

"TRADER" SERVICE SHEET  
**1680**

# MURPHY TR1

## Twin Track Single Speed Tape Recorder

USING a Garrard magazine loading tape deck, Murphy TR1 is a twin track single speed (3½ in sec) tape recorder designed for operation on mains supplies of 200-250V a.c. 50c/s. Total playing time is 70 minutes approximately. Two twin triodes, a pentode output valve, electronic record level indicator and a metal bridge rectifier are employed, and

power consumption is 45W average. The microphone is a crystal type. Release date February 1960. Price £29 18s 6d.

measured on a 20,000Ω/V meter with play-off-record switch in the "off" position.

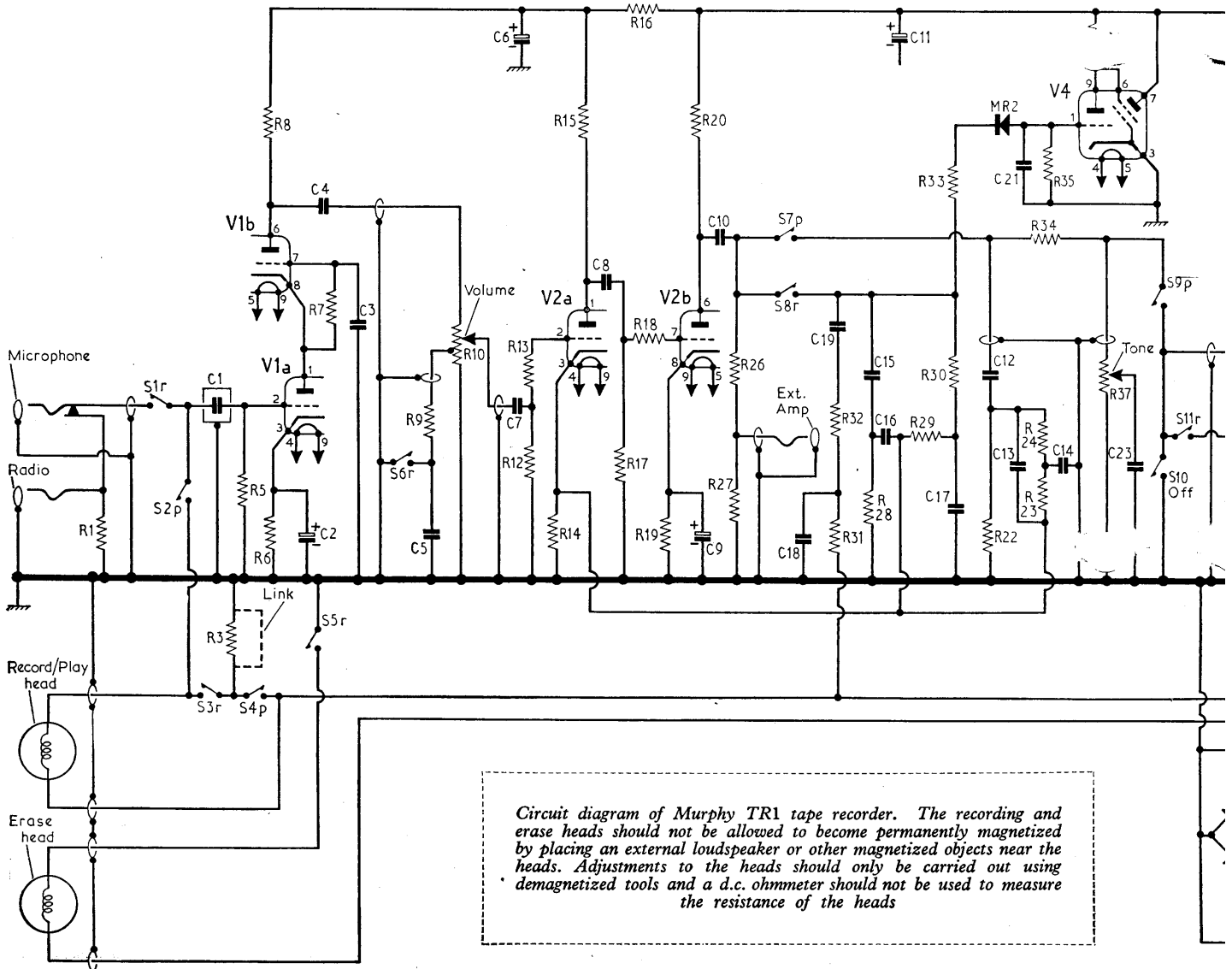
### VALVE ANALYSIS

Valve voltages given in the table in col. 6 were taken from information supplied by the manufacturers. They were

