MODEL 600A, PROJECTION RECEIVER

Suitable for use in either London or Birmingham areas, the Philips Model 600A is a table-type projection receiver designed for operation from A.C. mains supplies of 220–245 volts at 50 c/s.

Conversion from one transmitter frequency to the other is accomplished by making some slight internal circuit adjustments.

The Picture Tube

The external surface of the neck and cone of the tube is coated with a graphite preparation which is earthed. This coating, together with the internal metallising of the tube, forms a capacitance of about 450 pF., which serves as the final smoothing of the E.H.T. supply. Flash-over or leakage from the anode is prevented by the surrounding glass cup.

The tube has a metal-backed screen. The glass face of the tube forms the first lens of the optical system.

X-Ray Protection

For the purpose of normal adjustment and centring, when it is necessary to view the tube outside the optical unit, the tube should be operated at the minimum brightness, consistent with the examination of the picture. No protection against X-ray is then necessary.

Should it be desired, however, to operate the tube outside the optical unit at normal brightness, the use of a lead-glass shield is recommended. The location and dimensions of the shield should be such as to interrupt the X-rays between the tube and the observer. The equivalent lead thick-

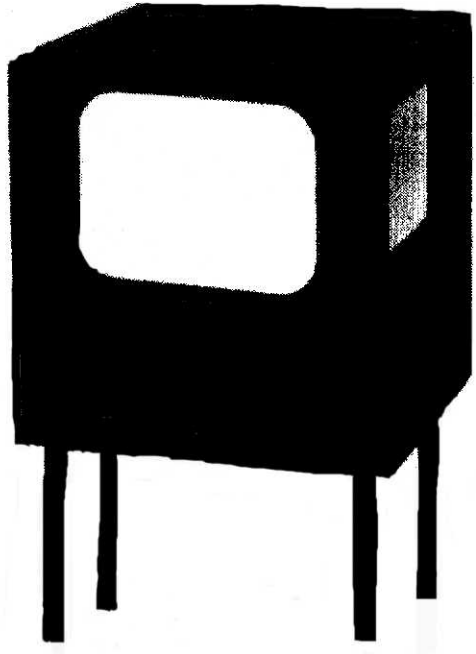


FIG. 15.—PHILIPS TABLE MODEL 600A

ness of the shield must be less than 0·5 mm. This precaution is desirable in the region within 40 in. of the tube screen, and is necessary only when operating the tube outside the optical unit.

The Optical Unit

Some optical units are made using Metric screws, whilst others utilise American-type threads. The two types may be identified by the fact that units with metric threads have an " M " marked on the corrector lens plate, whilst those using American threads are not marked.

The optical system employed is a " folded " version of the mirror-lens system originally developed by Schmidt for use in astronomical telescopes.

The principle of the optical system can best be followed by reference to Fig. 16, which shows a diagrammatic section of the optical unit. Light is projected forward from the screen of the picture tube and is collected by the spherical mirror *D*. It is then reflected as a convergent beam on to the plane mirror *E* mounted at 45° to the axis of the tube. (There is a central hole in this mirror through which the end of the cathode-ray tube passes.) The light is reflected from mirror *E* still as a convergent beam, through the corrector lens *F*, and on the second mirror *G*, from where the convergent beam is passed to the viewing screen *H*. It will be clear from this description and Fig. 16 that the picture is only in focus at the face of the tube and at the screen, and that the distances between the various optical elements are important.

The main function of the corrector lens is to correct for spherical aberration.

The body of the optical unit is a light-alloy casting (see Fig. 18, page 112) in which the spherical mirror (1), plane mirror (2), and corrector lens (3) are permanently fitted. These optical elements are accurately aligned in the factory and need no further adjustment.

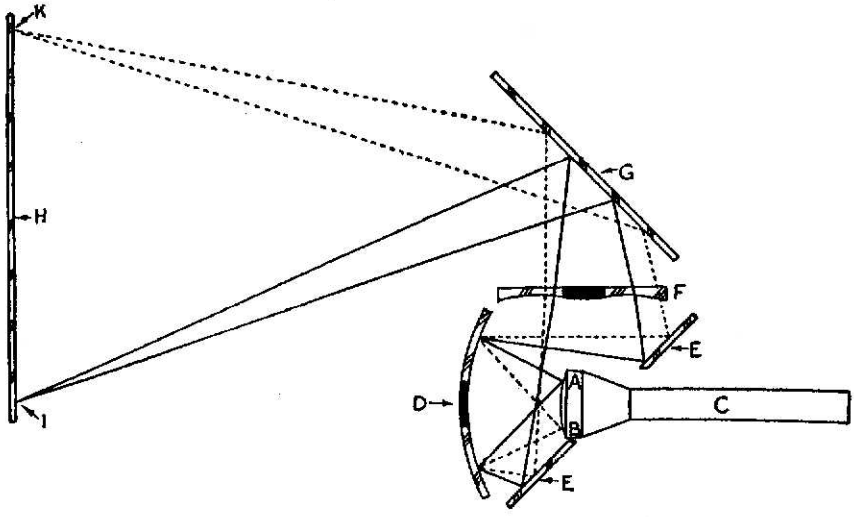


FIG. 16.—DETAILS OF THE OPTICAL UNIT

C, projection tube; *D*, spherical mirror; *E*, mirror; *F*, corrector lens; *G*, mirror; *H*, screen.

Focusing

Positioning and focusing of the picture, in so far as they are accomplished mechanically, are effected by tilting the axis of the focus coil, with respect to the axis of the cathode-ray tube and by shifting the tube with respect to the spherical mirror.

The cathode-ray tube mounting, the deflector coils, and the focus coil are attached to a yoke (4) which is held in its pre-set adjustment against spring pressure. In order to prevent movement of the yoke and possible damage under severe mechanical vibration during transit, a locking plate (5) is provided. This plate, which is painted red, must be removed before making adjustments, and must be replaced when the adjustment is completed, if the set is to be transported.

A locking screw (6), also coloured red, is fitted to prevent movement of the focus coil, and thus to remove the risk of fracturing the neck of the cathode-ray tube under conditions of severe vibration.

All optical surfaces are sealed against ingress of dust by the rubber grommet (7).

CIRCUIT DESCRIPTION

Cathode-ray Tube and Valves

These components are all of Mullard manufacture and the various types employed in this model are as follows:

V1	PZ30	V14	UF42
V2	PZ30	V15	UF42
V3	UAF42	V16	UF42
V4	PL38	V17	UB41
V5	EY51	V18	PL83
V6	EY51	V19	UF42
V7	EY51	V20	UCH42
V8	MW6-2	V21	UL44
V9 *	UF42 or UAF42	V22	UY41
V10	UAF42	V23	UCH42
V11	UB41	V24	UL42
V12	UL41	V25	EB91
V13	UF42		

