

# TANDBERG



## Instruction manual Series 1200 X

## The State of Art

in tape recording is presented to you with the Tandberg model 1200X. Successful application of the cross field bias technique gives a significant improvement of high frequency response, resulting in better tape economy as lower tape speeds can be used for high quality sound reproduction.

The conventional method of using tape with a thinner magnetic coating for extending frequency range upwards, led to an increase of the relative noise level. Using tape with normal coating thickness, Tandberg 1200X will give you improved frequency response at no sacrifice of dynamic range.



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### Unpacking

To avoid transport damage, plastic strips are inserted between the top plate and the cabinet. These strips are easily removed by loosening the four large mounting screws on the top plate. These screws must then be adjusted to provide only slight clearance between the cabinet and the top plate.

### Mains voltage

The tape recorder operates from the following power sources:

Standard model: 230 V, 50 Hz.

U.S. Model: 115 V, 60 Hz, Rewired from 230 V.

To change the recorder from 60 to 50 (or 50 to 60) Hz operation, the motor pulley must be changed and the motor capacitor altered. We recommend that only a Tandberg service station, representative or competent qualified technician perform this service.

Power consumption:

60 watts at 2 x 1.25 W output power.

100 watts at 2 x 10 W output power.

**Record level indicators.** Set signal level for meter reading up to red area.

**Bass control.**

**Treble control.**

**Input level controls.** Upper knob: Channel L, lower knob: Channel R.

**Input selector** for selection between the inputs LINE, MIC and PICK UP or a mixing of these.

**Microphone sockets** for channel L and R.

**Start/stop.** For instantaneous start/stop in record and playback.

**Function selectors.** REC: Recording starts when tape motion lever is set to →, whereby the function is locked in REC. PLAY: Playback starts when tape motion lever is set to →. AMP: Amplifier.

**Pick-up selector.** Allows recording from magnetic or ceramic pick-up.

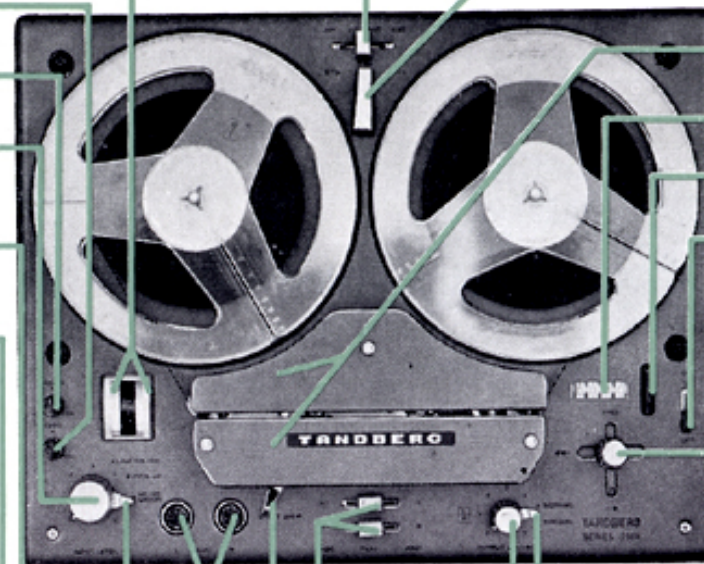
**+26V:** Operating voltage for external FM multiplex filter.

**LINE DIN-socket.** Connection to radio for record and playback.

**LINE phono sockets.** For recording from radio. Upper socket: Channel L. Lower socket: Channel R.

**PICK UP DIN socket.** For connection to magnetic or ceramic pick-up.

**PICK UP phono sockets.** For connection to magnetic or ceramic pick-up. Upper socket: Channel L. Lower socket: Channel R.



**Speaker selector** with 3 positions.

**Speed selector.** For selection between the speeds  $1\frac{7}{8}$ ",  $3\frac{3}{4}$ " and  $7\frac{1}{2}$ " per sec.

**Front and rear headcover.** Remove for cleaning of heads and guide posts.

**Tape counter.** Indicates the position of the tape.

**Reset button.** Sets the tape counter to 0.

**Mains switch:** Turns the power on.

**Tape motion lever.** Central position: Stop →: Normal forward drive for recording and playback. ←←: Fast rewinding. →→: Fast winding. FREE: For tape threading. Always return the lever to the central position when the tape recorder is not in use.

**NORMAL/SPECIAL switch.** SPECIAL: Both speakers reproduce programme from microphone if both function selectors are in AMP. In mono playback, set to NORMAL for progr. in both speakers.

**Volume controls** for setting of playback level. Upper knob: Channel L. Lower knob: Channel R.

**Compartment** for mains cord.

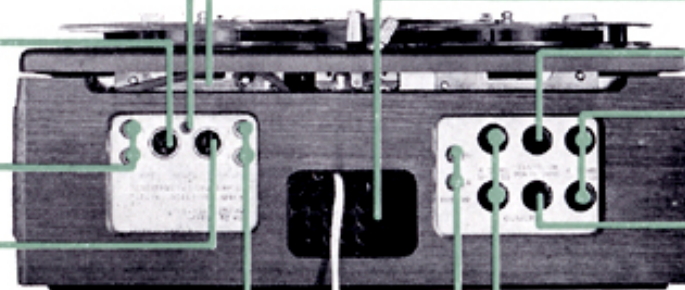
**Output for stereo headphones.**

**4 OHMS SPEAKER.** For connection of extension speaker to channel L. DIN socket and phone jack are connected in parallel.

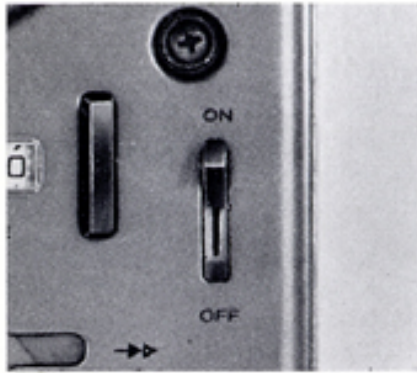
**Output for mono headphones.**

**4 OHMS SPEAKER.** For connection of extension speaker to channel R. DIN socket and phone jack are connected in parallel.

