

1026

## 'E R T' SERVICE CHART

GRUNDIG TK5 REPORTER

**T**HE Reporter is a portable, single-speed twin-track tape recorder for use on 105-115 and 190-250V 50c/s AC mains. Housed in modern style case with leather carrying handle, removable lid, and fitted with lock and key, the recorder is produced by Grundig (Great Britain), Ltd., Kidbrooke Park Road, London, SE3.

Optional accessories include telephone adaptor, stethoscope earphone, tape reels (850ft. and 1,200ft.), spare spools, spare leads with three-pin plug, output lead and three-pin plugs.

Twin track recording is used, recording on top half of tape in accordance with British standards.

Tape speed is 3½ in. per second and recording/playback time is 45 minutes per track with 1,200ft. reel.

Drive is obtained from outer rotating cage of a split-phase induction motor. Tape is driven by friction between a ground tape capstan (24) and rubber pressure roller (23), the latter being spring controlled. Self-lubricating bearings in the motor permit long periods of use before servicing is required.

The two spools are carried on the top halves of friction clutches (3, 33). Lower half of righthand clutch is driven from motor pulley by a plastic belt. The friction "clutching" between the lower (driven) and upper spool carrier halves is proportional to weight of tape on spool.

A counter-type (cyclometer) position indicator is fitted to assist location of a recording on the tape. An automatic stop, operated by metal foil at ends of tape, switches motor off at end of tape run, motor being held off by relay until selector switch is switched off.

The electronic chassis consists basically of recording and playback amplifiers, an oscillator supplying HF bias for recording and erasing, magic eye indicator for setting correct recording level, and an output stage with speaker.

**SWITCHING SEQUENCE**

**Operation switches.** Separate switches are incorporated as follows:

**Selector switch**, with positions for record, playback, fast rewind and off. Contacts 11-38, 42-46, 53-54.

**Push-buttons**, three for microphone, diode and radio, operating on input side. Contacts 1-10, 47-52.

**Motor switches**, contacts 42-46, operated by cams on shaft of selector switch.

**Speaker switch**, operated by lifting tone control knob slightly, contacts 39-41.

**Mains on-off** operated by tone control rota-

tion; DPST switch in both sides of mains input.

**RECORDING**

Selector switch is set to record position (red circle), condenser microphone is plugged into microphone socket at rear. Tape is held stationary by means of temporary stop (21) while recording level is set.

Level is set by R39 (32), outer of two left-hand control knobs. Level is correct when two green areas on magic-eye move fully without remaining in close proximity or overlapping.

Switching sequence is as follows:

Signal travels from microphone socket via contacts 1, 3 and 11, 13 through C1 to V1 grid. A polarizing voltage of approximately 100V DC is applied to microphone from potentiometer R44, 45.

From anode of V1 signal goes through C11 and is fed via R39 C14 to grid V2A. C13 provides high-frequency emphasis at low settings of R39.

Frequency selective feedback is applied over whole stage V2A, V2B. Contacts 22, 23 are closed, shorting out pre-set post-emphasis control R41.

Contacts 31, 32 make contact during change-over from fast wind to playback and from playback to record, momentarily earthing grid circuit of V3.

Contacts 26, 28 close, leaving R29, C19, C17 out of feedback circuit on V2A and B. Signal is taken from V2B anode via C9, R3 to L2, recording head, contacts 17, 19 and 14, 15 being closed. C25 in grid circuit of V3 is shorted out by 33, 34.

**HF bias** is provided by V4, tuned anode oscillator operating at approximately 50kc/s. Contacts 20, 21 close to provide HT for V4. Erase current reaches erase head L1 through C3. HF bias for L2 is provided through C2, C5.

**Recording level indicator** V5 is operated by signal taken from anode of V2B via C21, contacts 26, 28, R27, rectified by MR2 and fed to grid of V5 triode section from slider of pre-set potentiometer R42.

