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G.E.C. RADIO SERVICE,
CHURCHILL ROAD,
BRISTOL 6.

"TRADER" SERVICE SHEET

1077

BC5839

and BC9835 Autoradiogram

PROVIDED with six switch control positions for radio reception, three for the normal 3-band tuning and three for pre-set stations, the G.E.C. BC5839 is a 4-valve (plus rectifier) superhet designed to operate from A.C. mains of 190-250 V, 40-100 c/s. The waveband ranges are 16.5-50 m, 187-575 m and 1,000-2,000 m. The BC5839L employs an identical chassis, but the mains transformer primary is tapped for 110-130 and 210-230 V.

The BC9835 is an autoradiogram with a 3-speed motor and two interchangeable pick-up heads. It employs a modified BC5839 chassis, push-pull output and twin speakers, and the differences between the two are fully explained here, but this *Service Sheet* was actually prepared from a BC5839.

Release dates and original prices: BC5839 and BC5839L, April 1952, £24 5s 4d, reduced January 1953 to £20 11s 10d; BC9835, September 1952, £94 17s 4d. Purchase tax extra.

CIRCUIT DESCRIPTION

Aerial input via C2, L2 (S.W.), or by bottom capacitance coupling via C1 (M.W. and L.W.) to single-tuned circuits comprising coils L3 (S.W.), L4 (M.W.) and L5 (L.W.) tuned manually by C36. On these three manually tuned ranges S7 is closed to connect C36.

Three further positions on the main switch control provide a choice of three pre-tuned M.W. stations. In these positions S7 opens and S8 closes to connect the fixed tuning capacitor C4 across the circuit, and station-setting is performed by adjustment of the pre-set cores of

L6, L7 and L8. Aerial coupling in these circuits is via C1.

In areas of good signal strength a frame aerial L1 housed in the receiver casing may be plugged into the aerial and earth sockets in place of the external aerial leads, when it operates on all positions of the switch control.

First valve (V1, Osram X79) is a triode hexode operating as frequency changer with internal coupling. Oscillator grid coils L12 (S.W.), L13 (M.W.) and L14 (L.W.) are tuned manually by C37, which is connected via S22. Parallel trimming by C39 (S.W.), C38 (M.W.) and C12 (L.W.); series tracking by C13 (S.W.), C16 (M.W.) and C14, C16 (L.W.). Reaction coupling via L15 (S.W.), and across the common impedance of C16 (M.W. and L.W.). Oscillator stabilization by R7.

For pre-set station operation S22 opens and S21 closes, substituting fixed tuning capacitor C11 in place of C37. Reaction coupling is across C16, and tuning by L9, L10 and L11 whose cores can be adjusted to receive the desired stations.

Second valve (V2, Osram W77) is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings C7, L16, L17, C8 and C18, L18, L19, C19. Intermediate frequency 470 kc/s.

Diode signal detector is part of double diode triode valve (V3, Osram DH77). A.F. component in rectified output is developed across diode load R14 and passed via C22 and volume control R15 to grid of triode section which operates as A.F. amplifier. On S.W. S31 opens and S30 closes, and bass cutting capacitor C23 is inserted in the A.F. coupling to R15.

Provision is made for the connection of a gramophone pick-up across R15 via S32 which

closes in the gram. position of the waveband switch. In this position S30 and S31 open to prevent radio break-through.

Second diode of V3 is fed via C24 from V2 anode, and the resulting D.C. potential developed across R19 is fed back as bias to V1 and V2, giving automatic gain control.

