NUMBER EIGHTY-SIX **'TRADER' SERVICE SHEETS**

BURGOYNE 'DRAGON'

RECEIVER AND RADIO-GRAMOPHONE

IN their "Dragon" receiver Burgoyne incorporate a 4-valve (plus rectifier) superhet chassis suitable for A.C. mains of 200-250 V, 40-100 c.p.s. A sensitivity switch is fitted at the back of the chassis and there is provision for using a gramophone pick-up. An interesting point is that the I.F. valve is "reflexed" to provide L.F. amplification in addition.

A similar chassis is embodied in the "Dragon" radio-gramophone, but in this model the sensitivity switch is at the side of the cabinet.

CIRCUIT DESCRIPTION

Alternative aerial connections (**A2** via series condenser **C1**) both via **R1, L1, C3** and **L2** to coupling coils **L4, L5. R1** is switched into circuit for local station reception by **S1**; **L1** resonates towards the top end of the M.W. band and thus improves sensitivity, while on L.W. it is tuned by **C2** to form a second channel rejector; **L2** is in circuit only on L.W. to prevent interference from powerful M.W. transmitters; **L3** and **C21** form a filter for by-passing interference around the intermediate frequency.

Single tuned circuit **L6, L7, C22** precedes octode frequency changer (**V1, Mullard metallised FC4 or Tungsram V04**) operating with electron coupling. Oscillator grid coils **L8, L9** tuned by **C24** with shaped vanes for tracking; additional L.W. tracking by pre-set condenser **C27**; anode reaction coils **L10, L11.**

One variable-mu H.F. pentode intermediate frequency amplifier (**V2, Mullard metallised VP4B**) with tuned-primary tuned-secondary transformer couplings **L12, L13** and **L14, L15.**

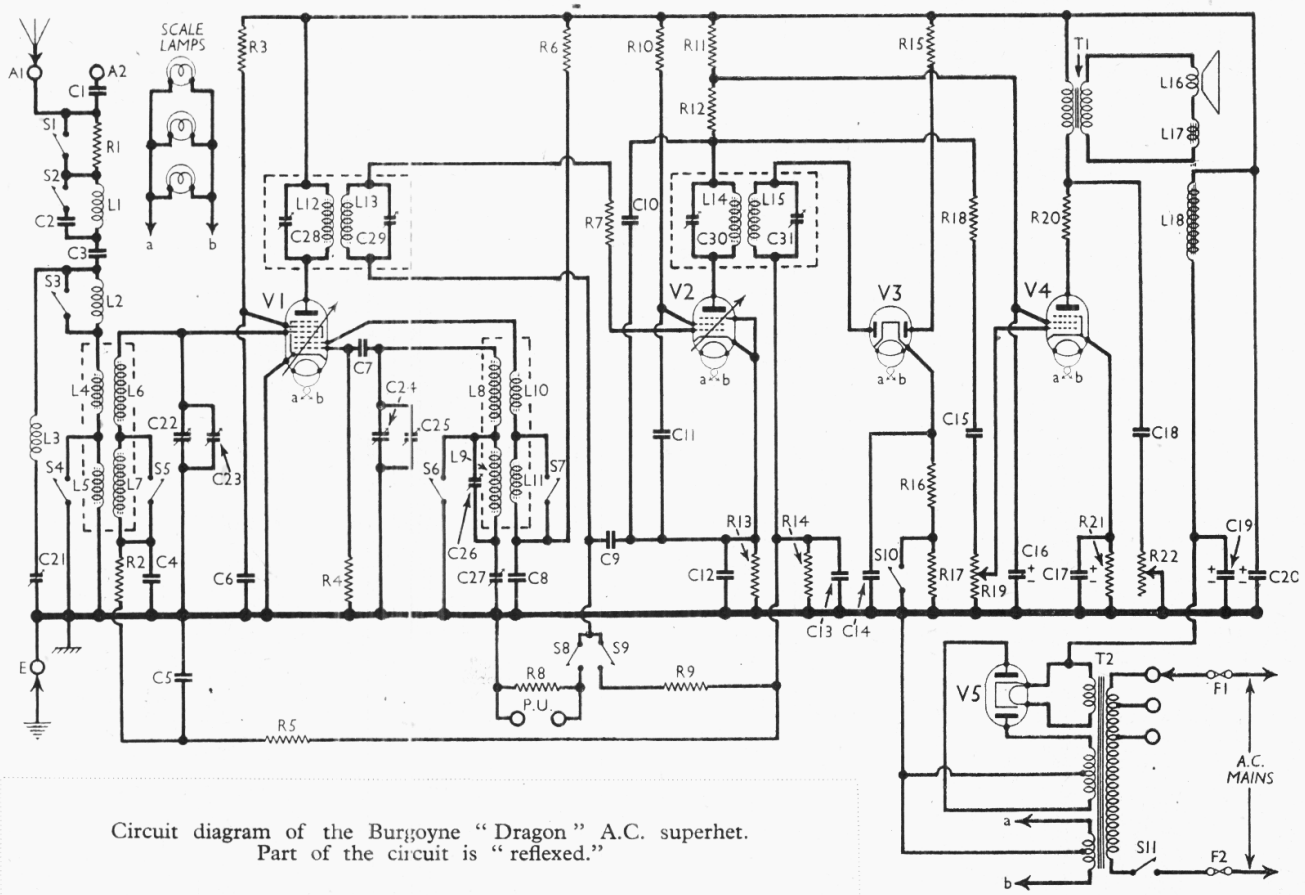
Intermediate frequency 473 KC/S.

