T-50A

ACCUTOUCH C.L.L. AM/FM STEREO TUNER

Owner's Manual

LUX CORPORATION, JAPAN

CONTENTS

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

Thak you for purchasing the LUXMAN T-50A

The T-50A is an AM/FM stereo tuner, featuring our original C.L.L. system (pat. pend.) and the ACCUTOUCH system to realize not only accurate reception of FM broadcast station but also easy operation of tuning. With our Closed Loop Locked (C.L.L.) circuitry, total control is effected throughout all stages from front end to IF and detector circuit in accordance with the crystal controlled transmission frequency of a broadcasting station. Therefore, once the wave of a broadcasting station is received, the strong feedback circuit locks it in the best condition. In addition, the C.L.L. circuit incorporates a lock-retaining circuit, and no fresh locking is needed when power is turned off and on once the set is tuned in.

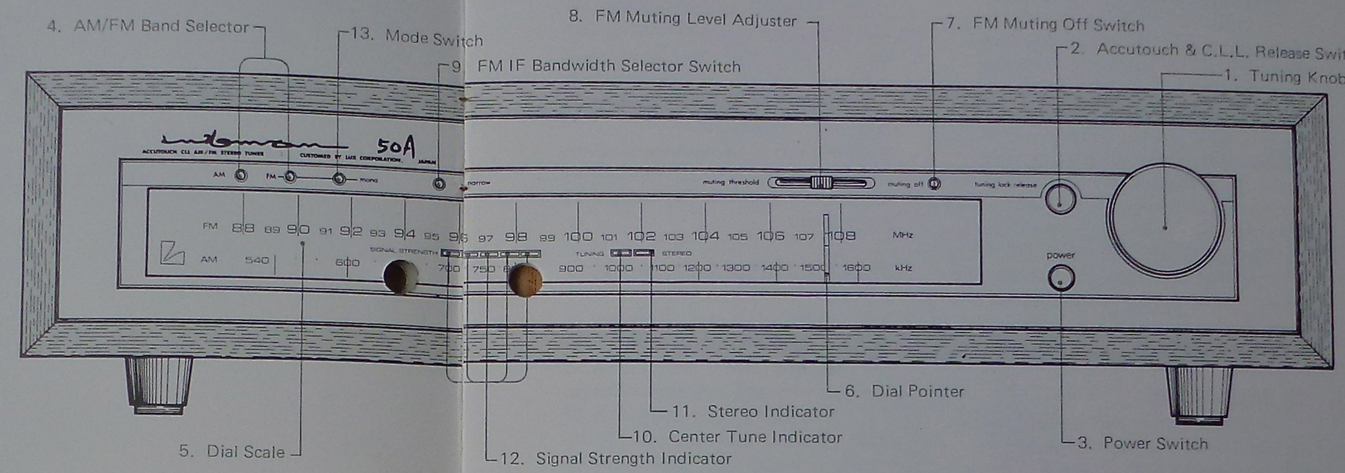
Another feature is an "ACCUTOUCH" system to synchronize all the tuning circuit exactly to the tuning point. This is made possible by means of an extremely narrow capture range set at the C.L.L. circuit. Therefore, correct tuning operation becomes much more difficult and less accurate with conventional methods which depend on a center-tuning meter. The "ACCUTOUCH" system detects an exact center tuning point utilizing a control voltage at the C.L.L. circuit, which triggers a mechanical lock on the tuning knob. Thus, precise tuning to a station is possible with an incomparable accuracy compared with that of current visual tuning systems.

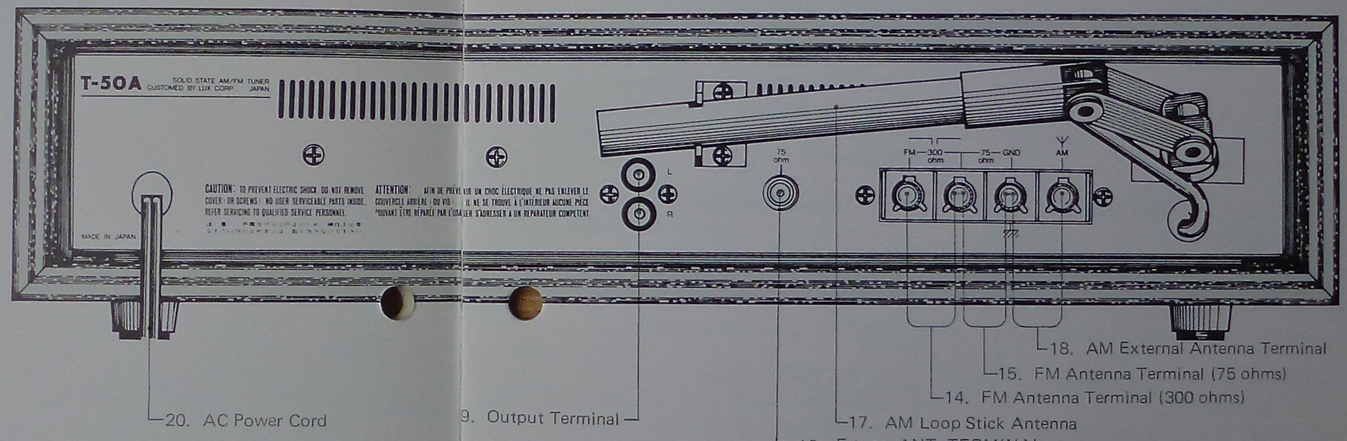
The front end employs a distortion free local oscillator and an RF amp stage composed by the combination of MOS FET and a quality variable capacitor, which makes it feasible to realize superb interference and intermodulation rejection characteristics. The IF stage is so designed as to be inherently low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

In the multiplex stage, in addition to the selected P.L.L. IC's offering good separation, low-pass filters are placed independently in the left and right channels to improve separation characteristics, especially in the treble range.

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-50A.

SWITCHES & TERMINALS





1. Tuning Knob

Use this knob to tune to desired stations. Conventionally, tuning point has been obtained by signal strength meter and center meter, but with our original C.L.L. system adopted in the T-50A, the capture range at the C.L.L. circuit is set quite narrow to obtain more precise tune-in point. Therefore it is hard to obtain the precise tune-in point center frequency of a broadcasting station by use of center meter. We adopted our original tuning lock function (ACCUTOUCH SYSTEM) which mechanically locks the center point by electronic sensing. Thus all the circuits are adjusted to obtain the optimum tuning point.

Depress the "FM" button of the Band Selector (4), and turn the Tuning Knob slowly, and it will be locked with a "responsive" feeling when the Accutouch & C.L.L. Release Switch (2) is set at the protruded position. At this time the Center Indicator (9) lights up to show the accurate tuning point is seized even at the RF stage (radio frequency amplifying stage), IF stage (inter frequency amplifying stage), and FM detection stage. The mechanical lock is automatically released in about 1 second.

