

TANDBERG

HI-FI STEREO



TANDBERG

PRODUCTS WITH A WORLDWIDE REPUTATION



Every musical performance is an experience. The composer's message is re-created by the players and the conductor for the listener. Tandberg products are designed to carry musical experiences and messages from people to people: to bring images, ideas, impressions, and contact: to stimulate, inspire and enrich people's lives. For more than 40 years Tandberg has developed and produced advanced electronic equipment with the highest regard for quality and reliability. Personal involvement in good working conditions and a pleasant environment gives the people behind Tandberg products the incentive to design and produce something out of the ordinary. We receive pleasure and enthusiasm from making products that are amongst the best in the world and we would like our customers to share this same pleasure and enthusiasm through owning a Tandberg product.

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TAPE RECORDERS



1977 is the 25th anniversary of the first Tandberg tape recorder

Tandberg was one of the first companies in the world to design and produce a tape recorder for domestic markets. Earlier tape recorders were used for professional purposes (broadcasting, films), but in 1952 Tandberg tape recorder I appeared on domestic markets. This machine marked the start of a development story that has reached the point today where the tape recorder is everyman's product.

Millions of people use tape recorders every day as a valuable electronic aid as well as for instruction and entertainment. In the space of 25 years Tandberg tape recorders have made

the name Tandberg renowned the world over and fashioned a reputation for quality and reliability second to none.

Tandberg's expertise and experience has been used to design the very advanced machines on the market today. And out of this solid background Tandberg has found many diverse applications for the tape recorder. We are for example one of the world's leading producers of learning laboratories where tape recorders play a leading role. Another professional product group using tape recorder technology is data processing equipment, and Tandberg is also engaged in this field.

Modern Tandberg tape recorders

The 1977/78 range includes 4 models, 2 open-reel machines, and 2 cassette machines.

The 10X is the most advanced model with 3 motors, full logic-controlled operation and servo-regulated tape speeds.

Model 3500X has approximately the same performance, but was designed to sell at a lower price.

The TCD 330 is the most advanced cassette tape recorder ever made by Tandberg, and it is one of the world's leading cassette machines available today. The quality of the TCD 330 can be compared to the most advanced open-reel machines in many ways (for example the 3500X). The TCD 310 Mk II is a more reasonably priced alternative with many of the same high performance characteristics as the TCD 330.

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10X STEREO



The 10X is a refinement of all that is technologically possible in the standard 1/4 inch open-reel format today. We started to design this machine for the home. But we know that because of its many professional features and its performance it is destined to become the standard field recording instrument for professional and semi-professional users as well. The 10X has all the essential requirements for the most demanding applications: first of all it has the legendary Tandberg quality: second it is extremely reliable, robust, flexible, and convenient to operate. As with the electronics so with the mechanism: all the parts have been designed and are produced to precise limits and are therefore extremely stable.

- Tandberg Crossfield recording technique
- 3 motors
- 15 i.p.s., 7 1/2 i.p.s., and 3 3/4 i.p.s.
- Fully integrated electronic controls
- 10 1/2" reels
- Servo tape drive and tape tensioning
- Stereo mixing
- Sound-on-sound and echo
- Equalized peak level meters
- Special editing facilities
- Remote control

Logic control

The control system on the 10X is an electronic brain with 8 high-level logic integrated circuits (IC's). Electronics has replaced mechanics and the control occurs firmly and precisely with a light touch on the keyboard. The logic circuits in the 10X "think for themselves".

The electronics and the tape-tensioning system ensure that the tape flows smoothly at all times. When connected to a remote control unit with 16 feet of cable (accessory) all the logic operations can be remote controlled. The 10X possesses all the features and facilities Tandberg tape recorders are renowned for: echo,

sound-on-sound recording, source and tape tests when recording. The tape test is a particularly valuable facility since it provides precise control over the recording quality as the recording progresses.

3 motors

2 reel motors connected direct to the reel spindles ensure fast forward and backward tape winding. The drive for record and playback is provided by a brushless d.c. motor. So the motor does not radiate unwanted electrical noise and it is very dependable. The motor is electronically controlled by built-in HALL-EFFECT devices.

Accessories

Tandberg microphone and remote control unit, see page 35. Suitcase, kit for mounting 10X in a 19" rack (American standard). Adapter for NAB-standard tape spools. Model 10X can also be equipped with a PITCH CONTROL for studio use (external manual control of the speed within certain limits, used for special editing purposes).

General

Adjusted for Tandberg tape or equivalent tape of the Low Noise High Output (LH) type. Largest spool diameter 10 1/2". Fitted with spool locks for use in vertical position. Delivered as a 2- or 4-track machine. Standard equipment: 2 adapters (NAB) and 1 empty spool 10 1/2" (NAB). **Dimensions** (without spools): width 17 1/2" (43.5 cm), height 7 1/2" (18.5 cm), depth 18 3/8" (45 cm). **Weight:** 36 lb (16.4 kg). **Specification, see page 12.**

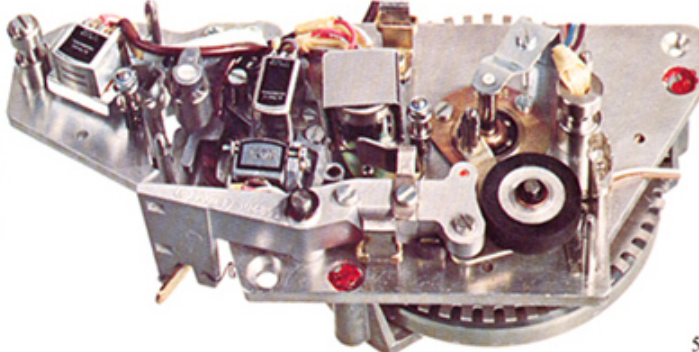
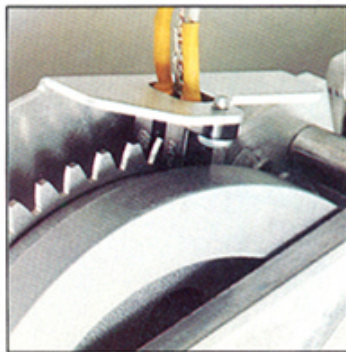
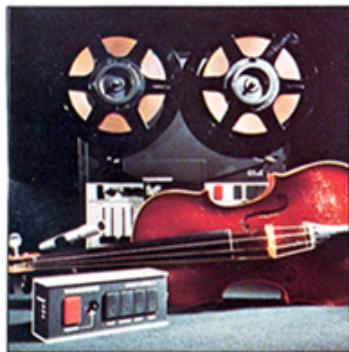
Read more about the 10X in the large separate brochure!

All the operational modes can be remotely controlled from a separate plug-in unit with 16 ft (5 m) of cable (accessory). The remote control unit contains the same keyboard as the tape recorder. Even when the remote control unit is connected, the mode buttons on the tape recorder are still operational. The buttons light up to show you which mode the machine is in at any particular moment. The remote control unit can be used with a timer to give you automatic record, playback, or stop at any chosen time of the day.

The servo-control system for speed regulation operates as follows: a light-emitting diode is located on one side of the toothed wheel attached to the flywheel. The teeth break the light beam and the resulting light pulses are transferred to electronic circuits via a photo-transistor located on the other side of the toothed wheel. Each speed (15", 7 1/2" and 3 3/4" per second) corresponds to a particular pulse frequency. If the comparison reveals a deviation, the capstan motor either increases or decreases its speed accordingly. The system operates instantaneously and naturally the corrections are far too small to be noticeable.

The 10X has a studio-type mechanism. This is the tape path, "the heart" of the tape recorder. The tape path consists of 4 heads, the capstan, the pinch roller and the flywheel mounted on a 5 mm thick aluminium plate. This design provides great stability so all the parts which are precisely adjusted to give optimum sound reproduction will not move. This is why the excellent performance of the 10X will be retained after years of use.

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3500X STEREO



A model in great demand in the middle price range with a good performance and many attractive features. Suitable for all Hi-Fi music systems providing record/playback in stereo or mono with excellent sound quality. The 3500X is designed for connection to a good quality stereo amplifier.

- Tandberg Crossfield recording technique
- 3 speeds: 7¹/₂, 3³/₄, and 1⁷/₈ ips.
- 4 heads
- Precise control of record and playback levels with slide potentiometers
- Large peak indicating meters — the best way to measure programme levels
- Easy editing with direct switchover from playback to record
- Tape and source monitoring during recording
- Trick recording facilities: sound-on-sound, echo, mixing in mono
- Photo-electric end stop
- Front jack for stereo headphones

Tandberg Crossfield recording technique

This is a special recording technique only found on Tandberg tape recorders. The magnetic tape passes between the record head and the Crossfield head. The tape is magnetized right through and its characteristics are thereby fully exploited. As a result the tape is able to accept very strong signals and reproduce them without audible distortion. During recording the most critical region is the one containing the highest tones. It is exactly in this region where the Crossfield technique has the most effect.

The recording quality determines the sound quality!

The playback quality of a tape can never be better than the recording quality. A tape recorded on a poor tape recorder can never be improved even when it is played back on a good machine. Tandberg has always paid particular attention to this point when designing tape recorders. The Tandberg Crossfield technique was specially developed to raise the recording quality. The tape transport and the tape path have been designed to allow the tape to pass smoothly and precisely across the heads without undue stress and strain. The heads have been developed and manufactured by Tandberg to exploit the best features of the latest types of tape. Everything possible has been done to ensure that the recording quality is excellent.

Even though the 3500X is reasonably priced it is fully equipped to play a central role in any Hi-Fi music system.

Peak level meters

The 3500X is equipped with peak-indicating level meters in the professional class. They have large scales making precise readings easy.

Peak meters (unlike VU meters) always show the parts of the sound containing the most energy — exactly those sounds that will distort first if the tape is overloaded. Correct use of the peak meters will safeguard your recordings against distortion, but at the same time allow you to fully exploit the available headroom on your tape to give you a full-depth recording.

Accessories

Tandberg microphone, see page 35. Suitcase, hard dust-cover.

General

Adjusted for Tandberg tape or corresponding tape of the Low Noise High Output (LH) type. Largest spool diameter 7". Equipped with spool locks (for use in the vertical position). Delivered as a 4-track machine.

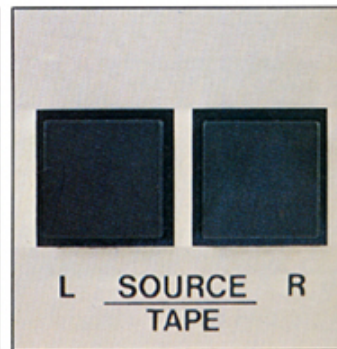
Dimensions: width 15³/₄" (40 cm), height 7¹/₄" (18 cm), and depth 16" (41 cm).

Weight: 20 lb (9.1 kg).

Specification, see page 12.

