DISK REPRODUCING DESKS DRD/5 AND DRD/5B

General Description

Desk DRD/5 (Fig. 1) is designed for the reproduction of monophonic fine-groove gramophone records at speeds of 45 and 33⅓ r.p.m.

The desk incorporates a commercial transcription turntable, modified to provide quick start and stop facilities, and has a modern lightweight pickup which does not cause any damage if the record is rotated backwards. The record may therefore be moved to and fro by hand so that a point in the programme can be located in the same way as with magnetic tape. Groove location is facilitated by an optical-scale device.

The desks can be used either singly or in banks. An account of the development of the DRD/5 and the reasons for the adoption of various features of its design are given in BBC Engineering Monograph No. 5: Reproducing Equipment for Fine-Groove Records.

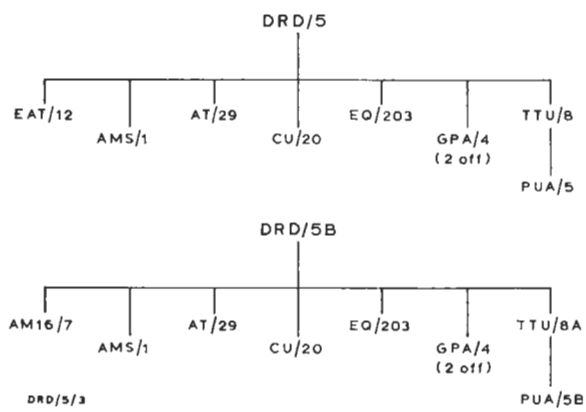


Fig. 1. DRD/5 and DRD/5B: Subunit Codes
(See Separate Instructions)

AM16/7	CU/20	GPA/4
AMS/1	EAT/12	PUA/5
AT/29	EQ/203	TTU/8

A general view of the desk is shown in Fig. 2. A wooden cabinet CT/104, fitted with a lockable lid, houses two main assemblies, one consisting of the Turntable Unit TTU/8, which is mainly a mechanical assembly with the associated controls, the other comprising amplifiers and other electrical units forming Apparatus Shelf No. 7, Assembly A.

Differences in Type DRD/5B

The DRD/5B (Fig. 1) enables stereophonic, as well as monophonic, fine-groove records to be played monophonically. For this purpose a modified pickup arm, fitted with a pickup cartridge differing from that used in the DRD/5, is mounted on the turntable unit, which then becomes Type TTU/8A.

An AM16/7 amplifier is provided (in place of passive equaliser EAT/12 used in the DRD/5) to compensate for the lower sensitivity of the different pickup cartridge. With this substitution of units, the Apparatus Shelf No. 7 becomes Assembly B.

Apparatus Shelf No. 7

In either version of the shelf, the amplifiers, attenuators and control equipment of the desk are mounted on a sliding tray attached to a hinged front panel, shown closed in Fig. 2 and open in Fig. 3.

The front panel carries a mains pilot lamp, the programme fader, a pair of headphone jacks, a key for prefade or ring-main listening and a switch for inserting a top-cut into the circuit. A narrow hinged flap below the front panel encloses the programme terminations and a mains outlet occupied by a plug which carries the mains supply to the turntable motor. The plug can be disconnected and connected to an external supply if necessary, e.g., if a variable-frequency supply is required to give a large variation of turntable speed.

A hasp under the hinged flap can be fitted with a padlock to prevent the shelf being withdrawn and also to prevent the front panel being hinged forward as this can only be done when the shelf has been withdrawn an inch or so.

The following coded units form part of the shelf:

Amplifier Mounting and Supply Panel AMS/1
2 General Purpose Amplifiers GPA/4
Control Unit CU/20
Variable Attenuator AT/29
Fader Unit PB/10/M1
Equaliser EQ/203
Equaliser EAT/12 (on Assembly A)
Amplifier AM16/7 (on Assembly B)

Fig. 4 shows the circuit of the Assembly-A shelf. Both the GPA/4 amplifiers are mounted on the AMS/1 and derive their power supplies from it. On an Assembly-B shelf, the AM16/7 is also mounted on the AMS/1 and is supplied from it.