**Diode input** socket is for use when using telephone adaptor or for recording direct from signal diode circuit of radio receiver.

For latter purpose a lead should be connected to top of receiver volume control and taken via resistor of between one and two megohms (exact value not critical) to pin 1 of diode input. From the same point, pin 1, a resistor of from 50-100K is connected to chassis. The two resistors should be connected in the receiver, adjacent to volume control, and a screened

lead used to connect to diode socket, screening being connected to receiver chassis. If DC is present on volume control a blocking condenser of .025mF should be used between volume control and the series resistor.

*Note: It is most important that the chassis connection be properly isolated in the case of AC/DC apparatus.*

**Radio socket** is used for recording from extension LS socket or direct from a gramophone pick-up. Input is attenuated by R11, R12 and passes via contacts 4, 5, 11, 13 to grid circuit of V1.

**PLAYBACK**

Playback head L2 is connected via contacts 12/13 to grid of V1, bottom end being earthed by 16/15. Signal is amplified by V1, V2A and B, part being fed back from V2B anode via contacts 26, 27 to cathode of V2A through frequency selective feedback network to correct overall response.

Signal is also fed via C21, potentiometer R24, R25 to output socket, contacts 29, 30 being closed. This provides low impedance output (3-15 ohms) between pins 1 and 2 of output socket.

Signal from R24, R25 potentiometer via contacts 29, 30 is taken to pin 3 and provides high-impedance output between pins 3 and 2 suitable for connection to external amplifier or PU sockets of a receiver.

Signal is also fed from C21 via C24 R26 to grid of V3, output valve, which feeds internal speaker.

**Motor.** Motor, which is a split-phase external rotating cage induction type, is fed from 165V AC tap on L11, MT1, for record and playback through contacts 45, 46. For fast wind motor is fed from 260V AC through 42, 43 and 44, 45.

**DISMANTLING**

**Removal of chassis.** Unscrew coin-slotted brass screws holding selector, volume and tone control knobs and remove knobs. Slacken grub screw and remove fast wind operating lever. Unscrew four brass retaining screws on top deck. Undo four nuts securing chassis to cabinet (3BA spanner). Unsolder LS connecting leads. Chassis may now be lifted out of cabinet, feeding mains lead through hole in rear of mains lead compartment.

Amplifier components are accessible on removing bottom cover (three screws).

**Dismantling mechanical components.** Selector switch should be set to "off." Unhook pressure roller arm (18) spring and remove circlip retaining pressure roller arm, which may now



be lifted off complete with recording head pressure pad assembly (23) (26).