Diode second detector forms part of double diode valve (**V3, Mullard metallised 2D4A**). D.C. potential in rectified output developed across load resistance **R14** is fed back through decoupling circuits as G.B. to F.C. and I.F. valves, thus giving automatic volume control. Audio-frequency component in diode output is also fed back to I.F. valve which is "reflexed" to operate as L.F. amplifier. Provision for connection of gramophone pick-up in control grid circuit by switch **S8.**

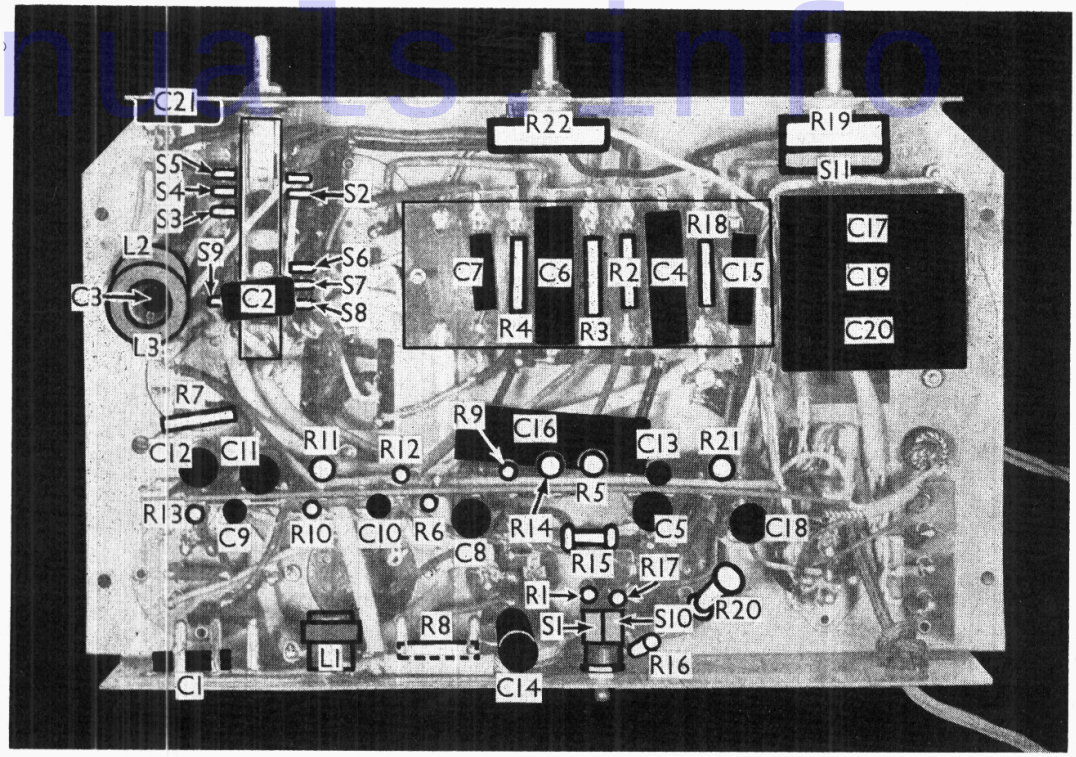
Resistances **R16** and **R17** in **V3** cathode circuit provide negative bias which is applied to signal diode in order to reduce sensitivity. Switch **S10** is ganged with local-distant switch **S1** so that in "distant" position **R17** is short-circuited to reduce diode bias, with a resultant increase in sensitivity. Cathode current of **V3** is slightly increased by reason of positive potential applied to second diode anode through **R15.**

