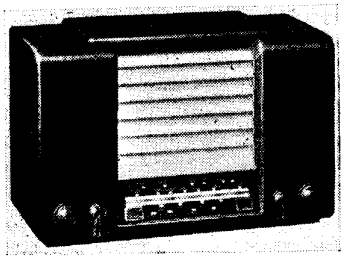
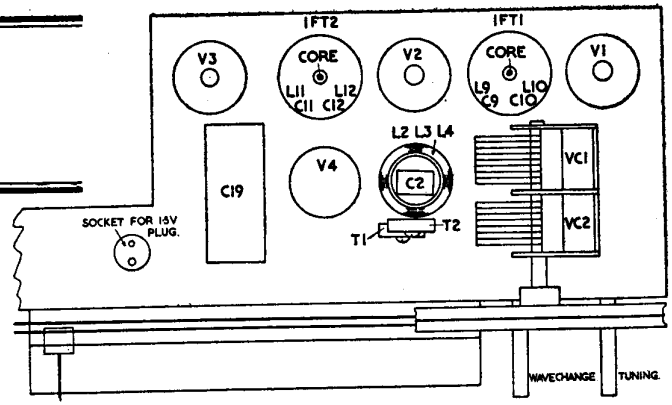
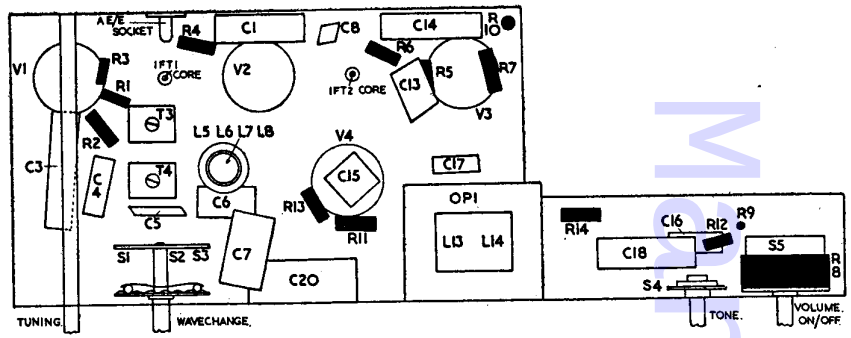
INVICTA 20



Four-valve, two-waveband, battery-operated superhet with internal frame aerial and sockets for external aerial and earth. Uses standard type 90 V HT battery and either 1.5 V battery or 2 V accumulator for LT supply. Brown plastic cabinet. Made by Invicta Radio Ltd., Parkhurst Road, London, N7.