**PREAMP.** For connection of external power amplifier. Upper socket: Channel L. Lower socket: Channel R.

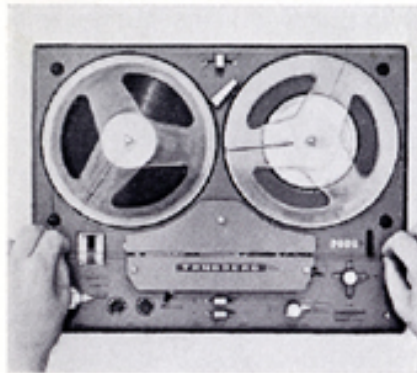


## Preparations for recording

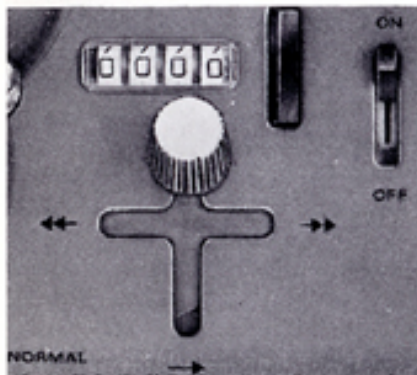


Pull out the mains lead from the recess at the rear of the tape recorder. Plug into a mains socket and switch on.

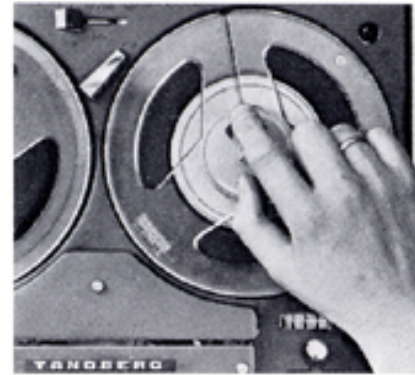
The tape recorder is furnished with an automatic end-stop mechanism. The motor will therefore operate only when a tape is inserted.



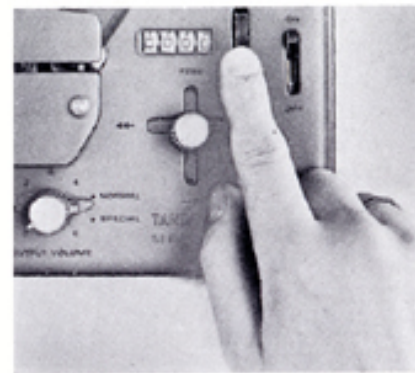
Cut off the length of self-adhesive tape on the end of new tapes to avoid the risk of depositing adhesive on the heads. Place a full reel on the left hand turntable. Hold the tape taut between forefingers and thumbs and insert it in the tape slot, ensuring that the shiny side is towards the front of the machine.



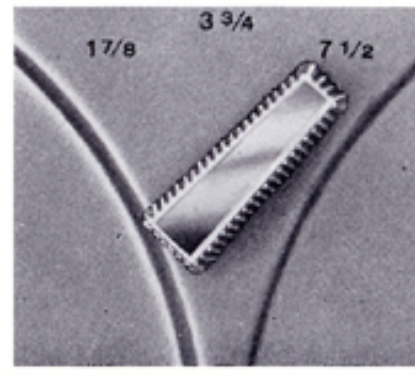
Set the tape motion lever to FREE position. Both turntables are now free to rotate independently of each other.



Pull out sufficient tape to form a loop on the right hand side. Insert the tape in the slot in the reel and hold the tape end in position while turning the reel anti-clockwise until the tape is taut.

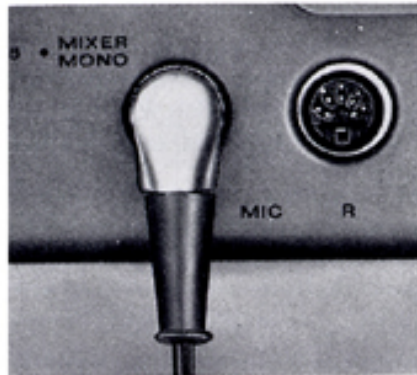


Set the tape counter to zero when starting at the beginning of a tape. The counter indicates the number of revolutions of the right hand turntable during recording, playback and fast wind and rewind.

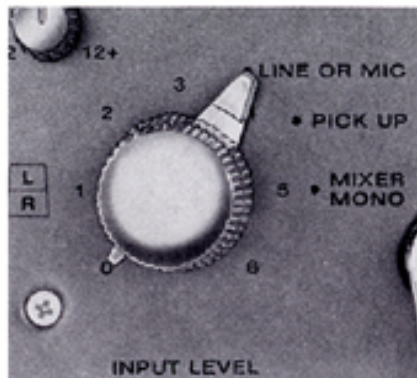


Set the speed selector to the required speed.  $7\frac{1}{2}$ " per sec. provides the best sound quality, while  $1\frac{7}{8}$ " per sec. gives longest playing time. See technical specifications on page 15.

## Mono microphone recording



Push the microphone plug into the socket marked MIC. L, making sure it is fully home.

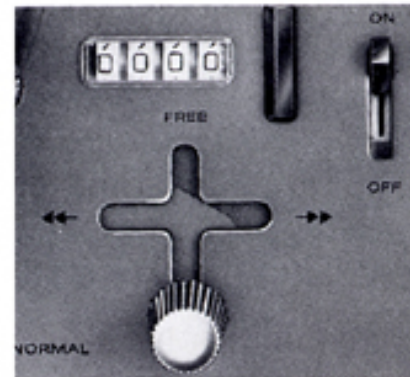


Set the input selector to LINE OR MIC thereby connecting the line/microphone sockets to their respective input amplifiers. In mono recording (only one function selector in REC) the outputs of the input amplifiers are connected together and the programme can therefore be fed to any one the MIC inputs. The signal level is set by means of INPUT LEVEL for the input in use.



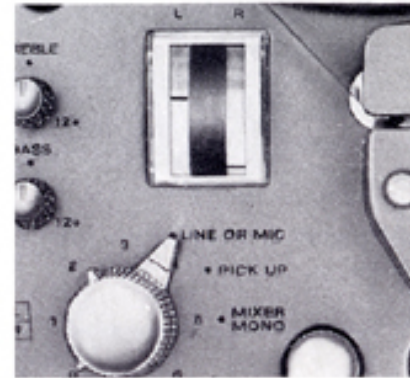
Push the START/STOP lever to the STOP position. Set the function selector for the channel not in use to AMP in order to prevent a programme on that channel from being reproduced in the speakers.

