

TANDBERG

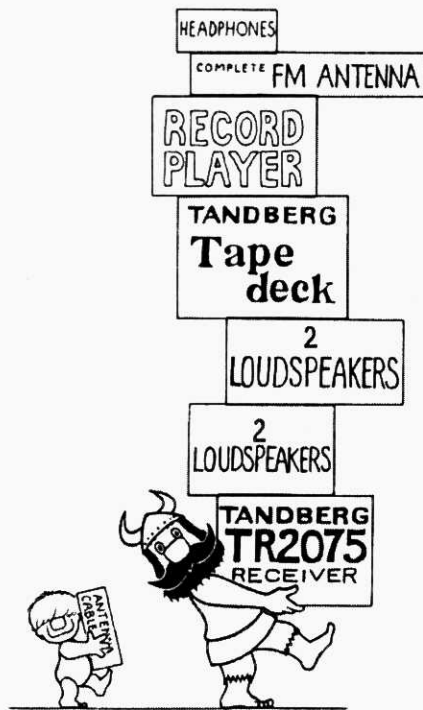
Operating instructions TR-2075



Tandberg
RADIO

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Power ON/OFF switch

Make sure that the receiver is marked with the correct a.c. voltage for your supply.

Switch the receiver on by depressing the ON/OFF-button. Another push on the button will release it and switch the receiver off. This button also controls the power to one of the extra power sockets, marked SWITCHED, at the back of the receiver (more details below).

NOTE!

When switching on you will notice that nothing happens until about 3 seconds after you have pushed the ON/OFF button. Then you will hear a click from inside the cabinet and the receiver becomes live smoothly without audible switching transients in the speakers.

Extra power sockets

Three extra power sockets are provided at the back of this receiver. These extra sockets are intended for other Hi-Fi units and reduce the number of untidy power cables.

Two of the sockets by-pass the ON/OFF-button and are live as soon as the receiver power plug is live. These sockets are marked UNSWITCHED and the total combined power drawn from them must not exceed 200 W. These sockets are useful for connecting Hi-Fi units having their own power ON/OFF switches.

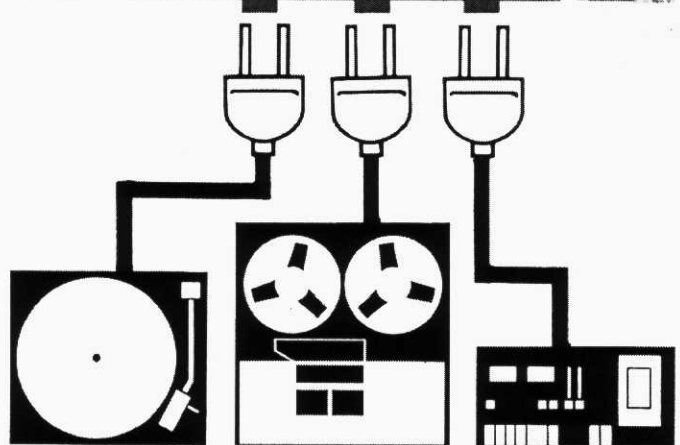
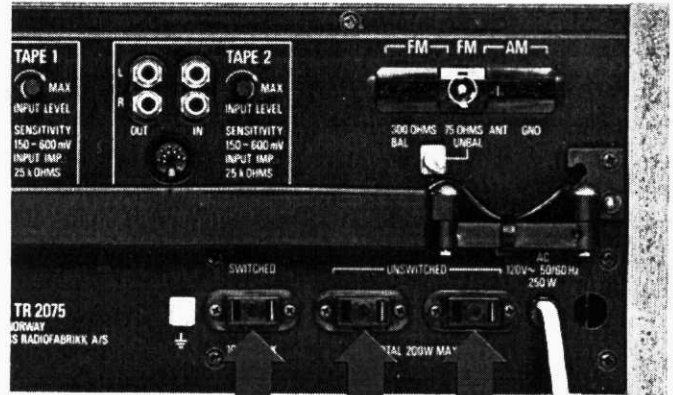
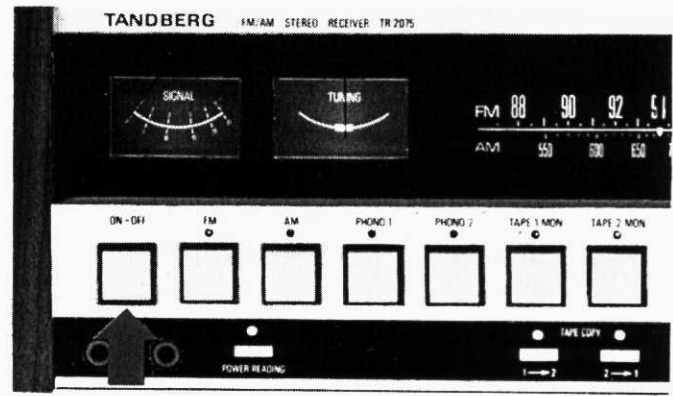
The third extra power socket is marked SWITCHED and is controlled by the ON/OFF switch on the receiver. This socket is suitable for a Hi-Fi unit that does not have its own ON/OFF power switch and the total power drawn from it must not exceed 100 W.

Check the power consumption of the units you connect to these extra sockets to ensure that it falls within the permissible total rating.

NOTE! When using a switched wall socket remember to release the ON/OFF-button on the receiver before breaking the power with the switched wall socket. Otherwise you will hear a loud click in the speakers when switching on.

Light dim

If the scale and meter lights are too bright, depress the LIGHT DIM button on the extreme right side of the receiver. Another push on this button will restore the lights to full brightness.

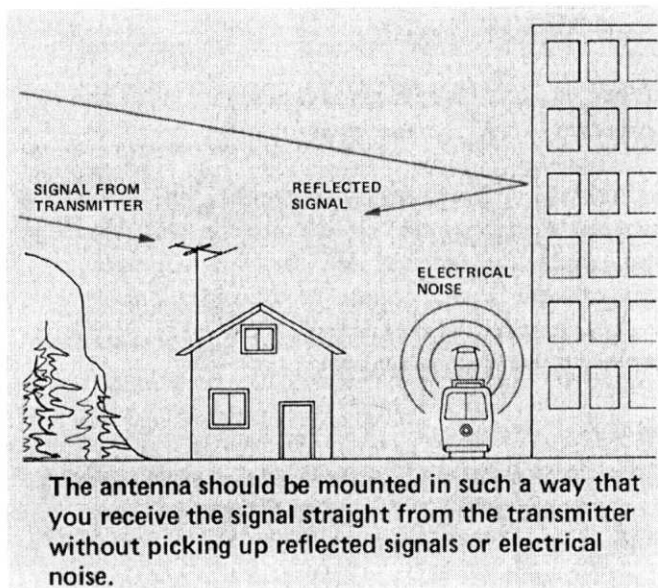


What type of antenna do you need?

Your need for a good antenna will depend on the receiving conditions where you live; the further you are away from the transmitter and the more obstacles (hills and tall buildings for example) between you and the transmitter, the greater will be your need for a good antenna. Remember that it is not good enough just to receive a signal, especially if you are a serious stereo listener. You need to receive a signal that is much stronger than any unwanted electrical noise that might be lurking around in your area. Furthermore, FM signals bounce off large obstacles and cause you to receive the same program from several directions at the same time, possibly out of phase with one another. This gives distortion which you do not want. Instead you need one strong, clear signal straight from the transmitter and this may call for an elaborate, directional antenna.

If in doubt you can consult your dealer who will probably be more familiar with local receiving conditions than most people. In any event you should install an antenna that is better than the one that you think you can just manage with, because under doubtful conditions a good antenna is just as important as good loudspeakers.

Whether you need a simple antenna such as a folded dipole or an elaborate multi-element array, the following tips will be useful.



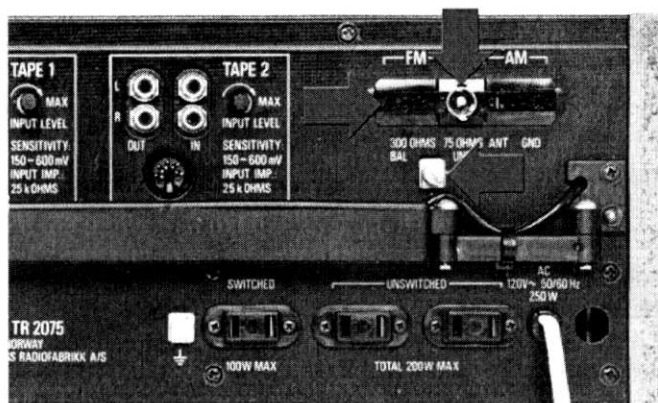
Antenna connections

This receiver is equipped with a balanced antenna input and an unbalanced antenna input.

The 300 ohm balanced input terminals (socket on European version) are intended for connection to a 300 ohm antenna via a flat twin-lead balanced feeder having the same impedance.

The 75 ohm unbalanced input terminals (socket on European version) are intended for connection to an antenna via a 75 ohm coaxial cable. The center conductor of the cable should be connected to the terminal marked 75 ohms and the shield should be connected to the chassis terminal just below.

If you have the European version you should fit the appropriate plug.

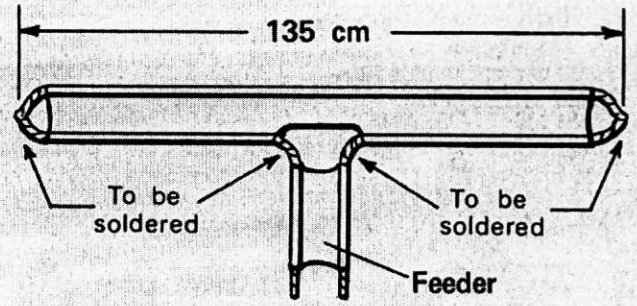


A simple folded dipole antenna

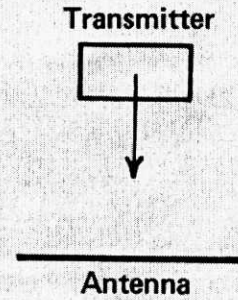
A simple folded dipole for connection to the balanced input can be easily made from flat twin-lead with an impedance of 240 to 300 ohms. A 135 cm (53") piece of antenna lead should be used for the loop. Strip off approximately 1 cm ($\frac{1}{2}$ ") of insulation at each end and solder as shown. Cut one of the wires in the middle of the loop and connect another twin-lead to act as feeder to the input. Solder as shown.

This antenna can be used indoors or outdoors. When used outdoors the solder joints should be protected against the weather and the loop can be fixed to a flat wooden board. When used indoors the loop can be fixed to any convenient non-metallic structure or a flat wooden board. The important requirement in all cases is that the loop should be firmly fixed, horizontal, and straight.

To obtain good reception the loop should be approximately at right angles to the transmitter (see diagram) although the best orientation may have to be found experimentally.



