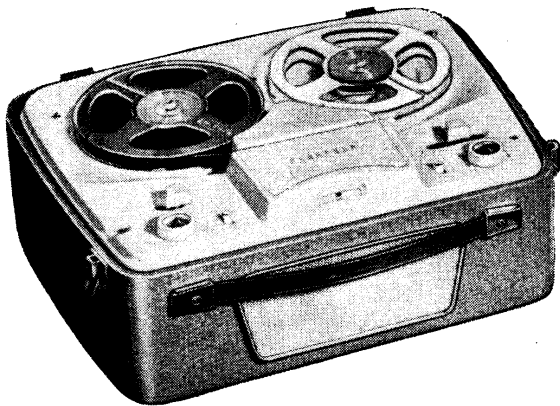


"TRADER" SERVICE SHEET  
**1529**

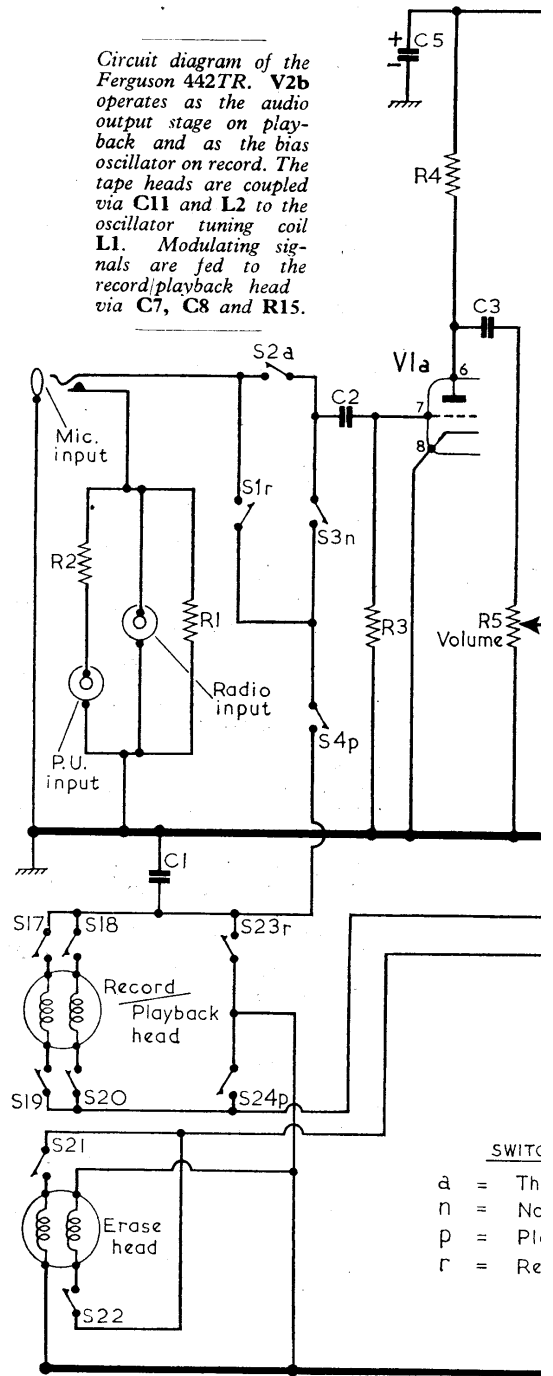
# FERGUSON 442TR

Four-Track Tape Recorder



Appearance of the Ferguson 442TR.

Circuit diagram of the Ferguson 442TR. V2b operates as the audio output stage on playback and as the bias oscillator on record. The tape heads are coupled via C11 and L2 to the oscillator tuning coil L1. Modulating signals are fed to the record/playback head via C7, C8 and R15.



