BRC

2000 SERIES COLOUR TELEVISION MANUAL

SECTION C

WORKSHOP SERVICING

IF AMPLIFIER

BRITISH RADIO CORPORATION LIMITED

CONTENTS

SECTION **C**

WORKSHOP SERVICING

Circuit Alignment

EQUIPMENT REQUIRED

(i) An AM signal generator of 75 Ω output impedance, covering 3.5 MHz - 41.5 MHz.

(ii) An oscilloscope sensitive up to 5 MHz.

(iii) A multirange meter (20,000 Ω/volt) such as Avometer Model 8 or a valve voltmeter.

(iv) Capacitors of 1pF, 1000pF and 0.01µF, and a 1K Ω resistor. Shorting links of suitable lengths as shown in the alignment diagram.

Unless it is known that the board has been misaligned or that tuning components have been replaced, all other possible causes for a particular fault condition should be checked before realigning the circuits. Careful replacement of individual components should not necessitate undergoing the complete realignment procedure and any readjustment can usually be confined to an individual stage.

The aerials should be disconnected and the chassis withdrawn into the service position. The copper side of the board provides best access for test connections which should be soldered to the appropriate points, as shown in the Alignment Diagram page 4. It is advisable to switch off the receiver whilst attaching or disconnecting test leads to avoid damage to components. The tuning cores are of the slotted type, and where two cores are fitted in the same former the core nearest the board must be tuned through the access hole from the copper side. Where shorting links are necessary, lead lengths should be kept to a minimum.

CHECK AGC LEVEL (R6)

As a preliminary, check that the AGC Level preset (R6) is not seriously misadjusted, otherwise the 1st Vision IF amplifier may be working at full gain.

With a VHF (405) channel selected and the Contrast control at minimum, check the voltage at VT1 emitter. If it is over 12V DC do not adjust—if it is less than 12V adjust R6 for that voltage. *This is a coarse setting which will suffice at this stage.*

6 MHz SOUND CIRCUITS

Connect the test equipment as follows:

Signal generator via 0.01μF and 1KΩ in series to junction L21–L27; Avometer (10V DC Range) across C84 with positive to earth; oscilloscope across PLG4 (Audio out) on most sensitive range.

Select a UHF channel and turn the 625 Contrast control to minimum. Tune the signal generator to 6 MHz CW and adjust during alignment so that the meter reading does not exceed 1V.

Tune the following coils for maximum meter reading: L32, L30, L17 and L18 in that order.

Disconnect the Avometer and connect two equal resistors of about 100KΩ each in series across C84. Switch the meter to the 50 μA range and connect it between the junction of these resistors and junction R57 – C82.

Adjust L33 for zero meter reading between positive and negative swings (i.e. adjust for zero, then reverse leads and adjust for zero again). Disconnect the resistors and remove the meter.

Switch signal generator to 30% AM modulation and readjust L33 for minimum display on the oscilloscope.

Disconnect oscilloscope and meter.

CHROMINANCE TAKE-OFF COIL (L40)

With the signal generator still connected to junction L21–L27 connect the oscilloscope across R100 on the Chrominance Board (see Section J). On the same board place a shorting link between the top end of R65 (bistable emitter) and the top end of R85, to maintain killer bias.

Turn Colour (saturation) control to maximum and tune signal generator to 4.2 MHz CW. With the generator adjusted for 1V p-p display, tune L40 for maximum display.

Remove oscilloscope and killer bias link.

VISION/SOUND BEAT REJECTOR (L27)

Select a VHF (405) channel and connect the oscilloscope across SKT7 (Luminance Out). Set the signal generator to 3.5 MHz CW and tune L27 for minimum display.

Disconnect oscilloscope and signal generator.

38.25 MHz SOUND IF

Detach the tuner from the cabinet and withdraw it to the rear (with the leads still connected) to allow a connection to be made to Tuner TP2. In certain models it may be necessary to release the cabinet mounted potentiometer bank for tuner removal clearance. If the tuner bonding strip has been released it must be reconnected before operating the receiver with the tuner withdrawn.

Connect the signal generator via a 1pF capacitor to Tuner TP2 and connect the oscilloscope across PLG4 (Audio Out).

Select a VHF (405) channel and turn the 405 Contrast control to minimum.

Tune signal generator to 38.25 MHz (30% AM modulation) and during the procedure reduce the output as necessary to keep the display below 0.5V p-p.

Tune the following coils for maximum display in the order shown: L35, L34, L31 and L28.

Disconnect the test equipment.

VISION IF COILS

Short the pole contact of S1B to earth (Link 2). Switch the signal generator for 30% AM modulation and connect via 1000pF to VT1 base (1st Vision IF Amplifier). Connect the oscilloscope to pin 6 of the CRT base connector (green cathode) and select a UHF channel. Adjust the signal generator output during the procedure to maintain 30V p-p display.

Generator Freq.	Tune	Display
33.5 MHz	L22	Minimum
37 MHz	L16, L15, L14	Maximum

Swing the signal generator from 34.65 MHz to 39.5 MHz and check that the response at these two frequencies is approximately 4dB below peak.

Disconnect the signal generator and remove Link 2.

RESPONSE SHAPING CIRCUITS

625 BANDPASS COILS

With the oscilloscope still connected to the Green cathode connect the signal generator via a 1pF capacitor to Tuner TP2. Turn 625 Contrast control to minimum. Tune the coils for maximum whilst keeping the generator output adjusted for a maximum display of 30V p-p.

Connect	Disconnect	Frequency	Tune
Link 3	—	36 MHz	L6
Link 4	Link 3	36 MHz	L5
—	Link 4	37 MHz	L29*

* *Tuner*

625 REJECTOR COILS

Switch the oscilloscope to its most sensitive range, and keeping the signal generator output as low as possible proceed as follows:

Frequency	Tune	Display
31.5 MHz	L1	Minimum
33.5 MHz	L3	Minimum
41.5 MHz	L4	Minimum
32 MHz	L7	Minimum

If the rejectors were considerably off-tune repeat the bandpass and rejector alignment.

405 BANDPASS COILS

Select a VHF (405) channel and turn the 405 Contrast control to minimum. Set the oscilloscope for a 30V p-p display. Tune the coils for maximum whilst keeping the generator output adjusted for a maximum display of 30V p-p.

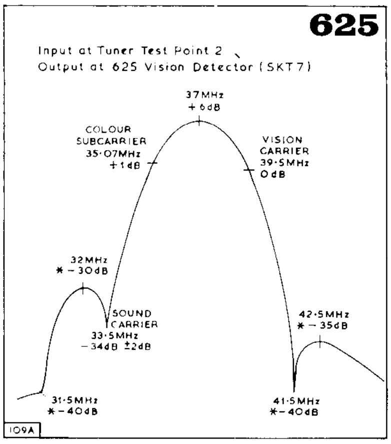
Connect	Disconnect	Frequency	Tune
Link 5 & Link 6	—	36 MHz	L13
Link 7	Link 6	35 MHz	L11
Link 6	Link 5	35 MHz	L9

Remove Link 6 and Link 7.