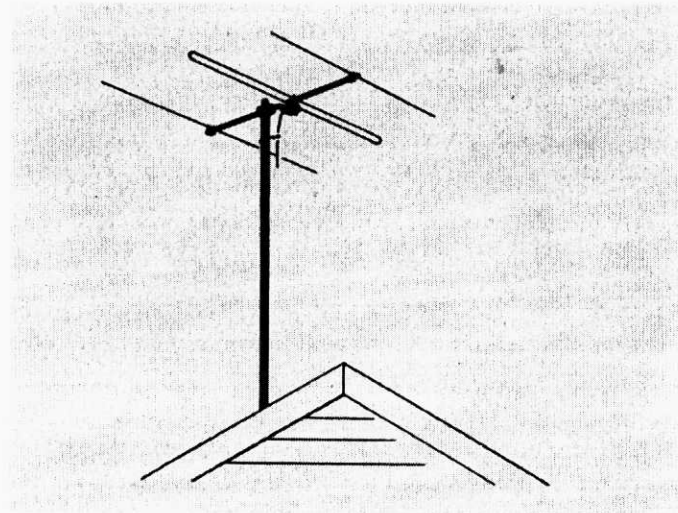
A simple folded dipole

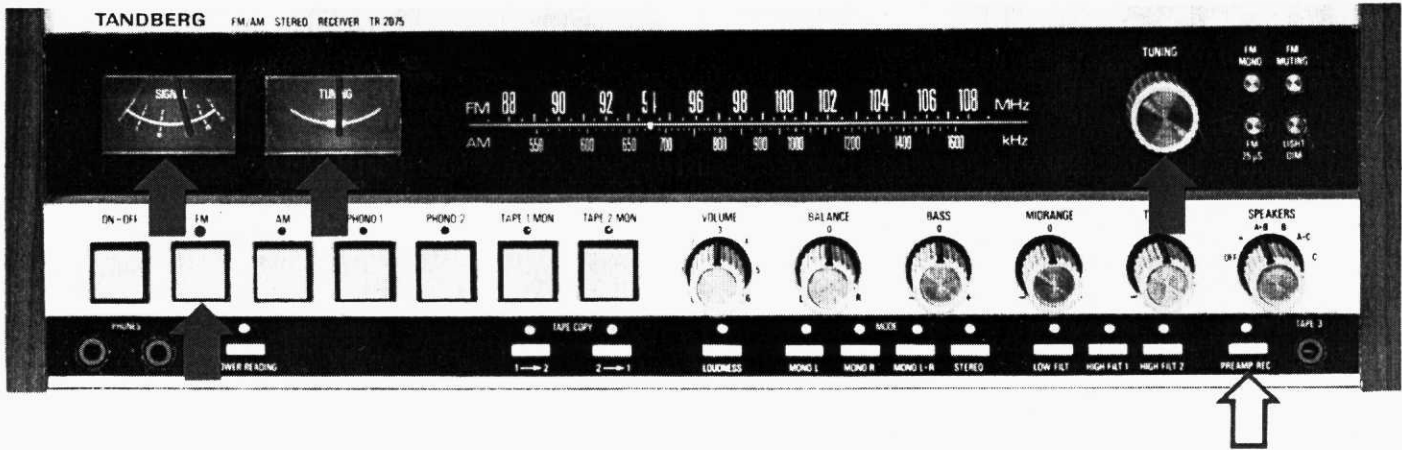


Typical multi-element antenna

The diagram shows a typical multi-element antenna for use where receiving conditions are doubtful. This type of antenna will provide typically 6 dB more gain compared with a folded dipole (the antenna signal fed to the receiver is doubled).

Many types of multi-element arrays are available and some can even be rotated every time you tune in to a different station. Your dealer will advise you or you can buy specialist literature and become an expert yourself.





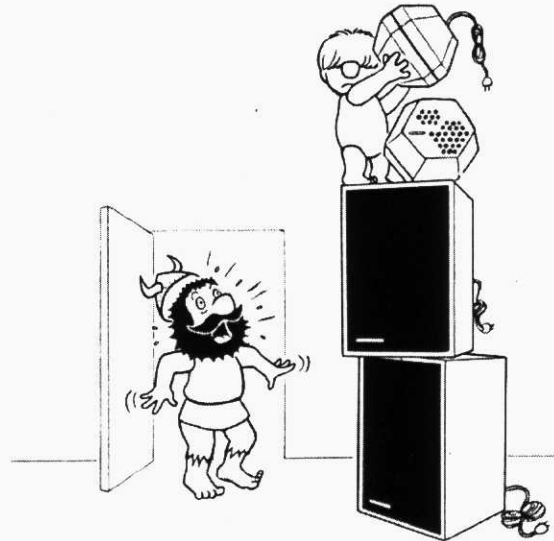
Select FM reception by depressing the FM button. The red light over the button will light telling you that the receiver is in the FM mode.

Use the large knob on the right side of the scale to tune in the required station.

NOTE! Make sure that the PREAMP REC button is released.

Correct tuning is important, particularly for stereo, if distortion is to be avoided. This receiver is therefore equipped with two tuning meters, one indicating signal strength (SIGA I) and the other indicating midscale for exact tuning (TUNING). First adjust the tuning knob for maximum deflection on the SIGNAL meter and then make a final fine adjustment to obtain midscale deflection on the TUNING meter.

The frequency calibration of the scale is accurate to within ± 200 kHz. So do not be confused if a station transmitting on, for instance, 103.9 MHz tunes in at 104.1 MHz on the scale. This is still within the tolerance. The scale is simply a guide and what really matters is that you use the two tuning meters correctly.



Muting

The high amplification necessary to obtain good sensitivity and limiting in high class tuners, makes tuning noisy. To avoid this, a muting circuit blocks the receiver automatically when no signal is received or if the signal is too weak to give satisfactory noise suppression. To receive a station that is not strong enough to cancel the blocking effect of the muting circuit, the circuit can be switched off.

The muting function is activated by depressing the FM muting knob on the extreme right side of the front panel. Another push on the button will release it and cancel the muting.



Stereo/mono

This receiver is fully equipped for the reception of FM stereo broadcasts.

FM stereo broadcasting is based on the pilot tone system which allows the program to be received in mono on mono receivers without impairment of program quality. It is an inherent property of this system that a stronger signal is needed in stereo to obtain the same noise suppression as in mono. The FM stereo decoder automatically switches to stereo operation when a stereo signal of sufficient strength is received. If the stereo signal falls below a preset threshold, the program will be automatically reproduced in mono.

However, it is possible for the strength of a stereo signal to be adequate and yet for the signal to be temporarily disturbed by noise or distortion. In this event depress the FM MONO button whereby the program will be reproduced in mono without noise or distortion.

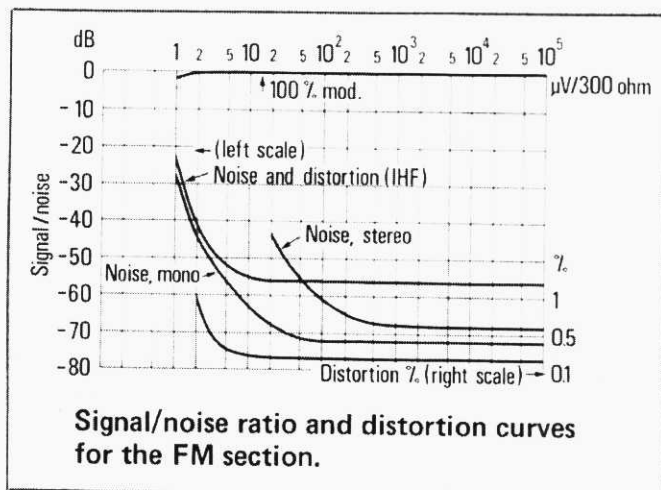
Because stereo reception requires a strong antenna signal and is sensitive to multi-path distortion, a good antenna is needed particularly under difficult receiving conditions and in fringe areas. Read the preceding section on FM antennas.

Dolby* programs from FM stations

The Dolby B noise reduction system offers a possibility to combat the higher noise in FM stereo transmissions. The system is in the USA approved by FCC** for FM broadcasting.

The Dolby B system use a program level dependent preemphasis. At high level the preemphasis is 25 usec., at lower level the preemphasis increases. The utilization of the allowed modulation can thereby be improved. The compatibility of the Dolby B system with existing standards is considered acceptable as the average preemphasis obtained in the Dolby B encoder matches the standard deemphasis. To take full advantage of the Dolby B noise reduction, a Dolby B decoder unit must be used and the deemphasis network in the receiver must be corrected to 25 usec.

For those who may receive Dolby B encoded FM broadcasts we have found a switchable deemphasis to be a useful feature, This serves two purposes. First: To enable the user to utilize a separate Dolby decoder, for instance the decoder already incorporated in Tandberg Tape Recorders 3600XD, 9200XD and 10XD. Second: To enable a direct recording of the Dolby B encoded program for later decoding when played back through the tape recorder's Dolby circuits.



PROCEDURE:

When receiving an FM Dolby transmission and using a Dolby B decoder, the FM 25 μ S button must be depressed. The button must also be



depressed when a direct recording of a Dolby B transmission is wanted ***.

When receiving an FM Dolby transmission without using a Dolby B decoder, the FM 25 μ S button must be released.

* The name Dolby is a registered trade mark of Dolby Laboratories Inc.

** FCC stands for Federal Communications Commission, the USA broadcasting standards organization.

***If you are using a Tandberg Tape Recorder with Dolby, set the Dolby knob of the recorder to DOLBY FM.

AM Antennas

Ferrite-rod

For operation in the broadcast band this receiver is equipped with a moveable ferrite-rod antenna. This antenna is intended for local reception where the signal strength is normally fairly high, but it can under favorable receiving conditions also pick up more remote stations efficiently. The ferrite-rod antenna is highly directional and picks up the strongest signal when it is at right angles to the transmitter. The antenna is hinged and should be rotated to the position giving the best reception. This is also possible when the receiver is placed on a shelf. The ferrite-rod antenna can never perfectly replace a good outdoor antenna.

NOTE! The antenna circuit is built into the ferrite-rod casing. When listening to AM you should always move the ferrite-rod away from the rear panel to avoid de-tuning of the antenna circuit. This is also important when using an outdoor antenna.

Outdoor antenna

To give the best results an outdoor antenna should be used. Suspend a wire 15 to 20 meters (50 to 60 feet) long at the highest possible elevation. The best results may be obtained by experimentation.

Connect a feeder to the terminal marked AM ANT (socket on European version) and if the feeder is long avoid running it too close to walls.

If you have the European version connect the appropriate plug.

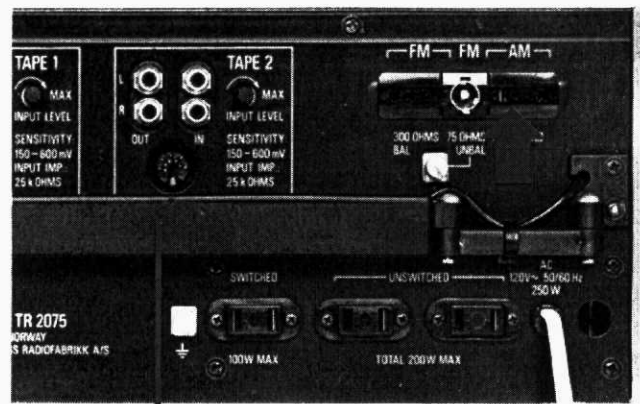
Grounding

To obtain best AM reception grounding of the receiver is recommended. Connect the AM ground terminal (A) to the nearest water pipe.