**Resistors**

R1	22kΩ	†
R2	1MΩ	†
R3	10MΩ	A2
R4	220kΩ	A2
R5	1MΩ	A1
R6	220kΩ	A2
R7	2.2kΩ	A2
R8	10MΩ	B2
R9	4.7kΩ	C2
R10	100kΩ	B2
R11	220kΩ	A2
R12	220kΩ	A2
R13	220kΩ	A1
R14	22kΩ	B2
R15	150kΩ	B2
R16	1MΩ	D1
R17	10kΩ	B2
R18	100kΩ	B2
R19	270Ω	†
R20	1.8kΩ	C2
R21	390Ω	B2
R22	100kΩ	B2
R23	10MΩ	C2
R24	680kΩ	C1
R25	470Ω	C2
R26	200Ω	D2

**Capacitors**

C1	470pF	A1
C2	0.04μF	A2
C3	0.005μF	A2
C4	0.01μF	B2
C5	32μF	C2
C6	32μF	C2
C7	0.05μF	B2
C8	0.04μF	B2
C9	620pF	A2
C10	220pF	D1
C11	470pF	C2

C12	4,700pF	C2
C13	3,900pF	B2
C14	0.003μF	B2
C15	50μF	B2
C16	100pF	C2
C17	0.02μF	C2
C18	32μF	C2
C19	32μF	C2

**Coils\***

L1	12.0	B2
L2	7.3	B2
L3	3.0	—

**Transformers\***

T1	{ a 400 } C2
	{ b — } C2
T2	{ a 150 } D2
	{ b 85 } D2
	{ c — } D2

**Miscellaneous**

W1	M1	C2
W2	EC1	†
S1	—	—
S2, S3	—	—
S4, S5	—	—
S6, S7	—	—
S9-S12	—	—
S14	—	—
S23, S24	—	—
S8, S13	—	†
S15, S16	—	C1
S17-S22	—	—
S25, S26	—	D1

\*Approximate D.C. resistance in ohms.  
†Not visible on the chassis illustration.

**SWITCH**  
a = Th  
n = Nc  
p = Pl  
r = Re

TECHNICAL SPECIFICATIONS (As Supplied by the Manufacturer)

**Mains Supply.** 200-250 V 50 c/s. A.C.

**Power Consumption.** 60 watts.

**Magnetic Heads.** Standard quarter-track, two record/replay stacked; two erase (double gap) stacked.

**Frequency Range.** 50-10,000 c/s.

**Controls.** Combined volume control and recording level control. Mains on/off switch combined with a continuously variable tone control.

**Switching Facilities.** A record switch interlocking with the Record/Replay control

to prevent accidental erasure. Track selector switch. Straight-through amplifier switch.

**Tape Speed.** 3 1/2 in./sec.

**Record Level Indicator.**—Cathode-ray type peak indicator.

**Tape.** The recorder is supplied with a 5 1/2 in. reel of L.P. tape.

**Playing Time.** 3 in. reel, 16 minutes per track. 5 in. reel, 48 minutes per track. 5 1/2 in. reel, 66 minutes per track.