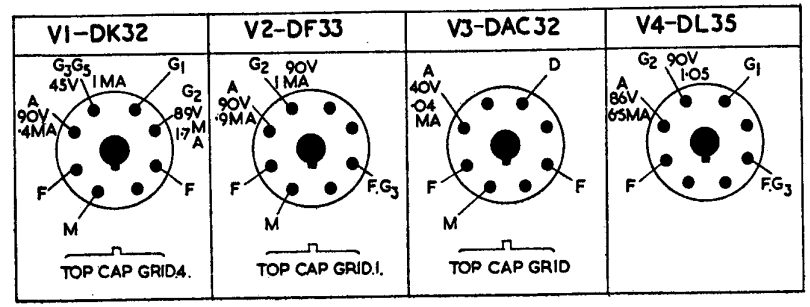


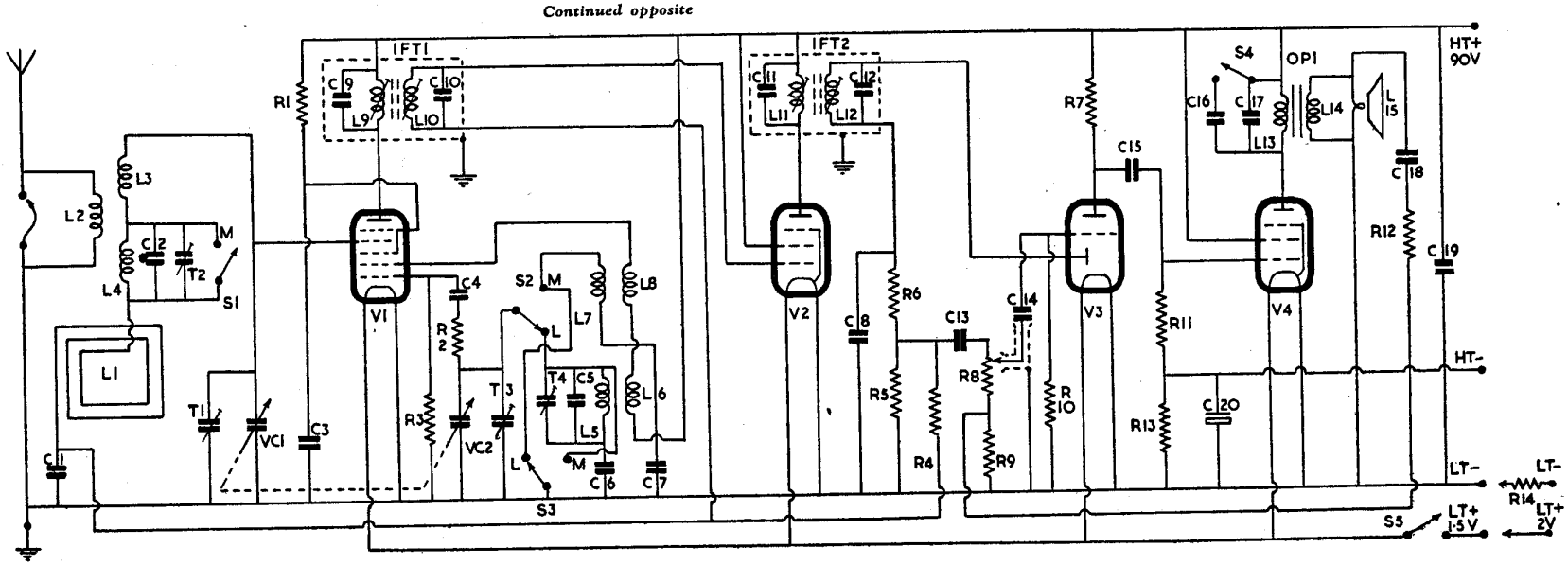
AERIAL. A frame aerial L1 provides for local station reception. L1, together with loading coils L3 (MW), L4 (LW), are connected to tuning capacitor VC1 and to control grid of heptode frequency-changer V1. T1 (MW) and T2, C2 (LW) are trimmers. S1 shorts out L4 (LW) when wavechange switch is in the MW position. AVC from R4 is fed through the tuned coils to V1 and is decoupled by C1.

When an external aerial is used the signal is coupled to the tuned coils by L2. L2 is shorted out when the aerial plug is withdrawn from its socket. On some models a wander lead fitted with a plug is supplied instead of the plug-switch type aerial socket. On these models this wander plug has to be inserted in the aerial socket to short circuit L2.

Screen voltage of V1 is obtained from R1 decoupled by C3. L9, C9, which form the primary of IFT1, are in the anode circuit.

Continued opposite





RESISTORS

R	Ohms	Watts
1	47K	¼
2	2.2K	¼
3	100K	¼
4	5M	¼
5	560K	¼
6	22K	¼
7	560K	¼
8	1M Potentiometer with Switch	
9	4.7K	¼
10	5M	¼
11	1M	¼
12	22K	¼
13	720	¼
14	2 Special	1

INDUCTORS

L	Ohms
1	.5
2	70
3	1.75
4	13.25
5	4
6, 8	together 195
7	2
9	8
10	8
11	8
12	8
13	600
14	.25
15	2.5

CAPACITORS

C	Capacity	Type
1	.05	Tubular 450V
2	22pF	Silver Mica
3	.05	Tubular 450V
4	150pF	Silver Mica
5	47pF	Silver Mica
6	180 pF	Silver Mica
7	560pF	Silver Mica
8	100pF	Silver Mica
9	70pF	Silver Mica
10	70pF	Silver Mica
11	70pF	Silver Mica
12	70pF	Silver Mica
13	.01	Mica
14	.005	Tubular 500V
15	.01	Mica
16	.01	Mica
17	.005	Tubular 500V
18	.05	Tubular 500V
19	1	Tubular 250V
20	50	Electrolytic 12V

INVICTA 20

Oscillator is connected in a series-fed tuned-grid circuit. L7 (MW), L5 (LW) are the grid coils and S2 switches them to tuning capacitor VC2, and through limiter resistor R2 and coupling capacitor C4, to oscillator grid of V1. T3 (MW), T4, C5 (LW) are trimmers and C7 (MW) C6 (LW) are padders.

Automatic bias for oscillator grid is developed on C4 with R3 as leak resistor. The unused tuned coils are earthed to chassis by S3. The HT is fed through the series-connected, inductively coupled, reaction coils L8 (MW), L6 (LW to the oscillator anode of V1.

IF amplifier operates at 465 kc/s. L10, C10, the secondary of IFT1, feed signal, and AVC voltages from R4, to grid of IF amplifier V2. Screen voltage is obtained direct from HT line. Suppressor grid is internally connected to negative side of filament. L11, C11, which form the primary of IFT2, are in the anode circuit.

