





Huldra 8

This model can truly be described as a High Fidelity Instrument, and not only will the quality of reproduction satisfy the most discriminating listener, but the long range performance will also please those who require a receiver capable of world-wide reception.

Features include

FM Tuner with provision for stereo multiplex reception later, AM radio with four wave bands. Two 10 watt amplifiers (20 watts total, mono or stereo). Separate pre-amplifiers for magnetic, ceramic, and crystal pickups. Intercommunication equipment (listen-respond system).

Huldra 8 is partially transistorised having 20 transistors and 5 tubes. The tubes are used in the high frequency stages where they are still superior to transistors.

The operations are simple and logical. Huldra 8 has large easy to read dials, duplex-tuning, station-markers, automatic frequency control on FM, interference-filter and selectivity switch for AM.

Tone regulation is achieved either by a tone switch selecting fixed sound curves, or by continuously variable bass and treble controls.

Huldra 8 incorporates a host of unusual technical features which attract all who look for the latest and finest developments in a home music system.



Huldra 8-55

This model is designed for use with external Hi-Fi loudspeaker systems. Therefore the dimensions are smaller and you can select Hi-Fi loudspeakers system for your own requirements. (See description of loudspeakers).

Huldra 8-55 fits well into modern wall sections and the cabinet is available in first class Siamese teak.

Dimensions: Length 19 $\frac{3}{4}$ " , height 8 $\frac{5}{8}$ " , depth 10"