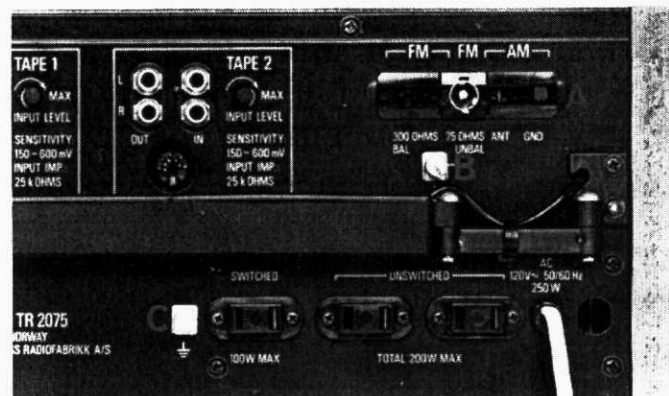
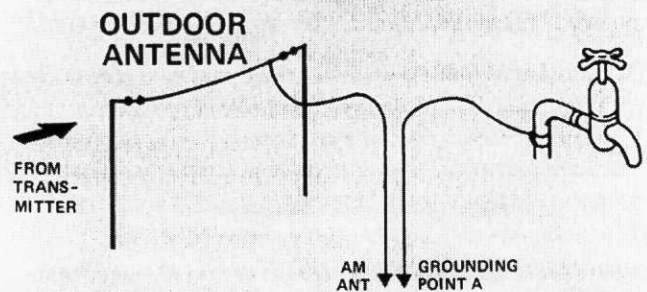
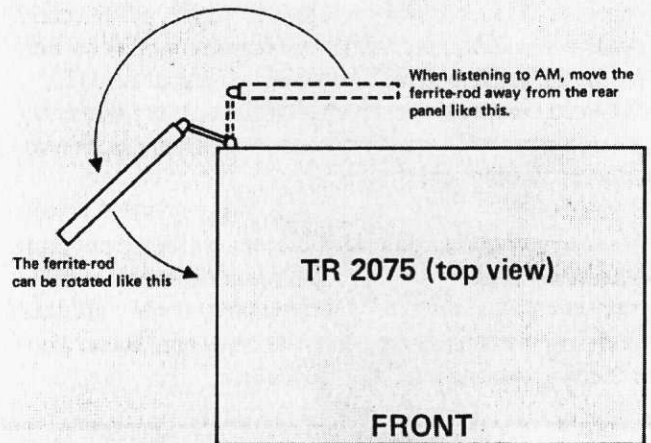
The grounding terminal B is designed for FM coaxial antenna cable (U.S. model only).

The grounding terminal C is prepared for grounding of transcription unit or record player chassises when phono connectors are used.

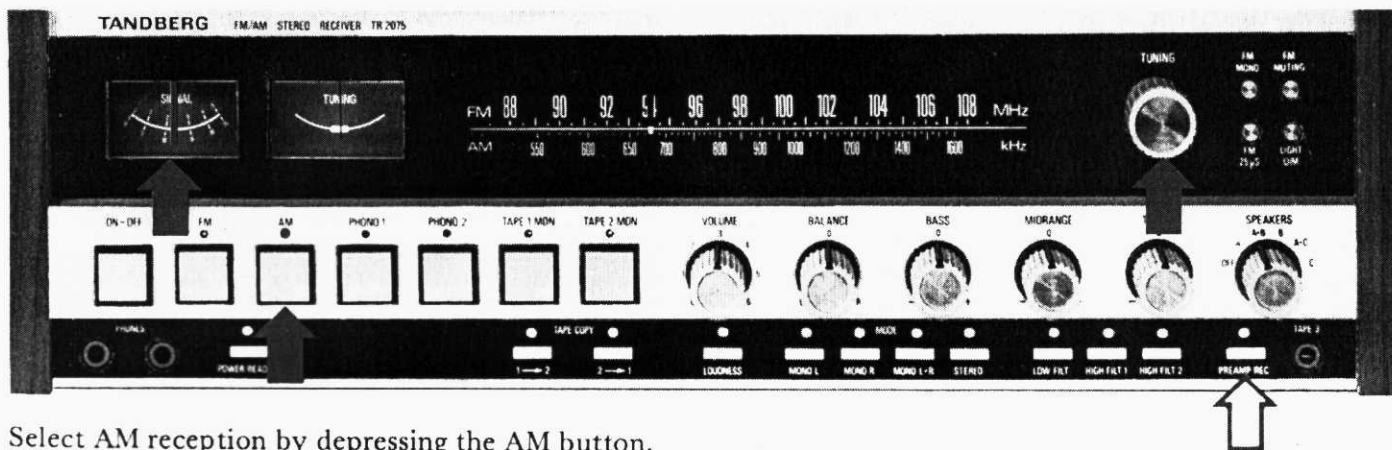
Wiring of the DIN connector for phono use is shown on the back cover.



Ferrite-rod



Tuning on AM

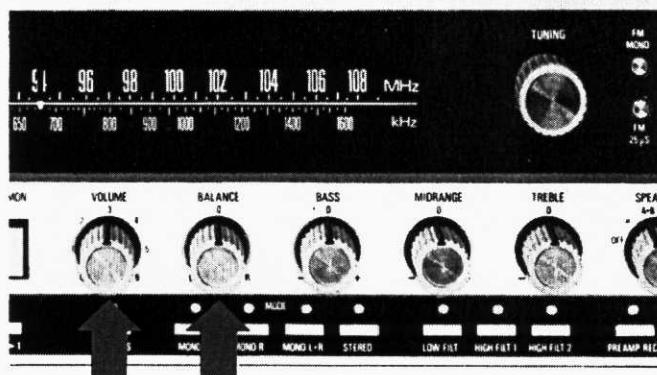


Select AM reception by depressing the AM button. The red light over the button will light telling you that the receiver is in the AM mode. Use the large tuning knob on the right side of the scale to tune in the required station. Tune for maximum deflection on the SIGNAL meter.

NOTE! Make sure that the PREAMP REC button is released.

Volume-Balance

Use the VOLUME knob to control the audio power fed to the loudspeakers. Use the BALANCE knob to control the relative output levels from the two speaker channels. A typical use for the BALANCE control is to compensate for differences in the characteristics or the positioning of left and right speakers.



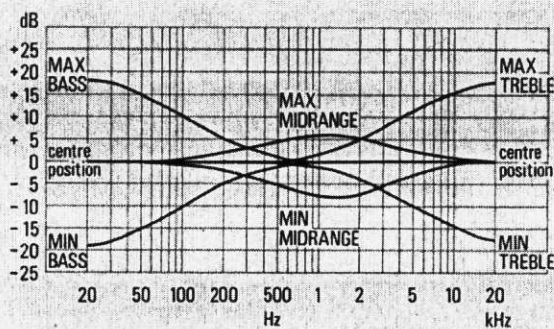
Tone Controls

This receiver is equipped with three independent tone controls for controlling the BASS, TREBLE and MIDRANGE audio frequencies. The effects that can be achieved when these three controls are used may be seen in the graphs.

The knobs are the split type where the inner part is for the right channel and the outer part is for the left channel.

Tone controls can be used to achieve a tone picture that is pleasing to the individual listener. They can also be used to compensate for lack of "body" in any particular tone region with a program from any source. A further use for tone controls is to compensate for speakers and/or room acoustics that do not give the desired tone picture.

Other controls affecting the tone response are LOW FILTER, HIGH FILTER 1, HIGH FILTER 2 and LOUDNESS (see page 11).



Effect of tone controls

Stereo-mono switching

Stereo-mono switching in the audio amplifiers may be performed for radio, disc, or tape programs by means of the STEREO, MONO L, MONO R, and MONO L+R mode buttons.

STEREO button depressed – the two channels are separated for stereo reproduction.

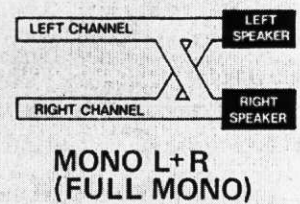
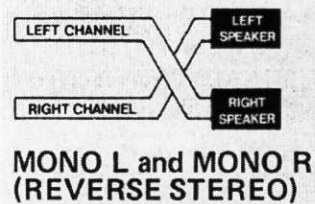
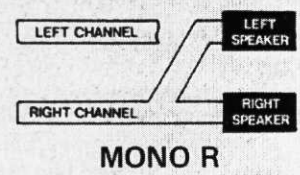
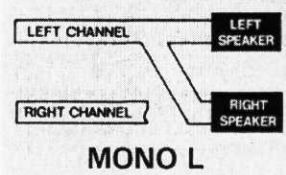
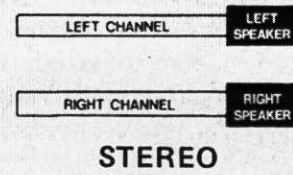
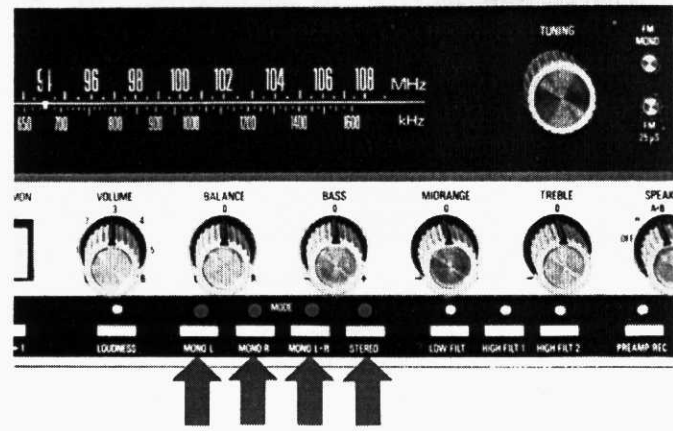
MONO L button depressed – the left channel program is fed to both speakers.

MONO R button depressed – the right channel program is fed to both speakers.

MONO L and MONO R buttons simultaneously depressed – the two channels are separated for stereo reproduction with the channels crossed over. This is a two-fingered operation because you must prevent the first button jumping out when you depress the second button.

MONO L+R button depressed – the two channels are mixed together and fed to both speakers (this is normal full mono operation).

The diagrams illustrate the five possibilities.



Use of PRE AMP OUT and MAIN AMP IN sockets

The four sockets on the extreme left of the back panel give access to the pre-amplifier outputs and the power amplifier inputs.

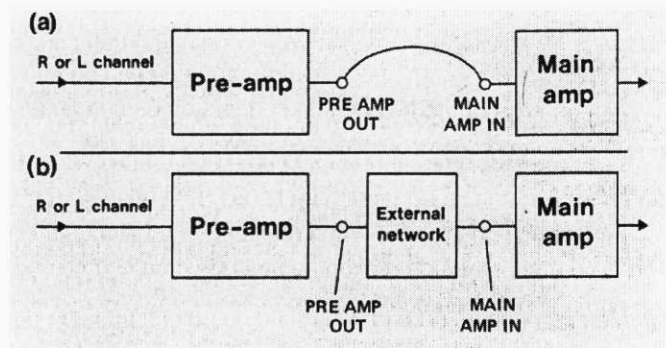
The sockets are intended for connection of external networks such as equalizers, echo boxes, and reverb units.

NOTE!

For normal use the sockets must be strapped together with U links as shown in figure (a).

When an external network is required between the PRE AMP output and the MAIN AMP input, remove the U links and connect according to figure (b).

The PRE AMP output provides approx. 2 volts at less than 0.1% distortion and has a source impedance of approx. 1 k ohms.



LOW FILT

Rumble from a record player, acoustic feedback between speakers and a pick-up, or excessive bass resonance in a speaker or a room can all be controlled by means of the LOW FILT. The graph shows the effect of the control (-12 dB/octave).

HIGH FILT 1

If the program is accompanied by strong hiss or scratch noise from old and worn records or noise from a tape recorder or from the receiver, depress the HIGH FILT 1 button to obtain moderate attenuation of the high frequencies. The graph shows the effect of the control (-12 dB/octave).