Signal rectifier. L12, C12, the secondary of IFT2, feeds signal to diode of V3. R5 is the diode load resistor and R6, C8 comprise an IF filter.

Automatic volume control. The DC component of the rectified signal is used for AVC and is fed by R4 to g4 of V1 and g1 of V2. C1 is decoupling capacitor.

AF amplifier. C13 feeds rectified signal to the volume control R8 and thence through C14 to grid of triode section of V3. Negative feedback, from secondary L14 of the output matching transformer OP1, is applied through C18, R12 to R9 and thence through R8, C14 to grid of V3. Negative bias for grid is developed on C14 with R10 as leak resistor. R7 is the anode load resistor.

Output stage. C15 feeds signal to grid of pentode output valve V4. R11 is its grid resistor and negative bias, developed across R13 in the HT negative lead to chassis, is fed through R11 to the grid. C20 is bias decoupling capacitor. Screen voltage is obtained direct from HT line. Suppressor grid is internally connected to negative side of filament.

L13, the primary of output matching transformer OP1, is in the anode circuit. C16, C17, with S4, provide a two-position tone control. L14, the secondary of OP1, feeds into a 6½ in. PM loudspeaker L15. Negative feedback from L14 is applied through C18, R12, R8, C14 to grid of V3.

High tension is provided by standard 90V battery such as Ever Ready portable 61 or Drydex H1146. The average HT consumption is 12.5 mA. C19 is HT bypass capacitor.

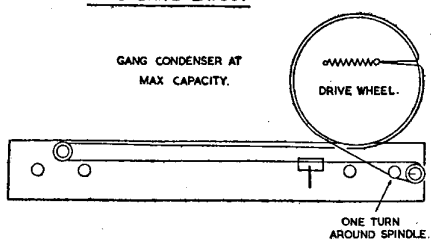
Low tension of 1.5V is obtained from Ever Ready Alldry 1 or Drydex H1155 dry type battery or alternatively from a 2V accumulator through dropper resistor R14. The average LT consumption is 250 mA. S5, which is ganged to the volume control spindle, is the ON/OFF switch.

Chassis removal. Remove the four control knobs—the circular knobs are held by a grub screw and the remaining pair are push-on type. Remove rear panel of cabinet on which is mounted the frame aerial L1 and unsolder the two leads to it. Unsolder the two leads to loudspeaker. Remove the three chassis bolts on underside of cabinet.

Chassis can now be withdrawn from cabinet.

When replacing chassis see that the rubber washers are in position correctly in the three chassis bolt holes at bottom of cabinet.

CORD DRIVE LAYOUT.



TRIMMING INSTRUCTIONS

Apply signal as stated below	Tune Receiver to	Trim in Order stated for Max. Ouput
(1) 465 kc/s to top cap V1, via .1 mF	—	Core L12, L11, L10, L9
(2) 1.5 mc/s to frame AE via A loop placed near	200 metres	T3, T1
(3) 600 kc/s as above	500 metres	Check dial calibration
(4) 300 kc/s as above	1000 metres	T4, T2
(5) 150 kc/s as above	2000 metres	Check dial calibration

PILOT BS648—*from page 18*

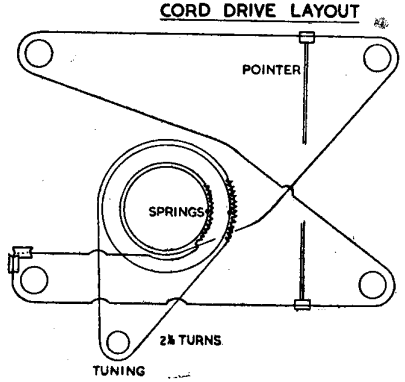
The field winding L35 of the energised loudspeaker, together with R26 and capacitors C37, C38 C39, provide smoothing of the HT. C7 is RF bypass capacitor.

Heaters of V1 to V5 and dial lights obtain their current from L38, one side of which is earthed to chassis. L39, the input primary of MT1, is tapped for 110-130 ; 200-225; 230-250 volt 40 to 100 c/s AC mains. C35 is mains filter capacitor.

S10, which is ganged to the tone control spindle is the on/off switch. On some models the ON/OFF switch may be ganged to the volume control.

Chassis removal. Remove the four push-on control knobs and rear panel of cabinet. Remove the four chassis bolts on underside of cabinet and withdraw chassis as far as loudspeaker leads will permit. Loosen the nuts fastening clamps of loudspeaker and rotate clamps so that speaker can be removed from baffle.

CORD DRIVE LAYOUT



SUPPRESSION OF DOMESTIC APPLIANCES

Continued from page 13

upon the circuit of the appliance to be suppressed. Typical arrangements are shown (Figs. 7, 8) for cases in which the load is close to the controlling contacts and when remote from them (Fig. 9).