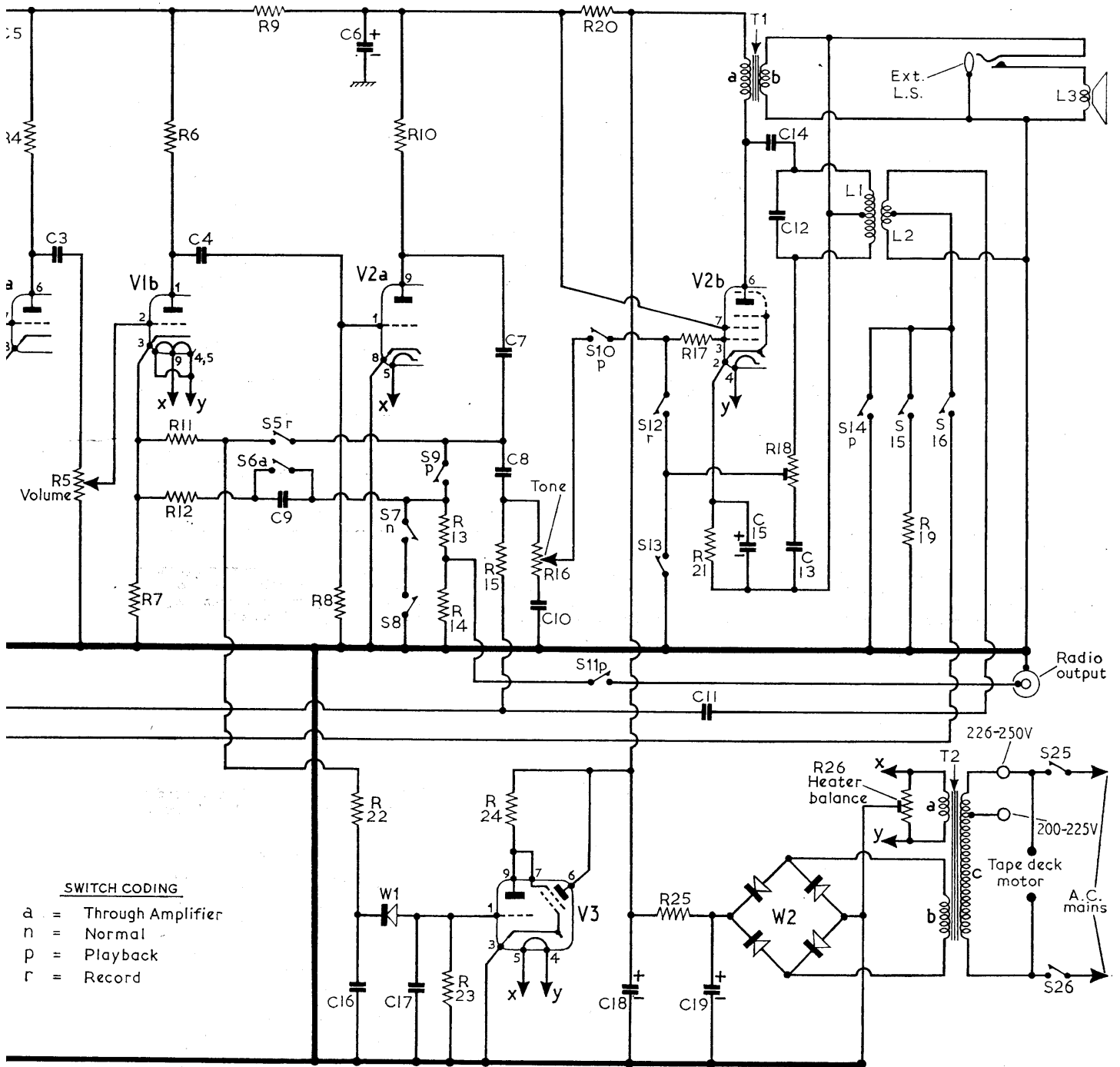
**Rewind Time.** Fast forward and fast rewind. 3 minutes for 5 1/2 in. reel of standard tape.