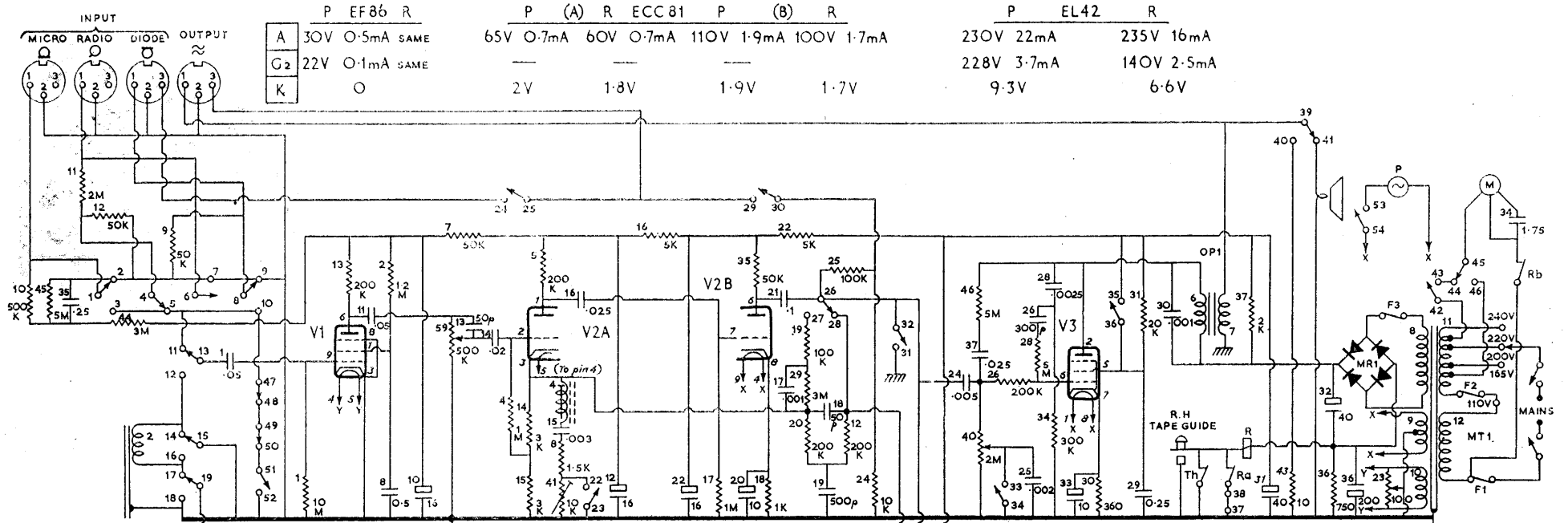
Remove two screws securing push-button switch unit and move unit forward, clear of centre mounting plate. Unscrew four fixing screws for centre mounting plate. By applying tension to brake lever spring through right- and left-hand brake levers (2) (13) until brake lever cam followers (4) (10) are clear of operating cam (7), the centre mounting plate may be lifted and swung over to the right, care being taken not to break the leads.

In addition to the recording (25) and erase heads (28), the centre mounting plate carries left- and right-hand brake levers (2) (13), the temporary stop lever (21), the erase head pressure pad assembly (27) and two outer tape guides (1) (22).

To remove right- and left-hand fast wind levers (8) (12), first remove position indicator drive belt and two circlips retaining each fast wind lever. The two fast wind levers and brake lever operating cam (7) should now be lifted slightly, allowing fast wind drive belt to be slipped off its pulley. Two fast wind levers should now be completely removed, with the interlocking cam (under (7)).

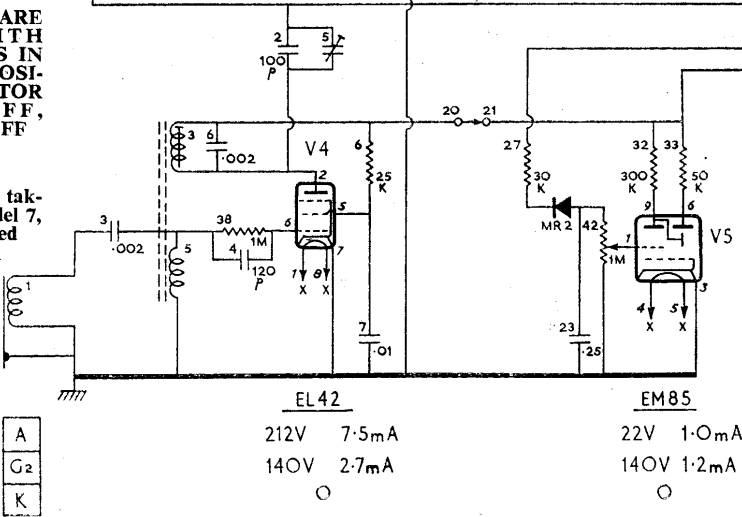
Undo two fixing screws (34) (36), and remove selector switch bearing bracket (35). Unhook spring operating tape stop lever (19). Remove operating cam for pressure roller bar, noting its position relative to switch spindle to assist replacement. Tension spring for interlocking bar (16) should now be unhooked and spring pillar unscrewed and removed. Interlocking bar may now be withdrawn.

