

Ned. Ver. v. Historie v/d Radio

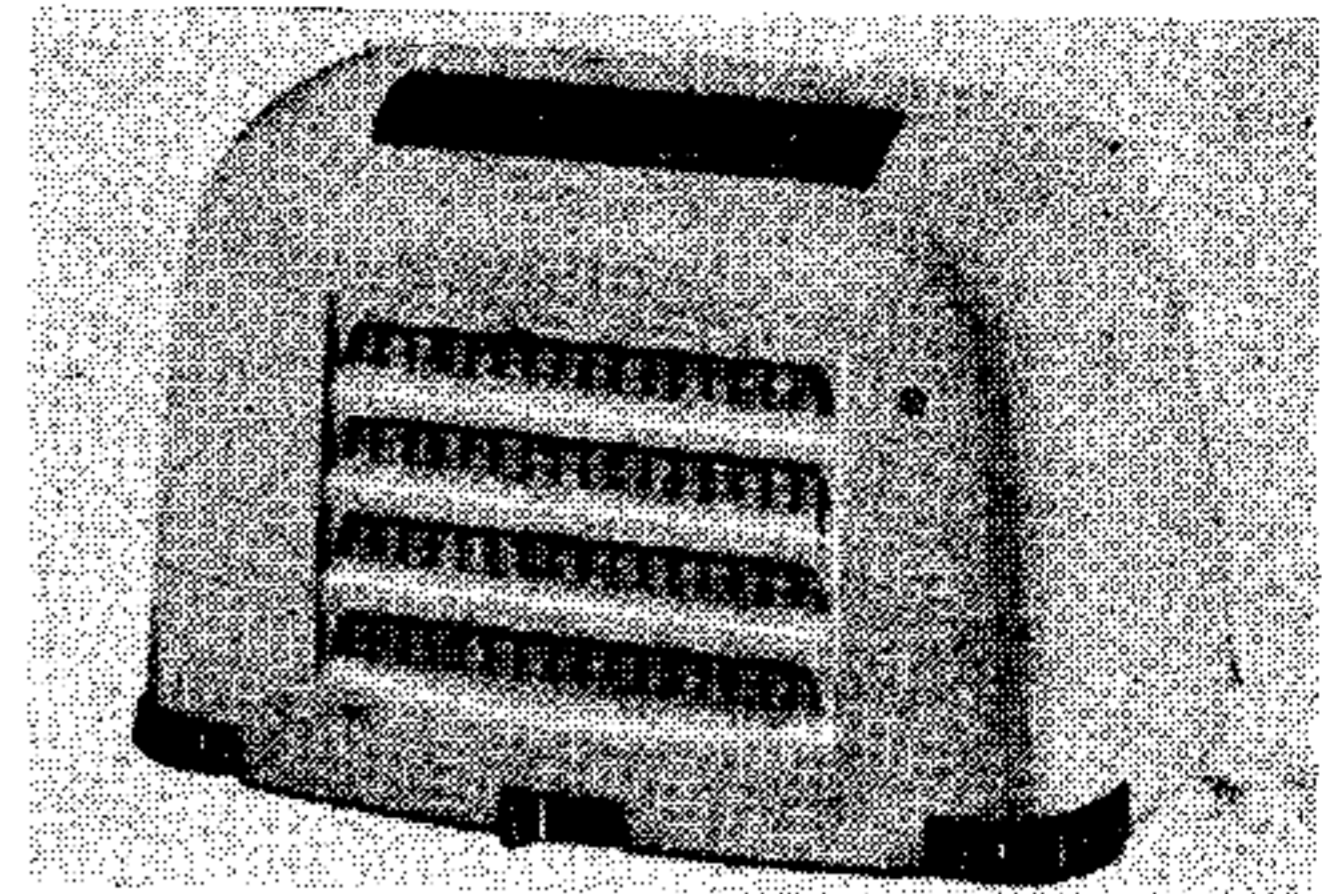


# K.-B. FB10FM

Transportable F.M. Receiver

## VALVE ANALYSIS

Valve voltages and currents in the table below are those measured in our receiver when it was operating from 230V mains. The normal/adaptor control was set to the "normal" position. Voltages were measured on Avo Electronic Test Meter, and as this is a high-resistance instrument, allowance must be made for the current drawn by other types of meter. Chassis was the negative connection.



Appearance of the K.-B. FB10FM.

**T**HE Kolster-Brandes FB10FM is a 4-valve (plus rectifier) A.C. transportable receiver for F.M. reception only. It can also be used as an F.M. adaptor. The frequency range is 88-100 Mc/s.

Release date and original price: September 1955, £10 16s 8d. Purchase tax extra.

## CIRCUIT DESCRIPTION

80Ω co-axial aerial input via fixed-tuned aerial coupling transformer L1, L2 to earthed-grid R.F. amplifier, section a of V1 (Brimar 12AT7). V1b operates as mixer/oscillator with tuned oscillator coil L5 and reaction coil L4. R.F. tuning by C8 and oscillator tuning by C14. An internal plate aerial is provided and can be connected to F.M. aerial socket A.