Note that the Accutouch System and the C.L.L. circuit do not operate at the time of AM reception.

2. Accutouch & C.L.L. Release Switch

This switch releases the Accutouch System & C.L.L. circuit. Press alternately for switch-on and off. The Tuning Lock function operates when the switch is in the protruded position, while it is released when depressed.

Normally, it is advisable to set the switch always at the protruded position.

The T-50A proclaims a tuner of sonic excellence, therefore the IF stage and the detector stage are designed to be quite wide range. Further the C.L.L. circuit utilizes the wave of broadcasting stations for its frequency control. Thus, in the area where many stations are jammed, the desired station may be interfered, or it is hard to judge to which station the locking should be made. Therefore, we provided the C.L.L. Release switch to the T-50A to prevent such inconvenience. In this case the Accutouch System is released at the same time.

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. 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 525kHz to 1605kHz.

6. 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.

7. 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.

8. FM Muting Level Adjuster

This adjuster is provided to determine the muting threshold level, and is operated when the FM Muting Off Switch is unpressed at 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 mechanical brake, accutouch system, 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.

9. FM IF Bandwidth Selector Switch

This switch is provided to realize either the low distortion characteristic which aims to improve sonic quality, or the high selectivity characteristic which aims to ensure clear reception. The switch is of an alternate push-on, push-off type. In the "protruded" position, the IF bandwidth is "WIDE", and the selectivity at ±400kHz becomes 40dB to realize low distortion. When it is depressed, the bandwidth is "NARROW" to provide 80dB selectivity at ±400kHz, which is effective to eliminate interference by an adjacent station.

Normally, this switch should be in the "wide" position to receive the broadcasting of strong electric field strength. And only when interference of the adjacent station occurs, set the switch to the "narrow" position.

10. Center Tune Indicator

This indicator lights up only when the center frequency of an FM broadcasting station is tuned in.

11. 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 (13) 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.

12. 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 five points. The greater the number of indicator light, the stronger the electric field strength. Stereo broadcasting can be received satisfactorily when the indicator lights up in excess of the third point.

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

13. 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 signal-to-noise ratio.

14. 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.

15. 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).

16. F-type FM Antenna Connector (75 ohms)

This is an FM antenna terminal of 75-ohm aerial input. Function of the terminal is identical to that of the FM Antenna Terminal (15) except that this is of F-type one.

17. 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.

18. AM External Antenna Terminal

Normally, it is not necessary to connect an AM external antenna to this terminal since the T-50A is provided with the loop-stick antenna (17). 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.

