

# Marconiphone

## SERVICE MANUAL



REGISTERED TRADEMARK OF  
THE MARCONIPHONE CO. LTD

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## Specification

**TAPE SPEEDS :**  $3\frac{3}{4}$  and  $1\frac{7}{8}$  in/sec

**MAXIMUM SPOOL SIZE :**  $5\frac{3}{4}$  in diameter

<b>PLAYING TIME (four tracks) :</b>	$3\frac{3}{4}$ in/sec	$1\frac{7}{8}$ in/sec
Long play tape :	4 hours	8 hours
Double play tape :	6 hours	12 hours

**FAST WIND TIME :**  $2\frac{1}{2}$  minutes, in either direction, for 850 feet of tape

**POWER SUPPLY :** 200-250 Volts AC 50 cps

**POWER CONSUMPTION :** 60 Watts

**AUDIO OUTPUT POWER :** 3 Watts

**FREQUENCY RANGE :** 60—12,000 cps ( $3\frac{3}{4}$  in/sec)  
60—6,000 cps ( $1\frac{7}{8}$  in/sec)

**TAPE POSITION INDICATOR :** Digital type with reset button

**MAGNETIC HEADS :** Standard quarter-track (stacked) one Record/Play, one Erase

**INPUT SOCKETS :** Microphone (MIC) 1.5mV into  $10M\Omega$ , Radio (RAD) 1.5mV into  $22K\Omega$ , and Pick-up (PU) 75 mV into  $1M\Omega$

**OUTPUT SOCKETS :** Low level (RAD) 500mV at  $22K\Omega$ , and External loudspeaker 3 Watts at  $3\Omega$ . Note: When the latter is used, the internal loudspeaker is automatically muted

**ACCESSORY SOCKET :** See inside page for details

**CASE DIMENSIONS :**  $14\frac{1}{2}$  in x  $12\frac{1}{2}$  in x 7 in

## Servicing Notes

For servicing information on the tape deck please refer to the FTD3/FTD4 Tape Deck Service Manual

**ACCESS FOR SERVICING.** To gain access to the top of the tape deck for routine cleaning, etc., first pull off the control knobs, speedchange knob and moulded head cover, then remove four screws securing the moulded top cover—two at the rear of the spool carriers, and two at the rear of the head plate assembly.

**NOTE :** The projecting pins on the underside of the cover locate in four grommets set in the mechanism top plate.

**Chassis Removal.** Remove control knobs and covers as described. Remove two fixing screws from each side of the mechanism top plate. The complete assembly (less loudspeaker) can now be lifted from the cabinet. To disconnect the loudspeaker pull the connecting leads from the loudspeaker tags.

**HEATER BALANCE.** The humdinger (R26) has been set during manufacture and should not be altered unless a valve change is made. If re-adjustment becomes necessary the procedure given below must be carefully followed. Whilst setting the adjustment, the chassis must be electrostatically screened particularly around V1.

Take off the tape spools and set the instrument to "Record" with the tone control set to minimum and the record level control set to maximum. Connect a sensitive valve voltmeter between the junction of C10/C11 and chassis. Place a shorting lead across R20 to prevent the oscillator from functioning and plug in a screened dummy microphone connector with a 1,000 pF capacitor strapped across pins 4 and 5.

Allow the machine to warm up for 10 minutes, then adjust R26 for minimum reading on the valve-voltmeter (approximately 50 mV).

**DEMAGNETIZATION.** It is important that there is no residual magnetism in the heads or the capstan spindle. This condition may arise if magnetized objects are brought near these components or if an ohm-meter is connected to the head windings and this will lead to an increase in background noise on Play. Suitable instruments for providing a demagnetizing field are available from a number of manufacturers.

**HEAD ADJUSTMENT.** Provision is made on the head mounting for both vertical (height) and horizontal (azimuth) adjustment. Adjustment only becomes necessary where the manufacturing settings have been disturbed. The height adjustment is made by turning the mounting screws to compress the leaf spring on which the head is mounted; the azimuth adjustment is achieved by complimentary adjustments to the mounting screws.

