

TURNTABLE UNITS TTU/8 AND TTU/8A

Introduction

The TTU/8 is a turntable unit for mounting in disk reproducers, where it serves as the mechanical assembly, with pickup arm, for playing fine-groove records at 33½ and 45 r.p.m. The pickup arm on the unit is a PUA/5.

As shown in Fig. 1, the assembly is mounted on two plates, a large one which carries the turntable, pickup arm, motor speed indicators, pickup position and fader indicators, and a narrower one on the right which carries the two control levers for lowering the pickup and for starting the record.

In the working condition the narrower plate carrying the controls is screwed to the cabinet but

the larger plate which carries the turntable and pickup rests on four conical springs (adjustable in height) to isolate it from mechanical shock.

For maintenance purposes the whole unit can be raised on four pillars, shown in Fig. 2, which extend below the supporting springs and normally hang down freely inside the reproducer cabinet.

The TTU/8A is similar to the TTU/8 but is fitted with a modified pickup arm Type PUA/5B, to permit the playing of stereophonic as well as monophonic records. The plate carrying the turntable may rest on rubber pads fitted to the reproducer cabinet instead of on the springs provided for supporting the TTU/8 version.



Fig. 1. Turntable Unit TTU/8 (Shown in the Cabinet of a DRD/5)

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|--------------------------|-----------------------------|------------------------------|
| 1. Motor-speed Indicator | 5. Fine Control, T.T. Speed | 10. Pickup Lifting Member |
| 2. Motor-speed Indicator | 6. Speed-change Lever | 11. Pickup Raise/Lower Lever |
| 3. Pickup Scale | 9. Fader Indicator Lamp | 12. Metal Disk |
| 4. Motor On/Off Lever | | 13. Disk Start/Stop Lever |