*Continued on page iii*



SWITCHES ARE SHOWN WITH ALL BUTTONS IN NEUTRAL POSITION, SELECTOR SWITCH OFF, MACHINE OFF

Voltage readings taken with Avo Model 7, button depressed



A
G <sub>2</sub>
K

**EL42**

A	212V	7.5mA
G <sub>2</sub>	140V	2.7mA
K	0	

**EM85**

A	22V	1.0mA
G <sub>2</sub>	140V	1.2mA (TARGET)
K	0	

**Inductors—**

L	Ohms
1 ...	12.5
2 ...	500
3 ...	15.5
4 ...	100
5 ...	3.5
6 ...	650
7 ...	VL
8 ...	200
9 ...	VL
10 ...	VL
11 ...	30
12 ...	30

**SELECTOR**

	13	13	15	20	22	25	35	19	19	25	26	33	24	31	37	37
OFF																
FAST REWIND																
PLAYBACK																
RECORD																

**MOTOR**

	42	43	45

**PUSH-BUTTON**

	2	1	14	6	8	18	18	47	49	15
MICRO										
DIODE										
RADIO										

R = AUTO-STOP  
 R<sub>a</sub> = OPEN IN NON-ENERGISED POSITION  
 R<sub>b</sub> = CLOSED  
 Th = THERMOCONTACT ON MOTOR

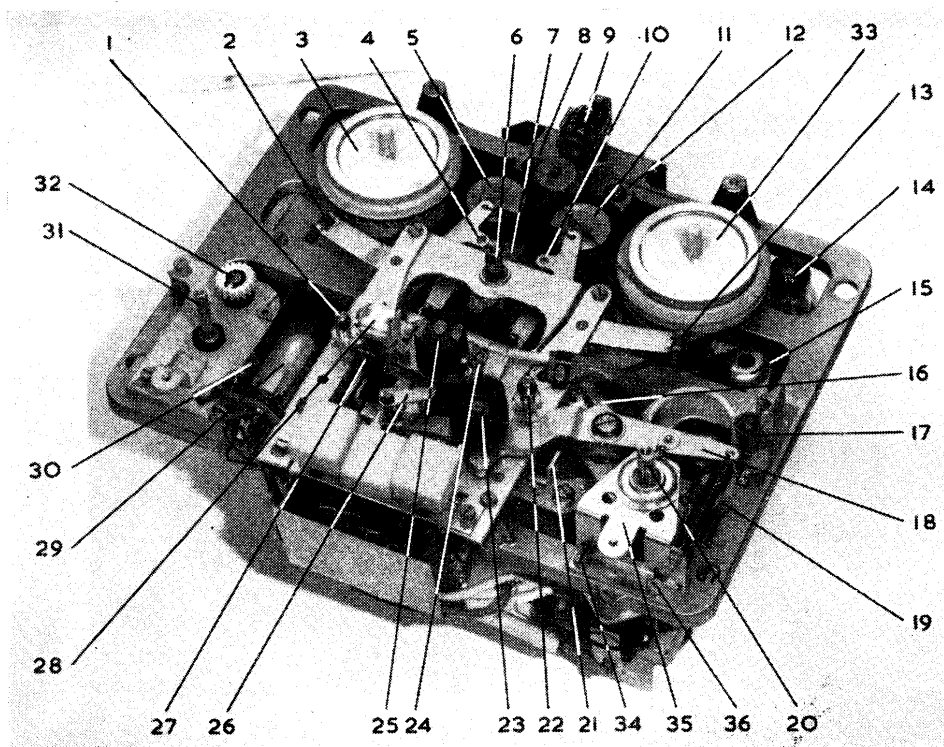
● CONTACT CLOSED

**COMPONENT RATINGS**

**Resistors**  
 Wirewound 2W : R36 37 43.  
 Carbon ½W : R6 7 16 22 30-32 44 45.  
 Remainder all carbon 1/3W.

**Potentiometers—**  
 Variable carbon : R39.  
 Variable carbon with DPST and microgap switch : R40.  
 Preset carbon : R41 42.