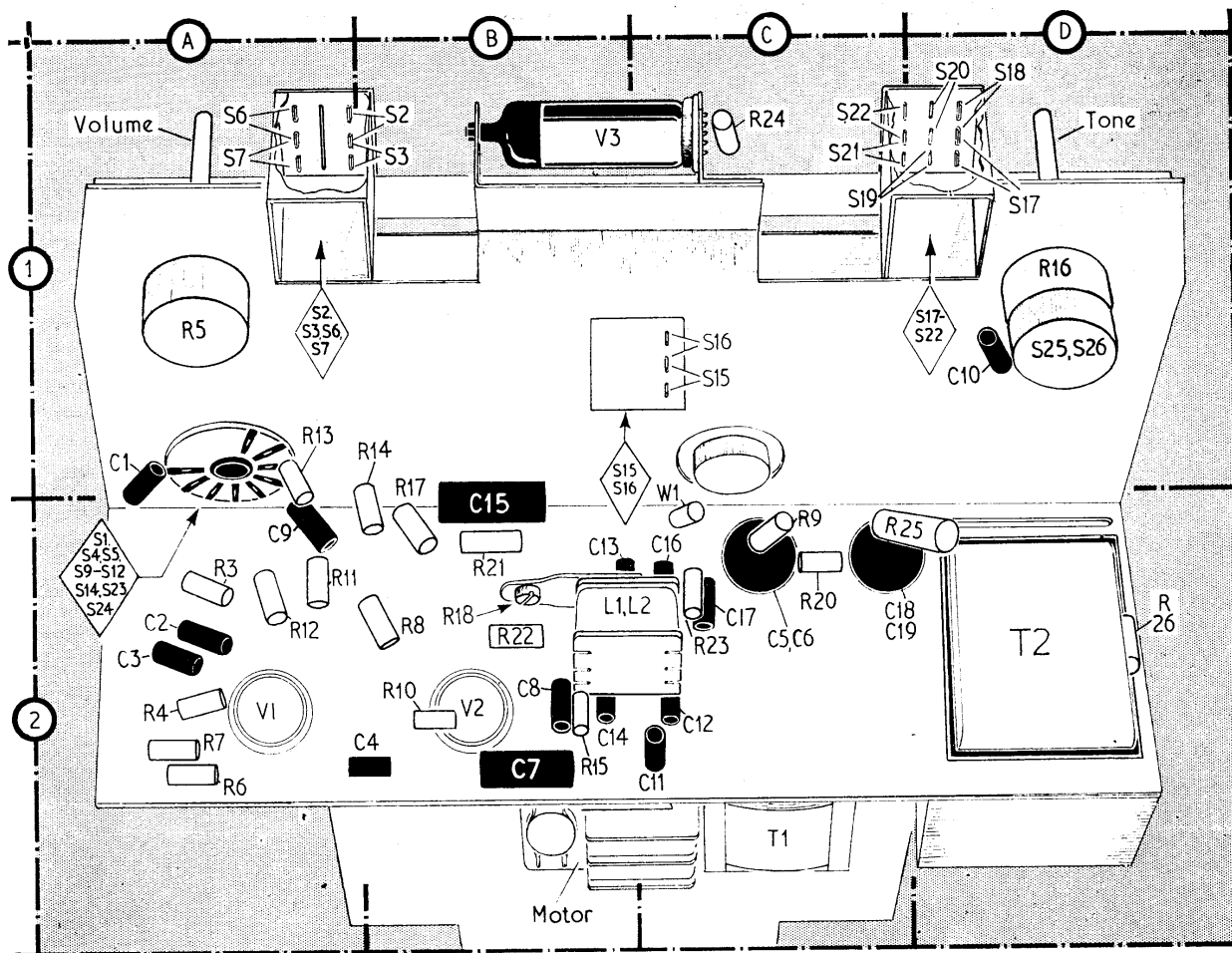
**Sockets.** Microphone input: 2mV into 10MΩ. Radio input: 2mV into 22kΩ. Pick-up input: 100mV into 1MΩ. Radio output: 500mV at 22kΩ. External loudspeaker: 2.5 W at 3Ω. Automatic muting of internal loudspeaker with external loudspeaker plug inserted.

**Loudspeaker.** 7 in. by 3 1/2 in. elliptical.

**Cabinet Dimensions.** 14 1/2 ins. wide by 12 1/2 ins. deep by 7 ins. high.

**Weight.** 17 pounds (including microphone, two tape reels etc.).





Underside view of the chassis as seen when the tape deck is lifted by its front edge. Superimpose switches S15 and S16 are not normally visible and have been drawn out of position. On normal recording, S16 is closed; S15 open. On superimpose the reverse action takes place. The individual wafers of the record/playback switch unit, shown in location reference A1, are drawn in col. 6 as they appear from the same angle as the arrowhead. All switch functions are explained under "Switches" in col. 4. V3 is the recording level indicator.

