RGD 516

Four-valve, plus rectifier, three-waveband, superhet with CR visual tuning indicator for operation from AC mains. Sockets are provided for a high-impedance pickup and a low-impedance extra loudspeaker. Made by the Radio Gramophone Development Co, Ltd, Pale Meadow Print Works, Bridgnorth, Shropshire.

THE aerial is connected by contacts on the wavechange switch to the appropriate untuned aerial coupling coil. The tuned grid coils are connected direct to the grid of the HF pentode amplifying valve V1.

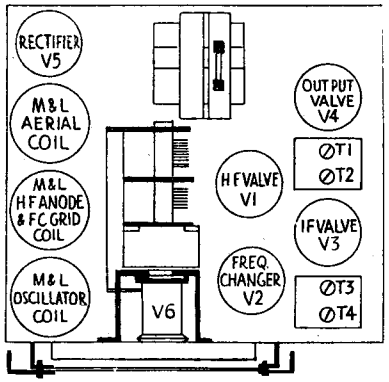
This valve has standing bias derived from R2, decoupled by C3, while the grid connects via the tuning coils to the AVC line. The screen is fed via R3 and decoupled by C2. R3 also feeds the screen of the IF amplifier V3.

The output from V1 is fed to HF transformers, the primaries of which are untuned. R4 and C4 are decoupling components for the anode circuit.

The tuned secondaries of the HF transformers connect to the grid of the triode-hexode frequency changer V2, which is permanently biased by R7 decoupled by C7. AVC is applied to the control grid of V2 from the AVC line. The screen of the valve is fed from the HT line through R5, decoupled by C6 and the squegger resistance R1.

The oscillator section of V2 has the usual grid leak and condenser R8 and C10 with the squegger suppressor R12. The anode circuit of the oscillator section of V2 incorporates the tuned circuits while feedback is established through the untuned grid coils. An intermediate frequency transformer couples the IF signals from V2 to V3, the pentode IF amplifying valve.

The IF transformer coupling these two valves incorporates a coupling coil which is switched into circuit in conjunction with the tone control components across the primary of the output transformer. This arrangement provides variable selectivity and tone control.



Top of chassis layout diagram, identifying the major components and showing the positions of the IF trimmers.

V3 derives standing bias from R14, decoupled by C16 while the grid is connected to the AVC line. The anode circuit of V3 is decoupled by R15 and C17.

A second intermediate frequency transformer passes on the signal from V3 to the signal diode of the double-diode-pentode output valve V4. The volume control R17 is the signal load while R16 and C19 are the IF filter components. The LF signal developed across the volume control is applied via the coupling condenser C20, to the grid of the pentode section of V4.

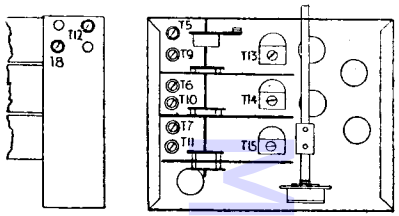
Bias for the output valve is obtained by the voltage drop across R19 and R20 both of which are decoupled by C21. The pentode section of the valve is biased by the voltage across R20, the grid being connected via the grid stopper R18 to the junction of R19 and R20, but the AVC diode has delay volts derived from the total bias voltage.

The AVC diode is fed from the anode of V3 via C18, the AVC load resistances being R24 and R25. Full AVC volts are applied to V1 and V2 via the usual decoupling components while the grids of V3 and the CR tuning indicator are fed from the voltage derived from R25.