**Capacitors—**  
 Preset wirewound : R23.  
 Tubular Ceramic : C19.  
 Tubular Polystyrene : C3 4 6 8 17 26 30.  
 Moulded mica 500V : C1 7 8 21 29 35.  
 Moulded mica 125V : C2 9 13 15 17-19 26 34.  
 Electrolytic 385V : C10 12 22 31 32.  
 Electrolytic 40V : C36.  
 Electrolytic 15V : C20 33.



Removal of circlip will release tape stop lever (19) which operates erase head pressure pad, with its push rod. Both drive belts may now be removed. *Note:* Drive belt is 3mm. diameter, fast wind belt is 4mm.

If necessary fast wind positioning cam and remaining cams on selector switch can be removed. Note their respective positions.

The motor is fixed to top casting at three points; two screws on left-hand side, and on right-hand side by pressure roller arm spindle which is bolted through the top casting and motor support plate.

**Clutches.** Clutches are of simple friction type and will not normally need attention other than occasional cleaning of felt clutch facings with methylated spirit.

To do this clutch may be taken apart as follows: Remove large circular retaining spring to release tape capstan (3) (33). The retaining circlip now exposed is removed with thin steel washer and plastic washer. (Note steel washer is uppermost.)

Top half of clutch can now be removed, and in the case of right-hand clutch, the lower clutch drive pulley also. A further plastic and steel washer will be found under this. Oilite bearings are provided and normally require no lubrication.

**MECHANICAL TESTS AND SERVICING**

After carrying out any adjustment, all screws must be resealed with insulating varnish or compound.

**Pressure roller arm and pressure roller.** Pressure roller should exert a pressure against the tape corresponding to a pull on the tape of about 350 gms. (about 18oz.), with the motor running. This can be checked by fixing a pair of tension scales to a piece of the tape and measuring the pull on the tape.

Adjustment for correct pressure may be made by adjusting locking nuts holding pressure roller arm spring.

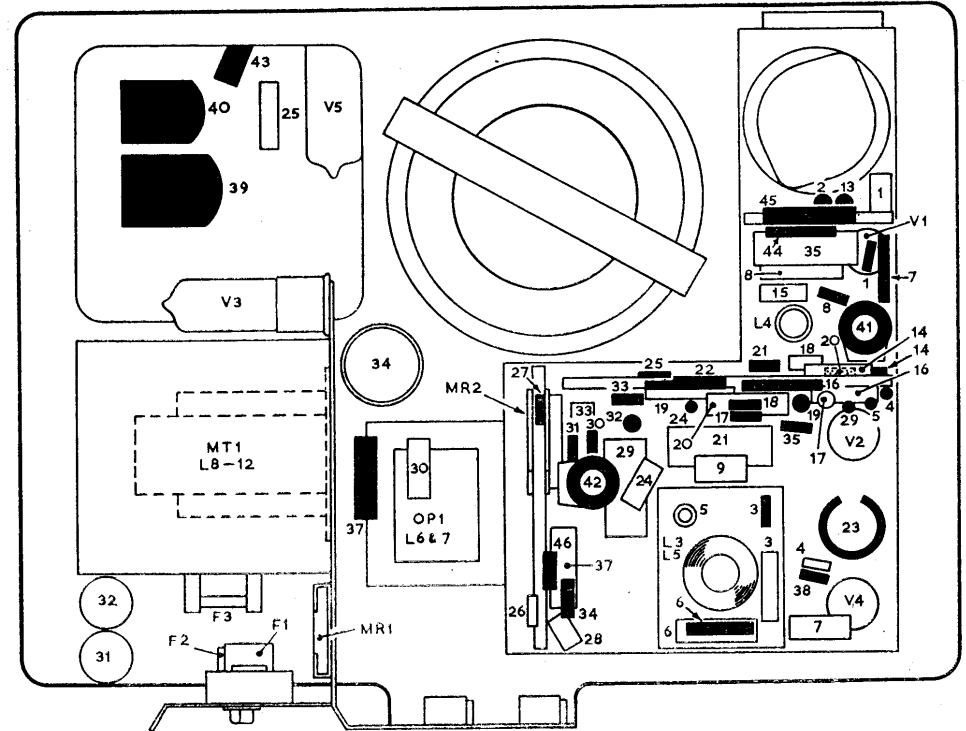
Both pressure roller and drive capstan should be absolutely vertical and parallel to one another.

