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"TRADER" SERVICE SHEET
1181/T66

PHILIPS 1446U Series

Covering Band I Models 1446U/45, 1746U/45, 1446UF/45, 1746UF/45
and Band I/III Models 1446U, 1746U, 1747U, 1446UF, 1746UF, 1747UF

EMPLYING a built-in 12-channel turret tuner, the Philips 1446U is a 19-valve table superhet employing a 14in C.R. tube, and designed to operate from A.C. or D.C. mains of 200-250 V, 50 c/s in the case of A.C.

Details of 17in version 1746U, 17in console version 1747U, 5-channel Band I versions 1446U/45, 1746U/45, and fringe versions 1446UF, 1746UF, 1747UF, 1446UF/45 and 1746UF/45 are given under "Associated Models" overleaf.

Release dates and original prices: 1446U, 1446UF, August, 1954, £51 16s 9d; 1446U/45, 1446UF/45, August, 1954, £47 2s 6d; 1746U, 1746UF, July,

1954, £61 5s 3d; 1746U/45, 1746UF/45, July, 1954, £56 11s; 1747U, 1747UF, September, 1954, £77 15s 1d. Purchase tax extra.

CIRCUIT DESCRIPTION

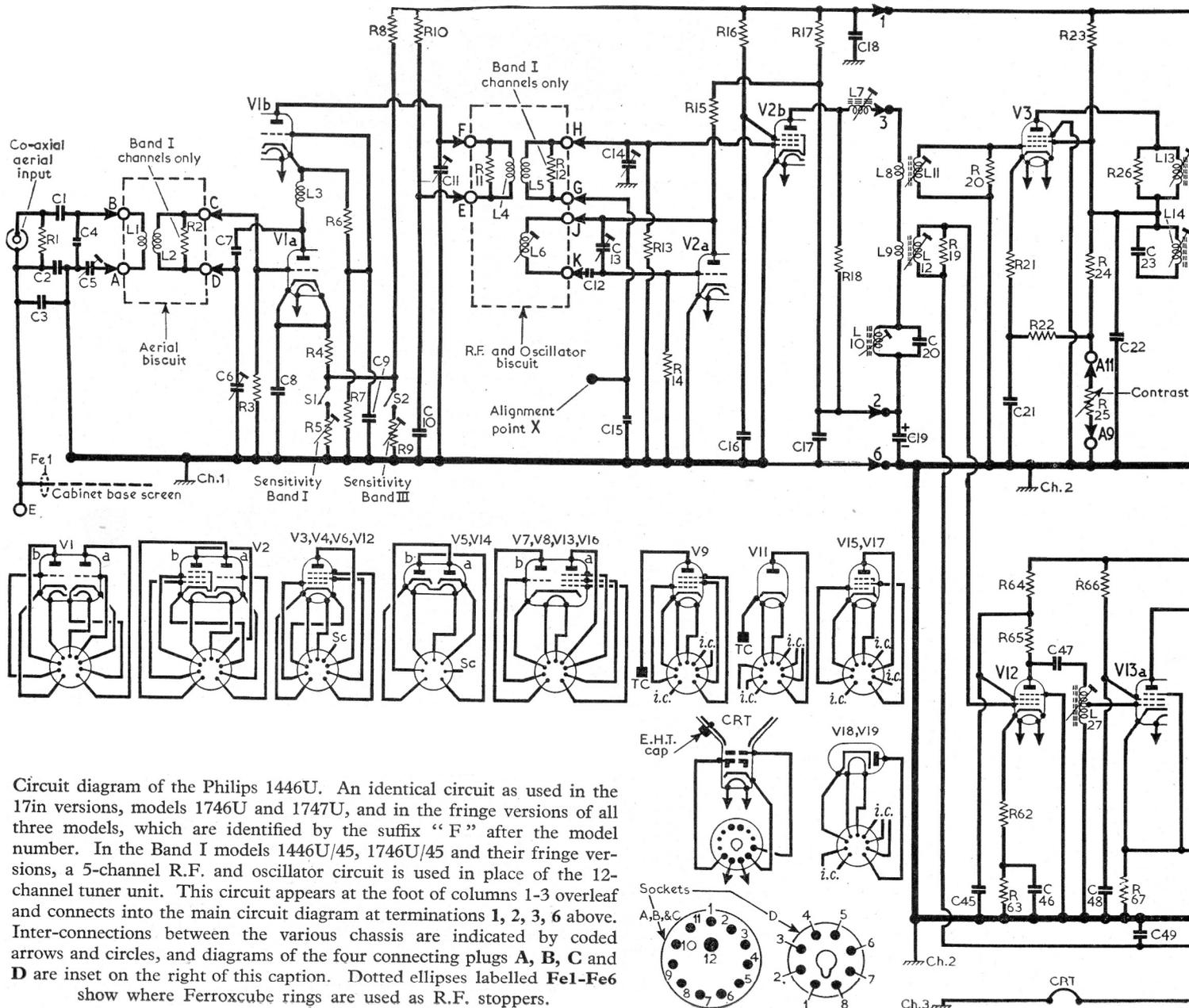
Co-axial 80Ω input via aerial coupling coil L1 to aerial tuning coil L2, the two coils being mounted on a detachable unit which forms one of the aerial "biscuits" in a 12-position turret tuner. A separate biscuit is available for each of the Band I and Band III channels.

