

"Design the best loudspeaker system on the market!"

How you should judge loudspeakers

One of the characteristics of a good loudspeaker is that it reproduces all the different frequencies equally well. Then we say the loudspeaker has a good tonal balance. Practical listening tests have shown that the ear is very sensitive even to small variations in a sound pattern. Tandberg has paid particular attention to this fact.

The tonal balance is the feature you should be most critical about when you are evaluating and comparing loudspeakers. Listen to different types of music. Make sure that the loudspeakers are demonstrated with good programme material replayed from equipment of the highest quality. It is very important that the tone controls on the amplifier are in the mid-position so that they do not compensate for the shortcomings of individual loudspeakers. Insist that the volume in the room also remains constant. Then you will have the correct conditions for a proper comparison between loudspeakers.

Tandberg's objectives for constructing loudspeaker systems

When a loudspeaker system is being designed, a number of problems must be solved. The system consists of relatively few parts, but even a small change to one detail can mean a large change in the sound picture. The final design is therefore a very careful compromise between many factors.

Tandberg has compiled a list of 6 target features for the design and construction of Hi-Fi loudspeakers:

- 1) Low cut-off for the bass frequencies
- 2) Low distortion over the entire frequency range
- 3) High power handling capability over the entire frequency range
- 4) Good transient response
- 5) Homogeneous sound distribution over a large room angle
- 6) Good tonal balance

On the next page you can read about how the Tandberg Studio Monitor was designed and how the 6 target features were achieved.

Tandberg's comprehensive test programme

Tandberg has a long and comprehensive test programme for all loudspeaker systems in the development phase. Great emphasis is placed on selecting from the best drive units on the market. When Tandberg designs loudspeakers, it is always after thorough and extensive measurements in a free-field and a reverberation chamber. But the most important tests we carry out are the



practical listening tests. These take place in a listening room where people with different opinions about what is good sound reproduction compare the designer's proposals against a sound source they believe is good. New prototypes are tested in this way together with different production models and always together with the best loudspeakers from our competitors.

The human ear is decisive when it comes to the final design of a Tandberg loudspeaker. New models are not sent out before all the engineers and the listeners are satisfied. During production all Tandberg loudspeakers are thoroughly tested and inspected. Not a single loudspeaker is allowed to leave the factory without tests to prove that it performs according to the specification we advertise.

"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 000Hz, 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 loudspeakers. 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!

Studio Monitor - an advanced design

1. Low bass cut-off

Every loudspeaker system has a particular bass resonance which is a function of the cabinet size (volume) and the construction of the woofer (the stiffness of the diaphragm suspension and the mass of the moving unit). These factors also affect the bass cut-off frequency and fixing them always involves a compromise between their various effects.

A large part of the research that went into the Tandberg Studio Monitor was devoted to finding the ideal compromise between these factors to achieve a low bass cut-off frequency in a cabinet of this volume. The woofer has a very long axial movement and a large magnet. Therefore the bass reproduction is good and the distortion is low – even at high powers.

2. Low distortion over the entire frequency range

Distortion in a loudspeaker system can have many causes, including weaknesses in the filter, non-linearity in the magnetic field and/or in the diaphragm suspension. These problems can be overcome by selecting loudspeaker drive units with large magnets because large magnets produce a homogeneous magnetic field. In the crossover filter the coils are one of the commonest sources of distortion. The filter in the Studio Monitor has air-cored coils. They do not have the disadvantages of iron-cored coils such as distortion at high sound levels caused by magnetic saturation. These are some of the reasons why the Studio Monitor has very low distortion.

3. High power handling capability over the entire frequency range

A loudspeaker system designed to deliver high power must withstand the mechanical and thermal effects that go with high power. At very high powers the temperature in the voice-coil and in the filter is high, at the same time as the axial excursion of the diaphragm is large. These conditions can lead to permanent deformation or destruction of vital parts in the system. This is why for the Studio Monitor we were very careful to choose high quality drive units and to set stringent requirements on the design of the filter.

4. Good transient response

Transient response is an expression that describes how the loudspeaker system responds to a sudden change in the programme signal from the amplifier. We say the transient response is good when the system reacts very quickly to a change in the signal and converts it to sound without itself affecting or distorting the sound. A very decisive factor for a good transient response is a large magnet such as the one we have in the woofer in the Studio Monitor.

5. Homogeneous (uniform) sound distribution

In a loudspeaker system the sound reproduction is also dependent on the location of the drive units. In the Studio Monitor the drive units are mounted slightly off-centre with regard to the middle axis of the front panel. This avoids undesirable edge resonances from the cabinet. Each drive unit has been carefully selected and matched to the system so that the circular sound distribution pattern for its own frequency range is optimum. This means that the Studio Monitor produces very uniform sound distribution over the entire frequency range.

6. Good tonal balance

In the opinion of many people this is the most important characteristic in the design and choice of loudspeaker systems. The frequency response of a system depends on the acoustics of the room it is in. With the mid-frequency and treble controls in the neutral position the Tandberg Studio Monitor is suited to the acoustics of an average listening room.

