

# 12

# TANDBERG

*tape recorder series 12*

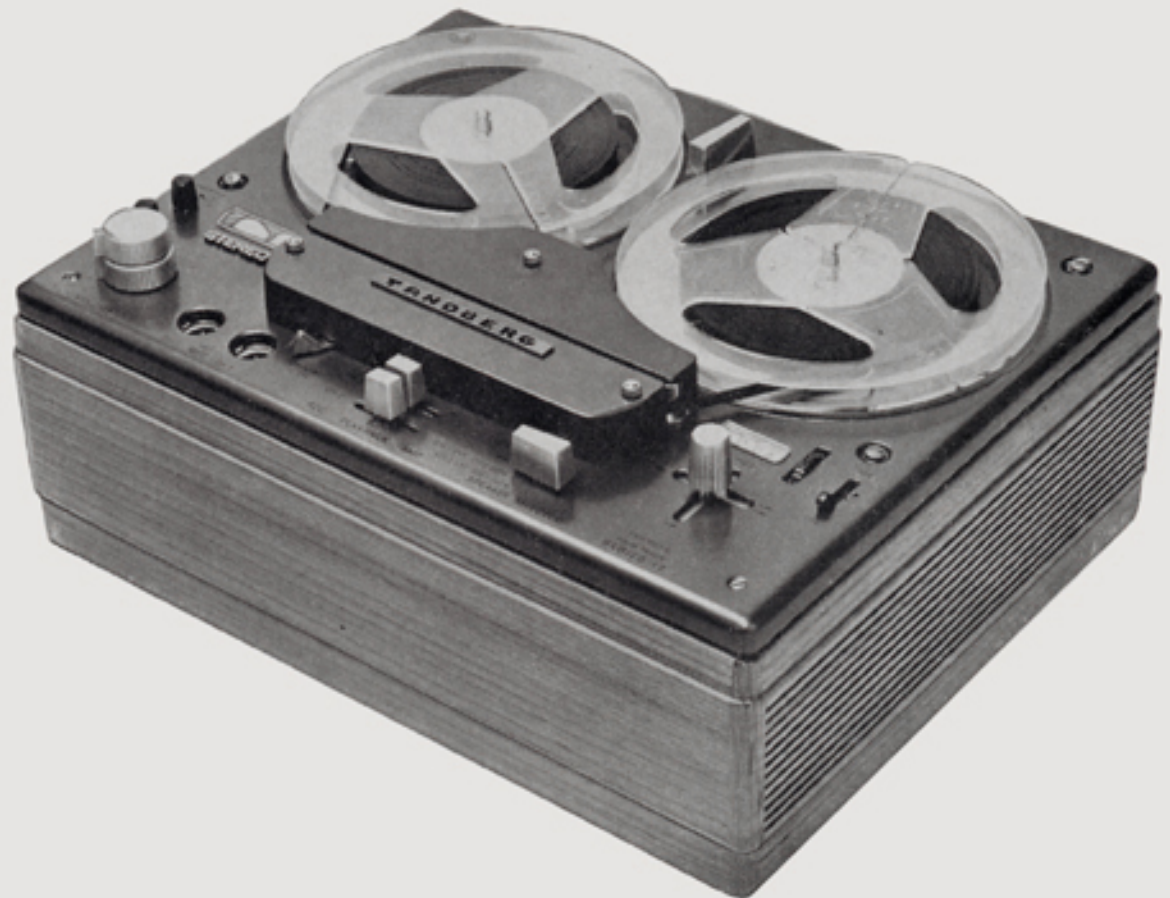
*instruction  
manual*

*Tandberg*  
**RADIO**



## We congratulate you on your new Tape Recorder

You are now the owner of one of the world's finest Tape Recorders. A new source of personal enjoyment and satisfaction for years to come. For many years Tandbergs Radiofabrikk has been among the world's leading producers and exporters of Tape Recorders. In U.S.A., Great Britain, Sweden and Norway the name TANDBERG stands for the finest quality in Tape Recording. It is recommended that you study the instruction booklet and follow the instructions carefully to obtain optimum use from the versatile quality instrument that your Tandberg Tape Recorder is.



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## UNPACKING

After removing the recorder from packing, loosen the four mounting screws on the top plate and remove the plastic strips placed between the top plate and the cabinet. Then adjust the screws so that there is only a slight clearance between the cabinet and the top plate.

## WHAT POWER SOURCE TO USE ?

The tape recorder operates from the following power sources:

Standard model: 220 V, 50 c/s AC

U.S. Model: 115 V, 60 c/s AC

The U.S. Model is furnished with an interlock inserted in the mains cord. To change the recorder from 60 to 50 (or 50 to 60) cycles operation, the motor pulley and motor capacitor must be changed. We recommend that only a Tandberg service station, representative or competent qualified technician perform this service.

Power consumption:

58 watts at 2 x 1.25 W output power.

100 watts at 2 x 10 W output power.



**Record level indicators**

For max. recording level the indicators should be just closed. Left indicator: CH 1. Right indicator: CH 2.

**Treble control****Bass control**

**Volume control** for recording and playback. The upper knob: CH 1, the lower knob: CH 2.

**Microphone contacts** for CH 1 and CH 2.

**Momentary start/stop lever**

The record or playback starts or stops instantly by operating the lever.

**Function selector switches:** CH 1 and CH 2. The switches can be operated together or separately.

**REC. pos.:** The recording starts when the tape motion lever is set to → pos. (The function selector switch is locked in this pos. by the tape motion lever.)