First valve (V1, PCC84) is a specially developed double triode operating as a cascode R.F. amplifier. Section a of V1 forms a conventional earthed cathode amplifier and is cas-

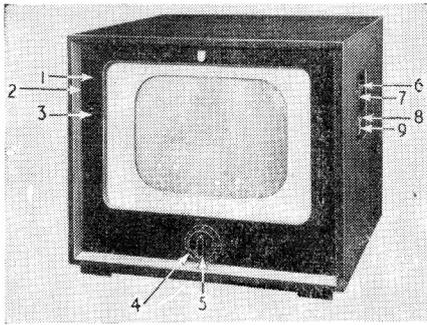
code-connected to V1b, which functions as an earthed grid amplifier. L3 is a small air-cored coil, critically proportioned to resonate with the internal capacitance of V1b. It should not be disturbed in any way as this may result in deterioration of the Band III performance. Neutralization by C7 and C6 which form two arms of a bridge circuit.

V1 output is coupled by bandpass tuned circuits C11, L4, L5, C14 to pentode section b of V2 (PCF80) which operates as mixer. Triode section a of V2 operates as a Colpitts-connected local oscillator with oscillator coil L6. The three coils, L4, L5, L6, are mounted to-

(Continued in col. 5)



Circuit diagram of the Philips 1446U. An identical circuit as used in the 17in versions, models 1746U and 1747U, and in the fringe versions of all three models, which are identified by the suffix "F" after the model number. In the Band I models 1446U/45, 1746U/45 and their fringe versions, a 5-channel R.F. and oscillator circuit is used in place of the 12-channel tuner unit. This circuit appears at the foot of columns 1-3 overleaf and connects into the main circuit diagram at terminations 1, 2, 3, 6 above. Inter-connections between the various chassis are indicated by coded arrows and circles, and diagrams of the four connecting plugs A, B, C and D are inset on the right of this caption. Dotted ellipses labelled Fe1-Fe6 show where Ferroxcube rings are used as R.F. stoppers.



Appearance of the Philips 1446U. The controls are numbered as follows:—1, Height; 2, Contrast; 3, Frame hold; 4, Tuner; 5, Channel switch; 6, Width; 7, Brightness; 8, Line hold; 9, Volume and on/off.

Circuit description—continued.

together on a second detachable unit and form one of the R.F. and oscillator "biscuits" in the 12-position turret tuner. As with the aerial section of the turret, a separate biscuit is available for each of the Band I and Band III channels. C13 shunts the oscillator circuit and provides a means of fine manual tuning.

V2a output is inductively coupled by the proximity of L5 and L6 to V2b input circuit, and combines with the amplified output from V1 to produce separate sound and vision intermediate frequencies of 8.5 Mc/s and 12 Mc/s respectively.

The aerial input and mixer circuit of the 5-channel Band I receivers is shown overleaf, the remainder of their circuit being the same as that used in the 12-channel models. Channel changing in the Band I receivers is accomplished by means of five sets of plug-in coils L35, L36, L37 (aerial unit, coded green), L38, L39 (R.F. unit, coded red) and L40 (oscillator unit, coded blue). The receivers can be converted to Band I/Band III operation by the addition of a separate tuner unit.