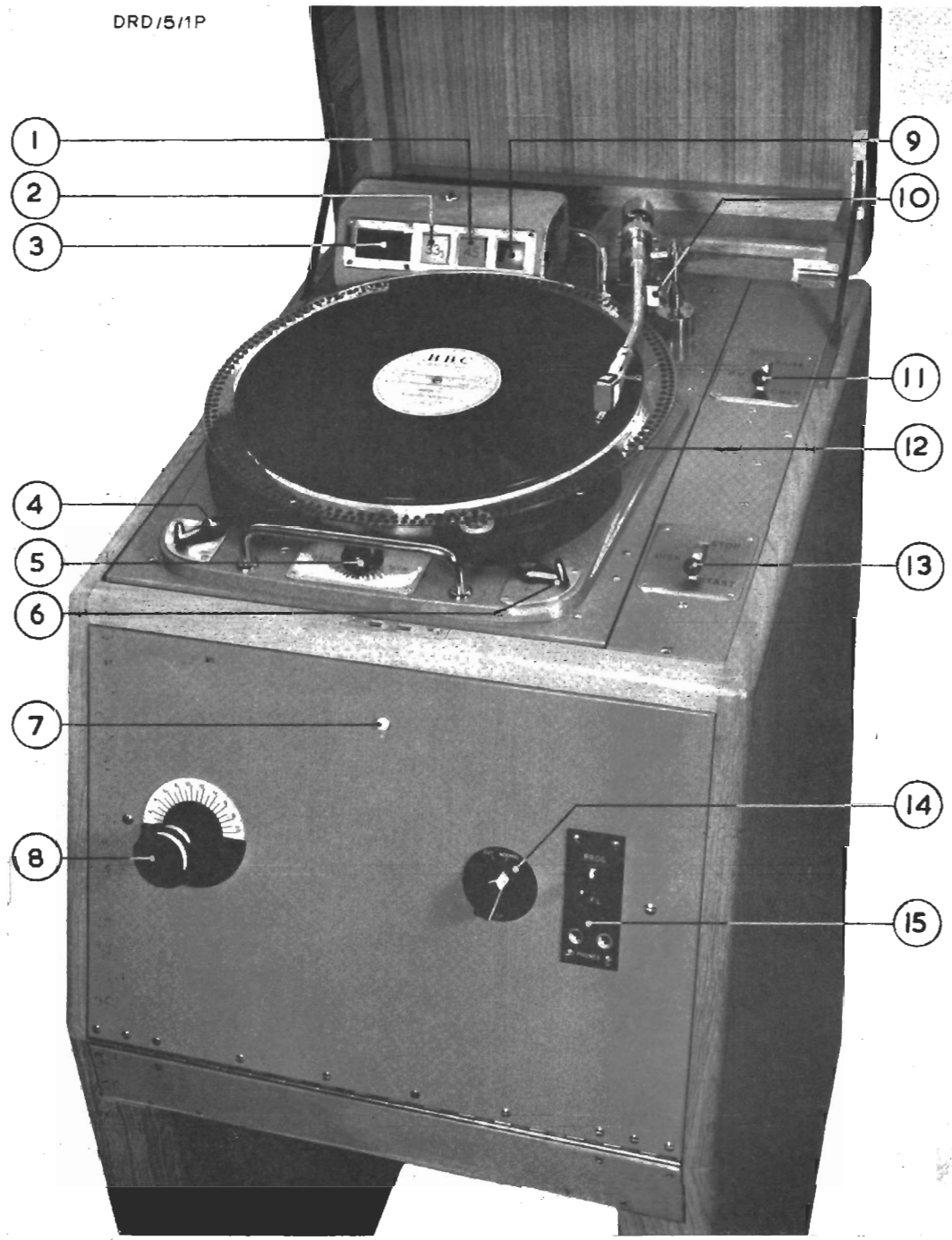


Fig. 2. Disk Reproducing Desk DRD/5

1. Motor-speed Indicator
2. Motor-speed Indicator
3. Pickup Scale
4. Motor On/Off Lever
5. Fine Control, T.T. Speed
6. Speed-change Lever
7. Mains Indicator Lamp
8. Programme Fader
9. Fader Indicator Lamp
10. Pickup Lifting Member
11. Pickup Raise/Lower Lever
12. Metal Disk
13. Disk Start/Stop Lever
14. Top-cut Switch
15. Pre-fade Listen Key