**Tape pressure pads.** Tape pressure against recording lead should be 30gms.; against erase head 50gms.

Pressure pads should be set squarely and centrally when engaged.

**Thermal switch.** Thermal switch incorporated in some TK5 models switches off the motor if temperature inside the instrument rises above 170 deg. F.

Contacts of the switch should be adjusted to a distance of 0.7mm. at room temperature.



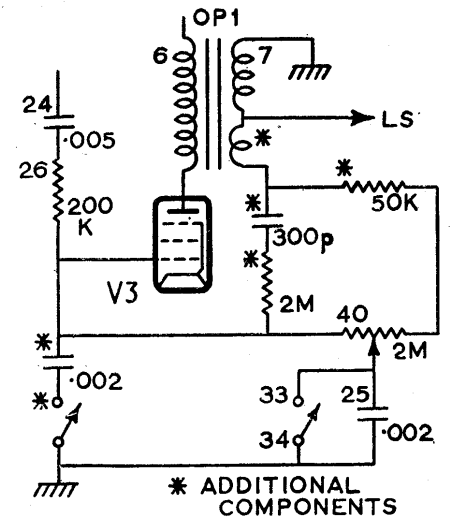
**Clutch facings.** Uneven pull from either spool spindle or jerkiness may be due to an accumulation of dirt on felt insert under spool spindle. The felt may be cleaned with methylated spirit, using a small brush. It is also advisable to roughen the felt with sandpaper.

**Drive belts.** Drive belts are made of thermo-plastic material and tend to stretch and stiffen under cold conditions. Applications of warmth for a few seconds, or running the machine on fast wind for about an hour will always restore the belts to normal.

**Lubrication.** All TK5 bearings are self-lubricating sintered type and do not require regular lubrication. It is recommended, however, that this should be checked after 500 hours' running. Shell Vitrea Oil No. 21 is recommended but should be used sparingly.

**Cleaning of head assemblies.** Any dirt or iron oxide should be carefully removed with a match or orange-stick. A little methylated spirit may be used, but on no account use carbon tetrachloride or acetone, as these will attack the thermo-plastic casings of the leads.

**Intermittent locking of push-buttons.** This fault is due to a bent or twisted locking bar on the push-button assembly. Observe where bar fouls and straighten accordingly.



**\* ADDITIONAL COMPONENTS**  
Main circuit diagram applies to models using OP1 marked BV 9054-501. Recent models include new type OP1, BV 9054-503, with tertiary winding. Circuit is as shown in the small diagram.

**MECHANICAL FAULTS**

**Tape does not move when motor running.** May be due to tape not being threaded correctly; insufficient tape pull, which should be adjusted, or pressure roller not free on spindle.

**Motor not stopping or starting properly.** Check motor switches 45, 46; 45, 44; 43, 42.

**Motor not running.** Check thermal switch.

**Tape speed incorrect.** Check C34, clutch adjustments, mains voltage setting, tape pull incorrect, tape pressure incorrect, position indicator jamming, tape jamming in guides, spool scraping on top deck.

**Sluggish starting of tape.** Toggle switch 44, 45, 46 faulty, or too much friction.

**Heads wearing quickly.** Too much tape pressure which should be adjusted.

**Tape jumps out of guides.** Pressure roller and motor spindle not parallel; dirt or iron oxide on pressure roller.

**Tape scraping on edge of spool.** Spool warped, tape guides out of alignment.

**RH spool spindle sluggish on starting.** Too much friction from place indicator, too much friction of spool spindle on shaft (this also applies to LH spool spindle), RH clutch incorrectly adjusted (see under "Clutches").