HIGH FILT 2

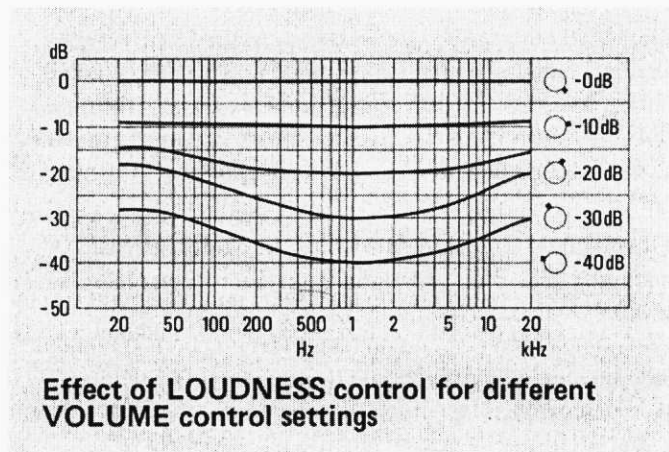
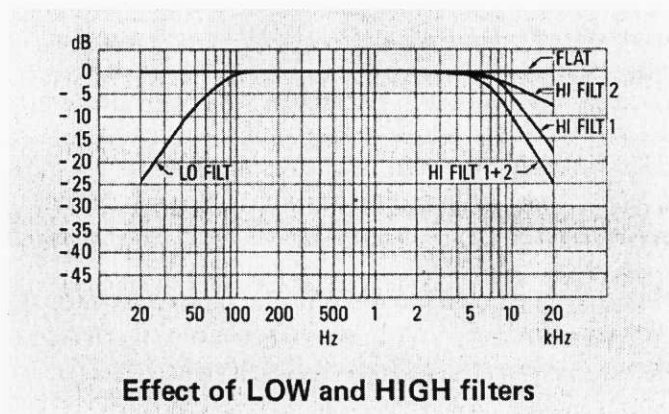
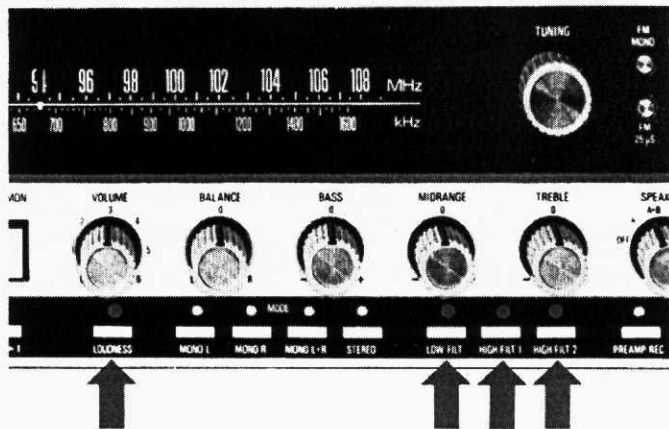
This control can be used for the same purpose as the HIGH FILT 1 control, it simply gives less attenuation (-6 dB/octave) as may be seen in the graph.

HIGH FILT 1 and HIGH FILT 2

Depressing both these buttons simultaneously gives the heaviest attenuation of all at the high frequencies as may be seen in the graph (-18 dB/octave).

LOUDNESS

At low volume the ear is less sensitive to high and low tones. As a result music at low volume from speakers tends to lack high and low tones and sounds as if it has too much "body" in the middle tone range. To compensate for this effect, depress the LOUDNESS button whereby the bass and treble will be boosted according to the setting of the VOLUME control. The graph shows how this boost increases as the volume is turned down.



Headphones

Stereo headphones can be connected to the 3-pole jacks marked PHONES on the left side of the front panel and the program level can be adjusted by the VOLUME and BALANCE controls. Two people can listen at the same time if two sets of headphones are plugged in and you can avoid disturbing other people in the room by switching the knob SPEAKERS to OFF.

Headphone listening is very convenient for monitoring when recordings are being made, particularly if microphones and loudspeakers are in the same room because it avoids "acoustic howling".

Some people also prefer headphones when listening to music. They provide a more intimate listening experience and difficulties associated with room acoustics are avoided. But there are disadvantages, for example the whole sound environment turns with the listener when he moves his head, a feeling regarded by some people as unnatural. It is a matter of personal taste.

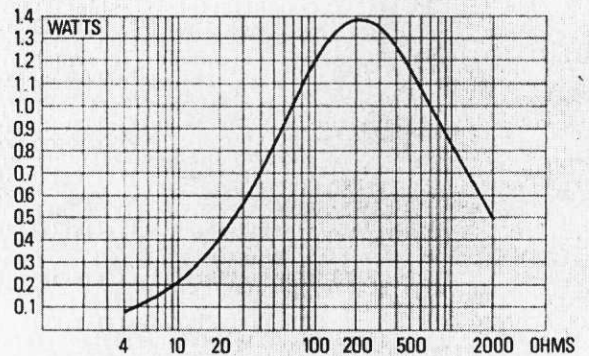
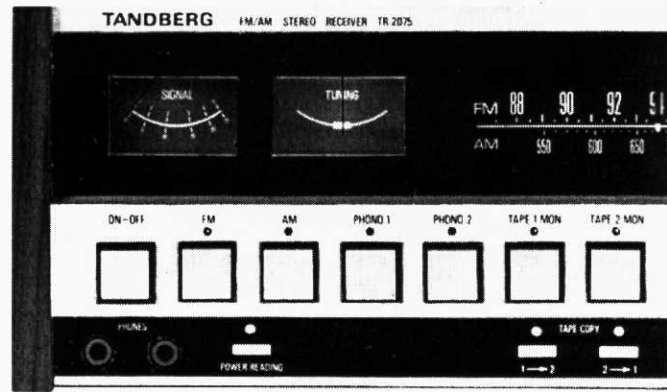
Headphones today are mainly the moving-coil type and are obtainable with impedances ranging from about 8 ohms up to about 2000 ohms.

The impedance of the headphone jacks is 220 ohms and they will accept any headphones with an impedance above 4 ohms. However, some caution may be necessary when playing at high volumes, because some types of headphones may be damaged by excessive power. The curve on the right shows how maximum obtainable power varies with the headphone impedance.

Headphones come in all shapes, sizes, and weights and are largely a matter of personal preference. When buying headphones it is wise to try them on and be aware that the heavy, close fitting type may cause fatigue when used for long periods.

Electrostatic headphones may be used on this receiver. They are thought by some people to give crisper sound.

Remember to order headphones terminated in a $\frac{1}{4}$ " jack plug. Occasionally the plug should be given a quick rub with a soft cloth and a very small amount of vaseline.



How output power to headphones varies with headphone impedance



Loudspeakers

Connections

Connect speakers to the terminals marked **LOUD-SPEAKERS** at the back of the receiver. Use multi-stranded wire as thick as possible and make firm connections. The receiver will deliver optimum undistorted power when the resultant impedance of all the speakers connected to each stereo channel is between 4 and 8 ohms. Speakers or combinations of speakers with higher or lower impedances will give output powers below the optimum. For load impedances below 4 ohms the output power drops rapidly (see curve).

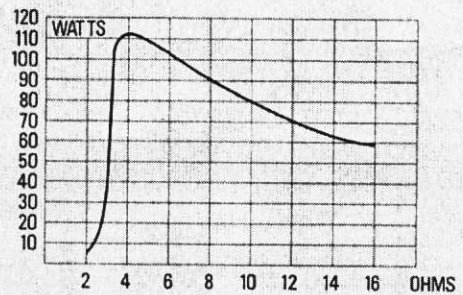
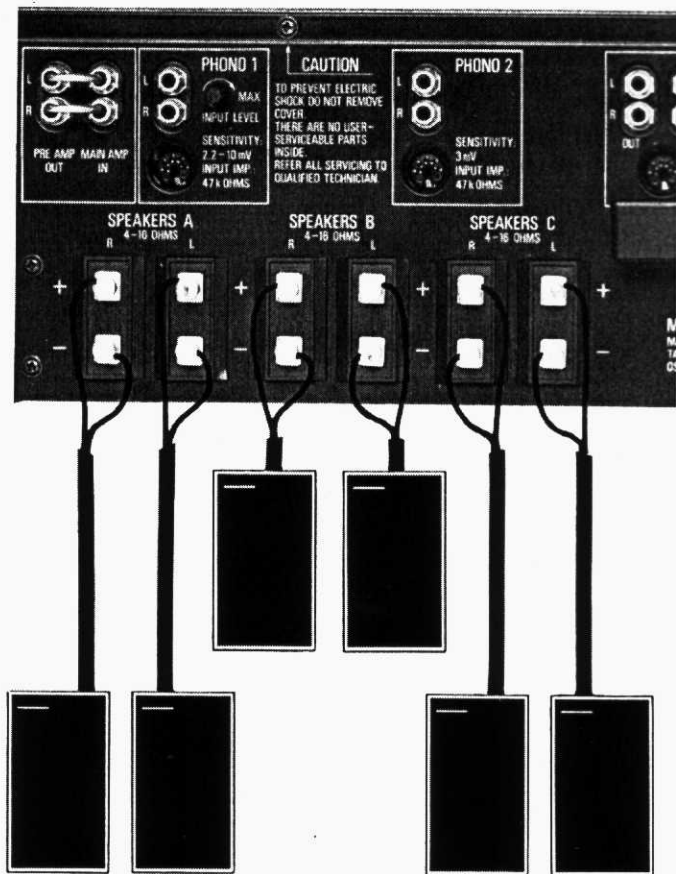
The bottom figure shows some possible speaker combinations for one stereo channel. Each channel has 3 outputs in parallel, A, B, and C. But only 2 of the outputs (A+B or A+C) can be switched in at the same time. So when calculating the resultant impedance you must take this into account.

Polarity

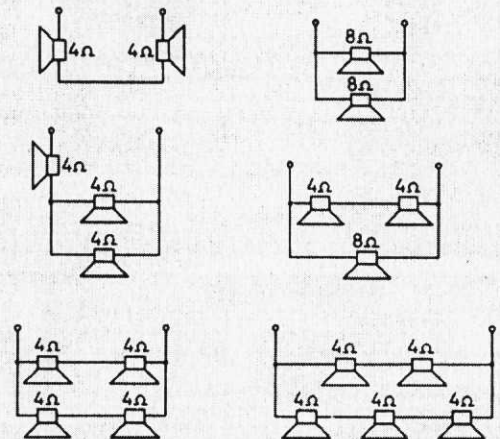
Whichever combination of speakers is used it is important to observe the polarity when speakers are in the same room. In other words the cones must move forwards and backwards together. If the polarity is wrong, one cone will be moving forwards when the other is moving backwards and the result will be a reduction in bass volume. The polarity will usually be correct when each terminal marked with a minus sign (-) on the rear panel of the receiver is connected to the terminal marked **COMMON** (or **NEGATIVE**) on each respective speaker. However, reversals of polarity can occur in the wiring between the receiver and the speakers or even occasionally inside the speaker cabinet and one way to be certain is to check the bass volume (under mono conditions with the speakers facing each other about 6 inches apart) and reverse any wrong connections.

What type of speaker?

This receiver has been designed for use with speakers having a wide range of phase angles i.e. electrostatic as well as moving-coil systems. A good all-round type of loudspeaker which is reliable in design, manufacture, and use is the totally enclosed infinite baffle type. Tandberg produce a full range of this type of loudspeaker. Ask your dealer for details.



How output power to loudspeakers varies with total loudspeaker impedance



Speaker combinations for one stereo channel

Combinations of A, B, and C

Each stereo channel has three sets of output terminals, A, B, and C. One way of using these outputs is to group two (A+B or A+C) speakers together for each stereo channel. If the speakers for each channel are separated by about three feet this will give a broader front to the stereo effect. The bottom figure shows the set-up.

Another way of using the outputs is for the A speakers to be in one room, the B speakers in a second room and the C speakers in a third room. This permits full stereo operation in two out of three of the rooms simultaneously, as shown in the figure.

