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Audiolab 8000T FM/AM Tuner



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Please read this manual before using your new Audiolab Tuner.

1 SAFETY INSTRUCTIONS

IMPORTANT

1:1 Read Instructions. All the safety and operating instructions should be read before the appliance is operated.

1:2 Retain Instructions. The safety and operating instructions should be retained for future reference.

1:3 Heed Warnings. All warnings on the appliance and in the operating instructions should be adhered to.

1:4. Follow Instructions. All operating and use instructions should be followed.

1:5. Water and Moisture. The appliance should not be used near water – for example, near bathtub, washbowl, kitchen sink, laundry machine, in a wet basement or near a swimming pool etc.

1:6. Carts and Stands. The appliance should be used only with a cart or stand that is recommended by the manufacturer.

1:6a. An appliance and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn.



1:7. Wall or ceiling mounting. The appliance should be mounted to a wall or ceiling only as recommended by the manufacturer.

1:8. Ventilation. The appliance should be situated so that its location or position does not interfere with its proper ventilation.

For example, the appliance should not be situated on a bed, sofa, rug, carpet, or similar surface that may block the ventilation openings; or placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.

1:9. Heat. The appliance should be situated away from heat sources such as radiators, heat registers, stoves, direct sunlight or other appliances (including amplifiers) that produce heat.

1:10. Power Sources. The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.

1:11. Grounding or polarisation. Precautions should be taken so that the polarisation means of the appliance power cord is not defeated.

1:12. Power-Cord Protection. Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.

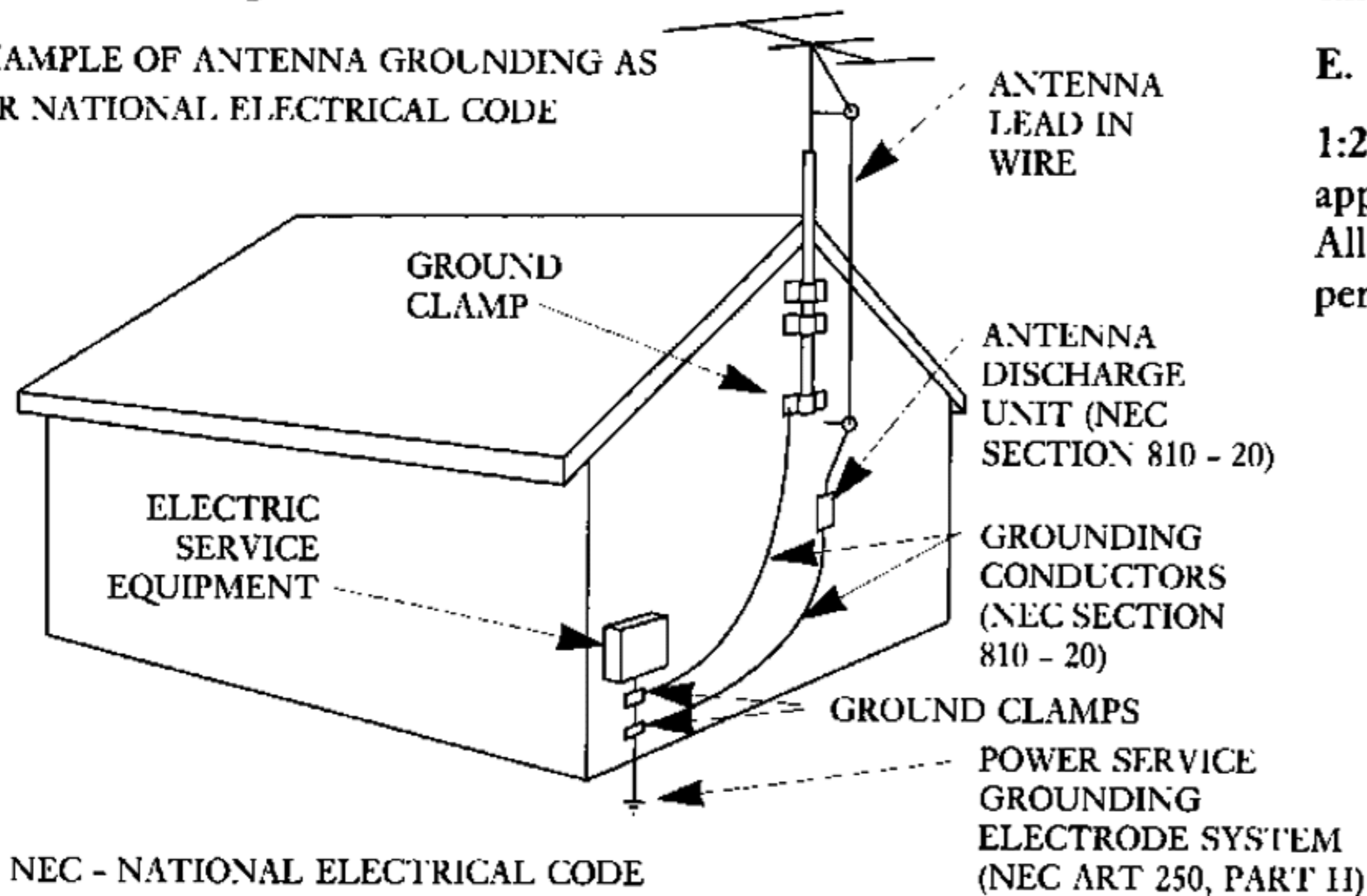
1:13. Protective attachment plug. If the appliance is equipped with an attachment plug having overload protection this is a safety feature. See Instruction Manual (Section 2. Mains Connection) for replacement or resetting of protective device. If replacement of the plug is required, be sure the service technician has used a replacement plug specified by the manufacturer that has the same overload protection as the original plug.