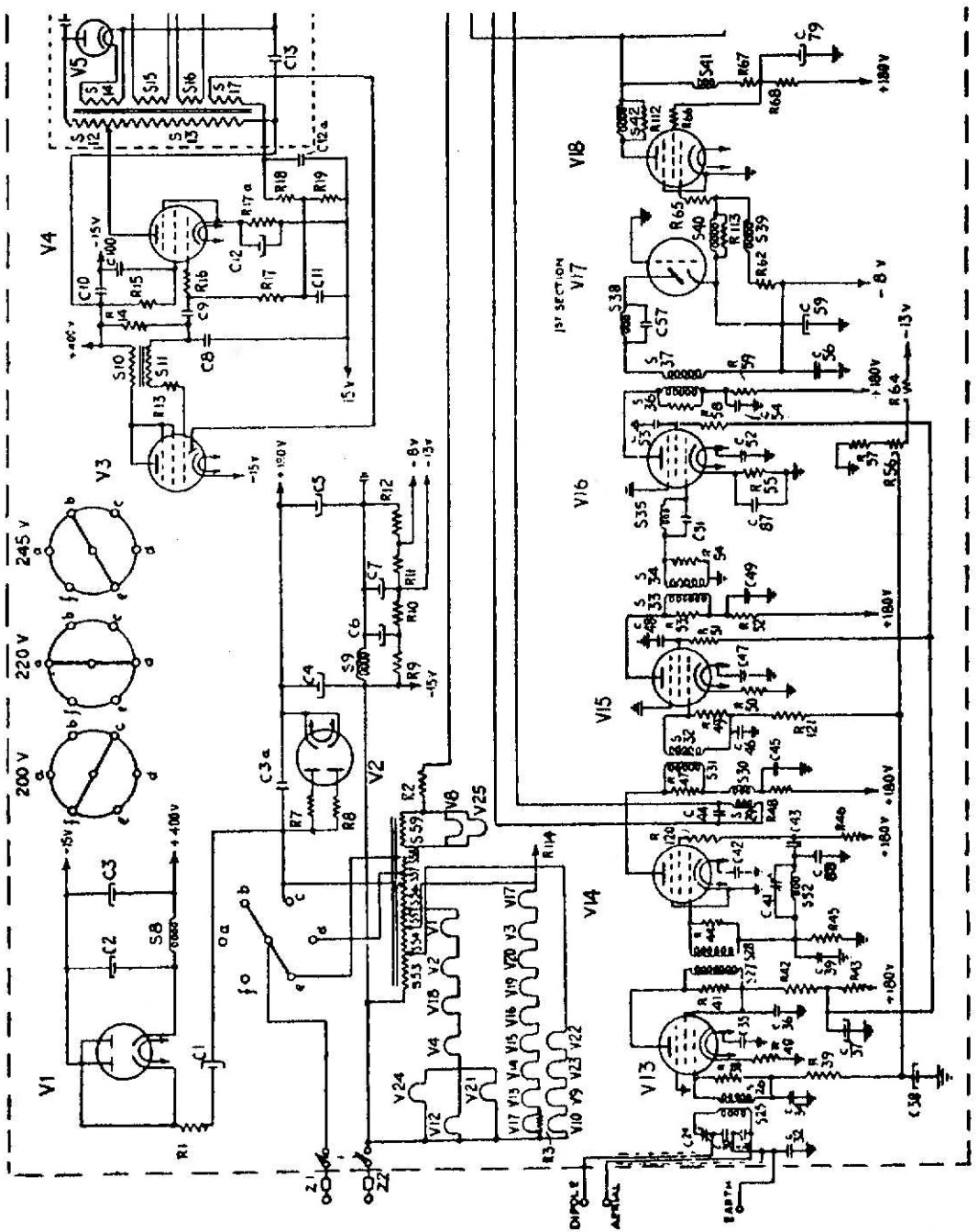
* See Note 3 of Modifications, page 122.

Vision Circuit

The aerial is fed to the signal grid of V13 (UF42) via the coupling transformer S25, S26, and the network of the capacitors C29, C30 and C31. (S26 is damped by R38 to produce the required bandwidth.) These capacitors match the circuit to the balanced line input.

C30 and C31 are centre tapped to earth via C32, which also isolates the aerial circuit from the chassis. S26 is tuned by the stray circuit capacitance. V13 acts as a sound and vision amplifier, and the signal is passed from its anode via the coupling transformer S27, S28 to the control grid of V14 (UF42). This valve acts as a mixer, the oscillator coil being S52, tuned by C41.

The oscillator frequency is lower than the sound- and vision-carrier frequencies. For the London transmission it is 31·7 Mc/s., and for


245 V
220 V
200 V
V1
V2
V3
V4
V5
V6
V8
V13
V14
V15
V16
V17
V18
V21
V24
V25
1st SECTION
+180V
+100V
-15V
-8V
-13V
EARTH

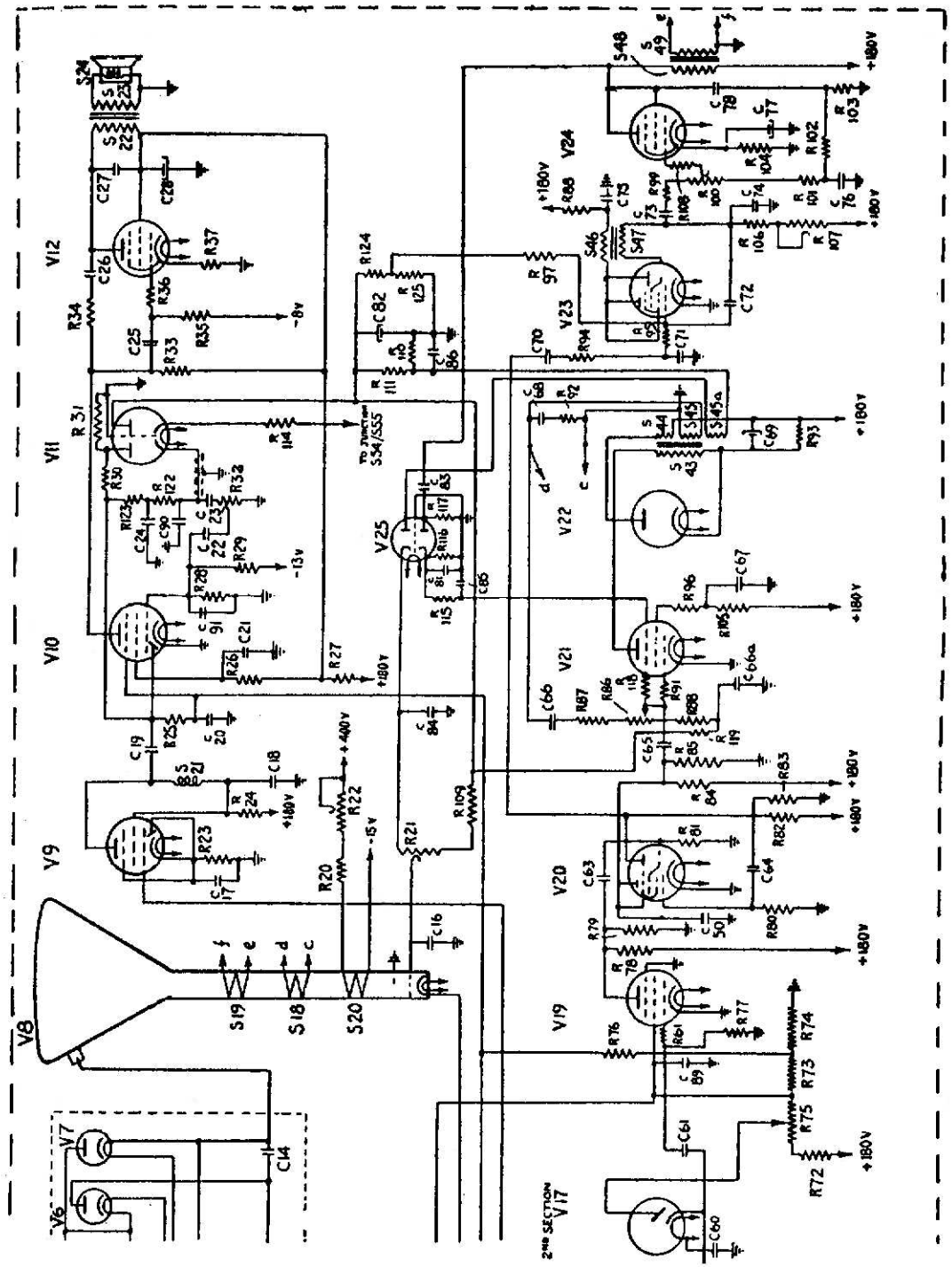


FIG. 17.—CIRCUIT DIAGRAM OF PHILIPS PROJECTION MODEL 600A

The component values are given on the following page.