**Machine does not start or very erratic.** Drive belts hardened due to storage in low temperature. Belts should be warmed in hot water or warmed from some source of heat for approximately 20 seconds. If merely erratic run TK5 for 20 minutes on fast wind.

**ELECTRICAL FAULTS**

**Distorted recording, low volume due to recording bias.** Faulty oscillator V4; L3 faulty; L2, recording head, faulty; incorrect mains voltage setting.

**No erase.** Faulty oscillator V4; faulty erase head; incorrect tape pressure against erase head; push rod bent or jamming.

**Cross talk from other channel.** Recording head or erase gaps incorrectly adjusted; tape not guided horizontally.

**Wow and flutter.** Clutches jerk; tape scraping on mu-metal head; tape not guided horizontally; too much pull from take-up spool (see under "Clutches"); insufficient pressure from pressure roller; wrong mains voltage setting; motor spindle.

**Hum level too high.** Low heater to cathode insulation on V1; V2 faulty; faulty smoothing, C10, C12, C22, C31, C32, C36; R23 out of adjustment; stray external AC fields, earth chassis or find better location; amplifier gain too low on record.

**No recording level indication.** Faulty R42; faulty V5; contacts 31, 32 shorting.

**Recording level too low.** Low HT; short on input socket panel; V1 faulty.

**Low gain on playback.** Incorrect recording bias, adjust L3; faulty or dirty recording

head; OP1 faulty; insufficient tape pressure; V3 losing emission.

**No playback.** Signal muted due to fault on selector switch; faulty switching; V4 oscillating, check contacts 20, 21.

**ELECTRONIC TESTS**

**Head currents and voltages.** HF bias current to record/playback head L2 when recording is approximately 1mA. If a 100 ohm resistor is inserted in series between the head and chassis the volt drop across it should be 100mV  $\pm$  10 per cent. If difference is considerable C5 should be adjusted for optimum condition.

HF voltage to erase head, L1, when recording should be 100V, measured on VTVM.

AF current to recording head should be 0.2mA approximately when using frequency of 333c/s fed into diode socket at full modulation level (magic-eye).

With 100 ohm resistor in series between head and chassis under above conditions volt drop across resistor should be between 15 and 20mV. V4 should be removed for this test.

**Alignment of heads.** Positioning of heads is extremely critical and should be carried out with a test tape or tape on which a 6,000c/s signal has been recorded on a standard machine.

Recording/playback head is plugged into baseplate fixed to main chassis by three screws. By adjusting these screws, head may be correctly lined up. This can be checked by connecting VTVM to output socket, pins 2 and 3, and reproducing the test tape. Head setting should then be adjusted until maximum reading is obtained.

The head can also be adjusted horizontally so that the gap in the head can be brought close to the tape. By unscrewing the two mounting screws on mu-metal hood the complete head with hood can be freed and rotated. Always check the result on VTVM or oscilloscope connected as above.

With tape running, top edge of recording/playback head should be about 0.5mm. above top edge of the tape.

Pole pieces of the erase head should overlap 0.1mm. above the tape and slackening the fixing screws of the erase head will allow sufficient vertical adjustment to achieve this.

When machine is running tape should be guided between guide posts in an absolutely straight line.

**Hum level.** Hum level may be reduced to minimum by adjusting humdinger, R23. To check hum level a signal of 20mV at 333c/s should be applied to the diode input and recording level control set for full modulation (magic-eye). This signal should be recorded and when played back at full volume hum level at high impedance output (pins 2 and 3) should not exceed .01 of the signal (-40dB).