V1a output is coupled via C9, C10 to V1b grid circuit. Radiation of oscillator voltages from the R.F. and aerial circuits is kept to a minimum by C9, C10 and C11, which together with the inter-electrode capacitances of V1b form a bridge neutralizing circuit.

V2 (Brimar 6BJ6) operates as single-valve intermediate frequency amplifier with tuned transformer couplings L6, L7 and L8, L9.

### Intermediate frequency 10.7 Mc/s.

Diode sections a and b of triple diode triode valve (V3, Brimar EABC80) are connected in a ratio detector discriminator circuit. Audio frequency output of discriminator is developed across C19 and passed via volume control R8 and C20 to triode section c of V3, which operates as A.F. amplifier. Limiting is performed by the flywheel effect of D.C. reservoir C21.

Resistance-capacitance coupling by R11, C23 and R12 between V3c and pentode output valve V4 (Brimar EL84). Tone correction by C24, R13 in V4 anode circuit.

The receiver can be operated either on its own internal speaker or it can be used as an F.M. adaptor in conjunction with an A.M. receiver or an amplifier. When used with its own speaker, with the normal/adaptor switch control in the "normal" position, switches S1, S2 and S4 close.

In the "adaptor" position of the control switch S3 closes to connect a dummy load L11 in place of the speaker across winding c of output transformer T1. Negative feed-back tone correction is introduced by S2 which disconnects the cathode by-pass capacitor C25. The A.F. output of the tuner unit is taken from winding d on T1 to the pickup sockets of the A.M. receiver or amplifier.

## GENERAL NOTES

**Scale Lamp.**—This is a 6.5V, 0.3A lamp with a small clear tubular bulb and an M.E.S. base.

**Drive Cord Replacement.**—About 36in of nylon-braided glass yarn is required for a new drive. It should be run as indicated in the sketch of the tuning drive overleaf. In the sketch the drive is viewed from the rear left-hand corner of an upright chassis with the gang at maximum.

**Modifications.**—Earlier versions of the FB10FM differed in many respects from our sample receiver. All these differences are shown in the section of circuit at the foot of columns 1 and 2 overleaf. In these earlier models S3, S4

(Continued column 1 overleaf)

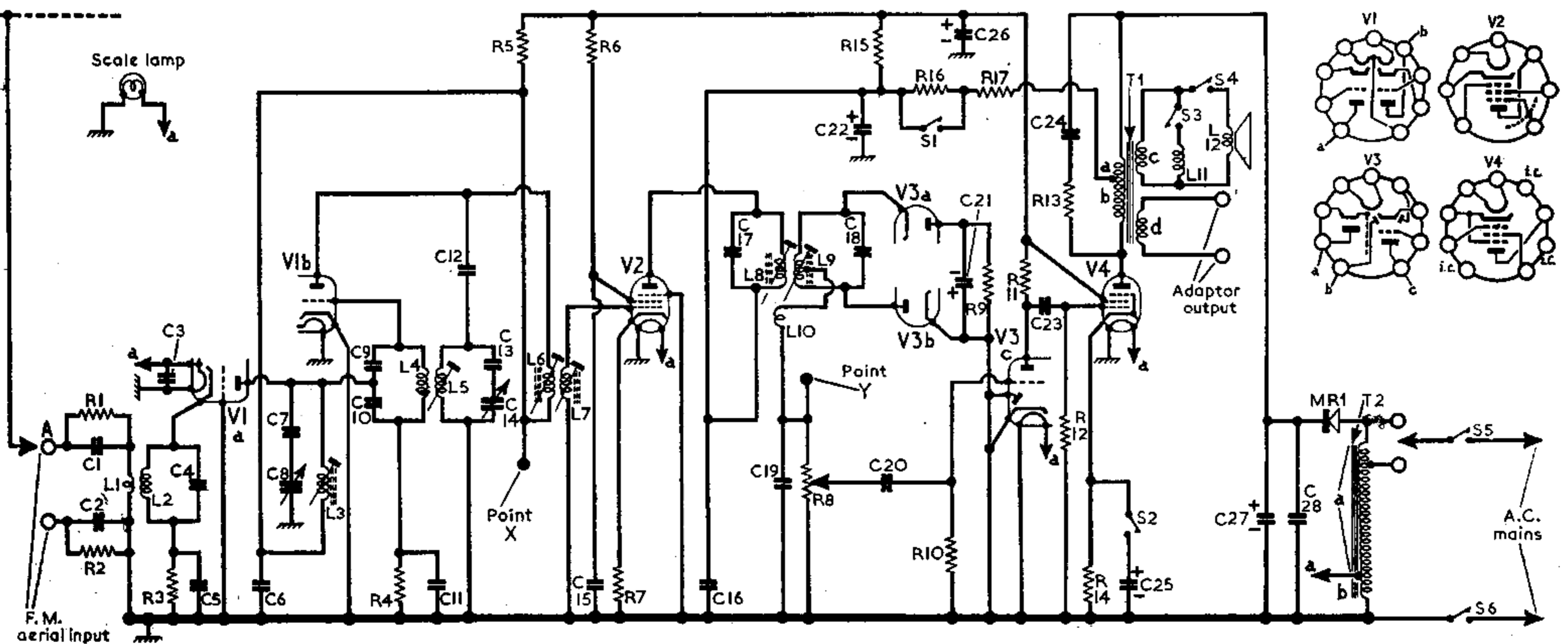
| Valve            | Anode |      | Screen |     | Cath.  |
|------------------|-------|------|--------|-----|--------|
|                  | V     | mA   | V      | mA  | V      |
| V1 12AT7 { a ... | 170   | 7.5  | —      | —   | 1.2    |
| { b ...          | 170   | 10.0 | —      | —   | —      |
| V2 6BJ6          | 225   | 7.5  | 86     | 2.6 | 0.7    |
| V3 EABC80 { a, b | —     | —    | —      | —   | —      |
| { c ...          | 60    | 0.4  | —      | —   | —      |
| V4* EL84         | 210   | 46.0 | 205    | 5.5 | 5.4    |
| MR1†             | —     | —    | —      | —   | —      |
| 18RA2N1151...    | 230‡  | —    | —      | —   | 240-0§ |