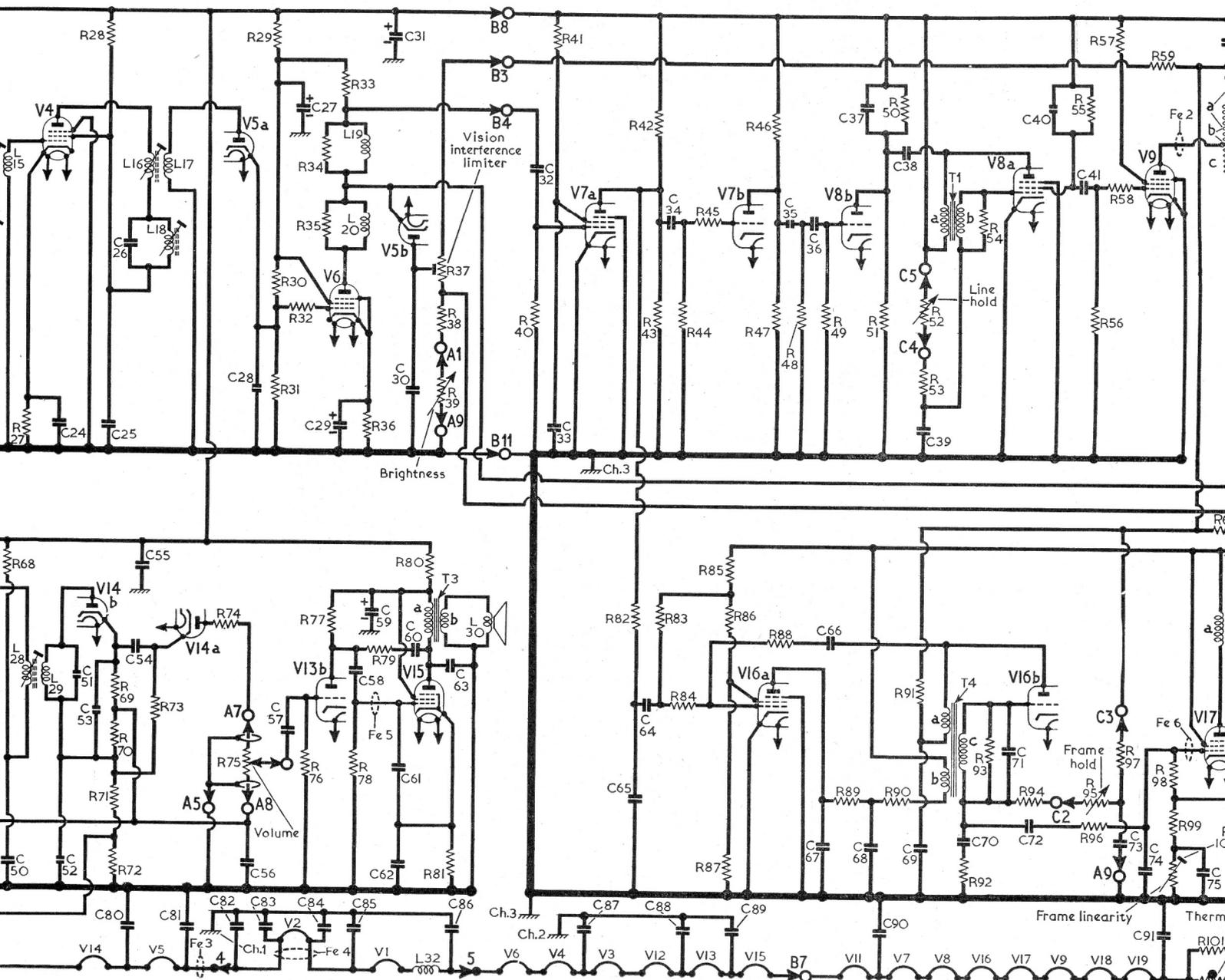
This tuner unit differs from that incorporated in the 12-channel models in that the lengths of the connecting leads and the type of mounting

bracket are modified for use with the Band I receivers, and the impedance of the output coil L7 is altered to match the impedance of the Band I receiver mixer valve (V21), which then becomes the first vision I.F. stage.

Two-valve vision I.F. amplifier (V3, V4, EF80) is coupled by single tuned circuits to vision detector diode, section a of V5 (EB91). Sound channel rejection by C23, L14 and C26, L18. Adjacent sound channel rejection by L10, C20.

The positive-going rectified output developed across R31 is passed via R32 to control grid of video amplifying valve (V6, EF80). Vision interference suppression in V6 anode circuit by V5b, whose cathode is swept negative by interference pulses which cause it to conduct and short-circuit the video output via C30. The anode bias potentiometer controls the level at which the diode conducts.

The negative-going output from V6 is directly coupled to the cathode of the C.R. tube (GRT, MW36-24 (models 1446U and 1446U/45) or MW43-64 (models 1746U, 1747U, 1746U/45)). Frequency correction is applied by means of the load network R33, R34, L19, R35, L20 in V6 anode circuit. Brightness control by R39. The vision interference limiter control R37 is re-



turned to the top of the brightness control so that the limiter diode bias is modified to compensate for changes in brightness level settings.

Negative-going output from V6 is also passed via C32 to sync separator valve, section a of V7 (ECL80) where positive-going sync pulses produce grid current which biases the valve to cut-off, restoring the D.C. component and eliminating the negative-going picture modulation.

V7a output, developed across R42, is applied via C34 to V7b which operates as line pulse clipper, having a short grid base which clips the more negative end of the pulse. The inverted output of V7b is fed via differentiating circuit C35, R48, C36, R49 which produces a pulse having a sharp positive-going leading edge and a sharp negative-going trailing edge. This differentiated pulse is fed to a second clipper, section b of V8 (ECL80), which removes its negative-going trailing edge.

The clipped and differentiated line pulse appearing at V8b anode is fed via C38 to the anode of line blocking oscillator, section a of V8. Line hold control by R52 which varies the time-constant of V8a grid circuit.

V8a output is developed across screen resistor R55 and passed via C41 to control grid of line

output valve (V9, PL81). Output from V9 is transformer-coupled by T2 to the line deflector coils L23, L24 via width control L21 and line linearity control L22. The deflector coils are fed from T2 via additional coupling coil d, e which is shunted across section a of the primary winding in order to reduce line "ringing" to a minimum. Line linearity coil L22 has a permanent magnet bias which causes magnetic

saturation about halfway through the scanning stroke.

The efficiency diode (V11, PY81) is fed with energy from winding a on T2, and its rectified output, developed across reservoir capacitor C42, is used to boost the H.T. supply to V9 anode, CRT first anode, the brightness control circuit and the frame time-base oscillator.