Open-reel tape recorders offer a unique method for making real high quality recordings, regardless of whether the recording source is a microphone, a record, a radio receiver, or another tape recorder. With a Tandberg open-reel machine and good microphones the sound quality and the dynamic range can be better than even the best record! Moreover Tandberg open-reel tape recorders have many valuable features and facilities e.g. opportunities for editing and trick recordings.

Unusual facilities. The 3500X has unusual facilities for record and playback. The TAPE/SOURCE buttons determine whether record monitoring will be a source (programme) test or a tape test (A test or B test). The tape test is particularly useful because you can listen to a recording that has just been made while the recording continues.



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TCD 330 STEREO



The TCD 330 is the top model in the Tandberg range of cassette tape recorders and in many ways compares favourably with open-reel machines: 3 heads, source and tape tests, editing facility, 3 motors, completely electronic controlled, remote control, servo controlled winding, dual-capstan closed-loop tape path, and dual Dolby*! The TCD 330 is a result of Tandberg's long experience with tape recorder technology and great success with the earlier models TCD 300 and TCD 310. Leading technical journals in many countries have repeatedly rated these models amongst the best in the world.

- Signal/noise ratio 65 dB minimum (DIN 45 500)!
- Frequency range 20 to 20 000 Hz (DIN 45 500)!
- Speed tolerance $\pm 0.5\%$ maximum!
- Maximum speed variation 0.15% (DIN 45 500)
- Stable tape transport. Full control over tape movement with exceptionally gentle tape handling
- MEMORY function (automatic stop during rewind at a chosen place)
- Tandberg-developed input circuits, optimized for minimum noise regardless of source impedance
- Peak indicating meters — the only correct way to measure sound level after equalization. Also indicate playback level
- Editing facility
- Manual head adjustment
- Decoder for recording Dolbyized FM programmes
- Built-in MPX filter (can be disconnected for extended frequency range when recording from another source other than stereo FM)
- Matched to all types of good quality tape
- Adjustable output level
- Front jack for stereo headphones (level controllable)

Read more about the TCD 330 in the large separate brochure.

Tandberg was the first company in the world to design a cassette tape recorder with a combination of 3 motors and an advanced tape transport called the dual-capstan closed-loop system. On the TCD 330 we have taken the development a stage further and included professional features and facilities normally found only on the most advanced open-reel machines. This means that with the TCD 330 Tandberg is setting new standards with the application of advanced technology, professional facilities and a professional performance for cassette machines.

3 heads — source and tape tests as you record!

This facility has been normal on open-reel machines for many years, but it has been missing on cassette machines. The TCD 330 has separate record and playback heads placed in the tape path where they enable you to listen to the recording as it takes place, but a fraction of a second after it has been recorded (tape test). With this facility we have fully exploited the advantage of 3 separate heads located in the correct places.

Editing facility

Another important advantage with the TCD 330. Because you can go over direct from playback to record without going via stop, you can edit tapes and clean-up recording overlaps in a simple, precise way without clicks.

Fully logic controlled

All the operational modes are logic controlled — including even the cassette eject mechanism. The control system is an "electronic brain" with integrated circuits. This corresponds to several hundred transistors and provides a very compact and reliable design. Regardless of how you use the mode buttons, the "electronic brain" always ensures that the tape flows smoothly and is not damaged. The TCD 330 has 3 motors controlled by electronics. The two reel motors are connected direct to the reel spindles while the third motor controls the capstans. The number of moving parts has been reduced to a minimum — a big advantage because all mechanisms sooner or later wear out and need adjusting or replacing. The advantages with electronic control of the TCD 330 are first and foremost, no mechanical time delays between operational modes and second, all operation times are minimal.

Rapid servo-controlled winding

The TCD 330 winds and rewinds rapidly and has an automatic electronic servo-system controlling the wind/rewind speed. The design problem is that the tape can easily be stretched at the ends if the speed and winding power are too great. We solved this problem by automatically reducing the speed as the tape gets near the end. So the tape speed is always correct and the tape is never exposed to powerful tugs when it stops.

Accessories

Tandberg microphone, Tandberg tape, Tandberg remote control unit; see page 35.

General

Dimensions: width 18 $\frac{1}{2}$ " (47 cm), height 4 $\frac{1}{8}$ " (10.5 cm) and depth 9 $\frac{1}{8}$ " (23 cm).
Weight: 14.5 lb (6.6 kg).

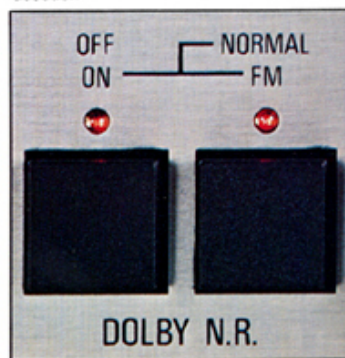
Specification, see page 12.

Azimuth adjustable on record head

The critical stage in the recording process is where the tape crosses the head. The angle between the tape and the head must be exactly 90° to achieve correct reproduction of the highest tones. But the tolerances in cassette construction will cause this angle to vary from cassette to cassette. So the tape/head angle will not always be 90°. The TCD 330 has a simple, built-in head-angle adjustment facility (azimuth adjustment) that allows you to set the head exactly to 90° for any cassette. So you get the best results from every cassette!

The Dolby B circuits

The TCD 330 Dolby B circuits are used for normal record and playback operations and to record so-called "Dolbyized FM programmes" in stereo! Increasingly more countries are transmitting stereo programmes on FM using Dolby noise reduction systems. These programmes are virtually free from hiss at the transmitter. But to take advantage of this improvement in the programme quality and to restore the correct frequency response the reproducing equipment must include a Dolby decoder. With the DOLBY N.R. button in the position "FM" the TCD 330 acts as a Dolby decoder.



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

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TCD 310 Mk II STEREO



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RADIO RECEIVERS, STEREO AMPLIFIERS



A wide selection of products setting even higher standards for quality than ever before!

Over the page we present the Tandberg range of radio receivers and stereo amplifiers for 1977/78. Few manufacturers can match this range for choice, quality or performance. The models are designed to meet different needs and are arranged to meet different price categories so that everyone can now own sophisticated Tandberg products.

The TR 2000 series is Tandberg's leading international range of receiver/amplifiers and includes some of the best Hi-Fi products in the world. All TR 2000 products have FM stereo receivers and amplifiers with high or medium output power. The top model in the series, the TR 2075 has been rated by American and European technical journals as one of the best receivers available from any manufacturer in the world. On page 28 you will find the performance specifications in a single table. You can compare the performances of the Tandberg models with each other or with any other model on the market. But make sure the measurement methods are the same when you compare Tandberg models with other models. Tandberg always expresses its specifications according

to recognized, defined methods of measurement. The output power, for example, is expressed as a continuous sine wave which should not be confused with "music power". Tandberg products have so-called "minimum specifications" which means that every single product unit leaving the factory has a performance better than the specification. Tests carried out by well-known Hi-Fi journals often report that they find the actual performance of Tandberg products is far better!

Over the years the names Sølvsuper and Huldra have gained a reputation as FM/AM multi-band receivers combined with stereo amplifiers. The new TR 2025 Multiband is a product in Tandberg's international TR 2000 series and is based on the Huldra concept.

The Sølvsuper 12 is also available with a built-in cassette tape recorder. The TR 220 is Tandberg's top ranking music centre and is available in three versions: as a straightforward FM stereo receiver and amplifier or combined with a record player (TR 220 G) or combined with a record player and a cassette tape recorder (TR 220 GC).

For availability of models see back page.

Note on equalization

All Tandberg radio receivers have the correct standard de-emphasis required for the particular market (50 μ s or 75 μ s). The TR 2075 Mk II and the TR 2055 also have a 25 μ s button which should be pressed in for Dolby broadcasts only.

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TR 2075 Mk II



The TR 2075 Mk II follows the successful model TR 2075 as the most advanced receiver/amplifier ever made by Tandberg. In common with the TR 2075 the Mk II comprises three separate main modules, a radio receiver (with FM stereo and medium waves), a preamplifier, and a power amplifier. Each module has a performance specification equal to the best individual units on the market. Leading technical journals have discovered after exhaustive tests that the individual modules in the TR 2075 (tuner, preamp, and power amp) have individual performance specifications as good as separate equivalent products costing much more.



Compared with the TR 2075 the TR 2075 Mk II has an improved performance spec. for the FM tuner and the amplifier. In addition the AM section is completely new. The stereo amplifier develops more than 75 watts sine wave for each channel into 8 ohm speakers over the complete frequency range from 20 Hz to 20 000 Hz with less than 0.05% distortion. The output power is more than 2×120 watts sine wave into 4 ohms, measured according to DIN! The TR 2075 Mk II is a truly outstanding product for all lovers of pure sound.

THE FM SECTION

- Significant improvements in important performance characteristics (image frequency rejection and spurious response), see page 28
- MOSFET transistors, 4-pole ceramic filters and integrated circuits (IC's)
- Signal/noise ratio 75 dB in stereo and 78 dB in mono (IHF)!
- Automatic switchover to FM stereo with illuminated indicator
- Electronic tuning. Heavy flywheel making tuning a pleasure
- Muting for quiet tuning
- Large tuning and signal strength meters for spot-on tuning
- 25 μ s de-emphasis button for equalizing the pre-emphasis at the transmitter

THE AM SECTION (medium wave)

- RF stage with MOSFET transistors. Balanced aerial input for receiving stronger signals without distortion
- Tuned RF circuits provide excellent sensitivity and image frequency rejection
- Outstanding selectivity and bandwidth
- Signal strength meter with large dynamic range