\*May be 6AM6. †Westinghouse (may be Brimar EZ80—see "Modifications" in "General Notes"). ‡A.C. reading. §Cathode current 75 mA.

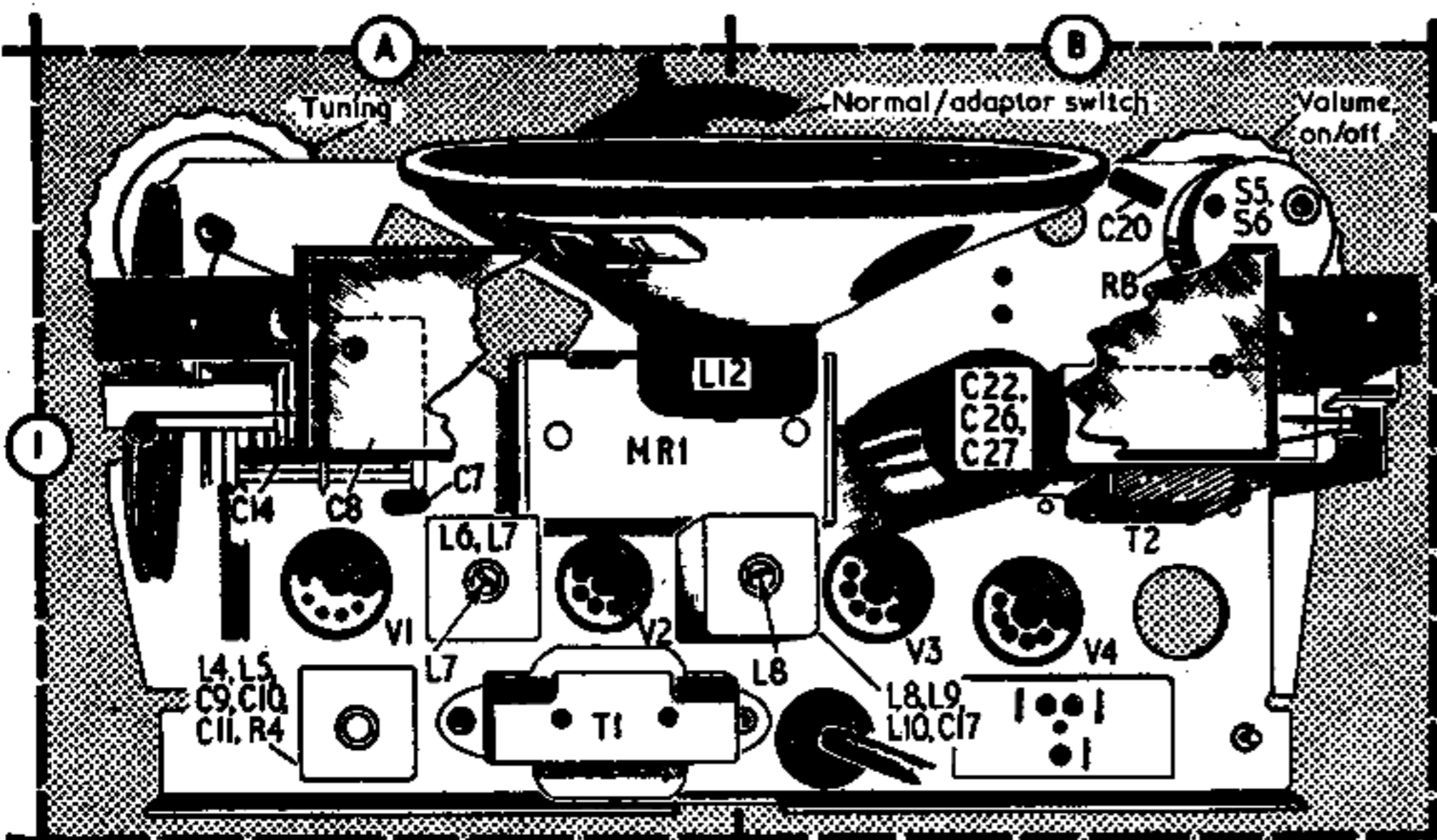
| Resistors |       | Capacitors |         | Coils† |     | Transformers† |  | Miscellaneous |   |
|-----------|-------|------------|---------|--------|-----|---------------|--|---------------|---|
| R1        | 470kΩ | C1         | 0.001μF | L1     | —   | T1            | { a 8.0 }<br>{ b 630.0 }<br>{ c — }<br>{ d 300.0 } | D2            | — |
| R2        | 470kΩ | C2         | 0.001μF | L2     | —   | T2            | { a 150.0 }<br>{ b 0.5 }                           | A1            | — |
| R3        | 150Ω  | C3         | 0.001μF | L3     | —   |               |  | A1            | — |
| R4        | 22kΩ  | C4         | 35pF    | L4     | —   |               |  | A1            | — |
| R5        | 2.2kΩ | C5         | 0.001μF | L5     | —   |               |  | A1            | — |
| R6        | 47kΩ  | C6         | 120pF   | L6     | 1.0 |               |  | A1            | — |
| R7        | 68Ω   | C7         | 50pF    | L7     | 1.0 |               |  | B1            | — |
| R8        | 500kΩ | C8         | —       | L8     | 1.0 |               |  | B1            | — |
| R9        | 39kΩ  | C9         | —       | L9     | 1.0 |               |  | B1            | — |
| R10       | 10MΩ  | C10        | —       | L10    | —   |               |  | B1            | — |
| R11       | 470kΩ | C11        | —       | L11    | —   |               |  | C2            | — |
| R12       | 1MΩ   | C12        | —       | L12    | 2.5 |               |  | A1            | — |
| R13       | 1kΩ   | C13        | —       |        |     |               |  |               |   |
| R14       | 100Ω  | C14        | —       |        |     |               |  |               |   |
| R15       | 1kΩ   | C15        | —       |        |     |               |  |               |   |
| R16       | 220Ω  | C16        | —       |        |     |               |  |               |   |
| R17       | 470Ω  | C17        | —       |        |     |               |  |               |   |
|           |       | C18        | —       |        |     |               |  |               |   |
|           |       | C19        | —       |        |     |               |  |               |   |
|           |       | C20        | —       |        |     |               |  |               |   |
|           |       | C21        | —       |        |     |               |  |               |   |
|           |       | C22        | —       |        |     |               |  |               |   |
|           |       | C23        | —       |        |     |               |  |               |   |
|           |       | C24        | —       |        |     |               |  |               |   |
|           |       | C25        | —       |        |     |               |  |               |   |
|           |       | C26        | —       |        |     |               |  |               |   |
|           |       | C27        | —       |        |     |               |  |               |   |
|           |       | C28        | —       |        |     |               |  |               |   |
|           |       |            |         |        |     |               |  |               |   |