But to give the listener the opportunity to adjust the Studio Monitor so that it produces the best possible sound pattern in a particular room, the mid-frequency and treble ranges can be tuned by ± 2 dB. The controls, which are conveniently placed at the front, provide very smooth tuning. See the curves in the Technical data section.



Tuning the tonal balance

The two controls for tuning the tonal balance in the mid-frequency and treble frequency ranges are located at the top of the front panel. With these controls the level of the tonal ranges can be adjusted by ± 2 dB for matching the system to a particular room.

Treble drive units

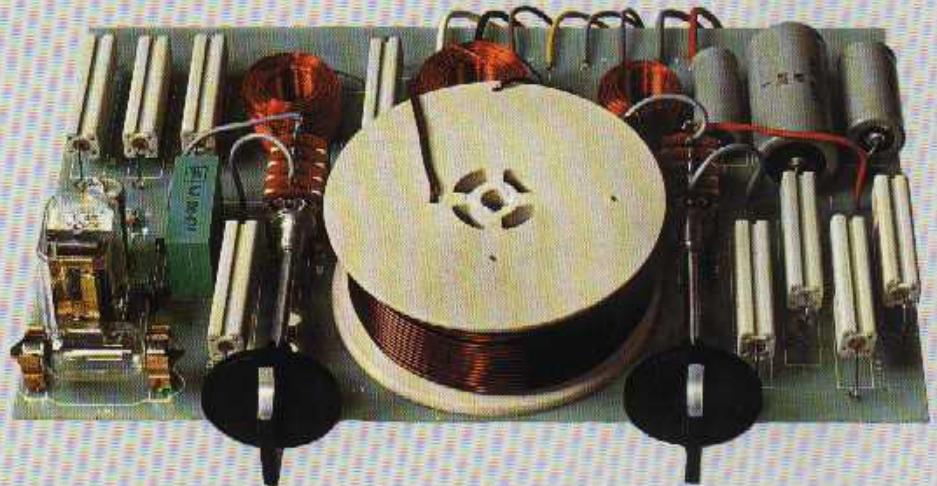
The treble drive units in the Studio Monitor are two 1" dome tweeters mounted in a column. The tweeters have a very good sound distribution pattern. They have a wide frequency range, high efficiency, low distortion, and high stability and reliability. The dome is made from a special-fibre textile that withstands continuous heavy loading. The voice-coil is wound from aluminium foil. This gives the tweeters a high power handling capability.

Mid-frequency drive unit

The mid-frequency drive unit is also the dome type with a 2" diameter dome. This unit has a very good circular distribution pattern and tolerates large axial excursions because the dome membrane has a double suspension system. The voice-coil is the heavy-duty type that withstands a large thermal load.

Bass drive unit

The 12" special woofer has been selected from the best units available on the market. A bass unit of this quality must meet extra-high performance requirements. The Studio Monitor has a bass cut-off frequency of 25 Hz which is low by any standards. The woofer has an exceptionally long axial excursion. This enables it to produce deep bass tones at the same sound pressure level as the higher frequencies. Because the magnet is so large the woofer produces very little distortion even when the power delivered is high.



The filter

The crossover filter is "the brain" of every loudspeaker system. The purpose of the filter is to divide the frequency range correctly between the loudspeaker drive units in a way that gives an even tonal balance and low distortion. Tandberg designs crossover filters that are carefully matched to the characteristics of every individual loudspeaker system. The Tandberg Studio Monitor employs air-cooled coils that cannot cause distortion even at high powers. The complete filter network is constructed on a single glass-fibre printed circuit board. It has a high power handling capacity. The resistors are raised up from the board to provide maximum cooling.

Special protection for the treble units

With normal use, even at high sound levels, there is no need to protect the treble drive units because they have a high power handling capability. But circumstances can arise where the sound level in the treble region is extremely high e.g. when you are monitoring (cueing) a tape recorder programme during fast wind/rewind at high sound levels. To protect the treble drive units against this kind of extreme overloading the Studio Monitor is equipped with a protection circuit. When the circuit triggers, the power



applied to the treble drive units is limited and a light at the front comes on. The circuit cuts out again as soon as the treble power falls below the extreme level.

Technical data

Unless stated otherwise, the performance has been measured according to DIN 45 500:

Frequency range: 25 to 20 000 Hz
Resonant frequency: 30 Hz
Sensitivity: 6 watts
Maximum continuous power (DIN 45573): 100 watts
Music power: 160 watts
Impedance: 8 ohms
Crossover frequencies: 600 Hz and 3500 Hz
Drive units: woofer, 12"
Mid-range unit: 2" dome tweeter
Treble units: two 1" dome tweeters mounted in a column
Enclosed volume: 80 litres
Outside dimensions: Height 30" (75,6 cm),
 plinth 2 1/4" (5,9 cm),
 Width 18 1/2" (47,0 cm),
 Depth 13 1/4" (34,2 cm)