Where should the speakers be placed?

The best position for speakers in a room depends upon the room acoustics and the type (or types) of speakers you use. Four basic arrangements are shown in the adjacent figures. It is particularly in the bass region where you are likely to have too much or too little or an uneven sound picture.

Room acoustics

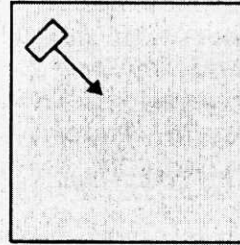
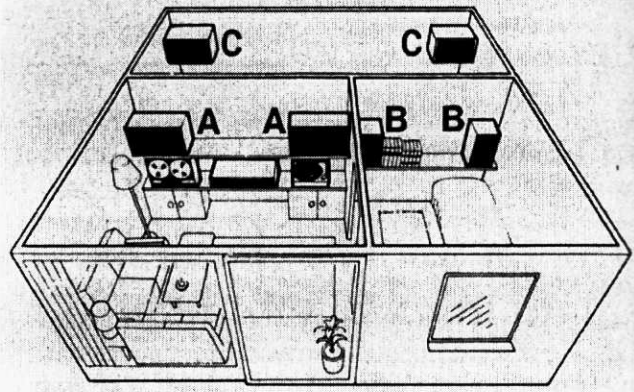
Loudspeakers are designed to provide a sound picture judged to be correct in an "average" position in an "average" room. However, no two rooms and no two speakers are alike so it pays to consider the shape, size, structure, and furnishings of a room when it comes to buying and siting loudspeakers.

You usually cannot do much about the shape and size of a room except possibly by using acoustic screens to make it non-symmetrical. As far as possible the floor, ceiling and walls should not be too hard. Thick curtains, carpets, soft furniture, soft wooden panels and acoustic tiles all help to reduce excessive reflections.

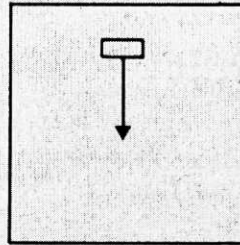
Stereo tips

The following tips may help you with your stereo set up.

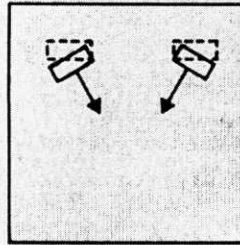
1. Place the speakers at the same height and (as far as possible) on the same level as the listener's ears.
2. Keep the space between the listener and the speakers clear.
3. Arrange the acoustic structures and surfaces in the room adjacent to the speakers to be the same for both speakers.



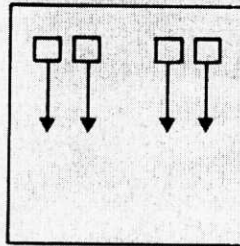
Conventional siting of a moving-coil speaker system in a corner of a room to obtain maximum bass response and even excitation of room modes.



Alternative siting of a speaker away from walls. This may reduce excessive bass response or give optimum coupling for an electrostatic speaker.



Conventional siting of two speakers in a stereo system. The distance between the speakers should be about 2/3 the distance to the listener. The speakers may be angled inwards with advantage.



Using (A+B) or (A+C) parallel speaker outputs to obtain a broader stereo front.

4. Arrange the speakers so that the distance between them is about $\frac{2}{3}$ the distance to the listener. Too little distance between the speakers is better than too much.
5. When listening to a mono speech program switch over to one speaker by using the BALANCE control.

Speaker selector

The speaker selector switch marked SPEAKERS has six positions as follows:

- OFF: All speakers disconnected
- A: Program to speaker outputs A only
- A+B: Program to speaker outputs A and B only
- B: Program to speaker outputs B only
- A+C: Program to speaker outputs A and C only
- C: Program to speaker outputs C only

In all positions of the speaker selector the program is also fed to the PHONES outputs.

NOTE!

It is not possible to feed all three speaker outputs at the same time.



Output power indicator

Depress the button POWER READING on the lower left of the front panel to obtain an indication on the SIGNAL meter of the audio power being delivered to the speakers.

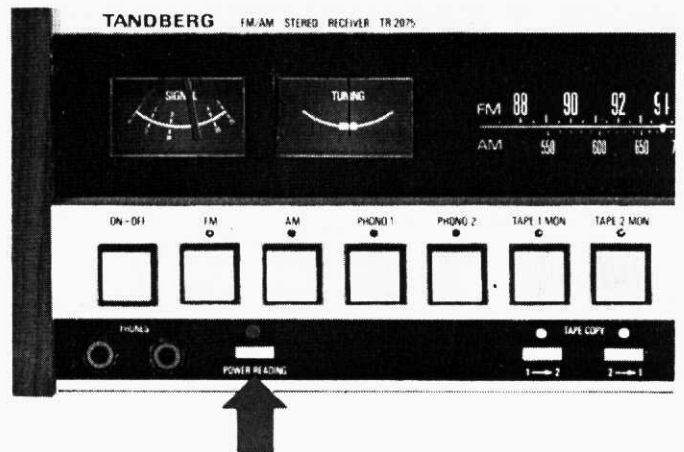
The meter is peak reading, and indicates output voltage for the left or right channel, whichever momentarily has the highest output. Maximum obtainable output power depends on the speaker impedance (load per channel). The table shows the relation between output power and meter reading at different load impedances.

The output monitoring function of the meter serves two purposes:

- To avoid overloading the output amplifier.
- To avoid overloading speakers not rated for the full output power of the amplifier.

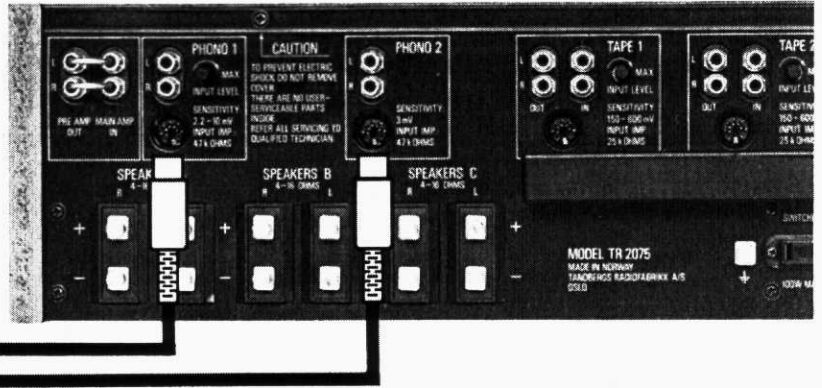
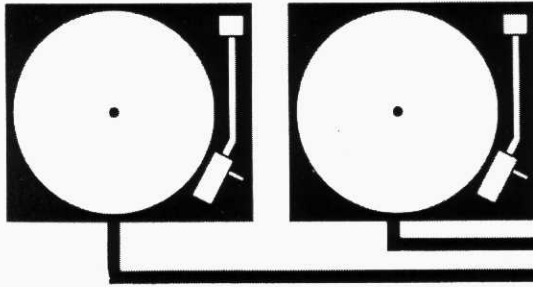
NOTE!

If the receiver is overloaded at too high ambient temperature (insufficient ventilation), a thermal switch will disconnect the amplifier. The amplifier will, however, resume normal operation as soon as the temperature inside the receiver has dropped sufficiently.



| Load | Meter reading | | | | | |
|--------|---------------|------|-----|------|------|------|
| | 10 | 12.5 | 15 | 17.5 | 20 | 25 |
| 4 ohm | 25W | 40W | 56W | 76W | 100W | 156W |
| 8 ohm | 12W | 20W | 28W | 38W | 50W | 78W |
| 16 ohm | 6W | 10W | 14W | 19W | 25W | 39W |

Grounding of transcription units: See page 8.
 Connection of DIN plug (if used): See back cover.



At the back of the receiver there are two sets of phono and DIN input sockets (marked PHONO 1 and PHONO 2) for two transcription units or two record players. Each input has an impedance of 47 k ohms and has the correct sensitivity for magnetic pick-ups.

One transcription unit

To play records from one transcription unit, connect the transcription unit to the PHONO 1 socket (using either phono or DIN plugs), start the transcription unit and depress the PHONO 1 button on the front panel.

Two transcription units

Using two transcription units is particularly convenient when you are playing large orchestral or choral works spanning several records. You can then play one record after the other non-stop. This gives you facilities similar to those on a record player.

PROCEDURE.

Connect the two transcription units to the PHONO 1 and PHONO 2 sockets, start the PHONO 1 transcription unit and depress the PHONO 1 button on the front panel. As the record ends, start the PHONO 2 transcription unit and depress the PHONO 2 button. With practice you will achieve timing which makes it possible to play two records without loss of continuity.

Of course you can then put a third record on the first transcription unit and play that without loss of continuity and so on.

You can also have both transcription units playing at the same time and switch backwards and forwards between two records by alternately depressing the PHONO 1 button and the PHONO 2 button.

Input sensitivity

When switching from one program source to another the output should not change. To obtain this you will need to set the input sensitivity controls as follows.

Depress the FM button and tune in a strong FM station. Then switch over to a program from PHONO 1 by depressing the PHONO 1 button, and adjust the PHONO 1 sensitivity control to obtain the same output as for the FM program. The adjustment range for the PHONO 1 input is 2.2 to 10 mV.

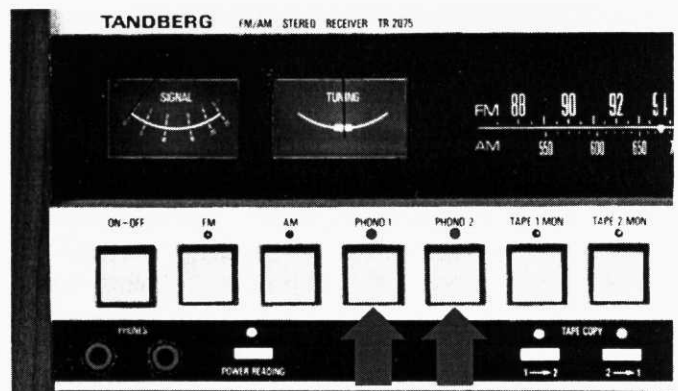
The sensitivity of the PHONO 2 input is fixed at 3 mV and cannot be adjusted.

Adjust the TAPE 1 and TAPE 2 sensitivity controls in the same manner, one after the other, while you listen to programs from the respective tape recorders. The adjustment range of the TAPE inputs is 150 to 600 mV.

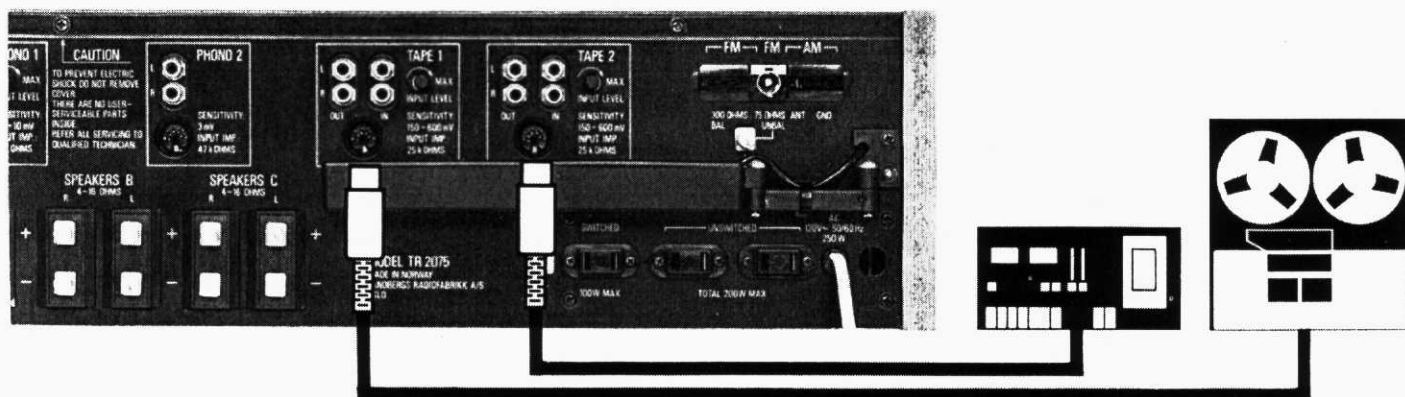
NOTE!

