DISK REPRODUCER RP2/7

See also AM7/3, AM9/8, AM16/7

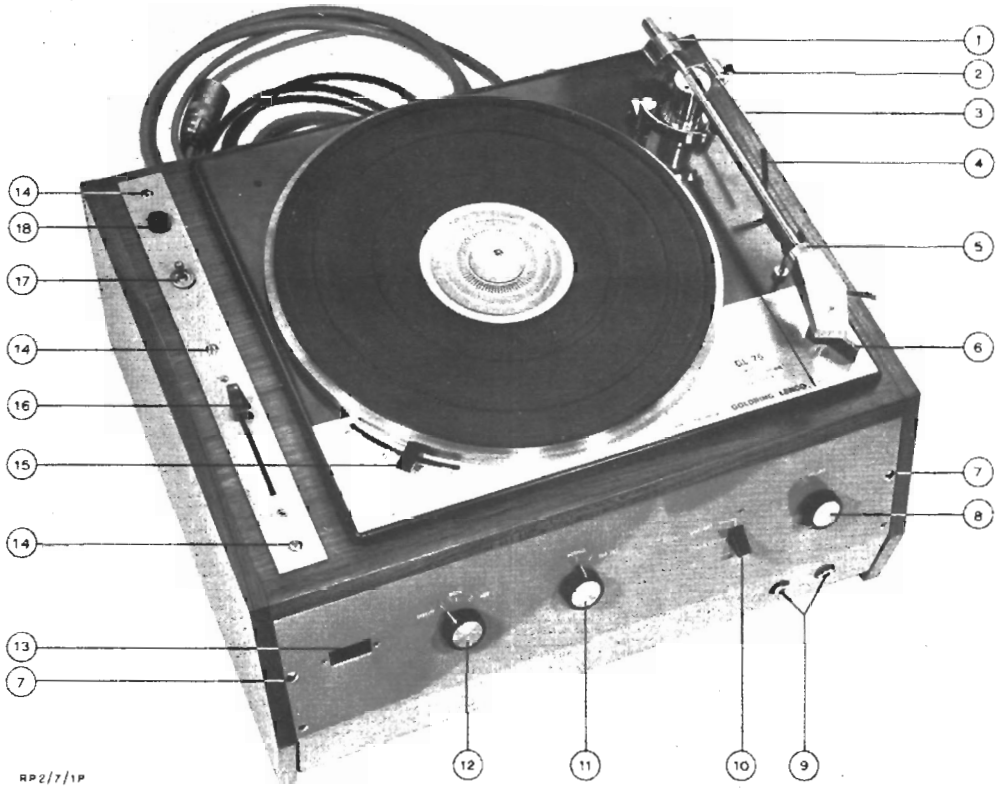

Fig. 1. General View of the RP2/7

1. Large adjustable counterweight
2. Small adjustable counterweight
3. Graduated arm
4. Pickup raise/lower lever
5. Headshell securing ring
6. Turntable motor on/off switch
7. Panel-fixing screws
8. Monitor volume control
9. Headphone monitoring jacks
10. Line Out/Studio Out/P. F. L. key
11. Top-cut switch
12. Direct/Both/A. E. R. Switch
13. Fader off-normal lamp
14. Plate-securing screws
15. Turntable speed control
16. Main fader
17. Main on/off switch
18. Mains indicator-lamp

General Description

The RP2/7 is a low-cost variable-speed single-turntable fine-groove disk reproducer capable of replaying monophonically either mono or stereo records. It is basically intended for studio reproduction of 33⅓-r.p.m. drama effects disks, but it can also be used in conjunction with a disk reproducer RP2/6 or for high-grade office listening.

It has a broadcast standard of technical performance, but certain commonly provided features such as groove location, quick starting, and R.S.A. insertion facilities have been omitted from the design.

It uses a variable-speed Goldring GL 75 turntable unit, a Goldring L 75 arm and a G800 pickup cartridge. The two outputs of the cartridge are paralleled and fed into a preamplifier, followed by a line amplifier and prefade monitor amplifier, all three amplifiers being mounted on a common printed circuit board.

The reproducer is housed in a wooden cabinet, the front and base of which are formed by a steel tray. This tray, which opens like a drawer, contains the amplifier card and power unit, and has a hinged front panel carrying controls similar in function to those on the front panel of the RP2/1.