1:14. Cleaning. The appliance should be cleaned only with a soft dry lint-free cloth. While cleaning is in progress the AC mains cord must be unplugged from the AC mains supply.

1:15. Power lines. An outdoor antenna should be located away from power lines.

1:16. Outdoor antenna Grounding. If an outside antenna is connected to the receiver(tuner), be sure the antenna system is grounded so as to provide some protection against voltage surges or build-up of static charges. Article 810 of the US National Electrical Code, ANSI/NFPA 70, provides information with regard to proper grounding of the lead-in wire to an antenna-discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode. See figure below.

EXAMPLE OF ANTENNA GROUNDING AS PER NATIONAL ELECTRICAL CODE



1:17. Non-use Periods. The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.

1:18. Object and Liquid Entry. Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.

1:19. Damage Requiring Service. The appliance should be serviced by qualified personnel when:

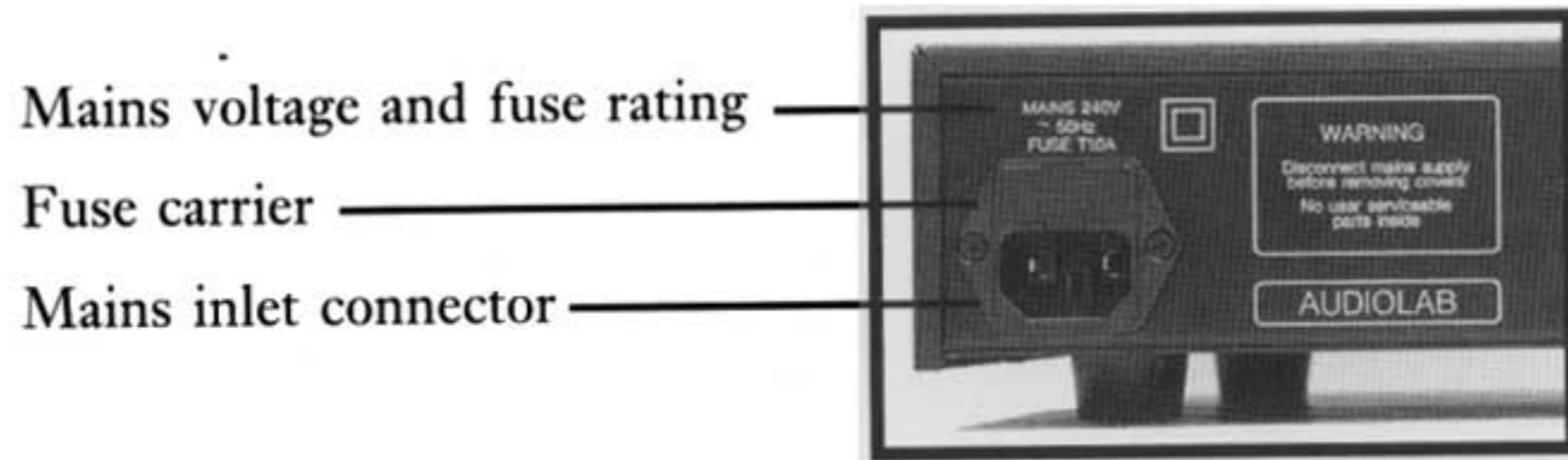
- A. The power-supply cord or the plug has been damaged; or
- B. Objects have fallen, or liquid has been spilled into the appliance; or
- C. The appliance does not appear to operate normally or exhibits marked change in performance; or
- E. The appliance has been dropped, or the enclosure damaged.