**PLAYBACK pos.:** The playback starts when the tape motion lever is set to → pos.

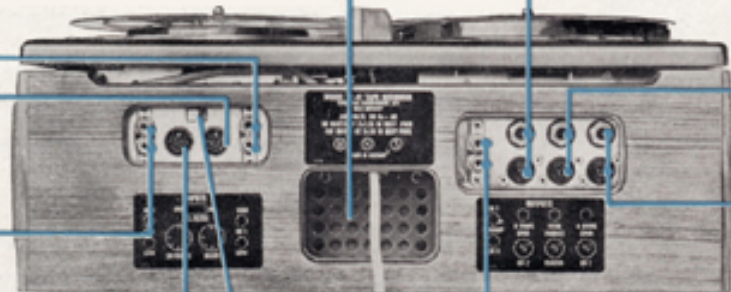
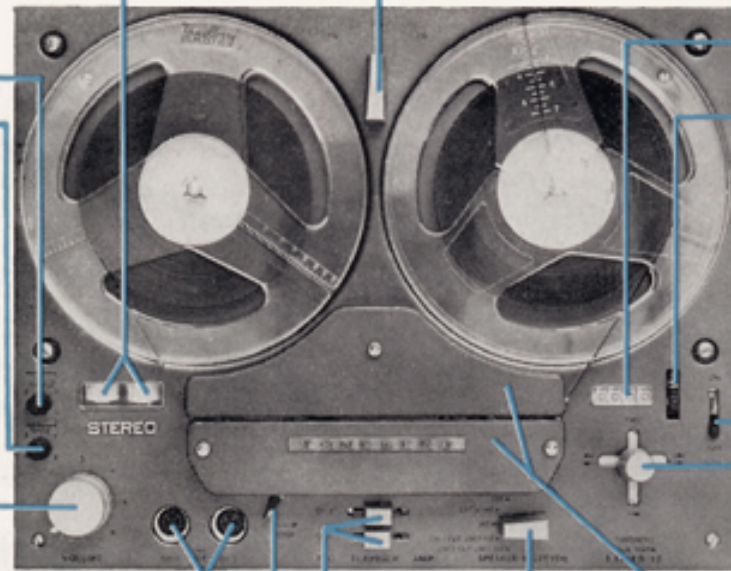
**AMP pos.:** Amplifier.

**Input terminal CH 1.** Upper contact: HIGH. Lower contact: LOW.

**Radio contact** for connection to radio turners with DIN connectors installed.

**Input terminal CH 2.** Upper contact: HIGH. Lower contact: Low.

**Cr phono contact:** For connection to crystal or ceramic pick up.



**MX-filter switch.**

**Speed selector.** Selects the required speed, 17/8 i.p.s., 33/4 i.p.s., 7 1/2 i.p.s.

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

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

**On/off switch.** Turns on the power. The tape counter window lights up when the switch is in ON pos.

**Tape motion lever.** Mid. – pos.: stop. ←: Fast rewind, →: Fast wind, →: Normal forward drive, FREE: For easy threading of tape. Always leave the tape motion lever in mid.-pos. when the tape recorder is not used.

**Front and rear cover.** Remove the cover when cleaning the heads.

**Speaker selector**

**Compartment** for mains cord.

**Ext. speaker CH 2.** For connection to 4 ohm ext. speaker. The two contacts are connected in parallel.

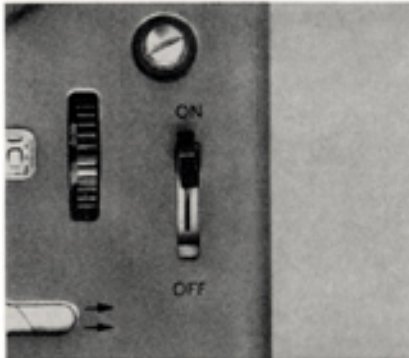
**Center channel output.** For connection to headphones. The two contacts are connected in parallel.

**Ext. speaker CH 1.** For connection to 4 ohm ext. speaker. The two contacts are connected in parallel.

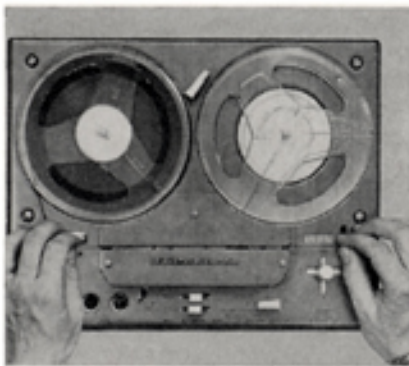
**Pre. amp. output.** For connection to external power amp. The upper contact: CH 1. The lower contact: CH 2.



## Make ready for recording



Pull out the mains cord from the compartment at the rear of the recorder and plug it into the electric outlet. Turn the power switch to ON.



Place a full tape reel on the left spindle and cut off the sticky end, (or one may risk getting glue on the tape heads). Insert length of tape in the tape slot, making sure that the tape is not twisted and the shiny side is towards you.



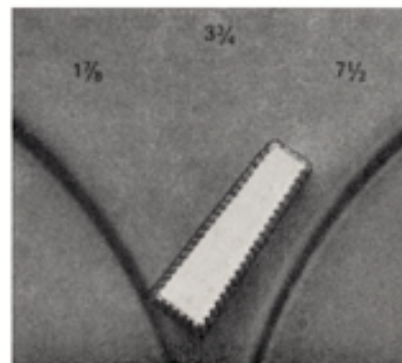
Set the tape motion lever to FREE position. Both turntables will now run freely.



Bring the tape end into the slot of the empty right tape reel and hold the tape while turning the reel counter-clockwise. During recording and playback the tape moves from left to right.