The rear panel accommodates the mains input socket, the mains and 24-volt fuses, and flying leads to the 8-pin F. & E. output plug and 6-pin F. & E. cue-programme plug.

The RP2/7 is 19 inches wide, 15½ inches deep and 10½ inches high. Generally, the units are mounted in pairs on a specially designed trolley.

Controls and Facilities (Fig. 1)

Any turntable speed within the ranges 15–18 r.p.m. and 30–86 r.p.m. may be obtained by means of the control (15) at the left. The turntable-motor on/off switch (6) is mounted at the right.

A mains on/off switch (17), mains indicator-lamp (18) and quadrant-type main fader (16) calibrated in steps of roughly 4 dB are on a horizontal plate to the left of the turntable. This plate can be removed after releasing three screws (14).

A fader off-normal lamp (13) is mounted on the front panel of the machine at the left-hand end. Also on the front panel, to the right of the lamp, is a switch (12) marked *Direct/Both/A.E.R.* which controls the main output of the machine. Next to this is a *Top Cut* switch (11), the effect of which is similar to that of the corresponding switch on the RP2/1.

Further to the right again are two headphone monitoring jacks (9) and associated controls. These comprise a volume control (8) which is independent of the main fader and a *Line Out/Studio Out/P.F.L.* key (10).

Access to the printed circuit board and power supply is effected by removing two fixing screws (7) on the front panel. The panel will then hinge down, allowing the complete subassembly tray to be pulled forward. Preset controls for monitor level (on the left), line output level (in the middle) and h.f. equalisation (on the right) are mounted along the top edge of the printed circuit board.

Pickup Arm (Fig. 1)

The headshell on the pickup arm can be removed by unscrewing the knurled securing ring (5) and pulling. The playing weight can be adjusted by the following method.

1. Push the small adjustable counterweight (2) on the graduated arm (3) back as far as possible.
2. With the headshell mounted in position, move the large adjustable counterweight (1) on the back of the pickup arm to the position where exact balance is achieved.
3. Select the playing weight required, which may have any value between 0·5 and 5·0 grammes, by moving the small counterweight on its graduated arm. Each graduation marks 0·5 gramme.

The raise/lower lever (4) to the right of the turntable operates a direct-action mechanism. The pickup arm should be adjusted to be exactly horizontal when playing a disk. To make this adjustment:

1. Loosen the grubscrews in the pedestal base and move the pedestal up or down as necessary. Tighten the grubscrews.
2. Adjust the distance between the rubber buffer on the pickup arm and the lowering arm to 1/16 inch by means of the knurled screw provided.

An antiskating bias-compensating device can be fitted if required. This comprises three items,

(a) A graduated L-shaped rod which fits into a hole on the top of the pedestal,

(b) A corkscrew with clip attached which fixes onto the bottom of the pedestal, and

(c) A 4-gramme weight on a nylon thread.

For a 3-gramme playing weight and 0·0005-inch stylus-tip radius, the loop in the nylon thread should rest in the third notch from the pedestal end of the graduated rod, and the weight should be hung over the corkscrew arm.

The antiskating device is not shown in Fig. 1.

Continued overleaf

Programme Circuit (Figs. 2, 7 and 8)

A block diagram of the programme circuit of the RP2/7 in given in Fig. 2, a detailed amplifier circuit is shown in Fig. 7 and the overall circuit of the machine is shown in Fig. 8.

The paralleled outputs of the G800 cartridge are fed to the amplifier printed circuit board via a coaxial plug. Preamplification and suitable correction for the R.I.A.A. recording characteristic are provided by a circuit identical to that of an AM16/7 amplifier. High-frequency equalisation is achieved by means of a variable series *RC* network connected across the input.