Set the function selector for the channel to be used for recording to REC. ---

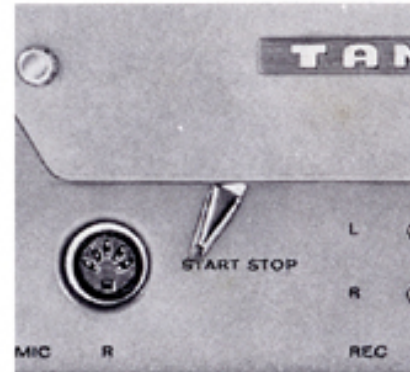


while the tape motion lever is set to →: The function selector is thereby locked in REC and the corresponding record level indicator is illuminated. Make a note of the revolution counter reading at the beginning of the recording.

The programme can be monitored in speakers or in headphones connected to PHONES STEREO or L and R MONO.

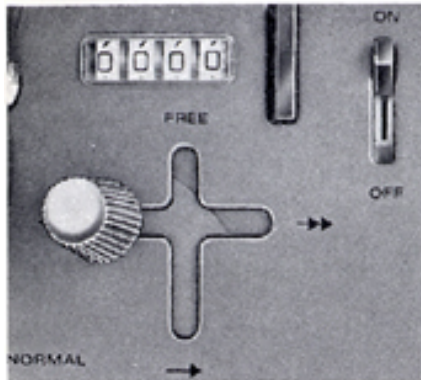


A little practice is necessary when adjusting the microphone recording volume. The indicator pointer may be allowed to deflect into the red area only for very short intervals. Excessive volume may cause distortion, whereas an unfavourable signal/noise ratio will result if the volume is adjusted too low. The bass and treble controls have no influence during recording.

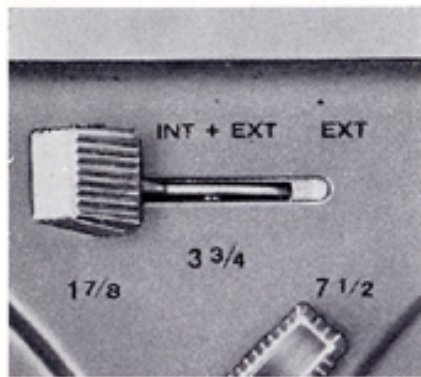


To start recording, move the START/STOP lever to the left. This lever can be used for instantaneous starts and stops during recording. The recording may be monitored through internal or external speakers. The upper OUTPUT VOLUME knob controls the volume in the left hand speaker and the lower knob controls the volume in the right hand speaker.

## Mono playback through internal speakers



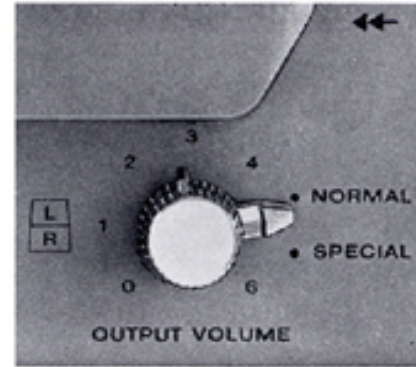
Rewind the tape to the position where recording started, by moving the tape motion lever to the ← position. Stop rewinding by moving the tape motion lever to the neutral position when the correct position is shown on the tape counter. Stop rewinding by moving the tape motion lever to the center position.



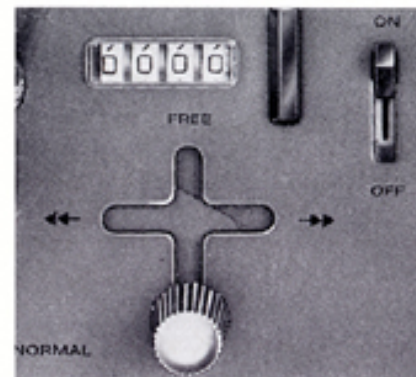
Set the speaker selector to INT, thereby connecting the internal speakers only. The remaining speaker selector positions are INT + EXT: Both internal and external speakers connected. EXT: External speakers only connected.



With the function selector for channel L in the PLAY position, move the function selector for channel R to the AMP position. When playing back from channel R, set the function selector for channel R to PLAY and channel L to AMP.



Playback volume is adjusted by the OUTPUT VOLUME controls. The upper knob controls channel L (left) and the lower knob controls channel R (right). Set the NORMAL/SPECIAL switch to NORMAL for programme reproduction in both speakers.

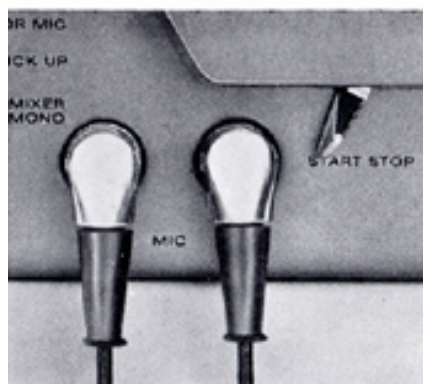


Start playback by moving the tape motion lever to →. The instantaneous START/STOP lever can be used whenever pauses are required during playback.



Both bass and treble can be varied continuously 12 dB either way by means of the BASS and TREBLE knobs. Bass and treble can be varied during playback, monitoring, or when the tape recorder is being used as an amplifier. The BASS and TREBLE knobs should normally be set to middle position to obtain correct sound reproduction.

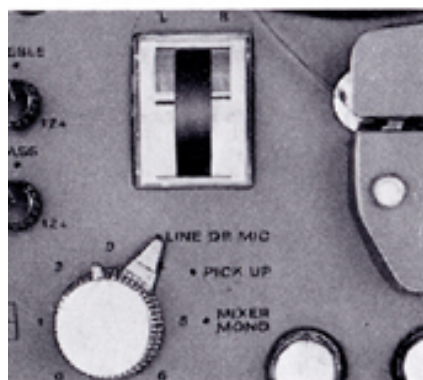
## Stereo microphone recording



The procedure for stereo recording is the same as described on page 6 for mono recording: One microphone is plugged into the MIC L socket and placed to the left of the signal source. The other microphone is plugged into the MIC R socket and placed to the right of the signal source. The input selector is set to position LINE OR MIC. Dynamic microphones must be used (Tandberg TM4).