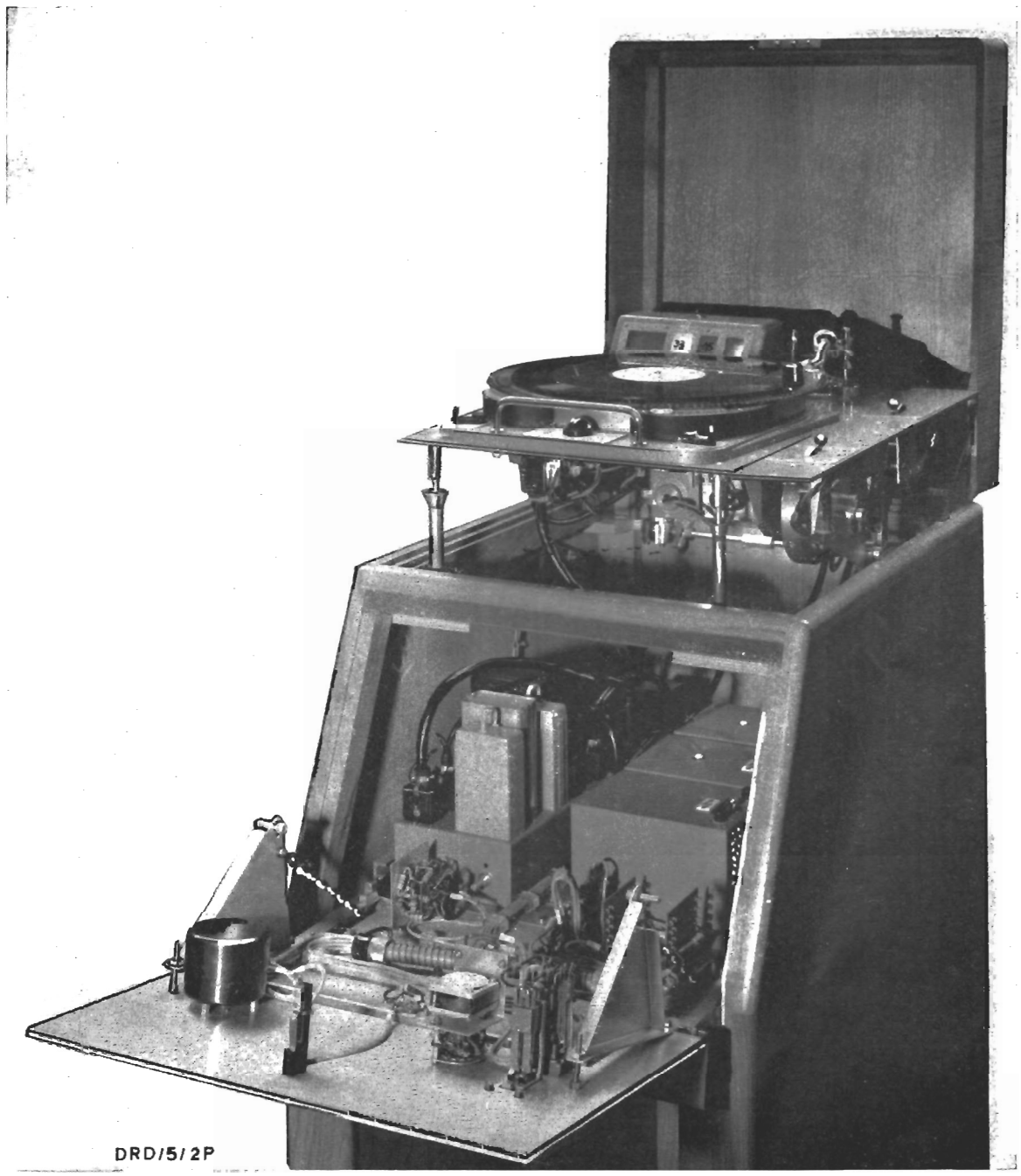


Fig. 3. Turntable Unit Raised and Front Panel of Apparatus Shelf Lowered

Programme Chain (Fig. 5)

The signal from the pickup arm passes through the equaliser EAT/12 in the DRD/5, or through the amplifier AM16/7 in the DRD/5B. Each of these units has characteristics appropriate to the different pickup cartridges employed and both provide a similar output, which is applied to an amplifier GPA/4 followed by an attenuator AT/29. The AT/29 can be adjusted to compensate for differing pickup sensitivities. This attenuator is followed by a switchable top-cut equaliser, Type EQ/203, which can be inserted for records which have a high level of upper-frequency surface noise or distortion.