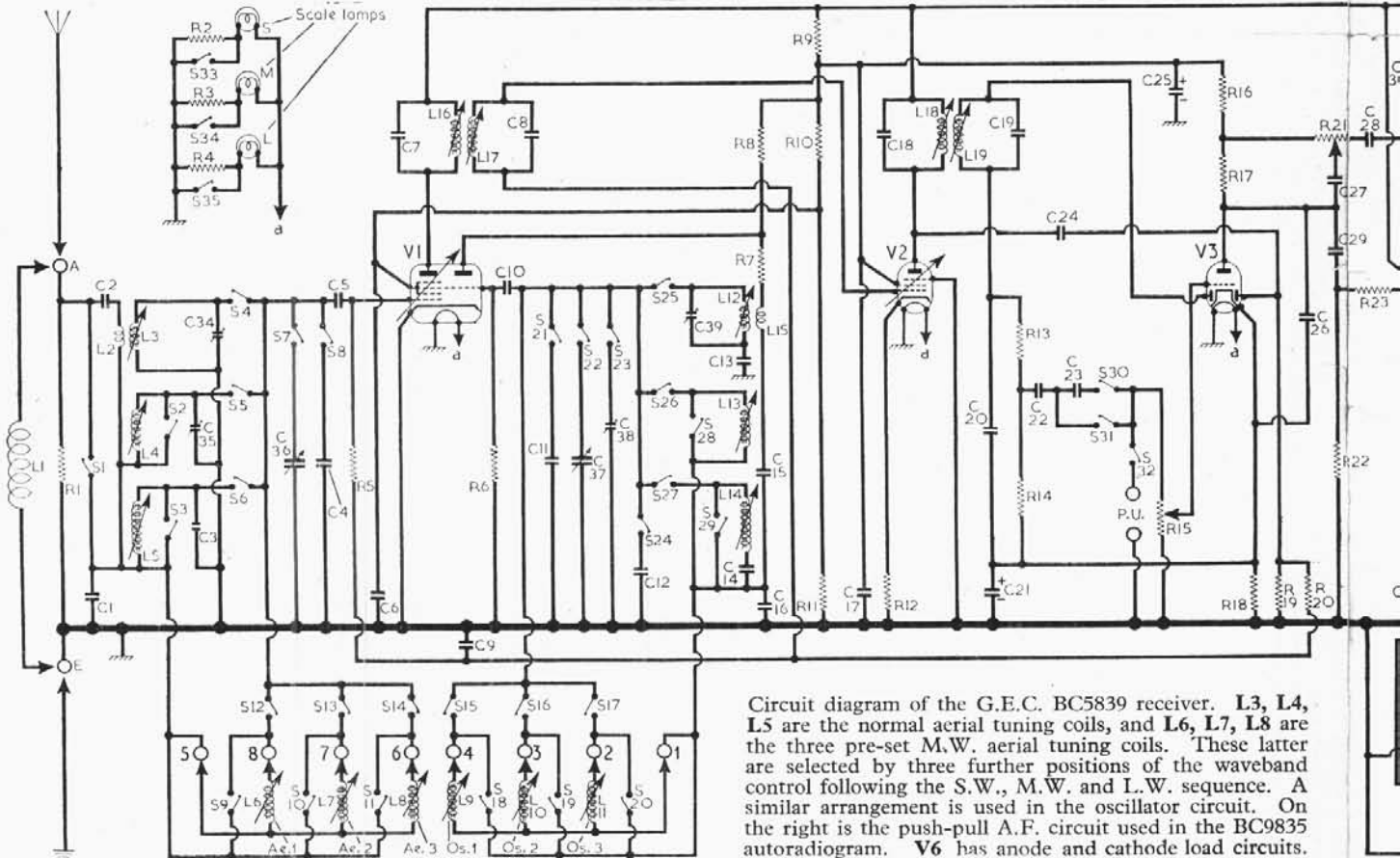
Resistance-capacitance coupling by R16, R17, C29 and R22 between V3 triode and pentode output valve (V4, Osram N78). Fixed tone correction by C30 in V4 anode circuit, and variable tone control by R21 in negative feed-back circuit C28, R21, C27, between V4 and V3 anode. Provision is made for the connection of a low impedance external speaker across T1 secondary winding.

H.T. current is supplied by I.H.C. full-wave rectifying valve (V5, Osram U78). Smoothing by iron-cored choke L21 and electrolytic capacitors C32, C33. In "L" versions, mains voltage adjustment tappings are provided at 115 V, 125 V and 220 V on the mains transformer primary, instead of at 200 V, 230 V and 250 V as in the standard version.

The scale lamps light dimly in all positions of the waveband control, except that on S.W., M.W. or L.W. manual tuning positions the appropriate lamp lights brightly.

In the radiogram model, whose audio frequency circuit is shown as a separate section on the right of our main circuit diagram, treble and bass controls R26, R27 respectively, together with their associated circuits, are inserted between S30, S31 and the manual volume control R15.

V3 output is coupled to a phase-splitter (V6, Osram DH77), whose output is developed across



Circuit diagram of the G.E.C. BC5839 receiver. L3, L4, L5 are the normal aerial tuning coils, and L6, L7, L8 are the three pre-set M.W. aerial tuning coils. These latter are selected by three further positions of the waveband control following the S.W., M.W. and L.W. sequence. A similar arrangement is used in the oscillator circuit. On the right is the push-pull A.F. circuit used in the BC9835 autoradiogram. V6 has anode and cathode load circuits.

