GRUNDIG TAPE RECORDERS Models TK20, TK25

General Description: These are portable tape recorders for dual-track working. Model TK20 is single-speed ($3\frac{3}{4}$ in./sec.); Model TK25 is two-speed ($3\frac{3}{4}$ in./sec. and $1\frac{7}{8}$ in./sec.). Maximum spool diameter $5\frac{3}{4}$ in. Tape chassis, **Model TM20**, is identical with Model TK20 except for input panels and for chassis being supplied without cabinet, loudspeaker or output stage.

Power Supply: A.C. mains, 110–120 and 200–250 volts (transformer also tapped at 150 and 160 volts), consumption about 45 watts.

Valves: (V1) EF86; (V2) ECC81; (V3) EL95; (V4) EM84 (recording level indicator); (V5) EL95 (H.F. oscillator).

Notes: Drive is obtained from flywheel driven by outer rotating cage, split-phase, induction motor. Tape is friction driven between capstan spindle on flywheel and rubber pressure-roller, spring controlled. Self-lubricating bearings are fitted. Two spools are carried on top halves of friction clutches, the lower half of right-hand clutch being driven from flywheel pulley through endless plastic belt. Friction between driving and idling halves is proportional to weight of tape and spool. Digital-type position indicator fitted. Metal foils, as fitted to Grundig tapes, cause motor to be switched off at end of tape. L.T. supply for V1 is fitted with humdinger (R49). Microphone socket is polarised with 100 volts D.C. and has sensitivity of about 2 mV. across 500k. Diode socket has sensitivity of 7 mV. across 180k and radio socket 80 mV. across 1M. Model TK25 is fitted with an erase cut-out button for superimposition. H.F. oscillator frequency approximately 78 kc/s. with amplitude control R3, while C2 controls bias current to recording head.

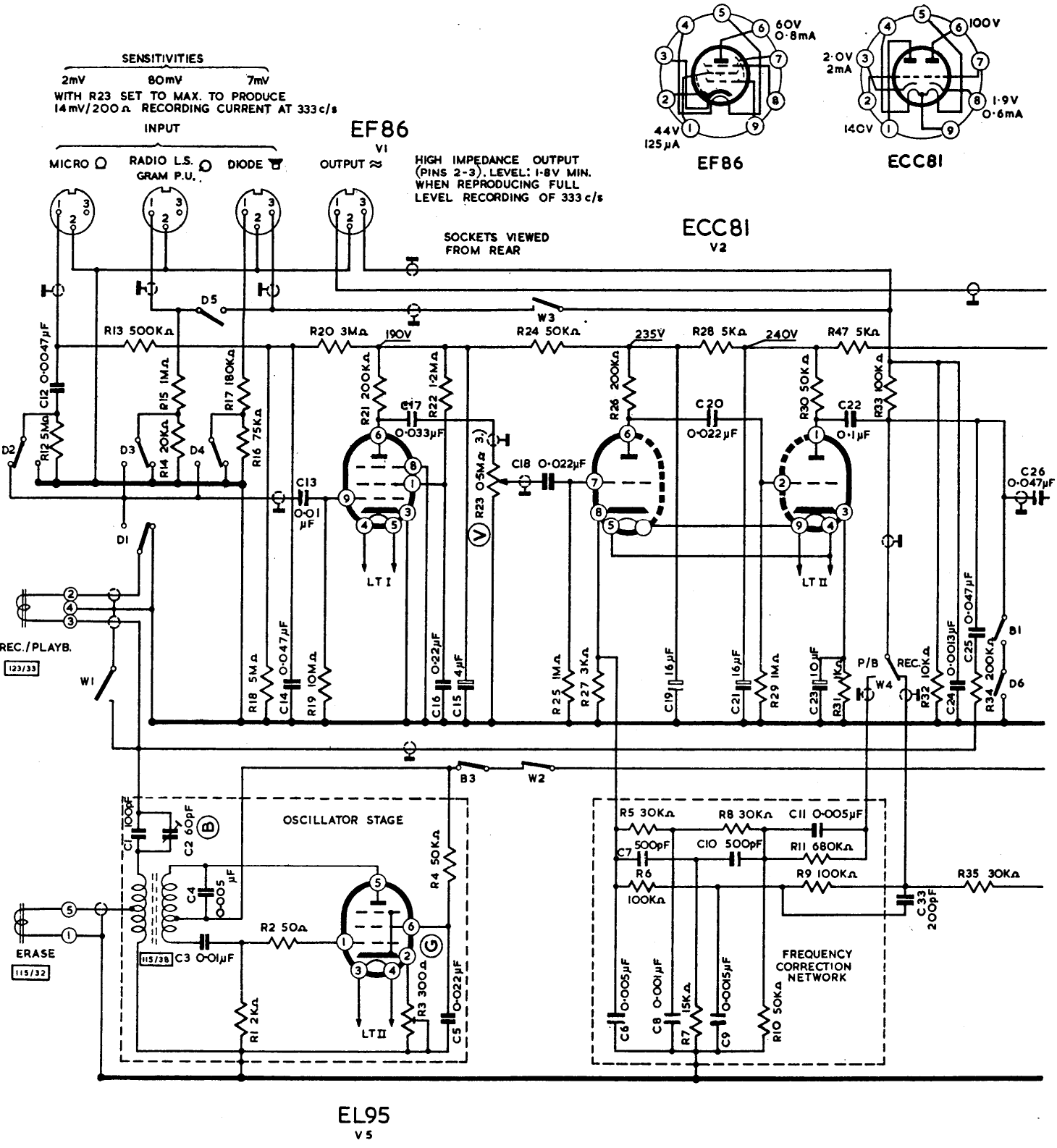
Chassis Removal: Slacken small grub screw retaining upper portion of right-hand control knob. Remove this and lower portion of knob. Pull off left-hand control knob. Remove four coin-slotted screws which retain top deck, and lift off deck. On TK25 also lift off plastic front moulding assembly. Unscrew four small nuts securing chassis to cabinet (3 B.A. spanner). Unsolder loudspeaker leads and earth connection from back panel. Chassis may now be lifted carefully out of cabinet: *do not lift chassis by clutches.*