**F**ERGUSON 442TR is a four-track single speed (3½ inches per second) tape recorder designed to operate from 200-250V 50c/s A.C. mains supply. In addition to the normal record and replay operations it is equipped with facilities for superimposition and use as a straight-through amplifier.

Release date and original price: May 1961, £31 10s. Purchase tax extra.

**VALVE ANALYSIS**

Valve voltages given in the table, col. 2 were derived from information supplied by the manufacturer. They were measured on a 20,000Ω/V meter. The recorder switches were in the "Replay" and "Normal" positions.

**Valve Table**

Valve	Anode (V)	Screen (V)	Cathode (V)
V1a	ECC83 .. 89	—	—
V1b	ECC83 .. 115	—	0.98
V2a	ECL82 .. 94	—	—
V2b	ECL82 .. 218	215	16.5
V3	EM84 .. 37	—	—

H.T. voltage measured across C19 260V. Total H.T. current 45mA. Voltage across H.T. winding b of T2, 222V A.C.

**TAPE DECK**

Apart from its external appearance the tape deck, which is incorporated, is essentially the same as the B.S.R. type

TD2. Service to the TD2 is covered by "Trader" Service Sheet 1510, 5 August, 1961.

**CIRCUIT NOTES**

All switches which are operated by the Record/Replay and the Play Through/Normal controls have been coded on the circuit diagram with a suffix letter to indicate the position on which they are closed. The suffix letters are a, n, p, and r, where a means closed on "Play Through," n means closed on "Normal," p means closed on "Replay" and r means closed on "Record." The functions of the switches without code letters are described under "switches" (col. 4).

**Record.**—Input to the first stage V1a

is via **S1** and **S3**. Insertion of the microphone jack plug disconnects the radio and pick-up inputs. After three stages of amplification by **V1a**, **V1b** and **V2a** the signal is passed via **C7**, **C8** and **R15** to the record head. The output from **V2b** is also passed via **S5** and **R22** to rectifier **W1** and the rectified output biases the recording level indicator **V3**. Negative feedback on record is provided by **R11**.

**V2b** operates as a bias frequency oscillator. **S12** is closed and **L1** is connected as a parallel fed oscillator coil. Output amplitude is adjusted by pre-set control **R18**. Recording bias is fed to the record head from coupling coil **L2** via **C11** and the erase head receives the bias waveform via superimpose switch **S16** (closed on record).

**Replay.**—Record/Replay head is placed across the input to **V1a** by the closing of **S4** and **S24**. Output from **V2a** is fed via the tone control **R16** and **S10** to **V2b** which operates on replay as the output stage. **R18** is disconnected from the control grid rendering the oscillator inoperative and **L2** centre tap is short-circuited to chassis via **S14**. The output in **V2b** anode drives the loudspeaker **L3** via **T1**. Negative feedback on replay is provided by **C9** and **R12**.

#### SWITCHES

**S1**, **S4**, **S5**, **S9**, **S10**, **S11**, **S12**, **S14**, **S23** and **S24** are record/replay switches and are combined in a rotary two-way unit shown in location reference **A1**. **S17**-**S22** (**D1**) are the track selection switches. **S2**, **S3**, **S6** and **S7** are the playthrough/normal switches shown in **A1**.

When used as a "playthrough" amplifier the record/replay switch should be in the replay position. **S3** disconnects the record/replay head from **V1a** grid and **S2** brings the input sockets into circuit. **S6** short-circuits feedback capacitor **C9**, removing bass boost.

**Superimpose.**—On superimpose, **S16** removes the bias waveform from the erase head and **S15** connects a resistive load **R19** into circuit.

**Muting switches.**—During fast rewind and when the mechanism control is in the off position, **S8** and **S13** operate to mute the output. **S8** short-circuits the output from **V2a** anode and **S13** produces decaying oscillations from the bias oscillator to prevent magnetization of the erase head.

#### GENERAL NOTES

**Dismantling.**—Remove tape spools and any plug connections.

Lift off head cover.

Pull off four control knobs (Volume, tone, Record/Play and Mechanism control). Unscrew six top cover fixing screws (replace serial No. label when reassembling).