Depressing either of the PHONO buttons automatically disconnects any radio program that is present (but not a tape program because tape programs have preference).

The receiver has a unique switching system that provides smooth transitions when you switch from one program source to another.



Playback from tape recorders (TAPE 1, TAPE 2 and TAPE 3)



At the back of the receiver there are two sets of phono and DIN input sockets (marked TAPE 1 and TAPE 2) for two tape recorders. Two reel-to-reel machines or two cassette machines or one of each type can be connected. Each input has an impedance of 25 k ohms which is suitable for most modern tape recorders.

One tape recorder

To play tapes from one tape recorder, connect the tape recorder to the TAPE 1 socket (using either phono or DIN plugs), start the tape recorder and depress the TAPE MON. 1 button on the front panel.

Two tape recorders

To play tapes from two tape recorders (one at a time), connect the two tape recorders to the TAPE 1 and TAPE 2 sockets. To play a tape from the TAPE 1 machine, depress the TAPE MON 1 button and start the tape recorder.

To play a tape from the TAPE 2 machine, release the TAPE 1 button and depress the TAPE 2 button and start the tape recorder.

Playback from TAPE 3

Connect a tape recorder to the TAPE 3 jack. Depress the PREAMP. REC. button. The signal will then be fed directly to the power amplifier, and consequently the volume, balance and tone controls will have no influence on the program being played back.

Set the VOLUME control to the minimum position, otherwise other programs from radio, transcription units or other tapes will mix with the signal from the tape recorder connected to TAPE 3 jack.

Input sensitivity

The sensitivity of TAPE 1 input and TAPE 2 input can be adjusted to be between 150 mV and 600 mV by means of independent potentiometers adjacent to the sockets. See page 16.

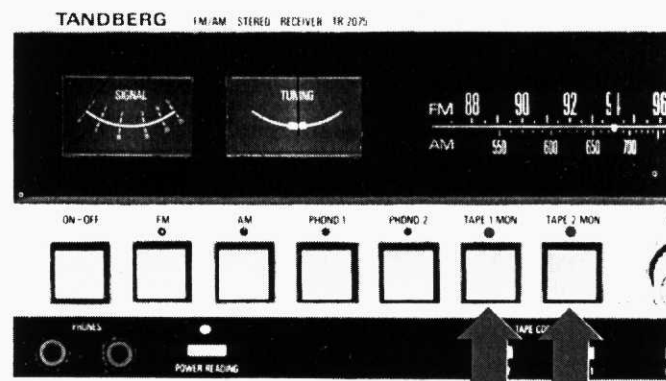
NOTE!

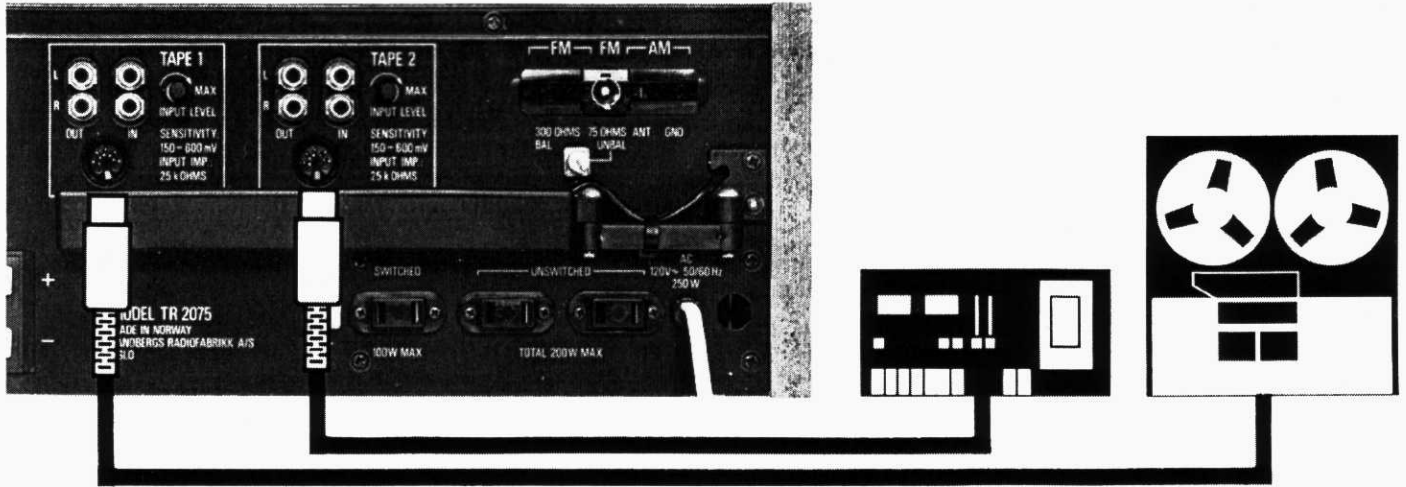
Depressing either of the TAPE MON. buttons automatically disconnects any record or radio program that is present. Furthermore, TAPE MON. 1 always takes precedence over TAPE MON. 2 when both these buttons are depressed simultaneously.

The receiver has a unique switching system that provides smooth transitions when you switch from one program source to another.

WARNING!

Depressing the PREAMP REC button reduces the amplification by 30 dB. Therefore be careful not to release the button when playing at high volume. Otherwise you may damage your speakers.





Connect one or two tape recorders to TAPE 1 input and/or TAPE 2 input (or both) at the back of the receiver. Use phono or DIN plugs. Depress either the FM button or the AM button and tune the receiver as described on page 6 or page 9. Any radio program that is being reproduced in the speakers (or headphones) will now be fed via the sockets marked OUT to the tape recorder and recorded. The VOLUME, BALANCE, BASS, MID-RANGE, TREBLE, LOUDNESS AND FILTER controls will have no effect on the recording. The recorded program will be fed back to the receiver via the sockets marked IN where it will be available for a B-test if required. (See Monitoring during recording on page 22).

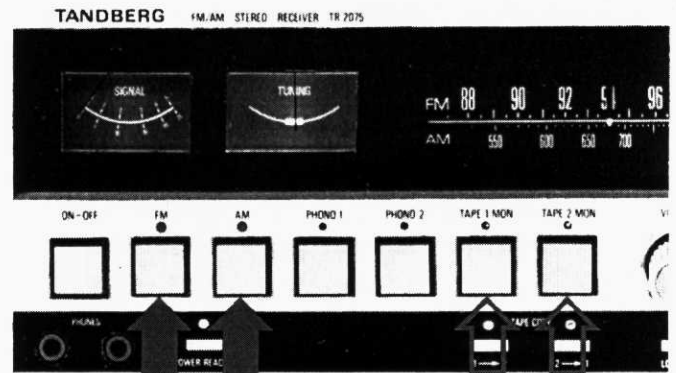
To record a program on a third tape recorder with or without being affected by all the audio controls, see page 21.

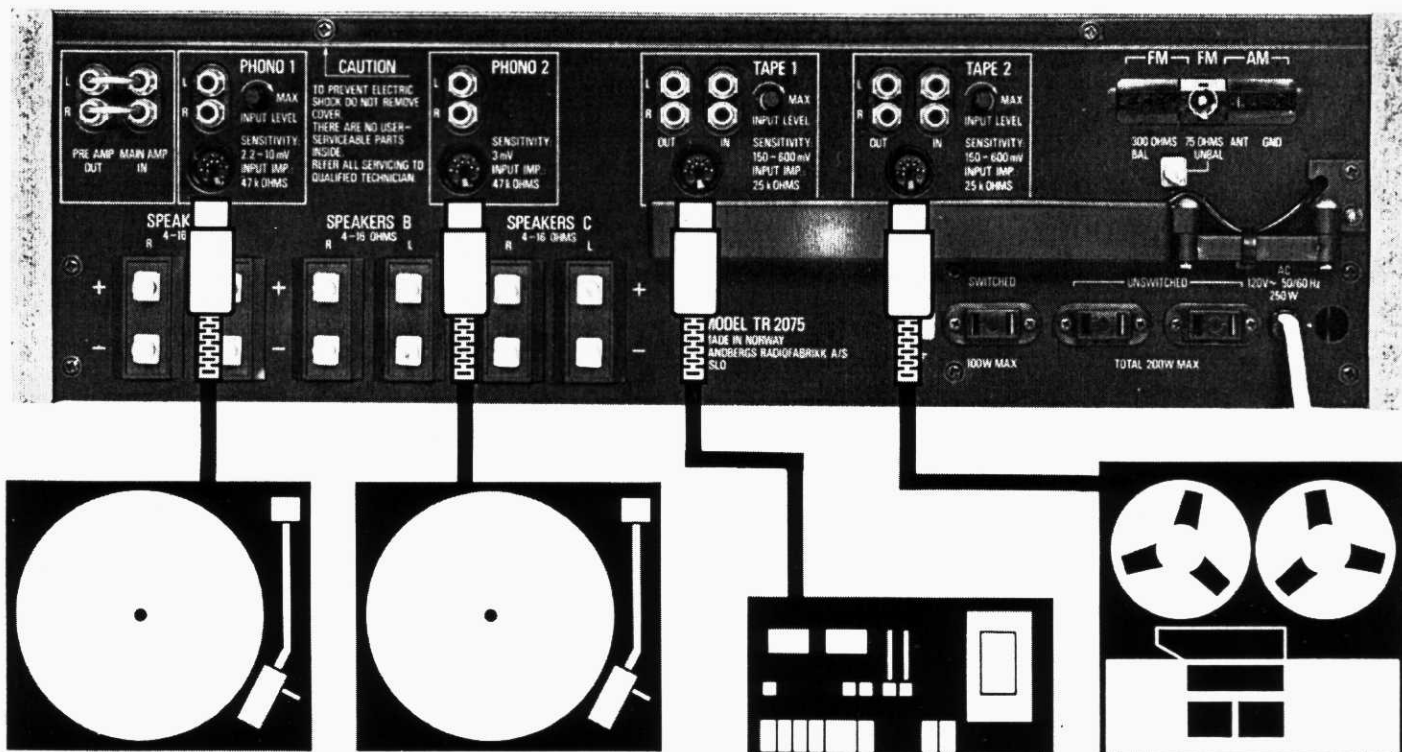
Tape tips

The two most important characteristics of a tape are signal/noise ratio and frequency range. The signal/noise ratio is determined by two quantities — the signal, that is to say the loudest undistorted sound that can be recorded on the tape (which should be as loud as possible) and the inherent hissing noise on the tape. These two quantities are distinct separate properties of the tape. Taken together they decide the dynamic range of the music that can be recorded without distortion. In other words, the higher the signal/noise ratio of the tape the higher the dynamic range of the music that can be recorded.