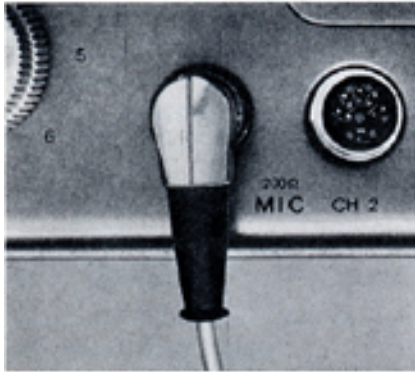


Reset the tape counter to zero when starting from the beginning of a tape. The counter indicates the number of rotations on the right turntable during all modes of operation.



Set the speed selector to the desired tape speed.  $7\frac{1}{2}$  i.p.s. speed gives best sound quality while the  $1\frac{7}{8}$  i.p.s. speed gives longest playing time. The speed can be changed while the recorder is running.

## Mono recording

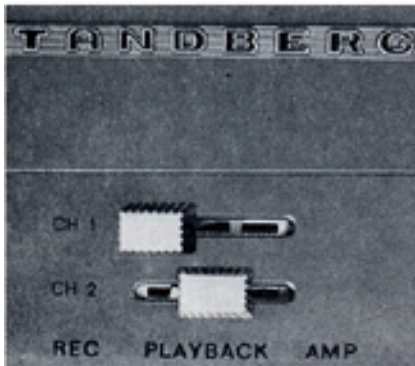


### From microphone:

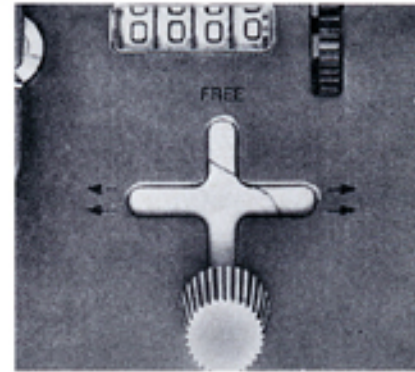
Push the microphone plug into the connector marked MIC. CH 1. The two microphone inputs are connected in parallel (after pre-amplifiers) during mono recording. Consequently the microphone can be left in the MIC. CH 1 input during mono recording on CH 2.



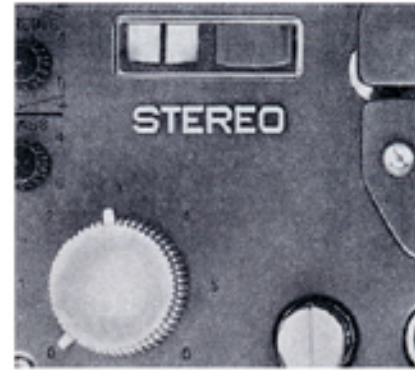
A low impedance dynamic microphone should be used. The Tandberg TM 4 has been specially designed for use with the model 12. This is a high quality dynamic microphone for recording of both speech and music.



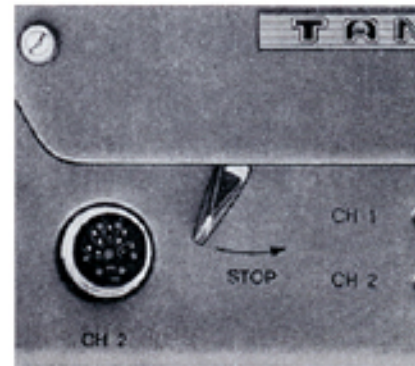
Set the function selector switch CH 1 to REC. position and hold —. If the recording is to take place on CH 2, the function selector switch CH 2 is to be set to REC. position.



Move the tape motion lever to → position while the function selector switch is held in REC. position. The function selector switch will now be locked in REC. position, and the left electronic beam indicator will light up.



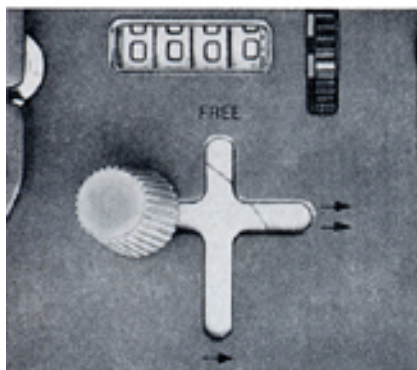
It should be learned by experience to set the recording level, but the following two matters must be taken into consideration. Too high recording gain will result in certain distortion, while too low recording gain will give an unfavourable signal to noise ratio. However, a certain overloading of the indicators (overlapping) can be allowed on short sound parties (crescendoes).



Start the recording by moving the start/stop lever to the left position. The tape can be stopped immediately during the recording by moving the lever to stop position. It is started instantly by releasing the lever .

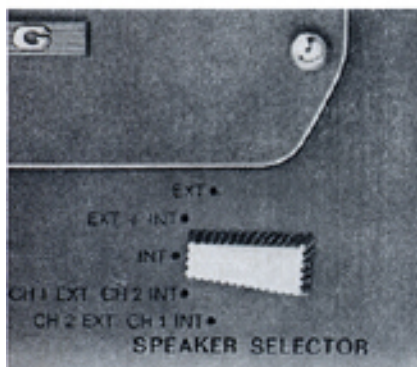


## Mono playback



### Through internal speakers:

Rewind the tape to the right spot, indicated by the tape counter, by moving the tape motion lever to ← position.



Set the speaker selector to INT position.