Lift off top cover.

Unscrew four chassis fixing screws and washers.

The chassis is now free to be removed

from the case. The loudspeaker leads are of sufficient length for most servicing requirements.

**Cleaning.**—Before attempting any cleaning maintenance the recorder must be disconnected from the mains supply.

Do not allow a screwdriver or anything made of iron or steel to come in contact with the recording heads. The working face of the magnetic heads, capstan and pinch wheel need occasional cleaning. Use a soft cloth, dampened with methylated spirit and place over a matchstick or wooden spill to clean tape guides as well as the record and erase heads. Do not use petrol or carbontetrachloride.

**Heater Balance.**—A humdinger **R26** is provided across the mains transformer heater winding. This has been set during manufacture and should not need altering. If adjustment does become necessary, the procedure given below must be carefully followed.

Whilst setting the adjustment the chassis must be electrostatically screened, particularly around **V1** and the input sockets. A shallow metal box, of suitable size and connected to the chassis metalwork, may be used.

Take off the tape spools and set the instrument to "record." Connect a sensitive valve voltmeter, between the junction **C8**, **R16** and chassis.

Short circuit **R18** to prevent the oscillator from functioning and plug in a dummy microphone connector consisting of a 1,000pF capacitor strapped across the plug.

Switch on and allow to warm up for 10 minutes.

Adjust **R26** for minimum reading on the valve voltmeter (approximately 80mV).

**Oscillator Level.**—Set instrument to "Record" and connect valve voltmeter across the top winding of erase head. Switch on and allow to warm up for 10 minutes. Select track "1-4" and adjust **R18** for a reading of 14 volts. Connect valve voltmeter to the lower winding of erase head and select track "2-3." If reading is less than 14 volts readjust **R18** for this figure.

**Head Adjustment.**—Two adjusting screws are provided on each head mounting to enable the heads to be accurately aligned. Do not over-tighten otherwise the head mounting might become distorted.

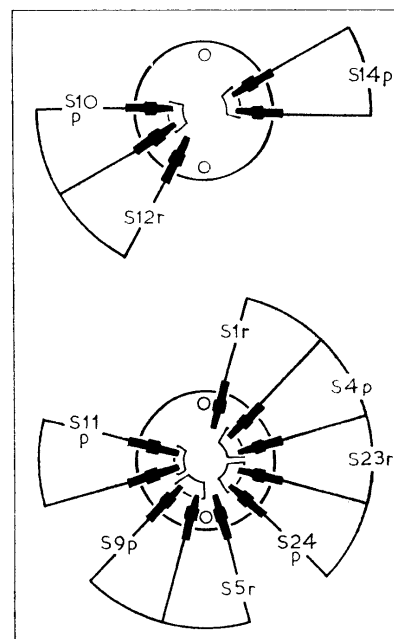
One of the screws on the record/replay head is fitted with a spring washer, adjust this screw so that the spring is lightly compressed, then align the head gap so that it is visually at right-angles to the tape motion. Select tracks "1-4" and replay a standard alignment tape. Adjust screw without spring washer for maximum output meter reading. Note setting of this screw (pencil mark on chassis). Select tracks "2-3" and adjust the screw for maximum output meter reading on alignment signal. Mark this setting and adjust screw to midway between the two marks, to obtain a compromise alignment for both tracks. To realign the erase head, ensure that the gaps are visually at right-angles to the

tape motion, and make final adjustments to obtain complete erasure on a previously recorded tape.

**Head Demagnetization.**—It is important that there is no residual magnetism in the magnetic heads or any other part in close proximity to the recording tape such as the capstan and tape guides.

If these become slightly magnetized in use, the background noise on the recordings will increase. Suitable instruments for providing a demagnetizing field are available from a number of manufacturers.

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



Record/Playback switch unit wafers as they appear when viewed from the same angle as the arrowhead in the chassis illustration. Suffix letters "p" and "r" indicate the positions in which the switches are closed.