Component Values for Model 600A.

Capacitors.

C1	100 mfd.	C37	65 mfd.	C86‡	10,000 pF.	R32	0·1M
C2	32 mfd.	C38	5 mfd.	C87	10,000 pF.	R33	0·1M
C3	32 mfd.	C39	330 pF.	C88	33 pF.	R34	2·7M
C3A	22,000 pF.	C41	3–30 pF.	C89	0·1 mfd.	R35	0·82M
C4	100 mfd.	C42	1,000 pF.	C90	220 pF.	R36	10,000
C5	65 mfd	C43	220 pF.	C91	150 pF.	R37	33
C6	50 mfd	C44	8·2 pF.	C92 *	330 pF.	R38	(London Area only) 8,200
C7	50 mfd	C45	10,000 pF.			R39	1,500
C8 *	2,700 pF.	C46	10,000 pF.			R40	47
C9	12,000 pF.	C47	10,000 pF.	*Resistors.*		R41	12,000
C10	0·1 mfd.	C48	10,000 pF.	R1	200	R42	1,500
C10A	0·5 mfd.	C49	10,000 pF.	R2	0·47M.	R43	1,000
C11	47,000 pF.	C50	330 pF.	R3	800	R44	(London Area only) 8,200
C12	50 mfd.	C51	270 pF.	R6§	{Cold 2,000–3,500 {Hot 220 approx.	R45	0·1M
C12A	27,000 pF.	C52	10,000 pF.			R46	22,000
C13	5,000 pF.	C53	10,000 pF.	R7	68	R47	10,000
C14	2,500 pF.	C54	10,000 pF.	R8	68	R48	1,500
C15	2,500 pF.	C56	10,000 pF.	R9	2,200	R49	6,800
C16	0·1 mfd.	C57	270 pF.	R10	1,800	R50	47
C17	10,000 pF.	C59	5 mfd.	R11	10,000	R51	1,500
C18	10,000 pF.	C60	10,000 pF.	R12	15,000	R52	1,500
C19	6·8 pF.	C61	68,000 pF.	R13	39	R53	12,000
C20	0·1 mfd.	C62	0·47 mfd.	R14	0·39M	R54	5,600
C21	47,000 pF.	C63†	1,000 pF.	R15	5,600	R55	180
C22	10,000 pF.	C64†	1,000 pF.	R16	39	R56	0·1M
C23	0·1 mfd.	C65	33 pF.	R17	0·15M	R57	27,000
C24	0·1 mfd.	C66	33,000 pF.	R17A	220	R58	1,500
C25	4,700 pF.	C66A	3,300 pF.	R18	0·62M	R58A	12,000
C26	1,000 pF.	C67	0·1 mfd.	R19	0·68M	R59	1,500
C27	22,000 pF.	C68	100 pF.	R20	2,800	R61	10,000
C28	65 mfd.	C69	8 mfd.	R21	2M	R62	4,700
C29	3–30 pF.	C70	4,700 pF.	R22	5,000	R64	0·22M
C30	(London Area) 150 pF. (Birmingham Area) 82 pF.	C71	3,300 pF.	R23	270	R65	39
		C72	10,000 pF.	R24 ‖	(When V9 is UAF42) 8200 *or* (When V9 is UF42) 1,500	R66	39
		C73	0·1 mfd.			R67	3,300
		C74	0·1 mfd.			R68	1,000
		C75	0·47 mfd.			R72	3,300
C31	(London Area) 150 pF. (Birmingham Area) 82 pF.	C76	47,000 pF.	R25	1·5M	R73	10,000
		C77	100 mfd.	R26	0·39M	R74	4,700
		C78	0·1 mfd.	R27	800	R75	10,000
		C79	65 mfd.	R28	1·5M	R76	10M
		C81	10,000 pF.	R29	10M	R77	10M
C32	4,700 pF.	C82	8 mfd.	R30	0·12M	R78	56,000
C34	1,000 pF.	C83	0·1 mfd.	R31	0·12M	R79	10,000
C35	1,000 pF.	C84	10,000 pF.				
C36	1,000 pF.	C85	10,000 pF.				

R80	1·5M	R110¶	0·68M		
R81	1·5M	R111¶	0·18M		
R82	33,000	R112	18,000		
R83	27,000	R114	12,000		
R84	33,000	R115	1·8M		
R85	27,000	R116	5·6M		
R86	30,000	R117	0·39M		
R87	22,000	R118	0·47M		
R88	6,800	R119	6·8M		
R91	27	R120	33		
R92	1,000	R121	1,500		
R93	2 × 22,000	R122	0·12M		
R94	0·1M	R123	0·15M		
R95	10,000	R124	0·1M		
R96	27	R125*	15,000		
R97	1M	R126 **	33		
R98	47,000	R127 ††	150		
R99	0·47M				
R100	1M				
R101	1·5M				
R102	15,000				
R103	39,000				
R104	1,200				
R105	2 × 5,600				
R106	0·47M				
R107	0·5M				
R108	27				
R109	1M				

* See modifications, note 7.
§ See modifications, note 6.
** See modifications, note 5.
† See modifications, note 2
‖ See modifications, note 3.
†† See modifications, note 4.
‡ See modifications, note 1.
¶ See modifications, note 1.

Birmingham 48·45 Mc/s. Bias for V14 is obtained due to the grid current through R45. The oscillator is of the Colpitts type.

The rectified vision signal is passed via S40, R113, R65, to the control grid of the video amplifier valve V18 (PL83), the output from the anode of which is passed to the cathode of the cathode-ray tube V8, via S42, R112. The cathode of V8 is shunted by the noise-limiter diode V17 (sound section) which, for normal signals, is non-conducting. When noise surges appear, the diode becomes conducting and shunts the cathode of V8. The point at which this occurs depends on the potential applied to the diode anode, which is governed by the resistor R75.

Sync. Separator

The video signal is fed from the anode of V18 into the signal grid of V19 (UF42), which acts as a sync. separator, followed by V20 (UCH42), in which the line and frame pulses are separated and passed on to their respective time bases.

Line Time Base

The sync. pulses are fed to the signal grid of V21 (UL44) via C65, R91. V21 is the oscillator valve, feedback being via C66, R87, and frequency control being by R86. The " booster " diode V22 (UY41) rectifies pulses via S44, which are stored in C69, thus giving extra voltage for the anode of V21.

Frame Time Base

The sync. pulses are fed via C70 to the signal grid of V23 (UCH42), which acts as a blocking oscillator, with V24 (UL41) as the amplifier. R100 is the amplitude control, and R107 is the frequency control.

Safety Circuit

The A.C. potential across S53, S54 is rectified by one-half of V11. The resultant D.C. potential appears across C82. This negative voltage blacks out the cathode-ray tube when applied to the grid via R109 and the brightness control R21. At the same time, the line-oscillator valve V21 is also rendered inoperative, by applying the same voltage to its grid via R119, R88. Assuming the frame time base to be operating, the output from V24 is fed to one anode of V25, via C83.

The rectified positive output appearing across C81 is applied to g1 and g3 of V21, thus cancelling the negative potential applied to this valve from C82. This permits V21 to oscillate, and the voltage generated in S45a is fed to the remaining diode of V25, the positive rectified output across C84 being applied to the grid of the tube also in opposition to the voltage from C82.

Thus, if failure occurs in either of the time bases, no positive potential is developed from the line time base to cancel out the negative potential produced by V11.