**Modulation level adjustments and sensitivity.** For setting modulation level, feed into diode input signal of 333c/s with recording level control at maximum and adjust input until output across pins 2 and 3 measured on VTVM is 1,300mV. Magic-eye should be adjusted by R42 to close at this figure and input signal for this should not exceed 2mV.

**Frequency response.** Feed in signal of 20mV at 333c/s to diode input and adjust recording level control for full modulation. Now reduce input by 20dB (1) and record frequencies of 60c/s, 333c/s, 1kc/s, 6kc/s and 8kc/s. Connect VTVM to high impedance output and play back the recording. Output should remain constant to within  $\pm$  4dB, referred to 1kc/s, over whole frequency range.

Correction to response curve may be made by adjustment of post-emphasis control R41.

**Adjustment of absorption coil L4.** Inject 8.5kc/s to grid of V2A and connect VTVM to high impedance output. Adjust input to give convenient reading on VTVM. Adjust core of L4 to give maximum reading on VTVM.

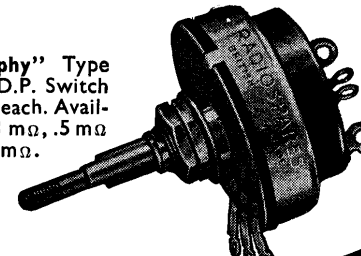
**Wow and flutter.** If a wow meter is available reading should not exceed 0.5 per cent. Alternatively, signal of 5,000c/s may be recorded, and when played back no appreciable change of pitch should be audible.

**DELIVERY CONFIDENCE...**

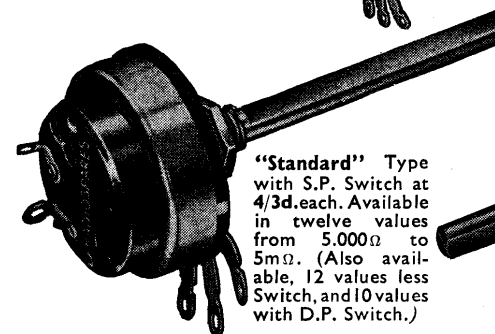
*...backs up  
your own  
promises!*

Your Service Department can now safely promise to complete that awkward repair, particularly if it involves Volume Controls. Do you know that we produce a range of 60 different Carbon Track Volume Controls? This range includes types less Switch, with S.P. Switch, with D.P. Switch. We have "Exact Replacements" too! Here are just a few typical examples—

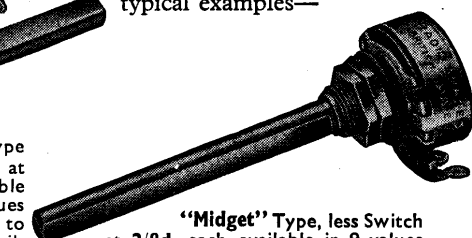
"Murphy" Type with D.P. Switch at 6/- each. Available .1 m $\Omega$ , .5 m $\Omega$  and 1 m $\Omega$ .



"Standard" Type with S.P. Switch at 4/3d. each. Available in twelve values from 5,000 $\Omega$  to 5m $\Omega$ . (Also available, 12 values less Switch, and 10 values with D.P. Switch.)



"Midget" Type, less Switch at 2/8d. each, available in 9 values from 5,000 $\Omega$  to 2m $\Omega$ . (Similar ranges available also with S.P. Switch and with D.P. Switch.)



*Of course, you know that our Catalogue, which, if you are a recognised member of our Trade, is readily at your disposal, will give you fullest details, not only of our Volume Controls, but also of the multitude of our other quality components. (All prices quoted are Net Trade prices).*

*Today's orders dispatched today  
Keenest Prices  
Every Component Guaranteed  
Supplies to the bona fide  
trade only*



**Radiospares Ltd.**

4-8 MAPLE STREET · LONDON · W.1 · ENGLAND

Telephone: EUSon 7232-7

TELEGRAMS: RADOSPERES, WESDO, LONDON

CABLES: RADOSPERES, LONDON