Clutches: Clutches are of friction type and will not normally need attention. Their felt should, if necessary, be cleaned with methylated spirits.

Head Currents: H.F. bias current to head when recording is 1·1 mA. and can be measured by inserting a 200-ohm resistor in series with chassis return lead of head. Potential drop, measured with valve voltmeter, should be 220 mV. ±10 per cent. If current below this figure, adjust C2 to

maximum capacitance, then R3 should be adjusted until optimum condition is reached.

Erase current should be measured by inserting a 10-ohm resistor in series



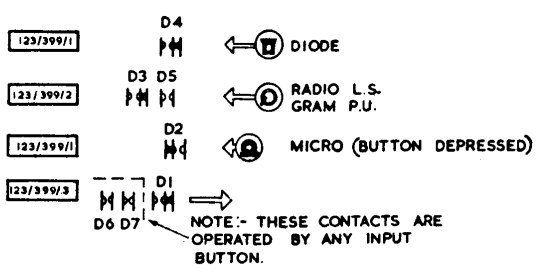
SELECTOR SWITCH

123/101

OPERATING POSITIONS:	B1 (123/198)	B2	B3 (123/199)
← FAST WIND	•	•	
O STOP	•		•
▬ RECORDING/PLAYB.		•	•
• TEMP. STOP	•	•	•
→ FAST WIND	•	•	•