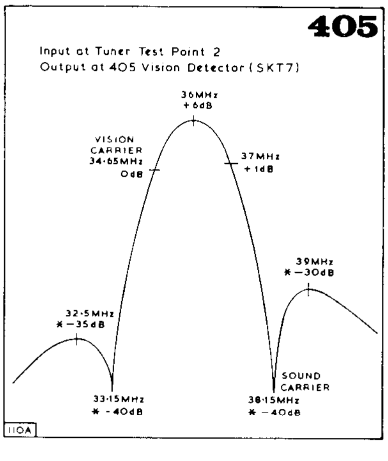
405 REJECTOR CIRCUITS

Frequency	Tune	Display
33.15 MHz	L10	Minimum
39.65 MHz	L12	Minimum
38.15 MHz	L8	Minimum

Disconnect oscilloscope and signal generator.



Vision IF Response Curves (taken with reduced gain)



✱ Minimum Rejection Levels

AFC CIRCUITS

SET AFC (R79)

Select a UHF channel, turn the 625 Contrast control to minimum and unplug the aerials. If there is a risk of signal breakthrough such as might occur in a very strong signal area then short VT6 base to earth using a minimum length link (Link 1, see Alignment Diagram). Connect an Avometer Model 8 (100V DC range) to VT8 collector and adjust R79 for a meter reading of 13V. Remove meter and shorting link and return Contrast control to normal.

AFC COILS

Set the signal generator to 40.5 MHz (30% modulated) and reconnect to Tuner TP2. Connect the oscilloscope across the Luminance Output (SKT7). Detune L39 by removing the core; the outer screening can may be removed for access. Tune L37 for maximum meter reading whilst adjusting the signal generator output, as necessary, for a maximum display of 1V p-p. Set the signal generator to 39.5 MHz (30% modulated) and tune L38 for maximum meter reading whilst keeping the generator output adjusted for 1V p-p display.

Refit core and tune the coil until the Avometer again reads exactly 13V: this is a critical adjustment. Swing the signal generator frequency between 39 MHz and 40 MHz whilst observing that the meter reading swings in sympathy over the range between 20V and 5V.

Disconnect all test equipment and refit the tuner in the cabinet, ensuring that the bonding strip is correctly connected.

AGC CIRCUITS

SET AGC LEVEL (R6)

1 Solder a 2.7KΩ resistor between edge-connector contacts 10 and 15 (on the copper side) – this will bias the tuner RF transistor into the minimum gain condition. Connect an oscilloscope to the CRT green cathode (pin 6 of the base connector).

2 Switch on the receiver, select a Band I channel and inject the appropriate vision RF frequency, 30% sine wave modulated at the VHF aerial socket. Turn the 405 Contrast control to maximum, tune the receiver for maximum on the oscilloscope and adjust the signal generator for 30V p-p display.

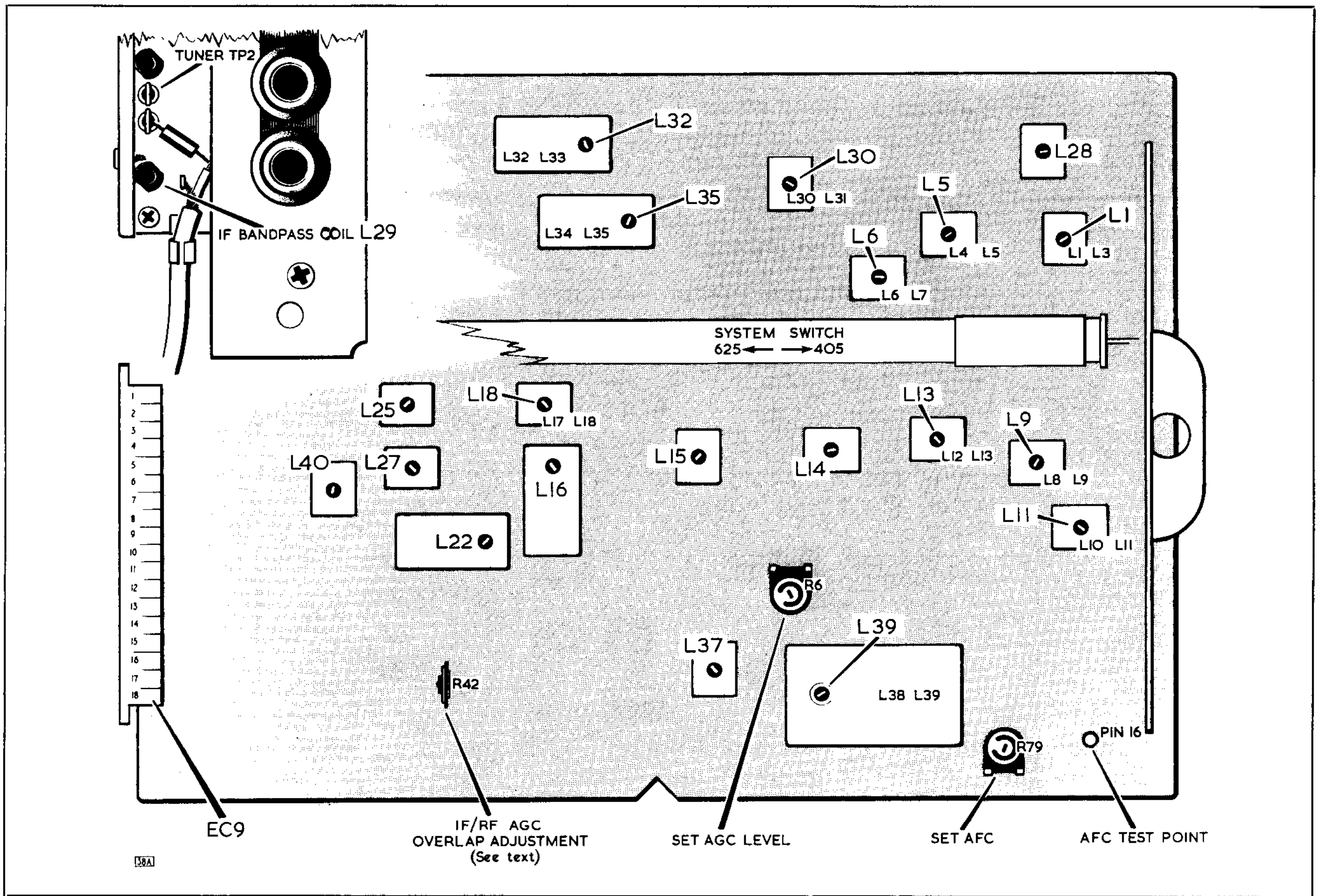
3 Turn the 405 Contrast to minimum and increase the input signal by 23 dB (14 times). Adjust R6 until 30V p-p display is obtained. Remove the 2.7KΩ resistor.