COMPONENT VALUES AND LOCATIONS

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| CAPACITORS | | | CAPACITORS (continued) | | | | |
|------------|--------------------------|-----------|------------------------|--------|------------------------|---------|----|
| | Values | Locations | | Values | Locations | | |
| C1 | Aerial coupling ... | 3,950pF | F4 | C34† | S.W. aerial trim. ... | — | F5 |
| C2 | | 0.001μF | F5 | C35† | M.W. aerial trim. ... | — | E5 |
| C3 | | 82pF | F4 | C36† | Aerial tuning ... | — | D1 |
| C4 | | 200pF | F4 | C37† | Oscillator tuning ... | — | D2 |
| C5 | V1 C.G. ... | 100pF | G5 | C38† | M.W. osc. trim. ... | — | E5 |
| C6 | V1 S.G. decoupling | 0.05μF | E5 | C39† | S.W. osc. trim. ... | — | E5 |
| C7 | 1st I.F. trans. tun. ... | 120pF | D2 | C40 | P.U. tone corrector | 500pF | — |
| C8 | | 120pF | D2 | C41 | Part tone controls | 0.001μF | — |
| C9 | A.G.C. decoupling | 0.05μF | E5 | C42 | H.T. by-pass ... | 0.005μF | — |
| C10 | V1 osc. C.G. ... | 100pF | E5 | C43 | A.F. coupling ... | 0.25μF | — |
| C11 | Pre-set osc. tune ... | 470pF | E3 | C44 | V7, V8 cath. by-passes | 50μF | — |
| C12 | L.W. osc. trim. ... | 120pF | E4 | C45 | — | 50μF | — |
| C13 | S.W. osc. tracker ... | 0.006μF | E4 | C46* | — | — | — |
| C14 | L.W. osc. tracker ... | 270pF | E4 | C47* | — | — | — |
| C15 | Reaction coupling | 0.005μF | E4 | | | | |
| C16 | M.W. osc. tracker ... | 410pF | E4 | | | | |
| C17 | V2 S.G. decoupling | 0.05μF | F5 | | | | |
| C18 | 2nd I.F. trans. tun. ... | 120pF | C2 | | | | |
| C19 | | 120pF | C2 | | | | |
| C20 | I.F. by-pass ... | 100pF | F5 | | | | |
| C21* | V3 cath. by-pass ... | 25μF | G4 | | | | |
| C22 | A.F. coupling ... | 0.05μF | F4 | | | | |
| C23 | S.W. bass cut ... | 80-001μF | E3 | | | | |
| C24 | A.G.C. coupling ... | 22pF | F5 | | | | |
| C25* | H.T. smoothing ... | 4μF | F4 | | | | |
| C26 | I.F. by-pass ... | 500pF | G5 | | | | |
| C27 | Part tone control ... | 500pF | G5 | | | | |
| C28 | | 0.005μF | B1 | | | | |
| C29 | A.F. coupling ... | 0.05μF | G4 | | | | |
| C30 | Tone corrector ... | 0.002μF | B1 | | | | |
| C31* | V4 cath. by-pass ... | 100μF | G4 | | | | |
| C32* | H.T. smoothing ... | 16μF | C2 | | | | |
| C33* | | 32μF | C2 | | | | |



The G.E.C. table model BC5839.

* Electrolytic. † Variable. ‡ Pre-set.

| RESISTORS | | |
|-----------|------------------------------|-----------|
| | Values | Locations |
| R1 | Mod. hum shunt ... | 10kΩ E5 |
| R2 | Scale lamp dimming resistors | 7.5Ω F3 |
| R3 | | 7.5Ω F3 |
| R4 | 7.5Ω | F3 |
| R5 | V1 C.G. ... | 1MΩ E5 |
| R6 | V1 osc. C.G. ... | 100kΩ E5 |
| R7 | Osc. stabilizer ... | 470Ω E5 |
| R8 | Osc. anode feed ... | 15kΩ E5 |

