



NUMBER EIGHTY-SIX

# 'TRADER' SERVICE SHEETS

## BURGOYNE 'DRAGON' RECEIVER AND RADIO-GRAMOPHONE

**I**N 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 Tungfram 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.

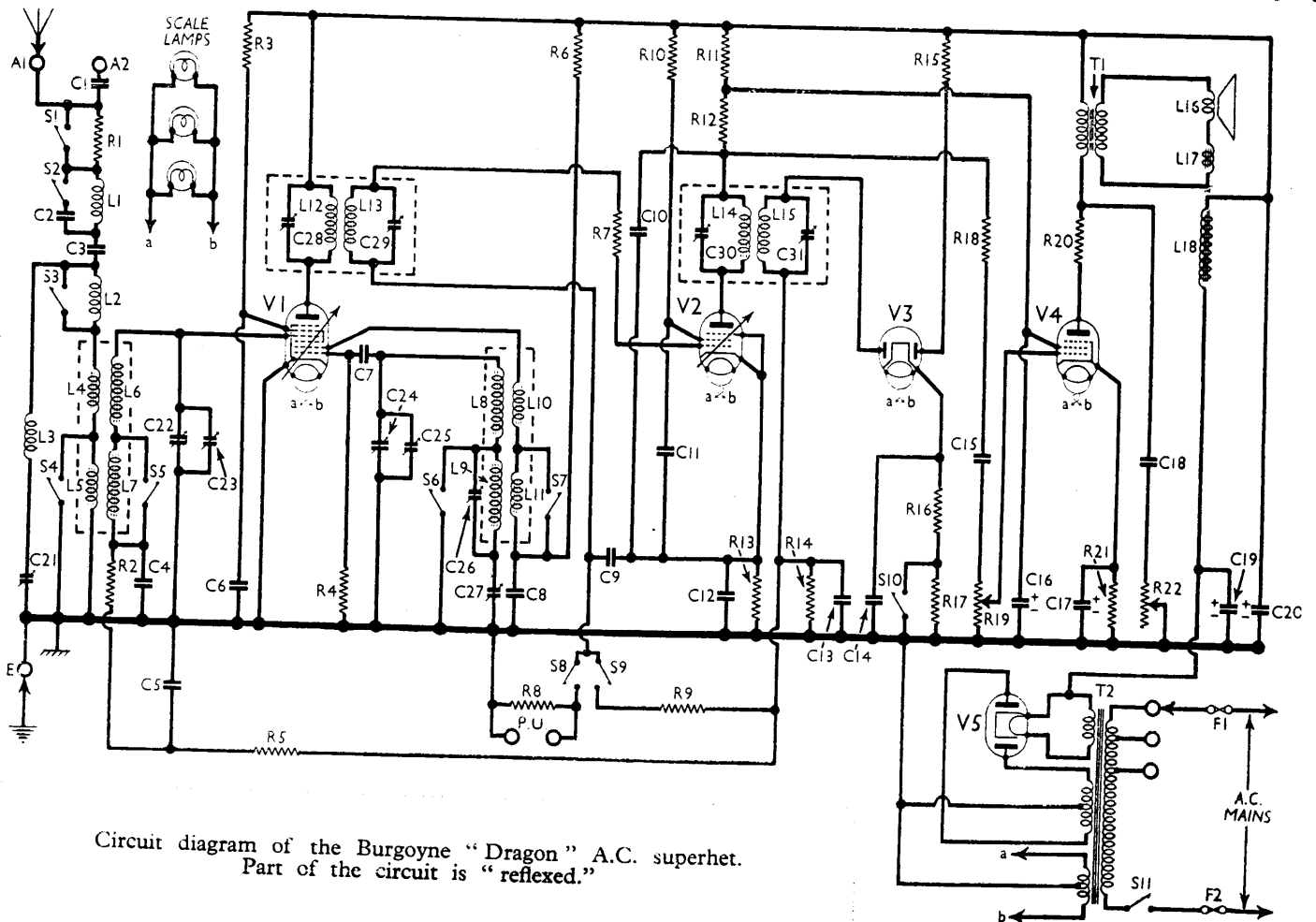
Diode second detector forms part of double diode valve (V3, Mullard metal-

lised 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.