**Record/Play head height setting**—The height of the Record/Play head may be set visually so that the upper edge of the top track is level with the upper edge of the tape. With the tape motion keys at neutral, thread the tape so that it runs behind the tape guide (on the right of the Record/Play head) to give sufficient tape contact on the head for observing the height setting. Whilst making the adjustments, ensure that the tape is taut by turning the take-up spool by hand. Finally, return the tape to its normal 'run' before operating the mechanism. The track positioning should then be checked by making recordings at peak level and developing the tape with 'Indicord' magnetic ink.

**Azimuth adjustment**—To re-adjust, play back a standard four-track azimuth tape with an output meter connected. Adjust the Record/Play head for maximum output, using the volume control to keep the output level as low as possible.

**Erase Head**—Ensure that the gap is visually at right-angles to the tape motion and make final adjustments to obtain complete erasure on a tape recording previously made on the same machine.

**NOTE:** On certain models an alternative type of magnetic head is fitted. These models can be identified by the suffix 'M' in the deck serial number and also by differences in the values of certain components—see circuit diagram.

When fitting new heads to these models they should also be adjusted for the following settings by sliding them backwards or forwards in the clamping brackets:

**Record/Play head**—Adjust for .090 in between head face and head gap screen with Record/Play key depressed.

**Erase head**—The head face should be level with edge of head plate.

**MICROPHONE.** *Due to difficulty in re-assembling and possibility of damage to the crystal element, it is suggested that no servicing is carried out on the microphone. In the event of any fault developing in this component, it should be returned to the nearest service depot.*

## Circuit Notes

**POWER SUPPLIES.** The motor is permanently connected to the 220-230V tap on **T2** primary to maintain the correct supply voltage at all mains input voltages. A separate winding, in **T2** secondary, supplies 25 volts AC to bridge rectifier **W3** which has its positive side connected to chassis, thus providing a supply of -32.5V DC. This supply is used to operate the 'Stop' and 'Pause' solenoids and is also taken to the accessory socket (**SKT6**) for external use. The solenoids are operated by the discharge of the reservoir capacitors which give a high initial energizing current. The 'Pause' solenoid is subsequently 'held on' by the current through feed resistor **R30**. The main HT supply is provided by a full wave selenium rectifier (**W2**) and the parallel heater chain is balanced to chassis by potentiometer **R26**, across **T2** heater winding.

**REPLAY.** The appropriate head winding is selected by track-selector switches **S6/S7**. The head output voltage is switched by **S1a** and **S5a** to **V1A** grid, the other side of the head winding being returned to chassis by **S1b**. The amplified signal at **V1A** anode is fed via **R5** (volume control) to the grid of **V1B** which, with **V2A**, provides two further stages of amplification. A frequency selective negative feedback loop, switched by **S1c**, from **V2A** anode to **V1B** cathode, gives bass boost playback equalization. **V2A** output is fed to the radio output socket (**SKT4**) via **S1c**, attenuator **R15/R16** and **S1d**, also via **C11** to tone control **R18**. From the tone control the signal is switched by **S1e** to **V2B** grid via grid stopper **R19**.

**V2B** operates as the audio output stage, with the Erase head short-circuited by **S1f**. The secondary of **T1** is connected in the return circuit of **V2B** cathode to provide negative feedback.