The circuit then divides, one branch feeding the programme fader, a PB/10/M1, via the control unit CU/20, and the other branch feeding a prefade-listen amplifier, which is a second GPA/4.

The programme signal is automatically muted by an attenuation network in the CU/20 until sufficient time has elapsed for a record to reach full speed after starting. Muting also occurs as soon as the action of stopping a record begins. The automatic muting is controlled by contacts which are actuated by the *Disk Start/Stop* lever on the turntable unit, and are connected to relay circuits in the CU/20.

Attenuators Nos. 3 and 4 and transformer TR1 which follow the fader are arranged to give a balanced output of approximately —70 dB programme volume across a 600-ohm circuit whether a desk is used alone or its output is connected in parallel with the outputs of other desks in a bank.

When a high-level output is required to feed a loudspeaker unit the fader is connected direct to the output terminals as shown in Fig. 4 and the attenuator and transformer disconnected.

Controls

Mains Supply

When the mains socket on the wall is switched on, the mains indicator lamp (7 in Fig. 2) on the front panel of the desk, and the neon stroboscope lamp, will light. There is no mains switch on the desk itself. So long as the indicator has been illuminated for a minute or so the amplifiers and the motor control unit are energised and the desk is ready for use.

Motor Controls

The motor controls are on the sprung portion of the turntable unit. On the left is the motor on/off lever (4 in Fig. 2) which both switches the supply to the motor and engages a rubber drive wheel with the turntable. It is therefore essential that the turntable should always be switched off by means of this lever. If the supply were switched off externally and the desk allowed to stand with this lever in the *on* position, flats might be formed on the rubber wheel and serious wow result.

The motor on/off lever also switches on the projection lamp for the pickup scale (3) and illuminates the appropriate motor speed indicating panel (1 or 2). The fact that one of these panels is