### CIRCUIT DESCRIPTION

**Operation on Record.**—Signals from the microphone or from a radio receiver are amplified by the cascode-connected double triode V1, and V2a and b with

C	1	2	4	3	5	7,6	8	9,10	18	19	15,16,11	17	12	13,21	14	23
R	1	3,5	8,6	7	9	10	12,13,14	15	17	16,18,19	20	26,27	31,32,28	29	33,30,22	34,35,24,23,36,37



*Circuit diagram of Murphy TR1 tape recorder. The recording and erase heads should not be allowed to become permanently magnetized by placing an external loudspeaker or other magnetized objects near the heads. Adjustments to the heads should only be carried out using demagnetized tools and a d.c. ohmmeter should not be used to measure the resistance of the heads*

# TR1

Recorder

R10 operating as the volume control. Recording equalization is provided by a parallel "T" network which is part of the feedback loop connected from the anode of V2b to the cathode of V2a. Amplified output developed across V2b anode load resistor R20 is fed via a filter network to the record head and is also applied via R33 and MR2 to the record level indicator V4.

V3 is switched to operate as a 56 kc/s oscillator providing recording bias and erase voltages via the tuning coil L1. The loudspeaker L3 and external speaker socket are muted by S13.

**Operation on Play.**—Recorded signals from the record/play head are amplified by V1 and V2 and equalization on play is obtained from a further network contained within the negative feedback loop. Amplified output from V2b is fed via C10, R34 and R42 to the grid of V3 which is switched for operation as the audio output valve.

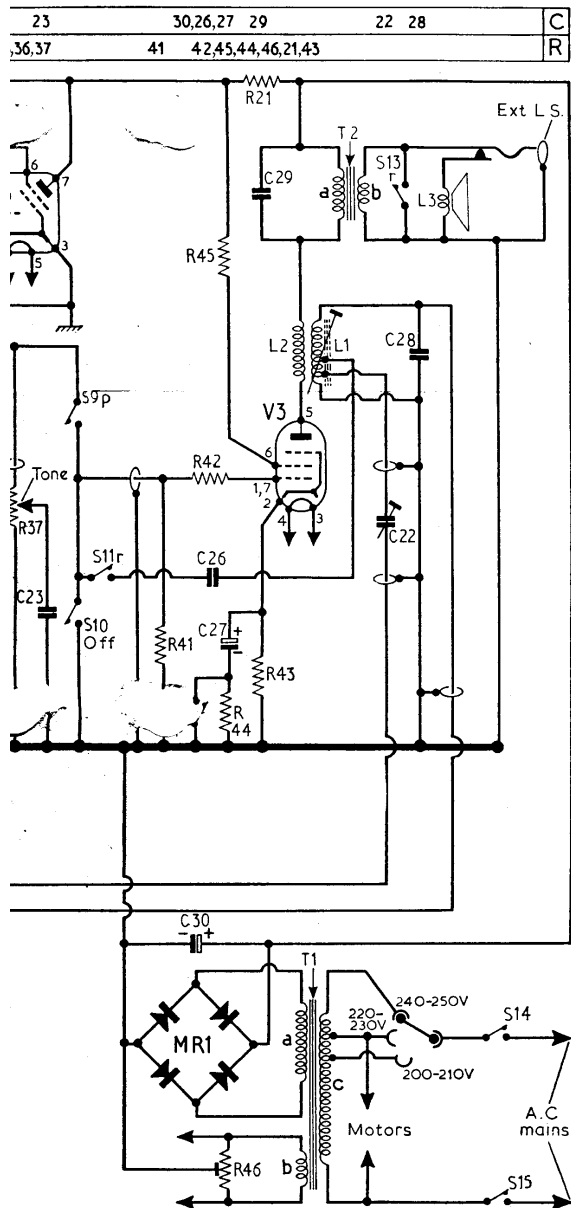
At V2a anode a low level signal is also available via the Ext./Amp. socket for feeding through a separate amplifier (the volume control R10 should be set at about one quarter of its travel back from maximum volume) with the equalizing network still in circuit. This socket may also be used to connect a monitor while recording.