Amplified audio-frequency output from **V2** is developed across anode load **R12** and passed via I.F. stopper **R18**, coupling condenser **C15,** and manual volume control **R19** to output pentode (**V4, Mullard Pen4VB**). Variable tone control in anode circuit by R.C. filter **R22, C18.**

H.T. current is supplied by full-wave rectifying valve (**V5, Micromesh** or **Brimar R3** or **Mullard IW3**). Smoothing by



Circuit diagram of the Burgoyne "Dragon" A.C. superhet. Part of the circuit is "reflexed."



Under-chassis view. The various switches are clearly marked, and it should be noted that one set of contacts is blank. C17, C19 and C20 are three electrolytic condensers in one unit. C3 is inside the tubular former of L2 and L3.

speaker field coil **L18** and electrolytic condensers **C19, C20.**

Mains circuit fuses **F1** and **F2** are incorporated in mains plug.

COMPONENTS AND VALUES

	Resistances	Values (ohms)
R1	Aerial series resistance	50,000
R2	V1 pent. cont. grid decoupling	100,000
R3	V1 S.G's H.T. feed	50,000
R4	V1 osc. grid resistance	50,000*
R5	V1 A.V.C. line decoupling	500,000
R6	V1 osc. anode decoupling	50,000
R7	V2 cont. grid circuit stabiliser	500
R8	Gram. pick-up shunt	750,000
R9	V2 cont. grid decoupling	100,000
R10	V2 S.G. H.T. feed	100,000†
R11	V2 anode decoupling	5,000
R12	V2 anode resistance	30,000
R13	V2 fixed G.B. resistance	200
R14	V3 signal and A.V.C. diode load	500,000
R15	V3 diode H.T. feed	5,000,000
R16, R17	A.V.C. delay voltage resistances	20,000‡, 20,000
R18	I.F. stopper	100,000
R19	Manual volume control	500,000
R20	V4 anode circuit stabiliser	100
R21	V4 G.B. resistance	160§
R22	Part of tone control filter	10,000

* May be 250,000 Ω. † May be 250,000 Ω.
‡ May be omitted in some chassis. § May be 140 Ω.

	Condensers	Values (μF)
C1	Aerial series condenser	0·00005
C2	Part of image rejector	0·00005
C3	Aerial series condenser	0·0001
C4	V1 pent. cont. grid decoupling	0·1
C5	V1 A.V.C. line decoupling	0·1
C6	V1 S.G.'s by-pass	0·1
C7	V1 osc. grid condenser	0·0001
C8	V1 osc. anode decoupling	0·1
C9	V2 cont. grid decoupling	0·001
C10	V2 anode I.F. by-pass	0·0005
C11	V2 S.G. by-pass	0·1
C12	V2 cathode by-pass	0·1
C13	I.F. by-pass	0·001
C14	V3 cathode by-pass	0·1
C15	L.F. coupling to V4	0·01

	Condensers (continued)	Values (μF)
C16*	V2 anode and V4 aux. grid decoupling	2·0
C17*	V4 cathode by-pass	25·0
C18	Part of tone control filter	0·025
C19*, C20*	H.T. smoothing	8·0, 12·0
C21‡	I.F. filter tuning	0·0001
C22†	Aerial circuit tuning	0·0005
C23‡	Aerial circuit trimmer	—
C24†	Oscillator tuning	—
C25‡	Oscillator main trimmer	—
C26‡	Oscillator L.W. trimmer	0·00007
C27‡	Oscillator L.W. tracker	0·00055
C28‡	1st I.F. trans. pri. tuning	—
C29‡	1st I.F. trans. sec. tuning	—
C30‡	2nd I.F. trans. pri. tuning	—
C31‡	2nd I.F. trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.

