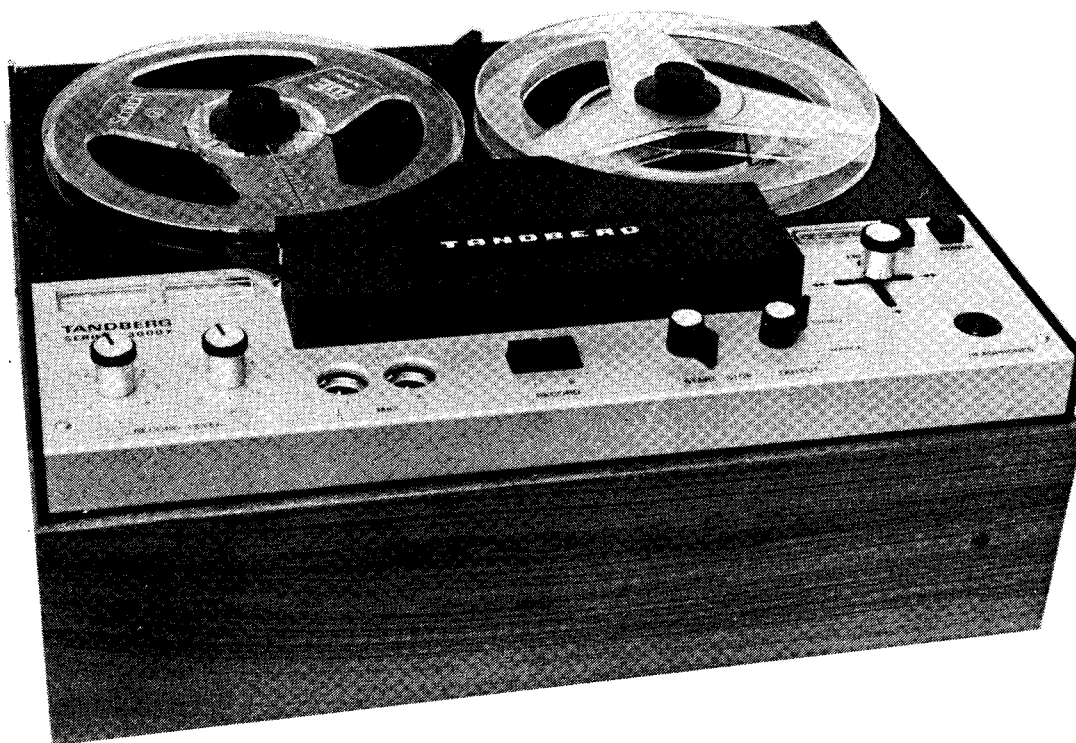


ON TEST



Tandberg 3000X tape unit F.C.Judd

Price £99 18s. Three-speed stereo record/replay unit.

field recording head system and operates at $7\frac{1}{2}$, $3\frac{3}{4}$ and $1\frac{7}{8}$ ips. It has a useful although rather limited track-to-track recording facility but otherwise caters fully for all normal stereo or mono recording and replay requirements.

Tandberg have always been noted for compact, well designed and well made tape recorders. The 3000X is yet another good example of Tandberg engineering, and although the styling is a little different from earlier models it is still typically Tandberg. This recorder has no power output stages or internal loudspeakers, so that replay must be effected by an external amplifier and speaker.

Adequate facilities are of course provided for recording from a microphone or radio tuner, and direct replay can be obtained by stereo headphones for which a socket is provided. The recorder operates at the usual tape speeds of $7\frac{1}{2}$, $3\frac{3}{4}$ and $1\frac{7}{8}$ ips and has provision for fast forward and reverse rewind, automatic tape stop, tape hold while setting up for recording, and controlled cueing for rewind.

Either of the two channels can be used independently for mono recording and one can record from one track to the other—

i.e. a recording on either track can be transferred together with additional signals. A limited form of mixing is possible by feeding signals simultaneously to the separate DIN and phono line sockets but there is no provision for varying either signal input independently. As the 3000X has a three head system—separate erase, record and replay heads—monitoring on or off tape is possible and echo can be added to a recording. These facilities are built in and are selected by switch.