Audio output signals are fed to the internal loudspeaker L3 via the matching transformer T2. H.t. and heater currents are derived from the mains via isolating transformer T1, the h.t. current being rectified by MR1.

## DISMANTLING

**Removing the Chassis from the Cabinet.**—Remove the cabinet lid, place the recorder upside down on a soft surface, and remove the cover from the underside of the cabinet. Unsolder the two loudspeaker leads at the tag strip on the chassis, remove the four chassis fixing screws, and lift the cabinet from the chassis.

**Separating the Tape Deck and the Amplifier Chassis.**—To separate the tape deck from the amplifier, disconnect from the amplifier chassis the two screened leads to the record/play and erase heads, and disconnect the motor leads at the mains adjustment socket. If the recorder has a brass coupling bush, instead of the levers and pin linkage between the upper and lower sections of the Play-Off-Record (Continued overleaf, col. 1)



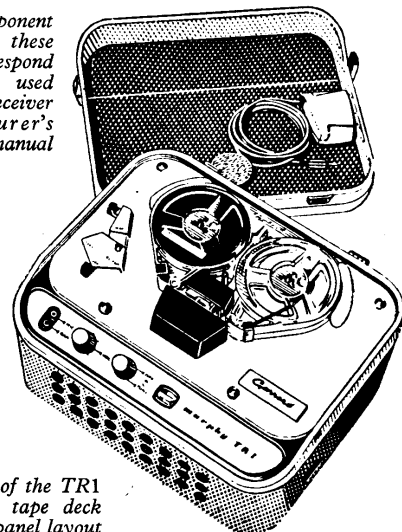
### Resistors

R1	100kΩ	F6
R3	1kΩ	F5
R5	2.2MΩ	F6
R6	1kΩ	F6
R7	1MΩ	F5
R8	47kΩ	F6
R9	47kΩ	A2
R10	1MΩ	F6
R12	1MΩ	E5
R13	4.7kΩ	E5
R14	3.3kΩ	E5
R15	220kΩ	E5
R16	18kΩ	E4
R17	1MΩ	F5
R18	1kΩ	E5
R19	1kΩ	F5
R20	56kΩ	E5
R21	10kΩ	E4
R22	150kΩ	E5
R23	100kΩ	E5
R24	100kΩ	E5
R26	150kΩ	F5
R27	33kΩ	C3
R28	100kΩ	F5
R29	180kΩ	F5
R30	180kΩ	F5
R31	150kΩ	F5
R32	68kΩ	F5
R33	150kΩ	F5
R34	150kΩ	A2
R35	10MΩ	F4
R36	470kΩ	D6
R37	1MΩ	E6
R41	470kΩ	F4
R42	4.7kΩ	F4
R43	330Ω	F4
R44	15kΩ	F4
R45	47Ω	F4
R46	100Ω	D5

### Capacitors

C1	0.01μF	F5
C2	50μF	F6
C3	0.02μF	F5
C4	0.01μF	E6
C5	5,000pF	A2
C6	16μF	E4
C7	0.01μF	E5
C8	0.01μF	E5
C9	10μF	F5
C10	0.05μF	E5
C11	50μF	E4
C12	2,000pF	E5
C13	12pF	E5
C14	1,000pF	E5
C15	82pF	F5
C16	82pF	F5
C17	180pF	F5
C18	100pF	F5
C19	0.04μF	F5
C21	0.1μF	F4
C22	110pF	E5
C23	2,000pF	E6
C26	470pF	A2
C27	50μF	F4
C28	1,800pF	A2
C29	2,000pF	B1
C30	50μF	E4

The component numbers in these tables correspond with those used in the receiver manufacturer's service manual



Appearance of the TR1 showing the tape deck and control panel layout

### Valve Table

Valve	Anode (V)	Screen (V)	Cathode (V)
V1 ECC83	a	95	—
	b	175	—
V2 ECC83	a	114	—
	b	147	—
V3 EL95	285	214	—
V4 EM85	16	—	—

### Coils and Transformers\*

L1	12.5	A2
L2	10.0	A2
L3	2.5	—
T1	{ a 450.0 } { b 117.0† }	C1
T2	{ a 580.0 } { b — }	B1

### Miscellaneous

MR1	16RD-2-2-10-1	D4
MR2	39MA1	F4
S1-S13	—	A2
S14, S15	—	E6

\*Approximate d.c. resistance in ohms.  
†Total primary.