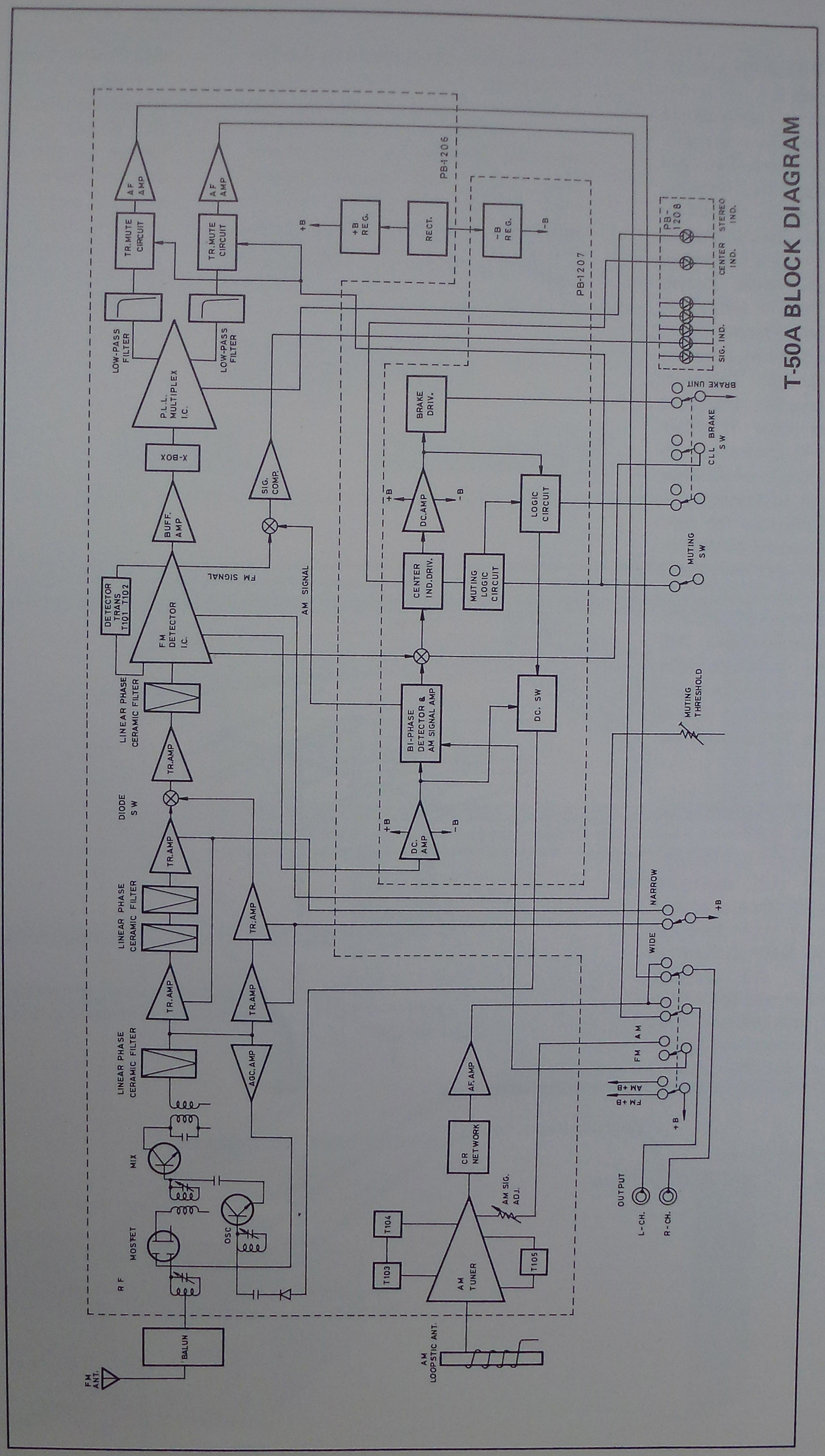
19. Output Terminal

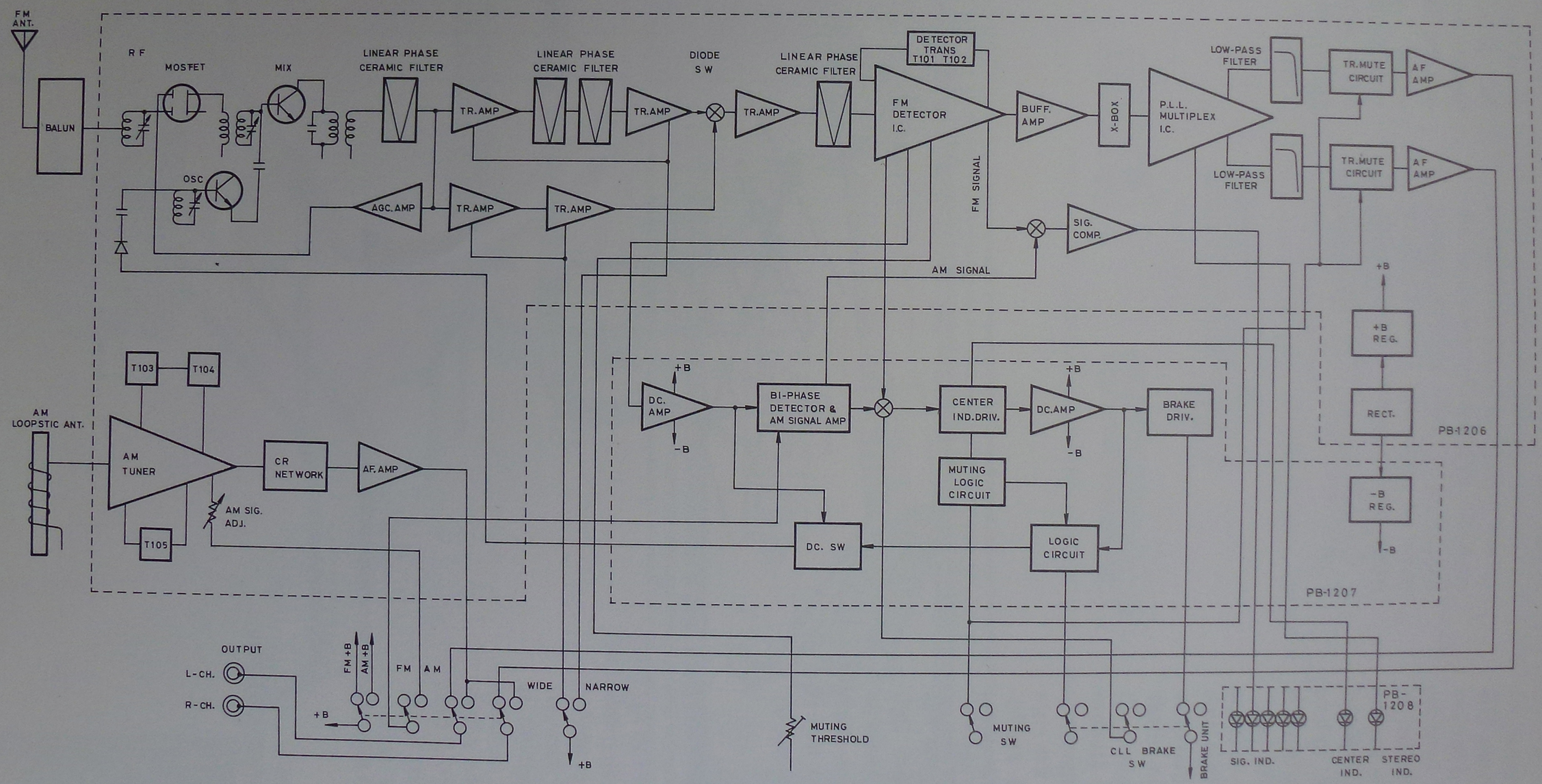
The output signals of the T-50A can be taken out from this terminal. Connect the terminal to the "TUNER" terminal or to the "AUX" terminal of an audio amplifier.

20. AC Power Cord

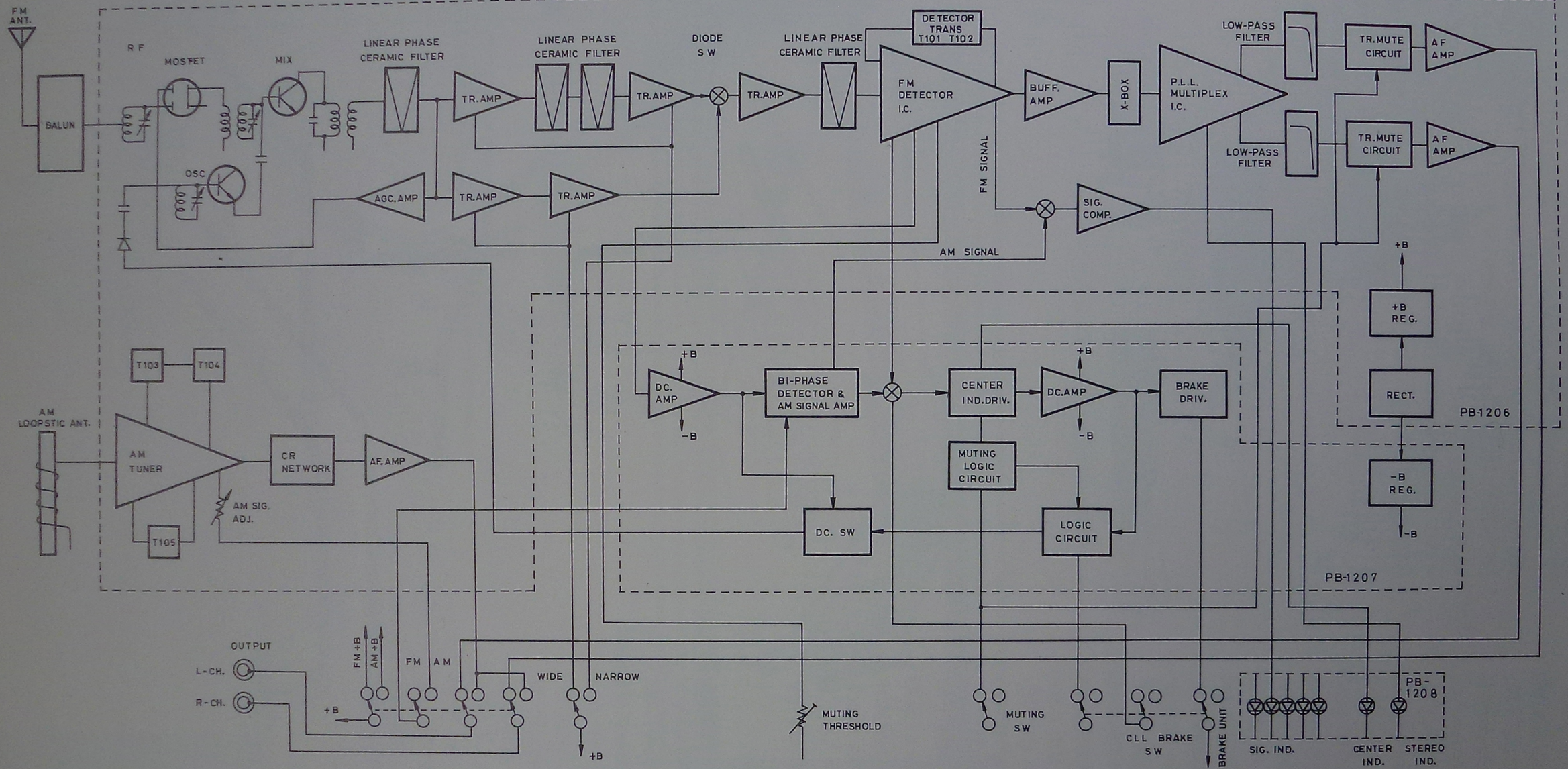
Plug the power cord into an appropriate AC outlet in your listening room, or into an extra AC Outlet (SWITCHED) of an amplifier. In the latter case, switching ON or OFF of the T-50A can be made by the power switch of the amplifier. The power consumption of the T-50A is 10W.