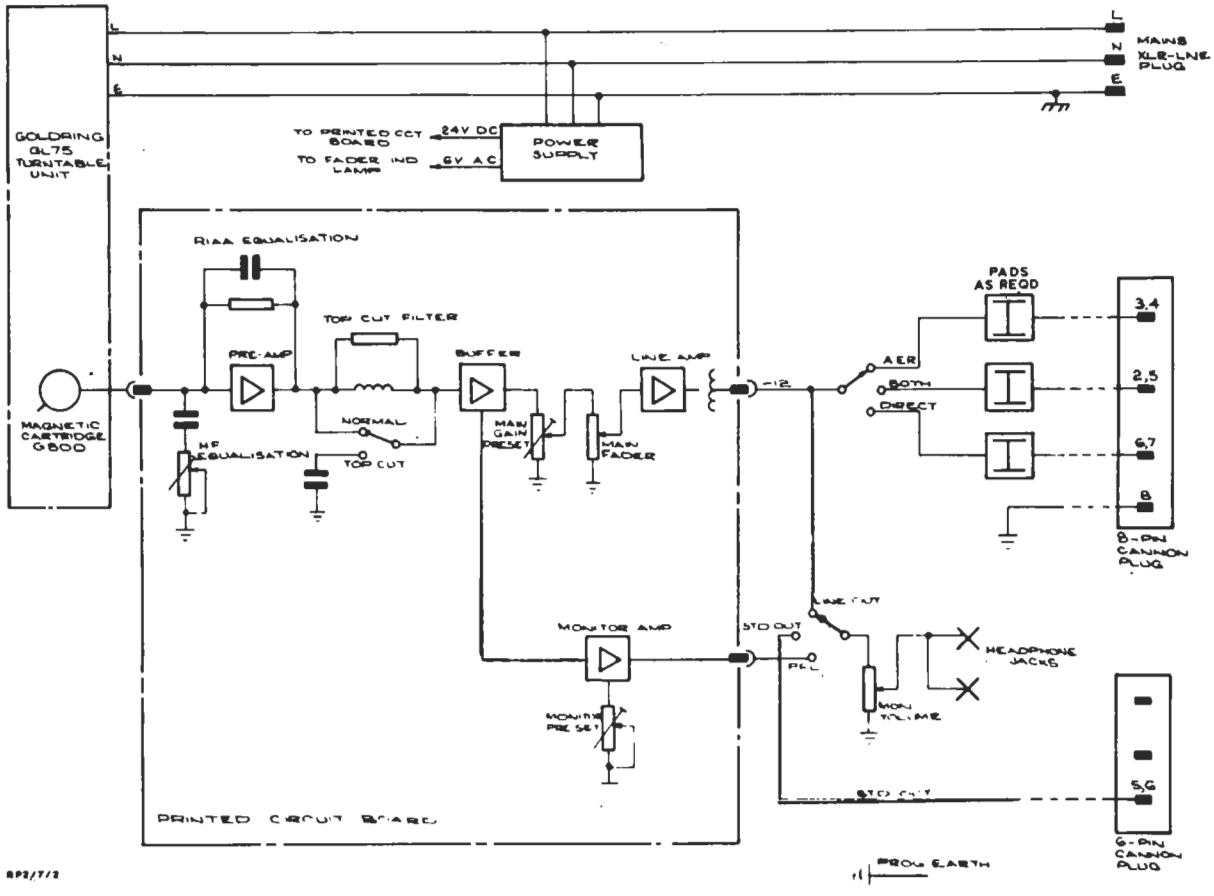

Fig. 2 Block Diagram of the RP2/7

The output from the preamplifier is then fed to a switched *LC* filter which provides a top cut of 12 dB per octave from 5 kHz. This is followed by a high-impedance buffer stage, a preset gain control and the main fader.

The output from the main fader is fed to a line amplifier, based on the circuit of the AM7/3 but with various changes, mainly in the values of components. This gives a balanced output requiring a 600-ohm load.

The output of the line amplifier is fed via a transformer to a three-way switch which allows the signal to be routed via separate loss-pads direct to line, to acoustic effects reproduction, or to both, as required. The values of the pads are fixed to suit the local installation.

Prefade monitoring is provided by amplifying the output of the buffer stage by means of an amplifier having the same circuit as the AM9/8.

Details of the AM16/7, of the (standard) AM7/3, and of the AM9/8 are given in the appropriate individual instructions.

Power Supply Circuit (Fig. 3)

This circuit requires an input at 240 volts a.c. and provides two outputs via separate transformers.

One output is at −25 volts d.c. obtained from a bridge rectifier. This supply is stabilised by a transistor and zener diode and used to supply the amplifier board via a 150-mA fuse.

The other output is at 6 volts a.c. and supplies the fader off-normal lamp via a changeover microswitch (Fig. 8) which when the fader is down mutes the amplifier chain by short-circuiting its output.