INPUT SWITCH

123/153

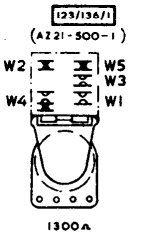


W = REC./PLAYB. RELAY

DE-ENERGISED IN RECORD POSITION

123/136/1

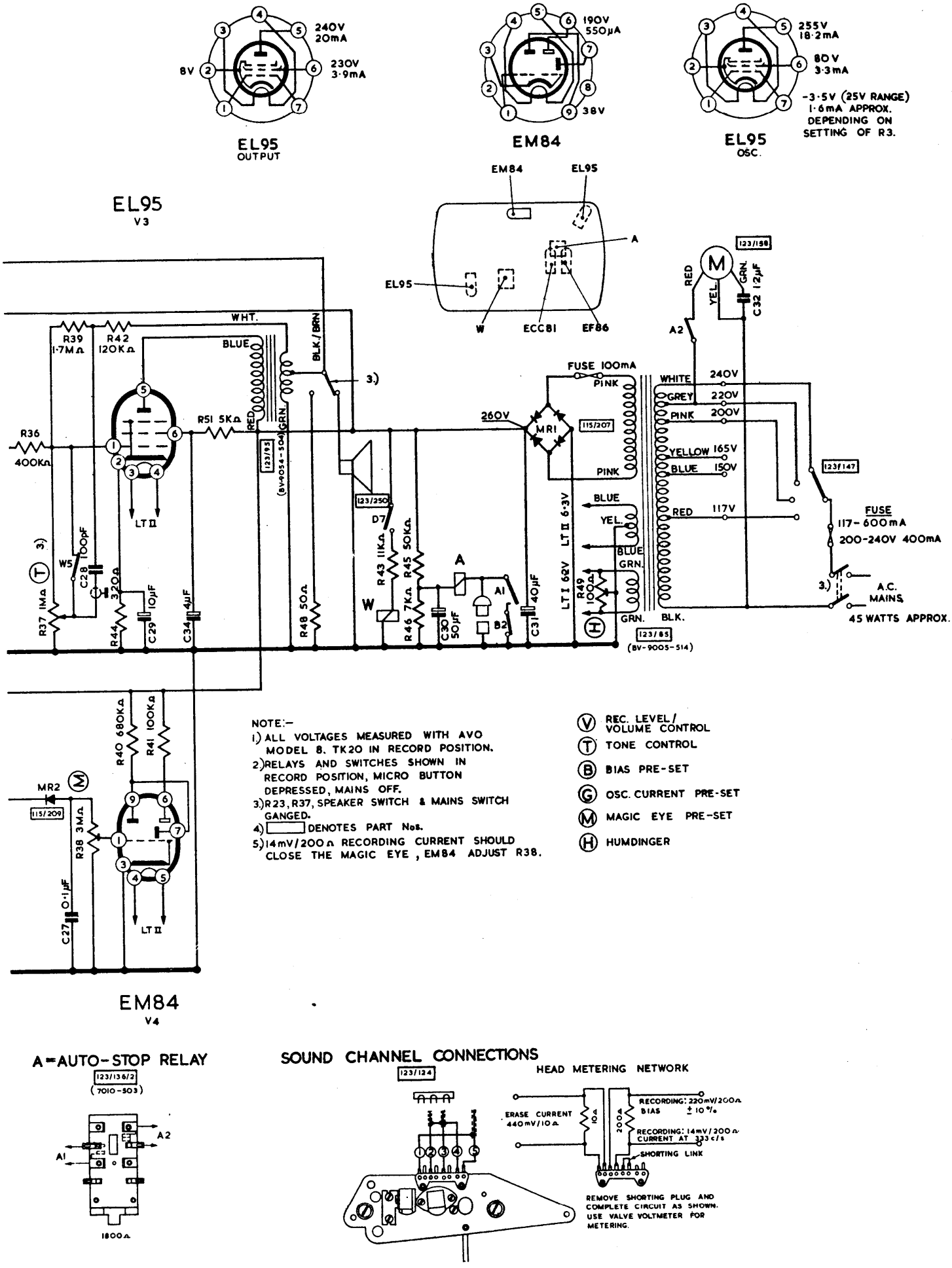
(AZ21-500-1)