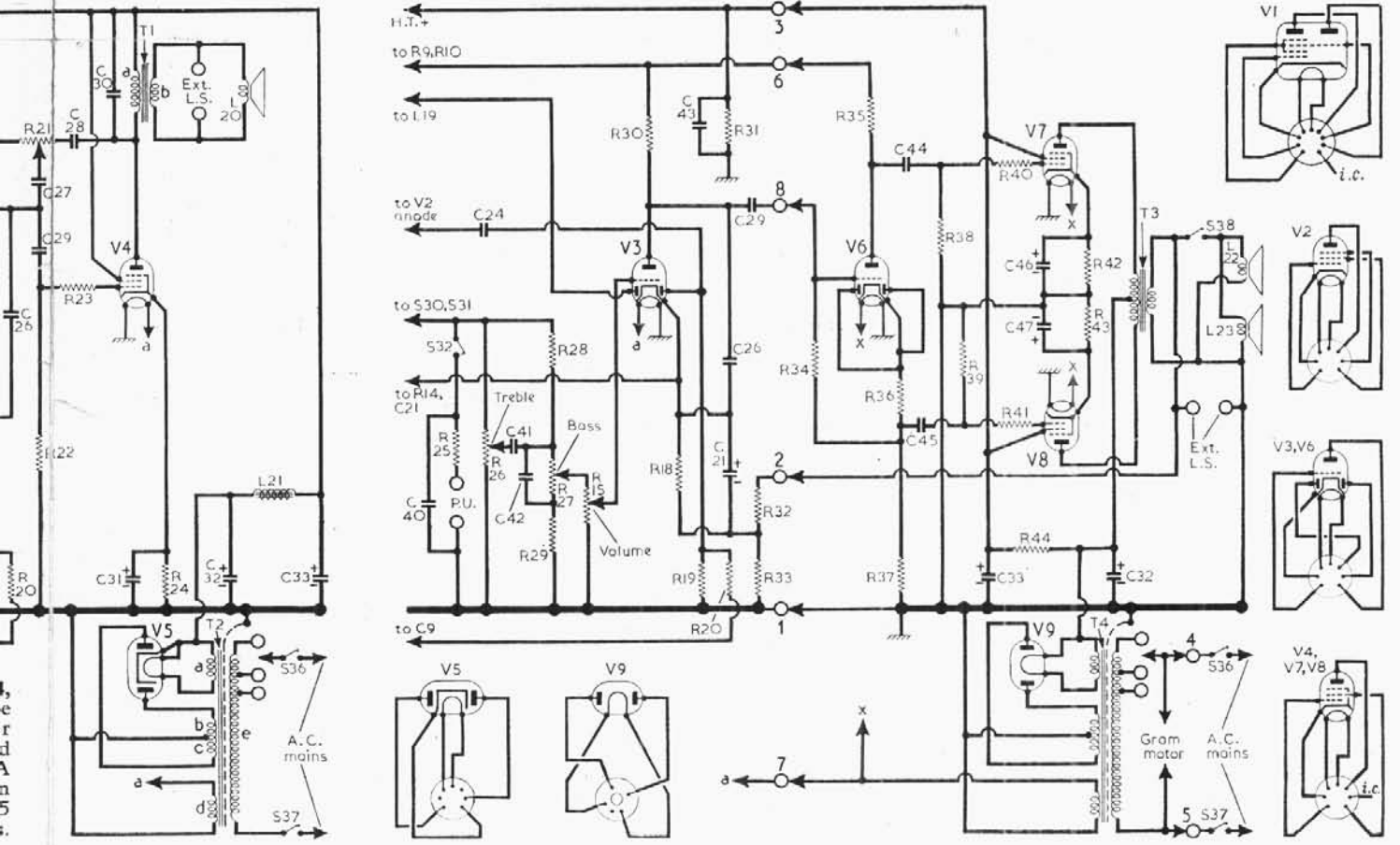
| RESISTORS (continued) | | |
|-----------------------|------------------------|-----------|
| | Values | Locations |
| R9 | H.T. potential divider | *8.2kΩ F5 |
| R10 | — | 56kΩ F4 |
| R11 | | 22kΩ F4 |
| R12 | V2 G.B. ... | 270Ω F5 |
| R13 | I.F. stopper ... | 50kΩ F5 |
| R14 | Diode load ... | †470kΩ F5 |
| R15 | Volume control ... | 1MΩ G3 |
| R16 | V3 anode load ... | 100kΩ G5 |
| R17 | | 100kΩ G5 |
| R18 | V3 G.B. ... | 2.2kΩ G5 |
| R19 | A.G.C. diode load ... | 470kΩ G5 |
| R20 | A.G.C. decoupling | 1MΩ G5 |
| R21 | Tone control ... | 500kΩ G3 |
| R22 | V4 C.G. ... | 270kΩ G5 |
| R23 | V4 C.G. stopper ... | 10kΩ G4 |
| R24 | V4 G.B. ... | 120Ω G3 |

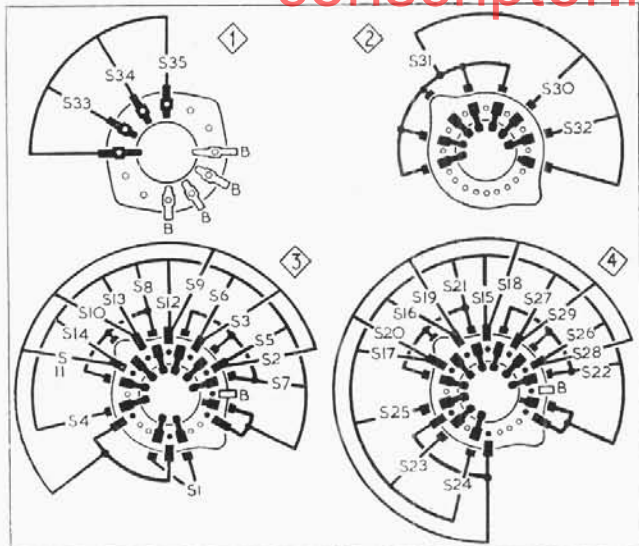
* Electrolytic. § 0.005μF in gram. model.