1:20. Servicing. The user should not attempt to service the appliance beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.

2 MAINS CONNECTION

IMPORTANT

Check the voltage setting. If the local mains supply matches the voltage shown on the rear panel connect a suitable plug to the mains cable. **DO NOT** connect this apparatus to an incorrect mains supply, serious damage may result.



NOTE: For some markets the mains cable is already fitted with a mains plug which complies with local requirements.

The wires in the mains cable are coloured in accordance with the following code:

GREEN AND YELLOW - EARTH
BLUE - NEUTRAL
BROWN - LIVE

AS THE COLOURS OF THE WIRES IN THE MAINS CABLE MAY NOT CORRESPOND WITH THE COLOURED MARKINGS IDENTIFYING THE TERMINALS IN YOUR PLUG PROCEED AS FOLLOWS:

The wire which is coloured **GREEN AND YELLOW** must be connected to the terminal in the plug which is marked by the letter **E** or the safety earth symbol \perp or coloured **GREEN** or **GREEN AND YELLOW**.

The wire which is coloured **BLUE** must be connected to the terminal in the plug which is marked by the letter **N** or coloured **BLACK**.

The wire which is coloured **BROWN** must be connected to the terminal in the plug which is marked by the letter **L** or coloured **RED**.

If the mains plug is fused fit a plug of at least 5A rating.

If the mains fuse is ever changed it must be replaced by a fuse of the correct type and rating. The fuse is a 5mm x 20mm Time Lag (T) type. The correct rating is shown on the rear panel.

The fuse is located in a slide-in carrier which also contains a spare fuse. The fuse carrier cannot be pulled out until the mains connector is unplugged. When the carrier is opened the first fuse you see is the spare one.

Do not connect the mains supply until all other connections have been made.

F M A N D A M A N T E N N A

IMPORTANT

USE A HIGH QUALITY FM ANTENNA

To achieve optimum performance from *any* FM tuner you must use a correctly installed antenna. The antenna should have good gain, good directional characteristics and it should be mounted as high as possible, away from large metal objects. The antenna should point towards the transmitter. Any distribution system must have very low noise and low RF intermodulation distortion. The antenna should be matched to a 75 ohm load and designed for the 88-108MHz FM band*. If the antenna has a 300 ohm output impedance it must be used with the 300-75 ohm adapter. Connect the FM antenna to the tuner 75 ohm FM co-ax input via a 75 ohm low-loss coaxial cable terminated with a matching PAL or F-type connector. Consult your dealer or a qualified installer for advice on FM antennas.

TEMPORARY FM T-RIBBON INDOOR DIPOLE

A simple ribbon antenna has poor directional characteristics, low gain and does not reject unwanted signals. A small FM antenna mounted in a loft or hidden in a cupboard can give a cleaner, stronger signal. If necessary the supplied FM T-ribbon can be used temporarily. Connect the spade connectors to the two screw terminals on the 300-75 ohm adapter. Plug the 300-75 ohm adapter into the 75 ohm FM coax input. For PAL connectors use the coax in-line adapter. When you tune you will have to experiment to find a suitable position and orientation for the 'arms' of the 'T' to give maximum signal strength. They should normally be horizontal, and perpendicular (90 degrees) to the direction of the transmitter. In some locations the T-ribbon may have to be adjusted for minimum interference.

