

BURGOYNE AWT

AND AWTG RADIO-GRAM

BURGOYNE'S AWT "TRF A.C. Four" receiver is a 3-valve (plus rectifier) A.C. all-wave model with a variable-mu pentode H.F. amplifier, a grid-leak pentode detector and a pentode output valve. It is for use on A.C. mains of 200-250 V, 40-60 c.p.s., and has a short wave range of 19-51 metres.

A similar chassis is also fitted in the AWTG "TRF A.C. Four Radio-Gram," but this *Service Sheet* was prepared on an AWT model.

CIRCUIT DESCRIPTION

Two alternative aerial input connections, **A1** via Droitwich retractor **L1**, **C21**, and series choke **L2**, and **A2** via fixed series condenser **C3**, to coupling condensers and coils **C2** (S.W.), **C1**, **L4** (M.W.), **L6**, **L7** (L.W.). Single-tuned circuits comprising **L3**, **C24** (S.W.), **L5**, **C24** (M.W.) and **L8**, **C24** (L.W.) precede variable-mu pentode H.F. amplifier (**V1**, **Tungstram metallised VP4B**). Gain control on M.W. and L.W. by variable cathode resistance **R4**, which varies G.B. applied.

Tuned-secondary transformer couplings

by **L9**, **L11**, **C29** (S.W.), **L13**, **L14**, **C29** (M.W.) and **L15**, **L17**, **C29** (L.W.), between **V1** and H.F. pentode detector (**V2**, **Tungstram metallised VP4B**) which operates on grid leak system with **C10** and **R6**. Reaction is applied from anode by coils **L10** (S.W.) and **L15** (M.W. and L.W.), and controlled by variable condenser **C28**. Provision for connection of gramophone pick-up in C.G. circuit by switch **S23**. H.F. filtering in anode circuit by choke **L18** and by-pass condensers **C8** (M.W. and L.W.) and **C13** (S.W. M.W., and L.W.).

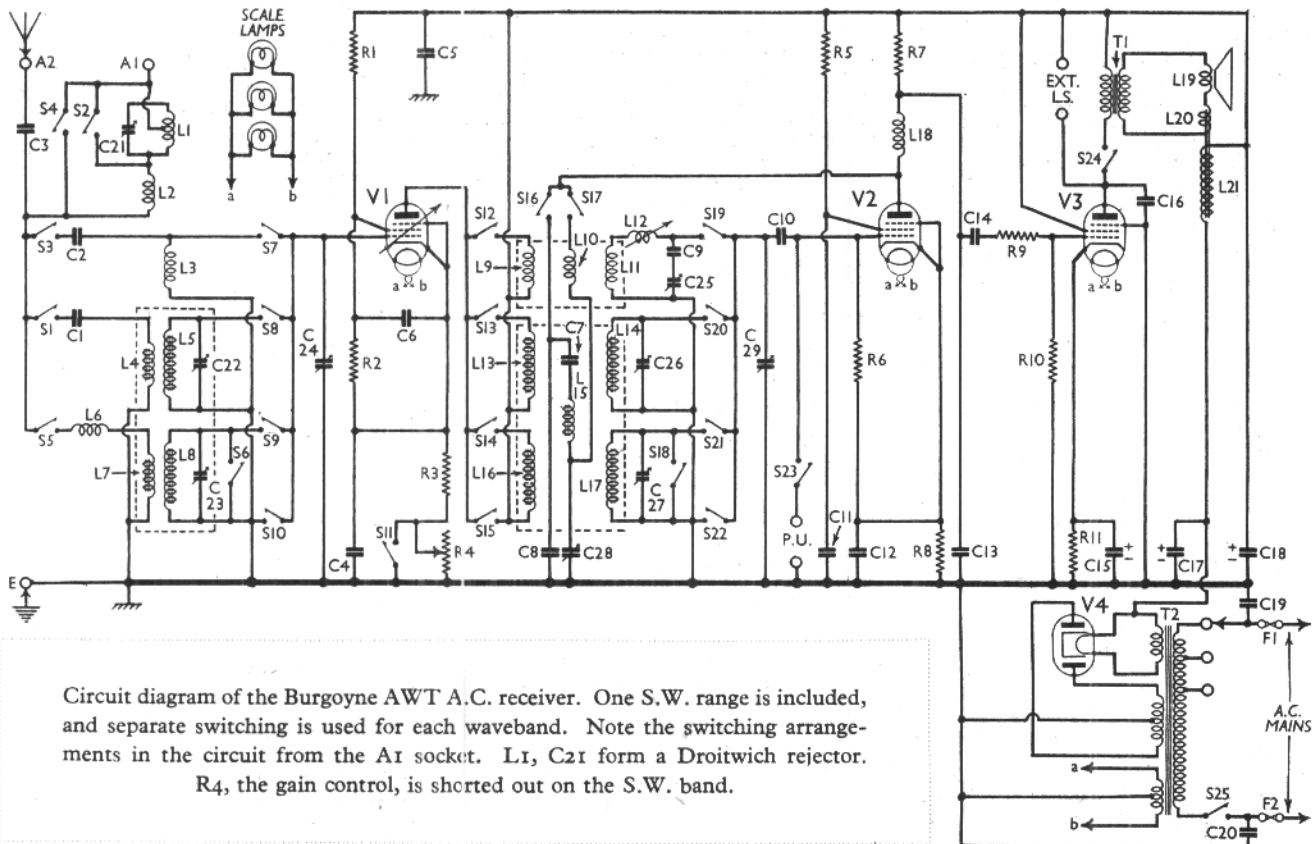
Resistance-capacity coupling by **R7**, **C14** and **R10** between **V2** and pentode output valve (**V3**, **Tungstram APP4C**). Fixed tone correction in anode circuit by condenser **C16**. Provision for connection of high-impedance external speaker in anode circuit; plug-operated switch **S24** breaks internal speaker transformer primary circuit.