R35 and R37 and is fed to a push-pull output stage comprising two pentode valves (V7, V8, Osram N78's). The speech coil voltages developed across T3 secondary are tapped off via the potential divider R32, R33 and fed back to V3 cathode circuit, giving tone correction.

A tone-filter network R25, C40 is added to the pick-up input circuit. H.T. current in the radiogram model is supplied by full-wave rectifying valve (V9, Osram U50). Smoothing by R44 and electrolytic capacitors C32 and C33.

* 10kΩ in gram models. † 100kΩ in gram models.





Diagrams of the waveband switch units, drawn as seen when viewed in the directions of the arrows in the underside chassis illustration opposite. On the right is the associated switch table.

| Switch | Gram | S.W. | M.W. | L.W. | 1 | 2 | 3 |
|--------|------|------|------|------|---|---|---|
| S1 | — | — | — | — | — | — | — |
| S2 | — | — | — | — | — | — | — |
| S3 | — | — | — | — | — | — | — |
| S4 | — | — | — | — | — | — | — |
| S5 | — | — | — | — | — | — | — |
| S6 | — | — | — | — | — | — | — |
| S7 | — | — | — | — | — | — | — |
| S8 | — | — | — | — | — | — | — |
| S9 | — | — | — | — | — | — | — |
| S10 | — | — | — | — | — | — | — |
| S11 | — | — | — | — | — | — | — |
| S12 | — | — | — | — | — | — | — |
| S13 | — | — | — | — | — | — | — |
| S14 | — | — | — | — | — | — | — |
| S15 | — | — | — | — | — | — | — |
| S16 | — | — | — | — | — | — | — |
| S17 | — | — | — | — | — | — | — |
| S18 | — | — | — | — | — | — | — |
| S19 | — | — | — | — | — | — | — |
| S20 | — | — | — | — | — | — | — |
| S21 | — | — | — | — | — | — | — |
| S22 | — | — | — | — | — | — | — |
| S23 | — | — | — | — | — | — | — |
| S24 | — | — | — | — | — | — | — |
| S25 | — | — | — | — | — | — | — |
| S26 | — | — | — | — | — | — | — |
| S27 | — | — | — | — | — | — | — |
| S28 | — | — | — | — | — | — | — |
| S29 | — | — | — | — | — | — | — |
| S30 | — | — | — | — | — | — | — |
| S31 | — | — | — | — | — | — | — |
| S32 | — | — | — | — | — | — | — |
| S33 | — | — | — | — | — | — | — |
| S34 | — | — | — | — | — | — | — |
| S35 | — | — | — | — | — | — | — |

GENERAL NOTES

Switches.—S1-S29 are the waveband and pre-set tuning switches, S30, S31, S32 are the radio/gram change-over switches, and S33, S34, S35 are the scale lamp switches, all ganged in four rotary units mounted beneath the chassis. These units are indicated in our underside drawing of the chassis, and shown in detail in the diagrams in cols. 1 and 2, where they are drawn as seen when viewed in the directions of the arrows in the chassis drawing.

The table in column 3 gives the switch positions for the seven control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and C, closed.

S36, S37 are the Q.M.B. mains switches, ganged with the volume control R15.

Scale Lamps.—These are three Osram type OS75 lamps, with M.E.S. bases and small clear spherical bulbs, rated at 0.5 V, 0.3 A.

External Speaker.—Two sockets are provided at the rear of the chassis for the connection of a low impedance (about 2-4 Ω) external speaker, a pair of plugs being provided with the receiver.

RADIOGRAM MODIFICATIONS

The differences between the radiogram model BC9835 and the table receiver from which this information was compiled are confined to the A.F. output and H.T. smoothing circuits. The A.F. and output circuits are quite different, involving push-pull output and twin speakers.

The electrical differences are shown in the section diagram on the right of our main circuit diagram overleaf, where the points of interconnection with the main circuit are indicated.

The chassis layout is considerably modified, because the phase inverting and output valves, together with the power supply unit, are mounted in a separate chassis. Interconnections between this and the main chassis are effected via a plug and socket arrangement. The plug is an octal, and the pin numbers are shown in the diagram in a vertical row between V3 and V6.