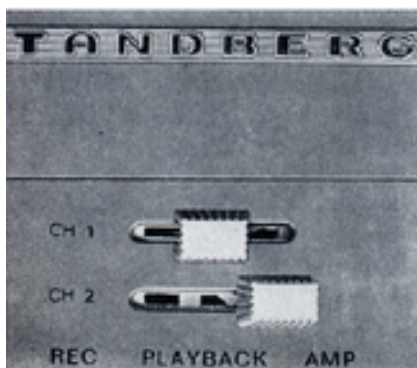
EXT: External speakers only.

EXT + INT: All speakers.

INT: Internal speakers only.

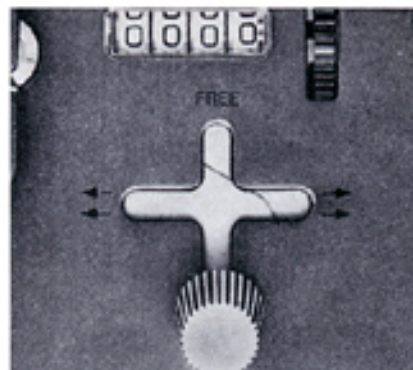
CH 1 EXT CH 2 INT: CH 1 through external speakers and CH 2 through internal speakers.

CH 2 EXT CH 1 INT: CH 2 through external speakers and CH 1 through internal speakers.

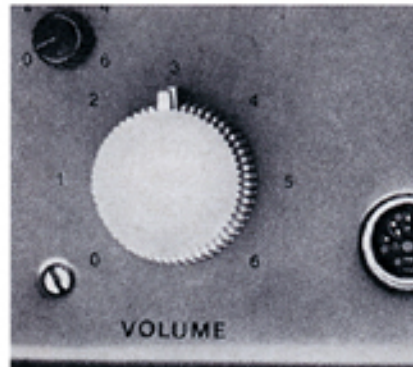


Leave the function selector switch CH 1 in PLAYBACK position and move the switch CH 2 to AMP position. If playing back from CH 2 the function selector switch CH 2 should be left in PLAYBACK position while the switch CH 1 is moved to AMP position.

The program will now be reproduced through both amplifiers and internal speakers.



Move the tape motion lever to → position, and the tape will start running. Pauses can be made during playback while operating the momentary start/stop lever.



The playback volume is adjusted by the volume control.

Upper knob: CH 1 – controls the left speaker.

Lower knob: CH 2 – controls the right speaker.

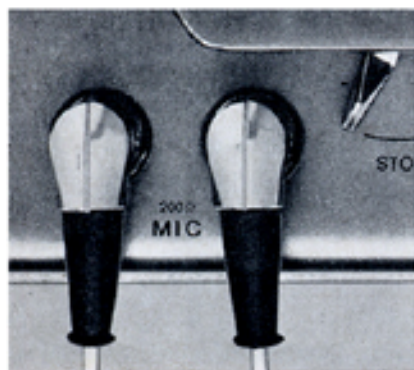


An increase of the bass amplification is obtained during playback by turning the BASS control knob clockwise.

A treble cut is obtained by turning the TREBLE control knob clockwise.



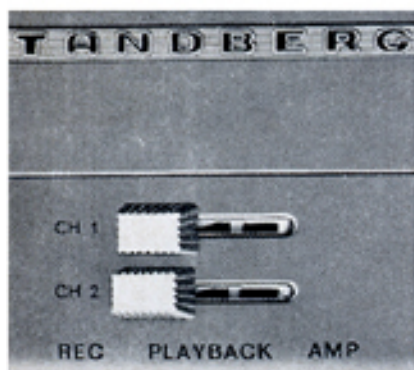
## Stereo recording



### From microphones:

The procedure for stereo recording is the same as described on page 6 for mono recording with the following exception.

One microphone is plugged into the jack marked MIC. CH 1 and placed to the left of the recording signal source. The other microphone is plugged into the MIC. CH 2 jack and placed to the right of the recording signal source.



Set both function selector switches to REC. position and hold— while the tape motion lever is moved to → position.

Both electronic beam indicators will light up.

The function selector switches are now locked in REC. position.

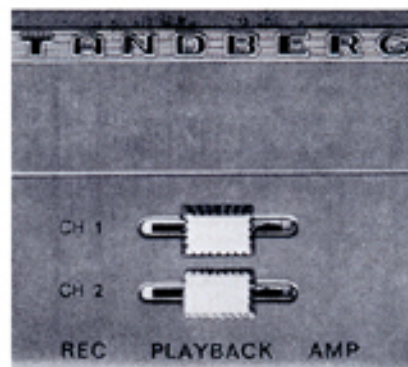


Adjust the recording levels with the two volume control knobs as described on page 6.

Upper knob: CH 1 – Left indicator  
Lower knob: CH 2 – Right indicator.

Start the recording by moving the momentary start/stop lever to the left position.

## Stereo playback



### Through internal speakers:

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

After the tape has been rewound both function selector switches should be left in playback position and the tape motion lever is set to → position.



The playback volume is adjusted by the volume controls.

Upper knob: controls the left speaker (CH 1).

Lower knob: controls the right speaker (CH 2).



An increase of the bass amplification is obtained during playback by turning the BASS control knob clockwise.

A treble cut is obtained by turning the TREBLE control knob clockwise.

The tone controls operate on both channels simultaneously.