Set both function selectors to REC and hold in position while moving the tape motion lever to the → position. The function selectors are now locked in the REC position, and both recording indicators will light up.



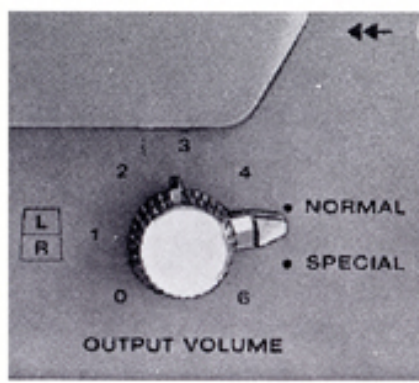
Adjust the recording levels by means of the two volume controls marked INPUT LEVEL. Adjust to the correct levels as described on page 6. Upper volume control: Channel L. Lower volume control: Channel R. The recording can be monitored in speakers or in headphones connected to PHONES STEREO.

## Stereo playback through internal speakers



The procedure for stereo playback is the same as described on page 7 for mono playback, with the following exceptions:

After the tape has been rewound, leave both function selectors in PLAY and move the tape motion lever to the → position.



Adjust the playback volume by means of the OUTPUT VOLUME controls. Upper knob: Left hand speaker (channel L).

Lower knob: Right hand speaker (channel R).

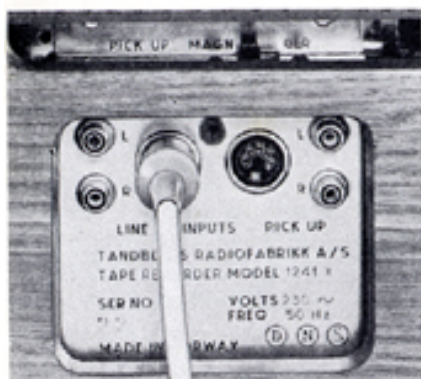
Set the NORMAL/SPECIAL switch to NORMAL position, and the speaker selector to INT position.



Bass and treble gain can be varied 12 dB either way simultaneously in both amplifier channels by means of the BASS and TREBLE knobs. Normally the center position will give correct sound reproduction. These controls have no effect on recording.



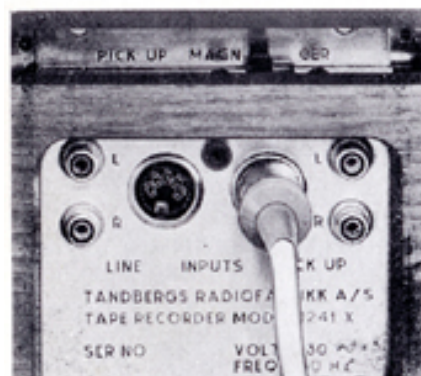
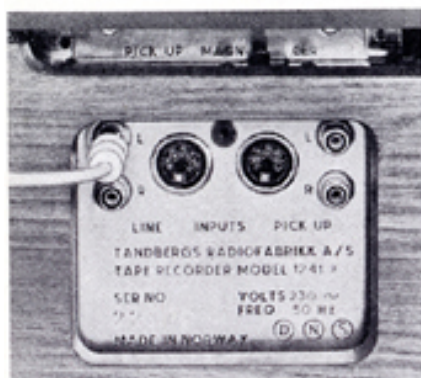
## Connecting external equipment for recording and playback



### Recording from mono radio

The programme from output TAPE or DIODE on the radio is fed to DIN socket LINE or to one of the phono sockets LINE L or R.

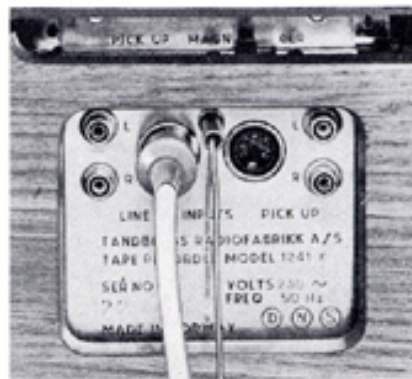
When the DIN-socket is used, pin 1 or 4 must carry the signal, pin 2 being the ground return. Set the input selector to LINE OR MIC and adjust the programme by means of INPUT LEVEL for the appropriate input, ensuring that the function selector for the channel to be used is set to REC. The output of both input amplifiers are thereby connected in parallel. In order to avoid interference, it is therefore important that the other input is not connected to a signal source, or that its INPUT LEVEL is turned down. Furthermore, a microphone must not be connected to the input in use, as this would disconnect the radio programme.



### Recording from record player

Set the input selector to PICK UP and connect the pick-up to DIN-socket PICK UP or to phono sockets PICK UP L and R. The pick-up selector accessible in the opening between the cabinet and the top plate should be set to:

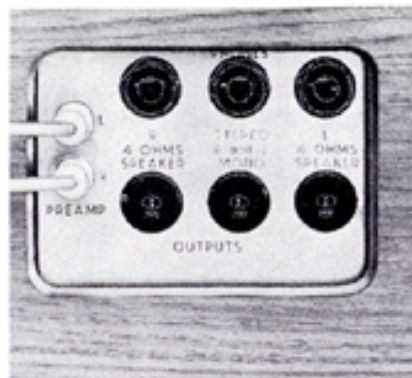
- MAGN. for magnetic pick-up
- CER. for ceramic or crystal pick-up.



### Recording from stereo radio

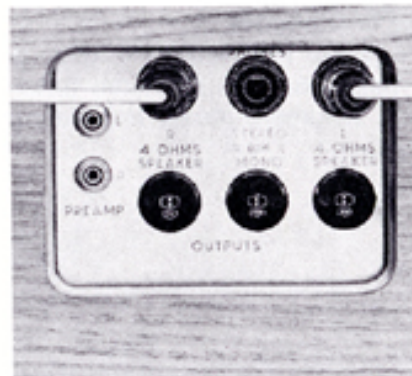
Connect the output TAPE or DIODE on the radio to the DIN-socket RADIO on Tandberg FM-MX filter. The DIN cable of the filter is connected to the LINE socket on the tape recorder, and the supply voltage lead to +26V. Alternatively the input and output phono sockets on the filter can be used.