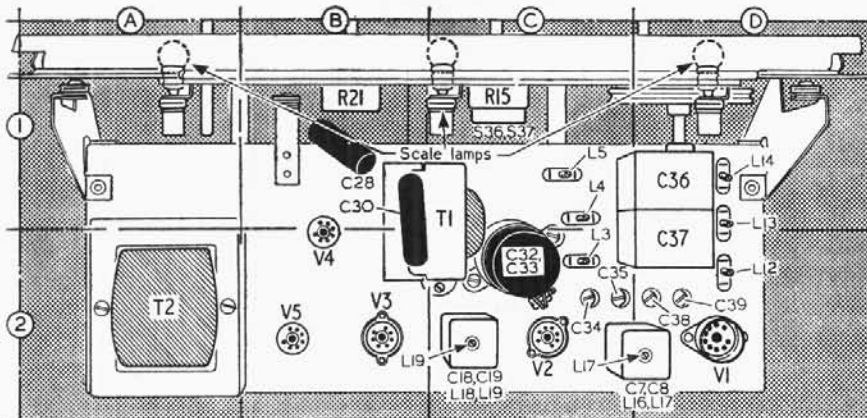
Component values that become changed in the radiogram chassis are indicated in the component tables. Added or changed components bear different numbers, and take the place in the tables in the normal sequence, after the last numbers of the table model.

An additional control spindle appears on the main chassis, the single tone control being replaced by separate treble and bass controls. The central spindle is for volume and on/off, and the treble and bass controls are disposed to the right and left of it respectively, when viewed from the front.

Pre-set Coils.—The six pre-set tuning coils L6-L11 are mounted in a small assembly on the

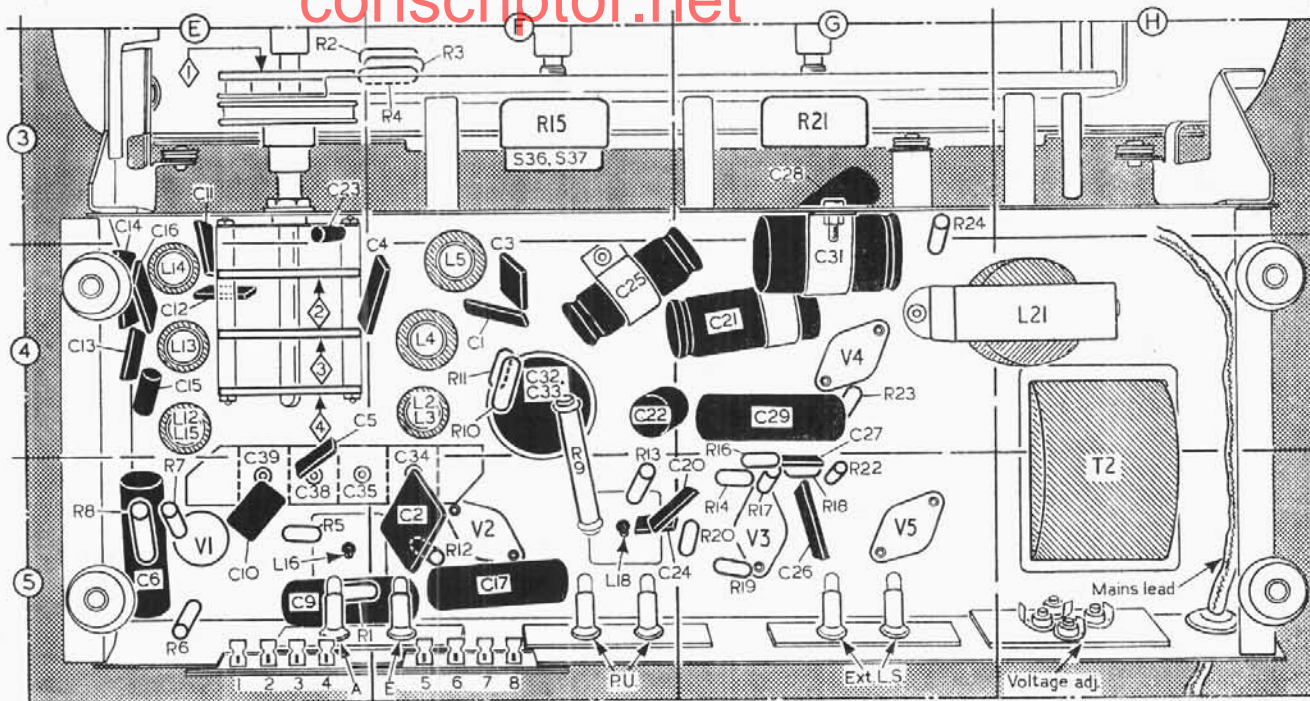
| RESISTORS (continued) | | Values | Locations |
|-----------------------|-----------------------|--------|-----------|
| R25 | P.U. tone corrector | 220kΩ | — |
| R26 | Tone controls | 500kΩ | — |
| R27 | | 1MΩ | — |
| R28 | Part tone controls | 220kΩ | — |
| R29 | | 220kΩ | — |
| R30 | V3 anode load | 150kΩ | — |
| R31 | H.T. shunt | 34kΩ | — |
| R32 | Negative feed-back | 390Ω | — |
| R33 | | 10Ω | — |
| R34 | V6 C.G. | 470kΩ | — |
| R35 | V6 anode load | 47kΩ | — |
| R36 | V6 G.B. | 2.2kΩ | — |
| R37 | V6 cathode load | 47kΩ | — |
| R38 | V7, V8 C.G. resistors | 220kΩ | — |
| R39 | | 220kΩ | — |
| R40 | V7, V8 C.G. stoppers | 10kΩ | — |
| R41 | | 10kΩ | — |
| R42 | V7, V8 G.B. | 330Ω | — |
| R43 | | 330Ω | — |
| R44 | H.T. smoothing | 3.9kΩ | — |

