'TRADER' SERVICE SHEET

245

INVICTA 340

3-VALVE BATTERY RECEIVER

A SIMPLE 3-valve battery-operated chassis is fitted in the Invicta 340 receiver, in which there is provision for an extension speaker. No batteries are supplied and it is recommended that either a 120 or 150 V H.T. battery should be used, and a separate G.B. battery.

CIRCUIT DESCRIPTION

Two alternative aerial input sockets; **A1** via series condenser **C1, A2** via Droitwich rejector circuit **L1, C2,** to coupling coil **L2** and mutually inductively coupled band-pass filter. Primary coils **L3, L4** are tuned by **C9**; secondaries **L5, L6** by **C11.**

First valve **(V1, Mullard metallised VP2B)** is a variable-mu hexode operating as R.F. amplifier with gain control by variable potentiometer **R2,** which varies G.B. applied.

Tuned anode coupling by **L8, L9, C14,** between **V1** and triode detector valve **(V2, Mullard metallised PM2HL)** which operates on grid leak system with **C6** and **R4.** Reaction is applied from anode by coil **L7** and controlled by variable condenser **C13.** R.F. filtering in anode circuit by **C7.**

Transformer coupling by **T1** via R.F. stopper **R5** between **V2** and pentode output valve **(V3, Mullard PM22A).** Provision for connection of external speaker across secondary of output transformer **T2.** Fixed tone correction in anode circuit by **C8.**

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 G.B. minimum limiting resistance	3,000
R2	V1 gain control	50,000
R3	V1 anode H.T. feed	3,000
R4	V2 grid leak	2,000,000
R5	V3 C.G. R.F. stopper	250,000

	CONDENSERS	Values (μF)
C1	Aerial series condenser	0·00015
C2	Droitwich rejector tuning	0·00015
C3	V1 C.G. decoupling	0·1
C4	V1 S.G. decoupling	0·1
C5	V1 anode decoupling	0·1
C6	V2 C.G. condenser	0·00007
C7	V2 anode R.F. filter	0·0002
C8	V3 anode tone corrector	0·005
C9†	Band-pass primary tuning	0·000493
C10‡	Band-pass pri. M.W. trimmer	—
C11†	Band-pass secondary tuning	0·000493
C12‡	Band-pass sec. M.W. trimmer	—
C13†	Reaction control	0·0005
C14†	Anode circuit tuning	0·000493
C15‡	Anode circuit M.W. trimmer	—

† Variable. ‡ Pre-set.

	OTHER COMPONENTS		Approx. Values (ohms)
L1	Droitwich rejector coil		19·0
L2	Aerial coupling coil		8·75
L3	Band-pass primary coils		2·6
L4			10·6
L5	Band-pass secondary coils		2·6
L6			10·6
L7	Reaction coil		2·1
L8	Anode circuit tuning coils		2·4
L9			10·6
L10	Speaker speech coil		2·1
T1	Intervalve trans.	Pri.	1100·0
		Sec.	2500·0
T2	Output trans.	Pri.	550·0
		Sec.	0·1
S1-S3	Waveband switches		—
S4	G.B. circuit switch		—
S5	L.T. circuit switch		—

DISMANTLING THE SET

Removing Chassis.—If it is desired to remove the chassis from the cabinet, remove the four control knobs (recessed grub screws) and the felt washers from the spindles. Now remove the four bolts (with washers) holding the chassis to the chassis shelf in the cabinet, when the chassis can be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes. *When replacing,* do not forget the felt washers on the spindles of the controls.

To free the chassis entirely, unsolder the speaker leads.

Removing Speaker.—If it is necessary to remove the speaker from the cabinet, remove the nuts from the four screws holding it to the sub-baffle. *When replacing,* see that the terminal panel is on the right.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on a new 120 V H.T. battery reading 125 V, on load. The H.T.+1 lead was plugged into the 60 V socket on the battery and the G.B.—1 lead was plugged into the 6 V socket of the grid bias battery.