H.T. current is supplied by I.H.C. full-wave rectifying valve (**V4**, **Tungstram APV4**). Smoothing by speaker field coil **L21** and dry electrolytic condensers **C17**, **C18**. Mains H.F. by-passing by condensers **C19** and **C20**.

COMPONENTS AND VALUES

CONDENSERS		Values (μF)
C1	Aerial M.W. coupling ..	0.0002
C2	Aerial S.W. coupling ..	0.0001
C3	Aerial series condenser ..	0.0002
C4	V1 cathode by-pass ..	0.1
C5	H.T. supply H.F. by-pass ..	0.1
C6	V1 S.G. by-pass ..	0.1
C7	React. series condenser, M.W., L.W. ..	0.001
C8	V2 anode by-pass, M.W., L.W. ..	0.0005
C9	H.F. trans. fixed S.W. trimmer ..	0.00005
C10	V2 C.G. condenser ..	0.0001
C11	V2 S.G. by-pass ..	0.1
C12	V2 cathode by-pass ..	0.1
C13	V2 anode H.F. by-pass ..	0.0002
C14	V2-V3 L.F. coupling ..	0.1
C15*	V3 cathode by-pass ..	25.0
C16	Fixed tone corrector ..	0.01
C17*	H.T. smoothing ..	8.0
C18*	H.T. smoothing ..	12.0
C19	Mains H.F. by-passes ..	0.001
C20	Mains H.F. by-passes ..	0.001
C21†	Droitwich retractor tuning ..	—
C22†	Aerial M.W. trimmer ..	—
C23†	Aerial L.W. trimmer ..	—
C24†	Aerial circuit tuning ..	0.0005
C25†	H.F. trans. S.W. trimmer ..	—
C26†	H.F. trans. M.W. trimmer ..	—
C27†	H.F. trans. L.W. trimmer ..	—
C28†	Reaction control ..	0.0005
C29†	H.F. trans. tuning ..	0.0005

* Electrolytic. † Variable. ‡ Pre-set.