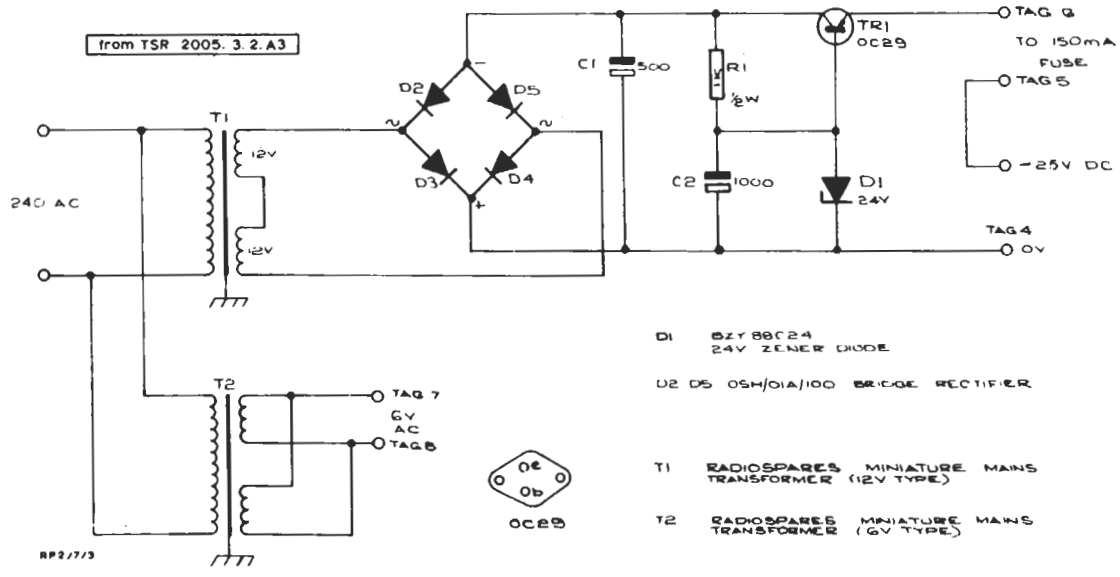

Fig. 3. Power Supply Circuit of the RP2/7

Line-up Procedure (Figs. 2 and 8)

1. With the fader fully open, play the 1-kHz band on test record FOM 2.
2. Measure the output level into a 600-ohm load across pins 6 and 7 *(Direct)*, 2 and 5 *(Both)* or 3 and 4 *(A.E.R.)* of the 8-pin plug.
3. By means of the preset gain control, adjust this level to −12 dB or, if loss-pads are wired between tagstrips 1 and 2 (Fig. 8), to whatever lower levels are required locally.

NOTE:- Turning the preset gain control anticlockwise increases the level.

4. Play the other bands on FOM 2 and adjust the preset equaliser control to make the response at the higher frequencies as flat as possible. Turning this control clockwise increases the higher-frequency response.
5. Play a recording of programme while listening at one of the monitoring jacks on headphones and, by means of the preset monitoring control, adjust the *P.F.L.* volume to match the *Line Out* volume.

TABLE 1.

Transistor	*Voltage*	*Transistor*	*Voltage*
TR2	−6·5	TR8	−6·8
TR3	−13·5	TR10	−6·9
TR4	−12·7	TR11	−8·7
TR5	−0·9	TR12	−12·2
TR6	−7·2	TR13	−7·2

D.C. Test Measurements (Figs. 3 and 7)

All tests should be made with the RP2/7 connected to a 240-volt a.c. mains supply. All voltages (except ripple) should be measured using an Avometer Model 8. The ripple voltage should be measured using the high-impedance T.P.M. circuit of an ATM/1 with a 2-μF series capacitor.

(a) Power Supply Unit (Fig. 3)

Bridge output −35·0 volts

Stabilised output (tags 4 and 6) −25·0 volts

Ripple voltage (tags 4 and 6) −63 dB

(b) Printed Board: Typical Voltages (Fig. 7)

Supply at point *A* −24·2 volts

Supply at point *B* −21·2 volts

Supply at point *C* −20·2 volts

(c) Emitter Voltages (Fig. 7)

Typical emitter voltages are shown in Table 1.

A.C. Test Measurements

In the following tests, pins 11 and 13 of the printed circuit board are specified as the line output measuring point, but if no loss-pad is wired into circuit between tagstrips 1 and 2 (shown at the top right of Fig. 8) then the normal line output connections of the RP2/7, which may for some operations be more easily accessible, are equivalent to the printed board connections and give the same output level.