	Other Components	Values (ohms)
L1	Aerial loading coil (M.W.)	8·75
L2	Anti-break through choke (L.W.)	23·0
L3	I.F. filter coil	30·0
L4, L5	Aerial coupling coils	0·8, 5·8
L6, L7	Aerial tuning coils	2·0, 10·7
L8, L9	Oscillator grid coils	1·0, 2·8
L10, L11	Oscillator anode reaction coils	21·5, 65·0
L12, L13	1st I.F. trans. Pri., Sec.	5·2, 5·2
L14, L15	2nd I.F. trans. Pri., Sec.	7·0, 5·0
L16	Speaker speech coil	2·5
L17	Hum neutralising coil	0·1
L18	Speaker field coil	2,000·0
T1	Speaker input trans. Pri., Sec.	500·0, 0·4
T2	Mains trans. Pri. total, Heater sec., Rect. heat. sec., H.T. sec.	28·5, 0·05, 0·1, 620·0
S1, S10	Local-distant switches	—
S2-S7	Waveband switches	—
S8, S9	Radio-gram switches	—
S11	Mains switch	—
F1, F2	Mains circuit fuses	—

DISMANTLING THE SET

Removing Chassis.—Should it be necessary to remove the chassis from the cabinet, first remove the back (six countersunk-head wood screws with washers), the four control knobs (recessed grub screws), the four chassis fixing bolts (with nuts and washers) and the cleat holding the speaker leads. The chassis can now be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

To remove the chassis entirely, unsolder the leads on the speaker terminal panel. *When replacing*, connect as follow:—F, green; 3, white; 2, blank; 1 and 2 joined together, green/white.

When replacing control knobs, place the large one on the tuning condenser spindle and the one with a white dot on the wave-change switch.

Removing Speaker.—The speaker can be removed, if necessary, by taking off the nuts from the four bolts holding it to the sub-baffle. *When replacing*, see that the transformer is on the right and do not forget the cleat for the speaker leads and its securing nut.

VALVE ANALYSIS

Valve voltages and currents overleaf in the table were measured with the receiver operating on mains of 220 V and with the transformer adjusted to the 220-230 V tapping. The volume control was at maximum, as was the sensitivity switch (in the "down" position). The receiver was tuned to the lowest wavelength on the M.W. band, but there was no signal input.

Voltages were measured on the 1,200 V scale of an Avometer, with chassis as negative.

(*Continued overleaf*)

BURGOYNE 'DRAGON' (*continued*)

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 FC4*	280	4·4	110	3·4
V2 VP4B	95	4·3	100	1·6
V3 2D4A	—	—	—	—
V4 Pen4VB	260	33·0	235	3·7
V5 R3	335†	—	—	—

* Osc. anode (G2) 125 V, 2.9 mA.
† Each anode, A.C.

GENERAL NOTES

Switches.—The waveband switches, **S2-S7,** and the radiogram switches **S8, S9** are all ganged in one unit, and are indicated in the under-chassis view. Note that one switch in the unit is not used. The table below gives the switch positions for the various settings of the control, O indicating open, and C, closed.

Switch	M.W.	L.W.	Gram.
S2	O	C	O
S3	C	O	O
S4	C	O	O
S5	C	O	O
S6	C	O	C
S7	C	O	C
S8	O	O	C
S9	C	C	O

S1 and **S10** are the "local-distant" switches, comprising a double Q.M.B. unit, mounted at the back of the chassis. Both switches are *closed* in the "distant" position (switch knob down), and *open* in the "local" position (switch knob up).

S11 is the Q.M.B. mains switch, ganged with the volume control **R19.**

Coils.—**L1, L2** and **L3** are beneath the chassis, **L1** being at the rear, and **L2, L3** on a single former to the left-hand side (in our under-chassis view). The remaining coils are all iron-cored, and are in four screened units on the chassis deck. The oscillator unit (**L8-L11**) embodies a dual trimmer at the top (**C26, C27**), while the I.F. units **L12, L13** and **L14, L15** also employ similar dual trimmers.

Scale Lamps.—Three of these are employed, wired in parallel. They are standard M.E.S. types, and in our case are marked "6V." The usual 6.2 V, 0.3 A type would be suitable for replacement purposes.

External Speaker.—No definite provision for this is made, but a high resistance type could be connected across the primary of the internal speaker transformer (tags 1 and 3).

Condenser C3.—This is mounted inside the tubular former of **L2, L3.**

Condensers C17, C19, C20.—These are three dry electrolytics in a single unit mounted beneath the chassis. This has a common negative lead (black). The positive of **C17** (25μF) is green, the positive of **C19** (8μF) is yellow, and the positive of **C20** (12μF) is red.

Chassis Divergencies.—Some chassis use a VO_4 octode frequency changer, while the double diode may be a DD_4.