(Continued col. 1 overleaf)

COMPONENT VALUES AND LOCATIONS

Capacitors

C1	1,800pF	D3
C2	1,800pF	D3
C3	0.01µF	D3
C4	27pF	N10
C5	5pF	N10
C6	5pF	N10
C7	1.8pF	N10
C8	0.001µF	N10
C9	820pF	N10
C10	820pF	N10
C11	2.5pF	N10
C12††	15pF	P10
C13	—	P10
C14	2.5pF	P10
C15	47pF	P10
C16	820pF	P10
C17	820pF	P10
C18	820pF	N10
C19*	10µF	G7
C20	180pF	G7
C21	4,700pF	G7
C22	4,700pF	F7
C23	330pF	F7
C24	0.068µF	F7
C25	4,700pF	F7
C26	330pF	F7
C27*	10µF	E6
C28	8.2pF	E7
C29*	100µF	E7
C30	0.22µF	E6
C31*	100µF	C1
C32	0.056µF	J8
C33	0.047µF	J8
C34	100pF	J8
C35	33pF	J8
C36	4,700pF	J9
C37	150pF	K9
C38	2,200pF	K9
C39	0.001µF	J9
C40	12pF	K9
C41	0.047µF	K9
C42	0.056µF	M9
C43	0.0022µF	M8
C44	390pF	J8
C45	4,700pF	G6
C46	4,700pF	G6
C47	100pF	F6
C48	4,700pF	F6
C49	0.047µF	F6
C50	0.01µF	F6
C51	22pF	F6
C52	47pF	F6
C53	47pF	E6
C54	0.068µF	F6
C55	4,700pF	F7
C56	4,700pF	F6
C57	0.022µF	F6
C58	0.015µF	F6
C59*	65µF	C1
C60	2,200pF	E6
C61	220pF	E6
C62*	50µF	E7
C63	0.022µF	D1
C64	0.001µF	K8
C65	470pF	K8
C66	4,700pF	K8
C67	0.001µF	L8
C68	0.001µF	K9
C69	0.47µF	L9
C70	0.056µF	L8
C71	0.001µF	E9
C72	0.1µF	L8
C73	0.015µF	R11
C74	330pF	L8
C75	0.022µF	L9
C76*	100µF	M9
C77	0.068µF	L9
C78	0.082µF	J9
C79*	100µF	M9
C80	390pF	E7
C81	4,700pF	F7
C82	820pF	N10
C83	820pF	P10
C84	820pF	P10
C85	820pF	N10
C86	820pF	N10
C87	4,700pF	F7

Resistors

R1	1MΩ	D3
R2	§§	N10
R3	100kΩ	N10
R4	120Ω	N10
R5	3kΩ	D3
R6	18kΩ	N11
R7	1MΩ	N10
R8	56kΩ	N10
R9	3kΩ	D3
R10	680Ω	N10
R11	§§	P10
R12	§§	P10
R13	220kΩ	P10
R14	22kΩ	P10
R15	10kΩ	P10
R16	47kΩ	P10
R17	1kΩ	P10
R18	15kΩ	P10
R19	100kΩ	G6
R20	8.2kΩ	G7
R21	47Ω	G7
R22	150Ω	G7
R23	1kΩ	F7
R24	120kΩ	G7
R25	3kΩ	R11
R26	12kΩ	F7
R27	180Ω	F7
R28	1kΩ	F7
R29	3.3kΩ	F7
R30	4.7MΩ	E7
R31	5.6kΩ	E7
R32	3.3kΩ	E7
R33	4.7kΩ	F7
R34	22kΩ	E7
R35	47kΩ	E7
R36	390Ω	E7
R37	20kΩ	E7
R38	10kΩ	F7
R39	50kΩ	Q11
R40	1MΩ	J8
R41	1MΩ	J8
R42	180kΩ	K8
R43	100kΩ	K8
R44	1MΩ	K8
R45	100kΩ	K8
R46	47kΩ	J8
R47	47kΩ	J8
R48	22kΩ	J9
R49	1MΩ	J9
R50	220kΩ	J9
R51	47kΩ	J9
R52	500kΩ	Q11
R53	270kΩ	J9
R54	10kΩ	K9
R55	100kΩ	K9
R56	470kΩ	K9
R57	3.9kΩ	K9
R58	1kΩ	K9
R59†	99kΩ	M8
R60	22kΩ	M8
R61	6.8kΩ	J8
R62	47Ω	G6
R63	330Ω	G6
R64	1kΩ	G6
R65	3.3kΩ	G6
R66	18kΩ	F6
R67	150Ω	F6
R68	680Ω	F6
R69	68kΩ	F7
R70	68kΩ	F6
R71	1.5MΩ	F6
R72	680kΩ	F6
R73	470kΩ	F6
R74	4.7kΩ	E6
R75	1MΩ	Q11
R76	2.2MΩ	F6
R77	220kΩ	F6
R78	820kΩ	E6
R79	680kΩ	E6
R80	500Ω	F7
R81	270Ω	F6
R82	100kΩ	K8

R83	2.2MΩ	K9
R84	470kΩ	K8
R85	39kΩ	K8
R86	22kΩ	K8
R87	10kΩ	K8
R88	2.2MΩ	K8
R89	22kΩ	L8
R90	22kΩ	K8
R91	33kΩ	M9
R92	10kΩ	L9
R93	47kΩ	L8
R94	1MΩ	M8
R95	1MΩ	R11
R96§	2MΩ	L8
R97	47kΩ	R11
R98**	1.24MΩ	L8
R99††	136kΩ	L8
R100	500kΩ	D4
R101	500Ω	D4
R102	270Ω	M8
R103	68Ω	J9
R104	100kΩ	R11
R105	68kΩ	L8
R106	47Ω	D4
R107	53Ω	D4
R108	40Ω	D4
R109	27Ω	D4
R110	24Ω	D4
R111	40Ω	D4