**Dismantling—continued**

switch, loosen the upper screw in the bush. Finally, remove the four large screws securing the deck to the amplifier, and lift the deck away.

**Refitting the Tape Deck.**—Lower the tape deck on to the amplifier chassis making sure that the spindle linkage of the Play-Off-Record switch engages correctly, and that the flat on the lower spindle faces the left hand end of the chassis (viewed from the front) when the switch is in the "Off" position. Then refit the screws and washers fastening the deck to the amplifier. When the Play-Off-Record switch has a brass coupling bush instead of the levers and pin linkage, it may be necessary to adjust the position of the switch on the amplifier chassis to secure correct alignment of the spindles, to do this, loosen the two screws securing the switch mounting plate to the amplifier chassis.

Reconnect the screened leads from the record/play and erase heads. Before reconnecting the motor leads, see that they are twisted together with a minimum of four twists.

**Replacing the Record/Play Head.**—Remove the two black covers by squeezing and lifting. Unsolder the two leads from the rear of the head. Remove the two small brass screws and the large screw from the top of the head mounting, raise the mounting block and carefully withdraw the head from the front.

Fit the new head with the cut-outs uppermost, so that they engage with the tips of the two brass screws. Fit the two brass screws but do not tighten them fully.

Fasten the mounting block to the deck using the large screw and ensure that the braiding tag is located under the head of the screw. Resolder the leads and finally align the gap to a standard test tape containing a 6 kc/s recording. Rock the tape head by means of the two screws on top of the head mounting for maximum output ensuring that the highest of a possible number of peaks is obtained.

**GENERAL NOTES**

**Recording from a Radio Receiver.**—Recordings from a radio receiver are usually made by connecting the "RAD" socket on the recorder to the tape recorder socket on the receiver or to the external loudspeaker sockets. As the tape recorder sockets are generally connected to the receiver detector output, connection to these sockets should provide the better quality.

**Recording from a Gramophone Pick-up.**—Any high impedance pick-up can be connected to the "RAD" socket but an attenuator will usually be necessary to prevent overloading of the input stage of the recorder. A suitable attenuator for use with a crystal pick-up comprises a 3.3MΩ resistor and a 150kΩ resistor in series, shunted across the pick-up terminals, and the output taken from across the 150kΩ resistor. The "live" lead i.e. the screened lead inner should be taken to the junction of the resistors and the braiding connected to the junction of the 150kΩ resistor and the pick-up terminal. The attenuator should be located as near the record player as possible.