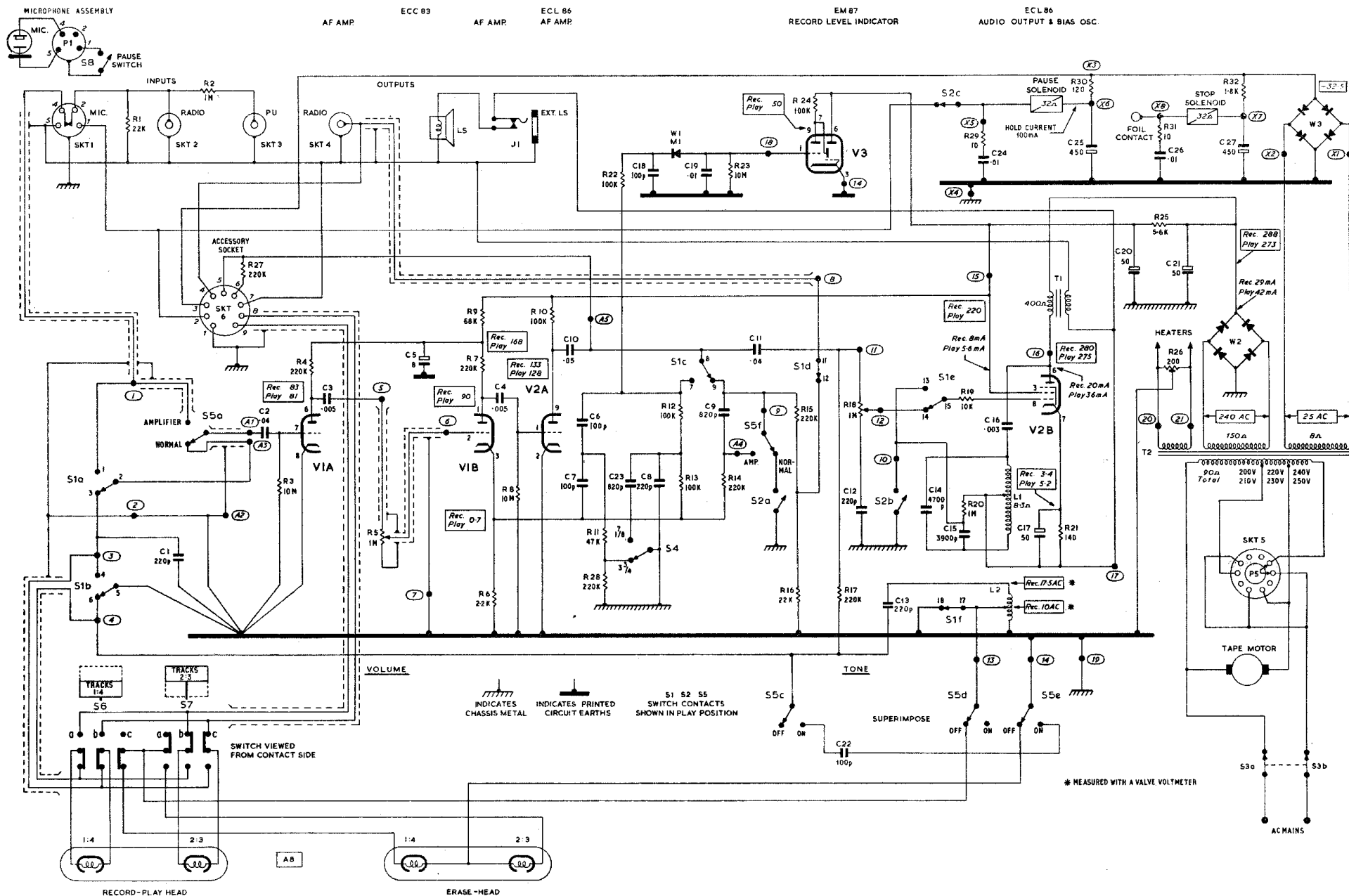
**RECORD.** **V1A** grid is switched to the input sockets by **S1a**. Switch contacts are incorporated in the microphone socket to break the radio and pick-up input circuit when the microphone is in use. **V1A** output is fed via the record level control (**R5**) to **V1B** grid.

Treble boost recording equalization is provided by a frequency selective negative feedback circuit connected between **V2A** anode and **V1B** cathode via **S1c** (contacts 7 and 8). When the mechanism is switched to the lower speed ( $1\frac{7}{8}$  in/sec) **R28** and **C23** are added to the circuit by the speed compensation switch (**S4**).

**V2A** output is fed to the appropriate head winding, via **C10**, **C11** and series resistor **R17**. The head winding is returned to chassis through **S1b**, its polarity now being reversed. Part of the signal developed at **V2A** anode is rectified by **W1** and fed to grid of **V3**, the record level indicator, this circuit having a fast rise and slow decay characteristic.

Power for erasing and recording bias is supplied by **V2B** which is connected as a modified Hartley oscillator when the instrument is switched to Record. The oscillator is tuned to approximately 55Kc/s and the erase power is fed to the Erase head from a tap on **L2** via **S5d** and **S6/S7**. The record bias is coupled to the record feed line by **C13**.

**MUTING.** (**S2a-c**) — When the mechanism is in the 'fast wind' and 'off' positions (with Playthrough/Superimpose switch at normal) **V2A**



**MODEL 4200 CIRCUIT DIAGRAM.** Figures in rectangles are voltage readings taken with a 20,000 ohm/volt meter. DC resistances are shown where the values exceed 1Ω. Ringed figures denote printed board tag connections. Tag numbers designated 'X' are located on the solenoid supply board.