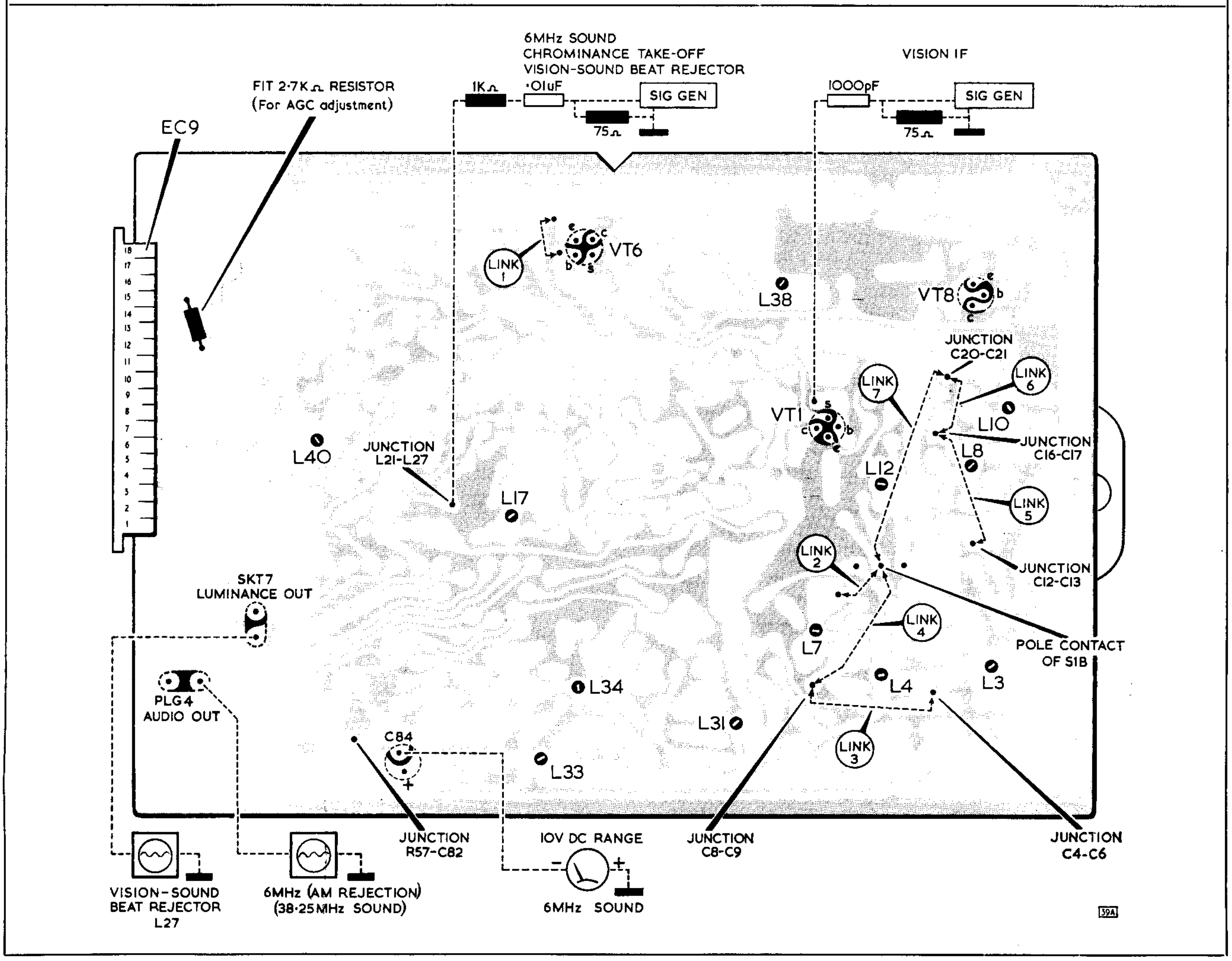
AGC IF/RF OVERLAP (R42)

If after changing the tuner or tuner RF transistor, a 'step' is noticed in the contrast action during weak Band I or Band III transmissions, it will be necessary to adjust R42. The 'step' or sudden change in contrast level may occur either whilst the 405 Contrast is being rotated or during changes in signal level.

Whilst rotating the 405 Contrast control, adjust R42 (anti-clockwise) to eliminate the 'step'. If the adjustment is being attempted in a strong signal area it may be necessary to fit an attenuator in order to provoke the condition to make the adjustment.

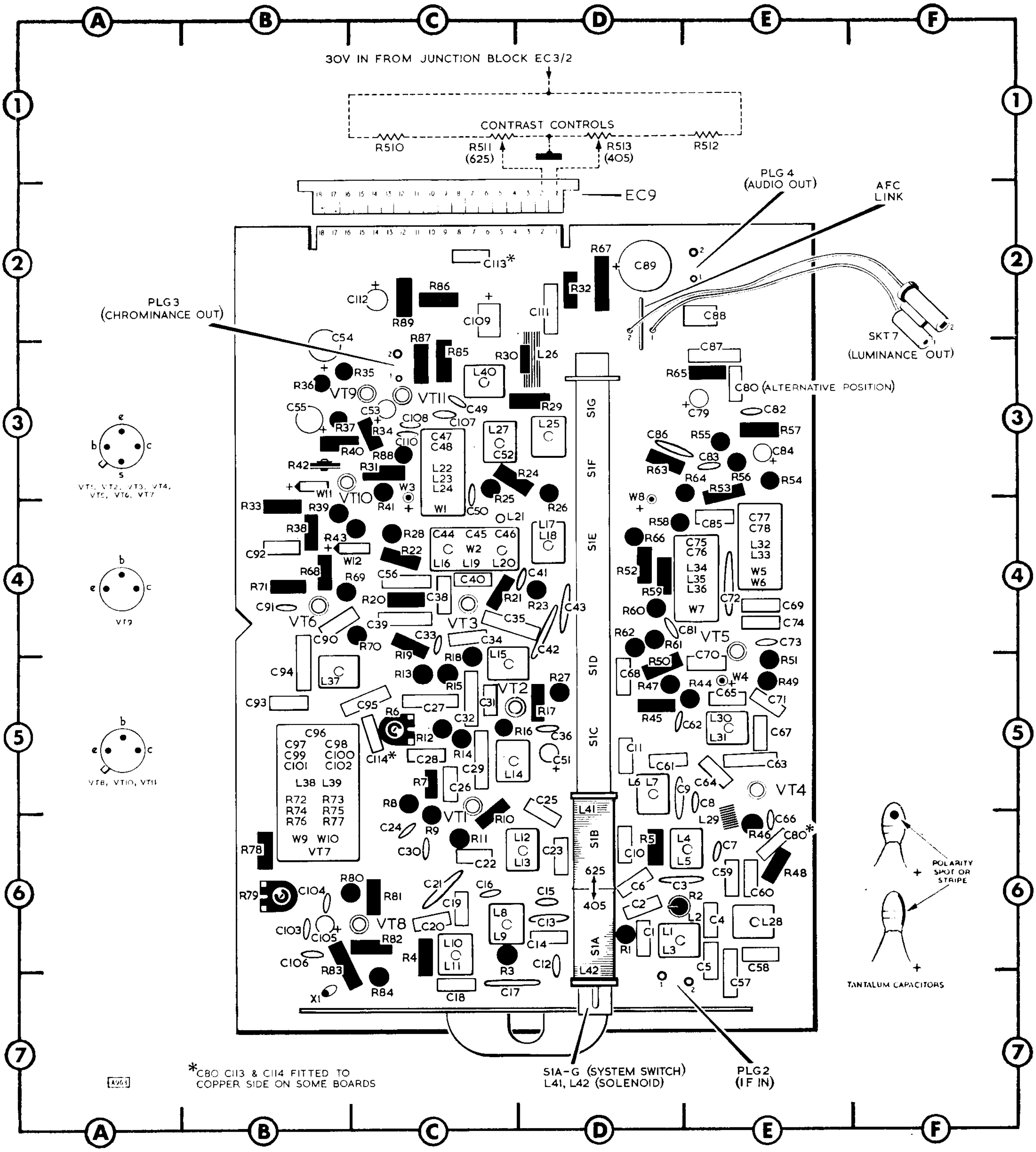
If, after changing the tuner, there is 'noise' on picture, even at high signal levels (on Band I or Band III) then adjust R42 in a clockwise direction to improve the picture but check that a 'step' does not occur at the new setting at low signal levels.