Coils†

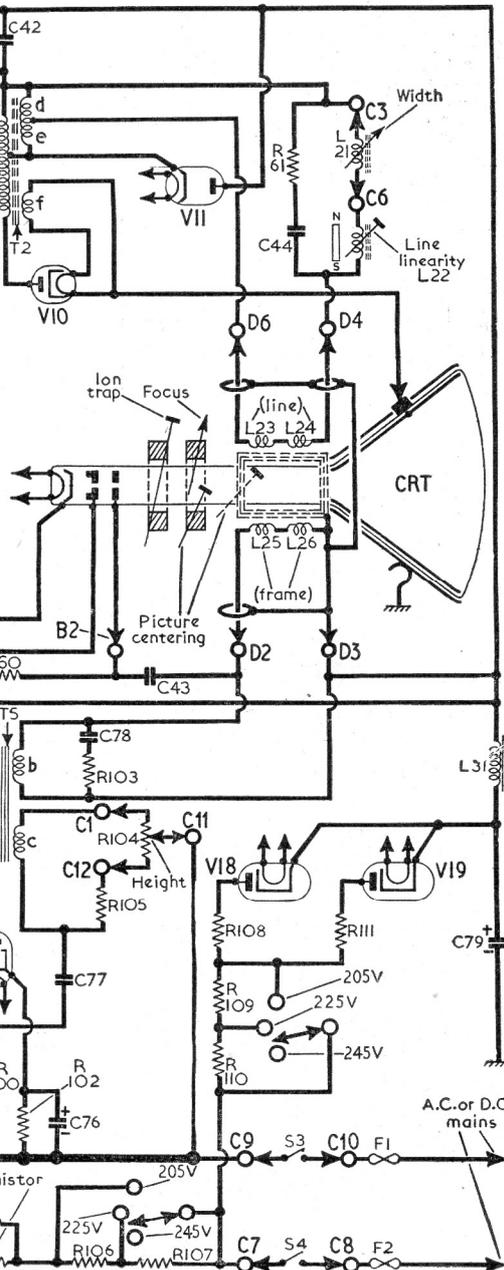
L1	—	N10
L2	—	N10
L3	—	N10
L4	—	P10
L5	—	P10
L6	—	P10
L7	—	B3
L8	—	B2
L9	—	B1
L10	—	B1
L11	—	B2
L12	—	B1
L13	—	C2
L14	—	C2
L15	—	C2
L16	—	C2
L17	—	C2
L18	—	C2
L19	20.0	E7
L20	20.0	E7
L21	3.0	Q11
L22	2.6	D4
L23	2.8	—
L24	2.8	—
L25	4.8	—
L26	4.8	—
L27	—	C1
L28	—	C1
L29	—	C1
L30	3.6	—
L31	38.0	D4
L32	—	N10

Transformers†

T1	{ a 140-0 } { b 35-0 }	C5
T2	{ a 9-1 } { b 6-9 } { c 340-0 } { d 3-2 } { e 5-9 }	B5
T3	{ a 250-0 } { b 0-4 }	D1
T4	{ a 280-0 } { b 300-0 } { c 470-0 }	B4
T5	{ a 560-0 } { b 2-4 } { c 1,750-0 }	A5

Miscellaneous

Thermistor CZ1	D4
F1, F2 1A fuses	D4
S1, S2	C3
S3, S4	Q11



* Electrolytic. † Approximate values in ohms. ‡ Two resistors, 220kΩ + 180kΩ, in parallel. § Two 1MΩ resistors in series. ** Two resistors 680kΩ + 560kΩ, in series. †† Two 68kΩ resistors in series. Negative temperature coefficient. §§ Replaceable only at works

any reason the unit is returned to the makers it should be released from the main chassis as described under "Dismantling Tuner Unit" and the extension spindle detached from it. The coil drum should **not** be removed from the unit.

VALVE ANALYSIS

Valve voltage measurements given in the table below are those derived from the manufacturers' information. The sensitivity, contrast and volume controls were turned to maximum, the brightness control to minimum and the remaining controls to their normal settings. There was no signal input. The receiver was operated from 242 V mains, with the voltage adjustment plug set to the 245 V position.

Volages, except where otherwise indicated, were measured on a valve voltmeter, chassis being the negative connection. Turning the brightness control from minimum to maximum increased CRT grid voltage from 30 V to 115 V.

Valve	Anode (V)	Screen (V)	Cath. (V)
V1 PCC84 ...	85	—	1.3
	170	—	85.0
V2 PCF80 ...	55	—	—
	165	120	—
V3 EF80 ...	175	175	2.0
V4 EF80 ...	165	165	2.0
V5 EB91 ...	80	—	1.7
V6 EF80 ...	110	145	4.0
V7 ECL80 ...	50	14.5	—
	48	—	—
V8 ECL80 ...	180	152	—
	29	—	—
V9 PL81 ...	*	97	—
V10 EY51 ...	—	—	12 kV†
V11 PY81 ...	180	—	4 kV†
V12 EF80 ...	150	165	3.0
V13 ECL80 ...	165	120	3.0
	54	—	—
V14 EB91 ...	—	—	—
V15 PL82 ...	150	155	11.0
V16 ECL80 ...	45	21	—
	360	—	—
V17 PL82 ...	165	180	12.5
V18, V19, PY82's	190‡	—	197.0
V20, EF80 ...	130	165	2.2
V21, EF80 ...	170	110	—
CRT MW36/24§ ...	1st anode, 400V; 2nd anode 12kV†.		

