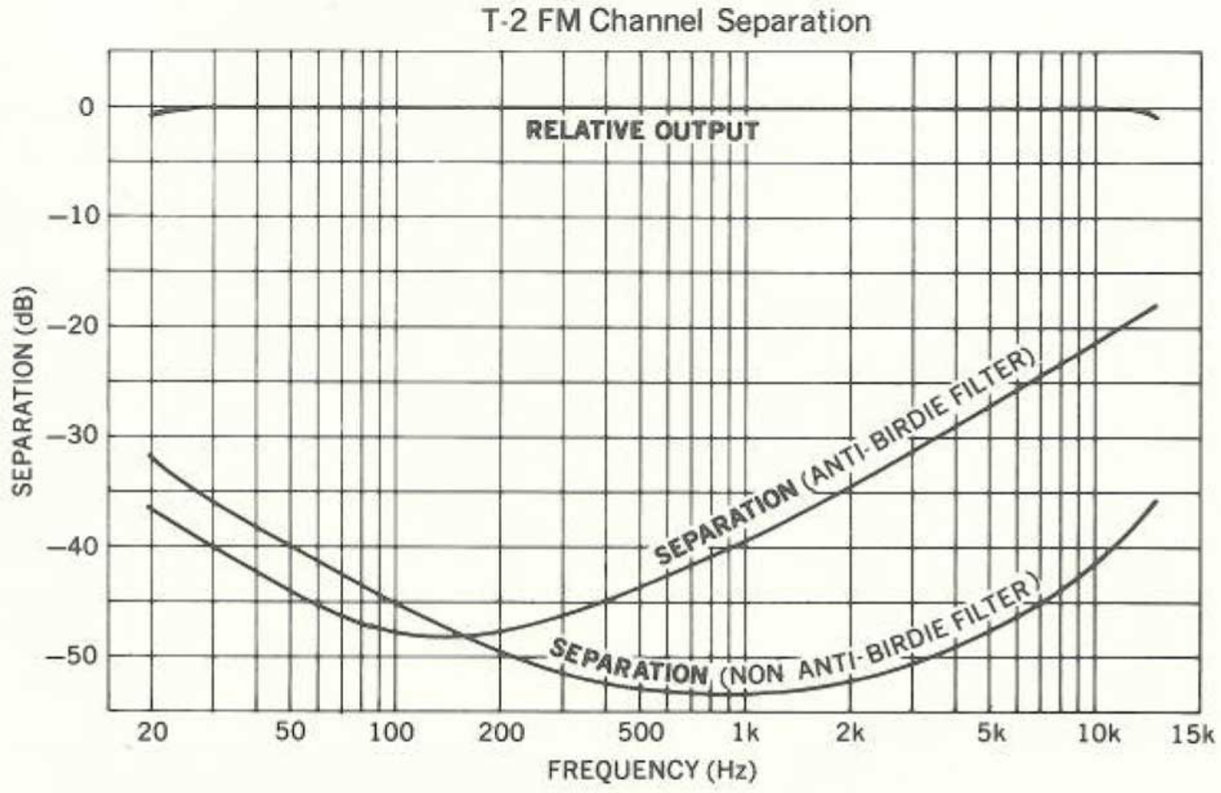
T-2 FM Total Harmonic Distortion



T-2 FM Distortion, Noise Response



T-2 FM Channel Separation



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SPECIFICATIONS

SPECIFICATIONS

<FM Section>			
Receiving Frequency:		87.5MHz – 108MHz	
50dB quieting Sensitivity:		75 μsec. 14.8dBf (3.0μV), 50μsec. 15.5dBf (3.3μV)	
IHF Usable Sensitivity:		10.8dBf (1.9μV)	
Signal to Noise Ratio:		75dB	
Frequency Response:		30 – 15kHz (within ± 1dB)	
Total Harmonic Distortion		(mono)	(stereo)
	100Hz:	0.15%	0.3%
	1kHz:	0.15%	0.3%
	6kHz:	0.3%	0.5%
Capture Ratio:		1.5dB	
Adjacent Channel Selectivity:		10dB (± 200kHz)	
Alternate Channel Selectivity:		75dB (± 400kHz)	
Spurious Response Ratio:		80dB	
IF Response Ratio:		80dB	
Image Response Ratio:		55dB	
AM Suppression Ratio:		55dB	
Stereo Separation:		44dB (100Hz), 48dB (1kHz)	
		38dB (10kHz), 38dB (1kHz, with optional birdie filter)	
Subcarrier Product Ratio:		65dB	
SCA Rejection Ratio:		60dB	
Output Voltage:		1V	
Output Impedance:		100 ohms	
Muting Threshold:		10μV – 300μV	
<AM Section>		(MW)	(LW for the T-2L)
IHF Usable Sensitivity:		250μV/m	500μV/m
Image Ratio:		50dB (45dB for the T-2L)	32dB
IF Rejection Ratio at 1MHz:		40dB	24dB
Signal to Noise Ratio:		50dB	50dB
Total harmonic Distortion:		0.6%	0.6%
Output Voltage 30% mod.:		0.3V	0.3V
Power Requirement:		10W	
Additional Features:		Centre Indicator, Signal Strength Indicator, FM Muting Switch, FM Muting Level Control	
Dimensions:		438(W) x 331(D) x 84(H)mm (17-1/4" x 13-1/32" x 3-5/16") (including legs and rear protrusions)	
Weight:		Net: 5.8kgs (12.8 lbs.)	Gross: 7.3kgs (16.1 lbs.)

Specifications and appearance design subject to change without notice.

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