BLOCK DIAGRAM





T-50A BLOCK DIAGRAM



T-50A BLOCK DIAGRAM

CONNECTION PROCEDURE

Connection of FM Antenna to Antenna Terminals

3 different Antenna Terminals are provided; the F-type Connector (75-ohm) (16), the Antenna Terminal (75-ohm) (15) and the Antenna Terminal (300-ohm) (14). 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 coaxiab 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 influenced by noises.

Connection of AM Antenna to Antenna Terminal

The T-50A is provided with an AM loop stick antenna (17), therefore it is not necessary to connect an AM outdoor antenna in such location where the electric field strength is strong. However, the outdoor antenna is required in case the T-50A 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 (18).

Connection of Outputs to Audio Amplifier

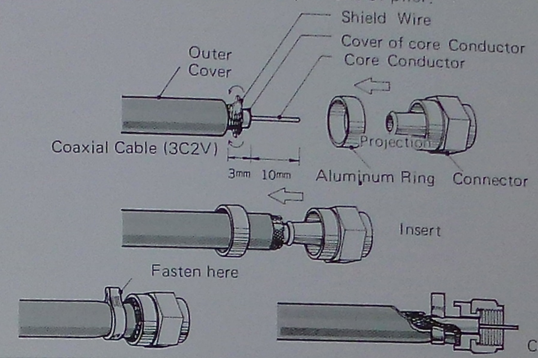
Connect the output terminals (18) to the TUNER or AUX terminals of an audio amplifier by means of pin jack cord. Left channel output must be connected to left channel input, and so with the right channel.

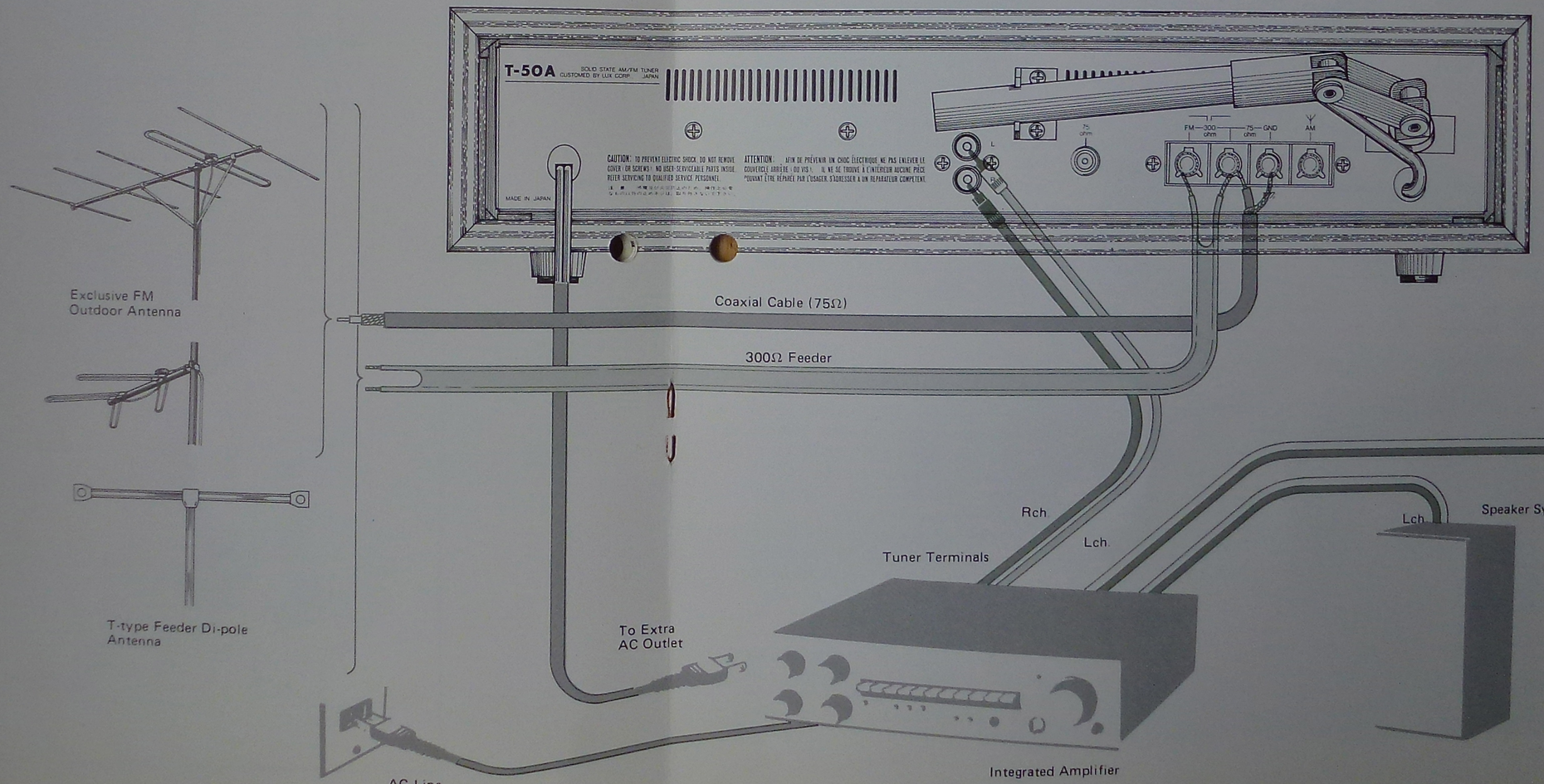
AC Power Cord

Plug the AC Power Cord (19) 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-50A is put into the operational condition, since a time-delay muting circuit is provided to prevent the unwanted switching thumps.