FM CABLE RADIO

The Audiolab 8000T may be connected to a cable FM distribution system.

AM LOOP ANTENNA

Connect the supplied AM loop to the screw terminals marked AM loop. The AM loop *must* remain connected even when using an external AM antenna as it forms part of the of the AM tuning circuit. When tuning rotate the AM loop for best signal strength and minimum interference. The AM antenna has a foot to hold the loop vertical. When adjusting the AM loop always rotate it through a full 360 degrees before choosing the best position. For reception in remote areas or heavily screened buildings an external AM wire or rod antenna can be connected to the terminal marked AM EXT.

*For Japan 76-90MHz.

4 QUICK SET UP

IMPORTANT

Read and follow the instructions in sections 1-3 covering *safety*, *mains connection*, and *antenna*. Then connect the phono sockets marked **AUDIO OUTPUT LEFT** and **AUDIO OUTPUT RIGHT** to the corresponding tuner inputs of your amplifier. Use a good quality screened phono-phono audio cable.

POWER

POWER must be **OFF**, power button **OUT**. Connect the mains cable to the mains inlet socket on the back panel of the tuner. Connect the mains plug to the AC mains supply. Make sure the amplifier tuner input is selected and the volume is turned down. Switch **POWER ON**. The window will illuminate and a few seconds later information will be displayed.



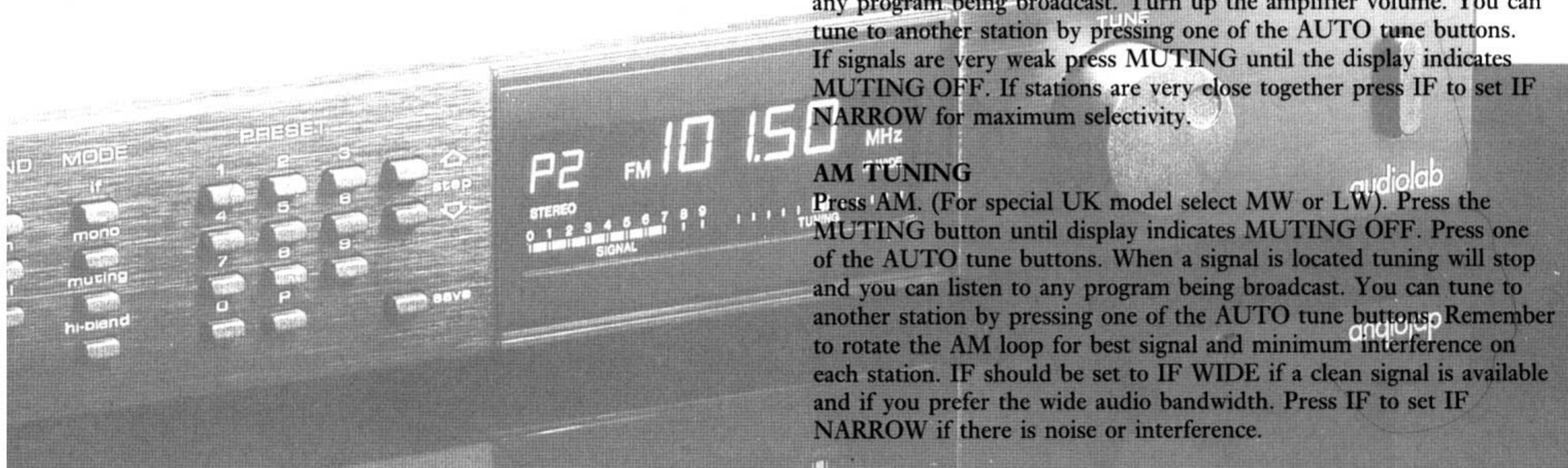
The display shows the station frequency, FM in MHz, AM in kHz. You can read the **SIGNAL** strength. On FM you can see that the station is correctly tuned when the centre-zero **TUNING** meter has the large centre-segment (magic eye) illuminated. The centre line of the display window indicates **STEREO** or **MONO** depending on the signal received.