A FM-MX filter is only required if interference from the stereo sub-carrier is audible.



### Playback through auxiliary amplifier

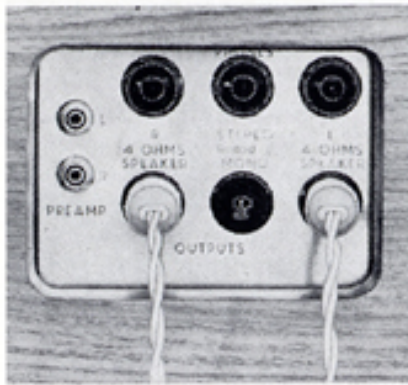
Connect the input of the amplifier to the phono-sockets PREAMP L or R (both L and R for stereo programme). The amplifier must have provisions for volume and tone control as the signal at the PREAMP output is independent of the operating controls. The same signal is also available on the DIN-socket pin 3 for channel L and pin 5 for channel R, pin 2 being the ground return.



### Extension speakers:

Extension speakers are connected to the telephone jacks marked 4 OHMS SPEAKER L and R.

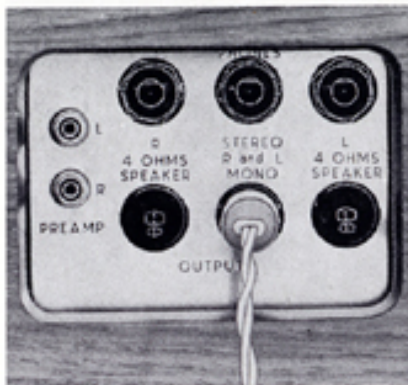
- L: Left hand speaker.
- R: Right hand speaker.



#### Extension speakers:

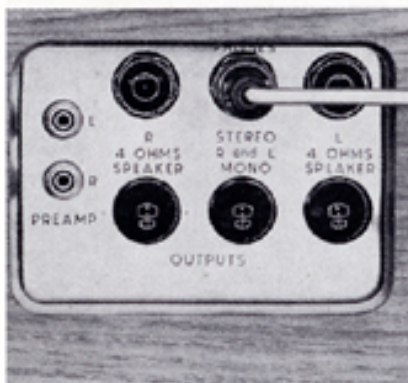
The two DIN speaker sockets marked 4 OHMS SPEAKER L and R are connected in parallel with the phone jacks.

L: Left hand extension speaker.  
R: Right hand extension speaker.



#### Mono headphones

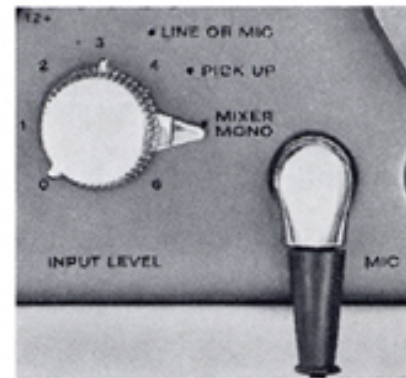
DIN-socket R and L MONO can be used for connection of mono headphones which will reproduce both channels simultaneously. (Center channel). Phone impedance minimum 75 ohm.



#### Stereo headphones

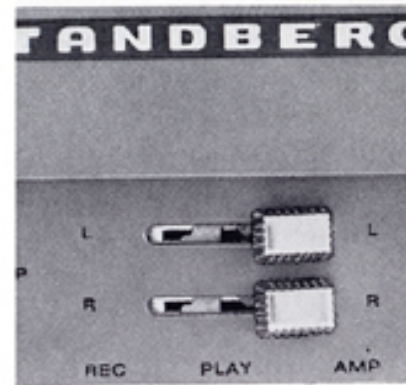
Phone jack PHONES STEREO is used for connection of stereo headphones. Minimum phone impedance 75 ohm.

## Mono amplifier

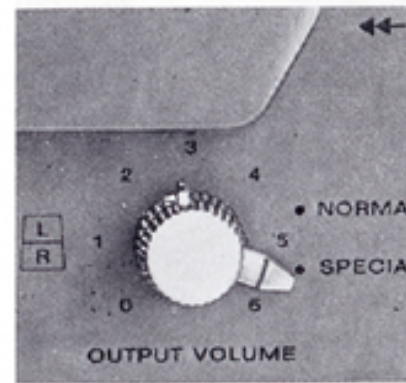


Plug the microphone into one of the MIC input sockets. Set the input selector to MIXER MONO and adjust the input level by means of the lower volume control, INPUT LEVEL R. Signals can be fed to the amplifier either from a microphone or from the line input terminals at the rear of the recorder.

Note: When the microphone is plugged in, the corresponding line input is automatically disconnected.

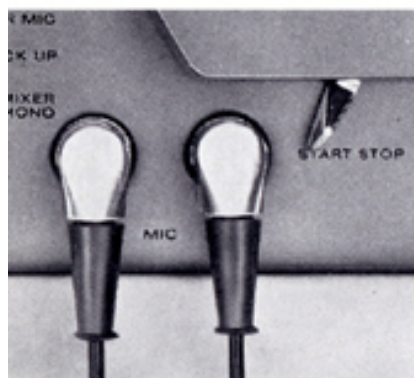


Move both function selectors to the AMP position.



The programme will be reproduced through both speakers when the NORMAL/SPECIAL switch is in SPECIAL position. The upper OUTPUT VOLUME L control adjusts the volume in the left speaker and the lower OUTPUT VOLUME R control adjusts the volume in the right speaker. When the switch is in NORMAL position, the programme will be reproduced through the right speaker only.

## Stereo amplifier

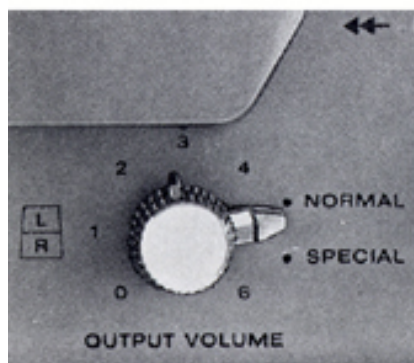


Plug the two dynamic microphones into the MIC L and R sockets and set the input selector to LINE or MIC. Signals can be fed to the amplifiers either from the microphone inputs or from the line input terminals at the rear of the recorder. Set the INPUT LEVEL controls to position 3-4.