\* Westinghouse

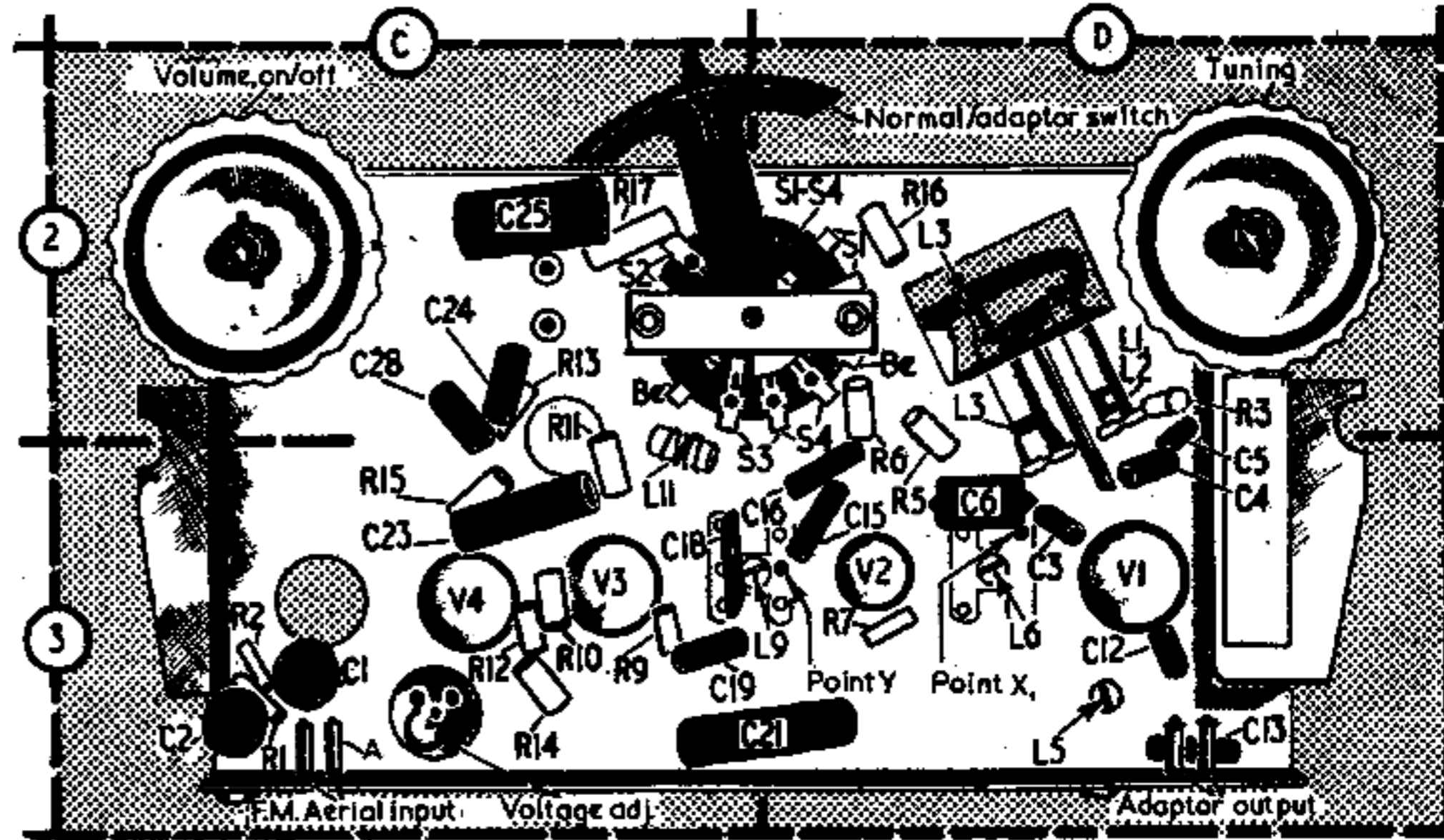
† Approximate D.C. resistance in ohms.



Circuit diagram of the K.-B. FB10FM. An additional section of circuit showing modifications in early models appears overleaf.



Plan view of chassis showing contact-cooled rectifier MR1 in A1.



Underside view of chassis. S1-S4 unit is identified in C2, D2.