All tests should be made with the RP2/7 connected to a 240-volt a.c. mains supply.

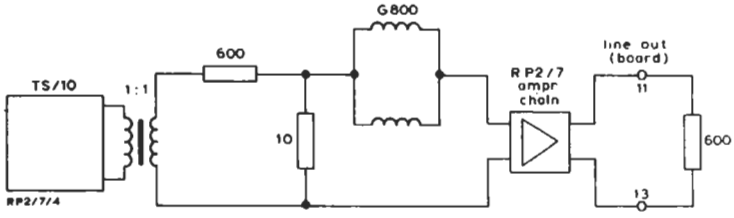

Fig. 4. Test Circuit 1

(a) Levels on Circuit Board (Figs. 4 and 7)

1. Adjust the preset equalisation control R1 to 10 kilohms.
2. With the fader fully open, play the 1-kHz band on test record FOM 2 and adjust the preset main gain and preset monitor gain controls to give a line output level, measured at pins 11 and 13 of the printed board, of −12 dB into the 600-ohm T.P.M. circuit of the ATM/1.
3. Set up test circuit 1 as shown in Fig. 4, with the two windings of the G800 cartridge connected in parallel.
4. Set the frequency of the TS/10 to 1 kHz and adjust its output level to make the level measured with the high-*Z* T.P.M. circuit of the ATM/1 across the 10-ohm resistor in the test circuit −61·0 dB.
5. With the high-*Z* T.P.M., measure the line output level at pins 11 and 13 of the printed board, across which is connected the 600-ohm resistor shown in the test circuit. This level should be −12 dB as before.
6. With an a.c. microvoltmeter of impedance not less than 1 megohm, measure the levels at the collectors or emitters of transistors as specified in Table 2 and check these levels against the typical values given in the table.

TABLE 2

Measuring Point	*Level (dB)*	*Measuring Point*	*Level (dB)*
TR1 C	−67·3	TR8 C	−7·3
TR2 C	−22·5	TR10 C	−7·2
TR3 E	−22·6	TR11 C	−43·2
TR4 E	−27·6	TR12 C	−12·0
TR5 C	−7·5	TR13 E	−12·0
TR6 C	−26·0		

(b) Amplifier Frequency Response (Fig. 4)

1. Set up test circuit 1.
2. Adjust R1 to 10 kilohms and put the *Top Cut* control on *Normal.*
3. With the fader fully open, apply a frequency of 1 kHz from the TS/10 and adjust the oscillator output to give a level of 0 dB measured with the high-*Z* T.P.M. circuit across the 600-ohm load resistor in the test circuit.
4. Vary the frequency as shown in Table 3, each time adjusting the oscillator output to keep the level across the 600-ohm load resistor constant.
5. At each frequency, measure the level across the 10-ohm resistor using the high-*Z* T.P.M. circuit and compare the results with the typical figures shown in Table 3.

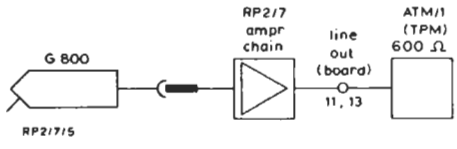

Fig. 5. Test Circuit 2

(c) Overall Frequency Response (Figs. 5 and 6)

1. Set up test circuit 2. (Fig. 5.)
2. With the fader fully open and R1 set to 10

TABLE 3

Frequency	*Level Across 10-ohm Resistor (dB)*	*Relative Response (dB)*
15 kHz	−30·2	−18·8
12 kHz	−34·0	−15·0
10 kHz	−37·1	−11·9
8 kHz	−40·3	−8·7
6 kHz	−43·8	−5·2
4 kHz	−46·8	−2·2
2 kHz	−48·5	−0·5
1 kHz	**−49·0**	**0**
500 Hz	−50·7	+1·7
200 Hz	−55·7	+6·7
100 Hz	−60·0	+11·0
60 Hz	−62·0	+13·0
40 Hz	−62·5	+13·5

kilohms, play the 1-kHz band on test record FOM 2.