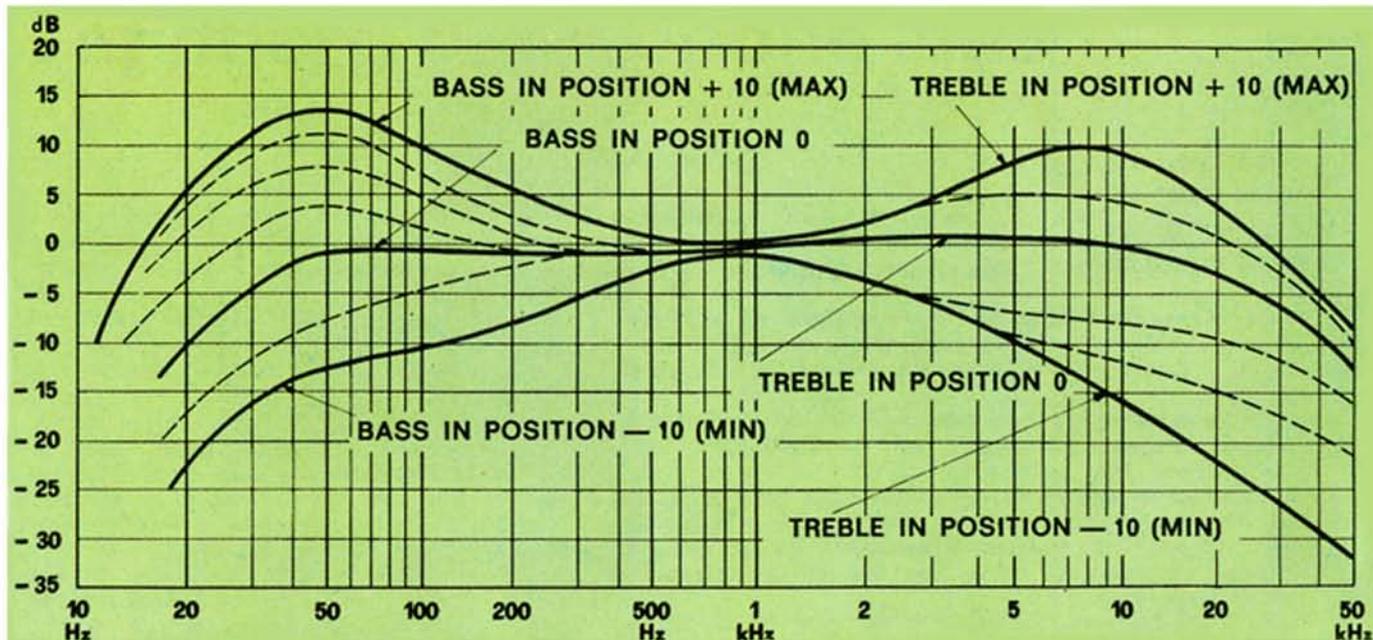
Huldra 8-56

An exclusive table radio in the luxury class. Huldra 8-56 incorporates two Hi-Fi loudspeakers in scientifically designed acoustic pressure chambers capable of full bass reproduction. Each system consists of a woofer and a tweeter with cross-over net-work. (System 113/106).

The handsome cabinet is available in Siamese teak.

Dimensions: Length 32 $\frac{3}{4}$ " , height 9 $\frac{3}{8}$ " , depth 10"





Technical Specification:

5 tubes: ECH 81, EAF 801, EF 89, ECC 85, EM 87.

20 transistors: 1 SE 1002, 5 U 3962, (SE 4010), 4 SE 4001, 2 SE 6001, 2 AC 127, 2 AC 128 (AC 152), 4 AD 150 (AD 149).

6 diodes: 2 1N 542 (AA113), 2 1S920, 1 OA 81, 1 BA 124.

3 rectifiers: 1 B 30 C 2200, 1 BY 112, 1 2,8 ST. 1.

Printed Circuits for improved stability and reliability.

5 wavelengths:

Longwave 150—350 Kc/s (2000—857 m)
 Mediumwave 510—1610 Kc/s (590—186 m)
 Coastal wave 1,6—5,9 Mc/s (187—50,9 m)
 Shortwave 5,9—23 Mc/s (50,9—13 m)
 FM-Band 87,5—108 Mc/s (3,44—2,78 m)

FM-Multiplex: Huldra 8 has provision for stereo Radio reception and a space is reserved within the cabinet, and connecting terminals are provided, for fitting a FM-Multiplex Decoder later. A separate indicator is illuminated during stereo reproduction.

Duplex-Tuning: Two separate tuners are incorporated, one for FM and the other for AM. The same tuning knob is automatically connected to the correct AM or FM pointer when the wave band is selected.

Station-Markers: 4 movable markers (arrows) facilitate identification of the tuning positions of popular FM stations.

The FM-tuner: This has three tuning circuits with band-pass filters in the high frequency stage.