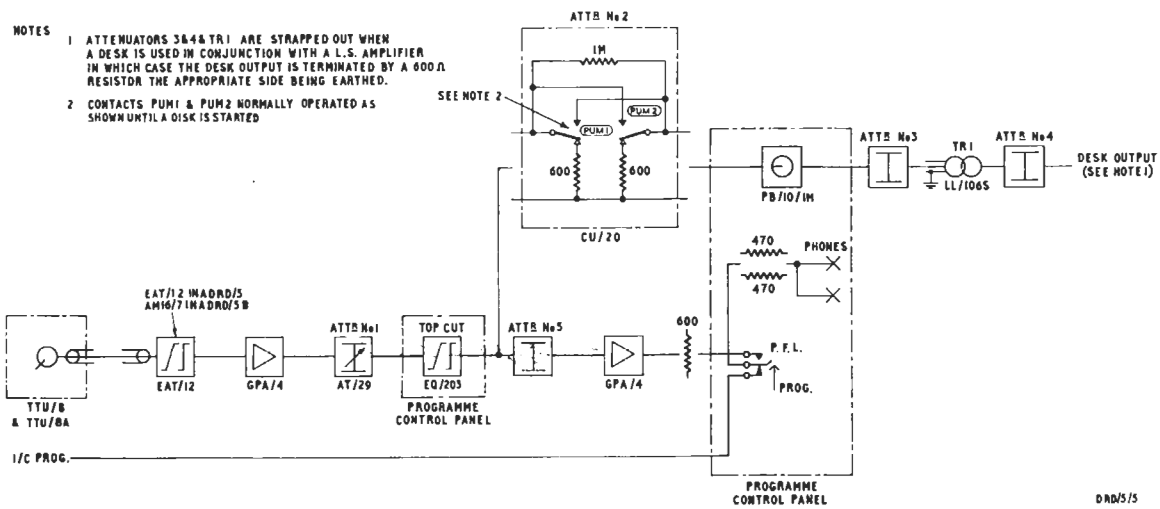
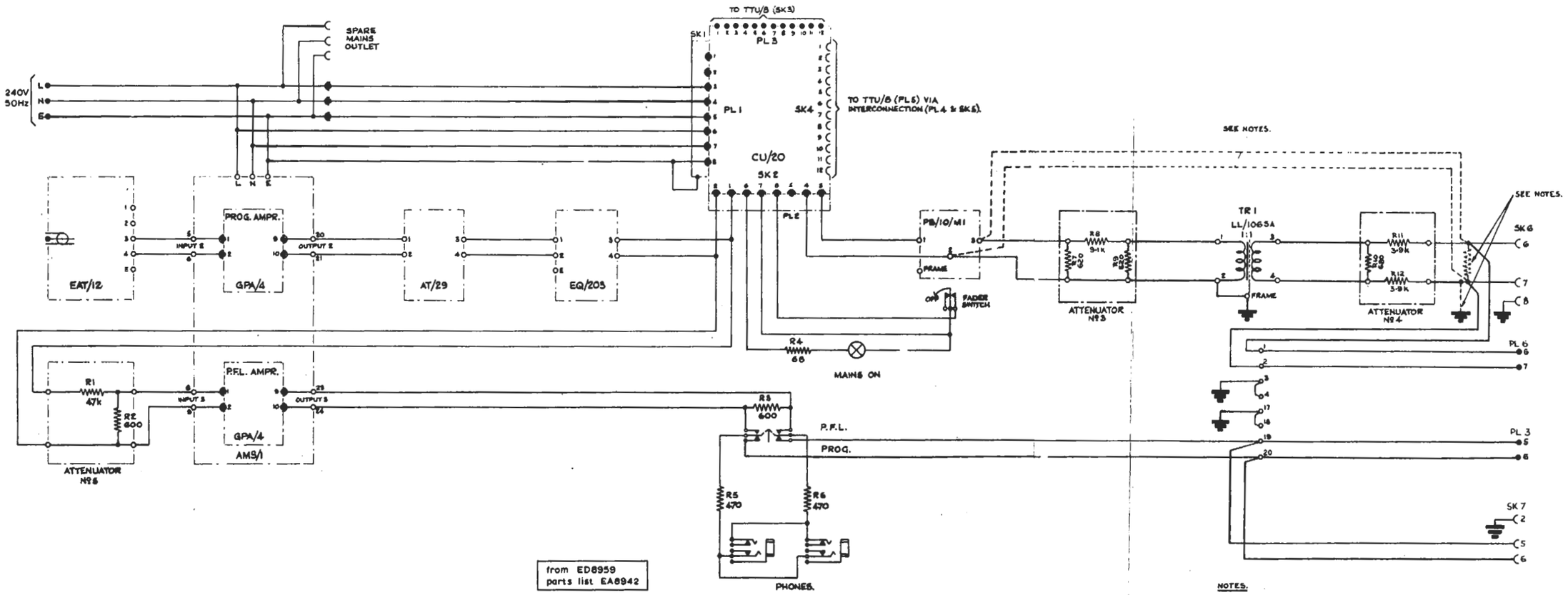


Fig. 5. Programme Chain



DRD/5/4T

NOTES.

WHEN A SINGLE DESK IS USED WITH A LOCAL LOUDSPEAKER, CIRCUIT IS MODIFIED AS FOLLOWS:-
1. ATTENUATORS 3,4 AND TR1 TO BE DISCONNECTED FROM CIRCUIT.
2. DIRECT CONNECTION TO BE MADE FROM PB/10/M1 TO SK6.
3. 600Ω TERMINATING RESISTOR AND EARTH ADDED AS SHOWN.

Fig. 4. Circuit of Apparatus Shelf No. 7, Assembly A

illuminated shows that the turntable is running though, of course, the record and the metal disk on which it rests may be stationary. The turntable speed required is selected by the speed change lever (6) which can be operated only when the on/off lever is in the *off* position.

The turntable can be set to exact speed by means of the fine control (5).