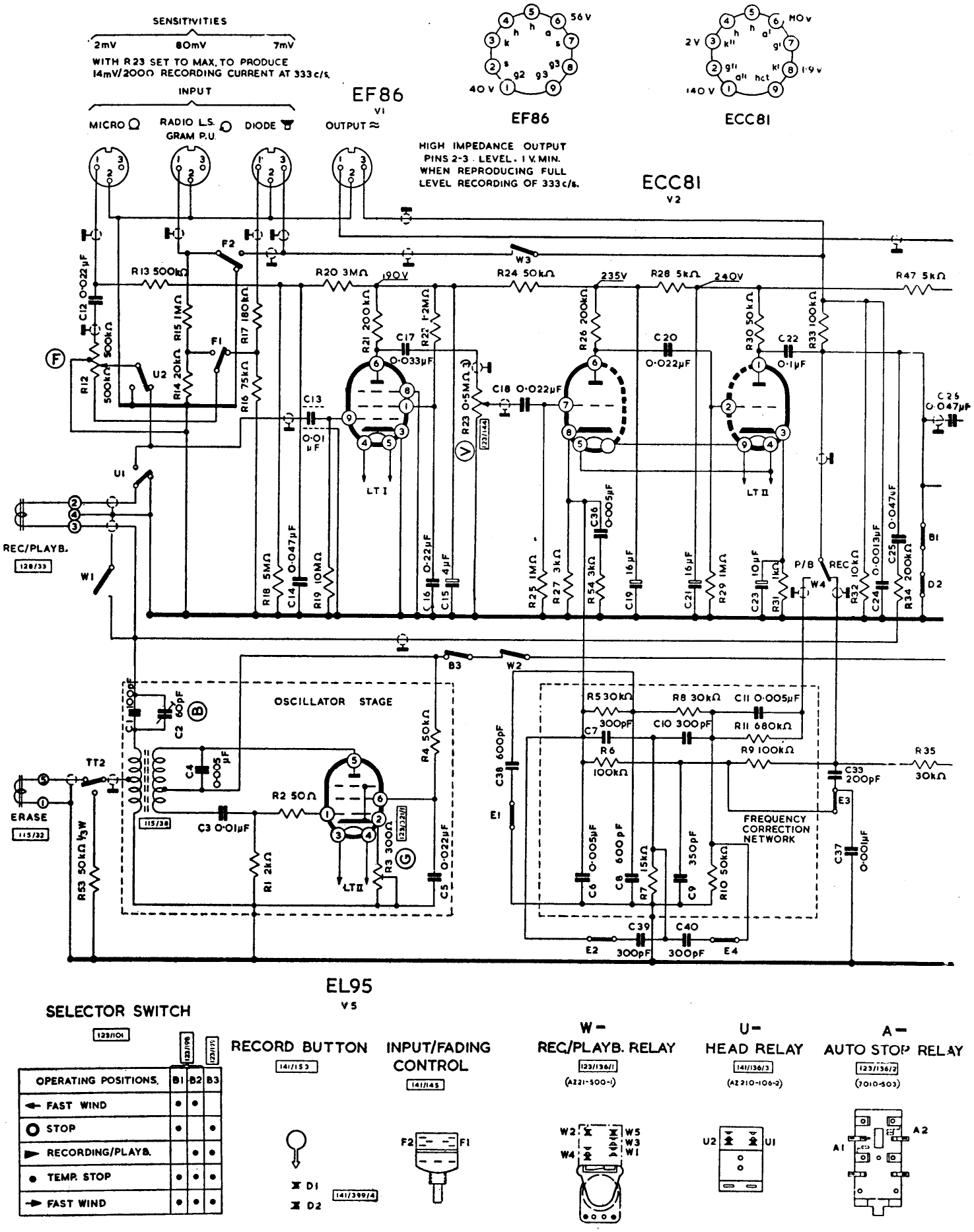


CIRCUIT DIAGRAM—

with chassis return lead of erase head. Valve voltmeter should show drop of 440 mV. across resistor.