FM TUNING

Press **FM**. If the display indicates **MONO ONLY** press **MONO** until it indicates **MONO** or **STEREO**. Press one of the **AUTO** tune buttons. When a signal is located tuning will stop and you can listen to any program being broadcast. Turn up the amplifier volume. You can tune to another station by pressing one of the **AUTO** tune buttons. If signals are very weak press **MUTING** until the display indicates **MUTING OFF**. If stations are very close together press **IF** to set **IF NARROW** for maximum selectivity.

AM TUNING

Press **AM**. (For special UK model select **MW** or **LW**). Press the **MUTING** button until display indicates **MUTING OFF**. Press one of the **AUTO** tune buttons. When a signal is located tuning will stop and you can listen to any program being broadcast. You can tune to another station by pressing one of the **AUTO** tune buttons. Remember to rotate the AM loop for best signal and minimum interference on each station. **IF** should be set to **IF WIDE** if a clean signal is available and if you prefer the wide audio bandwidth. Press **IF** to set **IF NARROW** if there is noise or interference.



5 FRONT PANEL



FM 102.2 MHz UK model.



AM 1340 kHz North American model.



MW 909 kHz UK model.



CAL ON export model.



FM 93.8 MHz export model.

POWER

Switches mains POWER ON or OFF. When POWER is ON the display is illuminated. Each time power is switched ON the audio output is muted for a few seconds to allow the power supply circuits to stabilise. Always switch power OFF before changing any connections. Whenever mains power is switched ON the tuner always retains the same setting as just before power was last turned off, except if CAL is set or P is displayed with a flashing bar. In these special cases the tuner returns to the last but one setting. When power is switched OFF the audio outputs are automatically muted.

DISPLAY

Display indicates the FREQUENCY in MHz for FM and kHz for AM. SIGNAL meter measures FM signal strength in steps of $10\text{dB}\mu\text{Vpd}/75\text{ ohms}$ (Note: $\text{dB}\mu\text{Vpd}/75\text{ ohms} + 11.2 = \text{dBf}$). On AM the SIGNAL meter reads in $\text{dB}\mu\text{V}/\text{m}$. An FM station is correctly tuned when the FM centre-zero TUNING meter has the large centre-segment illuminated. The tuning meter has a range of $\pm 125\text{kHz}$, each element is 25kHz . Centre line of display indicates the operating mode. There are indicators for STEREO, HI-BLEND, MONO, MONO ONLY, MUTING OFF, IF NARROW and IF WIDE. Display also indicates when a PRESET is selected and the number of the PRESET (e.g. P25). The display does not indicate MUTING ON. Except when tuning very weak stations MUTING is normally set ON.

AUTO

Press UP to tune up in frequency. Press DOWN to tune down in frequency. The tuner will scan the band until a station is found. With MUTING ON the tuner will ignore weak stations. On FM it is best to auto-tune with IF NARROW selected if there are many stations with narrow frequency spacing.

BAND

Press FM to select the FM band. Press AM to select the AM BAND. Special UK model has separate MW and LW bands for AM. When a new band is selected 8000T goes to last setting which was used on that band.

CAL

With CAL active on FM a 400Hz audio output tone representing 37.5kHz deviation (50% or 6dB below full modulation) replaces the broadcast programme. With CAL active on AM a 400Hz tone representing 50% modulation (6dB below full modulation) replaces the broadcast program.

Press CAL to activate the CALIBRATION OSCILLATOR, the main display is blanked and replaced by CAL. The output tone one can be used to pre-set you tape deck record level controls before making a recording. Push CAL again and the tuner is re-set to the last FM or AM setting. Do not operate any of the other controls while CAL is set or you will alter the tuner setting.

For special UK model. Press P followed by SAVE to activate CAL. Press P then SAVE to switch CAL OFF.

MODE

There are four independent control buttons. If you hold a button down the setting will toggle at intervals of about 1 sec.

IF

IF sets the FM bandwidth to IF WIDE or IF NARROW. Use IF NARROW for best selectivity (e.g. tuning in a "crowded air-space") and use IF WIDE for optimum sound quality with best stereo separation and lowest distortion.

The Audiolab 8000T has switchable bandwidth on AM. With IF NARROW high frequency response is rapidly attenuated as is normal practice for AM tuners. With IF WIDE the response is more extended than a conventional AM tuner. With IF WIDE it is possible to obtain better sound when there is little or no interference and a good quality wide-band signal is received.

