EDISON PHONOGRAPH

by

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Manufacturers' Specification

Portable sound recording apparatus employing cylindrical-scan tinfoil.
Tinfoil speed: Continuously variable.
Wow and flutter: Dependent upon alcohol level in blood of operator. 15 per cent (total abstinence).
Distortion: Dependent upon alcohol level in blood of listener: 1 per cent (blotto).
Frequency response: Heavily weighted.
Signal-to-noise: To BS 0001: 1812, Section XII, page IV.
Input level: High.
Output level: Low.
Other features: Separate record and playback diaphragms permit simultaneous off-tinfoil monitoring and echo.
Price: Subject to inflation.
Agent: Sonic Sophistry, Dock Lane, Wapping.

Despite its avant-garde appearance, this design has been on the drawing board and in other places for several years. The philosophy behind the Phonograph appears to be:

(1) Total reliability in return for a slight reduction in sound quality.

(2) Complete independence of mains or battery failure.

(3) A combination of points (1) and (2).

A perspective view of the unit is shown in the

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photograph while fig. 1 provides a sectional plan.

C is a cylinder of brass having a spiral groove or screw cut upon its surface from end to end. It is mounted upon a spindle whose length is rather more than three times that of the cylinder. At one end of the spindle is a winch handle, between which and the cylinder a screw is cut of the same pitch as that upon the cylinder--some three threads to the centimetre. The spindle turns in two brass bearings, one of which has an inside screw corresponding to the screw upon the spindle.

A very thin sheet-iron diaphragm d d^1 receives the operator's voice. It is secured by means of a brass flange over a shallow circular recess cut in the wooden frame F. In the middle of the recess is a round hole opening into the mouthpiece M. A short piece of hard steel wire ground to a blunt point and carefully polished is fixed perpendicularly to the iron diaphragm at its centre O.

On the other side of the cylinder is the diaphragm p p^1, which reproduces the sound of the voice. It is made of vegetable parchment and is stretched like a drum over the end of a piece of brass tube 25 mm long and 70 mm in diameter, fixed in the wooden frame H. The steel point t is attached to the end of a steel spring, its position coinciding with the centre of the circular opening in H. The light pine rod K, connecting the parchment and the spring abuts at the end next to the spring against a small pad of vulcanised india-rubber, and at the other end carries a disc of thin sheet iron 12 mm in diameter. The pressure of the spring is sufficient to render the diaphragm very slightly convex.

The square frame F, carrying the thin iron diaphragm which receives the voice, is attached by hinges to a piece of wood, which is connected rigidly with O, O again being connected by hinges B with X. By means of these hinges, and the screw S, the point O may be made to approach the cylinder, so as to dip into the groove upon its surface. The arrangement on the other side

of the cylinder is almost identical. At I and J are hinges and at N a screwnut and spring for regulating the depth to which t enters the groove.

The method of using the instrument is as follows. The two diaphragms being turned back, the cylinder is covered with a piece of stout tinfoil, fixed by gum, and is then moved, by turning the handle, as far to the right as possible. The stud at O is turned so as to allow the point O to press upon the tinfoil, and the cylinder is made to perform half a revolution. d d^1 is once more raised and, if the smooth furrow formed by the motion of the tinfoil against the point should be found too deep or too shallow, the nut S is turned slightly to the right or left. When the proper depth is attained--a point only to be learnt by experience--the same process is gone through with the other diaphragm, and the instrument is in working order. The point o is again dropped upon the tinfoil, the diaphragm p p^1 being kept raised as in the figure. The handle is then regularly turned at the rate of about one revolution per second, words being at the same time distinctly spoken into the mouthpiece M. When the speech is completed, d d^1 is removed from the tinfoil, when the furrow it has traced is found indented by the movements of the point in responding to the vibrations of the voice. The cylinder is then turned back to its original position and the point t, at the other side of the cylinder, dropped upon the furrow. Again the handle is turned, the undulations on the foil being caused to pass under the point. The original process is thus reversed, the indentations imparting to the second point movements precisely similar to those which the first point performed while producing the indentations. The vibrations of t are conveyed by the rod K to the parchment diaphragm p p^1, and by it to the air, producing sounds closely approximating in pitch and quality to those by which the iron diaphragm was set in motion. A cone of stout drawing-paper about 30 cm long can be slipped over the tube p p^1 to reinforce and give body to the sound.

The non-electric nature of this recorder is both a

blessing and a source of difficulty. Blessed is the fact that it may be placed in front of a musician (or optimally located near group of same) with nothing to twiddle but the driving handle. Problems arise only when multimiking or dubbing to or from an electrical machine. In an effort to increase 'presence' one might employ gas tube coupling between the instruments and the input diaphragm. Experiments were undertaken in this direction to record a brass band, our signal being derived by elastic tubes attached direct to the instrument bells. Recorded quality, in the few seconds before the equipment exploded, was probably good.

The absence of any erase facility led me to investigate the properties of cooking foil as a recording medium, since Sonic Sophistry were unable to provide replacements. Results were acceptable but improved when the foil was lubricated with warm chicken fat.

Table 1 shows frequency response measurements undertaken with a toothed wheel tone generator of known toothed wheel workmanship precision. The published readings are subjective estimates and may vary fractionally from one listener to another. Note the 1 kHz reference level, which is exactly 0 dB.

Lowest wow and flutter readings were obtained after a moderate lunch, in an ambient temperature of 20°C with jacket and cuff-link removed, the shirt sleeves being folded back towards the elbow. Speed control is effected by a servo system which, for complexity, variability and sophistication, is second to none. Fig. 2 shows the basic logic system employed on replay. The Phonograph design acknowledges the universal feature of all recording machines: that any similarity between record and reproducing speed is purely coincidental. Here all control is placed firmly in the hands of the operator and, to a larger or smaller extent, neighbouring listeners.

In conclusion I would say, if I knew the price, that the Phonograph represents good value, particularly at the discount probably offered to bona fide studios, but I don't.

TABLE 1 OVERALL FREQUENCY RESPONSE

	TTW	Mrs TTW	TTW Jnr
50 Hz	inaudible	inaudible	inaudible
200 Hz	—5 dB	something	yes
500 Hz	+10 dB	yes	loud
1 kHz	0 dB	0 dB	0 dB
5 kHz	+20 dB	yes	yes
10 kHz	—5 dB	no	yes
15 kHz	inaudible	inaudible	inaudible

Distortion: Yes.
Noise: Hiss and a once-per-cylinder revolution scroink.

FIG. 1

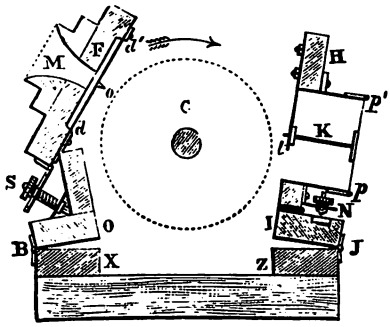

FIG. 2 PHONOGRAPH SPEED CONTROL LOGIC