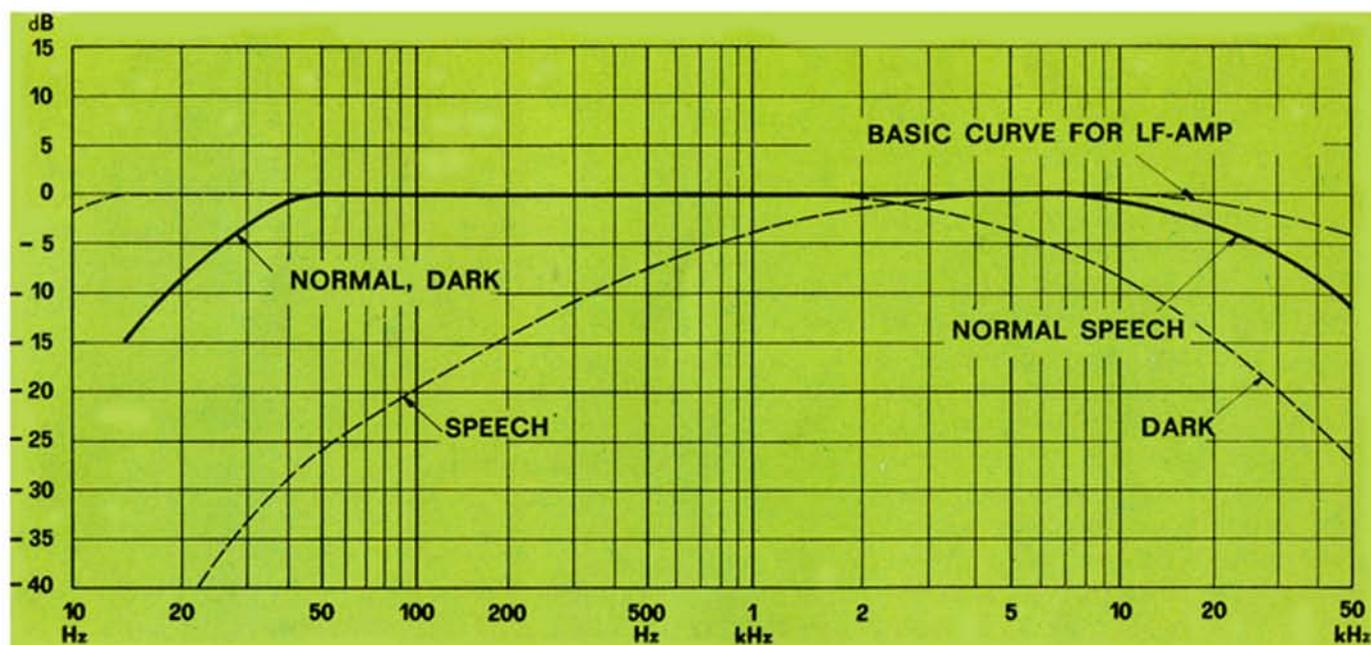
The intermediate frequency amplifier has four stages with band-pass filters and discriminator.

Automatic Frequency Control (A.F.C.) for the FM-Band. The A.F.C. automatically takes care of the fine tuning adjustment when the pointer is set to the station-marker for the required station. The A.F.C. can be switched off by means of a push-button.

Interference Filter: A 9 Kc/s filter is provided for AM reception.

Selectivity Switch: One position assists the separation of adjoining distant stations and the other permits a more extended frequency range for local stations, on the AM band.

Tone Controls: The Huldra 8 is unique in the fact that it combines a selection of fixed frequency characteristics and in addition variable bass and treble controls. A tone control selector has six positions of which four positions provide a choice of carefully designed frequency response curves and these are marked Bass, Speech, Normal, and Normal and Bass. The continuously variable bass and treble controls do not operate in these positions. One of the two remaining positions pro-



vides a straight line response with the continuously variable bass and treble controls in circuit. The remaining position for low volume listening, brings in a circuit which automatically lifts the bass response as the volume is decreased. All the above tone controls operate on both channels simultaneously.

Power Amplifiers: The Huldra 8 has two transistorised power amplifiers (class B). These amplifiers, which have individual controls, can be used independent of each other, or they can be operated in parallel when a total of 20 watts is available.

Frequency range: 20—20 000 c/s (—3 dB at 30 and 17 000 c/s).

Power output: 2 x 10 watts.

Amplifier for Magnetic Pickup: A 2 channel pre-amplifier, with four transistors, will drive the output amplifiers to their full rated power when a low output magnetic pickup is used. The input selector switch takes care of the correct sound equalisation for magnetic, ceramic, and crystal pickups.

Connections: The Huldra 8 has both Continental DIN and International Phono-contacts (parallel) for connections to mono-stereo tape recorders and record players. A diode output is provided in order that anything which is being reproduced by Huldra 8 can be recorded on a tape recorder.

In addition to the amplifier outputs to the internal speakers, there are DIN contacts and Phono plug sockets to which external speakers can be connected, and internal and external speakers are switched.

In addition to the above mentioned speaker connections, outputs are provided which are connected direct to the power amplifiers and are independent of the speaker selector.

The impedance at all speaker terminals is 4 ohms.

10 Push-Buttons select wave-length, tape recorder, record player, Mono/Stereo, selectivity when receiving the AM-bands, and automatic frequency control when receiving the FM band.