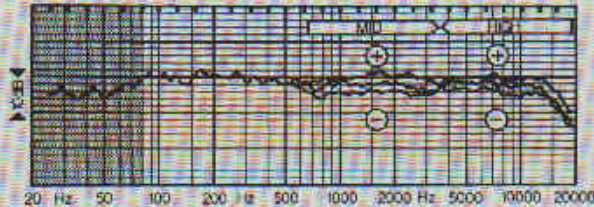
Weight: 48 1/2 lb (33,0 kg)

Wood veneers

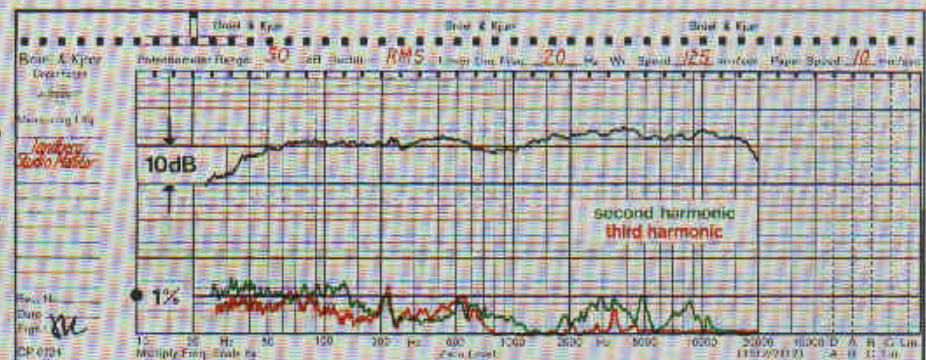
The Tandberg Studio Monitor is delivered with cabinets in teak, rosewood, walnut, or matt black finish.

Stand

As an optional extra a stand with 4 legs can be supplied. The stand is 13 1/4" (35 cm) high and screws to the cabinet.

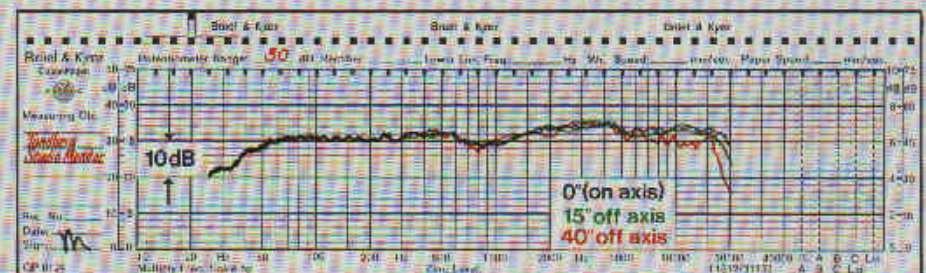


Power curve measured in a reverberation chamber showing the effect of the acoustic tuning for the mid-frequency and treble ranges.

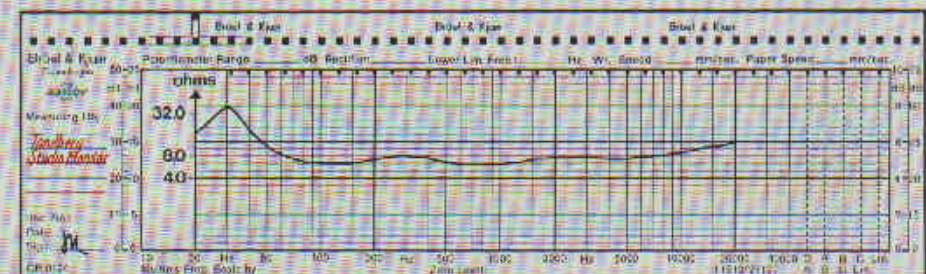


Top: Frequency response curve measured under free field conditions (0° on the axis). Measured at 1 metre with 6 watts applied.

Bottom: Distortion measurements. The top curve is second harmonic and the bottom curve is third harmonic distortion.



Sound distribution pattern 0°, 15°, and 40° off the loudspeaker axis.



Impedance characteristic (ohms)

Tandberg quality



Right from the early days when the firm was founded, Tandberg has developed and manufactured loudspeakers. We have always had stringent requirements for test and inspection. Our object is to make loudspeakers with the same high quality as the other products which have made the name Tandberg known throughout the world.

On the left you can see pictures showing the most important development methods for Tandberg loudspeakers; methods which are the background to the excellent performance characteristics. At the top, measuring the sound pressure in a particular direction under free-field conditions (an infinitely large room). The individual drive units and the complete loudspeaker systems are all tested in the same way.



In the middle you get a glimpse of the acoustic laboratory's measurement room (reverberation room). Prototypes of new loudspeaker systems are tested here where the radiated acoustic power is measured.

The lowest picture shows perhaps the most important tests of all: the practical listening tests. Many people listen to the prototypes in a normal listening room over and over again until they are satisfied with the sound reproduction. And all this is going on – today and in the future – so that you can receive joy from the loudspeakers in your music centre.



TANDBERG

DEALER:

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