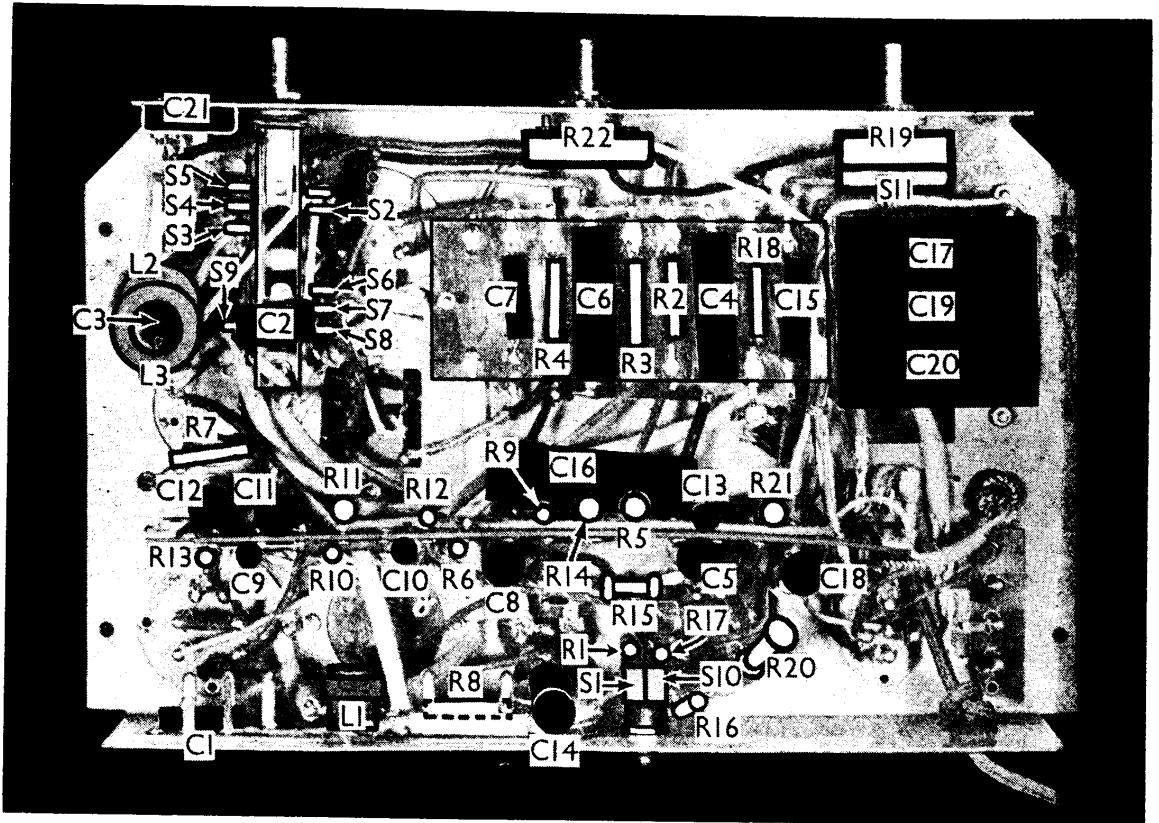
Amplified audio-frequency output from V2 is developed across anode load R12 and passed via I.F. stopper R18, coupling condenser C15, and manual volume control R19 to output pentode (V4, Mullard Pen4VB). Variable tone control in anode circuit by R.C. filter R22, C18.

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	A.V.C. delay voltage resist.	20,000‡
R17	ances	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 O. † May be 250,000 O. ‡ May be omitted in some chassis. § May be 140 O.