Speaker Selector: The speaker selector has three functions with 7 positions: A. Choice of internal speakers only, external speakers only, or internal and external speakers at the same time. B. It is possible to feed one mono programme to the internal speakers, and another programme to the external speakers. C. The internal and external speakers can be used for inter-communication between the Huldra 8 and other parts of the house.

Power Supply: Easy change-over for 115, 130, 150, 220 and 240 volts mains 50—60 c/s.

Power Consumption: Normal 55 watts. Continuous run at rated power 2 x 10 W: 85 watts.

Tandberg Loudspeakers

The loudspeaker is the final and decisive link in the chain of components which determine the quality of the sound which reaches your ears. The very greatest care should therefore be taken in selecting a loudspeaker as otherwise all the care and money you have expended on the preceding equipment will be of no avail. Some of the most important characteristics of a loudspeaker are the frequency range, efficiency, and radiated power at low, medium, and high frequencies. A loudspeaker radiates low frequencies equally in all directions, but in the upper register the radiation becomes progressively more concentrated into a narrower angle.

It is necessary to mount the speaker in a specially designed compartment, of pre-determined size, in relation to the unit used, and this is sometimes known as a «Pressure Chamber». The speaker unit is used in this way in order to avoid cancellation of the bass frequencies, due to the sound waves from the front and rear face of the cone conflicting with one another.

Every loudspeaker cone has a certain mass and stiffness of suspension and has a particular resonance frequency. The low frequency roll-off is determined by the point at which this resonance occurs. The lower the resonance frequency the better will be the bass reproduction. Mounting a loudspeaker unit in a closed cabinet increases the resonance frequency. The larger the cabinet is, the better the low note reproduction.

The resonance frequency can also be lowered by increasing the weight of the cone and the moving system. As a result more power will be required to move the cone assembly and the efficiency of the loudspeaker decreases. Similar bass reproduction to that of a large enclosure is obtainable with a small cabinet but at the cost of the efficiency of the system.

The loudspeakers used in Huldra 8-56 and Hi-Fi System 113/106-10 have been designed along the lines of the last principle. Tandberg engineers have compensated for the low speaker efficiency by incorporating two 10 watt power amplifiers in Huldra 8 and these provide wonderful sound quality and ample volume for the ordinary living room.

The maximum radiated power which a loudspeaker can reproduce without distortion will, among other things, be determined by the maximum amplitude of the cone which in turn is dependent on the concentrated field in the magnet gap. Here again the bass reproduction decides the limit. To maintain the same sound level the cone amplitude increases with decreasing frequency, and if the voice coil has to move outside this concentrated field then distortion increases rapidly. A musical instrument, or group of instruments, having maximum sound power in the medium frequency range will therefore be reproduced with greater sound power than for instance a large organ which produces maximum sound power in the lower frequencies e.g. 50 c/s.

Compared to the level at 1000 c/s piano music will be approximately 30 db weaker at 50 c/s and music from an orchestra approximately 20 db weaker. In an ordinary living room some of the lower frequencies will be accentuated due to room acoustics and resonances.

External Loudspeaker Model 9.

A first class extension loudspeaker for the living room, the kitchen, or other parts of the house. Incorporates loudspeaker chassis HT110 which has a dual cone for wide range reproduction. The speaker has an extremely low cone-resonance, is of moderate size, and has a long concentrated field ensuring minimum distortion at low frequencies. Dimensions: Length 14 1/8", height 10 3/8", depth 9 1/4". Teak cabinet. Internal volume: 8.5 litres. Loudspeaker chassis: HT110 with dual cone. Diameter: 6.5". Impedance (at 400 c/s): 5 ohms. Maximum continuous input: 5 watts. Efficiency (radiating from one side only): 1.5%. Bass resonance frequency: 115 c/s. Frequency response: 80—14 000 c/s.

Hi-Fi System 113/106-10.