Note: The line input terminals are automatically disconnected when microphones are plugged in.



Move both function selectors to the AMP position.



Set the NORMAL/SPECIAL switch to NORMAL position. If desired output level demands adjustment above position 4 on OUTPUT VOLUME controls, readjust the INPUT LEVEL controls. The speaker selector and the tone controls operate in the same manner as during stereo playback. The distance between microphones and speaker must be sufficient to avoid oscillations caused by acoustic feedback.

## Monitoring

### Monitoring during mono recording on channel L:

Set the function selector for channel L to REC and the function selector for channel R to AMP. The programme can now be monitored in left and right hand speakers or in headphones connected to R and L MONO or PHONES STEREO. Adjust volume by means of the appropriate OUTPUT VOLUME control. Monitoring is independent of the NORMAL/SPECIAL switch.

### Monitoring during mono recording on channel R:

The procedure for monitoring recording on channel R is the same as outlined above, with the following exceptions:

Set the function selector switch for channel L to the AMP position and the function selector switch for channel R to the REC position.

### Monitoring during stereo recording:

A stereo programme being recorded can be monitored in internal or external speakers or in stereo headphones connected to PHONES STEREO.

NOTE: If speakers are used for monitoring when recording from microphones, care must be taken to ensure sufficient distance between speakers and microphones to avoid oscillation due to acoustic feedback.

Should recording conditions make it impracticable to keep sufficient distance, the playback volume of the monitored programme can be reduced.

## Mixing

### Mixing during mono recording:

Mixing is controlled by the position of the input selector. The level of the mixed signal can be monitored through the internal speakers or external equipment. When the input selector is set to LINE OR MIC position, two microphone programmes, two line programmes or one microphone and one line programme can be recorded.

When the input selector is in PICK UP position, it is possible to record a stereo programme from pick-up as mono programme on track L or R depending on which of the function selectors that is set to REC.

In MIXER MONO, both microphone/line sockets are connected to right (R) input amplifier while the pick-up sockets are connected to left (L) input amplifier. The mixed programme from these inputs can be recorded on either track depending on which of the function selectors that is in REC.

### LINE OR MIC

#### Mixing two microphone programmes:

Plug the microphones into the MIC L and R sockets. Volume adjustment of the programmes takes place independently by means of the INPUT LEVEL controls. The programmes are mixed after the input amplifiers and are fed to the desired channel, as determined by the function selectors.

#### Mixing two line programmes:

Both microphone plugs must be unplugged when mixing line programmes. Each programme is fed to its own line input, and the input levels are adjusted by means of INPUT LEVEL. The programmes are then fed to the channel determined by function selectors.

### Mixing one line programme and one microphone programme:

One programme is fed to one of the microphone inputs while the second is fed to the other line input. The signal levels are adjusted by means of the INPUT LEVEL controls. The programmes are then mixed and recorded on the desired channel as determined by the function selectors.

## MIXER MONO

### Mixing microphone/line—and record player programmes:

When the input selector is in MIXER MONO position both LINE/MIC sockets are connected to the right input amplifier while both pick-up sockets are connected to the left input amplifiers. When only one of the function selectors is in REC (mono recording), signals from all these inputs are mixed. The relative signal levels within the same input amplifier cannot be adjusted, but the composite signal (MIC/LINE or PICK UP) can be set by means of the corresponding INPUT LEVEL.

Note: If signals from a LINE terminal are to be recorded or amplified, the corresponding microphone must be unplugged.

### Mixing during stereo recording:

Several programmes may be mixed on each channel during stereo recording. When the input selector switch is set to LINE OR MIC position, signal can be fed to the phono sockets marked LINE L and R. As these

sockets are connected in parallel to pin 1 and 4 on the LINE DIN socket, signal may also be fed to this socket.

The relative signal levels within each channel cannot be adjusted.

In MIXER MONO, two line/microphone programmes, or one microphone—and one line programmes can be recorded on channel R while a pick-up-programme from the DIN or phono PICKUP sockets can be recorded on channel L.

## Combined playback — amplifier function

The NORMAL/SPECIAL selector makes it possible to play back a programme from one channel while using the other as a microphone amplifier.

Assume that the programme is played back from channel L, using channel R as a microphone amplifier.

Plug the microphone into one of the MIC connectors and set the input selector to MIXER MONO position. The lower INPUT LEVEL knob regulates the microphone level and is usually set to position 3–4. The function selector for channel L is set to PLAY position while the function selector for channel R is set to AMP position. Set the NORMAL/SPECIAL switch to SPECIAL position.

The output level for channel L is controlled by the upper OUTPUT VOLUME knob while the lower knob controls channel R. If desired output level on channel R demands adjustment above position 4 on OUTPUT LEVEL controls, readjust the INPUT LEVEL R control.

When playing back from channel R while using channel L as a microphone amplifier, the procedure is the same as outlined above except that the function selector for channel L is set to AMP position and the one for channel R it is set to PLAY position.

This function may be applied to provide effects such as background music to speech, etc. A simplified form of language instruction is also possible. The master programme is played back on channel L and reproduced through speaker or headphones. The student listens to the programme and repeats the exercises during pauses (audio active). This repetition will not be recorded on the tape.

See chapter on Language instruction on page 14.

## Erasing

When recording a new programme, previous programmes will automatically be erased on the relevant track. To erase a programme without recording, run the tape through with the tape recorder set for recording and the INPUT LEVEL volume controls at zero.

## Cleaning the heads

The heads and tape guide posts should be cleaned at regular intervals. Any film which may have collected on the guide posts should be removed.