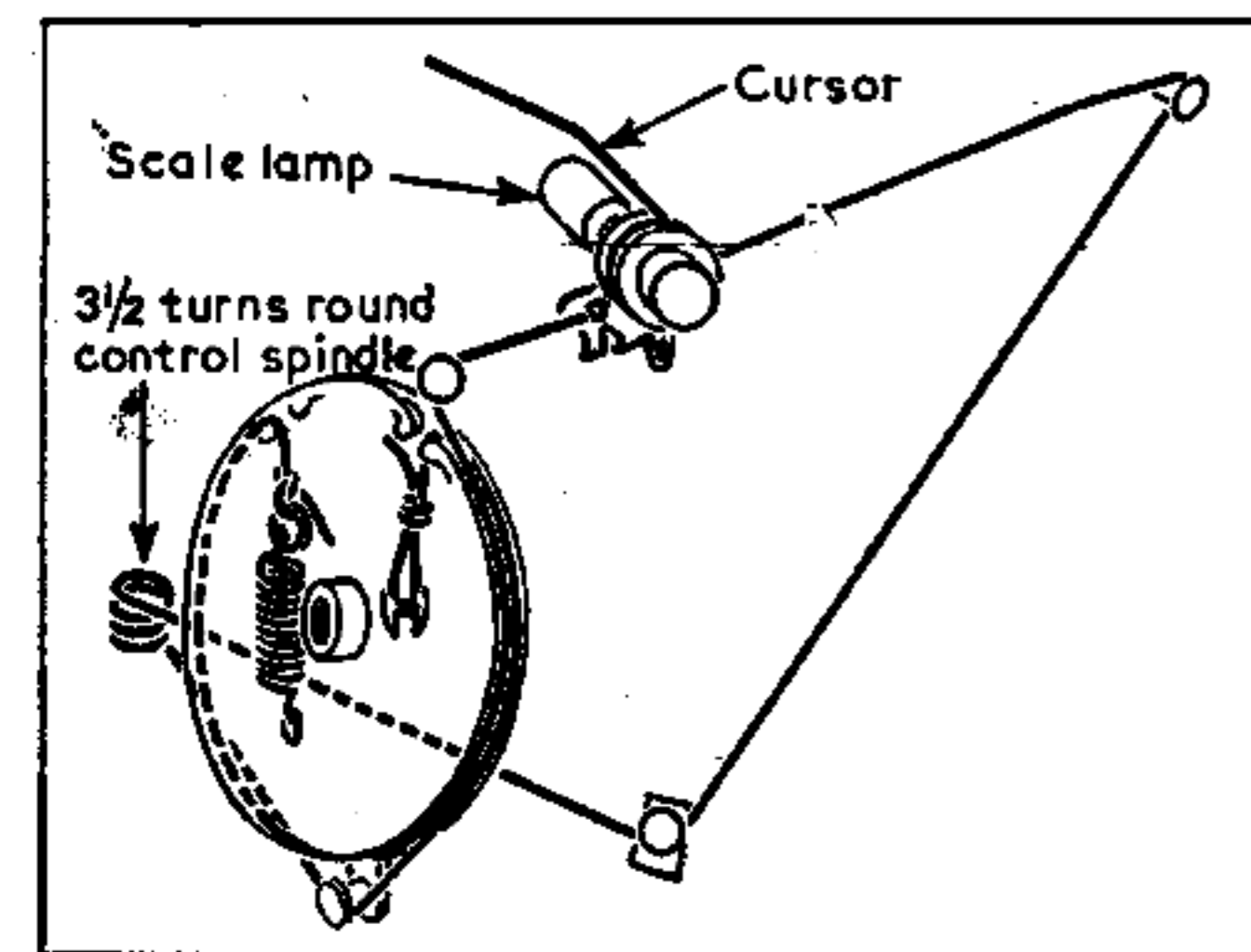
**General Notes—continued**

and S5 close in the "normal" position of the normal/adaptor switch, and S1, S2 close in the "adaptor" position.

**Adaptor Connections.**—When the receiver is used as an F.M. adaptor in conjunction with a radiogram, the following modifications can be made to avoid the necessity of switching between the pickup, the adaptor, and the radiogram input socket.

In receivers using high-impedance pickups, with or without a 1:1 isolating transformer, two 220kΩ resistors should be inserted in series with the pickup and adaptor leads as shown in figs. 1 and 2 at the foot of column 3.