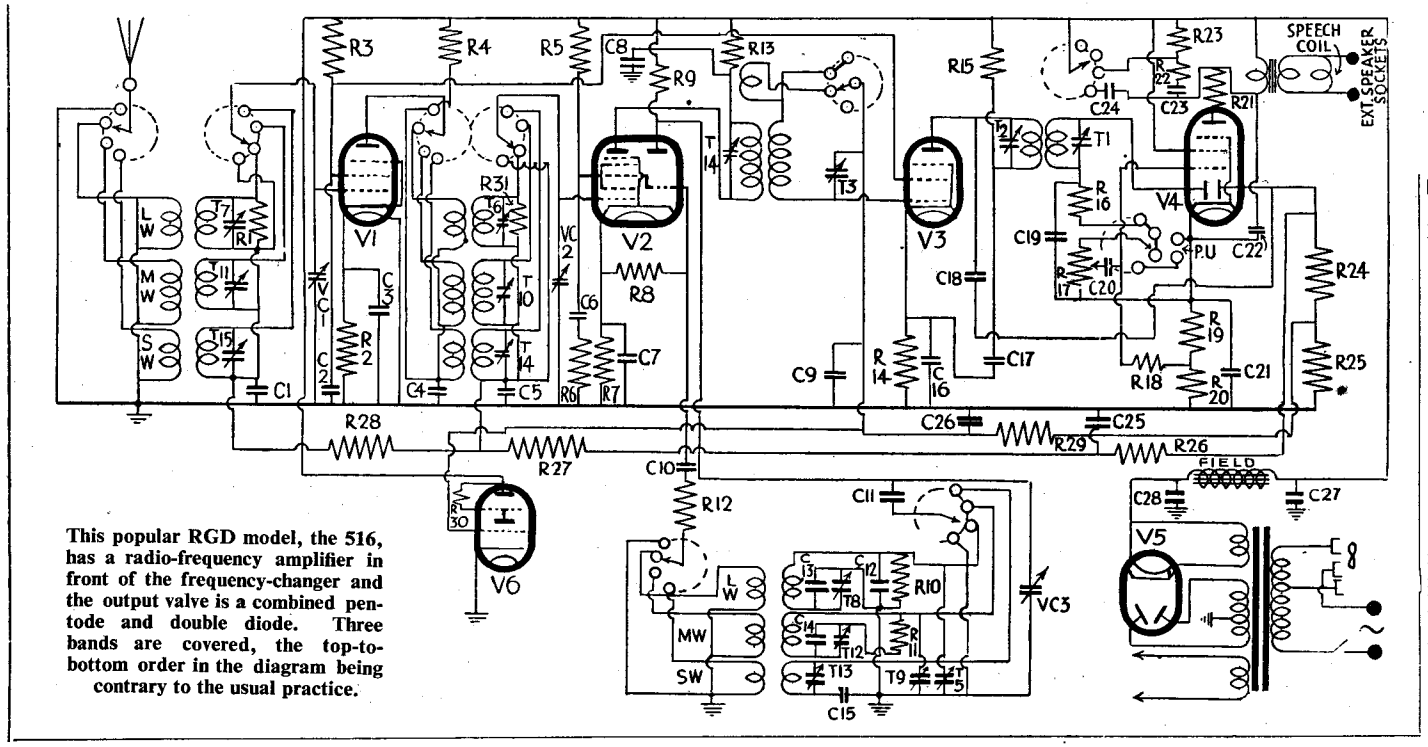
The pickup sockets are connected, when required, across the volume control R17, and as this feeds straight into the pentode section of the output valve, it is essential that any pickup used with the receiver should have a high voltage output. When the wavechange switch is adjusted to gram, the aerial is shorted to earth as are the grids of V1 and V2.

The output from V4 has permanent tone correction effected by C22 while, as has been stated, a tone control circuit is incorporated across the primary of the output transformer which couples the low impedance speaker to the output stage.

Continued on opposite page



These diagrams show where the RF and oscillator trimmers are located. The one on the left indicates the side of the chassis and the other shows the underside.



This popular RGD model, the 516, has a radio-frequency amplifier in front of the frequency-changer and the output valve is a combined pentode and double diode. Three bands are covered, the top-to-bottom order in the diagram being contrary to the usual practice.

RESISTANCES

R		Ohms
1	..	.25 meg
2	..	200
3	..	10,000
4	..	2,000
5	..	25,000
6	..	.76
7	..	160
8	..	50,000
9	..	40,000
10	..	50,000
11	..	25,000
12	..	100
13	..	5,000
14	..	200
15	..	2,000
16	..	100,000
17	..	.5 meg
18	..	1 meg
19	..	140
20	..	400
21	..	60
22	..	2,000
23	..	5,000
24	..	.5 meg
25	..	200,000
26	..	1 meg
27	..	100,000
28	..	100,000
29	..	1 meg
30	..	2 meg
31	..	.25 meg

CONDENSERS

C		Mfds	C		Mfds
1	..	.04	15	..	.003
2	..	.1	16	..	.1
3	..	.1	17	..	.1
4	..	.1	18	..	50 mmfds
5	..	.04	19	..	.0002
6	..	.04	20	..	.004
7	..	.1	21	..	20
8	..	.1	22	..	.001
9	..	.04	23	..	.02
10	..	.0001	24	..	.04
11	..	.0001	25	..	.002
12	..	25 mmfds	26	..	.002
13	..	110 mmfds	27	..	16
14	..	465 mmfds	28	..	8

WINDINGS

Field winding 1,000 *ohms.*
Output transformer primary 230 *ohms.*
Speech coil impedance at 400 *cycles* 2.5 *ohms.*
Ratio of output transformer 53 : 1.