* No reading taken. † Measured with electrostatic meter. ‡ A.C. reading. § 14in models; MW 43/64 in 17in. models.

ASSOCIATED MODELS

Model 1746U.—This is a 17inch version of model 1446U and uses a Mullard MW43-64 C.R. tube. A thermistor (Varite, Philips part No. MK.796.16) is inserted between C72 and the junction C70, R94.

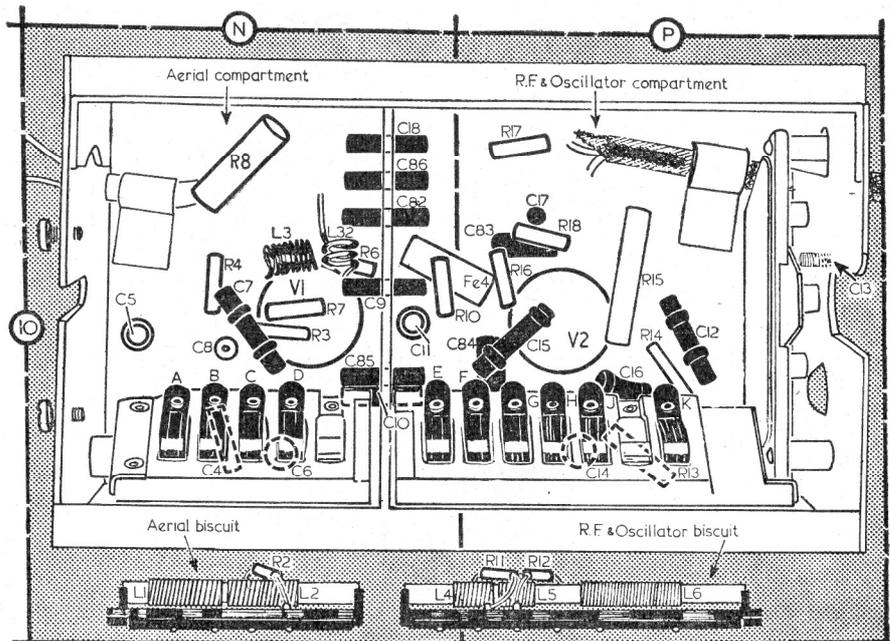
Model 1747U.—This is a console version of model 1746U.

Models 1446U/45, 1746U/45.—These are the Band I versions of models 1446U and 1746U respectively, and have facilities for the addition of a 12-channel tuner unit. The R.F. and mixer circuit for these models appears at the foot of cols. 1-3 and connects into the junctions numbered 1, 2, 3, 6 in the main circuit diagram in place of the tuner unit circuit. Five sets of plug-in coils, L35, L36, L37 (aerial), L38, L39 (R.F.) and L40 (oscillator), are available to cover the Band I channels. The following circuit changes occur in the main circuit diagram for these models.

L8 is shunted by an 8.2 kΩ resistor. L11 is more closely coupled to L8 by the use of an additional coupling loop in its earthy end. The heaters of V20 and V21 are inserted in series between V3 and V12. The heater of V5 is connected to the heater of V6. C19 is omitted. C81 is omitted. R106 becomes two resistors in series, 26Ω + 34Ω. R107 becomes 53Ω. R101 becomes 310Ω.

The add-on tuner unit (type AT7520-01) designed for use with these, and certain older types of receiver, differs from that used in the Band I/III models in the following respects. Lead lengths and fixing brackets are modified. The impedance of the output coil L8 is modified to match the control grid circuit of V21, which then becomes the first vision I.F. amplifier. Apart from these differences, the two tuner units are identical.

Fringe Models.—Fringe versions of all the above models are identified by the suffix "F" following the model number, and differ from the standard receivers only in their alignment as indicated in the circuit alignment tables.



Underside view of the tuner unit as seen with the coil turret and spindle removed (See "Dismantling Tuner Unit" below). A pair of coil "Biscuits" is seen below it.