TUNER TP2
IF BANDPASS COIL L29
L32
L32 L33
L35
L34 L35
L30
L30 L31
L28
L5
L4 L5
L1
L1 L3
L6
L6 L7
SYSTEM SWITCH
625 405
L25
L18
L17 L18
L13
L12 L13
L9
L8 L9
L40
L27
L16
L15
L14
L11
L10 L11
L22
R6
L37
L39
L38 L39
R42
R79
PIN 16
EC9
IF/RF AGC
OVERLAP ADJUSTMENT
(See text)
SET AGC LEVEL
SET AFC
AFC TEST POINT
38A


6MHz SOUND
CHROMINANCE TAKE-OFF
VISION-SOUND BEAT REJECTOR
VISION IF
FIT 2·7KΩ RESISTOR
(For AGC adjustment)
1KΩ
·01uF
SIG GEN
75Ω
1000pF
SIG GEN
75Ω
EC9
LINK 1
VT6
L38
VT8
JUNCTION
C20-C21
LINK 6
LINK 7
VT1
L10
JUNCTION
C16-C17
L40
JUNCTION
L21-L27
L17
L8
L12
LINK 5
LINK 2
JUNCTION
C12-C13
SKT7
LUMINANCE OUT
LINK 4
POLE CONTACT
OF S1B
L7
L3
L4
PLG4
AUDIO OUT
L34
L31
LINK 3
C84
L33
JUNCTION
R57-C82
10V DC RANGE
JUNCTION
C8-C9
JUNCTION
C4-C6
VISION-SOUND
BEAT REJECTOR
L27
6MHz (AM REJECTION)
(38·25MHz SOUND)
6MHz SOUND
39A

Component Locations and Details

Transistor connections shown are as viewed from transistor base.



Ensure that the receiver is switched off before removing or inserting the printed board or disconnecting plugs and sockets. Board removal techniques are described in Section A. When removing the printed board ensure that the board retainers do not interfere with the copper side during withdrawal—the retainers are slotted to provide sufficient clearance without completely removing the screw. However, it is advisable to completely remove the retainers to avoid accidental damage.

CAPACITORS

REF.	DESCRIPTION AND PART No.	LOC.
C1	5pF, ±0.5pf, 500V, Ceramic, 1N10...	D6
C2	5pF, ±0.5pf, 500V, Ceramic, 1N10...	D6
C3	120pF, 2%, 350V, Mica, 1N11	DE6
C4	42pF, 10%, 500V, Ceramic, 1N12 ...	E6
C5	68pF, 10%, 500V, Ceramic, 1N13 ...	E6
C6	18pF, 10%, 560V, Ceramic, 1N14 ...	D6
C7	8.2pF, 10%, 560V, Ceramic, 1N16 ...	E6
C8	8.2pF, 10%, 560V, Ceramic, 1N16 ...	E5
C9	120pF, 2%, 350V, Mica, 1N11	D5
C10	10pF, 10%, 500V, Ceramic, 1N17 ...	D6
C11	20pF, 20%, 500V, Ceramic, 1N18 ...	D5
C12	120pF, 10%, 500V, Ceramic, 1N19	D6
C13	100pF, 2%, 350V, Mica, 1N20	D6
C14	18pF, 10%, 500V, Ceramic, 1N14 ...	D6
C15	8.2pF, 10%, 500V, Ceramic, 1N16 ...	D6
C16	8.2pF, 10%, 500V, Ceramic, 1N16 ...	C6
C17	270pF, 2%, 350V, Mica, 1N21	C7
C18	18pF, 10%, 500V, Ceramic, 1N14 ...	C7
C19	6.8pF, 10%, 500V, Ceramic, 1N22 ...	C6
C20	6.8pF, 10%, 500V, Ceramic, 1N22 ...	C6
C21	270pF, 2%, 350V, Mica, 1N21	C6
C22	10pF, 10%, 500V, Ceramic, 1N17 ...	C6
C23	18pF, 10%, 500V, Ceramic, 1N14 ...	D6
C24	0.01μF, −20+80%, 100V, Ceramic, 9M71	C6
C25	120pF, 10%, 500V, Ceramic, 9M93...	D5
C26	3.3pF, ±0.25pF, 500V, Ceramic, 1N23	C5
C27	2000pF, −20+80%, 500V, Ceramic, 1N24	C5
C28	200pF, 10%, 500V, Ceramic, 9M70...	C5
C29	8.2pF, 20%, 500V, Ceramic, 1N15 ...	C5
C30	0.01μF, −20+80%, 100V, Ceramic, 9M71	C6
C31	3.3pF, ±0.25pF, 500V, Ceramic, 1N23	C5
C32	2000pF, 20%, 500V, Ceramic, 1N25	C5
C33	2000pF, −20+80%, 500V, Ceramic, 1N45	C4
C34	200pF, 10%, 500V, Ceramic, 9M70...	C4
C35	40pF, 20%, 500V, Ceramic, 1N26 ...	CD4
C36	0.01μF, −20+80%, 100V, Ceramic, 9M71	D5
C38	3.3pF, ±0.25pF, 500V, Ceramic, 1N23	C4
C39	5.6pF, 10%, 500V, Ceramic, 1N27 ...	C4
C40	120pF, 10%, 500V, Ceramic, 9M93...	C4
C41	0.01μF, −20+80%, 100V, Ceramic, 9M71	D4
C42	430pF, 10%, 350V, Mica, 1N28	D4
C43	430pF, 10%, 350V, Mica, 1N28	D4
C44	1000pF, −20+80%, 500V, Ceramic } included in L16 coil assembly	C4
C45	6.8pF, ±0.5pF, 40V, Ceramic } included in L16 coil assembly	C4
C46	4pF, ±0.5pF, 40V, Ceramic } included in L16 coil assembly	C4
C47	60pF, 10%, 350V, Ceramic } included in L22 coil assembly	C3
C48	2pF, ±0.5pF, 500V, Ceramic } included in L22 coil assembly	C3
C49	50pF, 10%, 500V, Ceramic, 1N29 ...	C3
C50	0.01μF, −20+80%, 100V, Ceramic, 9M71	C3,4
C51	4μF, 35V, Electrolytic, 0E0–221/04 ...	D5
C52	82pF, 5%, 40V, Ceramic, included in L27 coil assembly	C3
C53	20μF, 6V, Electrolytic, 0E0–224/01 ...	C3
C54	50μF, 12V, Electrolytic, 0E0–228/08	B2,3
C55	50μF, 12V, Electrolytic, 0E0–228/08	B3
C56	1000pF, 20%, 500V, Ceramic, 1N30	C4
C57	6.8pF, 10%, 500V, Ceramic, 1N31	E7
C58	33pF, 10%, 500V, Ceramic, 1N32 ...	E6
C59	25pF, 10%, 500V, Ceramic, 9M94 ...	E6
C60	82pF, 10%, 500V, Ceramic, 1N33 ...	E6
C61	35pF, 5%, 500V, Ceramic, 1N34 ...	D5
C62	0.01μF, −20+80%, 100V, Ceramic, 9M71	DE5
C63	1000pF, 10%, 500V, Ceramic, 1N35	E5
C64	4pF, 10%, 500V, Ceramic, 1N36 ...	E5
C65	250pF, 10%, 500V, Ceramic, 1N38	E5
C66	0.01μF, −20+80%, 100V, Ceramic, 9M71	E6
C67	62pF, 20%, 500V, Ceramic, 1N39 ...	E5
C68	1000pF, −20+80%, 500V, Ceramic, 9M85	D5
C69	330pF, 10%, 500V, Ceramic, 1N40	E4
C70	2pF, ±0.25pF, 500V, Ceramic, 1N41	E5
C71	150pF, 20%, 500V, Ceramic, 1N42	E5
C72	650pF, 5%, 350V, Mica, 1N43	E4
C73	0.01μF, −20+80%, 100V, Ceramic, 9M71	E4
C74	30pF, 10%, 500V, Ceramic, 1N44 ...	E4
C75	20pF, 10%, 500V, Ceramic } included in L34 coil assembly	E4
C76	56pF, 2%, 40V, Ceramic } included in L34 coil assembly	E4
C77	180pF, 5%, 350V, Polystyrene } included in L32 coil assembly	E4
C78	180pF, 5%, 350V, Polystyrene } included in L32 coil assembly	E4
C79	4μF, 35V, Tantalum Electrolytic, 0E0–221/04	E3
C80	1000pF, −20+80%, 500V, Ceramic, 9M85	E6*
C81	0.01μF, −20+80%, 100V, Ceramic, 9M71	DE4
C82	2000pF, −20+80%, 500V, Ceramic, 1N45	E3