Where a low-impedance pickup and a step-up matching transformer are used, two 220kΩ resistors and an 0.001μF capacitor should be connected in circuit as indicated in fig. 3.



Sketch of tuning drive system, seen from rear with gang at maximum capacitance.

**CIRCUIT ALIGNMENT**

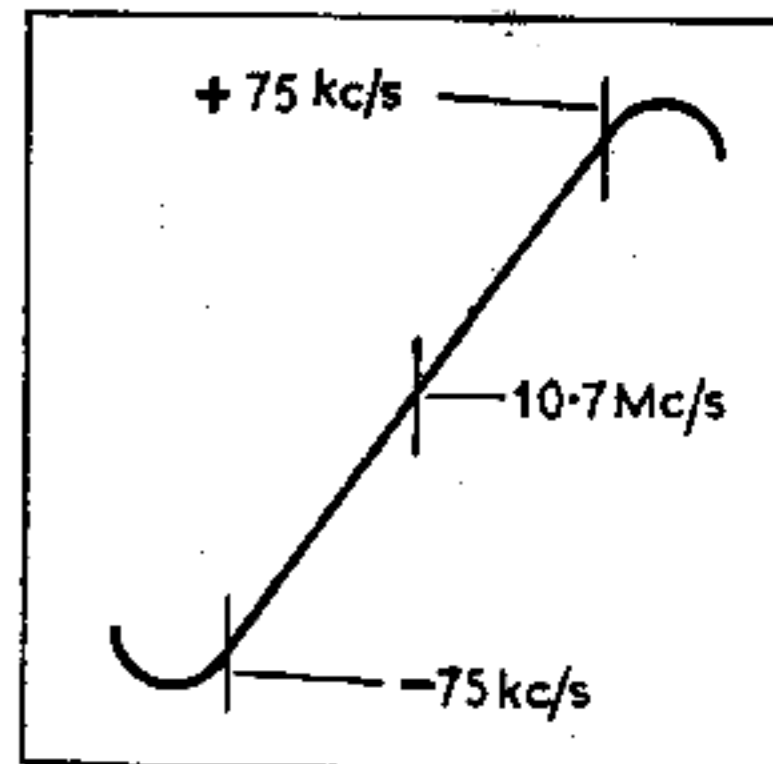
**Equipment Required.**—An F.M. signal generator covering 10.7 Mc/s and 85-100 Mc/s, with a deviation of at least ±150 kc/s; an 0-10V high-resistance D.C. voltmeter; an 0-250μA microammeter; a power output meter; an oscilloscope; two accurately matched 47kΩ resistors.