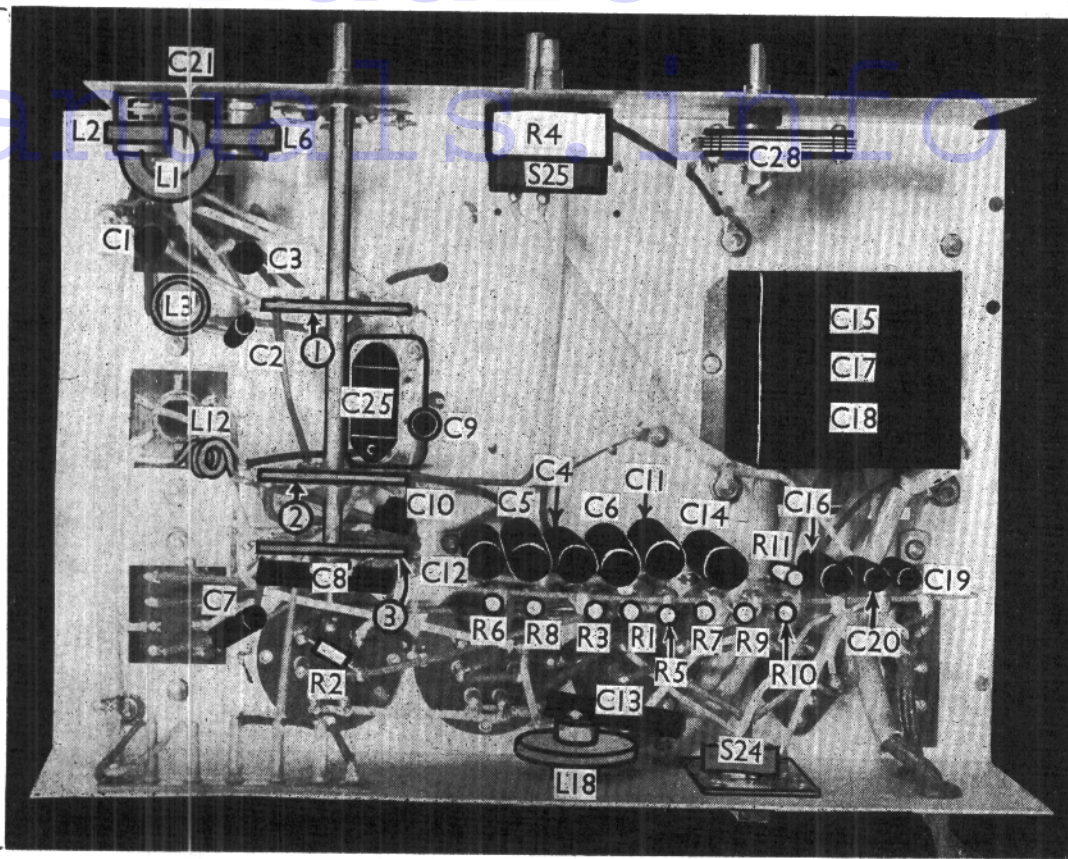


Circuit diagram of the Burgoyne AWT A.C. receiver. One S.W. range is included, and separate switching is used for each waveband. Note the switching arrangements in the circuit from the A1 socket. L1, C21 form a Droitwich retractor. R4, the gain control, is shorted out on the S.W. band.

Radio

Maintaining

Under-chassis view. The numbers in circles indicate the three switch units, the arrows showing the directions in which they are viewed in the diagrams on page VIII. L12 is a small inductance used for trimming at the upper end of the S.W. band. C21 is adjustable through a hole in the front of the chassis.



RESISTANCES		Values (ohms)
R1	V1 S.G. H.T. potential divider	20,000
R2	V1 S.G. H.T. potential divider	500,000
R3	V1 fixed G.B. resistance	200
R4	V1 gain control	100,000
R5	V2 S.G. H.T. feed	100,000
R6	V2 grid leak	1,000,000
R7	V2 anode load	50,000
R8	V2 G.B. resistance (gram.)	200
R9	V3 C.G. H.F. stopper	50,000
R10	V3 C.G. resistance	250,000
R11	V3 G.B. resistance	140

OTHER COMPONENTS		Approx. Values (ohms)
L1	Droitwich rejector coil	32.0
L2	Aerial series choke	9.0
L3	Aerial S.W. tuning coil	0.05
L4	Aerial M.W. coupling coil	0.4
L5	Aerial M.W. tuning coil	2.5
L6	Aerial L.W. choke	20.0
L7	Aerial L.W. coupling coil	3.0
L8	Aerial L.W. tuning coil	11.5
L9	H.F. trans. S.W. pri.	0.2
L10	S.W. reaction coil	0.1
L11	H.F. trans. S.W. sec.	Very low
L12	S.W. inductance trimmer	Very low
L13	H.F. trans. M.W. pri.	1.2
L14	H.F. trans. M.W. sec.	2.5
L15	M.W. and L.W. reaction coil	1.4
L16	H.F. trans. L.W. pri.	2.7
L17	H.F. trans. L.W. sec.	11.5
L18	V2 anode H.F. choke	200.0
L19	Speaker speech coil	1.7
L20	Hum neutralising coil	0.1
L21	Speaker field coil	2,000.0
T1	Speaker input trans. { Pri. ... Sec. ...	750.0
T2	Mains trans. { Pri. total ... Heater sec. ... Rect. heat. sec. ... H.T. sec. total ...	0.3 26.0 0.05 0.1 640.0
S1-22	Waveband and muting switches	—
S23	Gram. pick-up switch	—
S24	Internal speaker switch	—
S25	Mains switch, ganged R4	—
F1, F2	Mains circuit fuses	—

DISMANTLING THE SET

Removing Chassis.—Remove the four knobs (recessed grub screws) and the four bolts (with nuts and washers) passing through the chassis. Now free the speaker leads from the cleat and unsolder them from the speaker. The chassis can now be withdrawn by tilting the back up so that the tuning dial clears the cabinet.