CAPACITORS-*continued*

REF.	DESCRIPTION AND PART No.	LOC.
C83	2000pF, −20+80%, 500V, Ceramic, 1N45	E3
C84	4μF, 35V, Tantalum Electrolytic, 0E0–221/04	E3
C85	20pF, 10%, 500V, Ceramic, 1N46 ...	E4
C86	0.1μF, −20+80%, 20V, Ceramic, 1N47 ...	D3
C87	4000pF, −20+80%, 500V, Ceramic, 1N48	E3
C88	0.047μF, 20%, 250V, Polyester, 8M07	E2
C89	250μF, 35V, Electrolytic, 0E0–229/39	D2
C90	4pF, 0.25pF, 500V, Ceramic, 1N49...	B4
C91	5000pF, −20+80%, 500V, Ceramic, 1N45	B4
C92	1000pF, −20+80%, 500V, Ceramic, 9M85	B4
C93	150pF, 20%, 500V, Ceramic, 1N42	B5
C94	60pF, 20%, 500V, Ceramic, 1N50 ...	B5
C95	1000pF, −20+80%, 500V, Ceramic, 1N35	C5
C96	200pF, 10%, 125V, Polystyrene, 1N51	B5
C97	15pF, ±0.5pf, 40V, Ceramic, 1N52...	B5
C98	33pF, 5%, 40V, Ceramic, 1N53	B5
C99	5000pF, −20+80%, 500V, Ceramic, 1N54	B5
C100	22pF, 20%, 500V, Ceramic, 1N56 ...	B5
C101	22pF, 20%, 500V, Ceramic, 1N56 ...	B5
C102	1000pF, 20%, 500V, Ceramic, 1N57	B5
C103	5000pF, −20+80%, 500V, Ceramic, 9M72	B6
C104	1000pF, −20+80%, 500V, Ceramic, 1N58	B6
C105	4μF, 35V, Tantalum Electrolytic, 0E0–221/04	B6
C106	5000pF, −20+80%, 500V, Ceramic, 9M72	B6
C107	12pF, 10%, 500V, Ceramic, 1N59 ...	C3
C108	30pF, 10%, 500V, Ceramic, 1N55 ...	C3
C109	5μF, 64V, Electrolytic, 0E0–221/10 ...	C2
C110	0.01μF, −20+80%, 100V, Ceramic, 9M71	C3
C111	1000pF, 20%, 500V, Ceramic, 1N30	D2
C112	4μF, 35V, Electrolytic, 0E0–221/04 ...	C2
C113	1000pF, −20+80%, 500V, Ceramic, 1032...	C2
C114	1000pF, −20+80%, 500V, Ceramic, 9M85	C5
	* *Alternative location E3*	

DIODES

REF.	DESCRIPTION AND PART No.	LOC.
W1	0A90 Germanium, 0V4–610 ...	C4
W2	0A90 Germanium, 0V4–610 ...	C4
W3	0A91 Germanium, 0V4–616 ...	C3
W4	0A90 Germanium, 0V4–610 ...	E5
W5	BA130 Silicon, 0V4–120	E4
W6	BA130 Silicon, 0V4–120	E4
W7	0A70 Germanium, 0V4–601 ...	E4
W8	0A91 Germanium, 0V4–616 ...	D3,4
W9	AA119 Germanium, 0V4–001	B6
W10	AA119 Germanium, 0V4–001	B6
W11	BY124 Silicon, 0V4–106	B3
W12	BY124 Silicon, 0V4–106	BC4

TRANSISTORS

REF.	DESCRIPTION AND PART No.	LOC.
VT1	BF167 Mullard, 0V1–315	C5,6
VT2	BF184 Mullard, 0V1–327	CD5
VT3	BF173 Mullard, 0V1–326	C4
VT4	BF173 Mullard, 0V1–326	E5
VT5	BF173 Mullard, 0V1–326	E4
VT6	BF173 Mullard, 0V1–326	B4
VT7	BF184 Mullard, 0V1–327	B6
VT8	BC107A Mullard, 0V1–328 ...	C6
VT9	BC116 Fairchild, 0V1–321	BC3
VT10	BC107 Mullard, 0V1–314	BC3
VT11	BC107 Mullard, 0V1–314	C3