VALVE READINGS

Taken with 1,000 *ohms-per-volt meter.*

V	Type	Electrode	Volts
1	VP4B Mullard	Anode	250
		Screen	230
		Bias	2.5
2	AC/TH1 Mazda	Anode	240
		Screen	87.5
		Bias	2.2
		Osc. anode	80–85
3	VP4B Mullard	Anode	250
		Screen	230
		Bias	2.5
4	AC/2Pen/DD Mazda	Anode	255
		Screen	270
		Bias	5.25
5	UU4 Mazda	—	—
6	TV4 Mullard	Target anode	270

Pilot lamps 6.2*v*, .2 *amp.*

RGD Model 516 *Continued from opposite page*

The HT circuit is conventional and employs a full-wave rectifying valve V5, with smoothing effected by the field winding of the loudspeaker. C28 is the reservoir condenser and C27 the smoothing condenser.

GANGING

IF Circuits.—First check that the pointer, when vertical, lies directly over the three alignment dots on the scale. The alignment dots lie on a vertical diameter and are smaller than the station dots. If the alignment of the pointer is incorrect, rectify by slackening off the four screws which clamp the scale and adjust the scale until the dots coincide with the pointer.

Switch to medium or long waves and tune receiver to the bottom end of the scale. Adjust volume control to maximum and selectivity control to maximum selectivity, *i.e.*, position 2.

Inject a signal of 460 kc via a dummy aerial to the grid of the IF valve V3, and adjust T1 and T2 for maximum output.

Next inject the signal into the grid of V2 and adjust T3 and T4 for maximum output, keeping the output from the signal generator low. Check over the adjustments of T1 and T2 while the signal generator is connected to V2.

LW Band.—Switch to LW. Inject and tune in a signal of 800 m (375 kc), via the aerial socket and suitable dummy aerial. Adjust T5, T6 and T7 for maximum output. Inject and tune in a signal at 2,000 m (150 kc), and adjust T8 while rocking gang. Readjust T5 for maximum results.

MW Band.—Inject and tune in a signal of 220 m and adjust T9, T10, T11 for maximum output.

Inject and tune in a signal of 550 m and adjust T12 for maximum output while rocking gang. Readjust T9 for best results.

SW Band.—Inject and tune in a signal of 16.5 m (16.5 m is the last point marked on the left-hand short-wave scale). Adjust T13, T14 and T15 for maximum output.

Make sure that the oscillator trimmer T13 is adjusted at the setting which corresponds to the least trimmer capacity (higher oscillator frequency).

"Service Engineer" Index

AN index to "Service Engineer" reviews from November 1941 to the present issue will be found on page ii. A complete index from 1934 onwards was contained in the October 1941 issue.

INVICTA

650 Portable and B29P Transportable

Four-valve, two-waveband, battery superhet, incorporating AVC and automatic grid bias. A 90-volt HT battery is employed with the 650 and a 120-volt battery with the B29P. Made by Invicta Radio, Ltd, Parkhurst Road, London, N7.

THE MW and LW frame aerials are connected directly to the wave-change switch and thence to the VC1 section of the two-gang tuning condenser. Signals are passed via the blocking condenser C3 to the control grid of V1, the octode frequency changer. The grid of this valve is fed from the AVC line via R2, while R1, decoupled by C2, feeds the screening grid from the HT positive line. This supply line is decoupled by C1.

The oscillator section of V1 employs a tuned grid circuit with R3, C5, the grid leak and condenser. The oscillator anode is connected via the reaction windings direct to the HT line.

The IF signal from V1 is coupled by an iron dust cored intermediate frequency transformer IFT1. The inductances are set in the factory and have fixed capacities, C7, C8, across them.

The secondary of this transformer feeds directly into the grid of the IF amplifying pentode V2, which has AVC applied to it. The screening grid of the valve is fed from the HT line via R4 which is decoupled by C9.

A second IF transformer, IFT2, has variable inductance trimming and hands on the signal to the signal diode of the double-diode-triode V3. R7 is the signal load resistance while R5, C12 and C13 form the IF and HF filter network. From R7 the LF signal is passed, via C14, to the volume control R8, and thence to the grid of the triode section of V3.

The AVC diode of this valve is fed from the secondary of the IFT2 via C15, the AVC load resistance being R11. This is returned to the junction of the bias potentiometer R10, R12 in the HT negative line thus providing delay volts. This network is decoupled by C16.