E.H.T. Supply

The output from the 1000 c/s. oscillator V3 (UAF42) is amplified by V4 (PL38) and fed via S12, S13, to the voltage-trebler circuit V5, V6 (EY51). The diode in V3 rectifies the voltage from S17 which appears as a D.C. potential across R18, R19, C12a, and this is applied to the control grid of V4, and thus improves the regulation of the E.H.T. supply unit.

ADJUSTMENTS AND GENERAL SERVICING

The positions of the optical elements are pre-set in the factory. Electrical focus, linearity and picture centring differ in no way from a normal direct-viewing receiver. Focusing the picture on the viewing screen is effected by adjusting three screws only.

(A) To Fit or Replace the Cathode-ray Tube

(*a*) Remove the locking plate (5) (Fig. 18) by withdrawing the four fixing screws.

(*b*) Loosen the three screws (16), (17) and (18) (Fig. 22) securing the coil assembly to the yoke (4).

(*c*) Turn the coil assembly clockwise until movement is checked by the stop (19). The screws (16), (17) and (18) now coincide with three crescent-

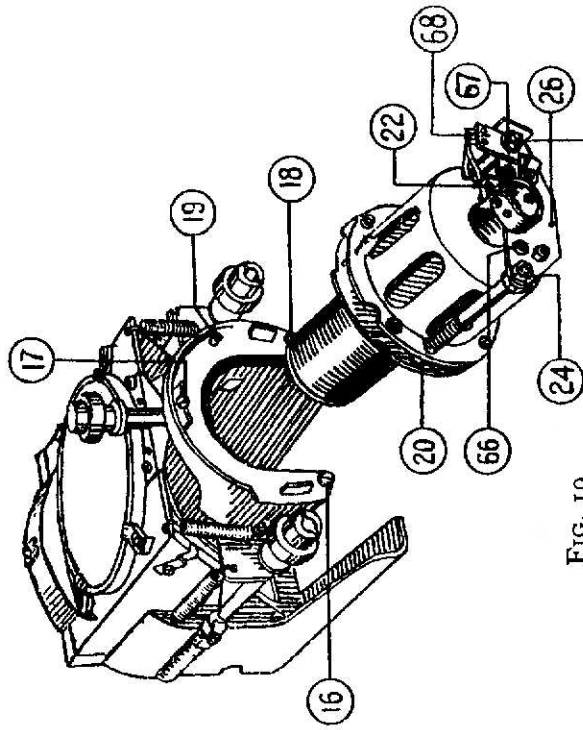


FIG. 19

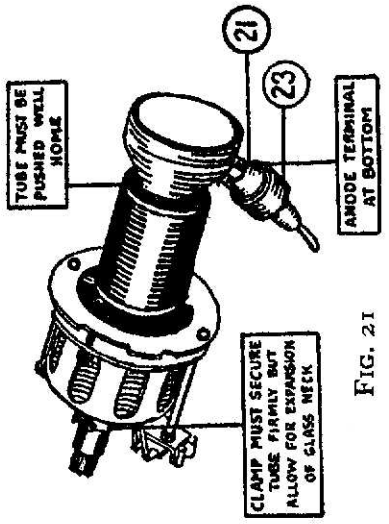


FIG. 21

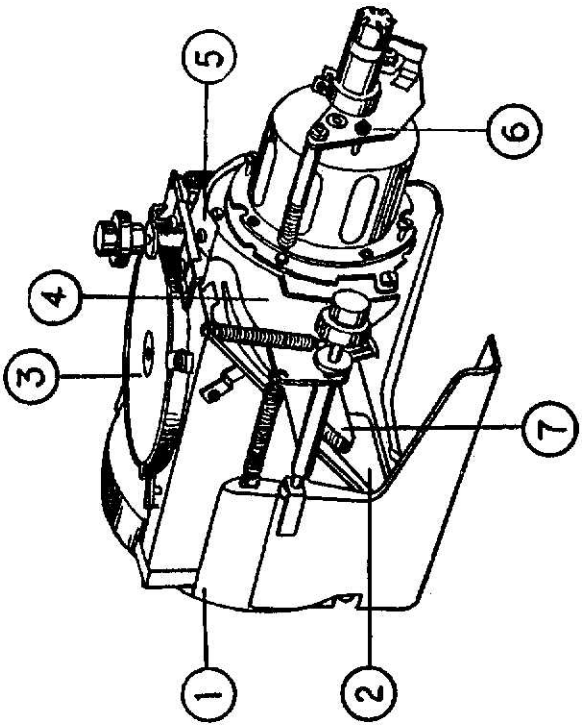


FIG. 18

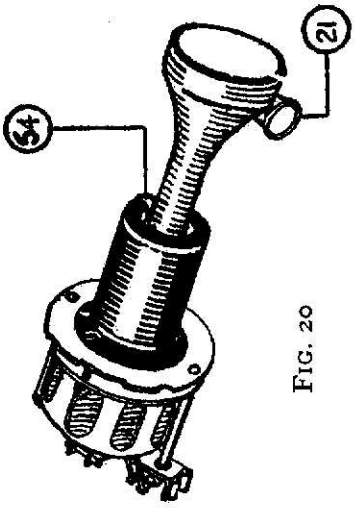


FIG. 20

FIGS. 18-21.—PARTLY DISMANTLED VIEWS OF PROJECTION UNIT.—STAGE I

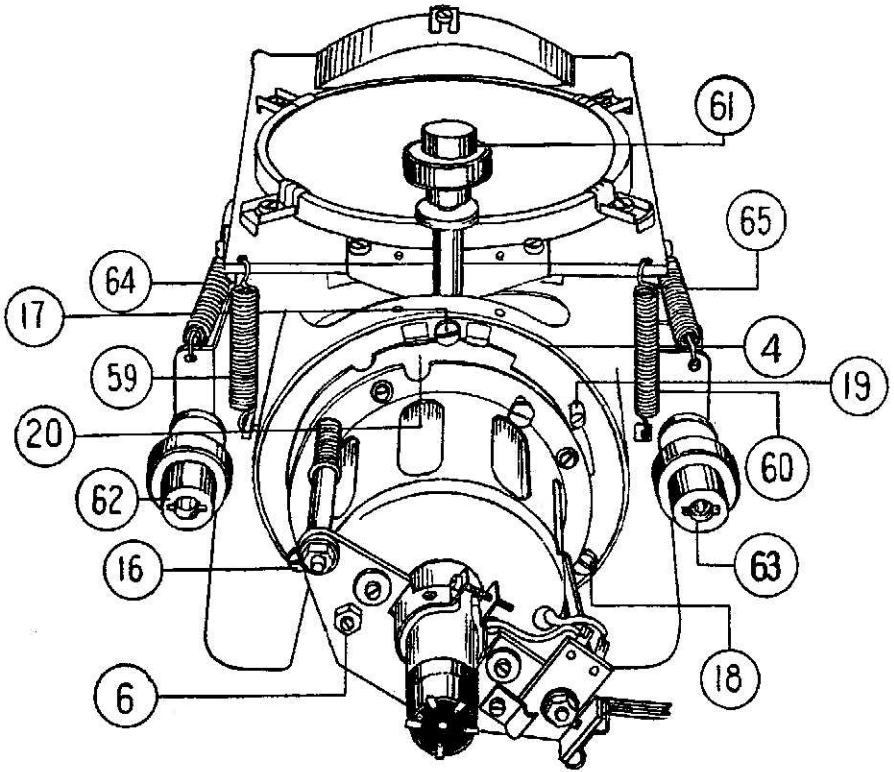


FIG. 22

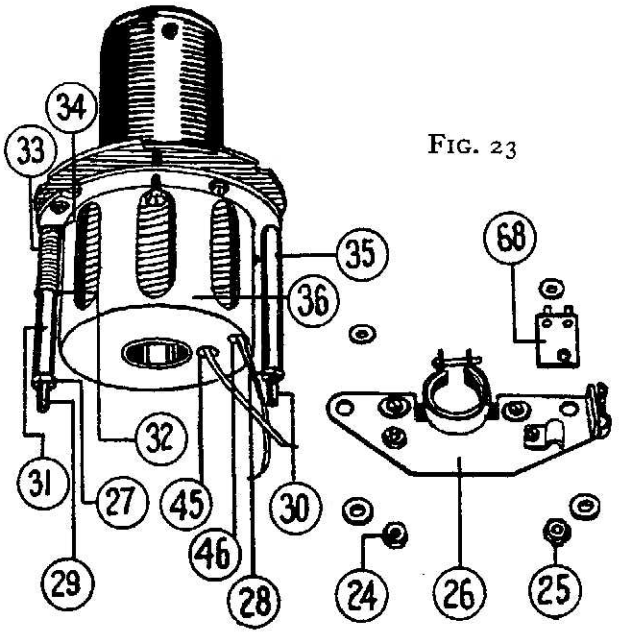


FIG. 23

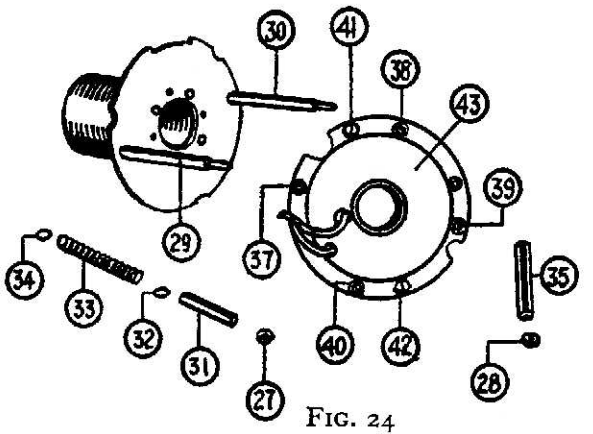


FIG. 24

FIGS. 22–24.—PARTLY DISMANTLED VIEWS OF PROJECTION UNIT —STAGE II

See also Figs. 25 and 26. Full instructions for dismantling this unit are given in the accompanying text.

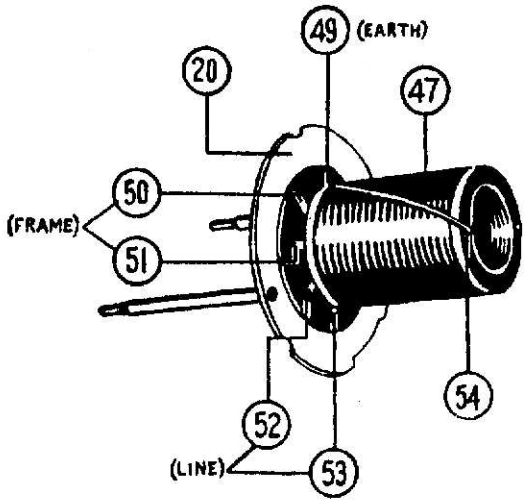


FIG. 25.—DEFLECTION-COIL ASSEMBLY

shaped recesses in the flange (20), and the coil assembly can be drawn forward and removed from the optical unit.

(*d*) Slacken the screws of the tube clamps (22) (Fig. 19), and also screws (66) and (67) securing the clamp (22) to the bridge (26), thus allowing the clamp to " float ".

(*e*) Insert the neck of the cathode-ray tube into the tunnel of the deflector-coil assembly and push home until the neck of the tube enters the clamp (22), and the flare seats snugly against the end of the coil former, thus ensuring that the earthing tongue (54) (Fig. 20) makes contact with the external conducting coating of the tube.

(*f*) Rotate the cathode-ray tube until the anode terminal (21) is so positioned that it will be at the bottom when the tube and coil assembly are inserted into the optical unit. (The word " TOP " is engraved at the edge of flange (20), which should be uppermost in the optical unit.)

(*g*) Tighten the clamp (22) until it grips the neck of the tube firmly enough to prevent movement, but without exerting excessive pressure.

(*h*) Check that the neck of the tube is supported in the V-shaped cut-out in the bridge (26), and then tighten the screws (66) and (67) (Fig. 19).

(*i*) Attach the E.H.T. connector (23) to the anode terminal (21), taking care that the contact spring of the connector makes good contact with the projecting pin of the anode terminal. (If difficulty in fitting the connector is experienced, the moulded portion should be warmed by kneading in the hand.)

(*j*) Insert the tube and coil assembly into the optical unit, taking care that:

(i) The face of the tube enters the grommet (7) and seats snugly therein.

(ii) The anode terminal is at the bottom.

(iii) The crescent-shaped recesses in the deflection-coil flange are opposite screws (16), (17) and (18).

(*k*) Rotate the coil assembly anti-clockwise until movement is checked by the stop (19).

(*l*) Tighten the screws (16), (17) and (18), thus securing the coil assembly to the yoke (4).

(*m*) Centre and focus the optical unit as described on page 115.

(*n*) Replace the plate (5).

(B) To Fit a New Focus Coil

(*a*) Withdraw the coil assembly and cathode-ray tube from the optical unit as described under (A), Sections (*a*) to (*c*).

(*b*) Remove the E.H.T. connector (23) from the anode terminal (21).

(*c*) Loosen the screws of the clamp (22) and also the screws (66) and (67) (Fig. 19) and remove the cathode-ray tube from coil assembly.

(*d*) Unsolder the focus coil connections from the tag plate (68).

(*e*) Remove the nuts and washers (24) and (25).

(*f*) Lift off the tag plate (68), and bridge (26), and also the two washers behind the bridge (26), and remove the nuts (27) and (28) (Fig. 23).

(*g*) Remove the sleeve (31), washer (32), spring (33), and washer (34) from the stud (29), and the sleeve (45) from the stud (30).

(*h*) Withdraw the pot (36) from the studs (29) and (30).

(*i*) Remove the four screws and washers (37), (38), (39) and (40) (Fig. 24) from the flange of pot (36). *Distance stops* (41) *and* (42) *should not be withdrawn.*

(*j*) Lift the end plate (43) away from the pot (36).

(*k*) The focus coil can now be withdrawn from the pot (36).

(*l*) Insert the new focus coil into the pot (36), taking care to thread the connecting tails through holes (45) and (46) in the pot (36).

(*m*) Re-assemble as above, but in the reverse order.

(*n*) Replace the cathode-ray tube and insert the tube and coil assembly into the optical unit as described above under (A) sections (*e*) to (*n*).

(C) To Fit New Deflection Coils

(*a*) Withdraw the coil assembly and cathode-ray tube from the optical unit as described under (A), operations (*a*) to (*c*).

(*b*) Remove the cathode-ray tube from the coil assembly, as described under (B), operations (*b*) and (*c*).

(*c*) Dismantle the coil assembly as far as operation (*h*) in section (B). This will leave the deflection coils (47) attached to the flange (20) as shown in Fig. 25.

(*d*) Unsolder the coil connections to tags (50), (51), (52), and (53), and the earth connection from tag (49). (Note, tags (50) and (51) are the frame connections; tags (52) and (53) are the line connections. Tag (49) is connected to the earthing tongue (54) (Fig. 20).)

(*e*) Undo the four screws from the back of the flange (20), and remove the deflection coils (47). Careful note should be made of which four of the total of eight holes are used for the screws.

(*f*) Fit new coils, and replace the whole assembly in the reverse order.

(D) To Set Up and Adjust the Optical Unit

These operations comprise the adjustment by electrical means of focus, linearity and centring of the picture as viewed on the screen of the cathode-ray tube, and the mechanical adjustments of the cathode-ray tube, and of the focusing on the viewing screen.