| OTHER COMPONENTS | | Approx. Values (ohms) | Locations |
|------------------|-----------------------------|-----------------------|-----------|
| L1 | Frame aerial | 0-2 | — |
| L2 | S.W. aerial coup. | — | F4 |
| L3 | — | — | F4 |
| L4 | Aerial tuning coils | 2-0 | F4 |
| L5 | | 17-0 | F4 |
| L6 | Pre-set aerial tuning coils | 2-4 | — |
| L7 | | 2-4 | — |
| L8 | 2-4 | — | |
| L9 | Pre-set osc. tuning coils | 0-8 | — |
| L10 | | 0-8 | — |
| L11 | 0-8 | — | |
| L12 | Oscillator tuning coils | 0-3 | E4 |
| L13 | | 3-0 | E4 |
| L14 | 6-8 | E4 | |
| L15 | S.W. reaction coup. | — | E4 |
| L16 | 1st I.F. trans. | 9-5 | D2 |
| L17 | | 9-5 | — |
| L18 | 2nd I.F. trans. | 10-5 | C2 |
| L19 | | 10-5 | — |
| L20 | Speech coil | 2-5 | — |
| L21 | Smoothing choke | 510-0 | H4 |
| T1 | O.P. transformer | 560-0 | — |
| | | a | 0-5 |
| | b | 0-5 | — |
| | c | 28-0 | — |
| T2 | Mains transformer | 28-0 | A2 |
| | | d | 28-0 |
| | e, total | 36-0 | — |
| S1-S3 | Waveband switches | — | E4 |
| S36 | Mains sw., g'd R15 | — | — |
| S37 | | — | F3 |



Plan view of the chassis. The scale lamps light dimly when their respective manual tuning bands are not in use, but when one of these bands is active its lamp lights up brightly.

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Underside view of the chassis. The eight sockets by which the back cover, carrying the pre-set tuning coils, is connected are identified at locations E5 and F5. Diagrams of the waveband switch units, numbered 1-4 in diamonds, appear at the head of cols. 1 and 2.

back cover of the receiver, and they are connected to the chassis via a row of eight plug pins which engage with a row of sockets on the rear chassis member. These sockets are numbered 1 to 8 in our circuit diagram and are indicated in our underside view of the chassis.

Frame Aerial Winding.—This is L1 and consists of a few turns of wire on supports inside the back cover of the receiver. Its connecting plugs are on flexible leads.

CIRCUIT ALIGNMENT

I.F. Stages.—Switch receiver to L.W. and turn gang to maximum. Connect signal generator output, via an 0.1µF capacitor in the "live" lead, to control grid (pin 2) of V1 and chassis. Feed in a 470 kc/s (638.3 m) signal and adjust the cores of L19 (location reference C2), L18 (F5), L17 (D2) and L16 (E5) for maximum output.

R.F. and Oscillator Stages.—As the tuning scale does not indicate the exact trimming and tracking points, it is necessary to remove the chassis from its cabinet so that the substitute tuning scale, printed on the cursor carriage slide, can be used for accurate settings of the gang. This substitute scale has 90 divisions, readings being taken against the right-hand edge (viewed from front) of the cursor carriage.