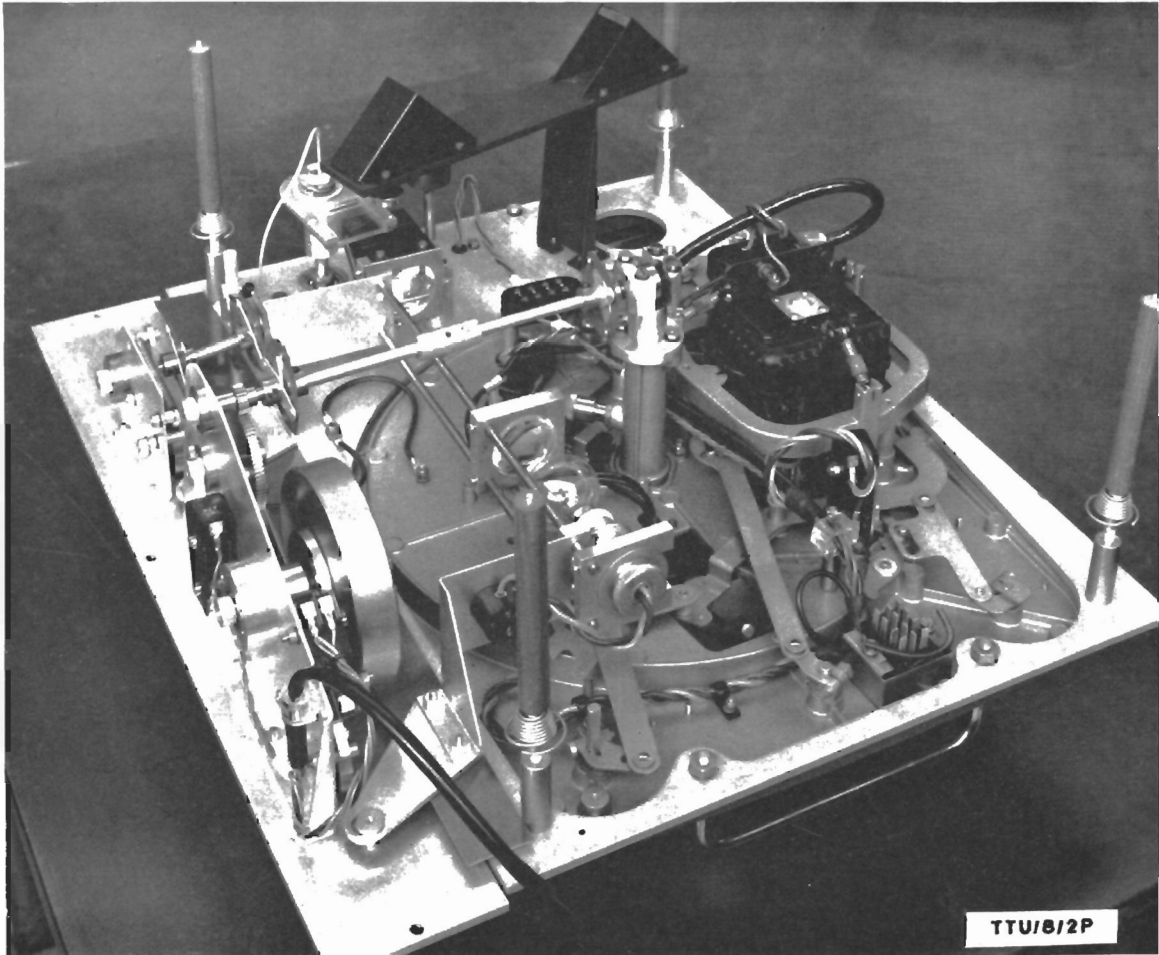


Fig. 2. Underside of Turntable Unit TTU/8

General Description

Turntable Drive

The turntable and driving motor are basically a modified Garrard Transcription Motor Model 301. This employs an induction motor with an eddy current brake for fine speed adjustment and normally any one of the three speeds 78, 45 and $33\frac{1}{3}$ r.p.m. can be obtained by engaging an intermediate rubber wheel between the appropriate diameter of the stepped motor shaft and the internal surface of the turntable rim. In the TTU/8 and TTU/8A only $33\frac{1}{3}$ and 45 r.p.m. are required and a stop has therefore been inserted to eliminate the third position.

Switches are coupled to the speed selection lever (6 in Fig. 1) and the motor *On/Off* lever (4) so that when the motor is running the speed selected is shown by illumination of the appropriate window (1 or 2) in the lamp housing at the rear of the desk. The circuit is shown in Fig. 3.

A concealed neon lamp, in conjunction with stroboscope markings on the edge of the metal disk which supports the record, enables the speed to be set exactly in synchronism with the mains frequency by means of the fine control (5 in Fig. 1) which enables the turntable speed to be varied by about $2\frac{1}{2}$ per cent; this corresponds to a change in the reproduced pitch of about half a semitone.