DISMANTLING TUNER UNIT

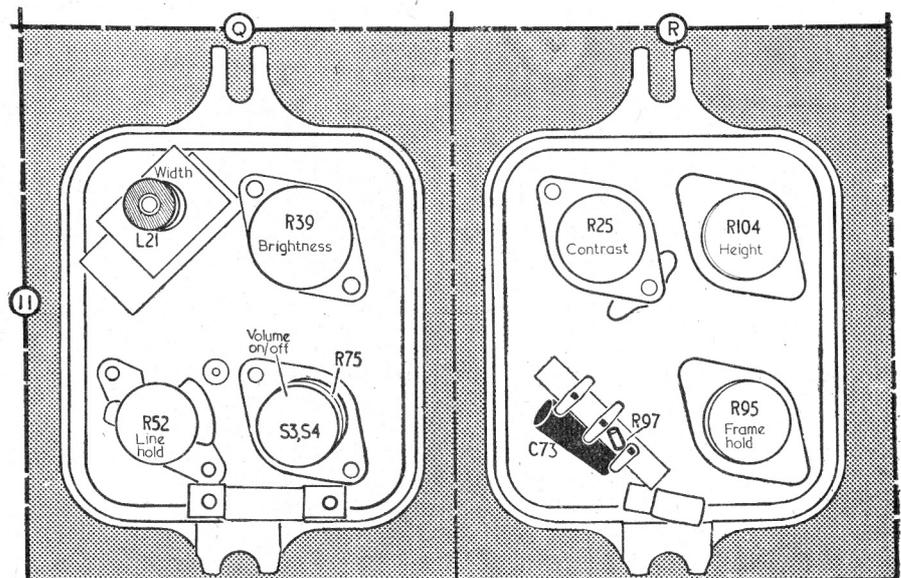
Release the tuner unit from the main chassis assembly by removing the four bolts (with washers and spacers) securing its front and rear brackets; unsolder the six leads (numbered 1-6 in the circuit diagram and chassis plan illustration) which connect the unit to the I.F. chassis; remove base cover plate (four 3mm bolts); remove the rear supporting bracket (two 3mm bolts); remove the two screws securing the switch wafer to the rear of the unit and withdraw it from the switch spindle; remove the position locating spring and roller from the side of the unit; remove the two 3mm bolts securing the front supporting bracket to the unit; withdraw the complete coil turret and spindle evenly and carefully, taking care not to damage the spring-loaded oscillator trimmer vane at the front end of the spindle. When replacing, the oscillator trimmer vane

must be pushed towards the knob end of the spindle, so that when in position it presses against the paxolin panel and also engages in the driving peg on the spindle.

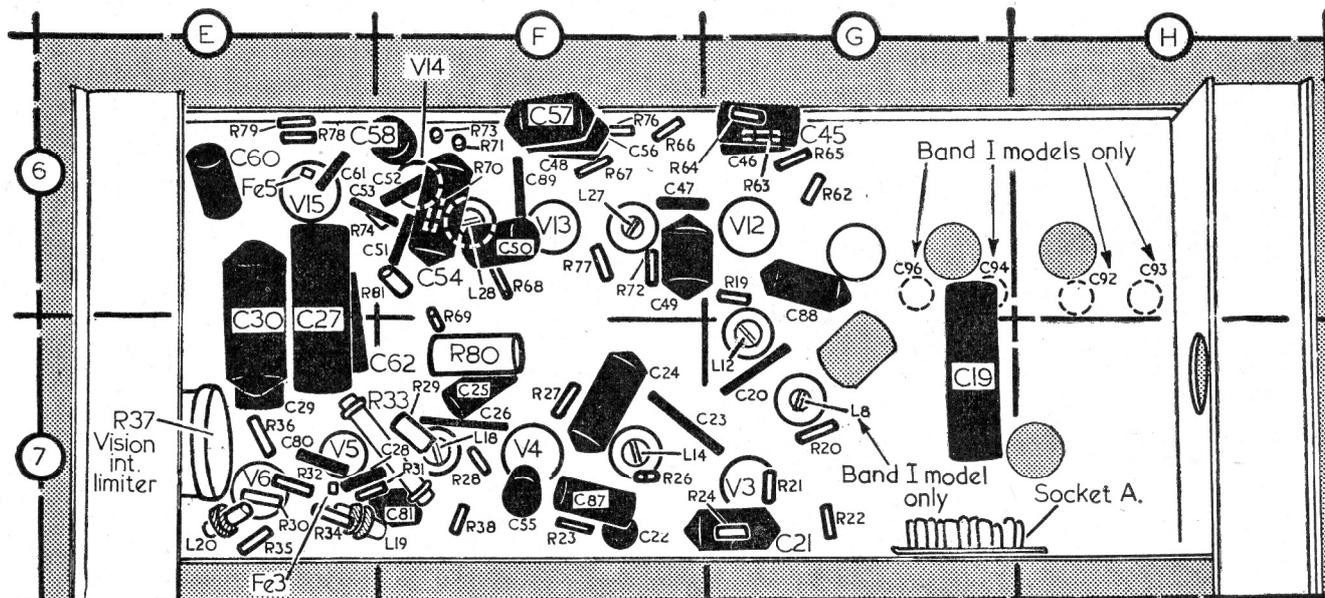
ADJUSTMENTS

Picture Centering.—Slacken the two bolts (fitted with spring washers and large brass washers) on the rear face of the focus magnet assembly. Move the focus magnet about the tube neck until picture is centred. Tighten up the two fixing bolts. If centering cannot be completely achieved by this method, the small correction magnet, clipped round the deflector coil assembly, should be rotated about the assembly for optimum correction. The normal position for this magnet is at 10 o'clock (viewed from rear), with its south pole (coded with white spot) to the right.