When tuning very weak stations it is best to select IF NARROW. Then when you find a good clean signal change the setting to IF WIDE for best sound quality.

MONO

STEREO/MONO switching on FM is automatic when MONO ONLY is *not* selected. A stereo broadcast will automatically be decoded in stereo as long as the signal is above the stereo switching threshold. If you want to lock the tuner in MONO mode (e.g. if the signal is very weak and noisy) press MONO until the display indicates MONO ONLY.

MUTING

To listen to very weak stations set MUTING OFF. When you want to tune manually and monitor the audio output continuously as you tune set MUTING OFF. Remember that the display indicates MUTING OFF, it does not indicate MUTING ON.

HI-BLEND

When receiving a very weak stereo FM station and back-ground noise is too high select HI-BLEND. Noise is reduced at the expense of some reduction in high frequency stereo separation.

PRESET

The 8000T has 39 pre-sets which can be used to save FM or AM settings in any order. To select PRESET 1-9 press one button on the numeric key-pad. For PRESET 10-39 press P followed by the first digit of the number; then press the second digit. Watch the display and see how it prompts for an entry with a flashing bar. If you accidentally press a number greater than 3 for the first digit an E (Error) will show. If this happens press 1,2 or 3 and E will disappear. If you press 0 for the first digit the leading zero is automatically blanked.

When PRESET is selected, as soon as you change the MODE or FREQUENCY the PRESET display is blanked to indicate that the tuner is in MANUAL tuning mode.

SAVE

To SAVE a station press SAVE. Then you have about 5 seconds to complete the entry sequence. Key in the PRESET (e.g., 7 or P23) on which you want to save the station. If you decide to abort an entry sequence, wait for the flashing MEMORY indicator to disappear, then try again.

STEP

STEP UP or DOWN through PRESETs by using the UP/DOWN STEP keys. If you hold a button the tuner will step between presets at one second intervals. When in MANUAL mode, if you press STEP UP you return to preset P1, and if you press DOWN you return to P39.

TUNE

The large tuning knob operates a rotary optical encoder. Turn the encoder and you immediately initiate manual tuning. You can tune in fine 25kHz steps across the FM band and in 9KHz (10kHz N.America, 1kHz UK LW band) steps across the AM band. You can tune with MUTING OFF or on. When you set MUTING OFF you can use the

special partially muted continuous audio output to listen to the signals being received. In this way you can look for interesting stations and also check the signal quality for your favourite stations. The FM tuning meter is calibrated in 25kHz steps. (On AM the tuning meter is not displayed). You will notice a light detent in the rotary encoder as each tuning step is completed. This gives a tactile feedback, so you can tune easily, quickly and accurately. Correct tuning of an FM station is achieved when the centre segment of the tuning meter is illuminated. If you spin the tuning knob fast with the muting off you may hear a gentle pulsing together with the audio signal.



UK model.

6 REAR PANEL



ANTENNA INPUTS

FM 75 ohm COAX

For connection of 75 ohm FM antenna as described in section 3.

AM LOOP

Terminals for connection of AM loop antenna as described in section 3.

AM EXT

For connection of AM wire or rod antenna. Not normally required except for special long-distance reception and in heavily screened buildings.

GND

Connect to true earth ground when using external AM antenna.

AUDIO OUTPUT

Audio outputs can be connected to the Tuner or line level input of your amplifier. The outputs can also be used for tape recording. Connect the phono sockets marked AUDIO OUTPUT LEFT and AUDIO OUTPUT RIGHT to the corresponding inputs of your amplifier. Use good quality low capacitance, screened phono-phono audio cable. The low impedance (100 ohms) output is buffered and will drive long cables or several inputs in parallel if required.

FM SIGNAL STRENGTH

Buffered output of 0-5V DC can be connected to DC voltmeter, or oscilloscope, to give a continuous reading of FM signal strength. Can be

used for checking antenna alignment if a motorised rotator is installed.

RDS MPX OUTPUT

A wide band buffered output from the FM demodulator. Signal will include any RDS modulated carrier. With a suitable decoder it is possible to monitor RDS information and data.