The recorder chassis and deck is one complete unit, surrounded at the sides by what might be called a half case. This is simply a three-sided box without top or bottom which could be removed if the unit is to be installed in a hi-fi equipment cabinet. The input and output sockets (except those for the microphone) are situated at the rear but in order to conceal these when the recorder is operating in the vertical position, a metal panel is supplied which provides a closed-in 'top'. A pair of cross-wise supports are also provided for use when the machine is operated vertically.

Accessories supplied with the recorder include two tape spool retainers, an empty 7in. tape spool and a DIN plug-terminated

Model 3000X is one of the latest Tandberg stereo record/replay units and can be operated horizontally or vertically. It requires an external amplifier and loudspeakers but replay can be obtained directly with stereo headphones. The recorder employs the cross-

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connecting cable. No microphone is supplied but the Tandberg TM5 microphone and a carrying case for the recorder are available as extras. The recommended tape is Tandberg low-noise LP available from the UK distributors or Tandberg dealers. The instruction book gives clear operating instructions with more than adequate illustration and includes diagrams for connection to DIN, phono and jack plugs.

The 3000X is of course transistorised and the crossfield head system is used for recording. This involves the use of two heads for recording, one of which carries audio signals directly into the magnetic track (the head is in close contact with the tape) while the other imparts the high-frequency recording bias signal through the tape onto the magnetic track. The two heads are therefore situated so that the tape runs between them. The claim for the crossfield system is that lower noise levels and an extended frequency range is possible particularly at lower tape speeds.

Inputs are provided for microphone (200-700 ohms) via DIN sockets on the deck for higher level signals via phono or DIN sockets at the rear. The DIN line sockets have a sensitivity of 5mV at 57 kohms and the associated phono sockets a sensitivity of 100mV at 1Mohm. The external amplifier outputs supply a nominal 700 to 800mV from a full level recording and are suitable for matching into more or less any impedance greater than 100 ohms.

Pickups

The headphone socket is suitable for stereo headphones of not less than 100 ohms impedance. The high-sensitivity line DIN input sockets are not suitable for direct connection of magnetic pickup cartridges as no equalisation is provided. A crystal or ceramic pickup cartridge with high output could, however, be connected to the 100mV phono inputs which have the requisite high impedance and would therefore automatically produce the proper frequency response characteristic for disc records.

The mechanics of the 3000X are similar to those in earlier Tandberg recorders with the exception of the cueing control which is a new device that brings the tape into contact with the replay head during rewind. A large single internal rotor drive motor is used for all modes of tape transport and the gate type function selector, it seems, is still very much a Tandberg feature except that all the latest models have a 'free' position for the selector which permits easy tape threading and free movement by hand of the tape spools. No pressure pads are used on the tape heads themselves since the tape is held in contact with the heads by its own tension. The automatic tape stop system operates on all tape transport modes, which means