## Connecting external equipment



### For mono recording:

The inputs (CH 1 and CH 2) are connected in parallel (after pre-amplifiers) during mono recording. Consequently the input signal can be fed to either terminals during mono recording. The recording procedure is the same as described on page 6 except for the microphone **which must be pulled out.**



### For stereo recording:

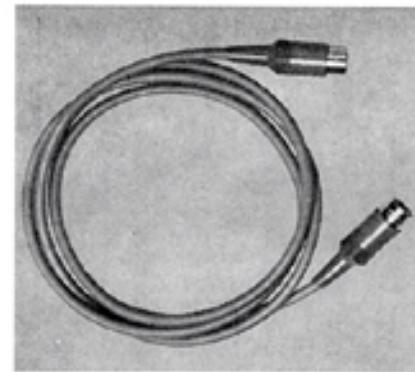
Connect the TAPE OUTPUTS from your pre-amplifier to the HIGH input terminals CH 1 and CH 2. The recording procedure is the same as described on page 8 except for the microphone plugs **which must be pulled out.**

Set the MX-FILTER switch to ON position when recording from FM-MX tuner.



### LOW inputs:

The LOW inputs are intended for connection to the diode outputs from radio receivers (European receivers).



### DIN contacts.

The DIN contacts are introduced to facilitate connection of the tape recorder to auxillary equipment where such contacts are installed. A cord with a five pin DIN connector at each end should be used for these connections.



### Radio, tuner, amplifier:

Connect the DIN cord between the RADIO contact on the tape recorder and the DIN contact on the amplifier, radio, tuner, etc. This cord will now carry all connections necessary for stereo or mono record or playback.

The DIN contact marked RADIO is connected in parallel with the two LOW level inputs.



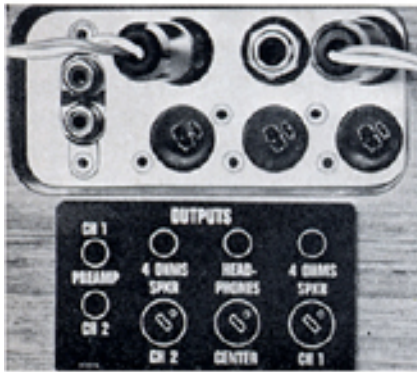
### Gramophone:

Connect the DIN cord between the DIN contact on the recorder marked PHONO and the DIN contact on the gramophone. This cord will now carry all connections necessary for stereo or mono recording from the record player.

The DIN contact marked CR PHONO is connected in parallel with the two HIGH level inputs.



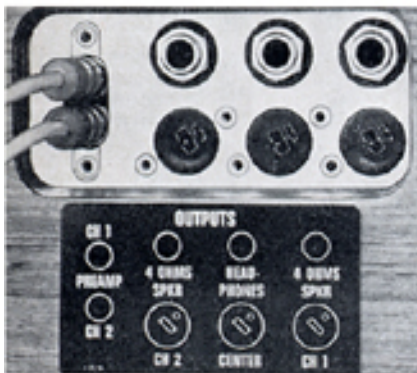
## Playback through external equipment



### External speakers:

External speakers are connected to the 4 OHMS SPKR. terminals which take standard telephone plugs.

CH 1: Left speaker  
CH 2: Right speaker



### External amplifier:

The input of external power amplifiers are connected to the PRE-AMP. output terminal.

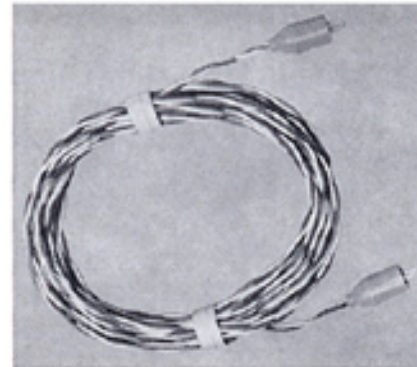
Upper phono contact: CH 1  
Lower phono contact: CH 2

The PREAMP output terminals are not affected by the volume controls, tone controls or speaker selector switch.



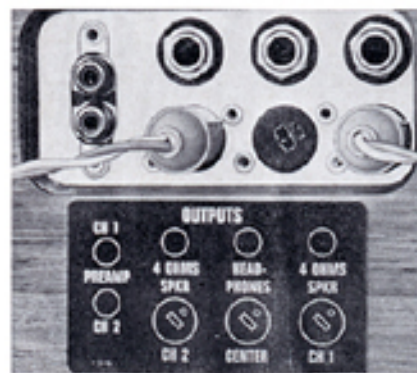
### Center channel output:

A mono amplifier or a radio receiver used as a mono amplifier can be connected to the HEAD-PHONES CENTER output terminal. Both channels in a stereo recording will be reproduced through this terminal during recording and playback. This terminal is also used for language study, see chapter Language education, page 14.



### DIN contacts for playback:

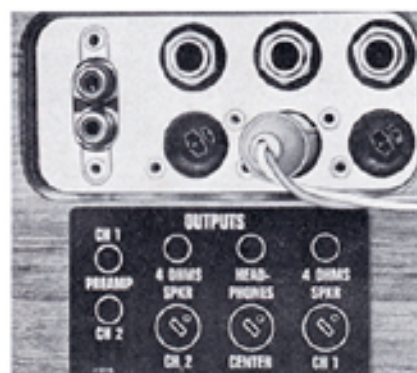
The two pin DIN contacts are introduced to facilitate connection to external speakers where such connectors already are installed. An external loudspeaker cord with two pin DIN connectors at each end should be used for these connections. Flat pin on DIN-connector is grounded.



### External speakers:

The two pin DIN loudspeaker connectors are connected in parallel with the two standard telephone output jacks for external speakers.

CH 1: Left speaker  
CH 2: Right speaker

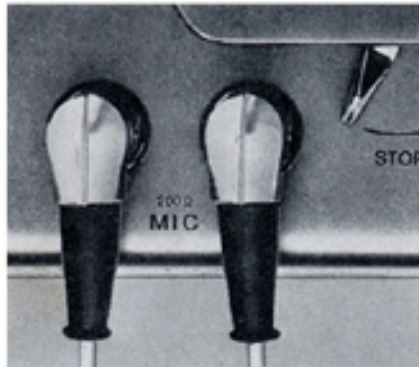


### Center channel:

The DIN connector for the center channel output is connected in parallel with the standard telephone jack for same, and can consequently be used for connection to headphones.