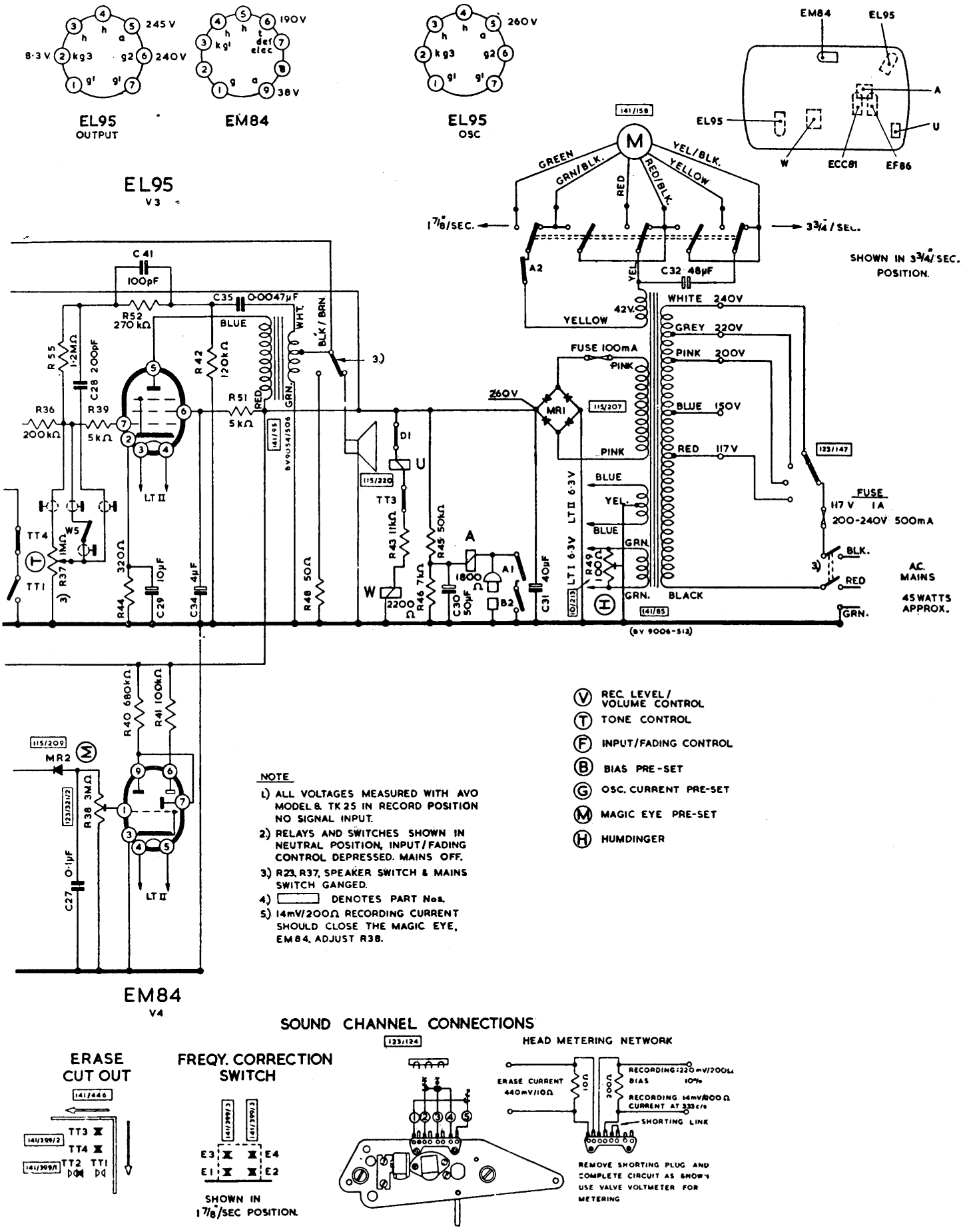
Recording current should read 14 mV. across a 200-ohm resistor in chassis





CIRCUIT DIAGRAM—

return lead of recording/playback head at frequency of 333 c/s. fed into diode socket at full modulation level. For this test V_5 should be removed. A diagram of a network for measuring-head current is given with the circuit



GRUNDIG TAPE RECORDER MODEL TK25

diagram. Under these conditions V4 should be closed. Adjust R38 until two sections of V4 just touch. Input signal required should not exceed 7 mV.

Head Alignment: Positioning of record/playback head assembly is very critical, particularly for reproduction of tapes made on other machines.

Adjustment should be carried out with 6000-c/s. test tape made on standard machines. Head is mounted on brass bracket fixed to head mounting plates by two screws, one being spring-loaded. By adjusting these screws head may be correctly aligned. This can be checked by connecting valve voltmeter to high-impedance output socket with test tape, adjusting head setting for maximum deflection. Top edge of head should be about 0·1 mm. above top edge of tape.