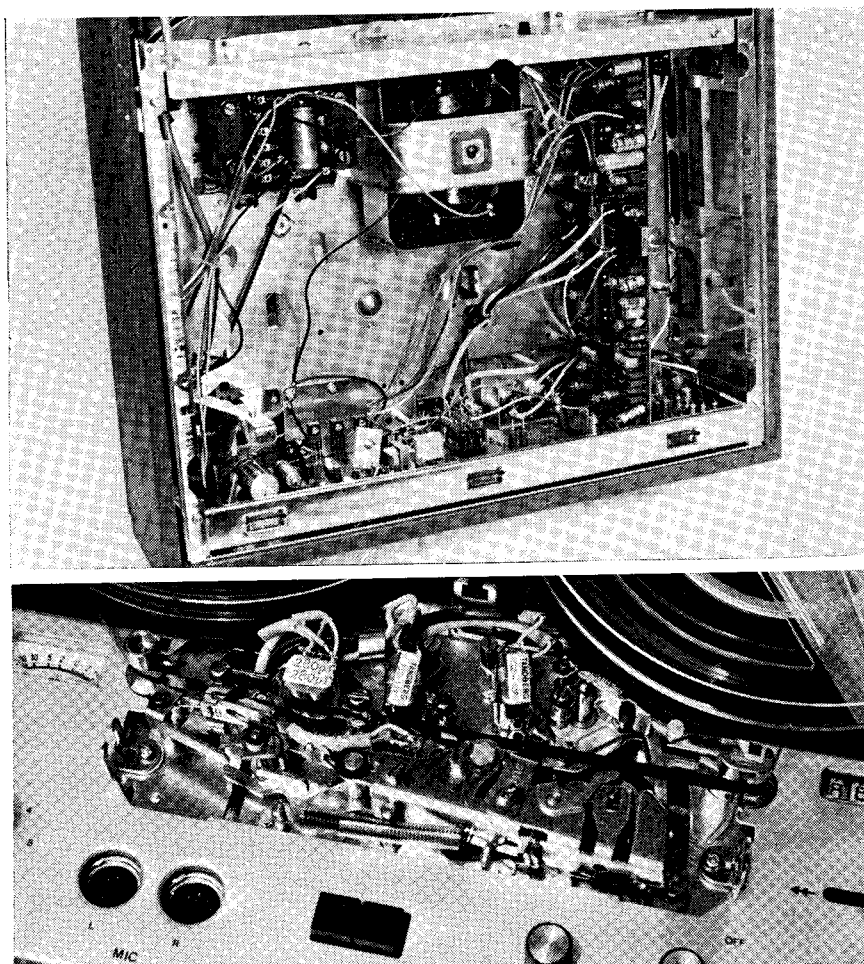


Fig. 2. Above: head assembly and capstan, and (top) underside of deck.

that the mechanism will not run unless the tape is in place, or will stop if the tape should break and/or when it comes to an end.

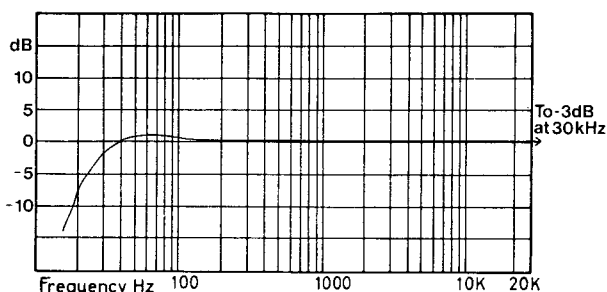
The 3000X submitted for review was the quarter-track version and was tested accordingly. An identical model is available for half-track stereo operation.

No fault whatsoever could be found with the mechanical function of the recorder after repeated running in record, replay and rewind modes. Cyclic speed variation and departure from nominal running speeds were well within the tolerances set by the manufacturers even after several hours of continuous operation. The drive motor ran for long periods without signs of excessive heating and all mechanical controls such as the gate selector lever, tape hold and cueing controls worked smoothly and efficiently. These checks were carried out with the recorder operating in both the horizontal and vertical position. Tests were also made with thin triple-play tape to ensure that no slipping or undue tension occurred, but no fault in this direction was

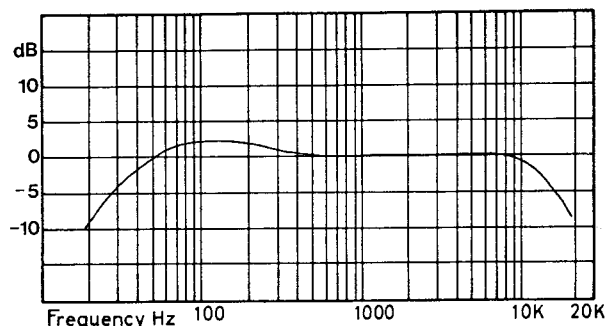
apparent either.

The electrical performance was marred only by the pointer of one of the VU recording level meters which persisted in sticking when it reached the 0dB mark. The frequency responses obtained for each of the three tape speeds are shown in the graphs. At 7½ips the response was quite exceptional and extended to 30,000Hz at -3dB. At 3¾ and 1½ips the responses at the high frequency end were down by a little against the specification but this deviation is small enough to be of little or no consequence.