THE AUDIO SECTION

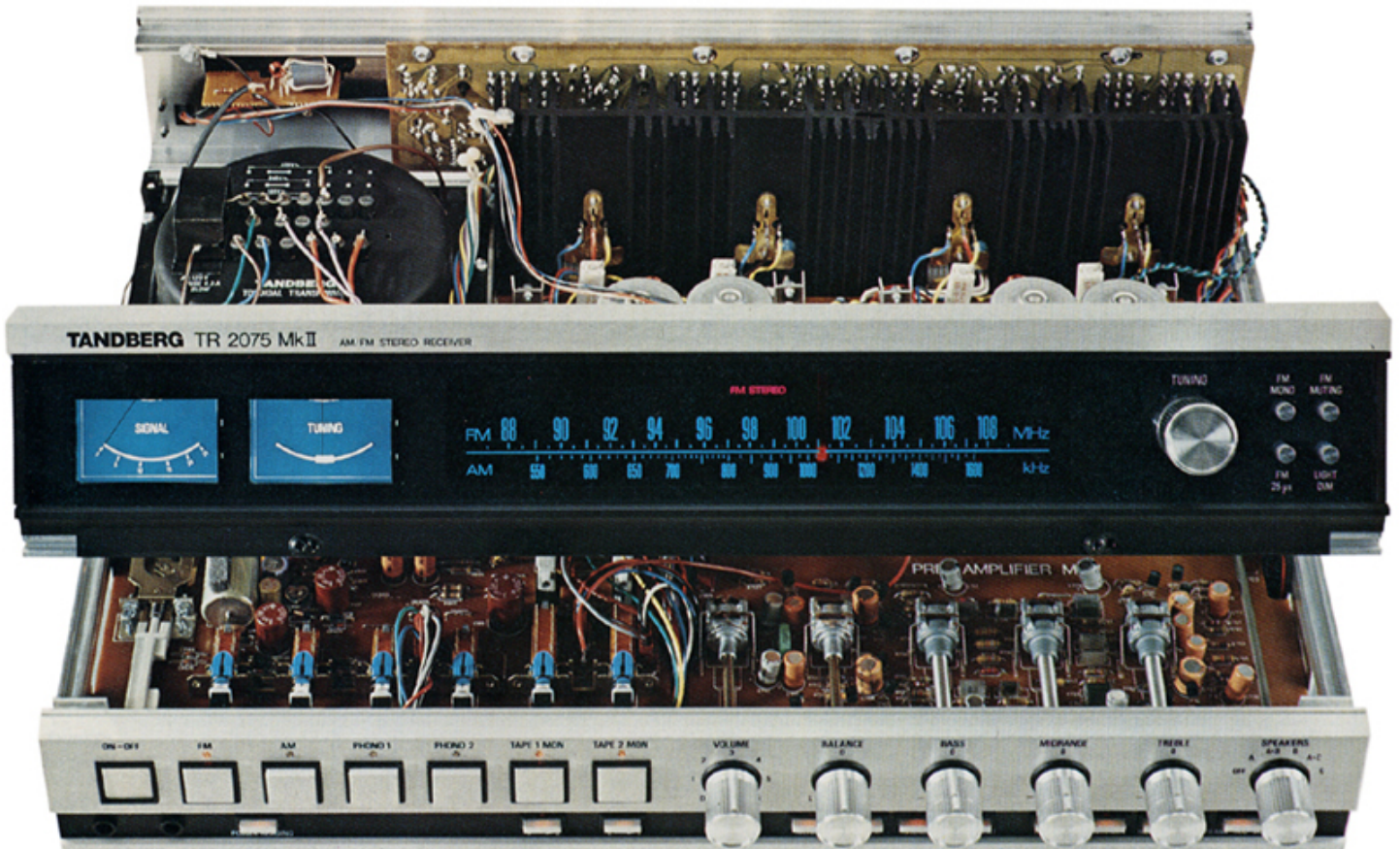
- Total distortion less than 0.05% at full output power!
- 2 inputs for transcription units, one with adjustable sensitivity
- Large dynamic range. Tolerates input signal range of 2 mV to 120 mV!
- New preamplifier with improved performance
- 2 inputs for tape recorders, adjustable sensitivity, large dynamic range and TAPE MONITOR facility
- Copying facilities for 2 tape recorders
- Output for tone-controlled programme
- 3 tone controls for each channel
- Neutralizing button for tone controls
- 3 filters (2 HIGH and 1 LOW) with steep skirts
- Excellent slew rate in the power amplifier (reacts quickly to large power changes)
- 2 front output jacks for stereo phones
- Automatic protection against all forms of overload
- Noise-free mode selection with feather-light push buttons
- Recommended speakers: Tandberg Studio Monitor (see pages 30 to 33)

General

Mains voltage: 240 V 50/60 Hz (internal tapings for 120-220-240 V).
 Dimensions: width 20 1/2" (51.5 cm), height 6" (15.3 cm), and depth 14" (35.3 cm) plus 1" (2.4 cm) for knobs.
 Weight: 27.5 lb (12.5 kg).
 Specification, see page 28.

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TR 2075 Mk II

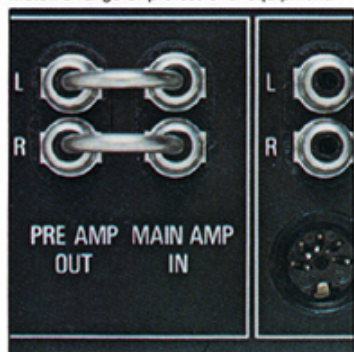


Large tuning meters. The TR 2075 Mk II has two tuning meters. The signal strength meter gives full scale deflection for strong aerial signals (200 mV); this meter can also be used for reading output powers. The centre-zero meter makes it easy to tune-in FM stations spot-on and is particularly important for stereo transmissions.

Output from preamplifier and input to power amplifier. Both the preamplifier and the power amplifier on the TR 2075 Mk II can be used as separate units. At the back of the receiver there are phono sockets with outputs and inputs for each channel. The TR 2075 Mk II has a completely new preamplifier with improved performance data. The maximum output voltage from the preamp. output is a full 5 volts with less than 0.1% distortion. This means that the TR 2075 Mk II will match a range of professional equipment.

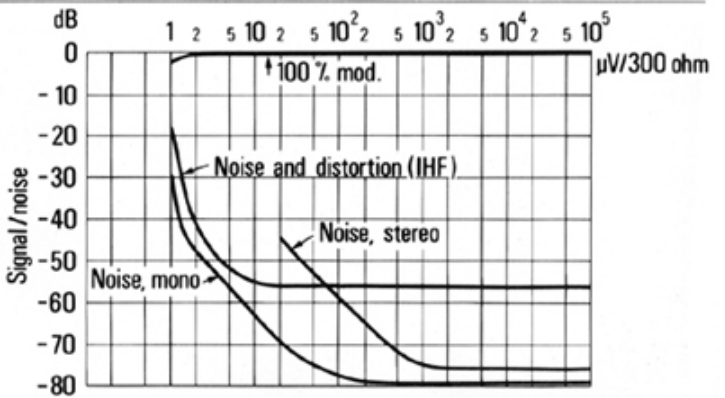
Neutralizing button for tone controls (TONE DEFEAT). A new facility. When the TONE DEFEAT button is pressed the tone controls are overridden and the audio frequency response is absolutely flat.

TAPE MONITOR and TAPE COPY facilities. Both tape recorder inputs have a TAPE MONITOR facility permitting source and tape testing during recording. The TAPE COPY facility allows copying in both directions between two tape recorders connected to the TR 2075 Mk II. Copying can take place without affecting any other programme going to the speakers.



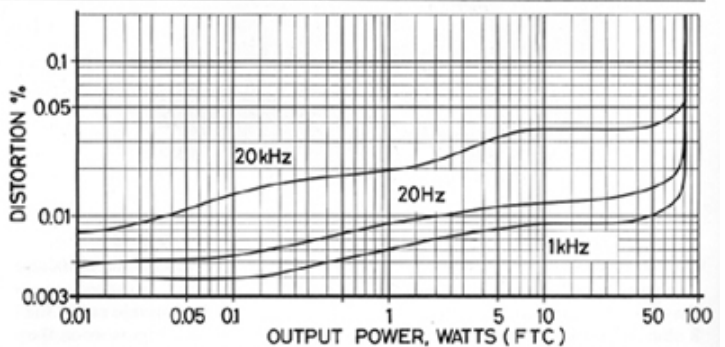
Signal/noise ratio in stereo and mono for FM receiver

The TR 2075 has a unique FM section. It has already achieved worldwide acclaim as one of the best available on the world's markets - regardless of price. With an aerial signal of only 200 μ V (300 ohms impedance) the TR 2075 Mk II has a signal/noise ratio of 78 dB in mono! With an aerial signal of 1 mV (300 ohms) the signal/noise ratio is 75 dB in stereo! One very important performance characteristic is the signal/noise ratio measured with very low aerial signals, as in the 50 dB quieting in mono according to IHF standards. From the curves you can see that with a signal of only 3 μ V (300 ohms) the TR 2075 Mk II has a signal/noise ratio of 50 dB! See also the other performance data for the FM section on page 28.



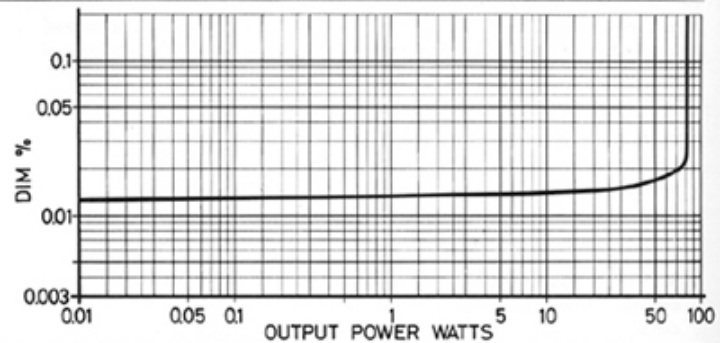
Distortion versus output power (both channels driven simultaneously)

The curves show distortion at 20 Hz, 1 kHz, and 20 kHz from the very lowest powers right up to nominal output power. The TR 2075 Mk II stands apart from many other receivers primarily because of the extremely low distortion in the output power region most used (from 0.5 watt to 10 watts). And even at full output power the total distortion is less than 0.05%! It is particularly important that the distortion does not show a tendency to increase at outputs lower than e.g. 0.5 watt. Increased distortion here would reveal a weakness in the output stage. The curves show that the TR 2075 Mk II has only 0.0015% distortion at 50 mW!



Dynamic intermodulation (DIM) versus output power

Dynamic intermodulation (previously called TIM) occurs when sudden changes in signal level from the programme source generate distortion products that were not present in the original signal. Listening tests have shown that these distortion products are not audible when they are lower than 0.2%. The curve shows that dynamic intermodulation for the TR 2075 Mk II is far below this limit of 0.2%. Tandberg is one of the first producers to give this very important key specification.



Highly efficient ferrite-rod aerial. The AM aerial is situated at the back of the receiver and can be rotated through 270° to the best position for reception. The TR 2075 Mk II also has sockets for outdoor aeriels for FM and AM.



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TR 2055



The same superb FM stereo tuner as the TR 2075 Mk II (pages 14 to 17). The power amplifier delivers more than 2×55 watts sine wave into 8 ohms over the complete frequency range 20 Hz to 20 000 Hz with less than 0.05% total distortion! The output power is more than 2×80 watts sine wave into 4 ohms, measured according to DIN!