Hum Level: Adjust R49 for minimum hum level.

Mechanical Notes: It is most important that the tape should be guided in a straight line along its full travel, and correct adjustment of the tape guides is critical. After any adjustment to tape guides, etc., all screws must be resealed with insulating varnish or sealing lacquer. Pressure of roller against tape capstan is 900 gm. (about 2 lb.). Pressure roller and drive capstan should be absolutely vertical and parallel to each other (adjust eccentric screw on pressure roller arm to achieve this). Tape pressure against recording head should be 30 gm. Pressure pad should sit squarely and centrally when engaged. The two clutch brakes should sit squarely against clutches. Left-hand brake should be so adjusted that its felt ring is just clear of outer rim of left-hand clutch when selector switch is set to " fast forward ". The right-hand brake should be so adjusted that its felt ring is just clear of outer rim of right-hand clutch when selector switch is set to " fast rewind ". In " off " position both brakes should be firmly engaged; in " temporary stop " left-hand brake should be engaged. For " record/playback " both brakes should be free.

Uneven pull from either spool spindle or judder may be due to dirt on felt inserts of clutches. These may be cleaned with methylated spirits using small brush. It is also permissible to roughen felts with piece of fine sand-paper. Regular lubrication should not be necessary, but it is advisable to check for need of lubrication after about 500 hours' use. Thin mineral oil (fine machine oil), if necessary, should be applied sparingly and with care. Dirt on capstan or pressure roller will increase wow and may cause tape to jump out of guides. This can be removed by holding piece of sand-paper against it while it is engaged and rotating. Crocus paper is recommended for cleaning drive capstan; its surface should always look highly polished. Care must be taken that tape does not scrape outer edge of Mu-metal shield of record/playback head. Head assemblies should be inspected occasionally and any dirt or iron oxide carefully removed. This is best done with a match or orange stick, if necessary, using methylated spirit.

Fault-finding: Mechanical faults. *Tape does not move with selector switch in appropriate position:* tape not threaded correctly; insufficient tape pull (adjust); tape pressure roller not free on spindle (clean and lubricate). *Incorrect speed on recording or reproducing:* C32 faulty; mains voltage incorrectly set; incorrect tape pull; incorrect tape pressure; tape jamming in tape guides; spool scraping against top deck. *Tape runs slow in either*

fast-wind position: see above; oily drive belts. *Head wears too quickly:* incorrect tape pressure. *Tape jumps out of guides:* pressure roller and capstan spindle not parallel; dirt on pressure roller or spindle; tape-transport system incorrectly adjusted. *Tape scrapes against edge of spool:* spool warped; tape guides out of alignment. *Tape moves with selector switch in neutral position:* braking pads not operating (clean and adjust). *Mechanical noises from motor or flywheel:* cables touching cage or case; bearing dry.

Electrical faults. *Distortion or low volume due to lack of H.F. bias:* oscillator valve; oscillator coil; faulty recording head; incorrect mains voltage setting; C2 or R3 incorrectly adjusted; faulty C1 or/and C2. *No erase:* faulty bias oscillator; faulty erase head; incorrect tape pressure against erase head. *Cross talk between channels:* recording-head or erase-head gaps not correctly adjusted (adjust tape guides and ensure tape runs freely without twisting). *Wow and flutter:* clutches jerk; tape scrapes against screening hood; tape not guided horizontally; insufficient pressure from pressure roller; pressure roller and capstan spindle not parallel. *Hum level too high:* low heater-cathode insulation on EF86; faulty ECC81; faulty smoothing; R49 incorrectly set; low gain on amplifier. *No recording level indication:* faulty R38; faulty EM84; faulty MR2. *Recording level too low:* low H.T.; short-circuit on input-socket panel; faulty EF86; faulty D1 contact. *Low playback gain:* incorrect H.F. bias (adjust C2, R3); faulty or dirty record/playback head; faulty output transformer; low H.T.; insufficient tape pressure; low valve(s) emission. *No playback:* signal muted due to faulty contacts (check B1, D6); bias oscillates in playback position (check contacts B3, W2). *Whistle on playback and magic eye closed:* contact D7 open or dirty.