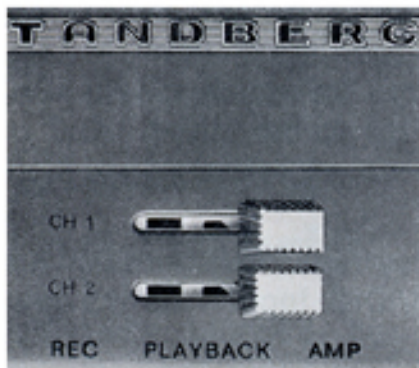


## Stereo amplifier



Plug in the two dynamic microphones in the microphone contacts. The amplifiers can be fed either from microphones or from the input terminals at the rear of the recorder.

Note: When the microphones are plugged in, the corresponding input terminals at the rear will automatically be disconnected.



Move both function selector switches to AMP position.

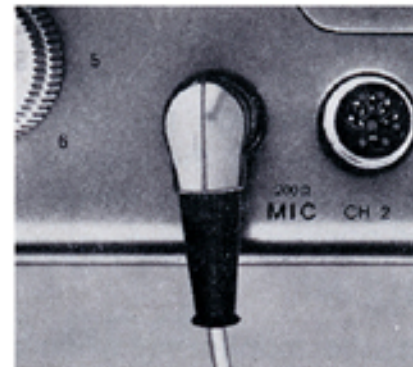


The volume is adjusted by the volume controls.

Upper knob: CH 1 – left speaker  
Lower knob: CH 2 – right speaker during stereo playback. To prevent oscillations caused by acoustical feedback one must ascertain sufficient distance between the microphones and speakers.

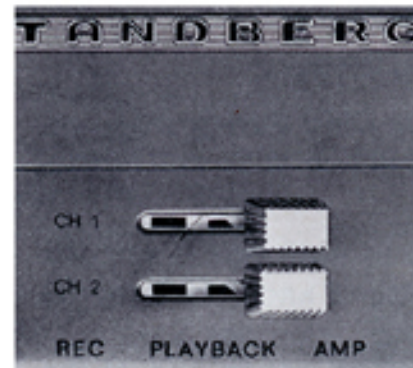
The speaker selector switch and the tone controls are active as

## Mono amplifier



Plug in a dynamic microphone in either of the microphone contacts, CH 1 or CH 2. The amplifier can be fed either from a microphone or from the input terminals at the rear of the recorder.

Note: When the microphone is plugged in, the corresponding input terminals at the rear will automatically be disconnected.



Move both function selector switches to AMP position and set the speaker selector switch to EXT position if the program is to be reproduced through the external speakers. If the program is to be reproduced through the internal speakers, the speaker selector switch must be set to INT position.



Adjust the volume by the appropriate volume control.

Upper knob is adjusted when channel 1 is used as amplifier (the microphone connected to MIC CH 1).

Lower knob is adjusted when channel 2 is used as amplifier (the microphone connected to MIC CH 2).

The tone controls are active as during stereo playback.

# Monitoring

## **Monitoring during mono recording CH 1:**

The function selector switch CH 1 is set to REC. position, while the function selector switch CH 2 is set to AMP position. The monitoring is obtained through the right speaker (CH 2) with adjustable output set by the volume control CH 2 (Lower knob). The speaker selector switch must be set to one of the following positions:

EXT. + INT., INT. or CH 1 EXT. CH 2 INT.

The EXT. position will disconnect the monitoring when external speakers are not used.

## **Monitoring during mono recording CH 2:**

The procedure for monitoring from CH 2 during mono recording is the same as outlined above with the following exceptions:

The function selector CH 1 is set to AMP pos. and CH 2 to REC pos. The upper volume control knob controls the monitoring volume.

The speaker selector switch must be set to one of the following positions:

EXT. + INT., INT. or CH 2 EXT. CH 1 INT.

## **Monitoring during stereo recording:**

Monitoring during stereo recording is automatically obtained through internal or external speakers at a reduced output dependent of the setting of the record gain controls. If headphones are preferred for monitoring these should be connected to the 4 OHMS SPKR output

terminals. The speaker selector switch should be set to EXT pos.

Note: To prevent oscillations caused by acoustical feedback when monitoring during recording with microphone one should ascertain sufficient distance between the microphone and speaker.

# Mixing

## **Mixing during mono recording:**

Two programs can be mixed during mono recording with microphones when the different programs are fed to each microphone input terminal. The recording level is set by the volume control for the recording channel. Instead of feeding both programs through the microphone inputs, one of the programs can be fed to the HIGH, LOW or the RADIO contact of the channel which is not used for the microphone program.

Note: Plugging in one microphone disconnects the HIGH, LOW and the RADIO inputs for the corresponding channel.

Four programs can be mixed during mono recording by feeding different programs to HIGH and LOW level inputs for both channels. The microphone plugs must be pulled out. The recording level for all programs will be controlled by the volume controls for the channel set to record mode.

## **Mixing during stereo recording:**

Two programs can be mixed on each channel during stereo recording by feeding different programs into HIGH and LOW level inputs CH 1 and CH 2.



## Erasing

Previous recordings will automatically be erased during the recording process. If you wish to erase a program without recording a new one it may be done by running the tape through the tape recorder with the function selector switches to REC. position and the volume controls set to zero.