THE FM SECTION

- Significant improvements in important performance characteristics (image frequency rejection and spurious response rejection), see page 28
- MOSFET transistors, 4-pole ceramic filters, and integrated circuits (IC's)
- Signal/noise ratio 75 dB in stereo and 78 dB in mono (IHF)!
- Automatic switchover to FM stereo
- Electronic tuning. Heavy flywheel making station-finding precise and easy
- Muting between stations
- Large tuning meter and signal strength meter for accurate tuning
- Equipped with 25 μ s de-emphasis button for Dolbyized[®] FM programmes

THE AUDIO SECTION

- Inputs for 2 transcription units and 2 tape recorders
- The same wide dynamic range for transcription unit inputs as on the TR 2075 Mk II
- Adjustable sensitivity for one of the transcription unit inputs and for both the tape recorder inputs
- Both tape recorder inputs have a TAPE MONITOR facility
- Copying facilities for 2 tape recorders
- Front output jack for recording a tone-controlled programme (TAPE CONTOUR OUT)
- Frequency/loudness compensated volume control
- 2 filters (LOW and HIGH)
- 2 front jacks for stereo headphones
- Noise-free mode selection (diode delay circuits)

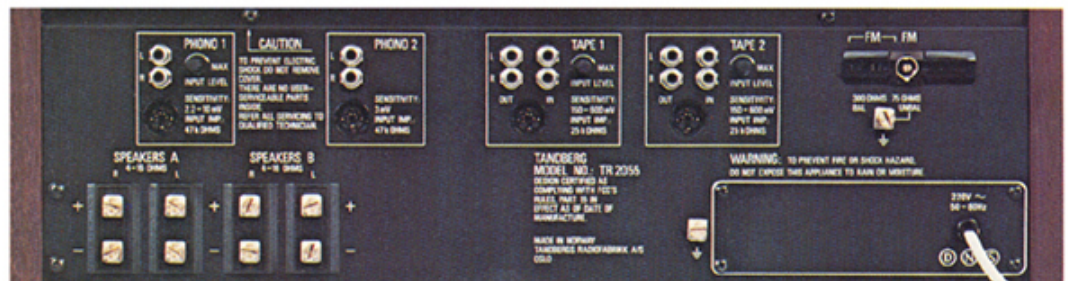
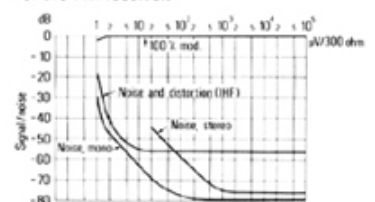
Recommended speakers for the TR 2055

We recommend first the largest speaker in the TL 20 Series — TL 5020. See pages 30 to 33. This speaker is very suitable for the large output power of the TR 2055 and it has a wide frequency response. An alternative is the TL 3520.

General

Mains voltage: 240 V, 50/60 Hz (internal tapplings for 120–220–240 V).
Dimensions: width 20" (51 cm), height 6" (15.3 cm), and depth 14" (35.3 cm) plus 1" (2.4 cm) for knobs.
Weight: 28 $\frac{1}{4}$ lb (13 kg).
Specification, see page 28.

Signal/noise ratio in stereo and mono for the FM receiver.



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

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TR 2040



The TR 2040 is also a combined stereo FM receiver and amplifier. The output power exceeds 2×40 watts sine wave over the complete frequency range 20 Hz to 20 000 Hz with less than 0.09% total distortion. The output power into 4 ohms is more than 2×70 watts sine wave, measured according to DIN! The FM receiver has 5 pre-tune station buttons.

THE FM SECTION

- Excellent stereo tuner. MOSFETS, IC's, and 3×4 -pole ceramic filters providing extremely good sensitivity and selectivity
- Automatic switchover to stereo
- Automatic frequency control (AFC) disconnects itself during tuning and connects itself again when tuning is completed. Can also be operated manually
- Heavy flywheel gives smooth, precise tuning
- 2 large sensitive meters
- Muting for quiet tuning

THE AUDIO SECTION

- The stereo amplifier has the same high quality as the other more expensive models (see specifications, page 28)
- Sockets for 2 tape recorders. Both sockets have a TAPE MONITOR facility
- Copying facilities for 2 tape recorders
- Input for record player with magnetic pick-up
- LOW and HIGH filters
- Frequency/loudness compensated volume control
- Front output jack for stereo phones

Recommended speakers for the TR 2040

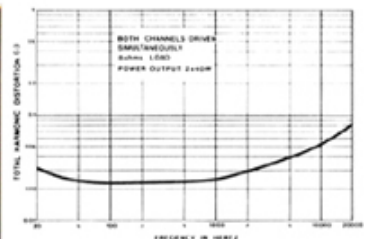
We recommend the TL 5020, or the TL 3520, or the TL 2520. All the speakers have 3-way systems with a wide frequency response that tolerate the power output from the TR 2040. See pages 30 to 33. Two or four speakers can be connected to the TR 2040.

General

Mains voltage: 240 V, 50/60 Hz (internal tapings for 120–220–240 V).
Dimensions: width $20\frac{1}{2}$ " (51.5 cm), height $5\frac{3}{4}$ " (14.3 cm), and depth $12\frac{1}{4}$ " (32 cm) plus $\frac{7}{16}$ " (2 cm) for knobs.
Weight: 21 lb (9.6 kg).
Specification, see page 28.

In common with all the other models the TR 2040 has electronic tuning. The large open scales make it easy to tune in. The scale pointer is driven by a heavy flywheel which combined with the large meters gives you spot-on station tuning – a big advantage with stereo transmissions.

Distortion versus frequency at full output power into 8 ohms.



TANDBERG

TR 2025



The TR 2025 completes the TR 2000 series — 3 top models to meet a variety of needs and pockets. The stereo FM section has pre-tuning for 5 stations. The power amplifiers deliver more than 2×25 watts sine wave in 8 ohms over the complete frequency range from 20 to 20 000 Hz with less than 0.09% total distortion. The output power exceeds 2×40 watts in 4 ohms, measured according to DIN!

THE FM SECTION

- Excellent stereo tuner. MOSFETS, IC's, and 3×4 -pole ceramic filters providing extremely good sensitivity and selectivity
- Automatic switchover to stereo
- Automatic frequency control (AFC) disconnects itself during tuning and connects itself again when tuning is completed. Can also be operated manually
- Heavy flywheel gives smooth, precise tuning
- 2 large sensitive meters
- Muting for quiet tuning

THE AUDIO SECTION

- Stereo amplifier with the same high quality as the more expensive models (see specifications on page 28)
- DIN sockets for 2 tape recorders. Both inputs have TAPE MONITOR facility
- Input for transcription unit (mag. p.u.)
- Copying facilities for 2 tape recorders simultaneously
- LOW and HIGH filters
- Frequency/loudness compensated volume control
- Front output jack for stereo headphones

Recommended speakers for the TR 2025 and the TR 2025 L

First we recommend the TL 3520, a 3-way system with a wide frequency range and high power handling capacity. An alternative is the TL 2520. See pages 30 to 33. 2 or 4 speakers can be connected to the TR 2025.

General

Mains voltage: 240 V, 50/60 Hz (internal tapings for 120–220–240 V).
Dimensions: width $20\frac{1}{2}$ " (51.5 cm), height $5\frac{3}{4}$ " (14.3 cm), and depth $12\frac{3}{4}$ " (32 cm) plus $\frac{7}{8}$ " (2 cm) for knobs.
Weight: TR 2025: $18\frac{1}{4}$ lb (8.3 kg), TR 2025 L: $18\frac{3}{4}$ lb (8.5 kg).
Specification, see page 28.



TR 2025 L: FM (stereo), long wave, and medium wave

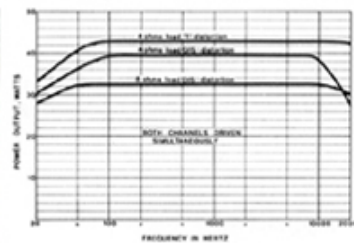
The TR 2025 is available in another version, the TR 2025 L. This model has exactly the same FM stereo tuner and amplifier as the TR 2025, but with 3 pre-tuned station buttons instead of 5. In addition the TR 2025 L has an AM section with long wave and medium wave. The built-in ferrite-rod aerial means that the TR 2025 L is independent of external aerials for long wave and medium wave, but an external aerial

can provide even better reception for weak and distant stations. Unwanted whistles are well attenuated and the receiver has a number of attractive electronic refinements. The TR 2025 L will pull in weak and strong stations with equal ease.

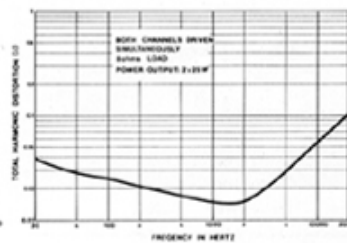
2 large meters. Signal strength meter (left) is dual purpose. For manual FM tuning it indicates signal strength with a large dynamic range. It is also a frequency scale for the 5 pre-tuned stations (TR 2025 L has 3 pre-tuned station buttons on FM). The meter on the right is a fine-tuning meter for FM.



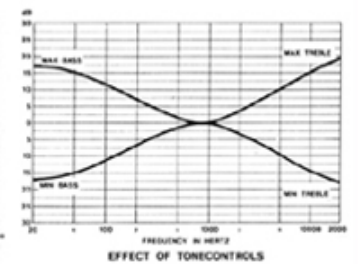
Output power versus frequency. Both channels driven simultaneously.



Distortion versus frequency.



Effect of tone controls.



TANDBERG

TR 2025 MULTIBAND



The TR 2025 Multiband is a continuation of Tandberg's long tradition in advanced receiver design. Tandberg has always had confidence in a radio receiver that covers all the wavebands with reception quality out of the ordinary. The TR 2025 Multiband is a product in the international TR 2000 series from Tandberg. This series has made its mark with outstanding specifications for FM and AM tuners and stereo amplifiers. One product in this series (the TR 2075) has already won the coveted French prize "The Golden Decibel".

The TR 2025 Multiband has 6 wavebands. The stereo amplifier delivers more than 2×25 watts sine wave output power into 8 ohms over the complete frequency range 20 Hz to 20 000 Hz with less than 0.09% total distortion. The output power measured according to DIN standards exceeds 2×40 watts sine wave into 4 ohms.

FM SECTION

- Top quality stereo tuner. MOSFET transistors, integrated circuits and three 4-pole ceramic filters provide extremely good sensitivity, selectivity, channel separation, noise suppression, and low distortion
- Automatic switchover to stereo
- Light-emitting-diode comes on for a stereo transmission
- Pre-tuning for 3 stations
- Automatic frequency control (AFC) is automatically disconnected for tuning and reconnected when tuning is complete
- 2 large, precision tuning meters make it easy to tune-in stations accurately. This feature is especially important for stereo reception
- Muting eliminates inter-station noise during tuning

AM SECTION

- Longwave, mediumwave, and 3 shortwave bands that together cover the entire international shortwave spectrum
- Strong emphasis on a brilliant tuner performance
- Carefully designed RF stage and balanced mixer stage
- Good image frequency rejection ratio, sensitivity, and signal/noise ratio for all bands
- First class reception from strong and weak aerial signals
- Large, open scale makes it easy to discriminate even when stations lie tightly packed together



Recommended speakers for the TR 2025 MB
 TL 2520 or TL 3520 (see pages 30 to 33).

General

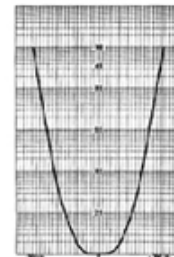
Mains voltage: 240 V (internal connections for 120, 220, and 240 V) at 50 or 60 Hz.

Dimensions: width 22" (55.5 cm), height 5 1/4" (14.5 cm), depth 12 3/4" (32 cm) plus 3/8" (2.1 cm) for knobs.