RESISTORS

REF.	DESCRIPTION AND PART No.	LOC.
R1	18 Ω, 10%, 0.2W, 3B91	D6
R2	620 Ω, 10%, 0.25W, incl. L2, 0D0–177	E6
R3	18K Ω, 10%, 0.2W, 4B30	C6,
R4	4.7K Ω, 10%, 0.2W, 1A32	C6
R5	18K Ω, 10%, 0.2W, 1A58	D6
R6	25K Ω, Preset, 0E1–032/01	C5
R7	2.2K Ω, 20%, 0.2W, 4B06	C5
R8	15K Ω, 20%, 0.2W, 4B29	C5
R9	220 Ω, 10%, 0.2W, 4B11	C6
R10	15 Ω, 10%, 0.2W, 4B03	C6
R11	1.5K Ω, 10%, 0.2W, 4B17	C6
R12	1K Ω, 10%, 0.2W, 4B16	C5
R13	100 Ω, 20%, 0.2W, 4B02	C5
R14	220 Ω, 10%, 0.2W, 4B11	C5
R15	22K Ω, 10%, 0.2W, 4B31	C5
R16	2.7K Ω, 10%, 0.2W, 4B19	CD5
R17	470 Ω, 10%, 0.2W, 1B68	D5
R18	2.7K Ω, 10%, 0.2W, 4B19	C4,5
R19	100 Ω, 20%, 0.2W, 4B08	C4,5
R20	27K Ω, 10%, 0.2W, 4A98	C4
R21	2.7K Ω, 10%, 0.2W, 3B30	CD4
R22	1.8K Ω, 20%, 0.2W, 4B10	C4
R23	330 Ω, 10%, 0.2W, 4B12	D4
R24	6.8K Ω, 10%, 0.2W, 8A08	D3
R25	10K Ω, 10%, 0.2W, 4B27	C3,4
R26	6.8K Ω, 10%, 0.2W, 4B25	D3,4
R27	3.9K Ω, 20%, 0.2W, 4B22	D5
R28	68K Ω, 20%, 0.2W, 4B33	C4
R29	2.7K Ω, 10%, 0.2W, 7A38	D3
R30	1.5K Ω, 10%, 0.1W, 4B43	CD3
R31	22K Ω, 10%, 0.2W, 4A92	C3
R32	3.3K Ω, 20%, 0.2W, 1B50	D2
R33	470 Ω, 20%, 0.2W, 3B40	B4
R34	47K Ω, 10%, 0.2W, 6A91	C3
R35	8.2K Ω, 10%, 0.2W, 4B26	BC3
R36	1K Ω, 10%, 0.2W, 4B16	B3
R37	1K Ω, 10%, 0.2W, 4B16	BC3
R38	2.7K Ω, 10%, 0.2W, 3B30	B4
R39	470 Ω, 10%, 0.2W, 4B13	B4
R40	100 Ω, 20%, 0.2W, 9A58	BC3
R41	5.6K Ω, 10%, 0.2W, 4B24	C4
R42	1K Ω, Preset, 0E1–027/01	B3
R43	15K Ω, 20%, 0.2W, 4B29	B4
R44	2.2K Ω, 10%, 0.2W, 4B18	E5
R45	100 Ω, 20%, 0.2W, 4B36	D5
R46	100 Ω, 10%, 0.2W, 4B01	E6
R47	120K Ω, 10%, 0.2W, 4B34	D5
R48	1K Ω, 20%, 0.2W, 7A20	E6
R49	22K Ω, 10%, 0.2W, 4B31	E5
R50	1.5K Ω, 20%, 0.2W, 4B05	D5
R51	470 Ω, 10%, 0.2W, 4B13	E5
R52	3.3K Ω, 20%, 0.2W, 3A54	D4
R53	680 Ω, 10%, 0.2W, 2A30	E3
R54	680 Ω, 10%, 0.2W, 4B15	E3
R55	1.5K Ω, 10%, 0.2W, 4B17	E3
R56	12K Ω, 10%, 0.2W, 4B28	E3
R57	27K Ω, 10%, 0.2W, 4A98	E3
R58	4.7K Ω, 20%, 0.2W, 4B23	D4
R59	6.8K Ω, 10%, 0.2W, 8A08	D4
R60	6.8K Ω, 10%, 0.2W, 4B25	D4
R61	6.8K Ω, 10%, 0.2W, 4B25	D4
R62	120K Ω, 10%, 0.2W, 4B34	D4
R63	1M Ω, 10%, 0.2W, 9A81	D3
R64	4.7K Ω, 20%, 0.2W, 4B23	E3
P65	470K Ω, 10%, 0.2W, 9A50	DE3
R66	1M Ω, 20%, 0.2W, 4B35	D4
R67	100 Ω, 10%, 0.25W, 4B37	D2
R68	56K Ω, 10%, 0.2W, 8A10	B4
R69	4.7K Ω, 10%, 0.2W, 5B48	BC4
R70	2.7K Ω, 10%, 0.2W, 4B19	C4
R71	180 Ω, 10%, 0.2W, 8A04	B4
R72	330K Ω, 10%, 0.1W, 4B41	B5
R73	68K Ω, 20%, 0.1W, 4B40	B5
R74	1K Ω, 20%, 0.1W, 4B39	B5
R75	470 Ω, 10%, 0.1W, 4B42	B5
R76	47K Ω, 20%, 0.1W, 4B38	B6
R77	47K Ω, 20%, 0.1W, 4B38	B6
R78	39K Ω, 10%, 0.2W, 2B01	B6
R79	5K Ω, Preset, 0E1–002/01	B6
R80	22K Ω, 20%, 0.2W, 4B32	BC6
R81	8.2M Ω, 10%, 0.2W, 4B07	C6

Continued overleaf

RESISTORS - *continued*

REF.	DESCRIPTION AND PART No.	LOC.
R82	27K Ω, 10%, 0.2W, 2A24	C6
R83	1.5K Ω, 10%, 0.2W, 8A06	B6,7
R84	510 Ω, 5%, 0.2W, 4B14	C7
R85	22K Ω, 10%, 0.2W, 8A06	C3
R86	2.2K Ω, 10%, 0.2W, 6A89	C2
R87	200 Ω, 10%, 0.2W, 4B04	C2,3
R88	3.9K Ω, 10%, 0.2W, 4B21	C3
R89	12 Ω, 10%, 0.2W, 8A03	C2
R510	15K Ω, 10%, 0.25W, 8A81	*
R511	5K Ω, Lin. Pot. (625 Contrast), 0X2–001	*
R512	15K Ω, 10%, 0.25W, 8A81	*
R513	5K Ω, Lin. Pot. (405 Contrast), 0X2–001	*
	* *See Chassis Frame, Section L*	

INDUCTORS

REF.	DESCRIPTION AND PART No.	LOC.
L1*	Adjacent channel vision rejector (625), 0D0–176	D6
L2	Transient correction coil incl. R2, 0D0–177	E6
L3*	Sound rejector (625), 0D0–176	D6
L4	Adjacent channel sound rejector (625) and Channel I sound rejector } 0D0–178	DE6
L5	1st IF bandpass coil (625) } 0D0–178	DE6
L6	2nd IF bandpass coil (625) } 0D0–179... ...	D5
L7	Adjacent channel rejector (wired distribution working) } 0D0–179... ...	D5
L8	Sound rejector (405) } 0D0 180	C6
L9	1st IF bandpass coil (405) } 0D0 180	C6
L10	Adjacent channel sound rejector (405) } 0D0–181	C6
L11	2nd IF bandpass coil (625) } 0D0–181	C6
L12	Adjacent channel vision rejector (405) } 0D0–182	CD6
L13	3rd IF bandpass coil (625) } 0D0–182	CD6
L14	VT1 vision IF collector coil, 0D0–183	CD5
L15	VT2 vision IF collector coil, 0D0–184	C4,5
L16†	VT3 vision IF collector coil, 0D0–185	C4
L17-18	6 MHz take-off coils, 0D0–187	D4
L19†	IF filter choke } 0D0–185	C4
L20†	IF choke } 0D0–185	C4
L21	Harmonic rejector choke, 0D0–213	CD4
L22	625 sound rejector } 0D0–188	C3
L23	IF choke } 0D0–188	C3
L24	Harmonic rejector choke } 0D0–188	C3
L25	Diode load compensation choke, 0D0–190	D3
L26	Vision detector compensation choke (625), 0D0–189 ...	D3
L27	Vision/sound beat rejector (405), 0D0–199	C3
L28	38.15 MHz take-off coil, 0D0–193	E6
L29	38.15 MHz stand-off coil, 0D0–194	E6
L30	VT4 sound IF collector coil (625) } 0D0–195 ...	E5
L31	VT4 sound IF collector coil (405) } 0D0–195 ...	E5
L32-33	6 MHz ratio detector coils, 0D0–197	E4
L34-35	38.15 MHz sound detector coils, 0D0–196	E4
L36	Harmonic rejector choke, 0D0–200	B5
L37	VT6 collector coil (AFC), 0D0–191	B4
L38-39	AFC discriminator coils, 0D0–209	B5
L40	Chrominance take-off coil, 0D0–198	C3
L41-42	405-625 Solenoid coils, 0D0–168	D7
	Slug and link assembly, 0M4–127	
	Solenoid cover, 0C8–166	
	* *Combined Assembly* † *Combined Assembly*	