Switch section S5b is not used.

**NOTE:** On some models an alternative type of magnetic head is fitted. These models can be identified by the prefix 'M' in the deck serial number and also by a white coding spot on the oscillator coils assembly. On these models each of the following components will have a value of 50pF: C1, C13, and C22.

Also, on some models, the following differences may be found in the solenoid circuit: R30—75Ω (2 x 150Ω in parallel), R32—820Ω, and an additional 450uF capacitor added across C27.

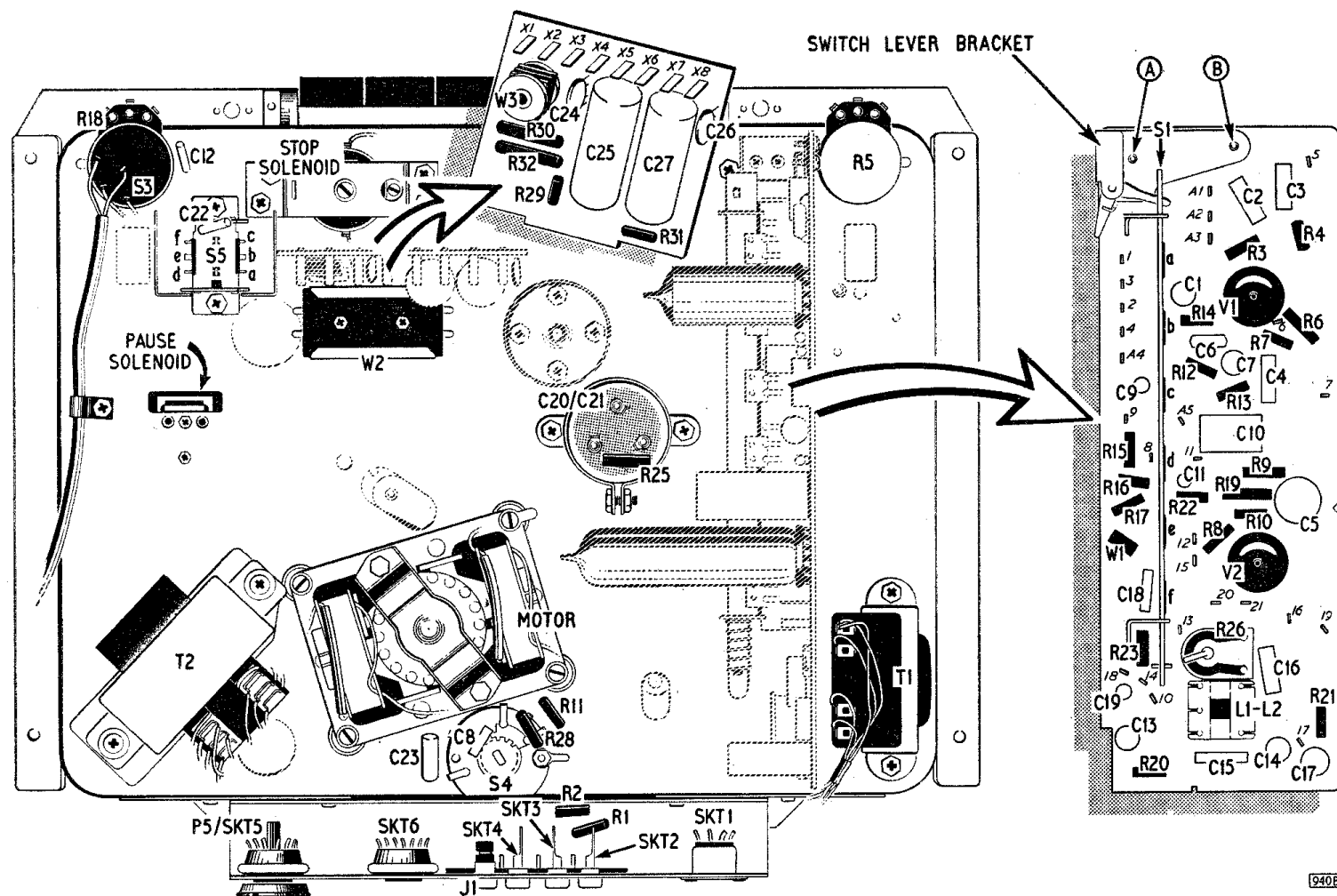
output is shorted to earth by S2a. When switching from 'record' to any other function, S2b causes the oscillator output to decay, thus ensuring that the heads are not left partially magnetized. Under the same conditions S2c breaks the 'Pause' solenoid circuit to prevent accidental application of the 'Pause' brake.