Operations (*b*) to (*d*) below involve viewing the picture (preferably a test card) on the tube screen itself when outside the optical unit. In order to avoid risk of personal injury by the soft X-ray radiation from the tube, it should be operated at minimum brightness consistent with examination of the picture. If, however, it is desired to view the tube at full brightness, a lead-glass screen as specified under " X-ray Protection " must be employed.

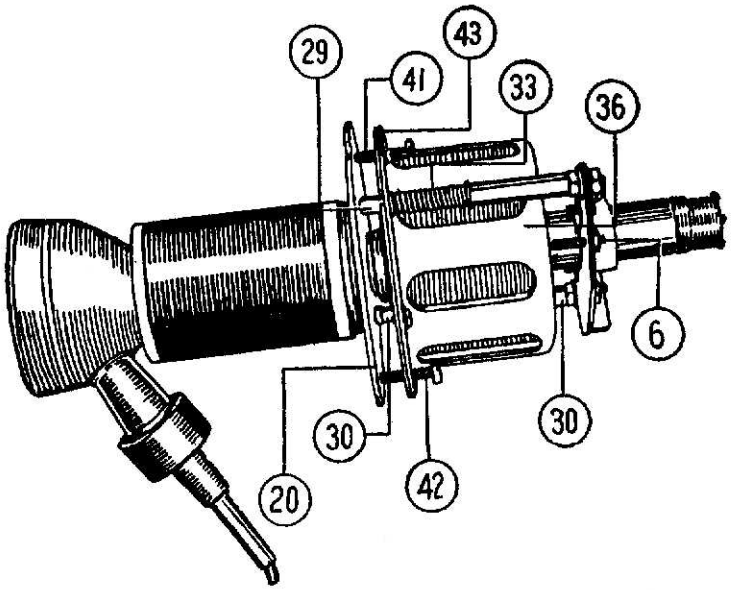


FIG. 26.—MECHANICAL ADJUSTMENT OF CENTRING

After loosening the lock-nut of the locking screw (6) several turns, the distance stops (41) and (42) are adjusted until the raster is correctly centred. The locking screw is then screwed in until the tip just bears against the end of the pot (46) and is then re-locked.

(*a*) Remove the focus- and deflection-coil assembly complete with tube from the optical unit as described in Section (A), operations (*a*) to (*c*).

(*b*) ELECTRICAL ADJUSTMENT OF FOCUS.—Taking the precautions against X-rays described above, and observing the image on the screen of the cathode-ray tube, adjust the focus by means of the normal electrical controls.

(*c*) ELECTRICAL ADJUSTMENT OF LINEARITY.—Still viewing the image on the screen of the cathode-ray tube, adjust the linearity of scan by the normal electrical control.

(*d*) MECHANICAL ADJUSTMENT OF CENTRING.—Centre the raster on the screen of the cathode-ray tube by mechanical adjustment of the axis of the focus coil with respect to the axis of the cathode-ray tube as follows (see Fig. 26):

(i) Loosen the lock-nut of the locking screw (6) several turns. The flange (43) of the focus coil pot (36) now has a fixed location with respect to the cathode-ray tube only on the stud (30). Its location on the stud (29) is against the load of the spring (33). The distance stops (41) and (42) which screw into the flange of the focus coil pot (36), bear against the deflection-coil flange (20). Adjustment of distance stops (41) and (42) cause the focus coil to tilt about the stud (30), thus shifting the axis of the focus coil with respect to the axis of the cathode-ray tube.

(ii) Adjust the distance stops (41) and (42) until the raster is correctly centred on the screen of the cathode-ray tube, taking care that the focus coil is not moved so far in any direction that it bears against the neck of the tube.

(iii) Screw in the locking screw (6) until the tip of the screw just bears against the end of the pot (36).

(iv) Tighten the lock-nut of the locking screw (6).

(*e*) Replace the coil and tube assembly into the optical unit as described in Section (A), operations (*i*) to (*k*).

(*f*) MECHANICAL ADJUSTMENT OF FOCUS. In making the following adjustments, care must be taken to avoid contact with any high-potential points. Tools having long insulated handles are available from the manufacturer's service department, and these enable the operator to make adjustments to the knobs without danger of shock.

(i) Remove the locking plate (5) (Fig. 18). The yoke (4) is now capable of movement relative to the main frame of the optical unit. Vertical movement of the yoke (4) is effected by turning the screw (61) (Fig. 22) against the load of springs (59) and (60). This adjustment allows the axis of the cathode-ray tube to be tilted slightly in a vertical plane. Horizontal movement of the yoke (4) against the load of springs (64) and (65) is effected by turning the screws (62) and (63). If both screws are turned simultaneously in the same direction, the face of the cathode-ray tube is made to approach or recede from the spherical mirror. If only one of the screws is adjusted, or if both screws are adjusted simultaneously in opposite directions, the axis of the cathode-ray tube is tilted slightly in a horizontal plane.

(ii) Slacken the knurled lock-nut of the screw (61) and turn the screw to one extremity of its travel. This results in only a narrow strip of picture being in focus as in (A), Fig. 27.

(iii) Slacken the knurled lock-nuts of the screws (62) and (63). Adjust the screws (62) and (63) simultaneously in the same direction, until the strip of picture which is in focus passes through the geometric centre of the picture. See (B), Fig. 27.

(iv) Adjust the screws (62) and (63) in opposite directions until the strip of picture which is in focus is both central and vertical as shown at (C), Fig. 27.

(v) Adjust the screw (61) to spread the strip of correctly focused picture, and adjust for optimum results.

(v) Adjust the same screw to spread the strip of correctly focused picture, and adjust for optimum results.

(vi) Tighten the knurled lock-nuts on screws (61), (62) and (63), and replace plate (5).

(*g*) CENTRING PICTURE ON VIEWING SCREEN. Centring of the picture is done by means of the cabinet mirror.

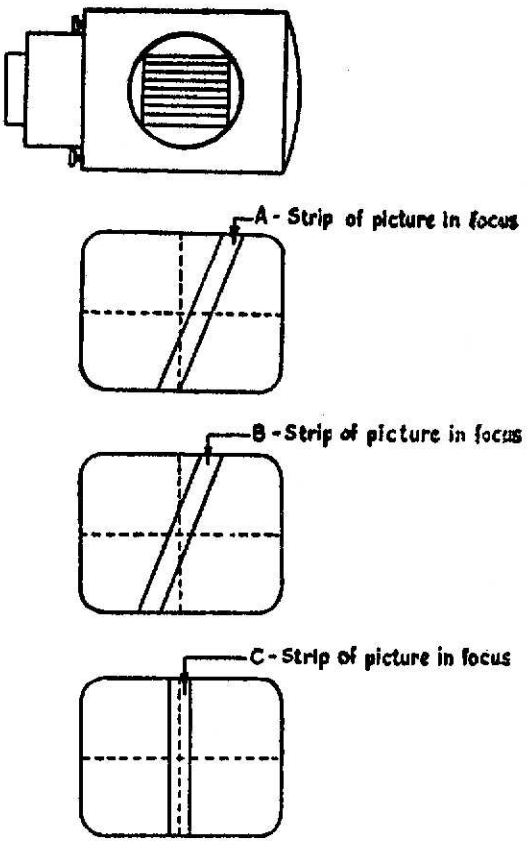


FIG. 27.—MECHANICAL ADJUSTMENT OF FOCUS

If the picture has moved vertically, loosen the adjusting slot locking-nut at the top of the mirror vertical support bracket, and tilt the top of the mirror either towards the front or back of the cabinet, according to whether the picture is too high or too low, respectively, on the screen.

When the picture is central on the screen, lock the vertical support bracket in position.