Tapes with a high signal/noise ratio are known as “Low Noise/High Output” tapes and they are gradually replacing older tapes which have inferior signal/noise ratios. Although older tapes can be played on any tape recorder it should be noted that they will give an inferior recording performance on tape recorders adjusted for Low Noise/High Output tape. In a nutshell, the best results will be obtained with Low Noise/High Output tape recorded on a recorder which is specially adjusted for it.

| Tape Length | PLAYING TIME IN MINUTES | | | |
|-------------|-------------------------|-----------|-----------|-----------|
| | 7 1/2 ips | 3 3/4 ips | 1 7/8 ips | 15/16 ips |
| 150' | 3.75 | 7.5 | 15 | 30 |
| 210' | 5.5 | 11 | 22 | 45 |
| 300' | 7.5 | 15 | 30 | 60 |
| 450' | 11 | 22 | 45 | 90 |
| 600' | 15 | 30 | 60 | 120 |
| 900' | 22 | 45 | 90 | 180 |
| 1200' | 30 | 60 | 120 | 240 |
| 1800' | 45 | 90 | 180 | 360 |
| 2400' | 60 | 120 | 240 | 480 |
| 3600' | 90 | 180 | 360 | 720 |
| 4200' | 107.5 | 215 | 430 | 860 |





Connect a transcription unit (or record player) to the PHONO 1 socket and a tape recorder to the TAPE 1 socket at the back of the receiver. Put the tape recorder into the RECORD mode but do not start it. Start the transcription unit and depress the PHONO 1 button. Let the record run for a minute or two and note the indication on the tape recorder input level meter. Adjust the input level controls on the tape recorder to take account of any peaks in the output from the record. Stop the transcription unit.

Now you can start the proper recording. Start the transcription unit and the tape recorder. The recording will be unaffected by all the other audio controls. See page 22 for advice on monitoring.

Two transcription units

A second transcription unit can be connected to the PHONO 2 socket so that when the record on the first transcription unit comes to an end a second record can be recorded without stopping the tape recorder, provided that you know there are no output peaks on the second record greater than those on the first record.

PROCEDURE.

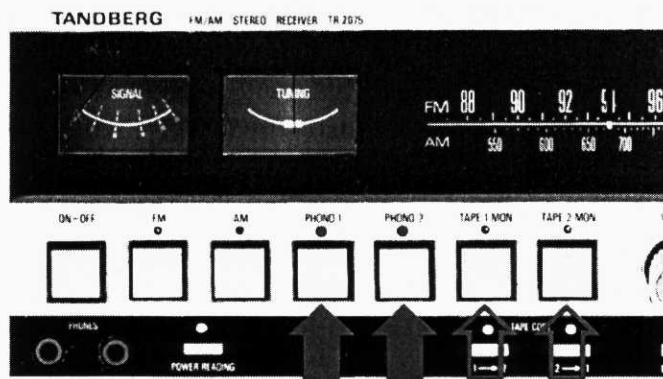
As the first record ends, start the second transcription unit and depress PHONO 2 button.

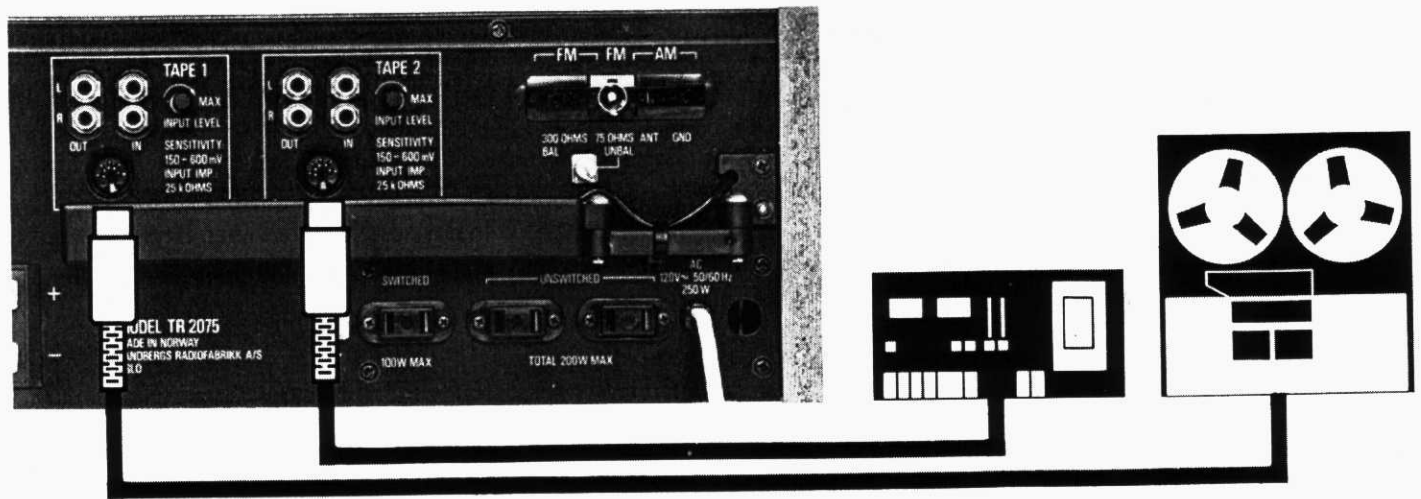
Two tape recorders

A second tape recorder can be connected to the TAPE 2 socket and recording can take place on this machine at the same time. The trial and error procedure for achieving the correct setting of the level controls can be carried out for the two tape recorders also at the same time. See page 22 for advice on monitoring.

WARNING!

Depressing the PREAMP REC button reduces the amplification by 30 dB. Therefore be careful not to release the button when playing at high volume. Otherwise you may damage your speakers.





Two tape recorders involved

■ a) Copying from TAPE 1 to TAPE 2 or vice versa.

Connect one tape recorder to the TAPE 1 socket and another tape recorder to the TAPE 2 socket. To copy from the TAPE 1 machine to the TAPE 2 machine depress the TAPE COPY 1→2 button. To copy from the TAPE 2 machine to the TAPE 1 machine depress the TAPE COPY 2→1 button.

PROCEDURE.

Start the two machines and control the recording level on the machine set to RECORD. A trial run may be necessary to avoid peak distortion. See page 22 for advice on monitoring.

NOTE!

You have the great advantage that copying from one tape recorder to the other can take place while you listen to a program selected with either of the buttons FM, AM, PHONO 1, PHONO 2.

■ b) Copying from TAPE 1 or TAPE 2 to TAPE 3.

Connect a tape recorder to the TAPE 1 socket or the TAPE 2 socket. To copy, depress the appropriate TAPE MON. button and follow the procedure described on page 21.

Three tape recorders involved

■ a) Copying from TAPE 1 to TAPE 2 & TAPE 3.

Connect one tape recorder to each of the TAPE sockets and one to the TAPE 3 jack. Depress the

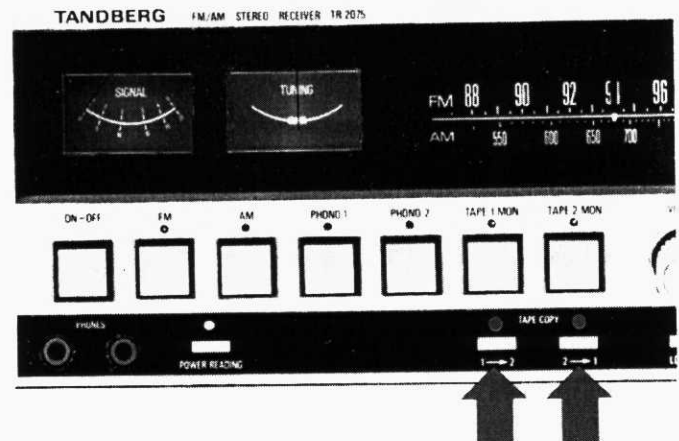
TAPE MON. 1 button and the TAPE COPY 1→2 button. If you now start all the machines, you will copy from TAPE 1 to TAPE 2 & TAPE 3 without tone and volume controls. At the same time you can listen to the program through the speakers. By depressing the PREAMP. REC. button you can copy from TAPE 1 to TAPE 2 without tone and volume controls, and from TAPE 1 to TAPE 3 with tone and volume controls.

■ b) Copying from TAPE 2 to TAPE 1 & TAPE 3.

Connect the tape recorders as for a). Depress the TAPE MON. 2 button and the TAPE COPY 2→1 button. Start the machines, and you will copy from TAPE 2 to TAPE 1 & TAPE 3 without tone and volume controls, etc. as for a). (Interchange TAPE 1 & TAPE 2).

WARNING!

Depressing the PREAMP REC button reduces the amplification by 30 dB. Therefore be careful not to release the button when playing at high volume. Otherwise you may damage your speakers.



Recording on a third tape recorder with or without audio controls



If you want to record on a third tape recorder with or without the effect of the audio controls, connect the tape recorder by means of a 3-pole jack plug to the TAPE 3 jack on the extreme right of the front panel. Any program that could be recorded on a tape recorder connected to TAPE 1 or TAPE 2 socket (or both) will now also be recorded on this third tape recorder.

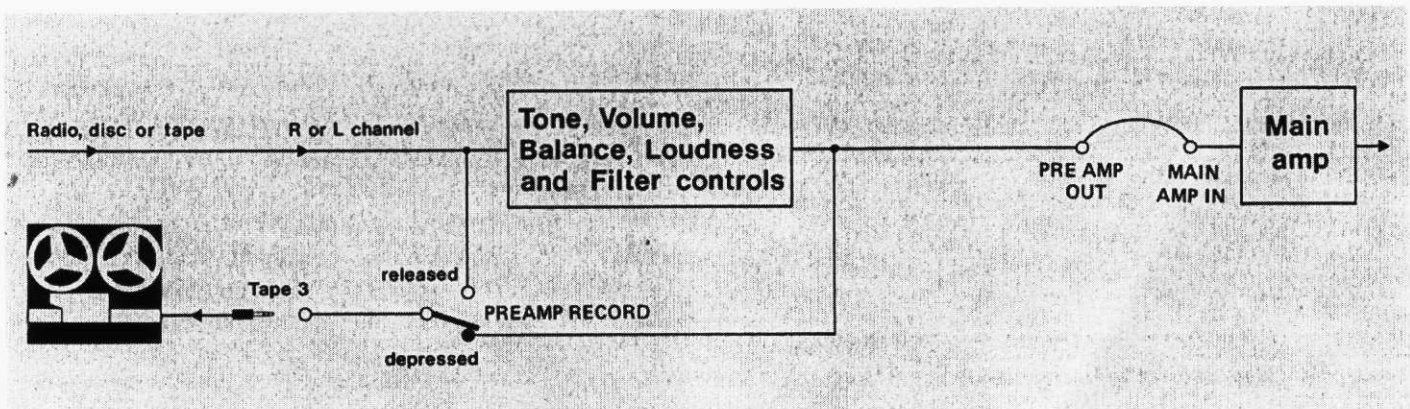
If you want to control the tonal balance and the volume of the program to be recorded, depress the PREAMP REC. button on the front panel. The speaker volume will be reduced to a suitable moni-

toring level (source test) and the volume, tone, balance, loudness, and filter controls will be active as shown in the diagram below.

Although the source test can be carried out from the receiver, the tape test can only be carried out from the tape recorder itself.

WARNING!

Depressing the PREAMP REC button reduces the amplification by 30 dB. Therefore be careful not to release the button when playing at high volume. Otherwise you may damage your speakers.



Monitoring during recording

If the tape recorder has separate heads for record and playback, the program can be monitored at the same time as the recording is being made. Two types of monitoring are possible, one is the source test (A-test), the other is the tape test (B-test). The source test is the program before going onto tape and the tape test is the program after it has been recorded on tape.