**PLAYTHROUGH/SUPERIMPOSE.** S5a connects the input circuits, when the instrument is used as a straight through amplifier, while at the same time S5f modifies the feedback circuit to reduce bass boost. Switch sections S5c-e are used to isolate the Erase head and also to connect C22 to chassis from the Record/Play head feed line, thereby reducing the bias to the Record/Play head. This is done to avoid partial erasure of original recorded signals whilst superimposing.

### ACCESSORY SOCKET (SKT 6)

The socket provides connections for auxiliary units which could be used to adapt the recorder for the following facilities: Playback for stereo tapes, slide projector synchronization, voice operated start/stop and second track dubbing. The pin connections are as follows:

- 1 Chassis earth.
- 2 Auxiliary 'Pause' switch contact for remote 'Pause.'
- 3 Auxiliary HT providing -32V DC at 50mA.
- 4 Radio output.
- 5 Compensated unbiased Record/Replay signal output.
- 6 Pin 5 via 220KΩ stand-off.
- 7 Direct earth, associated with pins 4, 5, 6, 8 and 9.
- 8, 9 Unselected Record/Play head.



### CHASSIS LAYOUT

**COMPONENT LOCATION.** V3, R24 and S2 (not shown) are located on the tape deck top plate. R27 (not shown) is connected between pins 5 & 6 of SKT6.

**NOTE:** Accurate positioning of the switch lever bracket on the printed board is necessary for correct switch operation. In cases where the bracket has been removed, the following procedure should be followed for refitting: With the printed board in position on the baseplate and the screws "A" and "B" slackened, adjust the printed board relative to the switch lever so that the switch lever arm just touches the baseplate; the screw holes in the printed board are slotted for adjustment. Finally, tighten screws "A" and "B".

# Component Details

## RESISTORS

All  $\frac{1}{4}$  Watt carbon, 20% tolerance, unless otherwise stated

Ref.	Value	Tolerance	Rating	Function and Part No.
R1	22K $\Omega$	10%		Radio input and part pick-up attenuator
R2	1M $\Omega$			Part pick-up attenuator
R3	10M $\Omega$			V1A grid leak
R4	220K $\Omega$	10%	Low noise	V1A anode load 224SC02/RR1
R5	1M $\Omega$	Log. Pot.		Record/Play volume control Y30656/1
R6	2.2K $\Omega$	10%		V1B cathode bias and NFB injection
R7	220K $\Omega$			V1B anode load
R8	10M $\Omega$			V2A grid leak
R9	68K $\Omega$			HT smoothing
R10	100K $\Omega$			V2A anode load
R11	47K $\Omega$	10%	}	Part record equalization
R12	100K $\Omega$	10%		
R13	100K $\Omega$	10%		
R14	220K $\Omega$	10%		
R15	220K $\Omega$	}		Replay bass boost
R16	22K $\Omega$			Radio output attenuator
R17	220K $\Omega$		10%	Constant current record signal feed
R18	1M $\Omega$	Lin. Pot.		Tone control (with S3) 30656/2
R19	10K $\Omega$			V2B grid stopper
R20	1M $\Omega$			Oscillator grid leak
R21	140 $\Omega$	10%		V2B cathode bias
R22	100K $\Omega$			W1 stand-off
R23	10M $\Omega$			V3 grid leak and W1 load
R24	100K $\Omega$			V3 anode load
R25	5.6K $\Omega$		$\frac{1}{2}$ W	HT smoothing
R26	200 $\Omega$	Preset		Heater balance (humdinger) Z13187/2
R27	220K $\Omega$			Record/Play signal stand-off
R28	220K $\Omega$	10%		Part $1\frac{1}{2}$ in/sec record equalization
R29	10 $\Omega$			Part 'Pause' solenoid click suppression
R30	120 $\Omega$	10%	2W	'Pause' solenoid hold-on
R31	10 $\Omega$			Part 'Stop' solenoid click suppression
R32	1.8K $\Omega$			'Stop' solenoid feed