Pickup Controls

The lever (11) controls the raising and lowering of the pickup, and the lifting member (10), which engages the pickup arm, incorporates a depression for the arm to rest in when it is swung off the record. In the raised position the pickup may be moved by sliding it gently across the lifting member and into its rest without further lifting; the head clears the edge of the stroboscope disk by a safe margin.

The arm must not be allowed to jar against the stops at either end of its travel for the magnification of the optical system will make any small displacements of the scale appear as enlarged errors in the scale reading.

The scale which appears on the screen (3) indicates the position of the pickup whether it is lowered on to a record or not. The accuracy with which the pickup can be placed at a previously logged position is limited, however, by record swing which on commercial records commonly amounts to a few grooves and may be as much as ten. The scale therefore provides only an approximate positioning of the pickup. The method of finding a point precisely is indicated below.

Disk Start/Stop

The *Disk Start/Stop* lever (13) operates by raising and lowering the rotating turntable so that it lifts the metal record-carrying disk (12) from its rests or lowers it on to them again. The lever is spring-loaded and if its motion towards the start position is initiated by a touch, the lever continues to move without being pressed further. Its motion should not be restrained, but the lever may be operated faster if desired,

The programme output from the desk, but not the PFL, is muted while the record is stationary and, on starting, the mute is removed after a delay which is sufficient to allow the record to come up to speed. This delay is equivalent to about one-quarter of a revolution of a record at 33⅓ r.p.m. and about one-third of a revolution at 45 r.p.m. The mute is re-applied as soon as the lever is moved from the *Start* towards the *Stop* position.

Operation of the *Start/Stop* lever also controls the switch which causes a higher voltage to be applied to the motor for a short time to help the disk to reach full speed quickly.

Programme Fader

The programme fader (8) which is in the main programme circuit has no effect on the prefade-listen chain. The auxiliary contacts operate a red indicating light (9) whenever the fader is not at zero.

Because of the mute circuit associated with the disk start/stop mechanism the pickup can be faded up to line only when the record is rotating at full speed.

Top-cut Switch

The top-cut switch (14) introduces a loss at high frequencies and is intended for use only on worn or distorted records. Its effect is quite small and will not be noticeable on some records or unless an unusually wide-range loudspeaker is used.

Prefade Listen

The prefade-listen key and jacks (15) are conventional except that jacks are provided for two sets of headphones. In the central position the key connects the phone jacks to the studio ring main; in the down position it connects them to the PFL output. The operation of the PFL circuit is quite independent of the programme fader and of the mute circuit.

Operating Procedure

General

It is assumed that the desk is ready for use, that is, it has been switched on long enough for the amplifiers to have warmed up and the desired speed has been selected and adjusted if necessary. It is also assumed that the scale reading of the approximate location of the start of the wanted passage has been found. This is best done, not by jumping the pickup across the disk, but by using the lever (11) to raise it, then sliding the arm along the member (10) to a new place and lowering it again.

Precise Location of Passage

1. With the programme fader (8) faded down and listening on PFL, the record is allowed to run until the start of the passage is heard, when the record is stopped by the disk start/stop lever (13).
2. The record is then turned backwards and forwards by means of the metal disk (12) until

the exact start of the passage is under the pickup stylus. This process may be facilitated if a mental note is made of the angular position of the record label at the instant the start of the passage is heard. The record is stopped at once and turned back until the label is once more in this position, which brings the start of the passage under the pickup stylus.

3. The record is now turned backwards for about a quarter of a revolution for 33⅓ r.p.m. or a third of a revolution for 45 r.p.m.
4. Having opened the fader (8) the record is started at the appropriate moment by a touch on the start/stop lever (13).

Maintenance

Before the turntable unit can be raised and stood on its four legs on top of the cabinet the three screws securing the control plate to the cabinet must be removed. It is unlikely, however, that the turntable unit will need to be raised during routine maintenance. For maintenance information on the turntable unit, see the Instruction for the TTU/8 and TTU/8A.

Muting

Muting of the programme output should cease when the disk is up to speed. This can be assessed either by listening on the desk output to the 1-kHz band on test disk FOM2 or by carefully watching the stroboscope pattern at the instant the relays cease to be energised. Adjustment is provided by a variable resistor whose spindle is visible on the front of the motor control unit CU/20.