**I.F. Stages**

- 1.—Set the normal/adaptor switch for "normal" operation, and connect D.C. voltmeter across C21 (location reference D3) taking the positive meter connection to chassis.
- 2.—Connect output of signal generator to control grid (pin 1) of V2 and chassis. Screw out the cores of L9 (C3), L7 (A1) and L6 (D3) until they are half-way out of their coil formers.
- 3.—Feed in an unmodulated 10.7 Mc/s signal and adjust the core of L8 (B1) for maximum reading on meter.
- 4.—Transfer live signal generator lead via an 0.001μF capacitor, to junction of R5, L6 (point X in D3).
- 5.—Feeding in an unmodulated 10.7 Mc/s signal, adjust the cores of L6 (D3) and L7 (A1) in that order for maximum reading on meter.
- 6.—Transfer live signal generator lead, with 0.001μF capacitor, to pin 3 of V1, and re-adjust the cores of L8, L6 and L7 in that order for maximum reading on meter.
- 7.—Re-connect live signal generator lead, via 0.001μF capacitor, to point X. Connect the two accurately matched 47kΩ resistors in series across C21 in place of D.C. voltmeter. Connect microammeter between junction of these resistors and point Y (D3).
- 8.—Feeding in an unmodulated 10.7 Mc/s signal, adjust the core of L9 (C3) for zero reading on microammeter. This will occur mid-way between a negative-going and a positive-going deflection. Disconnect meter and resistors.
- 9.—Connect Y amplifier terminals on oscillo-

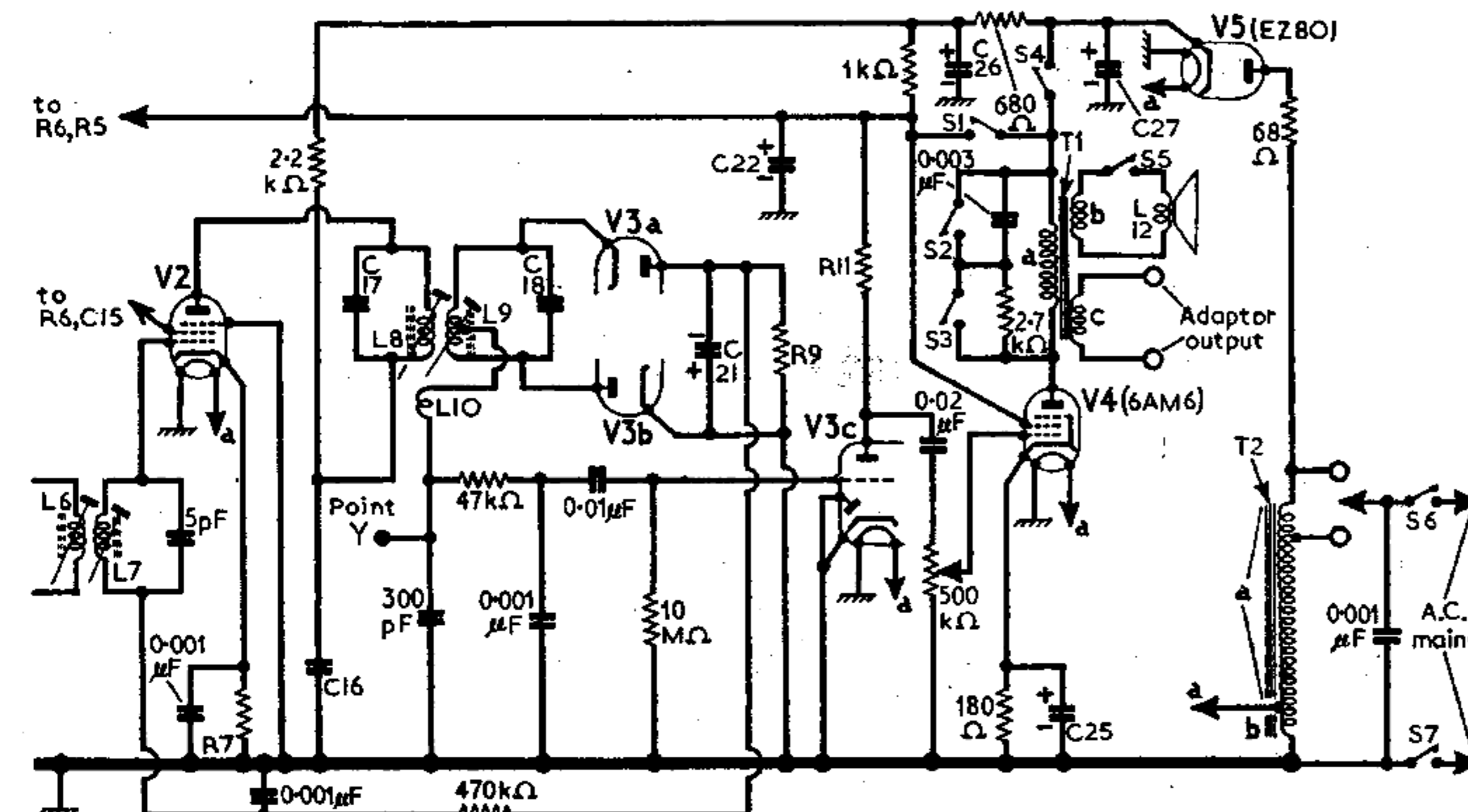
scope between point Y (D3) and chassis. Connect sweep output from signal generator to X plates on oscilloscope. Feed in a 10.7 Mc/s signal, deviated by ±150 kc/s, to point X and check that the response curve is similar to that shown in the diagram below. A slight adjustment to the core of L9 may be necessary to obtain optimum linearity.