## MISCELLANEOUS

Ref.	Description	Part No.
S1a-f	Record/Play switch	Y26469
S2a-c	Muting switch	Y26417
S3a-b	Mains On/Off switch (See R18)	
S4	Speed compensation switch	Z26522
S5a-f	Playthrough/Superimpose switch	N26523
S6-7	Track selector switches	Y26472/1
S8	'Pause' switch (included in microphone assy.)	
LS	Loudspeaker—3 $\Omega$ impedance	16009/4
W1	Record level rectifier	Z26484
W2	HT rectifier	Z26489
W3	Auxiliary HT rectifier	Z26513
SKT1	Microphone input socket	Z26495
SKT2	Radio input socket	} Socket strip Y26497
SKT3	PU input socket	
SKT4	Radio output socket	
J1	Extension LS jack	
SKT5-P5	Mains voltage adjustment	Z26499
SKT6	Accessory socket (9 pin)	Z26515

## CAPACITORS

All 350 Volts DC working, 20% tolerance, unless otherwise stated

Ref.	Value	Tolerance	Rating	Function and Part No.
C1	220pF (50pF)*	10%		Record/Play head tuning on Play
C2	.04uF		150V	V1A grid coupling
C3	.005uF		400V	V1B grid coupling
C4	.005uF		150V	V2A grid coupling
C5	8uF	Elec.	275V	V1A-B HT smoothing Y13222/25
C6	100pF	10%	}	Part record equalization
C7	100pF	10%		
C8	220pF	10%		
C9	820pF	10%		
C10	.05uF		150V	Replay bass boost
C11	.04uF			V2A anode DC blocking
C12	220pF			Part low frequency attenuator
C13	220pF (50pF)*	10%		Part tone control circuit
C14	4700pF	2 $\frac{1}{2}$ %		Record/Play head tuning and bias feed (record)
C15	3900pF			Oscillator tuning
C16	.003uF		300V AC	Oscillator grid leak bias
C17	50uF	Elec.	12V	Oscillator anode coupling
C18	100pF			V2B cathode bypass Y13228/27
C19	.01uF			Record level indicator feed decoupling
C20	50uF	Elec.	300V	V3 grid time constant
C21	50uF	Elec.	300V	HT smoothing } Y13238/16
C22	100pF (50pF)*	10%		HT reservoir } Superimpose bias reduction
C23	820pF	10%		Part $1\frac{1}{2}$ in/sec record equalization
C24	.01uF	25%		'Pause' solenoid click suppression
C25	450uF	Elec.	35V	'Pause' solenoid reservoir Y13229/44X
C26	.01uF	25%		'Stop' solenoid click suppression
C27	450uF	Elec.	35V	'Stop' solenoid reservoir Y13229/44X

\* Alternative value where oscillator coil assembly is coded with a white spot

## INDUCTORS AND TRANSFORMERS

Ref.	Description	Part No.
L1—L2	Bias oscillator coils assembly	Y26510*
T1	Audio output transformer	Y26487
T2	Mains transformer	Y26509

\* This number applies to assembly coded with a yellow spot  
Alternative assembly coded with a white spot, Part No. Y26588

## REPLACEMENT PARTS LIST

Description	Part No.
Cabinet	30846
Control knobs (2) (clip 48553)	Y26541/2
Washer	Z26550
Disc	Z26549
Speedchange knob (clip 37325)	Z50827/2
Deck cover	V26302/4
Head cover	V26303/5
Microphone assembly	30849
Radio connecting lead assembly	N30392
Socket panel dressing cover	Y26521/1
Switch lever return spring	Z26504
Tape deck—FTD4	26480

The manufacturers reserve the right to vary specifications or use alternative materials as may be deemed necessary or desirable at any time