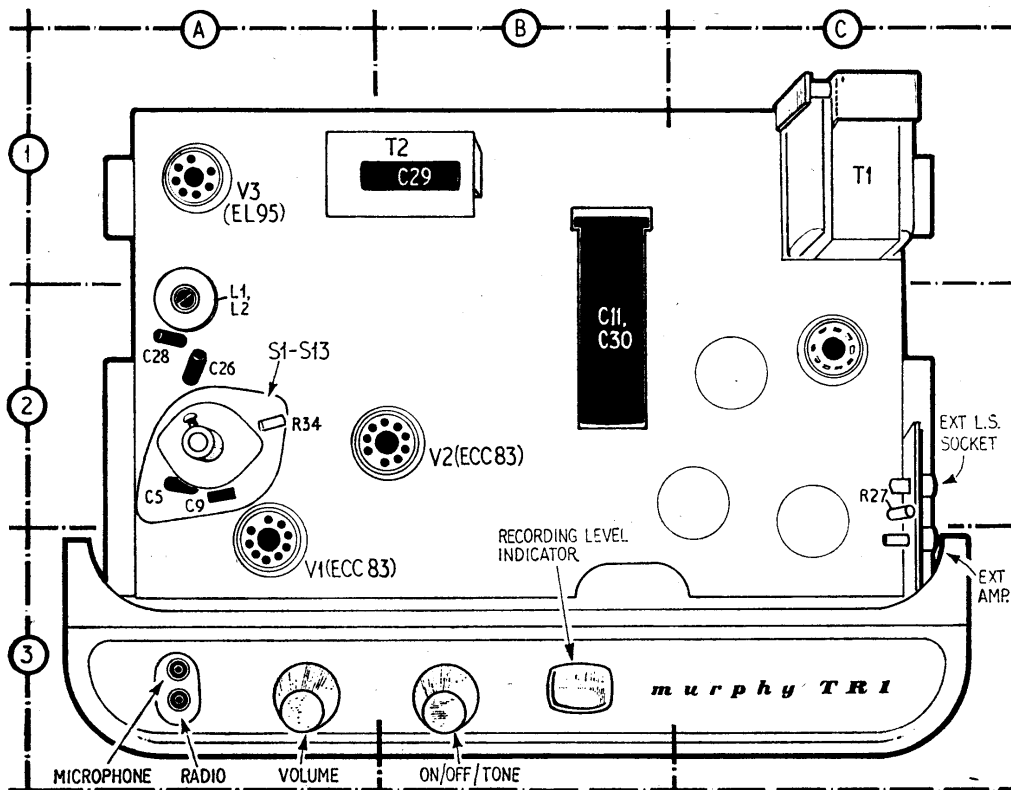
**Hum Cancelling.**—A balancing poten-

tiometer (R46) is connected across the valve heater supply to minimize hum. To reset this resistor, first see that the bottom of the cabinet with its screening foil is in position. Then without a magazine of tape being present on the deck, switch on, turn the volume control to maximum, and move the play-off-record switch to "Play." Insert a suitable tool through a slot in the bottom of the cabinet and adjust the slider of R46 to the position where the residual background hum from the loudspeaker is at a minimum.

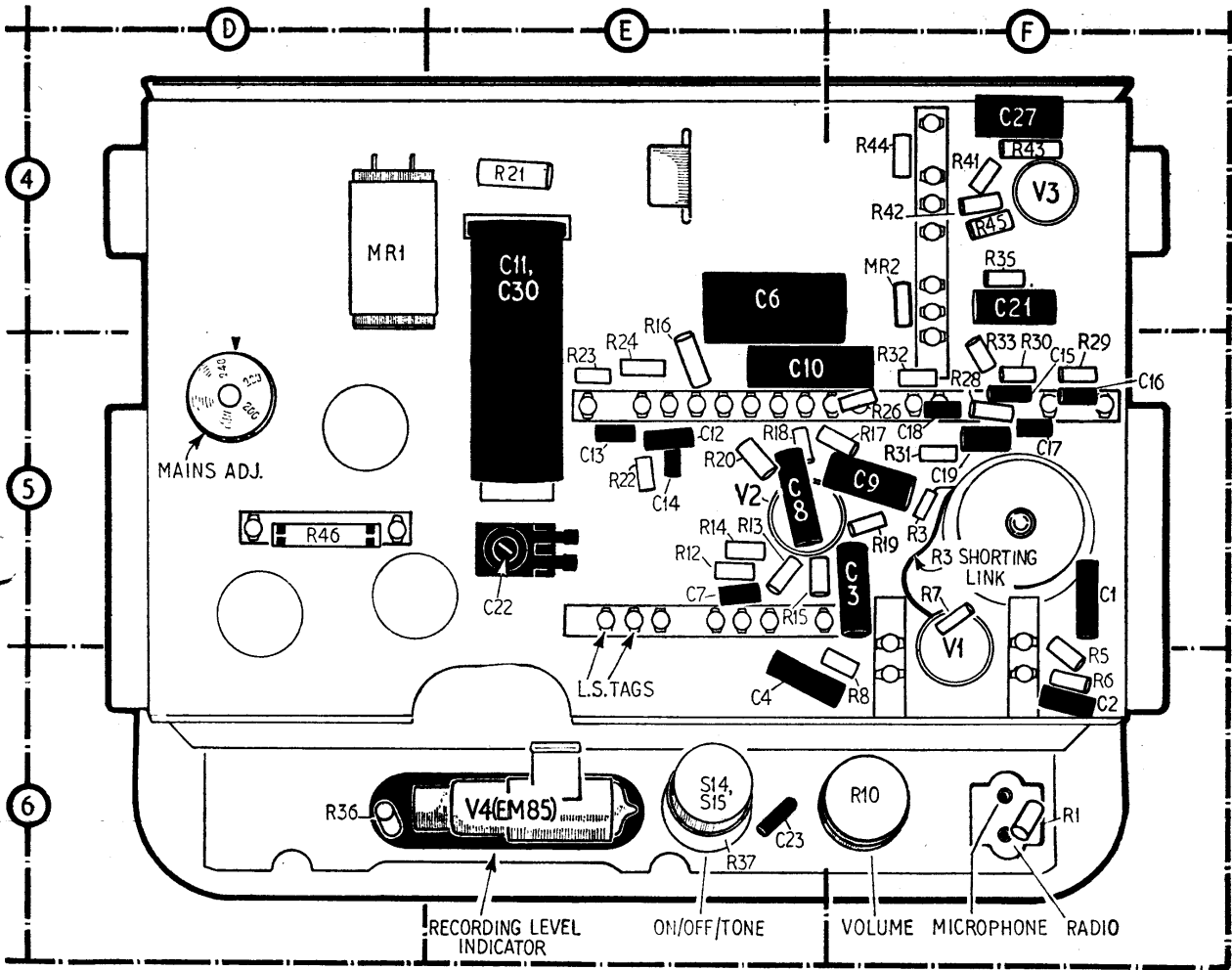
**Recording Head Bias.**—If V3, one of the heads, or any of the oscillator circuit components, is changed, it may be necessary to reset the bias current. The indication that the bias is too high, is some loss of the high frequencies when recording. The indication that the bias is too low, is a predominance of the high frequencies and possibly distortion. To adjust the bias current, proceed as follows:

Switch on, set the play-off-record switch to "Record" and allow the instrument to warm up for about 30 minutes. Then, unsolder the short-circuiting link across R3, connect an a.c. valve-voltmeter parallel with R3, and adjust the screw the trimmer C22 (below the chassis) until a reading of 1.2V r.m.s. is obtained on the meter. Remember to reconnect the link across R3 after the adjustment, otherwise instability may occur.

**Erase Head Current.**—No adjustment is provided, but when the correct current is flowing through an erase head which is not defective, a reading of between 23 and 28 volts r.m.s. should be obtained across it. An a.c. valve-voltmeter must be used.



Plan view of chassis as seen with the tape deck removed. The shaft of the switch assembly S1-S13 in location reference A2 engages with the Play | Off | Record lever on the tape deck when the deck is assembled



Underside view of the amplifier chassis. R3 shorting link in reference F5 should only be removed when it becomes necessary to measure the recording head bias (see "General Notes")

**Oscillator Performance.**—When the oscillator is functioning correctly, its grid current should be  $20\mu\text{A}$  approximately; this need not normally be checked unless a fault is suspected in the oscillator circuit. The meter can be connected in series with the "live" end of the grid leak (R41). Alternatively, the d.c. voltage across R41 can be measured with a valve-voltmeter; the reading should be 10V approximately.

The frequency of the oscillator is not critical but it should be close to 56 Kc/s. This can be checked with a calibrated oscilloscope. Alternatively, it can be checked by picking up the 4th harmonic on a receiver fitted with a tuning indicator and tuned to 1340m. (224 Kc/s). The calibration of the receiver can be checked against the Light Programme transmission at 1500m. It will be necessary to have the receiver very close to the recorder, alternatively an insulated wire connected to the receiver aerial socket and laid near the recorder will provide sufficient coupling.

**Demagnetizing the Heads.**—After a

considerable period of use, the heads may become permanently magnetized, resulting in an increase of the background noise from the tape. To cure this, use a suitable demagnetizer or defluxer and follow the maker's instructions. In some instances, the capstan spindle beside the heads may also become magnetized; it should be demagnetized at the same time as the heads.

**Cleaning the Heads.**—From time to time, a deposit from the tape will adhere to the heads, resulting in a reduction of the high frequency response. It is essential that only the correct cleaning fluid is used; either Carbontetrachloride or a fluid known as "Thawpit" is suitable. On no account should any abrasive material be used.

To clean the heads, remove the two black covers by squeezing and lifting, and wipe the front faces of the heads with a non-fluffy cloth which has been slightly moistened with the cleaning fluid. Take care that the fluid does not come into contact with the pressure roller or its bearings.

**ADDITIONAL NOTES & MODIFICATIONS**