Check that with gang at maximum capacitance, the substitute scale reading is 90, and that when the chassis is in its cabinet, the cursors coincide with the dots at the high wavelength ends of the scales. If the adjustments are carried out with the back cover unplugged, a 15 pF capacitor should be shunted across C16.

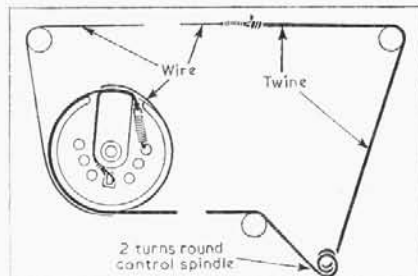
S.W.—Switch receiver to S.W., tune to 60.5 on substitute scale and transfer signal generator leads to A and E sockets. Feed in a 7.5 Mc/s (40 m) signal and adjust the cores of L12 (D2) and L3 (C2) for maximum output. Tune receiver to 5.5 on scale, feed in an 18 Mc/s (16.67 m) signal and adjust C39 (D2) and C34 (C2) for maximum output. Repeat these adjustments.

M.W.—Switch receiver to M.W., tune to 70 on scale, feed in a 600 kc/s (500 m) signal and adjust the cores of L13 (D2) and L4 (C1) for maximum output. Tune receiver to 9.5 on scale, feed in a 1,400 kc/s (214.3 m) signal and adjust C38 (D2) and C35 (C2) for maximum output. Repeat these adjustments.

L.W.—Switch receiver to L.W., tune to 30.5 on scale, feed in a 230 kc/s (1,304 m) signal and

adjust the cores of L14 (D1) and L5 (C1) for maximum output. Repeat these adjustments.

Pre-set Stations.—Replace chassis in cabinet, and fit back cover. Remove pre-set adjustment cover from right-hand side of back cover and switch receiver to M.W. Reading from left to right the adjustments thus exposed are as follows: Aerial 1, 2, 3; Oscillator 1, 2, 3. When adjusting the pre-sets to a desired station



Sketch showing the tuning drive system, drawn as seen from the front with the gang at maximum. The drawing has been broken to omit the central run.

No. 1, 2 or 3 aerial and oscillator sliders should be set so that their top edges roughly coincide with the wavelength of the desired station, as indicated on the individual scales. The station can then be accurately tuned in by use of the screwdriver type vernier adjustments in the centres of the sliders.

DRIVE CORD REPLACEMENT

The tuning drive cord consists of two parts, one of wire and one of twine. Fine gauge Bowden cable with soldered end loops (2 1/8 in long overall in our sample) can be used for the one, and high-grade flax fishing line, plaited and waxed (2 7/8 in our sample) can be used for the other. These lengths are not critical, however, so long as the overall length is 48 1/2 in. The combined cord should be run as shown in

the accompanying sketch, where the system is drawn as seen from the front when the gang is at maximum capacitance.

VALVE ANALYSIS

Valve voltages and currents given in the tables below are those derived from the manufacturers' information, and were measured with the receivers operating from A.C. mains of 230 V. The receivers were switched to M.W. and tuned to 200 m, but there was no signal input.

Voltage readings were measured on the 15 V and 750 V ranges of a 1,000 ohms per-volt meter, chassis being the negative connection.

Table Model

| Valve | Anode | | Screen | | Cath. |
|---------|------------|------|--------|-----|--------|
| | V | mA | V | mA | V |
| V1 X79 | 243 | 0.7 | 35 | 0.9 | — |
| | Oscillator | | | | |
| | 123 | 3.4 | | | |
| V2 W77 | 243 | 6.0 | 177 | 1.5 | 2.0 |
| V3 DH77 | 77 | 0.5 | — | — | 1.9 |
| V4 N78 | 225 | 32.0 | 243 | 5.5 | 4.5 |
| V5 U78 | — | — | — | — | 280.0* |

* Cathode current 52.5 mA.

Gram Model

| Valve | Anode | | Screen | | Cath. |
|---------|------------|------|--------|-----|--------|
| | V | mA | V | mA | V |
| V1 X79 | 264 | 0.75 | 35 | 0.8 | — |
| | Oscillator | | | | |
| | 116 | 3.8 | | | |
| V2 W77 | 264 | 5.5 | 173 | 1.6 | 1.9 |
| V3 DH77 | 92 | 0.45 | — | — | 1.0 |
| V6 DH77 | 140 | 0.6 | — | — | 30.0 |
| V7 N78 | 368 | 17.0 | 264 | 2.5 | 6.4 |
| V8 N78 | 368 | 17.0 | 264 | 2.5 | 6.4 |
| V9 U50 | — | — | — | — | 373.0† |

† Cathode current 62mA.