3. Adjust the main gain preset control to give an output level of −12 dB as measured by the 600-ohm T.P.M. circuit.
4. With the *Top Cut* on *Normal* and R1 adjusted to 40 kilohms, measure the output level at each of the frequencies indicated in Table 4 and compare the response, *relative to that at 1 kHz*, with the typical figures given.
5. Repeat operation (4) with R1 set
   (a) at 10 kilohms, and
   (b) at zero.
6. With the *Top Cut* switched into circuit, and R1 set to 10 kilohms, again repeat operation (4).

TABLE 4

Freq.	*Relative Response (dB)*			
	Top Cut Out			*Top Cut In*
	R1 40 kΩ	*R1 10 kΩ*	*R1 0 Ω*	*R1 10 kΩ*
kHz				
15	+3·5	−1·0	−4·0	−17·0
12	+2·5	−0·5	−1·5	−15·0
10	+1·0	−1·0	0	−14·0
8	+0·5	0	+3·5	−10·0
kHz				
6	+0·5	+0·5	+4·5	−4·5
4	+0·5	+1·5	+3·0	+2·0
2	+0·4	+1·0	+1·0	+2·0
1	**−0·2**	**0**	**0**	**+0·4**
Hz				
500	0	+0·3	−0·2	+0·4
200	−1·0	−0·5	−0·8	−1·0
100	−2·0	−1·5	−2·0	−2·0
60	−4·0	−4·0	−4·0	−4·0
40	−5·0	−5·0	−5·0	−5·0

Fig. 6 shows overall response curves based on Table 4.

(d) Total Harmonic Distortion (Fig. 4)

1. Establish the conditions resulting from operations (1) to (5) listed under (a). This

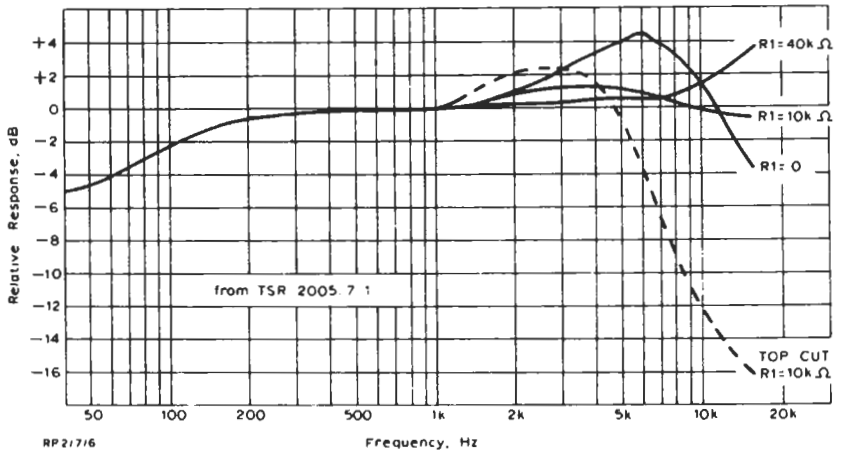

Fig. 6. Frequency Response of the RP2/7

should leave the TS/10 sending 1-kHz tone to test circuit 1 and producing a line output level of −12 dB across the 600-ohm resistor as measured with the high-Z T.P.M. circuit of the ATM/1.

2. Now increase the TS/10 sending level until the line output level is +8 dB.
3. Use the A.D. circuit of the ATM/1 and a harmonic routine tester FHP/3 to measure the total harmonic distortion, which should be less than 0·5 per cent, corresponding to a harmonic separation of −46 dB relative to the 1-kHz fundamental.

(e) Impedances

The source impedance of the amplifier is that of the G800 cartridge with its windings in parallel. At 1 kHz the cartridge has a resistance of about 260 ohms and an inductance of about 0·2 henry.

The input impedance of the amplifier depends on the setting of the preset equalisation control R1. With R1 at maximum setting the input impedance is about 56 kilohms at 1 kHz, and correspondingly less at other settings of R1.

The amplifier line output impedance is 55 ohms at 1 kHz.

The load impedance for which the equipment is designed is 600 ohms resistive.

(f) Wow and Flutter

The r.m.s. wow and flutter measured with a Gaumont-Kalee meter using 3-kHz tone should both be less than 0·1 per cent.

(g) Noise Volume (Fig. 5)

1. Set up test circuit 2.
2. With R1 set at 10 kilohms, the preset main gain control on the setting arrived at previously, and the fader fully open, measure the noise volume. The result should be lower then −72 dB.
3. Repeat the measurement with the turntable motor running. The result depends on the position of the pickup arm, but should be lower than −52 dB.