MISCELLANEOUS

REF.	DESCRIPTION AND PART No.	LOC.
EC9	18-way edge-connector	*
SKT3	2-way non-reversible connector	*
SKT4	2-way non-reversible connector	*
SKT7	2-way non-reversible connector incl. leads, 0G3–006 ... Socket moulding only, 0C8–165/009	F2
S1A-G	405–625 slide switch, 0E2–036	D7
X1	Thermistor, 0E5–113/00	B7
	* *See Chassis Frame, Section L*	

Circuit Description

After passing through a preliminary tuned circuit in the Integrated Tuner the IF signal is fed in at PLG2.

Separate response shaping circuits are employed for 405- and 625-line operation, the appropriate circuit being selected by system switch sections S1A and S1B.

405 INPUT CIRCUIT

The 38.15 MHz sound signal is taken off immediately at a capacitive tap, the circuit forming part of the input coupling element. The take-off point is followed by two similar bandpass networks each containing a bridged rejector. In the first network L8–C15–C16–R3 form a sound rejector whilst L10–C19–C20–R4 in the second network provide adjacent channel sound rejection. A third bandpass section incorporates the adjacent channel vision rejector C22–L12 and feeds the 1st common vision IF amplifier VT1 via S1B and matching components C25 and R10.

625 INPUT CIRCUIT

A bridged adjacent channel vision rejector L1–C1–C2 is connected at the input and is followed by transient correction coil L2 and 625 sound rejector L3.

The centre bandpass stage includes the bridged adjacent channel sound rejector L4–C7–C8. L7 and C10 in the third section provide adjacent channel rejection when the receiver is operated on Wired Distribution Systems (i.e. 625-line operation at VHF). From here the signal is fed via S1B to the common point.

VISION IF AMPLIFIER

VT1, VT2 and VT3 form a three-stage common IF amplifier neutralized by C26, C31 and C38 respectively. Forward AGC is applied at the base of VT1 and feedback is applied at the collector via R14 and C32 to maintain full bandwidth response during changes in gain due to AGC action. L16 in VT3 collector circuit is capacitive coupled to the detector circuits.

DETECTOR CIRCUITS

Two detectors W1 and W2 provide the appropriate polarities of output for 625 and 405. W1 operates as the 625 Luminance detector and is followed by an additional 33.5 MHz sound rejector L22–C47 to reduce beat interference between sound and sub-carrier during colour reception. At the same time W2 operates as the AGC and 6 MHz intercarrier sound detector and also as the chrominance detector during colour transmissions.

During 405-line operation W2 provides a negative-going (on white) output to drive the video amplifier.

Both diode loads are permanently in circuit to maintain the correct IF response on both systems.

The cold end of the detector circuit is taken to the contrast control network which is connected between +30V and earth, and incorporates an independent control for each system.

Contrast is adjusted by bleeding a variable positive DC into the AGC system. This voltage does not affect the operation of the detector circuit but permits the contrast controls to over-ride the AGC and it could be possible to blank off the picture at fully anti-clockwise rotation.

VISION AGC CIRCUITS

Forward AGC is applied to the 1st vision IF amplifier VT1 and also to the common RF transistor in the Integrated Tuner. The control circuit provides a mean level system on 405 and a peak system on 625. The AGC to the RF stage is delayed to improve the noise performance under low signal conditions.

The first AGC stage VT9 acts as an emitter follower driven from the negative vision detector. During 405-line operation C53 is switched in at the base so that the potential at the emitter corresponds to the mean level of the signal appearing at the detector. On 625 the emitter time-constant causes peak rectification so that the potential at the emitter now corresponds to the peak level of the signal at the detector. In both cases VT9 conduction increases with signal level and its emitter potential falls towards zero. VT9 is coupled through an RC smoothing network to the base of the AGC amplifier VT10.

As signal strength increases, the negative output from W2 increases and progressively increases conduction in VT9. The diode W3 is included to prevent clipping of sync pulses on 405. As VT9 conduction increases, the potential at the base of VT10 falls, gradually cutting off VT10 and causing the collector voltage to increase. This rising voltage is initially applied via W12 to VT1 base network causing the current in that transistor to increase thus reducing the gain. This action continues until the maximum gain reduction point is reached which is set at −23 db by preset R6. At this point W12 is cut off and the RF AGC diode W11 starts to conduct causing further gain reduction in the tuner RF transistor. This action commences when VT10 collector reaches a potential of 12V–14V.

During UHF reception additional gain reduction is obtained in VT1 by switching R43 in shunt with W12 to maintain a reduced AGC feed after W12 has cut off.

The switching is performed by the AGC switch on the tuner which also connects R42 in shunt with R39 during VHF reception to compensate for variations in the AGC characteristics of the tuner RF transistor between VHF and UHF operation. Preset R42 is adjusted to provide a smooth transition at the changeover from IF to RF AGC.

SOUND IF

The first stage VT4 forms an unswitched tuned amplifier at both 6 MHz and 38.15 MHz. The 6 MHz input line is isolated during 405-line operation by 38.15 MHz choke L29. Reverse AGC is applied at the base during 405 operation and the stage is neutralized by C64.

W4 connected across the 6 MHz tuned circuit acts as a clipper to improve the AM rejection and also to limit the drive to the second stage.

The second stage incorporates two double-tuned circuits which feed the FM Ratio Detector and AM Sound Detector respectively. C70 is the neutralizing capacitor for this stage.

AM SOUND DETECTOR

The primary of the AM sound detector coupling circuit (L34) is tuned by C74 and the detector W7 is connected to provide a negative going output so that reverse AGC can be obtained. The

Continued overleaf

AGC is tapped off at the centre of the diode load R59–R60 and passed via a smoothing circuit to VT4 base. R63 provides a 1M Ω bleed from the 30V line which cancels the reverse bias placed on the detector due to the base current from VT4 passing through part of the diode load. After suitable filtering the detected audio signal is passed through a conventional rate of change diode Noise Limiter W8, and thence via S1E to PLG4 which feeds the audio amplifier on the Frame Timebase and Sound board.

FM RATIO DETECTOR

The output from VT5 is transformer fed to W5 and W6 operating in a ratio detector circuit. The tertiary voltage is injected at the centre of the secondary tuning capacitors C77 and C78. C84 is the stabilizing capacitor with R56 as the detector load. R57 and C82 are the de-emphasis components. The audio signal is switched to the common output point PLG4.