When replacing, connect the speaker leads as follows, numbering the tags from bottom to top:—1 and 2 joined together, red; 3, white; 4, yellow. The black lead goes to the tag on one of the bolts holding the transformer to the speaker frame. Also note that the knob with the white dot goes on the spindle of the wave-change switch.

Removing Speaker.—Remove the nuts from the four bolts holding it to the sub-baffle. *When replacing,* see that the transformer is on the left.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 VP4B	275	8.4	200	2.7
V2 VP4B	35	4.7	100	1.7
V3 APP4C	245	30.0	275	3.8
V4 APV4	350†	—	—	—

† Each anode, A.C.

receiver when it was operating on mains of 220 V, using the 220-230 V tapping on the mains transformer. The volume control was at maximum but the reaction control was at minimum. There was no signal input.

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

GENERAL NOTES

Switches.—S1-S23 are the waveband and pick-up switches, in three ganged rotary units beneath the chassis. These units are indicated in the under-chassis view by numbers in circles, and the arrows show the direction in which they are viewed in the diagrams on page VIII. These diagrams show the individual switches. Blank tags are outlined and marked "B."

The table below gives the switch positions for the various control settings, O indicating open, and C, closed.

Switch	S.W.	M.W.	L.W.	Gram.
S1	O	C	O	O
S2	O	C	O	O
S3	C	O	O	O
S4	C	O	O	O
S5	O	O	C	O
S6	O	C	O	O
S7	C	O	O	O
S8	O	C	O	O
S9	O	O	C	O
S10	O	O	O	C
S11	C	O	O	O
S12	C	O	O	O
S13	O	C	O	O
S14	O	O	C	O
S15	O	O	O	C
S16	O	C	C	O
S17	C	O	O	O
S18	C	C	O	O
S19	C	O	O	O
S20	O	C	O	O
S21	O	O	C	O
S22	O	O	O	C
S23	O	O	O	C

Continued overleaf

BURGOYNE AWT—Continued

S24 is the internal speaker switch, normally closed, but which opens when the special external speaker plug is inserted and rotated anti-clockwise.

S25 is the Q.M.B. mains switch, ganged with the gain control **R4**.

Coils.—**L1-L3** are beneath the chassis, as is also **L6**. **L4, L5, L7, L8, L9-L11** and **L13-L17** are in three screened units on the chassis deck, two of them also containing two trimmers each.

L12, beneath the chassis, merely consists of two turns taken in one of the connecting leads. Its inductance is variable by altering the spacing of the turns.

L18 is an H.F. choke, mounted beneath the chassis, at the rear.

Fuses F1, F2.—These are two ¼-in. glass tubular types, rated at 1 A each, and incorporated in the special mains plug.

Scale Lamps.—These are three M.E.S. types, rated at 6.2 V, 0.3 A.

Condensers C15, C17, C18.—These are three dry electrolytics in a single unit beneath the chassis, with a common negative (black) lead. The green lead is the positive of **C15** (25 μF), the yellow the positive of **C17** (8 μF), and the red the positive of **C18** (12 μF). Note that the centre pin of the **V4** valve holder is used as a bearer for connections only.

Condensers C9, C10.—These are special ceramic types of fixed condensers.

External Speaker.—Provision is made, by the special plug supplied, and the sockets at the rear of the chassis, for a high impedance (7,000-8,000 Ω) external speaker. By rotating the plug, anti-

clockwise, **S24** is opened, and the internal speaker circuit broken.

Chassis Divergencies.—Earlier and later models may be slightly different in several respects. **R5** may be 250,000 Ω, not 100,000 Ω. **C7** may be omitted, and **R2**

may not occur in earlier chassis. A **V1** heater by-pass of 0.001 μF is shown in the maker's diagram, but is not in our chassis. The switches may also be slightly different in early models. Note that **V3** has a separate suppressor grid connection taken to pin 1, which, of course, is connected to chassis.

CIRCUIT ALIGNMENT

Set tuning condenser to maximum, and adjust scale so that pointer coincides with the end of the calibration "strip." Turn condenser to minimum, when pointer should coincide with the small black line at the lower end of S.W. (yellow) calibration strip.