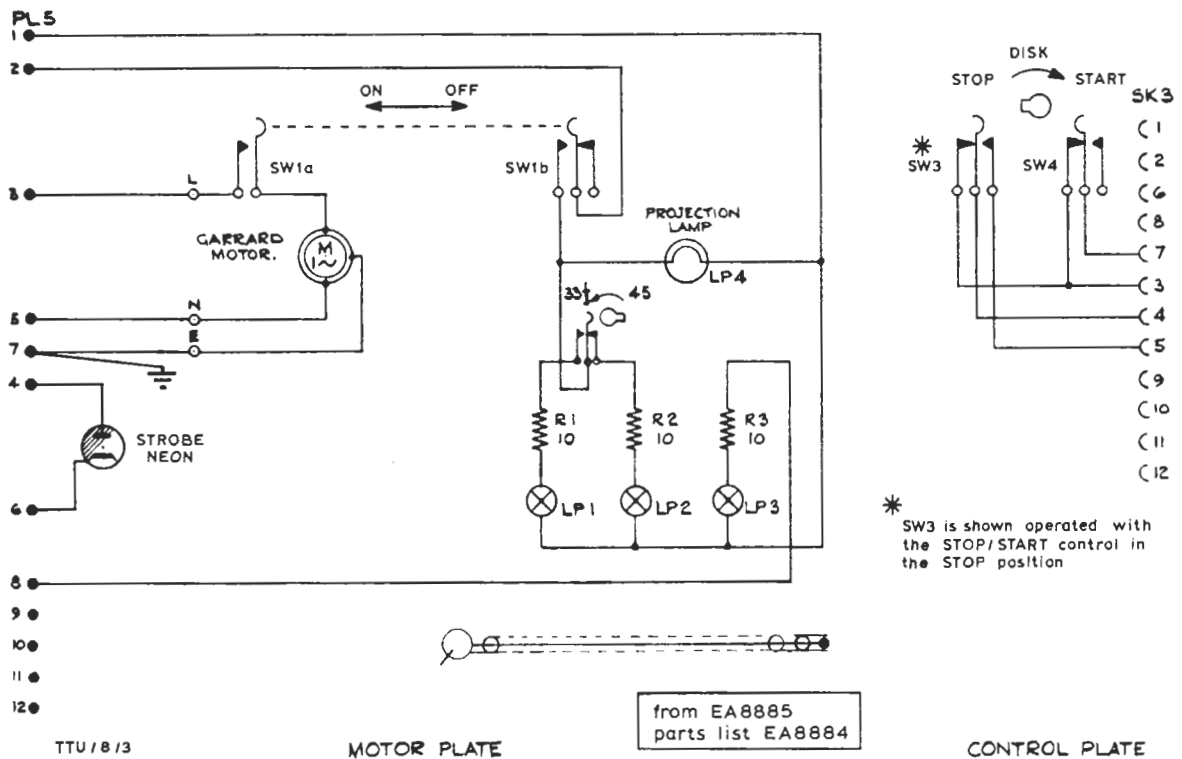


Fig. 3. Circuit of the TTU/8 and TTU/8A

The control for setting the position of the intermediate wheel is interlocked with the turntable starting lever so that it can be moved only when the lever is in the *Off* position. With the lever in the *Off* position the intermediate wheel is automatically removed from contact with the motor shaft and can therefore be moved from step to step without damage.

Start/Stop Device (Fig. 4)

The record (1) rests on a metal disk (2) which is considerably larger in diameter than the turntable (4) and in the *Stop* position of the *Disk Start/Stop* lever (Fig. 1) this disk is stationary, resting on fixed supports (3) that surround the turntable. When the motor is first switched on, the turntable itself rotates at the appropriate speed a small distance

below the disk, but when the *Disk Start/Stop* lever is moved to the *Start* position the rotating turntable is raised slightly so that it lifts the metal disk off the supports. Since the weight of this disk and the record is small they are brought up to speed quickly, and, to assist this, additional power may be supplied to the motor during the time that the load is being taken up.

The eccentric cam (6) which raises and lowers the turntable is connected to the operating lever (7) via a link and gear mechanism which is spring loaded in such a way that a snap over action is provided when the operating lever approaches the *Stop* position and spring loaded in the direction of the *Start* position when the lever is displaced from *Stop*.

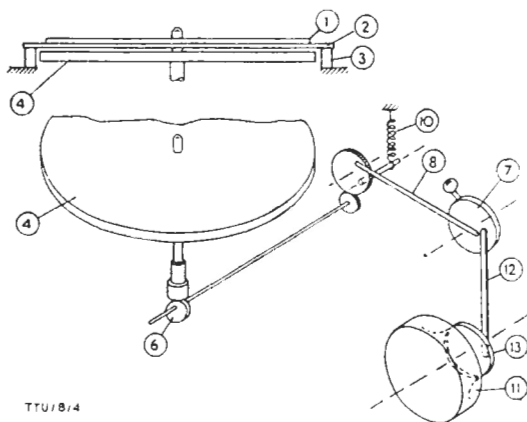


Fig. 4. Diagram of Quick-starting Arrangements

- | | |
|--------------------|---------------------|
| 1. Record | 8. Link |
| 2. Metal disk | 10. Spring |
| 3. Fixed supports | 11. Flywheel |
| 4. Turntable | 12. Link |
| 6. Eccentric cam | 13. Friction clutch |
| 7. Operating lever | |

The operating lever is also coupled to a flywheel (11) by means of a link (12) and a friction clutch (13), the linkages being arranged so that the velocity ratio between the flywheel and the cam increases as the mechanism moves from the *Stop* to the *Start* position; thus the flywheel accelerates with respect to the cam and gives smooth operation to the cam at a predetermined rate once the control lever has been moved from the *Stop* position. The friction clutch enables the control imposed by the flywheel to be overridden if more rapid operation

is required in either direction, and enables the energy stored in the flywheel at the end of the operation to be dissipated silently and without shock. The underside view of the turntable unit in Fig. 2 shows how the mechanism is arranged.

Switch contacts are actuated by the *Disk Start/Stop* lever, as shown in Fig. 3, and these may be connected so that various electrical functions (e.g., turntable motor boosting and programme signal muting) are automatically dependent on the setting of the lever.