IGNITION

Ignition systems on motor vehicles form a class of their own, so far as interference with radio reception is concerned. The remedy is simple and consists merely of a resistor inserted in the high-tension circuit to damp out the radio frequency oscillations which are normally set up by the spark discharge.

When suppression is required only for the benefit of those who live beside the roads along which the vehicle is to be driven, one resistor of about 10,000 ohms, in the lead between the coil and the distributor, is sufficient.

When it is desired to operate a receiver on the vehicle, further resistors must be used, one in each plug lead, close to the sparking plug. It may also be necessary to screen the high-tension leads and to use a capacitor suppressor at the contacts in the low-tension circuit.

Other devices on a motor-vehicle which may interfere with a car-radio are the dynamo, windscreen-wiper motor and voltage regulator. The first two of these can be dealt with by the methods already outlined. If the voltage regulator is of an interfering type, however, suppression may prove difficult, and as such regulators are easily put out of adjustment, it is usually advisable to consult the makers, rather than to attempt suppression by methods which may cause expensive damage.

FLUORESCENT LAMPS

A frequent offender nowadays is the fluorescent lamp, although only a small percentage of these lamps cause serious interference. No adequate explanation for the occurrence of this interference is as yet forthcoming, and all that can be said is that it is a function of the lamp itself, and not of its associated circuit.

Most lamps never cause interference, and those that do may not do so until they have been in use for a considerable time. Often, the interference may be eliminated by reversing the lamp in its holder, although this may sometimes afford only a temporary respite. A cheap and effective method of suppression by small capacitors is shown in Fig. 10.

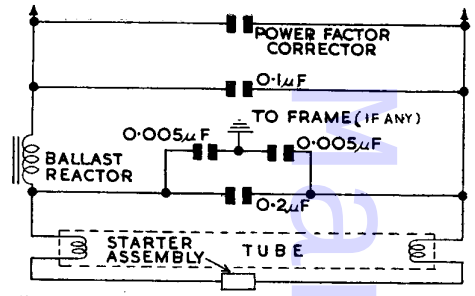
CONVERTERS AND FURNACES

The majority of appliances in general use have now been covered, and there is little space in which to deal with special considerations. Rotary converters should be treated as motors, but may require inductor-capacitor filters in their outputs, and may also require to be screened. Oil-burning furnaces for domestic hot-water systems have recently become popular, and can often cause havoc with radio and television reception. A combination of the treatments given for motors, thermostats and ignition systems is called for.

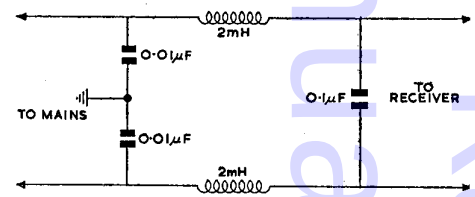
SUPPRESSION AT RECEIVER

Suppression at the receiver, in many cases, may not be possible but where it can be applied it may be the easiest and cheapest way out of a difficulty.

Interference can reach a receiver in three ways, namely, via the aerial-earth system, via the mains leads and by direct pickup on the receiver components.



(10) A circuit to try where a fluorescent lamp causes interference



(11) Filter for insertion in mains lead to a radio set

Disconnection of the aerial and earth leads proves whether the interference is being picked up by the aerial systen. In making this test, the receiver should not be tuned to a signal, so as to rule out any possibility of misleading results arising from the operation of the automatic gain control. If the interference proves to be due entirely to aerial pick-up, some improvement may be possible, by fitting an anti-interference aerial.

If, on the other hand, interference is found to be due to direct pickup by the receiver components, or that it is being conducted into the receiver by way of the mains leads, the remedies are fairly straightforward. Adequate screening of the receiver will effect a cure in the first instance, while a radio-frequency filter inserted in the mains leads will generally provide an answer for the second case. A typical filter circuit is seen in Fig. 11.

CONCLUSION

Suppression of electrical interference is largely a matter of applying elementary principles of radio-frequency propagation together with a measure of common sense. Remember that all conductors possess inductance, and that inductance is a bad thing to have in series with a capacitor which is doing its best to act as a short circuit at radio-frequencies. Remember also that a suppressor which is too far removed from the offending appliance will be by-passed by the radiation from the unsuppressed wiring which will re-energise the wiring beyond the suppressor. These are two of the points which are most commonly overlooked.

Finally, bear in mind that a great deal of interference is caused by faulty apparatus and wiring—loose connections and inadequate bonding for example. The cure is obviously to clear the fault but the difficulty in such cases is to find it. A thorough overhaul of house-wiring, checking up on switches, lampholders and such like often pays good dividends.