If the picture has moved laterally, loosen the cabinet side brackets from the sides of the cabinet, and by turning the mirror assembly in the required direction, the side brackets will ride in their adjusting slots, and the picture will move across the screen. When the picture is central on the screen, re-clamp the side brackets to the cabinet.

(E) Mirror Cleaning

As has already been stated, the optical unit is sealed, and no cleaning of the items contained therein is necessary.

Dust which may collect on the large cabinet mirror may be blown off. Since the mirror is surface silvered, *normal mirror or window-cleaning methods must not be applied.* If it is necessary to handle the cabinet mirror, touch the edges only. If, through faulty handling, finger-marks are produced, they should be removed immediately, using one of the following methods :

(i) Moisten a piece of very soft cotton wool (Egyptian cotton wool) with industrial alcohol, and apply it to the mark with a very light stroking action, in one direction. Each piece of cotton wool should be used once only. The solvent, together with any foreign matter, is then removed with a clean dry piece of cotton wool, using the same light stroking action. This piece of cotton wool should also be used once only. The process may be repeated if the mark proves obstinate, but not more than twice, as the damage to the mirror through scratching can be more serious than slight discoloration.

(ii) Dust the mirror very carefully with a clean dry chamois leather. Wash with warm, soft (preferably distilled) water containing a suitable proportion of a wetting agent (obtainable from photographic supply stores).

(iii) Dry with chamois leather.

It should be noted that any cleaning method will probably reduce to some extent the reflecting properties of the mirror, and it is, therefore, better to handle the mirror carefully and thus avoid the necessity to clean it.

(F) Screen Cleaning

The plastic screen may be cleaned if necessary, using industrial alcohol and clean chamois leather.

ALIGNMENT PROCEDURE

The volume and contrast controls must be turned fully clockwise, and the vision-noise-limiter control fully anti-clockwise.

The sound output should be observed on an output meter of 5 ohms impedance connected to the secondary winding of the speaker transformer.

The video output should be observed on a high-impedance 10-volt full-scale deflection, A.C. voltmeter, connected between the cathode of V8 and earth via a 0·25-mfd. capacitor. The meter should be shunted with a capacitor of 1200 pF. at the set end of the connecting lead.

All R.F. signals should be sinusoidally modulated to a depth of 30 per cent.

The damper used consists of a resistor of 680 ohms, connected in series with a capacitor of 1200 pF. The leads must be kept as short as possible.

The receiver must be fed via an isolating transformer, with the chassis earthed. The tapping plate should be set to the mains voltage in use.

Connections to g1 of V14 for I.F. trimming must be from a 40-ohm source between chassis and grid. Connection to the aerial for R.F. trimming must be from a 40-ohm source between chassis and upper aerial terminal. The lower aerial terminal should be connected to chassis through a resistance of 40 ohms.

No connection should be made to the screen of the lead connected to the set aerial terminals.

Rough Trimming

Apply a signal of 12·1 Mc/s. to g1 of V14, and trim S37, S36, S34, S33, S32, S31 for maximum video output.

Apply a signal of 9·9 Mc/s. to g1 of V14 and trim S21, S30 for maximum sound output, and S35, S38 for minimum video output. (When trimming S30, take the peak with the core nearer to the top.)

Inject a signal of 41·5 Mc/s. (Birmingham 58·25 Mc/s.) to the aerial. Trim C41 for maximum sound output.

Apply a 44-Mc/s. signal (Birmingham 60·75 Mc/s.) to the aerial and trim S28, S27, S26, C29 for maximum video output.

Vision I.F. Circuits

Apply a 12·1-Mc/s. signal to g1 of V14. Damp (to chassis) and trim (for maximum video output) as follows:

Damp	*Trim*
Anode V16	S37
Junction S37, C57	S36
Anode V15	S34
Junction S34, C51	S33
Anode V14	S32
G1, V15	S31

Sound I.F. Circuits

Apply a 9·9 Mc/s. signal to g1 of V14. Trim S21, S30 for maximum sound output.

R.F. Circuits

Apply a 44 Mc/s. signal (Birmingham 60·75 Mc/s.) to the aerial. Damp and trim as follows:

Damp	*Trim*
Anode V13 to chassis	S28
G1, V14 to junction S28, R45	S27
Junction S25, C29 to chassis	S26
G1, V13 to chassis	C29