The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but the reaction control was at minimum. There was no signal input.

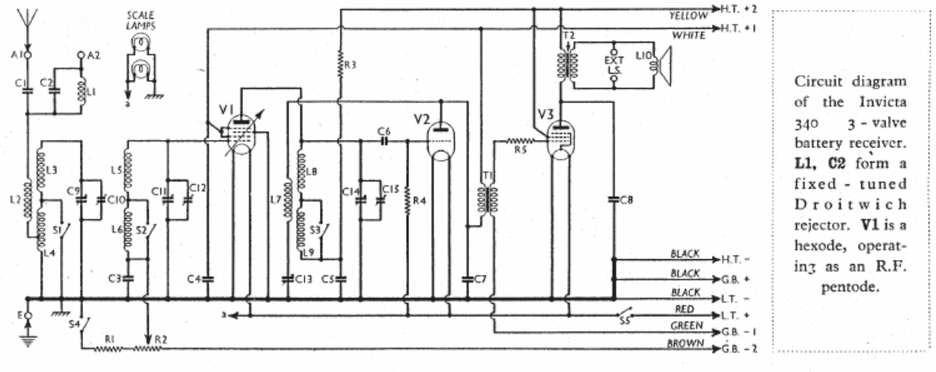
Voltages were measured on the 1,200 V scale of an Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 VP2B	110	3·7	63	1·5
V2 PM2HL	60	0·5	—	—
V3 PM22A	122	1·8	125	0·3

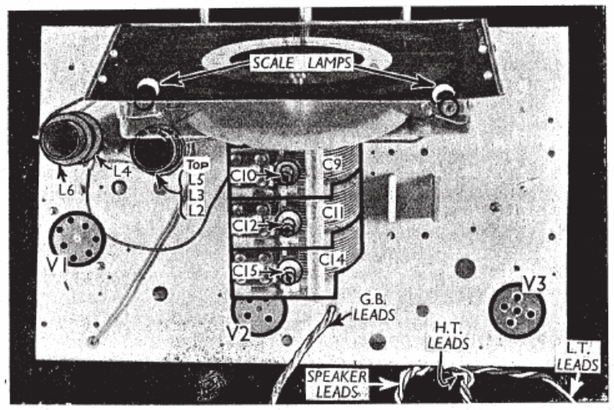
GENERAL NOTES

Switches.—**S1-S3** are the wavechange switches, and **S4** and **S5** the G.B. and L.T. circuit switches respectively, ganged in a single unit beneath the chassis, and indicated in our under-chassis view.

The table (p. III) gives the switch positions, starting from the M.W. setting, and proceeding clockwise. A dash indicates open, and **C** closed.



Circuit diagram of the Invicta 340 3-valve battery receiver. **L1, C2** form a fixed-tuned Droitwich rejector. **V1** is a hexode, operating as an R.F. pentode.



Plan view of the chassis. Note the two unscreened coil units.

Switch	M.W.	L.W.	Off
S1	C	—	C
S2	C	—	C
S3	C	—	—
S4	C	C	—
S5	C	C	—

Coils.—**L1** is beneath the chassis on a tubular former mounted at the rear close to the aerial-earth panel. **L7-L9** are wound on another tubular former beneath the chassis, and their order from top to bottom is indicated in our under-chassis view.

L2, L3, L5 and **L4, L6** are on two unscreened tubular formers on the chassis deck. The positions of these coils are indicated in our plan chassis view.

Scale Lamps.—These are two Ever Ready M.E.S. types, rated at 2·0 V, 0·1 A.

External Speaker.—Two sockets are provided at the rear of the chassis for a low resistance (about 2 Ω) external speaker.

Bearer Panel.—A small paxolin panel bolted to the underside of the chassis deck carries four tags, three of which are used merely as bearers, while the fourth is blank.