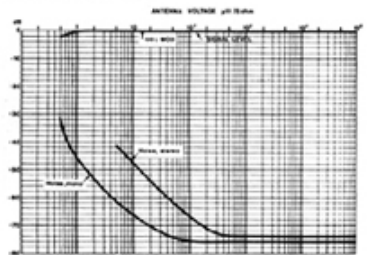
Weight: 19 1/4 lb (8.7 kg).

Specification, see page 28.

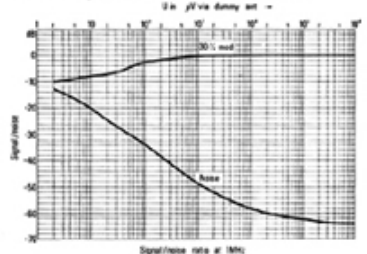
Selectivity curve for the FM tuner.



Sensitivity curves for the FM receiver in mono and stereo.



Sensitivity curves for the AM receiver.



AUDIO SECTION

- Output power 2 x 40 watts sine wave into 4 ohms (DIN)
- Amplifier quality the same as in our top models TR 2075 and TR 2055!
- Sockets for 2 tape recorders. Both inputs have the TAPE MONITOR facility
- Tape copying facilities between 2 connected tape recorders
- Input for record player with magnetic pick-up
- 2 efficient filters (LOW and HIGH)
- Frequency/loudness compensated volume control
- Front output jack for stereo phones

Ask your dealer for the large separate brochure on the TR 2025 Multiband.

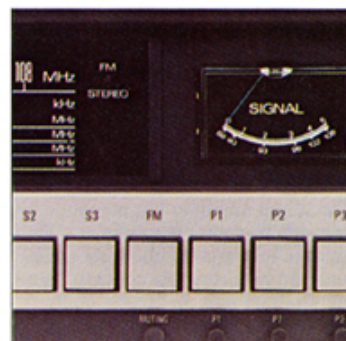
The TR 2025 Multiband as the heart of an advanced Tandberg music system

The TR 2025 MB can be combined with other Tandberg products to make a range of superb music systems from which you can choose according to your personal taste and needs. With an open-reel tape recorder you can make really sparkling recordings from radio programmes, a transcription unit, or a microphone. Two tape recorders can be connected to the TR 2025 MB and one of them can be for example a cassette recorder for copying programmes you have edited.

There are 4 separate speaker outputs and stereo headphones can be plugged into the front panel. Headphone listening avoids disturbing others.

With the TR 2025 MB you can receive radio programmes from all over the world. There are 6 wavebands and the 3 short-wave bands cover the entire international SW spectrum. The large open scale spreads out the stations and coupled with the large meters makes precision tuning easy. On FM 3 stations can be pre-selected.

Some of the outstanding performance characteristics on the TR 2025 MB. Both tape recorder connections have the TAPE MONITOR facility allowing you to monitor the quality of a recording as it progresses with a source (A) test and a tape (B) test. The B test is particularly useful for revealing the quality of a recording. The speaker selectors (below) have 4 positions. They control all the speakers connected to the receiver.



TANDBERG

SØLVSUPER 12, 12C



Tandberg Sølvsuper — the best selling table receiver in Norway. You can now buy this famous model with a built-in stereo cassette tape recorder as the Sølvsuper 12 C. The cassette tape recorder has a microphone input, manual level controls for recording, and LED record level indicators. There are many reasons why the Sølvsuper has become so popular. First of all its reliability. Then good design and a clean simple layout for the operating controls. The Sølvsuper 12 has the same quality features as its 11 predecessors. To obtain full enjoyment from it you ought to have loudspeakers that do it justice. We therefore recommend that you ask for the Sølvsuper 12 to be demonstrated with Tandberg Hi-Fi loudspeakers!

- FM, long wave, medium wave, and short wave
- FM tuner fully equipped for stereo reception
- Muting (no noise between stations)
- AFC (automatic frequency control)
- Powerful stereo amplifier. Sine wave output power 2×17 watts in 8 ohms, 2×22 watts in 4 ohms
- Frequency/loudness compensated volume control
- Can be connected to a record player with ceramic or magnetic pick-up and a tape recorder
- Front jack for stereo headphones

The receiver

The stereo decoder in the FM tuner has integrated circuits and a light diode to indicate stereo transmissions. The FM tuner has ceramic filters that discriminate well between stations (good selectivity).

The high quality stereo amplifier

The stereo amplifier has many valuable features. The volume balance between the channels can be changed by a separate control. There are separate bass and treble controls. The volume control is frequency/loudness compensated.

Sølvsuper 12 C — the cassette model

The Sølvsuper 12 C cassette model has the same tuner and amplifier sections as the Sølvsuper 12. In addition it has an excellent built-in cassette tape recorder for record and playback of programmes from radio, record player, microphone, or another tape recorder.

The Sølvsuper as the central unit in a Tandberg Music Centre

Most people who own a Sølvsuper use it as the central unit in a music centre. The Sølvsuper 12 can be connected to a tape recorder and a record player with a magnetic or ceramic pick-up (to achieve the full benefit of quality reproduction from the Sølvsuper a magnetic pick-up is recommended).

From the loudspeaker range on pages 30 to 33 we recommend the TL 1520 for use with the Sølvsuper 12. The TL 1520 can handle more power than the Sølvsuper can deliver!

General

Mains voltage: 240 V, 50 or 60 Hz (internal tapings for 120–220–240 V).
Dimensions: Sølvsuper 12: width $19\frac{1}{2}$ " (49.5 cm), height $4\frac{3}{8}$ " (11.7 cm), and depth $9\frac{1}{2}$ " (24 cm) plus $\frac{7}{8}$ " (2 cm) for knobs. Sølvsuper 12 C: width $25\frac{1}{2}$ " (64.5 cm), height $4\frac{5}{8}$ " (11.5 cm), and depth $9\frac{1}{2}$ " (24 cm) plus $\frac{7}{8}$ " (2 cm) for knobs.
Weight: Sølvsuper 12: 12.5 lb (5.8 kg). Sølvsuper 12 C: 18 lb (8.2 kg).
Specifications for the receiver and the stereo amplifier, see page 28.

Specification for cassette tape recorder (DIN 45500)

Speed tolerance: $\pm 1\%$ max.
Speed variations: 0.25% max. (peak weighted).
Frequency range: 40 to 13 000 Hz.
Signal/noise ratio: greater than 57 dB.

TANDBERG

TR 220



FM stereo tuner and powerful stereo amplifier: 2 x 17 watts sine wave output power in 8 ohms, 2 x 25 watts sine in 4 ohms.

- FM stereo receiver
- Tuner has MOSFET transistors, ceramic filters and integrated circuits (IC's)
- Pre-tuning for 4 stations
- Muting
- 2 large meters
- AFC (automatic frequency control)
- Pre-amplifier designed for record player with magnetic pick-up (RIAA)
- Frequency/loudness compensated volume control
- LOW and HIGH filters
- Inputs for 2 tape recorders, one with TAPE/MONITOR facility
- 4 speaker outputs
- Front jack for stereo headphones

The FM tuner

The Tandberg TR 220 has an excellent FM tuner constructed with field effect transistors (MOSFETS) and integrated circuits (IC's). This combination provides good sensitivity and prevents interference from strong neighbouring stations. The tuner also has ceramic filters providing good selectivity and minimum distortion. The stereo decoder has integrated circuits and a phase-locked-loop oscillator providing good channel separation and low distortion. The 2 large meters make it easy to tune-in stations spot-on.

The powerful stereo amplifier

The stereo amplifier has full complementary output stages giving low distortion — i.e. pure sound. There is a balance control and a common volume control for both channels. The volume control can be frequency/loudness compensated. The bass and treble controls are very effective. The TR 220 is also equipped with efficient filters (HIGH and LOW) which attenuate undesirable noise from programme sources.

Input/output sockets

The TR 220 can be connected to a record player with a magnetic pick-up and 2 tape recorders. One of the tape recorder inputs has a TAPE/MONITOR facility making it possible to test and control the programme being recorded in two ways, source test and tape test. There are 4 speaker outputs and a front jack for stereo headphones. The extra input can also be used for connecting a portable radio with AM bands (long, medium, and short waves).

Loudspeakers

We recommend the TL 1520 or the TL 2520 or the Fasett.

General

Mains voltage: 240 V, 50/60 Hz (internal tapings for 120–220–240 V).
Dimensions: width 22 1/4" (56.7 cm), height 4 3/4" (11.7 cm), and depth 12 1/2" (31.2 cm) plus knobs 3/4" (1.6 cm).
Weight: 14.5 lb (6.6 kg).
Specification, see page 28.

TANDBERG

TR 220 GC



A compact model in the same quality class as the TR 220. The stereo amplifier and the FM tuner are identical with the TR 220, and in addition the TR 220 GC has the same built-in record player as the TR 220 G (see the TR 220 G for a full description of the record player). The TR 220 GC also has a built-in cassette tape recorder making it a complete compact audio system. With the TR 220 GC you only need loudspeakers to turn it into a full Hi-Fi music centre (see page 25 for recommended loudspeakers).

Convenience and compatibility

The TR 220 GC gives you an extremely comprehensive audio system with the minimum of loose wires. You are also assured that all the separate audio units in the system match one another because they are designed to be compatible by Tandberg.

The cassette tape recorder

With the cassette tape recorder you can record from the radio receiver, the record player, another tape recorder, or a microphone. Recording FM stereo broadcasts is a particularly useful facility. Afterwards the cassettes can also be used in a portable cassette player or a car cassette player. The cassette tape recorder has manual level controls for recording, peak indicating level meters, high quality heads, an automatic end stop, and the Dolby B* noise reduction system that really does cut the tape noise. A hinged dust cover completely covers the record player and tape recorder.

General

Mains voltage: 240 V, 50 Hz (internal tappings for 120-220-240 V).
Dimensions: width 22 1/2" (56.7 cm), height 7 1/2" (18.6 cm) with cover, and depth 13 1/2" (33.9 cm) plus 3/4" (1.6 cm) for knobs.
Weight: 27 lb (12.3 kg).

Specification for cassette tape recorder measured according to DIN 45500

Speed variations: ±0.2%.
Speed tolerances: ±1%.
Frequency range: 35 Hz to 14 000 Hz.
Signal/noise ratio measured with the Dolby noise reduction system: 64 dB.

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

TANDBERG

TR 220 G



A compact model in the same quality class as the TR 220. The stereo amplifier and the FM tuner are identical with the TR 220, and in addition the TR 220 G has a built-in record player with a magnetic pick-up and a Dual DMS 210 cartridge (all high quality record players and transcription units have magnetic pick ups).

The TR 220 G has two speeds (33 1/3 and 45 r.p.m.) with both automatic and manual operation. The pick-up arm has a damped lowering action that prevents damage to records. The magnetic pick-up has a diamond stylus and a wide frequency range. The TR 220 G has a hinged dust cover over the record player.