[HOW TO USE COAXIAL CONNECTOR]

As shown in the Figure 1, peel off the outer cover and insert the projected section of the connector in between the shield wire and the core conductor cover. Then firmly fasten the aluminum ring, as shown by the Figure 2, by means of plier.





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 of 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 Meassures]

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 oppositive 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.

About ACCUTOUCH System

The ACCUTOUCH System will not operate for weak-wave stations below the pre-fixed muting level, since it is operated by the control signal from the C.L.L. Circuitry and the Muting Circuitry.

Therefore, when such station whose electric field is fluctuating around the muting level is tuned in with the ACCUTOUCH & C.L.L. Release Switch turned on, the ACCUTOUCH System starts or ceases to function in accordance with the fluctuation of electric field. In this case it is advisable to turn the muting level adjuster counter-clockwise.

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.

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 ribbonfeeder 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.

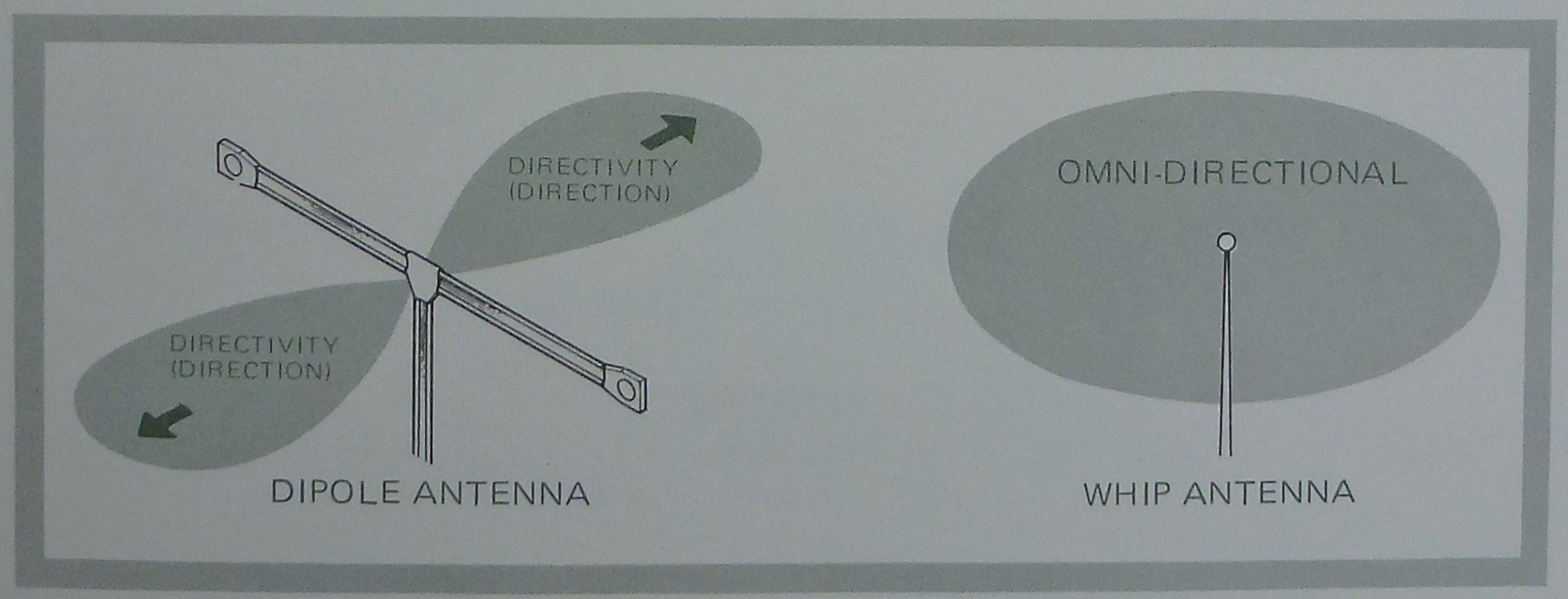
In case 75-ohm coaxial cable is used, use the exclusive terminals for coaxial cable of the FM antenna.

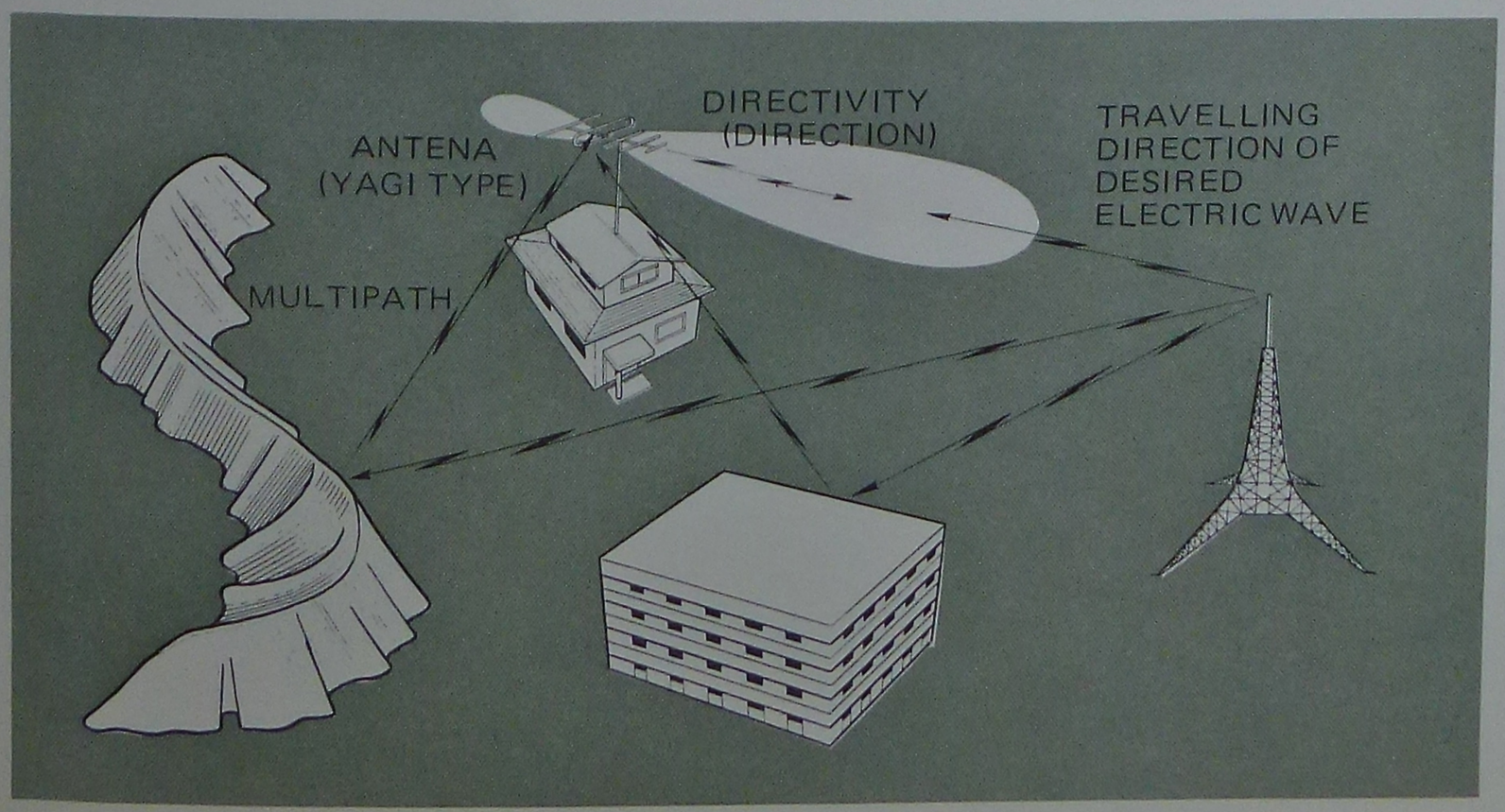
The 75-ohm coaxial cable is more stable than the 300-ohm ribbon feeder against environmental (weather) conditions. Also, it is less influenced by external electrical noise, and the impedance is quite stable even if it is located in the vicinity of metallic obstacles. Therefore, we recommend that you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