Pickup Arm Lifting Mechanism

The pickup can be raised and lowered by means of a sector of about 2-in. radius (10 in Fig. 1) which is positioned under the pickup arm concentric with its vertical axis. This sector is moved up or down by a single rack and a pinion which is connected by a shaft and flexible couplings to the operating lever (11 in Fig. 1). This lever is spring-loaded in the lower direction but is locked when in the raised position.

Pickup Position Indicator

Although the precise positioning of the pickup on the disk is done by listening to its output when the disk is moved, its approximate position is indicated on a scale (3 in Fig. 1) by means of an optical system. This kind of system enables large magnification to be obtained without impeding the free movement of the pickup arm. A magnification of about six has been chosen; a higher figure would have served no useful purpose as the eccentricity between the centre hole of the record and the groove spiral which is permitted by the British Standard 1928:1955 corresponds to a swing of $2\frac{1}{2}$ grooves during each revolution of a record with 250 grooves per inch. In addition, the groove pitch is sometimes varied during a recording in accordance with the recorded amplitudes, and so a scale cannot be made to give any indication of the number of grooves or the playing time. The optical system employed projects on to a fixed screen the image of a scale which moves with the pickup arm. This enables a stationary beam to be used which can be arranged clear of obstructions and requires only a small fixed screen for the indicator.

The flat horizontal graticule, which is carried on the extension to the vertical spindle of the pickup below the turntable mounting plate, has a scale in the form of a circular arc which subtends an angle of about 25 degrees at the axis of the vertical shaft. A fixed beam of light from a projector lamp is

directed by a system of lenses and a mirror downwards through the graticule. The light beam is then directed by a further system of lenses and mirrors to the ground-glass viewing screen at the rear left-hand corner of the top side of the turntable unit. An image of the scale on the graticule appears on this screen and the movement of the pickup causes it to move in the same direction past the fixed reference line on the screen.

The arrangement of the optical system on the underside of the turntable unit is illustrated in Fig. 2.

Note on Operation

When the turntable unit is not in use, always leave the *On/Off* lever at *Off*, so that the rubber drive wheel is disengaged and does not develop flats.

Maintenance

It is undesirable to remove the turntable itself from the turntable unit except, for example, when replacing the intermediate rubber wheel, but if its removal is required the following procedure should be adopted:

- (a) Take off the stroboscope disk.
- (b) Lift the turntable manually by a small amount.
- (c) Strike the turntable spindle lightly, and just sufficiently to release the turntable, with a wooden mallet; this operation should be performed by a second person.

When replacing the turntable it is important that no foreign matter should be trapped between the tapered mating surfaces, and that the turntable should not be dropped on the spindle. **On no account should the turntables from different desks be interchanged.**

Attention should be paid to the following points:

- (a) The *pickup* movement should be quite free in both directions and should exhibit no slack or stiffness. It may be necessary to adjust the pickup leads to prevent pull on the pickup arm. If the horizontal pivot bearings are initially adjusted and securely

locked, no further maintenance should be necessary.

If it is suspected that the counterbalance weight has moved, the playing weight should be checked and, if necessary, adjusted to 6 grammes on a TTU/8 or 3 ± 0.5 grammes on a TTU/8A. If a stylus pressure gauge is not available, it is sufficient to balance the arm on a TTU/8 statically with the Acos head removed.

- (b) The *groove indicating scale* should give the same scale reading for the same relative position of the pickup on all desks. A calibrating groove is engraved on the top surface of the stroboscope disk, and with the pickup resting in this groove the scale reading in the indicator housing should be 100.

Any adjustment required can be obtained by rotating the scale holder at the extreme lower end of the pickup axis. The scale holder is coupled frictionally to the pickup and the retaining nut should not be slackened.

Fine focusing adjustment is provided by a screw situated behind the turntable and to the right of the indicator housing.

- (c) The *intermediate rubber wheel* should be free from cracks and flats. Provided the turntable and motor are not misused, the wheel should last a long time. Evidence of any defect is given by undue wow or flutter so that visual inspection is not normally necessary. The wheel runs in self-lubricating bearings and therefore no lubrication is necessary except at, say, yearly intervals.
- (d) *Lubrication* of the main turntable shaft is provided by a screwed brass reservoir cap on the side of the bearing housing; screwing this cap forces grease into the bearing, and one half-turn over a month should be sufficient. Use 'Garrard Special Grease for Model 301 Transcription Motor'.

Reference

Disk Reproducers DRD/5 and DRD/5B.

WG 10/58
DPEB 5/70