Convenience and compatibility

There are two main advantages with a high quality compact system such as the TR 220 G. First there is the great convenience of having your Hi-Fi system in a single neat cabinet

with no loose wires. Second you are assured that the individual units (the radio receiver and the record player) are matched to each other because they are from the same producer.

Loudspeakers

We recommend the TL 1520 or the TR 2520 or the Fasett.

General

Mains voltage: 240 V, 50 Hz (internal tapings for 120-220-240 V).

Dimensions: width 22 1/2" (56.7 cm), height 7 1/2" (18.6 cm) and depth 13 1/2" (33.9 cm) plus 3/4" (1.6 cm) for knobs.

Weight: 24 lb (11 kg).

Specification: see TR 220 on page 28 for specifications on the receiver and the stereo amplifier.

Specification for record player

Speed variations: less than $\pm 0.15\%$.

Rumble: better than 37 dB measured unweighted, better than 56 dB measured weighted.

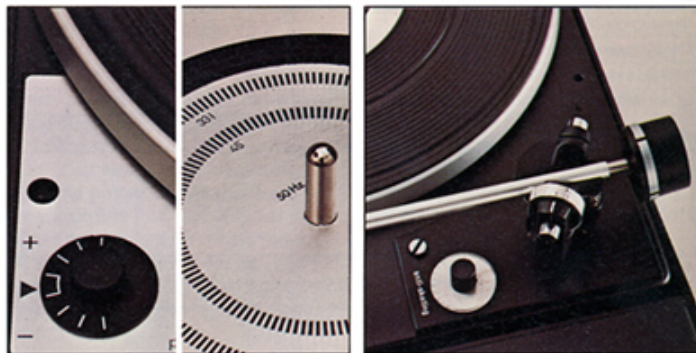
Playing weight (stylus pressure): from 0 to 5 grammes, continuously adjustable. The automatic facility works down to 1 gramme.

Motor: 4 pole asynchronous motor.

Manual speed control: each speed can be adjusted by about 6% (a semi-tone). Visual check by stroboscope.

Manual speed control. The speed of the record player can be controlled within certain limits. With the stroboscopic disc supplied, the required fine adjustment can be made.

Variable playing weight. The playing weight can be varied by adjusting the stylus pressure between 0 and 5 grammes. This allows you to adjust the pick-up to suit different types of cartridges. In addition there is a separate adjustment for the anti-skating device.



SPECIFICATIONS RECEIVERS, STEREO AMPLIFIERS

AMPLIFIER SECTION	TR 2075 Mk II	TR 2055	TR 2040	TR 2025	TR 2025 MULTIBAND	SØLVSUPER 12	TR 220
Output power per channel, sine wave, with 1 kHz in 8 ohms (4 ohms). Both channels driven simultaneously. DIN 45 500.	95 W (120 W)	60 W (80 W)	50 W (70 W)	32 W (40 W)	32 W (40 W)	17 W (22 W)	17 W (25 W)
Output power per channel, sine wave, from 20 to 20 000 Hz in 8 ohms. Both channels driven simultaneously (FTC). Dist. in %	75 W 0.05 %	55 W 0.05 %	40 W 0.09 %	25 W 0.09 %	25 W 0.09 %	12 W 1 %	14 W 1 %
Distortion with output power 1 dB below nominal and lower at 1 kHz in 8 ohms (4 ohms).	0.01 %	0.02 %	0.05 %	0.05 %	0.05 %	0.2 % (0.3 %)	0.2 % (0.3 %)
Intermodulation according to DIN 45 500.	0.05 %	0.05 %	0.09 %	0.09 %	0.09 %	0.5 %	0.3 %
Damping factor with nominal output power in 8 ohms (4 ohms).	60 (30) 20–20 000 Hz	50 (25) 20–20 000 Hz	50 (25) 20–20 000 Hz	50 (25) 20–20 000 Hz	50 (25) 20–20 000 Hz	30 (15) 1 kHz	40 (20) 1 kHz
Frequency response from linear inputs (–1.5 dB).	6–80 000 Hz	7–80 000 Hz	8–50 000 Hz	8–50 000 Hz	15–50 000 Hz	30–25 000 Hz	30–30 000 Hz
Channel separation at 1 kHz, minimum.	60 dB	60 dB	60 dB	60 dB	60 dB	60 dB	60 dB
Tone controls Treble control at 10 kHz: Frequ./loudness comp. at 10 kHz (max.): Mid-frequency range at 1 kHz: Bass control at 50 Hz: Frequ./loudness comp. at 50 Hz (max.):	±15 dB + 3 dB ± 7 dB ±15 dB + 8 dB	±15 dB + 3 dB – ±15 dB + 8 dB	±15 dB + 3 dB – ±15 dB + 8 dB	±15 dB + 3 dB – ±15 dB + 8 dB	±15 dB + 3 dB – ±15 dB + 8 dB	±15 dB + 4 dB – ±16 dB + 5 dB	±15 dB + 4 dB – ±15 dB + 8 dB
LOW filter –12 dB (*–6 dB)/octave, –3dB at	30 Hz	30 Hz	70 Hz	70 Hz	70 Hz	–	70 Hz*
HIGH 1 filter –12 dB/octave, –3 dB at	8000 Hz	8000 Hz	8000 Hz	8000 Hz	8000 Hz	–	7000 Hz
HIGH 2 filter –6 dB/octave, –3 dB at	8000 Hz	8000 Hz	8000 Hz	–	–	–	–
Input sensitivity for nominal output power in 8 ohms. TAPE 1: TAPE 2 (EXTRA): PHONO 1 magn. (cer.): PHONO 2 magn. (cer.):	150–600 mV 150–600 mV 2.2–10 mV 3.0 mV	150–600 mV 150–600 mV 2.2–10 mV 3.0 mV	190 mV 190 mV 2.8 mV –	170 mV 170 mV 2.3 mV –	170 mV 170 mV 2.3 mV –	150 mV – 2.5 mV (75 mV) –	150 mV 150 mV 2.5 mV –
Signal/noise ratio with 2×50 mW in 8 ohms according to DIN 45 500. TAPE 1: TAPE 2 (EXTRA): PHONO 1: PHONO 2:	68 dB 68 dB 62 dB 64 dB	62 dB 62 dB 60 dB 58 dB	61 dB 61 dB 60 dB –	61 dB 61 dB 60 dB –	61 dB 61 dB 60 dB –	55 dB – 55 dB –	60 dB 60 dB 60 dB –
FM SECTION							
Wave band.	87.5–108 MHz	87.5–108 MHz	87.5–108 MHz	87.5–108 MHz	87.5–108 MHz	87.5–108 MHz	87.5–108 MHz
Frequency response (–3 dB).	20–15 000 Hz	20–15 000 Hz	20–15 000 Hz	20–15 000 Hz	20–15 000 Hz	20–15 000 Hz	20–15 000 Hz
Sensitivity in mono for 26 dB signal/noise ratio according to DIN 45 301 with 75 (300) ohms aerial impedance.	0.8 µV (1.6 µV)	0.8 µV (1.6 µV)	0.8 µV (1.6 µV)	0.8 µV (1.6 µV)	0.8 µV (1.6 µV)	1.0 µV (2.0 µV)	0.8 µV (1.6 µV)
Sensitivity in stereo for 46 dB signal/noise ratio according to DIN 45 500 with 75 (300) ohms aerial impedance.	20 µV (40 µV)	20 µV (40 µV)	20 µV (40 µV)	20 µV (40 µV)	20 µV (40 µV)	40 µV (80 µV)	20 µV (40 µV)
Signal/noise ratio with 1 mV aerial voltage: According to IHF, stereo (mono) Weighted according to DIN, stereo (mono) Unweighted according to DIN, stereo (mono)	75 (78) dB 62 (66) dB 65 (68) dB	75 (78) dB 62 (66) dB 65 (68) dB	74 (76) dB 62 (64) dB 65 (65) dB	74 (76) dB 62 (64) dB 65 (65) dB	74 (76) dB 62 (64) dB 65 (65) dB	66 (68) dB 54 (58) dB 61 (63) dB	70 (72) dB 60 (62) dB 63 (65) dB
Distortion according to DIN 45 500, stereo (mono).	0.15 % (0.15 %)	0.15 % (0.15 %)	0.3 % (0.2 %)	0.3 % (0.2 %)	0.3 % (0.2 %)	0.5 % (0.3 %)	0.4 % (0.2 %)
Selectivity according to IHF, ±400 kHz.	80 dB	80 dB	80 dB	80 dB	80 dB	55 dB	60 dB
Image frequency rejection ratio (IHF).	100 dB	100 dB	100 dB	100 dB	100 dB	46 dB	70 dB
AM suppression (IHF).	70 dB	70 dB	65 dB	65 dB	65 dB	48 dB	50 dB
IF rejection (IHF).	100 dB	100 dB	100 dB	100 dB	100 dB	90 dB	95 dB
Limiting (–3 dB) with 75 ohms aerial impedance (IHF).	0.7 µV	0.7 µV	0.7 µV	0.7 µV	0.7 µV	0.7 µV	0.7 µV
Muting threshold with 75 ohms aerial impedance (IHF).	3 µV	3 µV	3 µV	3 µV	3 µV	2 µV	3 µV
Capture ratio (IHF).	0.9 dB	0.9 dB	1.5 dB	1.5 dB	1.5 dB	1.5 dB	1.5 dB
Channel separation acc. to DIN 45 500, measured select.	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB
Pilot tone suppression according to DIN 45 500.	70 dB	70 dB	55 dB	55 dB	55 dB	50 dB	55 dB
38 kHz suppression according to DIN 45 500.	60 dB	60 dB	55 dB	55 dB	55 dB	50 dB	55 dB
AM SECTION							
Wave bands. Long wave Medium wave Short wave	– 518–1600 kHz –				150–268 kHz 518–1600 kHz 3.3–10 MHz 10–20 MHz 20–30 MHz	150–268 kHz 518–1600 kHz 5.8–18.5 MHz	
Selectivity at 1 MHz ±9 kHz.	42 dB				43 dB	40 dB	
Distortion with 30% modulation.	0.8 %				1 %	1 %	
Sensitivity at 1 MHz, 30% modulation and 20 dB signal/noise ratio.	30 µV				30 µV	50 µV	

TANDBERG

TECHNICAL TERMS

AM
Abbreviation for Amplitude Modulation of the carrier wave from the transmitter. AM is a common term for long, medium, and short waves. Radio transmissions on AM-waves occupy a small part of the radio frequency spectrum and can use frequencies with a longer broadcasting range. However they have a limited tone range and are easily disturbed by noise and distortion.

AM Suppression
FM receivers must suppress AM signals because they cause distortion. Usually given in dB and the higher the number the better.

Capture ratio
The ability of an FM receiver to reject unwanted broadcasts on the same frequency as the frequency you want. The smaller the dB number the better. In some UK areas (e.g. Northampton and the Solent) you must have a good capture ratio.