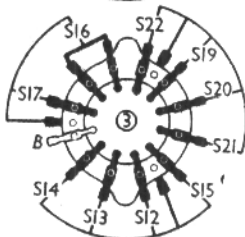
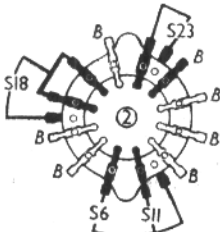
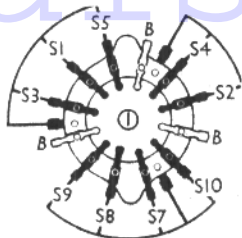
Leave condenser at minimum, feed a 200 m. signal into **A2** and **E** sockets, and switch set to M.W. Adjust **C22** and **C26** for maximum output with critical reaction.

Switch set to L.W., set pointer to coincide with 1,700 m. mark and feed in a 1,700 m. signal. Adjust **C23** and **C27** for maximum output with critical reaction.

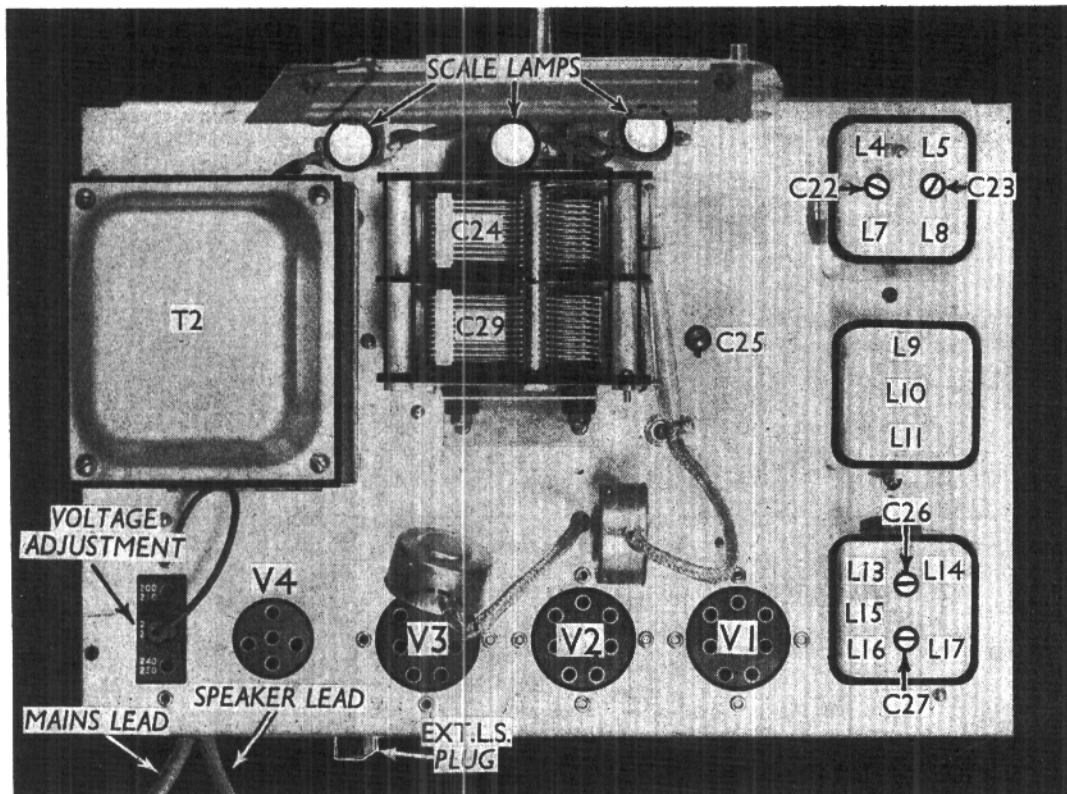
Apply a 1,500 m. signal via **A1** aerial socket, and adjust **C21** for minimum output.

Switch set to S.W., set pointer to coincide with the 21 m. mark, feed in a 21 m. signal, and adjust **C25** (through hole in chassis deck) for maximum output with critical reaction. Set pointer to 48 m., feed in a 48 m. signal, and adjust **L12** by opening out or closing up the turns, for maximum output with critical reaction. Return to 21 m., and re-adjust **C25**.

Continue adjusting **L12** at 48 m. and **C25** at 21 m. until no further improvements can be made. In actual practice, **L12** rarely needs adjustment once it has been set at the works. Care should be taken not to alter it accidentally, however.



Diagrams of the switch units, looking at the underside of the chassis in the directions indicated by the arrows in the under-chassis view.



Plan view of the chassis. The three scale lamps are wired in parallel. **C25**, the H.F. transformer S.W. trimmer, is adjustable through a hole in the chassis deck. The external speaker plug is indicated, and when this is inserted and rotated, the internal speaker can be cut out of circuit.