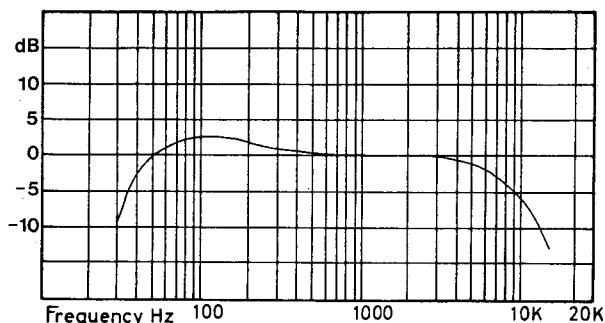
Special attention was given to the overall, record to playback, signal-to-noise performance, which certainly proved to be very good indeed at better than -54 dB. How much of this can be attributed to the use of the crossfield recording system is difficult to say. One thing is certain: the noise performance is not impaired as one might expect by the high rate of treble pre-emphasis used during recording at the lower tape speeds, 3¾ and 1½ips, or by the small amount of treble lift



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Fig. 3. Frequency response at 7½ ips (see text).

Fig. 4. Frequency response at 3¾ ips.

Fig. 5. Frequency response at 1⅞ ips.

applied during playback. The claim that the crossfield recording system provides a wider frequency response and lower noise level at lower tape speeds would seem to be a perfectly valid one.

Crosstalk between channels on stereo operation was -53dB and, therefore, better than specified. This test and also that for the signal-to-noise performance was made relative to a full level (0dB) recording at 1000Hz and an output signal level of 0.75V rms. The frequency response checks were made with recording at 20dB below full (0dB) level.

Like the Tandberg 1641X on which I reported in March 1970, the external amplifier outputs of the 3000X have no means of attenuation. The peak signal level from a fully recorded tape is around 600 to 800 mV and this could be too high for some amplifier inputs. Deck mounted output volume controls would of course add to the cost. Pre-set controls mounted at the rear next to the output sockets would not only provide adequate control over the output signal level but would cost little to

fit. Designers please note!

The inputs have more than ample overload margins and the sensitivities and impedances are quite satisfactory for all the usual signal sources. As already mentioned, however, there is no provision for independently controlling the level of separate signal sources fed into the DIN and phono line inputs simultaneously. Signals from microphone and the high level inputs cannot be mixed or even recorded simultaneously onto one channel as the high level signal sockets are automatically switched out of circuit when the microphone plug is inserted.

Hi-Fi category

The only point I have any real concern about is the price of the 3000X. The prices of tape recorders have risen quite appreciably over the last two or three years, and while the 3000X gave a very good performance, I feel that a somewhat more flexible sound-on-sound facility, or controllable mixing, or even output volume controls might have been included since

the machine is virtually in the £100 category. Aside from this, the 3000X has my recommendation as a recorder that can be rated as hi-fi and which should prove to be very reliable in all respects.

Manufacturer's Specification

Tape speeds: 7½, 3¾ and 1⅞ ips. **Speed tolerance:** ±1.5%. **Input:** mic-200/700 ohms, 0.1mV. **Line:** 100mV at 1 Mohm and 5mV at 57kohms. **Outputs:** external amp 0.75V rms at not less than 100 ohms. **Headphones:** not less than 100 ohms. **Distortion:** recording less than 0.5%. Playback less than 0.3% at 0.75V rms output. **Frequency response:** 7½ips, 40-20,000Hz ±2dB. 3¾ips, 50-16,000 ±2dB. 1⅞ips, 50-9,000Hz ±2dB. **Wow (rms):** 7½ips better than 0.07%. 3¾ips, 0.14%. 1⅞ips, 0.28%. **Signal to noise:** (DIN) 51dB. **Crosstalk:** mono 60dB. stereo 50dB. **Dimensions:** 15½ × 6½ × 12¾in. **Weight** 20lb. **Price:** £99 18s 0d. **Power supply:** 230V, 50Hz. **UK Distributors:** Farnell-Tandberg Limited, Farnell House, 81 Kirkstall Road, Leeds LS3 1HR.