If the RDS output is connected to the X input of an oscilloscope, and the FM signal strength output is connected to the Y input, a trace can be generated to give an indication of any multipath interference.

7 OPERATING NOTES

Do not place the tuner too close to CD players, TV sets, video recorders, digital equipment, computers and other radio receiving or transmitting equipment. Excessive electromagnetic radiation from these sources can cause noise and interference.

Note that some TV sets and fluorescent light fittings generate high levels of AM radiation, this can cause severe noise and interference on AM.

Do not place the tuner too close to your turntable or sensitive equipment, the magnetic field radiated by the transformer could induce hum.

Take care not to rest the tuner on the rotary control knob.

BEFORE CLEANING always disconnect the tuner from the mains supply and read and follow the safety instructions. Any grease or dirt on the case may be removed with a soft lint-free cloth moistened *slightly* with a mild solution of warm water and detergent/washing-up liquid. Do not use any other solutions or solvents.

If you have any queries regarding use of the Audiolab 8000T consult your dealer.

8 METER CALIBRATION

FM SIGNAL METER



SIGNAL

dB μ V	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
dbf	11.2-21.2	21.2-31.2	31.2-41.2	41.2-51.2	51.2-61.2	61.2-71.2	71.2-81.2	81.2-91.2	91.2-101.2
pd/75 ohms	1 μ V-3.2 μ V	3.2 μ V-10 μ V	10 μ V-31.6 μ V	31.6 μ V-100 μ V	100 μ V-316 μ V	316 μ V-1mV	1mV-3.2mV	3.2mV-10mV	10mV-31.6mV

Tolerance ± 5 dB

FM TUNING METER



TUNING

-125kHz	-100kHz	-75kHz	-50kHz	-25kHz	0	+25kHz	+50kHz	+75kHz	+100kHz	+125kHz
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AM SIGNAL METER



SIGNAL

dB μ V/m	42-48	48-54	54-60	60-66	66-72	72-78	78-84	84-90	90-96+
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Tolerance ± 5 dB

SERVICE

Servicing of Audiolab products should only be carried out by authorised service agents. If service is required the tuner should be returned, correctly packaged, to your dealer or distributor. In the UK tuners may be returned to Cambridge Systems Technology Ltd. A note should be enclosed giving your name, address, telephone number and a brief description of the reason for return. It is advisable to retain the original packaging and to use it whenever the tuner is transported.

WARRANTY

All Audiolab products are guaranteed against defects in components, materials & labour for a period of 5 years from date of purchase. Within this period parts will be replaced free of charge provided that failure is not due to misuse, accident or negligence. Carriage to be paid one way only by M. & G. HOSKINS P/L. to nearest capital city.

Please register ownership of your Audiolab tuner by completing and returning the guarantee card. This will help us to deal quickly with any queries regarding your tuner.

II SPECIFICATIONS

TUNING (E= Europe/Asia, J= Japan, N= North America, UK= UK)

TUNING RANGE/BAND FM 87.5-108.0 MHz (E/N/UK). FM 76.0-90.0 MHz (J). AM 522-1611 kHz (E). AM 530-1710 kHz (N). MW 522-1611 kHz (UK). LW 144-288 kHz (UK).

TUNING STEPS FM 50kHz auto (E/J/UK), 100kHz auto (N), 25kHz manual (E/J/N/UK). AM/MW 9kHz auto/manual (E/J/UK), 10kHz auto/manual (N). LW 9kHz auto, 1kHz manual (UK).

PRESETS 39 randomly accessible, any band/mode.

TUNING ACCURACY FM better than $\pm 0.001\%$.

SIGNAL METER FM range 0-90dB μ V, 9 elements each 10dB μ Vpd/75 ohms ± 5 dB. AM/MW/LW 0-1=42-48dB μ V/m, each additional step +6dB.

TUNING METER FM range ± 125 kHz, 11 elements, 25kHz steps, centre 0.

FM ONLY

ANTENNA INPUT 75 ohms unbalanced, PAL or F-type according to country.

SENSITIVITY (IHF SINAD) mono 1.6 μ V/4.0dB μ Vpd/15.2dBf.

SENSITIVITY (IHF 50dB) mono 2.0 μ V/6.0dB μ Vpd/17.2dBf. Stereo 18 μ V/25dB μ Vpd/36.2dBf.