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	0.0025
C19*	H.T. smoothing	8.0
C20*	H.T. smoothing	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	Aerial coupling coils	0.8
L5	Aerial coupling coils	5.8
L6	Aerial tuning coils	2.0
L7	Aerial tuning coils	10.7
L8	Oscillator grid coils	1.0
L9	Oscillator grid coils	2.8
L10	Oscillator anode reaction coils	21.5
L11	Oscillator anode reaction coils	65.0
L12	1st I.F. trans. { Pri. . . . . 5.2	
L13	1st I.F. trans. { Sec. . . . . 5.2	
L14	2nd I.F. trans. { Pri. . . . . 7.0	
L15	2nd I.F. trans. { Sec. . . . . 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. . . . . 500.0	
	{ Sec. . . . . 0.4	
	{ Pri. total . . . . . 28.5	
	{ Heater sec. . . . . 0.05	
	{ Rect. heat. sec. . . . . 0.1	
	{ H.T. sec. . . . . 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 counter-sunk-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 C2.**—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 VO4 octode frequency changer, while the double diode may be a DD4.

**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 DD4 is used.

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

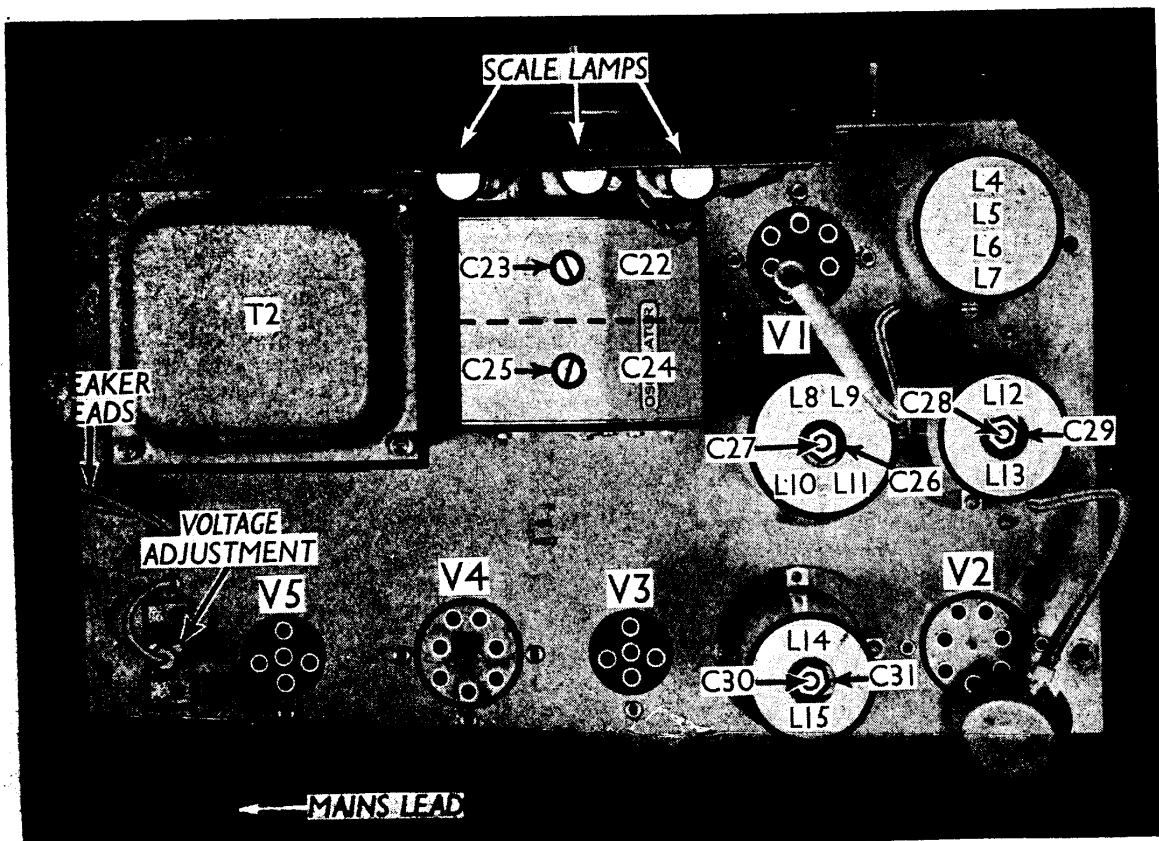
**CIRCUIT ALIGNMENT**

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.