Output Level and Frequency Response

(*a*) *Desk DRD/5*

Using frequency test record FOM2 and playing the 1-kHz band, the pickup sensitivity attenuator AT/29 should be adjusted so that the desk output is −77 dB when working into 600 ohms and measured on an a.c. voltmeter. This corresponds to programme volume from a commercial fine-groove record of about −60 dB.

Using record FOM2 the overall frequency response should be tested, and if the stylus tip and head are satisfactory, it should lie between the limits of Table 1 which are those laid down for the HGP 39-2 pickup and EAT/12 equaliser terminated in 600 ohms.

(*b*) *Desk DRD/5B*

The preset gain control on the amplifier GPA/4 in the programme chain should be set to 40 dB, and then the gain control on the AM16/7 should be adjusted so that the output level of the GPA/4 is −12 dB measured at the high-impedance input of an ATM/1 (or on an a.c. voltmeter) when a 1-kHz band on test record FOM2 is played.

The overall frequency response should be within the limits for the DRD/5.

The noise level measured at the output of the GPA/4 in the programme chain, using the high-impedance input of an a.c. test meter ATM/1 set to the *TPM* mode, should be better than −60 dB. This measurement should be taken with the motor running and the pickup arm on its rest.

TABLE 1

Frequency kHz	*Ideal Response dB*	*Tolerance dB*
15	0	+3 / −15
12	0	+3 / −10
10	0	±3
8	0	±3
6	0	±2·5
4	0	±2·5
2	0	±2·5
1	0	±0
0·5	0	±2·5
0·2	0	±2·5
0·1	0	±3
0·06	0	±3
0·04	0	±3

Sensitivity at 1 kHz: −72 dB ±3·5 dB

Installation

Feet Locating Plates

The four adjustable feet of the desk stand directly on the floor, being constrained horizontally by four circular steel plates screwed to the floor by means of No. 10 countersunk steel woodscrews (length to suit type of floor).

The centres of the four plates should lie at the corners of a rectangle 16 in. by 22 in., the shorter side being parallel to the back of the desk. When the lid of the desk is hinged back to the vertical position (the normal operating condition) the top face of the lid then overhangs the centres of the two rear plates by 6 in.; these two plates should therefore be at least 7 in. from the wall.

The four plates locating an adjoining desk (assumed in line) should be positioned at the corners of a similar rectangle so that the adjacent long sides of the two rectangles are parallel and 3 in. apart to give a gap of about $\frac{1}{2}$ in. between the desks.

Levelling of Desks and Turntable

The adjustable feet of the desk are threaded into self-locking bushes recessed in the bottom of the cabinet and can be rotated by means of a $\frac{3}{16}$ in. diameter tommy bar. A spirit level should be placed on the top edges of the cabinet and *not* on the turntable unit.

The turntable unit is levelled and adjusted to be flush with the top of the cabinet by screwing or unscrewing the four tufnol feet projecting below the turntable at each corner. These are accessible when the front panel has been opened after sliding forward the apparatus shelf about 2 in. On a DRD/5B, the turntable motor plate should rest solidly on the rubber pads added at the top of the cabinet.

Mains Connections

The mains lead from one desk is plugged into a 240-volt three-pin wall socket. The mains lead from a second desk can be plugged into the spare three-pin socket situated behind the small panel below the control panel on the first reproducer. A third desk can be connected to the second similarly.

Programme

All programme connections to the desk, including incoming programmes, are made on F. and E. plugs and sockets situated behind the small panel below the control panel.

Attenuators No. 3 and No. 4 and transformer TR1 are connected in circuit in all desks as delivered and enable the outputs of several desks to be connected in parallel across a balanced 600-ohm circuit without individual outputs being affected. All desks have the same circuit whether fitted singly or in banks when the normal low-level programme volume output of approximately −70 dB is required.

When a high-level unbalanced output is required for feeding a loudspeaker unit the desk output must be bridged by a 600-ohm resistor and one side earthed, and attenuators Nos. 3 and 4 and transformer TR1 removed from the circuit as shown in Fig. 4.

The performance of the desk should be checked as described in the section on maintenance in this Instruction and the Instruction for the TTU/8 and TTU/8A.

Reference

Reproducing Desk DRD/5B, Designs Department Specification No. 1.44(68).

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Revised DPEB 6/70