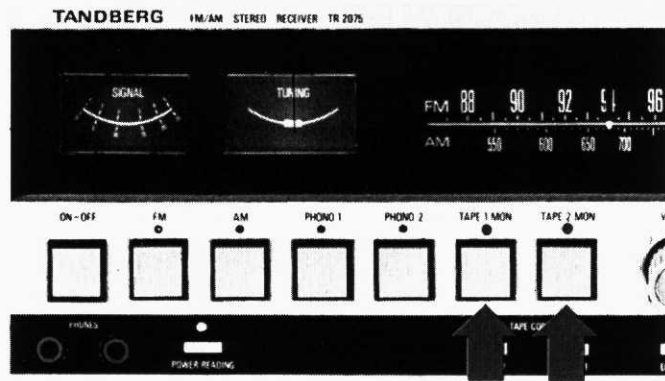
When tape recorders are connected to TAPE 1 and TAPE 2 sockets, the source and tape tests can be carried out on the speakers or headphones on the receiver. For tape test, depress the appropriate TAPE MON. button. For source test, release the same button.

Adjust the sound level for the two tests so that when you switch from one test to the other the level will be the same.

NOTE!

Do not depress both TAPE MON. buttons at the same time because TAPE MON. 1 always takes precedence.

When a third tape recorder is in use for recording on TAPE 3 jack, all monitoring must be carried out on the tape recorders and the TAPE MON. buttons must both be released. It is sometimes more convenient to carry out monitoring on the tape recorders anyway (using headphones) because there you can watch the level meters and adjust the input more easily.



WARNING!

Depressing the PREAMP REC button reduces the amplification by 30 dB. Therefore be careful not to release the button when playing at high volume. Otherwise you may damage your speakers.

A note on adjusting the input level of the recorder

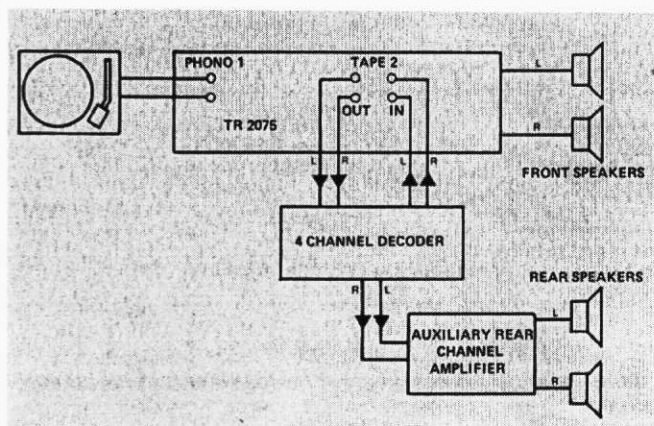
Some tapes require a higher input level than others. When starting to use a new brand of tape, you should therefore make a few recordings at different input level settings to find out how high the input level can be before any audible distortion occurs.

If you sample the loudest passages of the music when adjusting the input level you will not have to readjust later on.

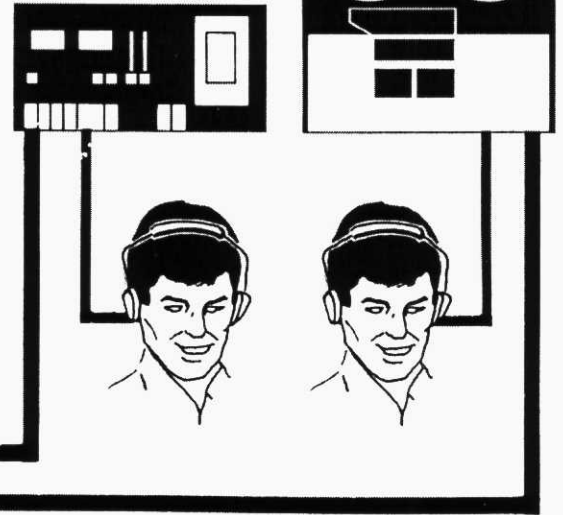
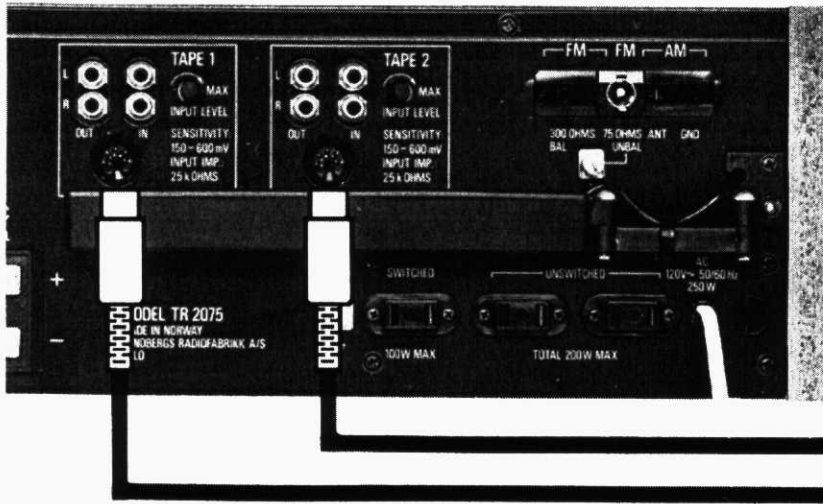
4 Channel use

The TAPE 1 and TAPE 2 sockets are also suitable for 4 channel use.

To play a 4 channel program a 4 channel decoder must be connected with its input to the TAPE OUT sockets. The front output signal from the decoder must be fed back to the TAPE IN socket of the receiver and the rear output signal to the auxiliary rear channel amplifier.



Simultaneous recording of a radio/transcription program and playback of another program from tape

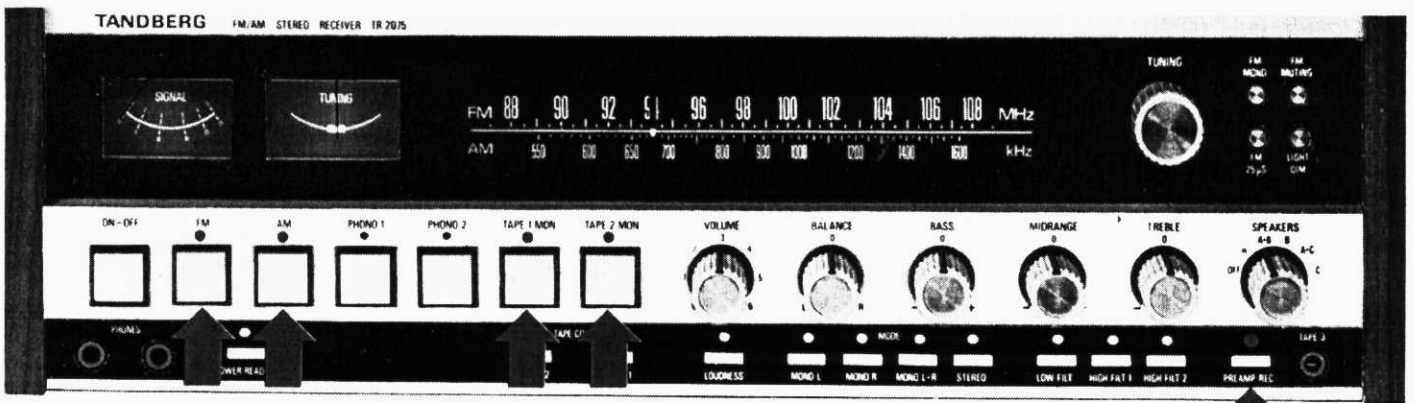
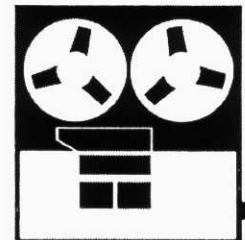


Recording of a radio/transcription program on a tape recorder connected to the TAPE 1 socket or the TAPE 2 socket can take place while a second program from another tape recorder, connected to the TAPE socket (1 or 2) that is not being used for recording, is played through the speakers. If the radio/transcription program is recorded on TAPE 1 it can also be monitored in the speakers by depressing the TAPE MON. 1 button. A program recorded on TAPE 2 can only be monitored on headphones connected to the tape recorder.

jack is played through the speakers. The radio/transcription program can only be monitored on headphones connected to the tape recorder(s).

The VOLUME control must be set to the minimum position and the PREAMP REC button must be depressed. The tape recorder connected to the TAPE 3 jack should have an output level control, otherwise it is not possible to adjust the speaker output volume.

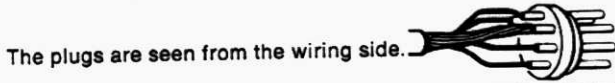
Also, recording of a radio/transcription program on a tape recorder (or tape recorders) connected to the TAPE 1 socket or the TAPE 2 socket (or both) can take place while a second program from another tape recorder connected to the TAPE 3



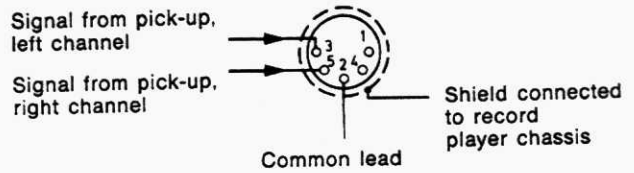
WARNING!

Depressing the PREAMP REC button reduces the amplification by 30 dB. Therefore be careful not to release the button when playing at high volume. Otherwise you may damage your speakers.

Plugs

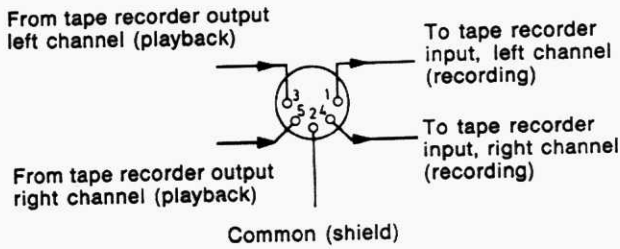


Record player (PHONO) DIN plug

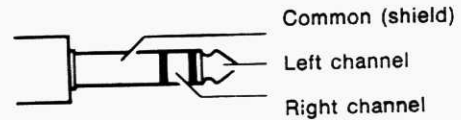


The common lead and the shield must not be wired together.

Tape recorder (TAPE 1 and TAPE 2) DIN plug



Tape recorder (TAPE 3) and headphones (PHONES) jack plug



Useful data

Inputs

Input sensitivity for nominal output in 8 ohms at 1 kHz:

| | | | |
|-----------------------|------------|------------------|----------------|
| PHONO 1: | Adjustable | 2.2 to 10 mV | (Z = 47 kohms) |
| PHONO 2: | | 3.0 mV | (Z = 47 kohms) |
| TAPE 1: | Adjustable | 150 mV to 600 mV | (Z = 25 kohms) |
| TAPE 2: | Adjustable | 150 mV to 600 mV | (Z = 25 kohms) |
| Main amplifier input: | | 440 mV | (Z = 10 kohms) |

Maximum input signals: (0.2% distortion at 1 kHz)

| | | |
|----------|--------|---------------------------------|
| TAPE 1: | 8 V | Preset level control at minimum |
| TAPE 2: | 8 V | Preset level control at minimum |
| PHONO 1: | 200 mV | Preset level control at minimum |
| PHONO 2: | 80 mV | |

Outputs

PREAMP: 2 V at 0.2% distortion (Z = 1 kohm)

TAPE 1 and TAPE 2 at 100% FM modulation: Phono sockets 1 V at 1 kohm load
DIN sockets 250 mV at 33 kohm load

Output power in speakers: See curve, page 13
and table, page 15

Output power in headphones: See curve, page 12.

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