NOTE:- Noise volume, like programme volume, is related to peak readings of 6 on a P.P.M.

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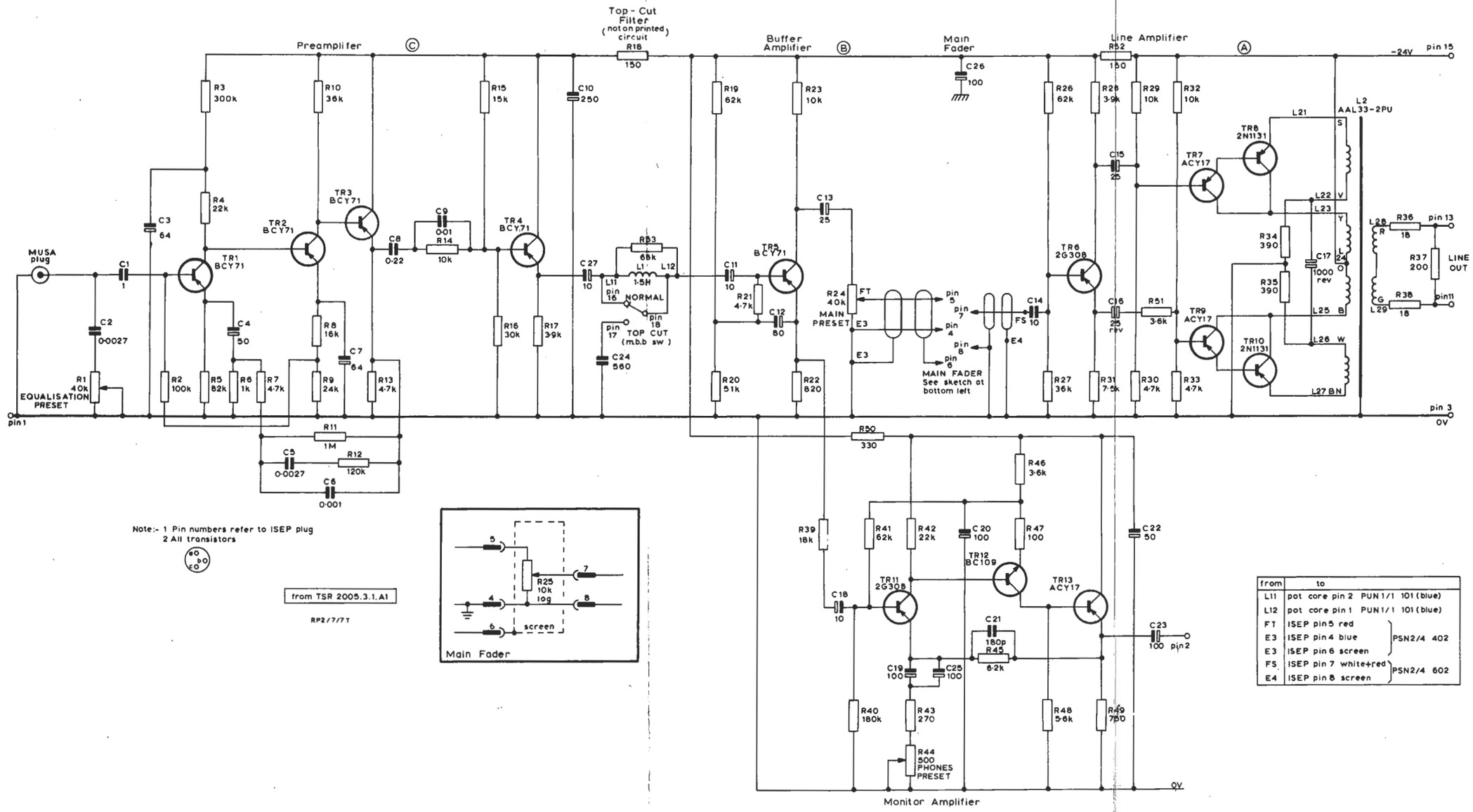