## BRITISH RADIO CORPORATION LIMITED

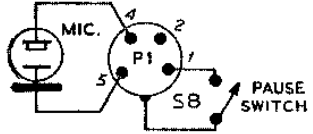
### SERVICE DEPOTS

LONDON: Eley's Estate, Angel Road, N.18 • EDMonton 3060

BIRMINGHAM: 24 Sheepcote Street, 15 • Midland 5291

GLASGOW: 160/162 Battlefield Road, S.2 • Langside 9251/2/3/4

MICROPHONE ASSEMBLY

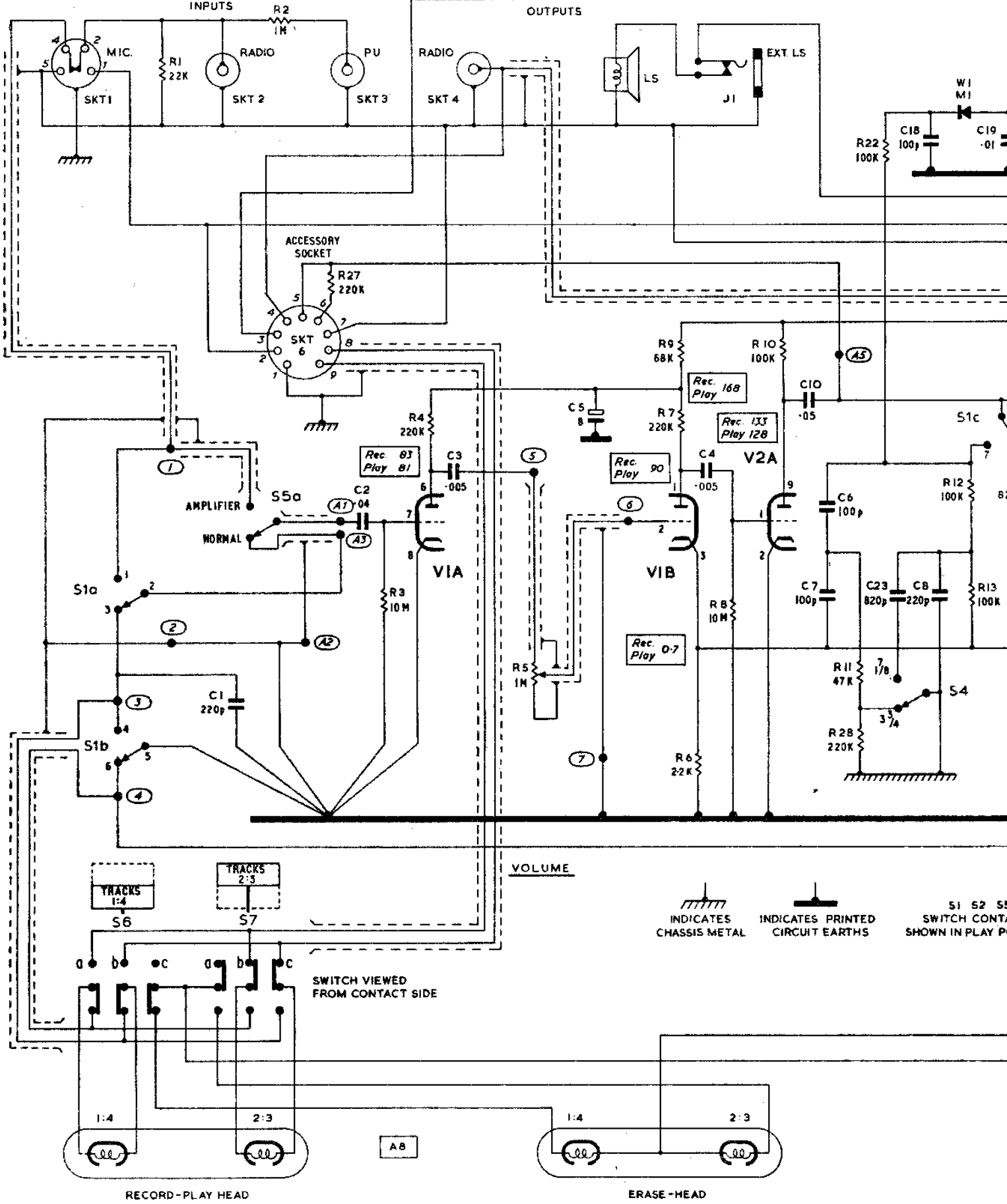


AF AMP

ECC 83

AF AMP

ECL 86  
AF AMP



INDICATES CHASSIS METAL  
INDICATES PRINTED CIRCUIT EARTHS  
SWITCH CONTACTS SHOWN IN PLAY POSITION

RECORD-PLAY HEAD

ERASE-HEAD

EM 87  
RECORD LEVEL INDICATOR

ECL 86  
AUDIO OUTPUT & BIAS OSC