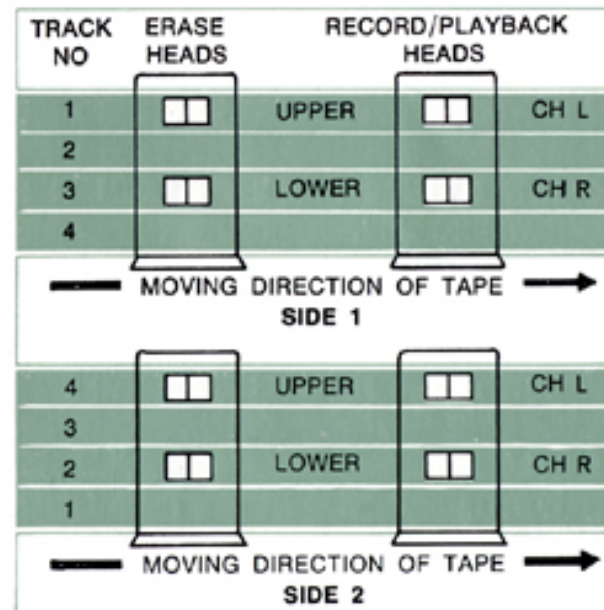
Unscrew and remove the front and rear covers. Wrap a clean piece of flannel around a small stick and dampen with purified petrol (gasoline). Do NOT use acetone or trichlorethylene as these fluids can cause damage. Clean the heads and guide posts and replace the covers.

Note: The adjusting screws on the heads must on no account be disturbed.

## 4-track mono recording and playback

In 4-track recorders, the two head halves for channels L and R respectively are located as shown in the figure. Recording will therefore always take place on upper and next lowest track. The tracks are numbered consecutively from top or bottom depending on which end of the tape is leading or trailing.

The upper part of the figure shows that recording and playback takes place on tracks 1 and 3. When the tape has run through and left reel is empty, the reels are turned and changed around. Thus tracks 4 and 2 will now be recorded or played back. For practical reasons the above two cases have been referred to as side 1 and side 2 of the tape, but must not be interpreted as the front and rear side of the tape, since re-



ording is only taking place when the coating (dull) side is facing the record/playback head.

For mono recording on all four tracks, the procedure is as follows: Insert the tape with side 1 uppermost. Set the function selector for channel L to REC, and the function selector for channel R to AMP. The programme is recorded on track 1, and the input level is controlled by the INPUT LEVEL L. When the first run is finished, reverse both reels and tape so that side 2 is uppermost and continue the recording. Recording will now take place on track 4. When the tape has been run through reverse it once more and set the function selector for channel R to REC and the function selector for channel L to AMP. The programme is recorded on track 3, and the input level is controlled with the INPUT LEVEL R.

Finally, reverse the tape once more in order to record on channel R track 2.

During mono playback you may choose between tracks 1 and 3 when side 1 of the tape is uppermost by setting the function selector for the required channel to PLAY and the other function selector to AMP. When side 2 is uppermost you may choose between tracks 4 and 2 in the same manner.

## Add a track

This is a technique whereby one may play back a programme from one channel while simultaneously recording on the other channel. When playing back in stereo, both programmes will be heard simultaneously. Add a Track is used when synchronisation of two programmes is required, or when desired to record a programme on the basis of the first programme.

This technique may also be used for song and music recordings, such as singing a duet with oneself or singing to the accompaniment of an orchestra etc.

The Tandberg Tape Recorder Model 1200X is excellent for Add a Track recordings. The combined record/playback heads will always ensure complete synchronization between the programmes.

## Language instruction

The Model 1200X is well suited for language instruction purposes. The instructor's voice (master programme) is recorded on channel L, pauses being provided to allow the student to repeat each sentence. The student records his exercises on channel R. During the recording he will be able to monitor his own voice and adjust the level by means of the OUTPUT VOLUME control. When recording is finished, the student rewinds the tape and plays the programme back in stereo. He will now hear the instructor's voice first, followed by his own voice. During recording the student wears headphones which are connected to the R and L MONO output. The procedure for language instruction on Model 1200X is as follows: Connect the headphones to the center channel output terminal marked R and L MONO. Presume that the master programme has been recorded on channel L and that the function selector for this channel is in the PLAY position. The student's voice is to be recorded on the lower track and the function selector for channel R must therefore be moved to the REC position and held there while the tape motion lever is moved to →.

The student can adjust the volume of the instructor's voice by means of the upper OUTPUT VOLUME control knob, the student's own recording level being adjusted by the lower INPUT LEVEL control knob. The input selector must be set to the LINE OR MIC position.

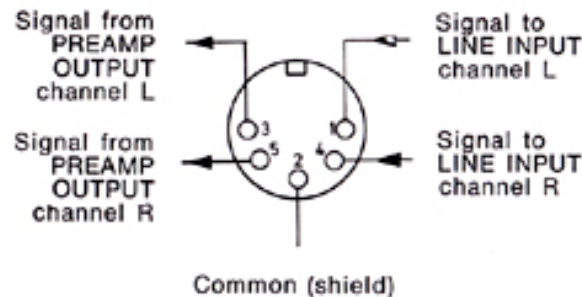
The student's own voice in the headphones is adjusted by means of lower OUTPUT VOLUME knob, while the level of the master programme is adjusted by means of upper OUTPUT VOLUME knob.

When the student's recording is finished, rewind the tape and set both function selectors to PLAY. Move the tape motion lever to →. The tape will now be played back in stereo and the student will hear the master programme first, followed by his own voice, enabling an immediate comparison to be made. The headphone levels of the student and master tracks are set to equal levels with the OUTPUT VOLUME controls R