Note:- 1 Pin numbers refer to ISEP plug
2 All transistors

from TSR 2005.3.1.A1

RP2/7/7T

from	to	
L11	pot core pin 2 PUN1/1 101 (blue)	
L12	pot core pin 1 PUN1/1 101 (blue)	
FT	ISEP pin 5 red	PSN2/4 402
E3	ISEP pin 4 blue	PSN2/4 402
E3	ISEP pin 6 screen	PSN2/4 402
FS	ISEP pin 7 white+red	PSN2/4 602
E4	ISEP pin 8 screen	PSN2/4 602

Fig. 7. Amplifier Circuit of RP2/7

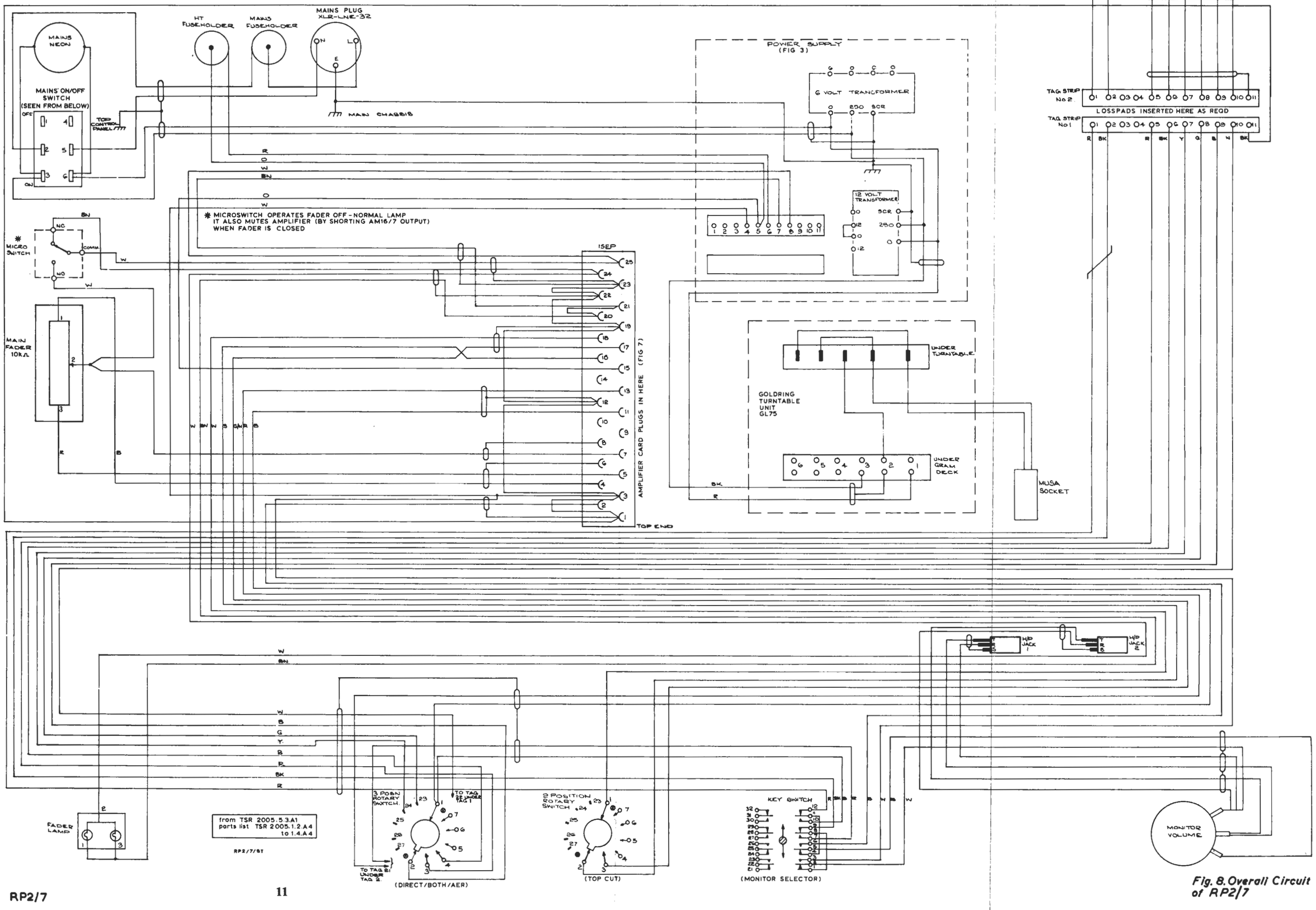

Fig. 8. Overall Circuit of RP2/7