SELECTIVITY (IHF) alternate channel >65dB (narrow) >40dB (wide). Adjacent channel >10dB (narrow) >4dB (wide).

SPURIOUS RESPONSE (IHF) image >75dB, Half IF >80dB, IF >120dB, Others >120dB.

RF INTERMOD (IHF) >65dB.

AM SUPPRESSION (IHF) >60dB.

CAPTURE RATIO (IHF 40kHz dev) <1dB (wide), <2dB (narrow).

SIGNAL HANDLING >2.0V RMS for <0.2% THD (wide).

MUTING THRESHOLD 10 μ V/20dB μ Vpd/31dBf.

STEREO THRESHOLD 10 μ V/20dB μ Vpd/31dBf.

MUTING BANDWIDTH > \pm 100kHz.

FREQUENCY RESPONSE 5Hz-15kHz \pm 1dB, 3Hz-16kHz \pm 3dB.

CHANNEL BALANCE better than 0.5dB.

STEREO SEPARATION 50dB (1kHz), 35dB (10kHz).

THD <0.05% (mono wide), <0.2% (mono narrow).
<0.08% (stereo wide), <0.2% (stereo narrow).

ULTIMATE SIGNAL TO NOISE >82dB for >200 μ V/46dB μ Vpd/
57dBf (mono). >75dB for >1500 μ V/64dB μ Vpd/75dBf (stereo).

PILOT TONE REJECTION 19kHz >85dB, 38kHz >95dB.

DE-EMPHASIS 50 μ S or 75 μ S according to country.

CALIBRATION TONE 400Hz, level corresponds to 37.5kHz deviation.

AUDIO MUTING partial mute 15dB, full mute >75dB.

AUDIO OUTPUT 700mVRMS/100 ohms for 75kHz deviation at 1kHz.

FM SIGNAL STRENGTH OUTPUT 0-5V DC/1000 ohms
corresponding to 0-90dB μ V.

RDS MPX OUTPUT 1.3VRMS/470 ohms for 75kHz deviation.
B/W 10Hz-60kHz.

AM ONLY

SENSITIVITY (20dB S/N) 600 μ V/m (AM/MW), 800 μ V/m (LW).

SELECTIVITY >50dB \pm 9kHz/ \pm 10kHz. >75dB \pm 18kHz/ \pm 20kHz.

SPURIOUS RESPONSE image >40dB. IF >50dB.

SIGNAL TO NOISE >54dB (ultimate).

THD (50Hz - 4kHz) 30% mod <0.3%. 100% mod <1.0%.

SIGNAL HANDLING >100mV/m for <1% THD.

MUTING THRESHOLD 700 μ V/m.

FREQUENCY RESPONSE Wide 45Hz-4.5kHz \pm 1dB, 30Hz-
5.0kHz \pm 3dB. Narrow 45Hz-1.5kHz \pm 1dB, 30Hz-2.0kHz \pm 3dB.

CALIBRATION TONE 400Hz, level corresponds to 50% modulation.

AUDIO MUTING partial mute 15dB, full mute >75dB.

AUDIO OUTPUT 700mVRMS/100 ohms for 100% modulation at 1kHz.

GENERAL

ACCESSORIES SUPPLIED mains cable, FM T-ribbon 300 ohm
temporary indoor antenna, coax in-line adapter (PAL version only), 300
ohm - 75 ohm adapter, AM loop antenna, instruction manual.

COLOUR Black (Standard). For metallic dark grey fascia with silver
grey cover specify GREY when ordering.

OPERATING TEMPERATURE RANGE 10-35 degrees C.

POWER REQUIREMENTS 50-60Hz. 100, 115, 230, 240V models
available. Maximum power consumption 25VA.

DIMENSIONS (W x H x D) 445 x 74 x 330mm including feet,
terminals and controls. 445 x 64 x 302mm excluding feet, terminals and
controls.

WEIGHT NET 6.2kg. **SHIPPING** 7.4kg.

Audiolab products are designed and manufactured by Cambridge Systems Technology Ltd. We reserve the
right to alter designs and specifications without notice. Specifications may vary for different countries.