This loudspeaker has been scientifically designed in order to provide a full bass response from a unit in a very small cabinet and this has been achieved by means of a heavy cone and a fairly low efficiency.

The system combines two loudspeakers with a cross-over network: one loudspeaker taking care of the lower and medium frequencies and the other is a Tweeter for frequencies above 3000 c/s. Dimensions: Length 7 1/8", height 9 1/8", depth 9 1/8". Teak cabinet. Internal volume: 6.5 litres. Loudspeakers: HT-113 Woofer 6.5" HT-106 Tweeter 2". Impedance (at 400 c/s): 4 ohms. Maximum continuous input: 8 watts. Efficiency (radiating from one side): 0.5%. Bass resonance frequency: 90 c/s. Frequency response: 60—16 000 c/s.

Hi-Fi System 112-7.

This model is specially designed to accommodate the full output of a 10 watt amplifier and provide maximum power and outstanding frequency response throughout the entire range.

The loudspeaker incorporates a co-axial system with a Woofer unit for the lower and medium frequencies, and a Tweeter mounted in the center of it taking care of frequencies above 3000 c/s. The low bass resonance and long magnetic field ensure excellent bass reproduction.

Dimensions: Length 20 1/2", height 10 1/4", depth 9 3/4". Teak cabinet. Internal volume: 25 litres. Loudspeaker chassis: HT112 with Tweeter. Woofer 10" x 6". Tweeter 2". Impedance (at 400 c/s): 3.2 ohms. Maximum continuous input: 8 watts. Efficiency (radiating from one side): 2.5%. Bass resonance frequency: 85 c/s. Frequency response: 60—16 000 c/s.

Hi-Fi System 114/116-8.

Hi-Fi System 114/116-8 is a high efficiency combination designed for perfect reproduction of the entire audible range from 45 c/s to 16 000 c/s, and capable of dealing with input power up to 20 watts. The HT116 Tweeter is co-axially mounted in front of the large Woofer. An efficient filter network crosses over at 3000 c/s. The powerful long magnetic field permits bass amplitude up to 1.5 mm without distortion.

Dimensions: Length 27 5/8", height 13 3/8", depth 11". Teak cabinet. Internal volume: 50 litres. Loudspeaker chassis: HT114 with Tweeter HT116. Woofer: 10". Tweeter 2.5". Impedance (at 400 c/s): 4 ohms. Maximum continuous input: 15 watts. Efficiency (radiating from one side only): 4%. Bass resonance frequency: 65 c/s. Frequency Response: 45—16 000 c/s.

Hi-Fi System 113/106-10.



External Loudspeaker Model 9.



Hi-Fi System 112-7.



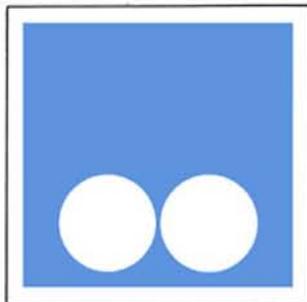
Hi-Fi System 114/116-8.



As a direction for the choice of Hi-Fi systems one may use the following table:

	Normal living room volume (approx. 80 db)		Strong living room volume (approx. 100 db)	
	Medium Bass (orchestra)	Strong Bass (organ)	Medium Bass (orchestra)	Strong Bass (organ)
Small living room (180 sq. ft.)	113/106-10	112-7	112-7	114/116-8
Large living room (450 sq. ft.)	113/106-10	114/116-8	112-7	114/116-8
Small hall (900 sq. ft.)	112-7	114/116-8	114/116-8	
Large hall (1800 sq. ft.)	112-7	114/116-8	114/116-8	





Here are some of the checking points:



All parts are inspected on arrival at the factory. This picture shows the checking of the turntables for accuracy.



All electric components are tested — this shows the method of checking the resistors and capacitors.