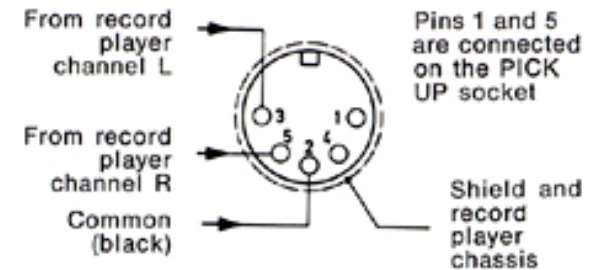
## Mating plugs

**NOTE: THE PLUGS ARE SEEN FROM THE WIRING SIDE.**

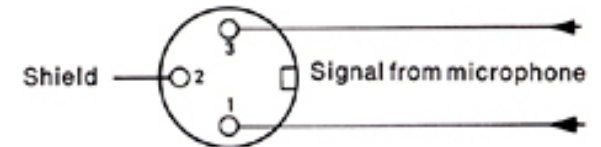
### LINE



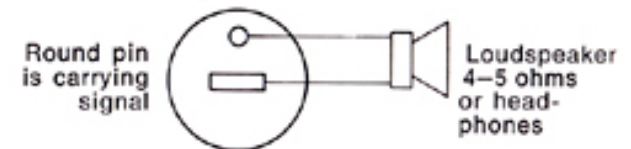
### PICK UP



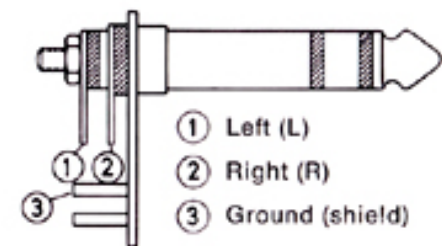
### MIC



### 4 OHMS SPEAKER AND MONO HEADPHONES



### STEREO HEADPHONES



## Microphonn TM4

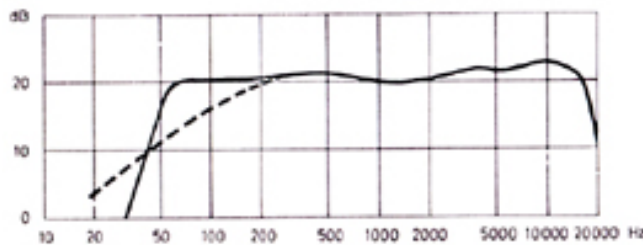


This dynamic microphone is specially designed for use in conjunction with Tandberg Tape Recorders. The Tandberg TM4 is a high quality microphone with spherical characteristics, well suited for recording both speech and music.

The Tandberg TM 4 Handy is supplied with a small, handy stand and a cord for hanging the microphone around the neck.

The Tandberg TM4 Complete is supplied with an adjustable stand of unbreakable plastic, a cord for hanging the microphone around the neck and a cover to screen from wind during outdoor recording. The microphone is packed in a strong case of unbreakable plastic.

Frequency response:  $\pm 3$  dB 50–17.000 Hz.  
Sensistivity: .096 mV/ $\mu$ bar (at 1000 Hz).  
Impedance: 200 ohms.  
Length: 133 mm. (5 $\frac{1}{4}$ "").  
Diameter: 33.5 mm. (1 $\frac{5}{16}$ "").



## Technical specifications

### Model 1200X, four track

#### Power requirements:

230 V, 50 Hz. Can easily be rewired for 115 V.

**Power consumption:** 60–100 W depending on power output.

**Reel size:** Maximum 7 inches.

**Tape speeds:** 7 $\frac{1}{2}$ , 3 $\frac{3}{4}$  and 1 $\frac{7}{8}$  ips.

**Speed tolerance:**  $\pm 1,5\%$ .

**Playing time:** 4 tracks on 1200 feet tape give the following playing times:

	Stereo	Monaural
7 $\frac{1}{2}$ ips. 2 x 32 min.	4 x 32 min.	
3 $\frac{3}{4}$ ips. 2 x 64 min.	4 x 64 min.	
1 $\frac{7}{8}$ ips. 2 x 128 min.	4 x 128 min.	

**Fast wind and rewind:** The fast wind and rewind time for 1200 feet of tape is approximately 2 minutes.

**Immediate start/stop:** The tape may immediately be stopped and started in record and playback modes.

**Semiconductors:** 36 transistors, 1 zenerdiode, 2 diodes, 1 bridge rectifier.

**Heads:** 1 erase head, 1 record/playback head and 1 separate crossfield head.

**Erase and bias signal:** 85,5 kHz, distortion less than .5 %.

**Record level indicator:** Dual moving coil meter with a range of 20 dB.

**Signal/Noise ratio** as defined in DIN 455110 at 7 $\frac{1}{2}$  ips. for 4-track model: 58 dB. Corresponding figure for linear conditions (Fremdspannung): 56 dB.

**Inputs:** 2 low impedance dynamic microphones, 200 ohms unbalanced, may be connected to the respective 3-pole DIN-connectors, sensitivity .1 mV.

**Line input:** A 5-pole DIN-connector designated LINE is common for the two channels and connected in parallel with two Phono-connectors, impedance 100 kohms, sensitivity 6 mV.

**PICK UP** – input for magnetic cartridge, 30 kohms, sensitivity 2 mV. Can be adapted for ceramic or crystal pick-up by means of the pick-up selector. All inputs have a dynamic range 60 dB above specified sensitivity.

**Outputs:** The phono connectors marked PREAMP OUTPUT L and R are connected in parallel with pin 3 and 5 respectively, on the DIN socket LINE.

Impedance 5 kohms. Outout level of unloaded amplifier is 0.75 V. The signal level is independent of all manual controls.

A 4 ohms external speaker may be connected to the amplifier via a phone jack or a DIN-connector. Available power output of each channel is 10 W.

**Mono headphones:** 2-pin DIN-socket. 1.5 volt across min. load impedance, 75 ohm.

**Stereo headphones:** phone jack. 1.5 volt across min. load impedance 75 ohm.

The power delivered to the internal 7" x 4" speakers is limited to 3 W. To obtain 2 x 10 W output external speakers must be used.

**Frequency response** according to DIN 45511:

7 $\frac{1}{2}$  ips. 30–20.000 Hz.

3 $\frac{3}{4}$  ips. 40–15.000 Hz.

1 $\frac{7}{8}$  ips. 40– 9.000 Hz.

In amplifier mode  $\pm 3$  dB 30–16.000 Hz.

**Bass control:** The bass may be continuously varied over a 12 dB range at 80 Hz in playback, monitor and amplifier modes.

**Treble control:** The treble may be continuously varied over a 12 dB range at 8.000 Hz in playback, monitor and amplifier modes.

**Wow and Flutter:** according to DIN 45511:

7 $\frac{1}{2}$  ips.:  $\leq \pm 0,1\%$

3 $\frac{3}{4}$  ips.:  $\leq \pm 0,2\%$

1 $\frac{7}{8}$  ips.:  $\leq \pm 0,45\%$

**Dimensions:** Length 15 $\frac{3}{8}$  inches, depth 11 $\frac{13}{16}$  inches, height 6 $\frac{7}{8}$  inches.

**Weight:** 23,4 lbs.

### Model 1200X, two track

Specifications as four track model, except for the following:

1 ea two track erase head

1 ea two track record/playback head

1 ea separate crossfield head

Signal to noise ratio is 2 dB better compared to the four track model.

The playing time is reduced by a factor of two.