## Cleaning the heads

All parts touched by the tape should be cleaned occasionally. Any foreign matter, such as dust, lint, or magnetic oxide particles from the tape can seriously affect the quality of recording, resulting in drop outs and lack of treble response. To clean, remove front and rear head-covers. Use a piece of cotton or soft cloth and clean the parts touching

the tape with alcohol or magnetic head cleaner. Do NOT use acetone or trichlorethylene. Dry off rubber roller and capstan. Replace head covers.

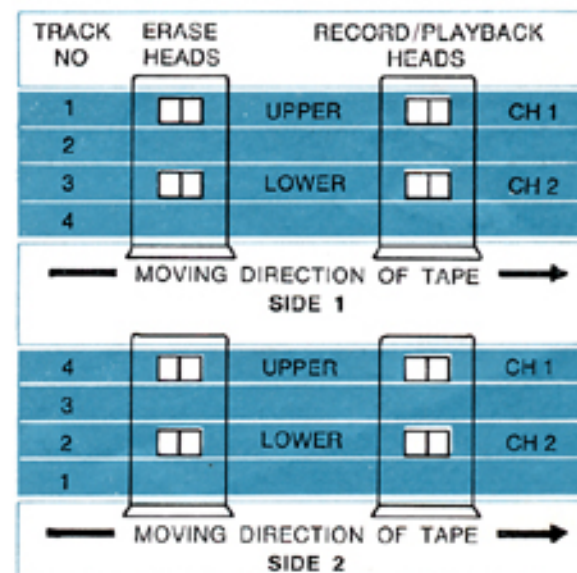
## 4-Track mono recording and playback

This paragraph is valid for the four track version of model 12 only.

During stereo recording or playback, the tape heads cover tracks 1 and 3 on side 1 of the tape. If the tape is turned around (see fig.), side 2 will be up, and the tape heads cover track 2 and 4. The upper channel will cover either track 1 or track 4 and the lower channel either track 3 or track 2.

For monaural recording on all 4 tracks, the procedure is as follows: Push the function selector switch for CH 1 to REC. position. The re-

ording will take place on track 1. When the tape has been run through, turn it around and continue the recording, now on track 4. (Adjust the upper Volume Control knob for tracks 1 and 4.) Turn the tape reel around again and move the function selector switch for CH 2 to REC. position. You will now record on track 3. Finally turn the tape around once more to record on track 2. (Adjust the lower Volume Control knob for tracks 3 and 2.)



# Add a Track - Sound on Sound

## Add a Track

This is a technique whereby one may play back a program from one channel and at the same time record another on the other channel. When playing back in stereo both programs will be heard simultaneously. If this is done on a recorder with a combined record and playback head (Model 12) a synchronized playback of both channels in stereo is possible.

Add a Track is used when synchronization of two programs is desired.

The Tandberg Tape Recorder Model 12 is very well suited for Add a Track. With the combined record and playback head in line, one is always assured full synchronization.

## Language Education

The teacher's voice (master program) is recorded on channel 1. The student records his lesson on channel 2 while listening to the playback of the teacher's voice. He will monitor his own voice at a level set by the recording volume.

During playback in stereo the student will hear the teacher's voice in the left speaker and his own voice in the right speaker.

The model 12 has built in a center channel output terminal marked HEAD-PHONES CENTER to facilitate the use of model 12 for language education. Monaural earphones are connected to the center channel output. During recording (function selector switch CH 2 in REC. position and function selector switch CH 1 in PLAYBACK position), the student will hear both the master program and his own voice in the earphones. During playback (both function selector switches to PLAYBACK position) the student will first hear the master program then his own

exercise in the earphones for compare. The student is able to record and erase his own exercise at will, with no interference to the master track.

Add a Track may also be used when commentary, background music or other sound effects are needed in conjunction with film or slide projection.

## Sound on Sound

This is a technique whereby a program is played back from one track and simultaneously a second program is added, the two programs being recorded combined on another track. (One superimposed on the other.)

Consequently the playback of the combined program must be in mono. In Add a Track where the two programs are on two separate tracks the playback must be in Stereo. In Sound on Sound one has the possibility of building up a complete program from separate sources, however, the sound quality may be slightly reduced by many recordings. Model 12 has limited possibilities for Sound on Sound. When working with combined record and playback heads as in model 12 there will always be some magnetic coupling between the head which is recording and the head playing back. When recording Sound on Sound on Model 12 the output of the playback channel is connected to the input of the recording channel. If the loop amplification from the playback head to the recording head is too great the feedback between the two heads will cause instability and oscillations. Sound on Sound can only be completely satisfactory on a machine with three heads, i.e. Tandberg Tape Recorder Model 64, if, in spite of this, you wish to make a Sound on Sound recording on Model 12, you must first find out where the oscillation limit is and keep your volume controls below this limit.

## Microphone TM 4



This dynamic microphone has been specially designed for use with Tandberg tape recorder series 12. It is combined with a detachable adjustable stand made of unbreakable plastic material. The microphone is provided with a cord to go around the neck, which enables it to be suspended on the chest.

Tandberg TM 4 is a high quality omnidirectional dynamic microphone, suitable for making high fidelity recordings of both speech and music. Careful measurements and tests, made both in the laboratory and in the field, have confirmed that TM 4 is capable of results comparable with microphones which are much more expensive.

The microphone TM 4 is furnished with a 13 ft. (4 m) cable.

## Technical data:

Frequency response:  $\pm 3$  dB 50–17 000 c/s.