R4 may be 250,000 O in some chassis, while **R10** may be 250,000 O with early type VP4B valves. **R16** is only used with the late type 2D4A valve, and may be omitted when a DD_4 is used.

Fuses F1, F2.—These are incorporated in a special 2-pin plug (Goltone). The values are not marked, but 1A types would be suitable.

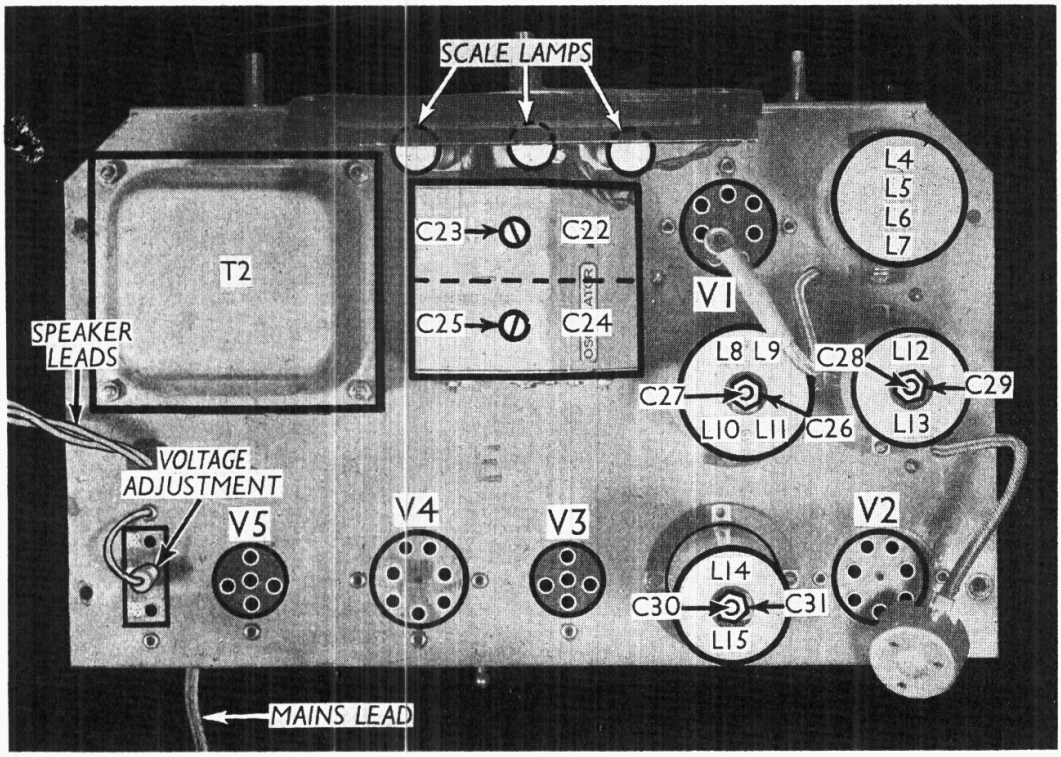
CIRCUIT ALIGNMENT

Temporarily disconnect the top cap (grid) connection of **V1** and connect a 250,000 O resistor between the top cap and chassis. Apply a 473 KC/S signal to the grid via a .0001 μF condenser, and gang the I.F. circuits (**C28, C29, C30** and **C31**). Replace the original **V1** connections. Apply the 473 KC/S to the aerial socket, with the set switched to L.W., and tuned to lowest wavelength. Adjust **C21** for *minimum* output. The condenser will have to be near its minimum.

Switch set to M.W., tune to 200 m. on scale, apply a 200 m. signal and adjust **C23, C25** for maximum output. Ganging should then hold over the whole M.W. band.

Switch set to L.W., set pointer at 1,700 m. on scale, apply a 1,700 m. signal and adjust **C23** (nut) and **C27** (screw) for maximum output. Now set pointer to 1,200 m., apply 1,200 m. signal, and re-adjust **C26** *only* for maximum. Now re-set pointer to 1,700 m., apply 1,700 m. signal, and re-adjust **C27** (screw) *only*. Continue this procedure (adjusting **C27** on 1,700 m. and **C26** on 1,200 m.) until no further improvement can be made. Ganging should then hold over whole of L.W. band.

Do not attempt to re-adjust **C23** and **C25** when ganging on the L.W. band.



Plan view of the chassis. Three of the coil units (oscillator and two I.F. transformers) have dual trimmers, operated by a nut and a central slotted screw.