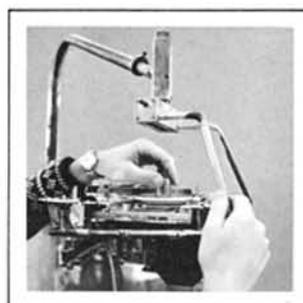
Optical inspection of the printed circuits.



Electrical check of the printed circuits.



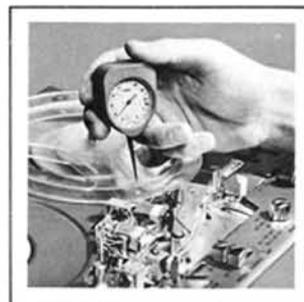
Tandberg manufacture the heads themselves — this picture shows the examination of the head gap.



Inspection of the turntable alignment.



Inspecting the alignment of the recording head — just one of the many electrical checks.



Measuring the take-up torque of the right turntable.



After the final inspection point is passed, every recorder is given a two hour warm up run, and is then given a recheck before pack-



Sample testing. Records taken at random from final production are thoroughly analysed and checked out, with a view to maintaining



Samples taken from stock are put through some stringent tests. This shows the machine which shakes the recorder very forcibly.



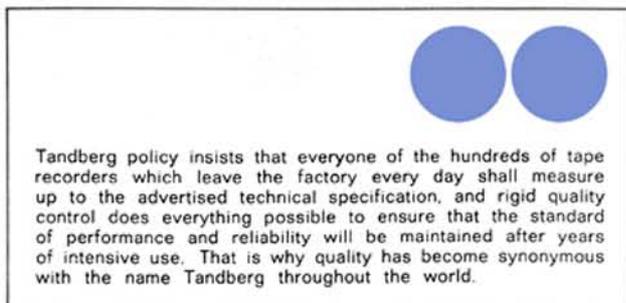
Reliability test in the climate chamber — from arctic cold to tropical humidity.



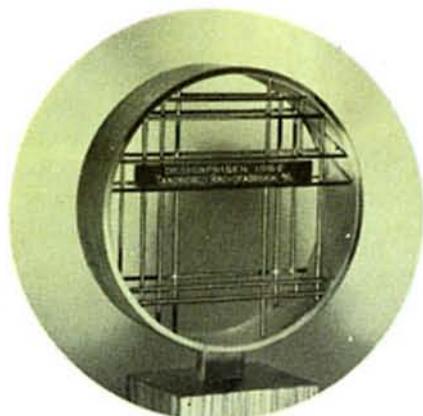
After specially hard handling the recorder is put through a thorough measurement and inspection routine.



A new Tandberg Tape Recorder is ready for despatch carefully packed in the special polystyrene shell.



Special Tandberg Features



Design. Tandberg tape recorders have several times been awarded prizes for outstanding and functional design. The materials used are steel and teak.



Electronic Beam Indicator. An electronic beam indicator is without mass and mechanical motion. Any increase of the sound level is precisely and instantly indicated. A delayed falling off avoids flickering.



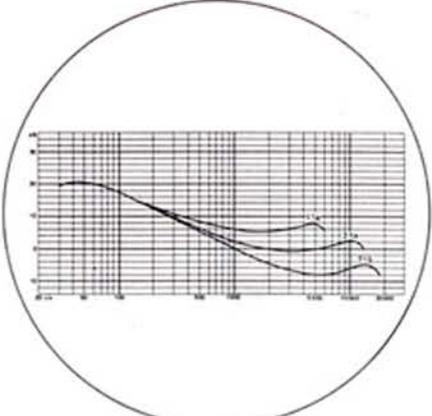
The Heads. The ability of a tape recorder to provide perfect sound reproduction is to a very large extent dependent upon the quality of the heads. Tandberg make their own heads and this entails fine precision work.



4 Digit Revolution Counter with indirect illumination and zero indicator make it easier to locate any part of the tape.



One Lever Control of the tape transport mechanism ensures simple and precise operation reducing the possibilities of mistakes. Pause switches are fitted to all models for momentary start and stop.