Channel separation
Unwanted transfer of a programme from one channel to another channel. In practice this makes itself noticeable when sound that should come exclusively from one loudspeaker in a studio installation, also comes at a reduced level from the other loudspeaker. Channel separation is given in dB. The higher the dB-number, the better the quality.

Damping factor
Number indicating ability of amplifier to operate a speaker properly. The higher the number the better. The speaker impedance must also be stated.

Signal/Noise ratio
Ratio of the (wanted) signal to the (unwanted) noise. Usually expressed in decibels (dB) and the higher the number the better because the noise (mainly hiss) is then less noticeable. Needs to be considered with other data such as aerial voltage or audio output power.

DIN
Abbreviation for Deutsche Industrie Normen (German Standards Organization for Industry). DIN 45500 is a group of standards concerned with Hi-Fi equipment. These standards

have been interpreted as a synonym for quality. When technical data is prescribed according to DIN it provides a good opportunity for comparisons to be made between different models or between different manufacturers. When making a comparison you must make sure the data has been measured according to the same DIN standard, otherwise the comparison is not valid.

Distortion
Distortion can be heard as imperfect sound. In the specifications this is given as a percentage. The lower the percentage the better the quality. It is sometimes called total harmonic distortion (THD), but as a rule it does not include intermodulation distortion.

Echo
A sound that is re-inforced a fraction of a second later by the same sound. When you shout in a large hall the echo is given by the sound bouncing back from the walls and the time taken for the sound to bounce back depends on the distance between you and the walls. In a tape recorder the echo can be achieved artificially and the time delay between the two sounds is obtained from the distance between the recording head and the replay head. In a way it is a combination of the source test and the tape test since you listen to the sound just before it goes onto the tape and just after it has gone onto the tape. The time delay between the heads is dependent on the tape speed. The lowest tape speed (17 $\frac{1}{8}$ ips) gives the longest time delay. All Tandberg stereo reel-to-reel tape recorders can be used to make echo.

FM
Abbreviation for Frequency Modulation of the carrier wave from the transmitter. Broadcasts on FM-waves normally have Hi-Fi quality, because FM generally speaking can cater for the complete tone range with low noise levels and low distortion.

Image frequency rejection ratio
The ability of a receiver to reject radio frequencies displaced from the wanted frequency by an amount that causes undesirable beats with the IF oscillator. Usually given in dB and the higher the number the better. If you live near an airport or under a flight path you probably need a receiver with a high number.

Intermodulation distortion
Extra unwanted tones produced when two other tones are present at the same time under certain electronic conditions. The lower the percentage the better the performance. As a rule it does not include harmonic distortion (see Distortion). Intermodulation distortion is more disturbing to the ear than harmonic distortion so it is important to look for a low figure here.

Limiting
In an FM receiver all received signals are heavily peak clipped to make them the same amplitude. This clipping is called limiting. One of the benefits is that it reduces ignition interference from vehicles. Usually given in μ V and the lower the number the better.

Muting
A technical refinement which is used on advanced FM radio receivers. This is an electronic technique for removing the characteristic noise heard between stations during tuning on FM.

Output power
This is a term for the power transferred to the loudspeakers from the amplifier. Output power is specified in watts for a particular loudspeaker impedance (4 or 8 ohms). 2×20 watts in 4 ohms for example means that the amplifiers can deliver 20 watts to each stereo channel where each stereo channel is connected to a 4 ohm speaker. The term sine wave power means that the power can be delivered continuously and not only for a short period as with music power. When looking at figures for output power note that the most meaningful figures are those giving a frequency spectrum (e.g. 20 Hz — 20 000 Hz)

and a distortion figure at the same time. The figure for sine wave power is the correct figure to use for comparisons.

Selectivity
The ability of a receiver to reject radio frequencies other than the frequency it is tuned to. Usually given in dB and the higher the number the better.

Sensitivity
The minimum aerial signal required to produce a specified output signal having a specified signal/noise ratio. Often given in microvolts (μ V) and the lower the number the better.

Source test
Listening to a programme at the same time as it is recorded on tape, but before it is actually recorded on the tape. All Tandberg stereo open-reel tape recorders have this facility (sometimes called the A test).

Speed variations
These are unwanted variations in the speed of e.g. a tape recorder. It is very important that the variations are as small as possible if the sound is to be smooth. The lower the values given in the specification the better. Tandberg tape recorders have very good performance data for speed variations. We differentiate between slow variations called "wow" and fast variations called "flutter".

Tape test
Listening to a programme after it has been recorded on tape at the same time as the tape recorder continues to record. This is a very valuable feature on a tape recorder, because with the tape test it is possible to hear exactly how good the recording process is while it is happening. Coupled with the peak level meters on Tandberg tape recorders, the tape test is a test you should always make during the recording. All Tandberg stereo open-reel tape recorders have the tape test facility. By changing between the source and tape tests you can check whether there is any difference between the original programme and the recorded programme. The tape test is sometimes called the B test.

TANDBERG

LOUDSPEAKERS



It is important to make the right choice

The task of a loudspeaker in a Hi-Fi system is to convert the programme from the gramophone record, tape, or radio into sound via the amplifier. If you have a good quality sound source and a good quality amplifier, the loudspeakers must be of equal quality to accomplish this task. So it is unwise to save money on this last link in the sound reproduction chain. It is not easy to make the right choice. There are many factors to consider, but when you choose the speakers recommended by the manufacturer to go with a particular amplifier, you are assured of a good performance. Tandberg loudspeakers are developed for use with Tandberg amplifiers. They take full advantage of the performance characteristics of the amplifiers.

How to compare and evaluate loudspeakers

Listen to different kinds of music. Make sure that the programme source is good (e.g. a good gramophone record) and the playback equipment is high quality. Check that the tone controls on the amplifier are set in the neutral position (mid-position) to ensure that they do not compensate for weaknesses in individual speakers. Check that the volume in the room remains the same when the demonstrator switches from speaker to speaker. Take great care to see that the speakers under comparison are standing on the same level and in the same part of the room i.e. one of them should not be in a corner or nearer the floor than the other.

Listen carefully to the bass, treble, and mid-frequency ranges. The bass should be distinct without rumble and not too dominating. The treble should be clean and clearly audible.

Relation between speakers and amplifiers. The same sound quality

Today all quality amplifiers give almost distortionless sound reproduction. One of the most important tasks for the loudspeaker designer is to design speakers that do not add any audible distortion — even at high sound levels.

The speaker must handle the full power capability of the amplifier

Most modern quality amplifiers deliver high output power. Good loudspeakers must be able to reproduce the peak intensity from the amplifier without being damaged. It is easily done to buy speakers that

are under rated. But they will distort the sound at high levels and probably sustain damage because they will not tolerate frequent overloads. At the back of every Tandberg loudspeaker you will find a label stating the maximum continuous power that can be applied to it. This power should be the same or higher than the sine wave power output from the amplifier. So it is very easy to find one or more Tandberg speakers that are suitable for any amplifier if you look at the table on page 33!

The impedance

The impedance (ohms) of the loudspeaker should coincide as far as possible with the impedance marked on the speaker output of the amplifier. It is also permissible to use speakers with a higher impedance than is marked on the amplifier.

TANDBERG

STUDIO MONITOR



“Design the best loudspeaker on the market!”

This was the challenge delivered to the engineers in Tandberg's acoustics laboratory. The result was the Studio Monitor — the most advanced loudspeaker system Tandberg has ever made. An 80 litre, 3 way system with 4 drive units that can reproduce more than 100 watts continuously

applied power over a frequency range from 25 to 20 000 Hz, measured according to DIN standards! Good transcription units, tape recorders, and amplifiers can reproduce sound practically speaking without distortion. A loudspeaker that can rank with the best of these products must have far better characteristics than conventional loud-

speakers. When Tandberg developed the Studio Monitor, it was a requirement that it should be suitable for the best Hi-Fi equipment on the market.

Tandberg's long experience with sound reproduction techniques was put to good use in the design and development of the Studio Monitor. The loudspeaker drive units were selected after thorough evaluation of the best units on the market. The filter, level controls for the mid-frequency and treble frequency ranges, and a special protection

system for the treble drive units were all designed in the laboratories. The system was then put through an extensive programme of comprehensive tests including the all-important practical listening tests. We invite you to compare the Tandberg Studio Monitor under the same conditions with any other loudspeaker system on the market. Let your own ears be the deciding factor when you choose!

For more information on the Studio Monitor, see the separate, large brochure.

Specification, see page 33.

TANDBERG

TL 20 SERIES



The TL 20 Series — designed for all types of music

The TL 20-Series is the top quality series of loudspeakers from Tandberg. New techniques and a new design in keeping with the rest of the Tandberg products. Much emphasis is put on making the sound picture for the sound systems in the TL Series, from the largest to the smallest, the same character. Therefore the difference between them is really that the large systems can reproduce louder sounds and deeper tones in the bass region than the small loudspeakers. The TL 20 Series consists of 4 loudspeakers: TL 5020, TL 3520, TL 2520 and TL 1520 (the first two numbers mean the number of litres in the enclosed volume, also the size). The TL 5020 is the most advanced loudspeaker in the TL 20 series. It is a 3-way system with

four loudspeakers, 2 dome-tweeters in a column, a middle frequency speaker and a bass speaker. The TL 5020 has special protection for the treble loudspeakers (see separate paragraph about this).

The TL 3520 and the TL 2520 are also 3-way systems, but the smallest in the 20-Series, the TL 1520, is a 2-way system with bass and treble loudspeakers.

All the systems in the TL 20-Series have high density wood veneered cabinets with black fabric and aluminium trimming at the sides.

Specifications for the TL series, see page 33.