I.F. response curve obtained in operation 9 of circuit alignment instructions.

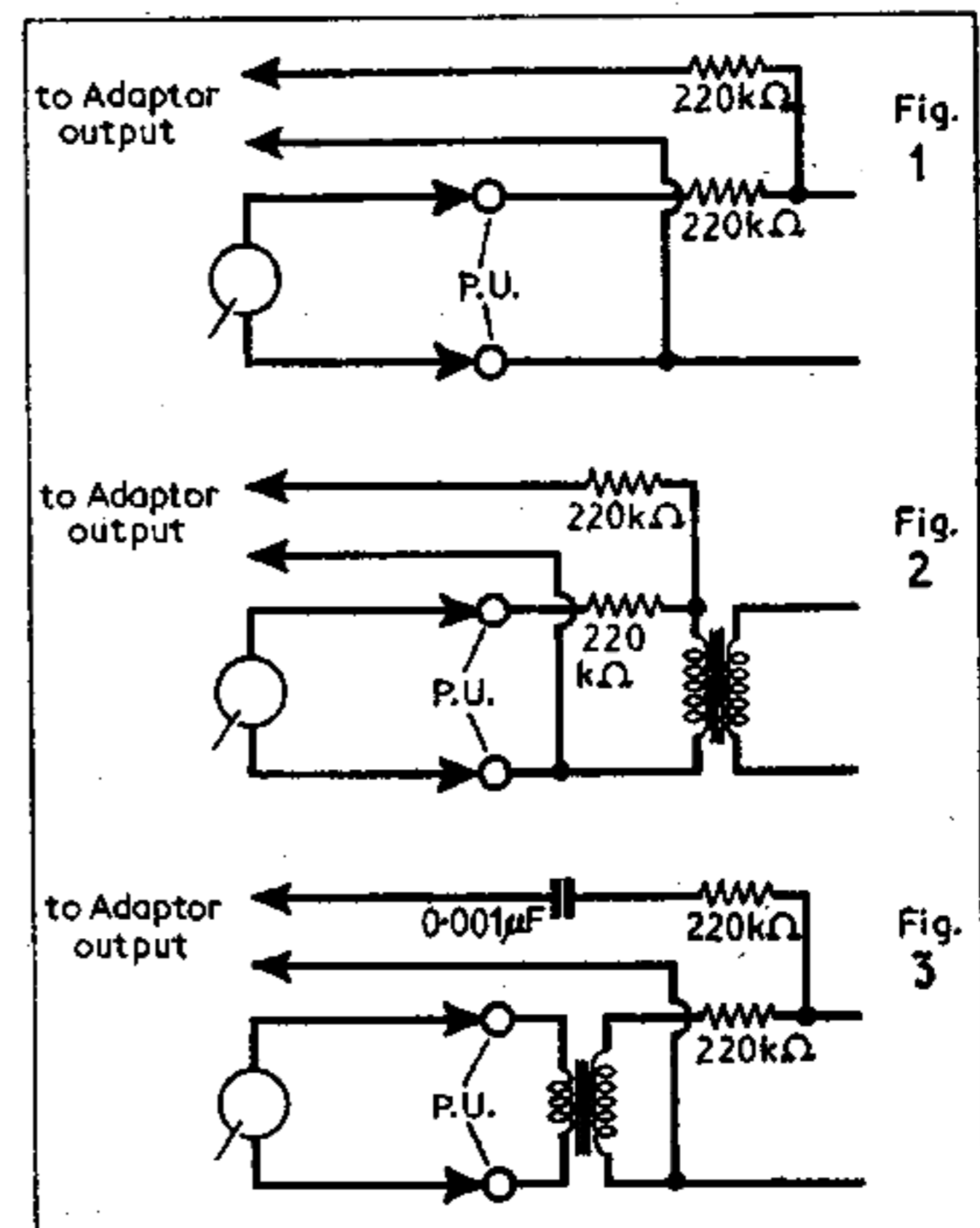


**R.F. and Oscillator Stages**

- 10.—Connect signal generator output to aerial sockets (C3). Connect D.C. voltmeter across C21 (D3) taking positive meter connection to chassis. Check that with gang at maximum capacitance, the cursor coincides with the calibration mark at the right-hand lower edge (viewed from front of chassis) of the scale backing plate.
- 11.—Tune receiver to 93 Mc/s calibration mark at centre of scale backing plate. Feed in an unmodulated 93 Mc/s signal and adjust the cores of L5 (D8) and L3 (D2) in that order for maximum reading on voltmeter. Repeat L5 core adjustment.



Section of circuit diagram showing modifications in early models.



Sketches showing adaptor connections as explained in "General Notes"