Chassis Divergencies.—The bottom of **L2** goes to a tapping on **L4,** and not to chassis as in the makers' diagram. **R1** is not shown in the makers' diagram, but appears in their list of components. **C7** was 0·0002 μF in our chassis, but may be 0·000 3μF.

Batteries.—L.T., 2 V 30 or 40 AH accumulator cell. H.T., 120 V or 150 V standard or power type battery. G.B., 9 V grid bias battery.

Battery Leads and Voltages.—Black lead, spade tag, L.T. negative; red lead, spade tag, L.T. positive 2 V; black lead and plug, H.T. negative; white lead and plug H.T. positive 1, +60 V; yellow lead and plug, H.T. positive 2, +120 V or +150 V; black lead, red plug, G.B. positive; green lead and plug, grid bias negative 1, −4·5 V or −6 V (120 V H.T.), −6 V or −7·5 V (150 V H.T.); brown lead and plug, grid bias negative 2, −9 V. (If local station cannot be reduced sufficiently in volume, use −10·5 V or −12 V for G.B.−2.)

CIRCUIT ALIGNMENT

With the gang at maximum the scale pointer should be horizontal.

Connect signal generator to **A1** and **E** sockets, feed in a 250 m. signal, switch set to M.W. and tune to 250 m. on scale. With reaction control at minimum, adjust **C10** and **C12** for maximum output.

Reduce the output from the signal generator and increase reaction until the set is just below the oscillation point. Adjust **C15** for maximum output. If the receiver breaks into oscillation, reduce reaction slightly.

Check alignment at 550 m. and on the L.W. band.

MAINTENANCE PROBLEMS

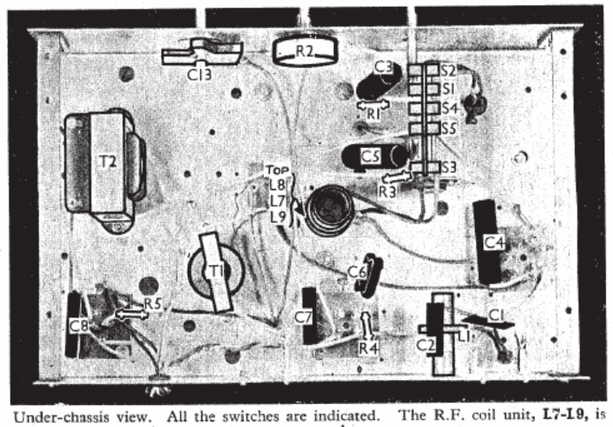
New Source of H.T. Leakage

THE receiver giving trouble was a three-valve battery, S.G., det., power type, and the owner complained that it had consumed two H.T. batteries within ten days.

The set was placed on a small table close by a window, and before making any tests I removed the table slightly from the wall. Putting a reliable milli-ammeter in series with the H.T. negative lead showed the current consumption to be 8 mA, thus leading me to believe that there was no internal short circuit. The G.B. battery also showed a full voltage and the leads were O.K., while the set was working well on the new H.T. battery I had fitted for test purposes.

After finding everything in order I was about to inform the owner that his set was O.K., having replaced the table against the wall, when I happened to place my hand on the wallpaper over the set, receiving quite a pronounced shock and also noticing the dampness of the paper. This gave me a clue, and upon examining the back of the receiver with the table in its original position I saw a loose piece of wallpaper touching the H.T.+120 plug. The plugs were of the high spring pattern in which a large portion of the plug protruded above the battery top, this portion being bare.

The solution was then obvious, as the damp condition of the wallpaper was making an earth connection, and by coming in contact with the H.T. plug was wasting the H.T. battery. This I think goes to show how strange faults may crop up to puzzle the service man on his job.—J. D. KENNY, Co. GALWAY.



Under-chassis view. All the switches are indicated. The R.F. coil unit, **L7-L9,** is unscreened.