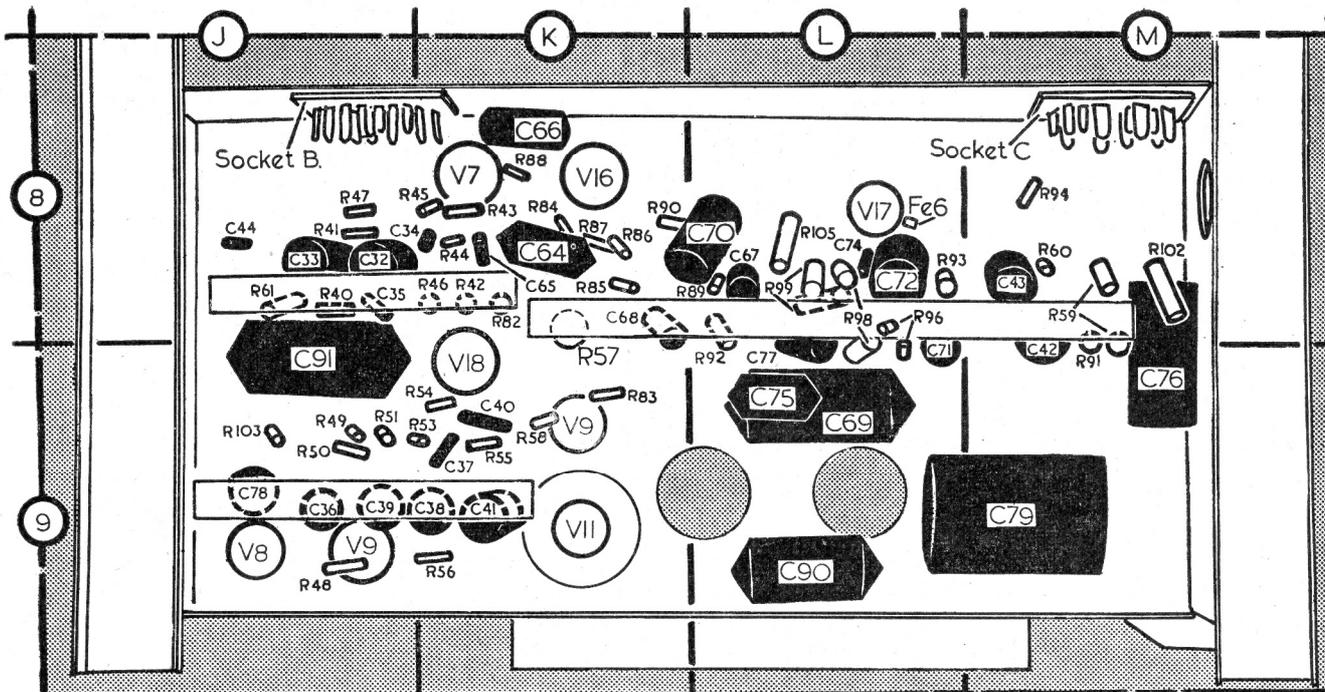
Picture Levelling.—This is carried out by rotating the deflector coil assembly about the tube neck. A small lever is provided at the lower edge of the assembly for this purpose.



Rear views of the control panels. The positions of the controls in the cabinet are indicated in the picture of the receiver overleaf.



Above: Underside view of the I.F. chassis. Below: Underside view of the time-base and power supply chassis.



"live" lead with a 37.5Ω resistor and connect it to the aerial socket. Feed in a 30% modulated signal. No adjustment is made during alignment to the cores of L36, L37, L38, L39 or L40. These are pre-set at the factory for the particular channel in use.

Band I R.F. and Oscillator Table

Sig. Gen. Output	Shunt to Chassis	Adjust	Location	Meter Deflection
*	—	C95	B1	Max. S
†	L38	C96	G6	Max. V
†	V21C.G.	C94	G6	Max. V
†	L36	C93	H6	Max. V
†	L37	C92	H6	Max. V

* Sound channel frequency. † Vision carrier frequency minus 1.5 Mc/s.

12-channel Models

I.F. Stages.—Shunt output leads of signal generator with 75Ω resistor, and connect them, via the 0.005 μF capacitor in series with the "live" lead, to alignment point X (location reference B3) and chassis. Feed in a 30% modulated signal. Carry out adjustments 5-10 inclusive in the Band I I.F. alignment table and then follow on with the adjustments in the following 12-channel I.F. alignment table.

R.F. and Oscillator Stages.—The tuner unit has been accurately set up at the factory and addition or substitution of sets of coils will not involve re-alignment. However, if any of the constants of the unit are upset due to replacement of components, or to movement of the wiring, the unit may need re-alignment. The manufacturers recommend that if for any reason the tuner unit needs re-aligning, it should be returned to their service department. No instructions are therefore given for R.F. alignment, but if the tuner control does not

tune to maximum sound at about the centre of its rotation, the core in the particular oscillator coil may be adjusted to correct this. The position of the core adjustment is indicated in the plan view of the chassis at B3. If for

12-channel I.F. Table

Sig. Gen. Output (Mc/s)		Adjust	Location	Meter Deflection
Standard	Fringe			
11.8	12.0	L16	C2	Max. V
9.6	10.4	L13	C2	Max. V
10.5	10.5	L11¶	B2	Max. V
10.5	10.5	L7	B3	Max. V

¶ Connect damping unit from V2b anode to chassis. Set core to peak nearer adjusting end for standard operation, and to peak farther from adjusting end for fringe operation. || Connect damping unit across L11.