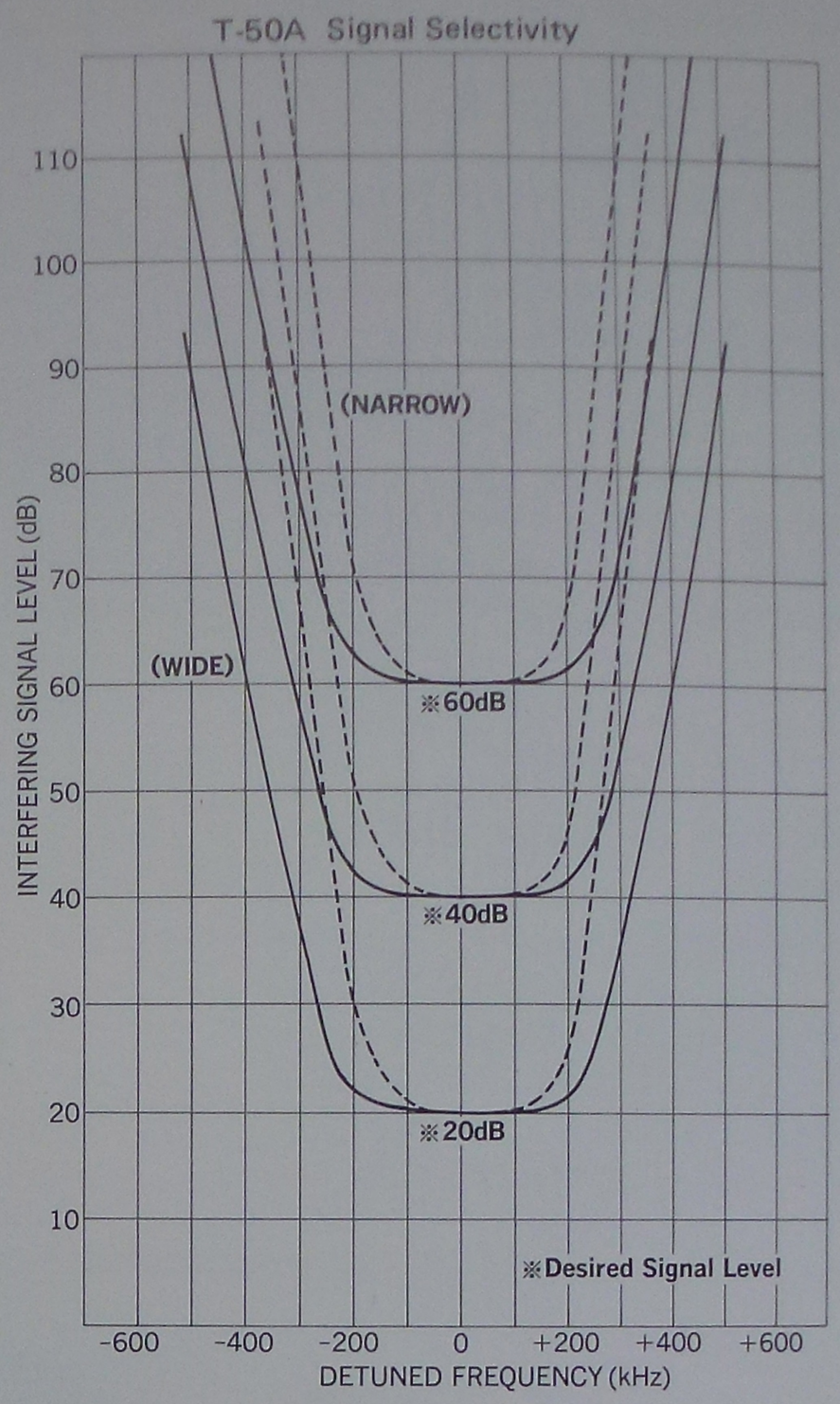
[Cable Wiring]

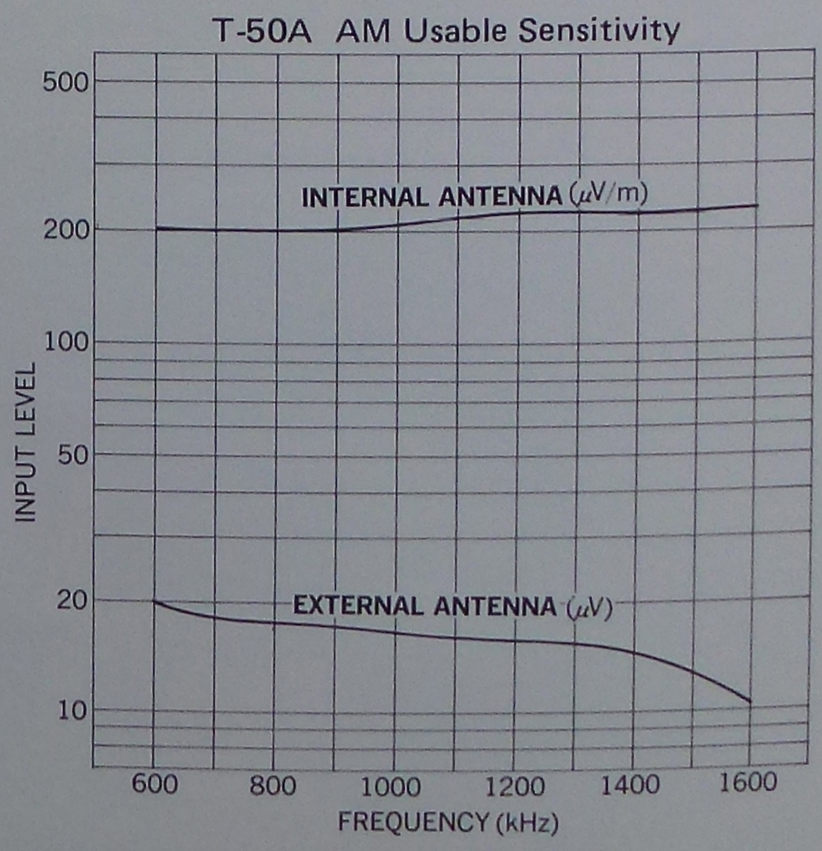
The antenna cable must be placed carefully. Avoid placing it near or in parallel to conductive substance as this causes the cable impedance to vary. Coaxial cable has more stable characteristics against various environmental conditions inclusive of weather and it is less influenced by external noise 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.