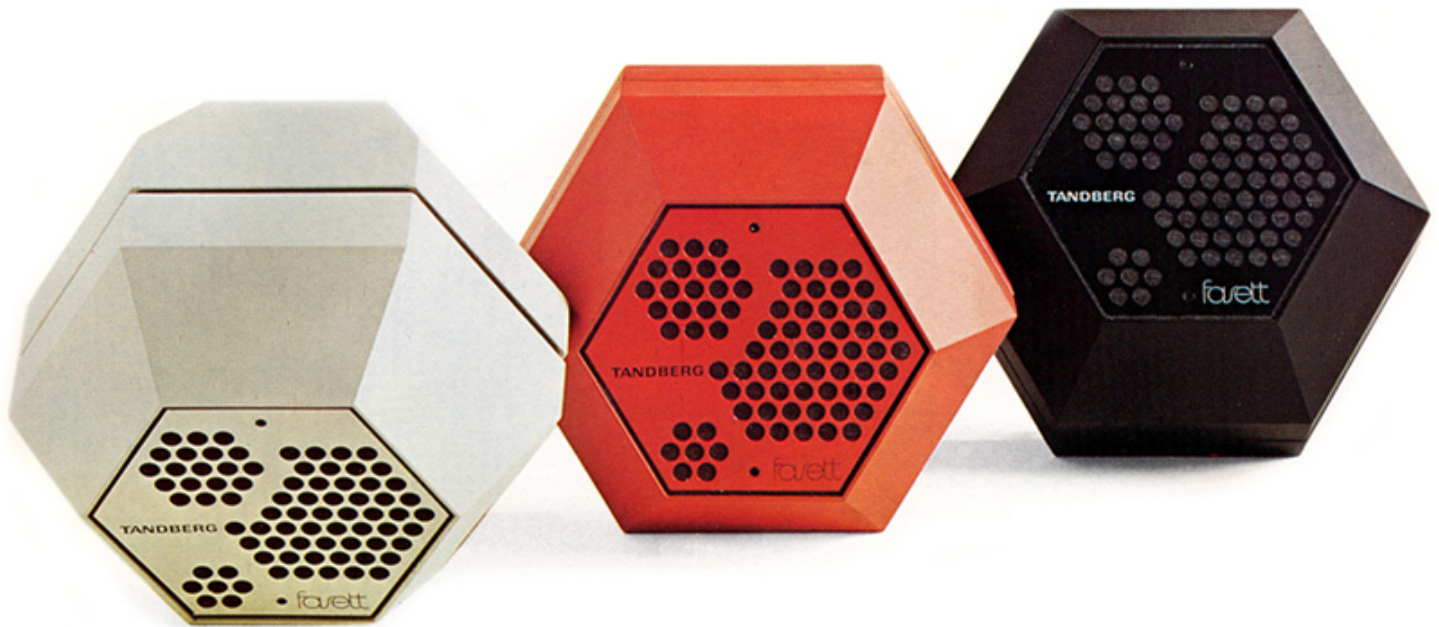
Special protection for treble loudspeakers (the Studio Monitor and the TL 5020)

To ensure that the treble loudspeakers are not overloaded and damaged, a special protection circuit has been developed. It starts to operate only with extreme overload (above the maximum tolerated by the system) and limits the power in the treble units. The protection system is disconnected again immediately the power falls below the overloading level. The connecting and disconnecting of the protection system passes without notice.

TL 1500 — the high efficiency loudspeaker

The TL 1500 is a compact Hi-Fi system giving good reproduction and specially designed to deliver a high sound level in relation to the power applied from the amplifier. The TL 1500 has a black polyurethane front and a cabinet in simulated wood finish.

TANDBERG FASETT



Fasset — a new concept in loudspeakers

The Tandberg Fasset combines faithful sound reproduction in a small loudspeaker with the newest ideas in industrial design. Instead of the traditional square box the Fasset has a number of small surfaces put together at different angles. This makes it into a very versatile sound source.

The Fasset is a 2-way system equipped with bass reflex, giving an impressive bass response in relation to the loudspeaker's small dimensions. You can safely apply 25 watts sine wave (DIN) to a Fasset. Clusters of this unusual speaker can be used in halls, discotheques, hotels, and department stores.

Fasset is delivered in 3 colours: black, antique white and orange. This makes it easy to adapt to different interiors.

Play with sound

All radio/stereo amplifiers from Tandberg have outputs for 4 loudspeakers. This gives many opportunities for improving the sound picture in a particular music installation. With 4 Fasset loudspeakers, or 2 Fasset and 2 TL-systems, you can experiment with a broader sound picture in the room with combinations of direct and indirect sound.

The Fasset was specially designed to be mounted in many different positions. If two loudspeakers (one for each channel in the music installation) are beamed direct at the listener, the other two loudspeakers can be pointed to the side, backwards or upwards against a hard wall or ceiling. These loudspeakers contribute to the reflected sound and increase the space effect.

Specifications, loudspeakers

	Studio Monitor	TL 5020	TL 3520	TL 2520	TL 1520	Fasset	TL 1500
Outside dimensions (inches)	W: 18½ H: 30 D: 13½	W: 25¾ H: 14¾ D: 11	W: 23¼ H: 14 D: 10¼	W: 21 H: 12 D: 8¾	W: 16½ H: 10½ D: 8¾	W: 11 H: 10½ D: 8¾	W: 16½ H: 11 D: 8
Enclosed volume	80 litres	50 litres	35 litres	25 litres	15 litres	6.5 litres	15 litres
Frequency response, DIN 45 500	25–20 000 Hz	33–20 000 Hz	38–20 000 Hz	43–20 000 Hz	48–20 000 Hz	50–20 000 Hz	50–20 000 Hz
Resonance frequency	30 Hz	50 Hz	53 Hz	60 Hz	70 Hz	85 Hz	70 Hz
Sensitivity*, DIN 45 500	6 watts	3 watts	4 watts	4 watts	3 watts	6 watts	3 watts
Max. sine wave driving power, DIN 45 500	100 watts	60 watts	50 watts	40 watts	30 watts	25 watts	25 watts
Music power, DIN 45 500	160 watts	100 watts	75 watts	65 watts	45 watts	40 watts	40 watts
Impedance	8 ohms	8 ohms	8 ohms	8 ohms	4 ohms	4 ohms	4 ohms
Size of speakers	Woofer Mid-range Tweeter	12" 5" 2×1" Dome	12" 3½" 1" Dome	10" 3½" 2"	8" 3½" 2"	7" 5" 2¼"	8" 8" 2½"

* Driving power to reach a sound level of 96 dB measured at a distance of 1 metre from the speaker.

TANDBERG

RECORD PLAYER TT 5000



The Tandberg TT 5000 is a high fidelity record player with modern styling. The design and quality of the TT 5000 make it eminently suitable for a range of combinations in Tandberg music centres.

The TT 5000 will bring out the full brilliance of your best records. It is equipped with an advanced "S" shaped arm with precision bearings. The magnetic pick-up has a wide frequency range. The pick-up weight can be balanced to very fine limits and the arm is fitted with an anti-skating device. Viscous damping is used in the arm raising and lowering mechanism and this ensures that your records are handled gently. The TT 5000 has two speeds (33 $\frac{1}{3}$ and 45 r.p.m.). The operation is semi-automatic. The pick-up arm returns by itself and the record player stops when the record has been played.

The belt drive between the motor and the turntable provides very smooth operation (belt drives are well known for low rumble). The large (12" diameter) turntable gives the fly-wheel effect.

The record player is delivered with a smoke tinted dust cover which is friction-hinged so that it can stay at any required angle. The cabinet and the mechanism are both designed to damp external vibrations. The TR 5000 has a low-profile cabinet that blends well with the other Tandberg products in this catalogue.

General

Mains voltage: 240 V, 50 Hz.
Dimensions: width 20" (49.5 cm), depth 14 $\frac{1}{2}$ " (36 cm), height (with cover down) 6 $\frac{1}{4}$ " (15.5 cm).
Weight: 14 $\frac{3}{4}$ lb (6.7 kg).

Specification

Speed variations (DIN): less than 0.2%, typically 0.1%.
Rumble: better than 58 dB weighted, better than 35 dB linear.
Stylus pressure: from 0 to 4 g (adjustable).
Drive: 4 pole synchronous motor with belt transfer system.
Frequency range of pick-up: 20 to 20 000 Hz.
Channel separation at 1 kHz: better than 20 dB.
Stylus: 15 μ , spherical.
Pick-up head: universal connector.

TANDBERG ACCESSORIES



Tandberg Headphones TH 12
High quality stereo headphones designed according to the well-known dynamic principle. TH 12 headphones give you quality at a reasonable price. They are very light in weight and the plastic foam gives a suitably gentle pressure to the ears that makes the headphones very comfortable to wear. The plastic foam is designed to allow the full tonal range to pass unhindered. The TH 12 is fitted with a $\frac{1}{4}$ " stereo jack. Impedance: 400 ohms per system. Frequency range: 16 Hz to 20 000 Hz. Distortion: less than 1%. Weight $9\frac{1}{2}$ oz (275 g).

Tandberg Headphones TH 18
Stereo headphones in the highest class designed according to orthodynamic principles. This design incorporates marked acoustic improvements. This set of headphones has a large diaphragm providing excellent reproduction with no colouration and negligible distortion. The orthodynamic principle gives the TH 18 the same sound quality as the best electrostatic headphones. The bass response is faithful and the built-in lining cuts out unwanted environmental noise. The diaphragm is attached in the middle and at the edges. This feature damps unwanted bass resonances and at the same time provides smooth, correct reproduction of the complete tonal range. The TH 18 is supplied with a

$\frac{1}{4}$ " stereo jack. Impedance: 110 ohms per system. Frequency range: 16 Hz to 20 000 Hz. Distortion: less than 1%. Weight: $7\frac{1}{2}$ oz (270 g).

Tandberg TM 6 Microphone
An elegant case in extruded aluminium. Suitable for reproduction of speech, vocal and instrumental music. The TM 6 is not sensitive to touch noise and is well damped for wind noise and breath noise. This means that it can also be used very near to the sound source for singing or speaking. The TM 6 has a spherical characteristic and can accept sound from practically any direction. The TM 6 is delivered in an elegant plastic case with a table stand and fixture for mounting on a floor stand. As an accessory a bigger and more stable table stand can be delivered.

Frequency response: 50–15 000 Hz (+3, -6 dB).
Directional characteristic: spherical (omnidirectional).
Principle: electro-dynamic (moving coil).
Sensitivity: 0.1 mV/ μ bar (at 1000 Hz).
Impedance: 250 ohms.
Connections: permanently connected to a 4 m lead with a DIN plug.
Dimensions: length $7\frac{5}{16}$ " (185 mm), max. diameter $1\frac{5}{16}$ " (23.5 mm).
Weight: $5\frac{1}{2}$ oz (160 g) with cable and plug.

Tandberg Magnetic Cassette Tape
The quality of the record and replay on a tape recorder is to a large extent dependent on the magnetic tape characteristics. Tandberg has more than 20 years experience with the development and production of tape recorders. Therefore we are qualified to provide specifications for a magnetic tape which satisfies the demands from users. Strict requirements are made for the electrical, acoustic and mechanical properties of Tandberg magnetic tapes. A comprehensive testing system with close tolerances gives even, high quality. This is the basis for good results on your tape recorder. Tandberg Magnetic Cassette Tape is delivered in the following lengths:
Tandberg Tape C60XD
Tandberg Tape C90XD

Tandberg Remote Control Unit
For Models 10X, and TCD 330 with 16 feet of cable. Remote control of wind, rewind, record, playback and stop. The same keyboard as on the tape recorder (even if the remote control unit is connected the keyboard on the tape recorder continues to work). The remote control unit can be connected to a timer which gives automatic record, playback, and stop at chosen times.

Tandberg Slide Synchronizer Model 3
This synchronizer provides automatic slide projection synchronized with recorded music and a commentary. The commentary is recorded on one tape track while shift pulses are recorded on a second track by the synchronizer. During playback the synchronizer changes slides at the right moments. The Tandberg slide synchronizer can be used with any automatic slide projector and stereo tape recorder, and also with a mono tape recorder equipped with a free head output.