AFC CIRCUIT

The signal present at the base of the 3rd Vision IF Amplifier VT3 is fed via C39 to the base of VT6 which is a neutralized amplifier. Its collector circuit, resonant at 40.5 MHz, provides some equalisation for the asymmetry above the vision carrier caused by the 41.5 MHz rejector L4. The signal is then fed via the capacitive potential divider C93 and C94 to the base of VT7 which functions as a neutralized limiting amplifier. Its collector circuit is resonant at 39.5 MHz (IF vision carrier) and is just more than critically coupled to L39 which, with the diodes W9 and W10, acts as a Foster-Seeley discriminator. The shunt resistors R76 and R77 provide DC returns for the diodes. The discriminator DC output is fed via the low-pass filter R80 and C105 to the base of VT8, a DC amplifier. As VT8 has to be biased to equally accept the plus and minus output of the discriminator it is important that a standing DC potential does not exist across the diodes. To this end, the potential divider R78–R79 provides the necessary balancing voltage. R79 is adjusted for a reading of 13V DC at VT8 collector with no input to the AFC circuit (VT6 base shorted to earth). Temperature stability of the DC amplifier is obtained by X1, a positive temperature coefficient resistor. The shunt resistor R84 slows down the effective rate of resistance change with temperature of X1. Unwanted variation in the tuner UHF oscillator frequency produces positive or negative outputs from the AFC discriminator. Any resultant DC output drives the DC amplifier VT8, which in turn controls the tuner UHF oscillator via the AFC loop which incorporates a varactor.

CHROMINANCE TAKE-OFF

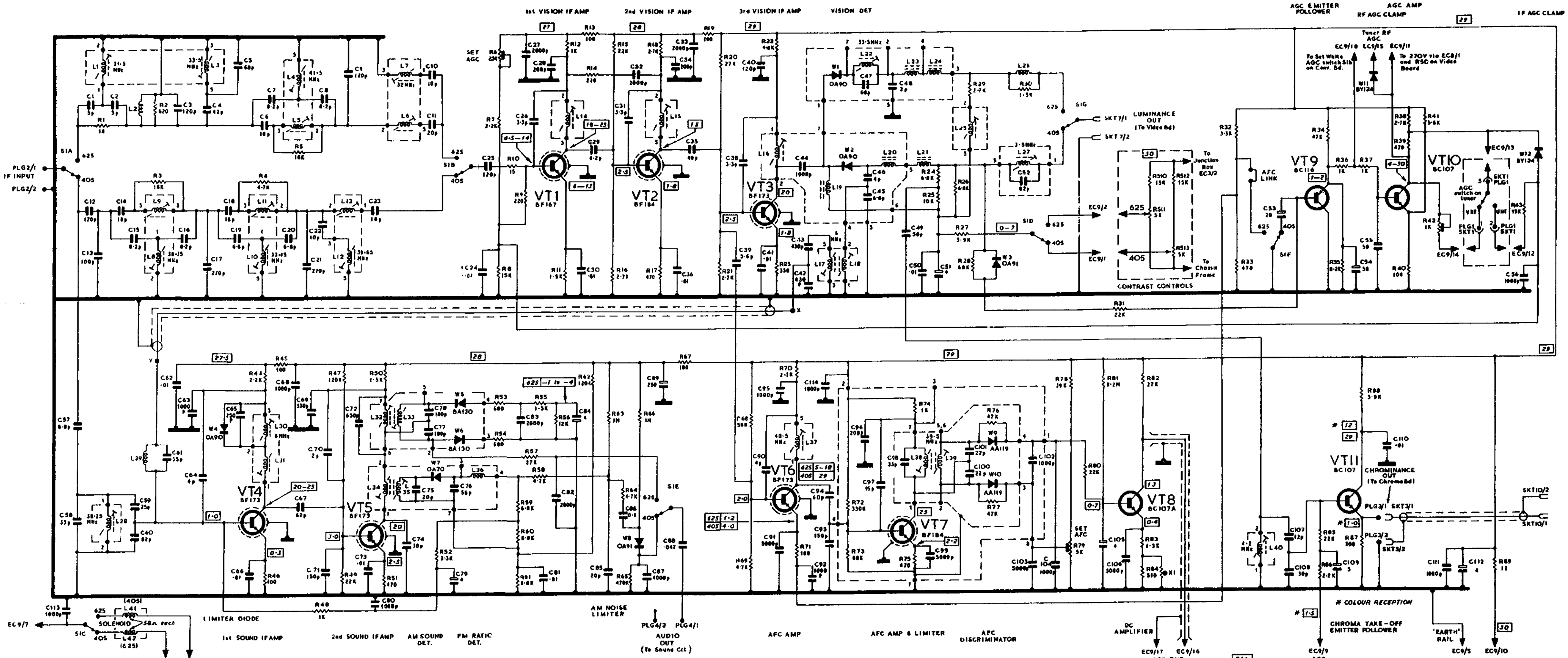
During colour reception the detected chrominance signal is taken off at the junction of R24 and R25 and fed to emitter follower VT11 which is controlled by the ACC bias derived from the Chrominance board.

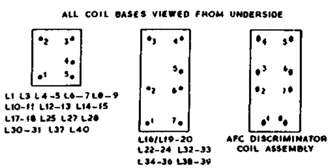
Interdependent adjustments may be necessary in other parts of the receiver when a module is being fitted as a replacement from stock. For details see Replacement Modules—Setting Up and Checking Procedures, Section A.

Circuit Diagram Notes

VOLTAGES. Figures in rectangles are DC voltages: They were taken with an Avometer Model 8 on a 240V mains input with mains tap set for this figure; all controls set for normal reception. Unless otherwise stated the figures are typical for all modes of operation. A tolerance of $\pm 5\%$ should be allowed for in the 30V board supply at EC9/10. Variations of up to 20% in other voltages do not necessarily indicate fault conditions.

MODIFICATIONS SUMMARY. The following differences from the circuit diagram may be found on some boards: C113 and C114 —not fitted; a capacitor (42pF or 62pF) across R16; 1K Ω resistor across L25; W11 and W12—Y728 or BA130.





Interconnection Details

EC9

1 Slider of 405 Contrast control
2 Slider of 625 Contrast control
3 Junction Block EC3/14
4 Junction Block EC3/10
5 Chassis earth
6 not used
7 Power Supply EC10/10
8 not used
9 Chrominance EC7/2
10 Junction Block EC3/5
11 Video EC8/1

EC9—*continued*

12 SKT1/2 } Tuner Connector
13 SKT1/5 }
14 SKT1/1 }
15 To Tuner via SKT1/6
16 To Tuner via SKT1/8
17 To Tuner via SKT1/7
18 Convergence EC2C/10

PLG2—pins on board

1 inner } IF in from Tuner
2 screen }

PLG3—pins on board

1 inner } Via main cableform and SKT10
2 screen } to Chrominance PLG10

PLG4—pins on board

1 inner } Via Volume control to Frame Timebase
2 screen } and Sound EC6/17 and EC6/18

SKT7—on flying co-axial lead

1 inner } Video PLG7
2 screen }

IF Amplifier