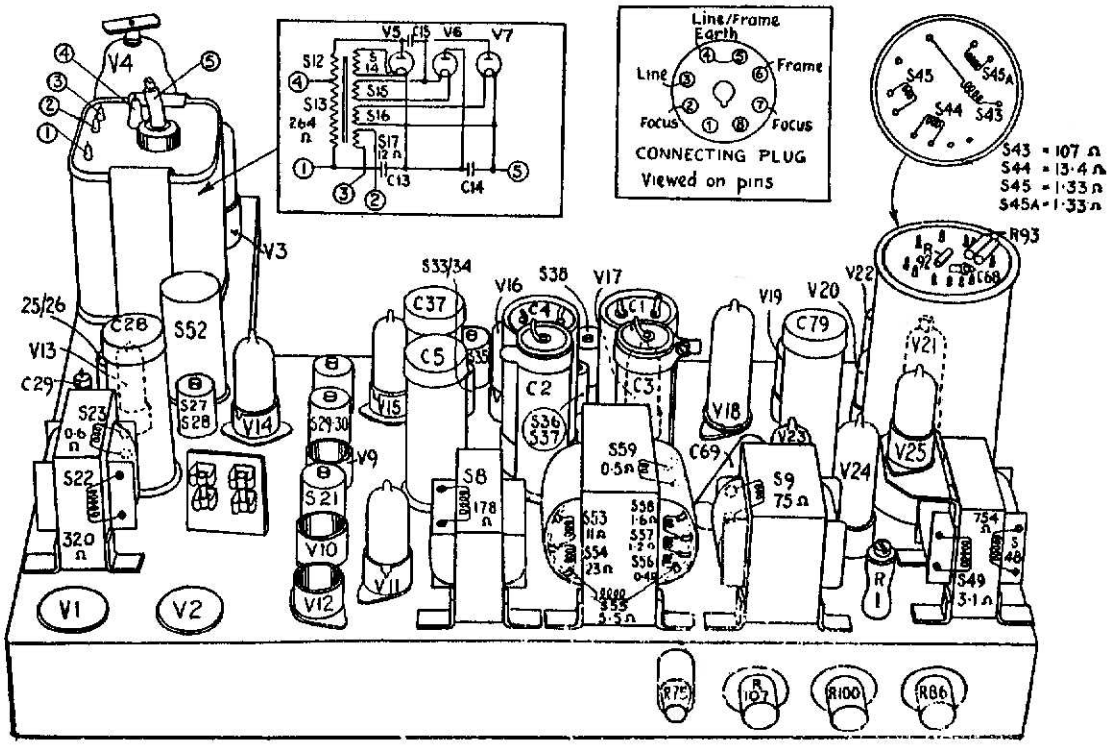


FIG. 28.—TOP VIEW OF CHASSIS

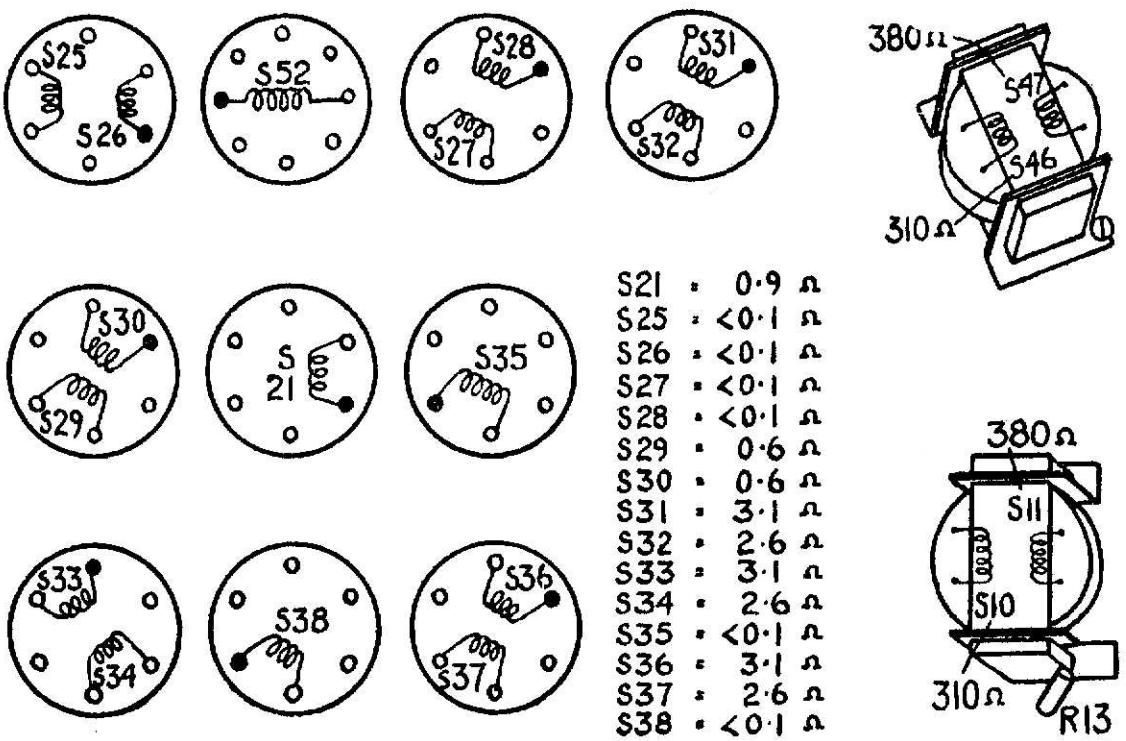


FIG. 29.—COIL DETAILS

Oscillator

Inject a 41·5 Mc/s. (Birmingham 58·25 Mc/s.) signal to the aerial, and trim C41 for maximum sound output.

Sound-rejector Filters

Using input method and frequency as for (v) above, turn the volume control fully anti-clockwise, and increase the input to obtain video output. Unscrew the core on S38 by two turns. Trim S35, S38 in that order for minimum video output.

VOLTAGE AND CURRENT READINGS

The following measurements were taken using an Avometer Model 7. Where two figures are quoted, they represent the minimum and maximum readings obtainable by adjusting the controls:

Heater current (V1, V2, V4, V12, V18, V21, V24)			= 0·3 amp.
Heater current (V11, V13, V14, V15, V16, V17, V19, V20, V23)			= 0·1 amp.
Heater current (V3, V9, V10, V22)			= 0·1 amp.
Focus coil current at focus			= 25 mA.
Voltage across C38			= − 1 to − 6 v.
Voltage across C3			= 340–400 v.
Boost voltage across C69			= 147–155 v.
H.T. voltage across C5			= 180–195 v.
Voltage on slider R73 to chassis			= + 90 to + 135 v.
V1	Ia		= 50–70 mA.
V2	Ia		= 180–206 mA.
V3	Va		= 330–400 v.
V3	Ia + Ig2 + Ig3		= 1·3–1·8 mA.
V4	Vg2		= 200–350 v.
V4 *	Ig2		= 4–9 mA.
V8	Heater voltage		= 6·3 v.
V8	Heater—cathode		= 56 v. nominal, 110 v. max.
V8	Grid—cathode		= 35 v. nominal, 110 v. max.
V9	Va		= 94–100 v.
V9	Ia		= 8·6–9·3 mA.
V9	Vg2		= 93–96 v.
V9	Ig2		= 2·7–2·9 mA.
V10	Va		= 55 v. (max.)
V10	Ia		= 0·8 mA. (max.)
V10	Vg2		= 30 v. (max.)
V10	Ig2		= 0·2 mA. (max.)
V12	Va		= 118–132 v.
V12	Ia		= 26–38 mA.
V12	Vg2		= 128–144 v.
V12	Ig2		= 6–22 mA.
V13	Va		= 155–165 v.
V13	Ia		= 5–8 mA.
V13	Vg2		= 158–160 v.
V13	Ig2		= 1·5–20 mA.
V14	Va		= 188 v. (max.)
V14	Ia		= 5·5 mA.
V14	Vg2		= 106 v. (max.)
V14	Ig2		= 1·5 mA. (max.)
V15	Va		= 165–175 v.
V15	Ia		= 0·5–7·0 mA.
V15	Vg2		= 165–185 v.
V15	Ig2		= 2mA. (max.)
V16	Va		= 180–190 v.

VOLTAGE AND CURRENT READINGS—*continued*

V16	Ia	= 8·0 mA. (max.)
V16	Vg2	= 170–190 v.
V16	Ig2	= 2·3 mA. (max.)
V18 †	Va	= 45–175 v.
V18	Ia	= 3·6–25 mA.
V18	Vg2	= 45–180 v.
V18	Ig2	= 0·4–10 mA.
V19	Va	= 28 v. (max.)
V19	Ia	= 2·5 mA. (max.)
V19	Vg2	= 180–185 v.
V19	Ig2	= 2–23 mA.
V20	Vat	= 45–50 v.
V20	Iat	= 2·2–2·5 mA.
V20	Vah	= 57–65 V.
V20	Iah + Ig3	= 3·3–3·7 mA.
V21	Ia	= 35–41 mA.
V21	Vg2	= 110–116 v.
V21	Ig2	= 25–28 mA.
V22	Ik	= 48–58 mA.
V23	Vat	= 118–126 v.
V23	Iat	= 0·3–0·5 mA.
V23	Vah	= 118–125 v.
V23	Iah + Ig2	= 24 mA. (max.)
V24	Va	= 182–184 v.
	Ia + Ig3	= 13–15 mA.

* Current high and unstable at maximum brightness and/or contrast.
† For good picture, Va = 150 v., Ia = 11 mA., Vg2 = 185 v., Ig2 = 1·7 mA.

MODIFICATIONS

Note 1

R110, R111, C86 are fitted only to some models. For sets not fitted with these components, S45A is connected to the junction R109/C82. If it is necessary to replace a line transformer, the above items should be deleted and the circuit connected as specified.

Note 2

Some receivers were fitted with ceramic capacitors in positions C63, C64.

Note 3

Two types of mains transformer are used. Type MK 512 51 is used when V9 is a UAF42 and R24 is 8200 ohms. Type MK 512 93 is used when V9 is a UF42 and R24 is 1500 ohms.

Note 4

Some receivers are fitted with a line-amplitude control which is not indicated in the circuit diagram. It consists of a choke S60, shunted by a resistor R127 which is connected in series with the line-deflection coil (*i.e.*, in lead " C " on the circuit). The unit is mounted on the top of S9 and the choke is made variable by means of its core.

Note 5

A new type of choke has been fitted to the majority of sets in position S9 involving the use of a series resistor R126. This resistor is not indicated on

the circuit diagram. Only new type chokes can be supplied for replacement purposes, and R126 must also be fitted.

Note 6

Some receivers contain a resistor R6, in series with R20, which for normal use is shorted out. In other sets, R6 is a negative temperature coefficient resistor mounted on the focus coil shroud, in which case R20 may be shorted out. Under certain conditions of use, if the focus control is working at the end of its travel, the shorting wire may be removed.

Note 7

Most receivers contain a capacitor C92 in parallel with C8. C92 is not indicated on the circuit diagram. For sets not using C92, C8 is 3300 pF.