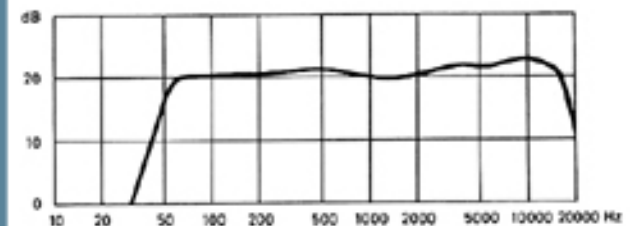
Sensibility: .096 mv/ $\mu$  bar (at 1000 c/s).

Impedance: 200 ohms.

Dimensions, microphone alone:

Length: 5 1/4" or 133 mm.

Diameter 1 3/16" or 33,5 mm.



Frequency response for Tandberg dynamic microphone TM 4.



# Specifications

## Model 12-4 (four tracks)

**Power Supply:** 220 Volts 50 c/s AC

**US-model:** 115 Volts 60 c/s AC

**Power consumption:**

58 Watts at 2 x 1,25 W output power  
100 Watts at 2 x 10 W output power

**Recording Tape:** Max. reel diameter 7". Best quality recording tape should be used.

**Tape Speeds:** 7½", 3¾" and 1⅞" per sec. The speed can be changed while the recorder is running.

**Speed Tolerance:** ± 2%, absolute tolerance.

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

	Stereo	Monaural
7½" per sec.:	2 x 32 min.	4 x 32 min.
3¾" per sec.:	2 x 64 min.	4 x 64 min.
1⅞" per sec.:	2 x 128 min.	4 x 128 min.

**Fast Forward and Rewinding:** Approx. 2 min. in either direction for 1200 feet of tape, without wear of heads.

**Transistors: 35:**

2 pairs Complementary transistors AC127, AC128 (Alternatively AC127, AC152)  
2 pairs Matched transistors AD149 (Alternatively AD150, or SFT213)  
2 ea BC107/B      2 ea SE6002  
4 ea BC109      4 ea 2848/2  
4 ea BC109/B      4 ea U3962  
6 ea SE4001      1 ea T13030

**Diodes: 3:**

1 ea Silicon voltage reference diode, 1N971B  
2 ea 1N542

**Bridge Rectifiers: 2:**

1 ea Y416  
1 ea B250 C75/30 KP

**Heads:**

1 ea Quadruple erase head.  
1 ea Quadruple record/playback head.

**Erase and Bias Frequency:** 85,5 Kc/s. Distortion less than .5%.

**Recording Level Indicators:**

2 ea EAM86.  
One electronic beam indicator for each channel, with sluggish backward movement. Indicating range 25 dB, plus overload. The indicator eyes should just close at 5% distortion (from tape).

**Inputs:** 2 microphone inputs for low impedance dynamic microphones, 200 ohm unbalanced (5 pin DIN-connectors). Sensitivity .15 mV. 2 line inputs: High level input, 1 Mohm, sensitivity 75 mV. Low level input, 100 Kohm, sensitivity 7.5 mV. Dynamic range, for all inputs + 40 dB. Four phono contacts for HIGH and LOW inputs (CH 1 and CH 2). One 5 pin DIN connector for connection to Radio. One 5 pin DIN connector for connection to Phono. Stereo multiplex filter for line inputs can be switched in or out.

**FM-Mx filter:** 19kc/s filter for stereo radio recordings. The filter can be switched in or out.

**Signal/noise ratio:** Noise 55 dB below maximum recording level. Max. recording level corresponding to 5% distortion from the tape.

**Power Amplifier Output:** At maximum recording level (5% distortion from tape) 10 watts in each channel, continuous power. Two standard telephone jacks (CH 1 and CH 2) in parallel with two DIN loudspeakercontacts are furnished for connection to ext. speakers.

**Playback Preamplifier Output:** Internal impedance 5 Kohm. Open circuit output voltage .75 Volt, independent of the setting of all switches and controls during playback. Two phono contacts (CH 1 and CH 2) are furnished for connection to external power amplifier.

**Center Channel Output:** Output voltage in record position, .75 Volt, open circuit. Internal impedance 82 ohm from each amplifier. Output voltage in playback position and amplifier position (AMP) max. 3 volts, open circuit. One standard telephone jack in parallel with one DIN loudspeaker contact are furnished for connection to headphones.

**Frequency Response:**

7½" per sec.: 30–20 000 c/s (± 2 dB 40–16 000 c/s)  
3¾" per sec.: 30–13 000 c/s (± 2 dB 50–10 000 c/s)  
1⅞" per sec.: 30– 7 000 c/s (± 2 dB 60– 5 000 c/s)  
In amplifier mode ± 3 dB 30–16 000 c/s.

**Wow**

7½" per sec.: Better than .1 % R.M.S.  
3¾" per sec.: Better than .15% R.M.S.  
1⅞" per sec.: Better than .25% R.M.S.

**Bass Control:** The bass can be continuously increased approx. 12 dB at 80 c/s during playback, or in amplifier mode.

**Treble Control:** The treble can be continuously decreased approx. 15 dB at 15 kc/s during playback, or in amplifier mode. Minimum bass and maximum treble correspond to flat frequency response.

**Internal Speakers:** 2 ea 4" x 7" speakers. Maximum output power for internal speakers is limited to 2 x 3 watts. Maximum output power 2x10watts, obtained with 4 ohms external speakers.

**Dimensions:** 15½" length, 11⅞" width, 6⅞" height. Teak cabinet.

**Weight:** Approximately 23 lbs.

## Model 12-2 (two tracks)

Specifications as Model 12-4 (four tracks) except for the following:

1 ea two-tracks erase head.  
1 ea two-tracks record/playback head.  
The signal to noise ratio is 3 dB better compared with model 12-4.