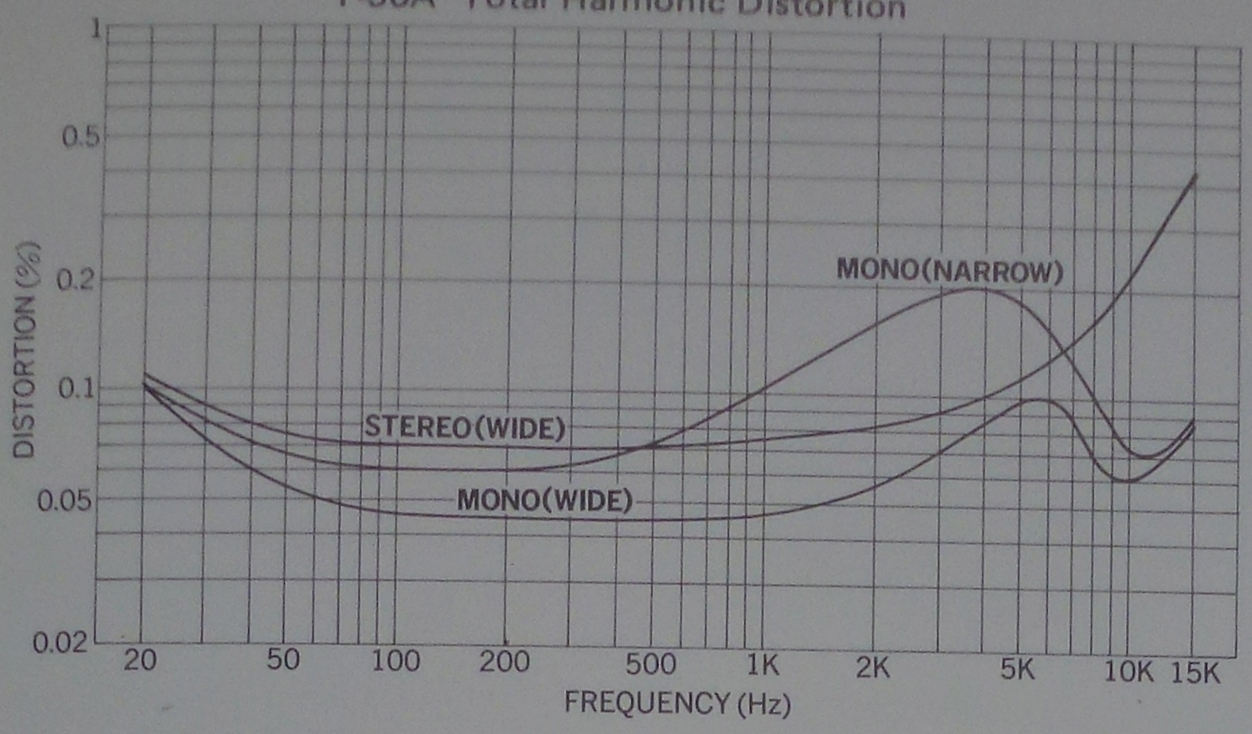


STANDARD CURVES

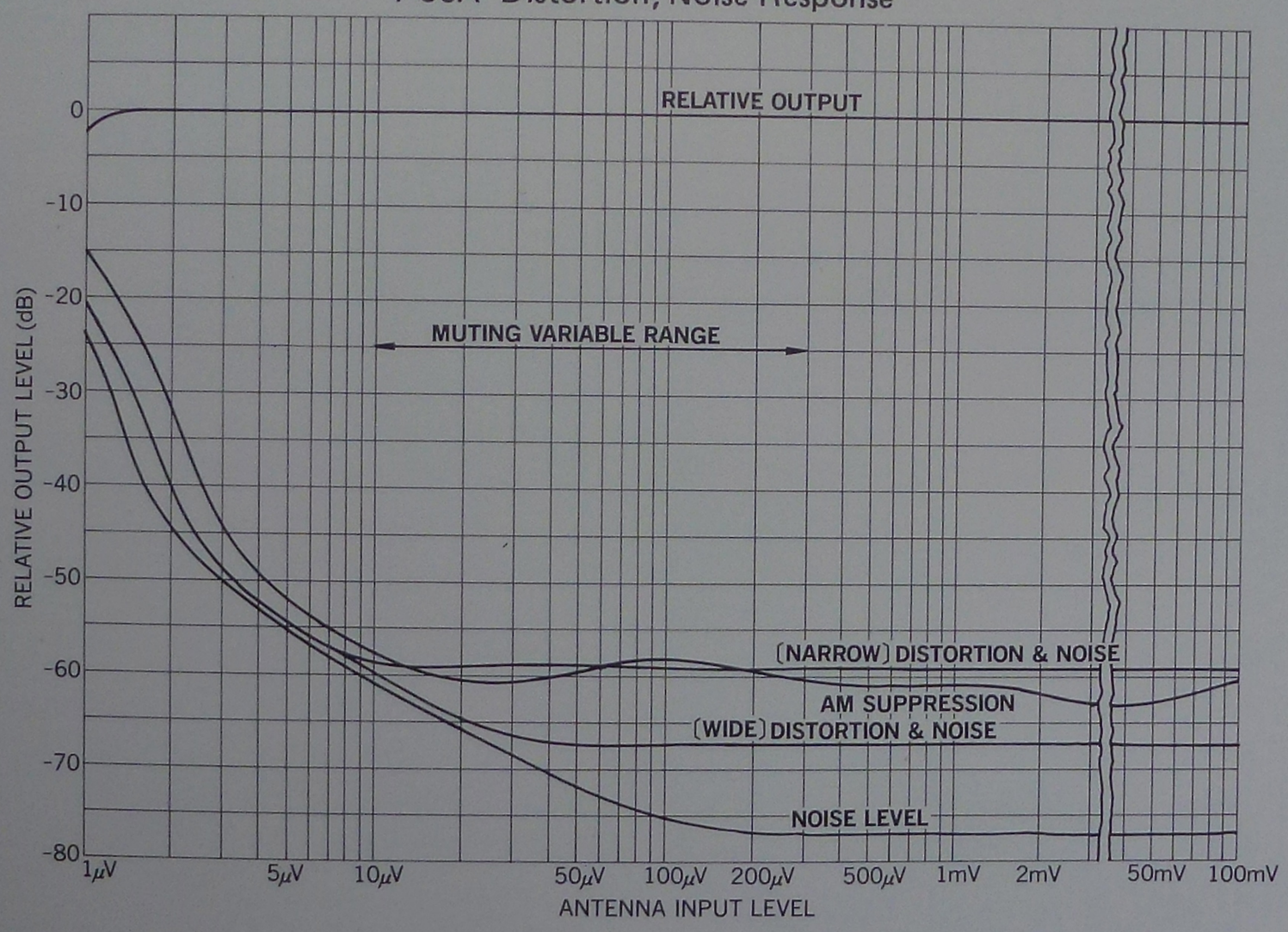




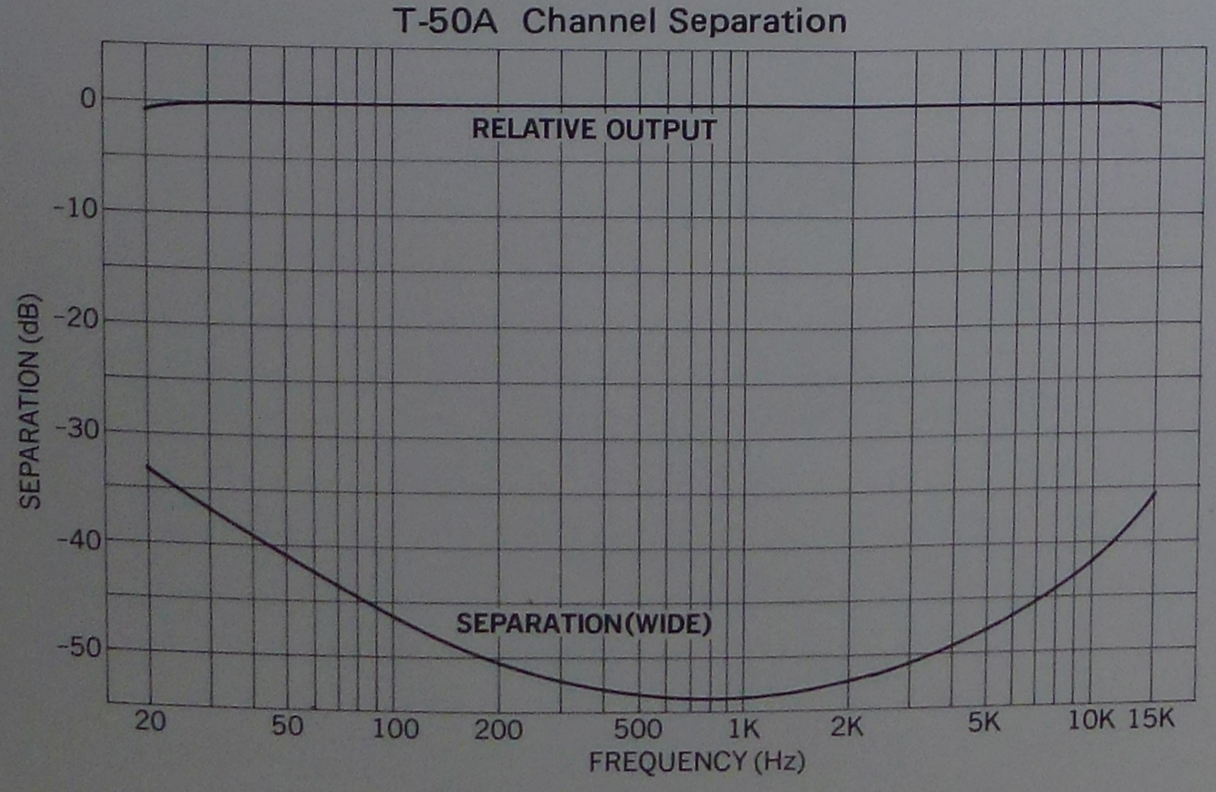
T-50A Total Harmonic Distortion



T-50A Distortion, Noise Response



T-50A Channel Separation



SPECIFICATIONS

SPECIFICATIONS

< FM Section >			
Receiving Frequency:		87.5MHz – 108MHz	
50dB Quieting Sensitivity:		75 μsec. 14.2 dBf (2.8μV), 50 μsec. 14.8 dBf (3.0 μV)	
IHF Usable Sensitivity:		10.3 dBf (1.8 μV)	
Signal to Noise Ratio:		75 dB	
Frequency Response:		30 – 15 kHz (within ± 1 dB)	
Total Harmonic Distortion		(mono)	(stereo)
	100Hz:	0.08% (wide)	0.2% (wide)
	1kHz:	0.08% (wide)	0.15% (wide)
	6kHz:	0.15% (wide)	0.3% (wide)
	1kHz:	0.2% (narrow)	0.5% (narrow)
Capture Ratio:		1.0dB (wide)	2.0dB (narrow)
Adjacent Channel Selectivity:		10dB (narrow ± 200kHz)	
Alternate Channel Selectivity:		80dB (narrow ± 400kHz)	
		40dB (wide ± 400kHz)	
Spurious Response Ratio:		80dB	
IF Response Ratio:		80dB	
Image Response Ratio:		55dB	