Fixed Frequency Responses ensure that a tape recorded on one Tandberg recorder will provide exactly the same sound reproduction when played back on any other Tandberg tape recorder.

Accessories

Carrying Case. Accommodates all the teak models, provides good protection and can be locked. Weight 2,5 kg.

Carrying Bag in attractive strong plastic material is supplied complete with loose dust cover inside which protects the top plate and reels, etc.

Dust Cover suitable for all current models. Slightly smoke coloured transparent Polyester. Protects the recorder against dust or accidental damage when the machine is not in use.

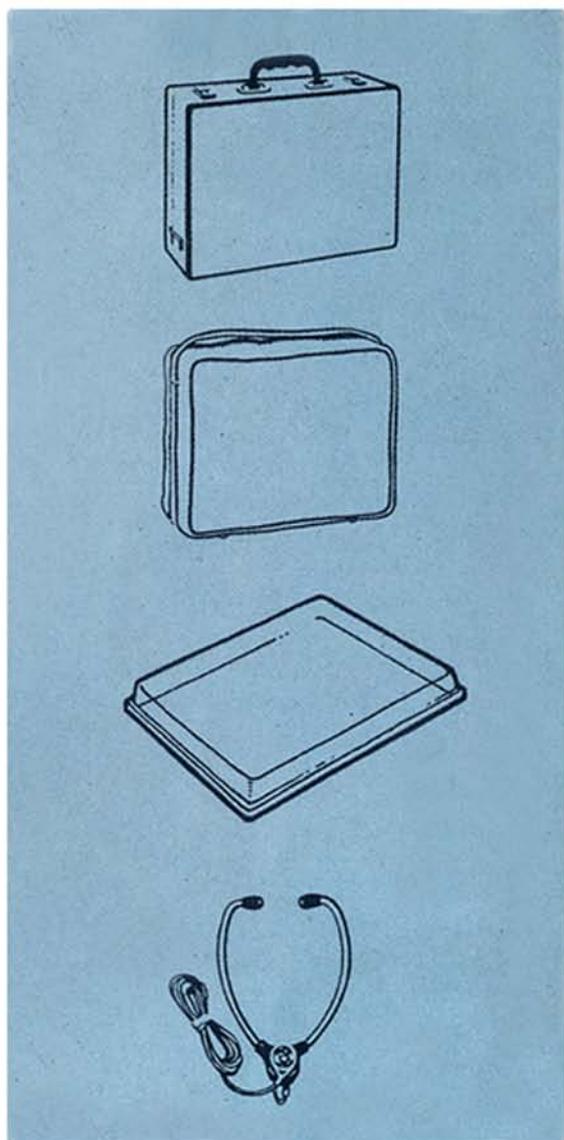
Microphone TM 3. A high class crystal microphone which is specially designed for use with Tandberg tape recorders. (See special description). Is available with stand and 12 ft. connecting cables.

Telephone Pickup for recording of telephone conversations. Attaches to the telephone by means of a suction cup.

Stetset Headphones. Light and comfortable for monitoring and private listening.

Foot Controller for F Models. For remote operations of start, stop, and rewind.

Tapes. Magnetic recording tapes with Polyester base.



Tandberg Slide Synchronizer.

Accompany your coloured slides with music and/or commentary. Automatic picture change through a silent impulse from the tape recorder. The synchroniser enables any automatic slide projector to be controlled by a stereo tape recorder or the Tandberg Model 8 4-track. This model has a stereo record head and output for a «Free» head. Music and/or commentary are on one track and a synchronising impulse for the picture change on the other track. The synchroniser has an adjustment for timing and length of the impulse. It is fully transistorised with 8 transistors and 8 diodes.
Dimensions: Length 8 $\frac{5}{8}$ " height 4 $\frac{7}{8}$ " depth 3"