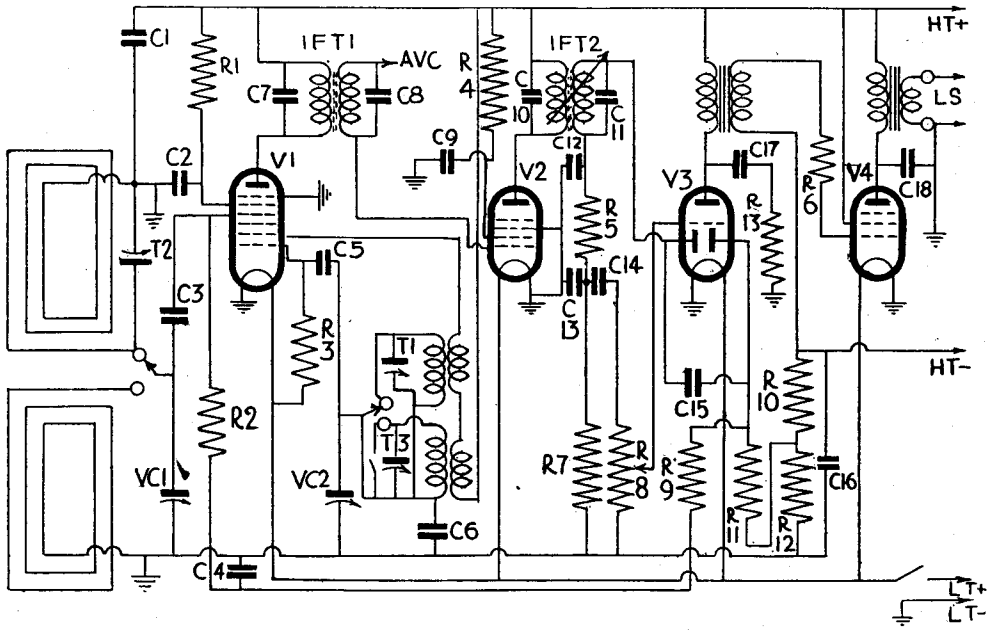
The primary of the intervalve transformer is connected directly in the anode circuit of V3, while C17 and R13 provide a degree of permanent tone correction. The secondary of the intervalve transformer connects via a grid stopper R6 to the grid of the pentode output valve V4, and to the maximum negative end of the bias network R10, R12.

C18 provides tone correction for the anode circuit of V4 which is coupled to the low impedance loudspeaker by an output transformer.

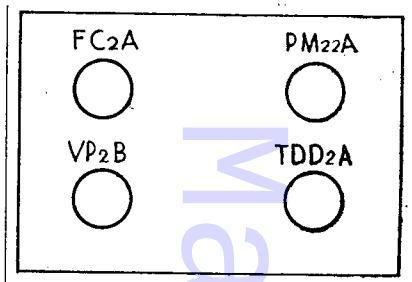
GANGING

IF Circuits.—Inject a 465 kc signal into the grid of V1 via a dummy aerial consisting of a .1 mfd condenser in series with the service oscillator lead and a 100,000-ohm resistance from V1 grid to earth. As already stated, the IFT1 trimmers are permanently set, but the trimmers of the IFT2 should be adjusted for maximum output. This transformer is located at the edge of the chassis next to the gang condenser.

MW Band.—First see that the pointer is horizontal when gang is fully closed. Adjust the service oscillator to 250 m and lay the service oscillator output lead near to the MW frame aerial.



The same four-valve battery circuit is used in both these Invicta models. A two band superhet arrangement is employed, with the input coils forming the frame aerial.



How the four valves are located on the Invicta chassis.

Switch the receiver to MW and set pointer to 250 m, and adjust the oscillator trimmer T1 for maximum output. This trimmer is the top one of the three trimmers located near the gang condenser. Then adjust T2 for maximum output; this trimmer is the bottom one of the three trimmers.

LW Band.—Switch receiver to LW. Inject and tune in a signal of 1,200 m and adjust T3 for maximum output. There is no trimmer across the LW frame aerial.

CONDENSERS

C		Mfd	C		Mfd.
1	..	1	10	..	.0001
2	..	.1	11	..	.0001
3	..	.00015	12	..	.00015
4	..	.1	13	..	.00015
5	..	.00015	14	..	.05
6	..	.000657	15	..	.00002
7	..	.0001	16	..	10
8	..	.0001	17	..	.01
9	..	.1	18	..	.005

VALVE READINGS

Readings taken with a 1,000-ohm-p-v meter. No signal input, volume control at maximum, with a 120-volts battery. (Model B29P)

V	Type	Electrode	Volts.	Mas
1	FC2A	Anode	115	.5
	Mullard	Osc. Anode	115	2.5
		Screen	45	.75
2	VP2B	Anode	115	1.5
		Screen	45	.5
3	TDD2A	Anode	110	2.5
4	PM22A	Anode	110	3.0
		Screen	115	.5

RESISTANCES

R		Ohms	R		Ohms
1*	..	10,000	8	..	1 meg
2	..	.25 meg.	9	..	1 meg
3	..	40,000	10*	..	150
4	..	100,000	11	..	1 meg
5	..	60,000	12	..	100
6	..	100,000	13	..	20,000
7	..	.5 meg			

*In Model B29P, R1 is increased to 40,000 ohms, and R10 to 330 ohms, for use with 120-volts battery.