AM Suppression Ratio:		60dB	
Stereo Separation:		45dB (wide, 100Hz), 48dB (wide, 1kHz)	
		40dB (wide, 10kHz), 30dB (narrow 1kHz)	
Subsonic Product Ratio:		65dB	
SCA Rejection Ratio:		60dB	
Output Voltage:		1V	
Output Impedance:		100 ohms	
Muting Threshold:		10μV – 300μV	
< AM Section >			
IHF Usable Sensitivity:		250μV/m	
Image Ratio at 1MHz:		50dB	
IF Rejection Ratio at 1MHz:		40dB	
Signal to Noise Ratio:		50dB	
Total Harmonic Distortion:		0.6%	
Output Voltage 30% mod.:		0.3V	
Power Requirement:		10W	
Additional Features:		Tuning Lock System, CLL Circuit, IF Bandwidth Selector. Center Indicator, Signal Strength Indicator, FM Muting Switch. FM Muting Level Adjuster	
Dimensions:		466(W) x 350(D) x 120(H) mm (18-11/32" x 13-25/32" x 4-23/32") (including legs and rear protrusions)	
Weight:		Net: 6.5 kgs (14.3 lbs.)	Gross: 8.0kgs (17.6 lbs.)

Specifications and appearance design subject to change without notice.

LUX CORPORATION, JAPAN

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