

BRC

2000 SERIES COLOUR TELEVISION MANUAL

SECTION

B

**WORKSHOP
SERVICING**

INTEGRATED TUNER



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B

SECTION

WORKSHOP SERVICING

Service Notes

Full information on Preset Push-button Fine Tuning, Push-button Band Changing and VHF Wired Distribution System Working is provided in Section A.

IF BANDPASS ALIGNMENT (L29)

Detach tuner from cabinet and withdraw leaving the connecting leads and bonding strip intact.

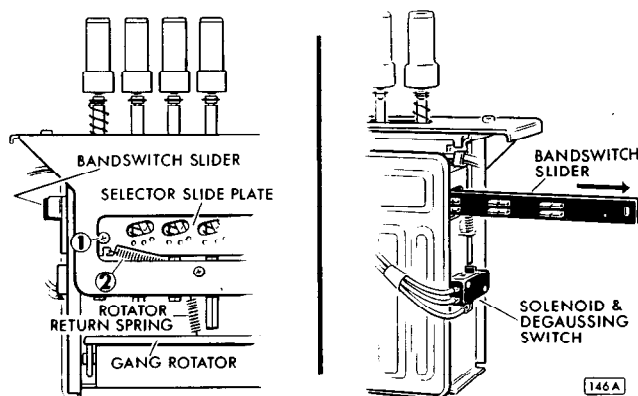
Connect a signal generator via a 1pF capacitor to TP2 on the tuner and connect an oscilloscope to pin 6 of the CRT base connector (green cathode).

Switch on the receiver, select a UHF channel and turn the 625 Contrast control to minimum. Set the signal generator to 37 MHz (30% sine wave modulated) and adjust L29 for maximum whilst keeping the generator output adjusted for not more than 30V p-p display.

Switch off the receiver, disconnect the test equipment and refit the tuner into the cabinet.

BANDSWITCH CONTACTS

The bandswitch contacts are of a double-contact self-cleaning type and are designed to give long service with minimum need for cleaning or lubrication. However, after extended service in adverse locations, such as areas with high air pollution it may be necessary to clean and lubricate the contacts. Note: A redesigned contact introduced in later production is identified in the illustration as Type 'B' and is interchangeable with the earlier contact, Type 'A'.



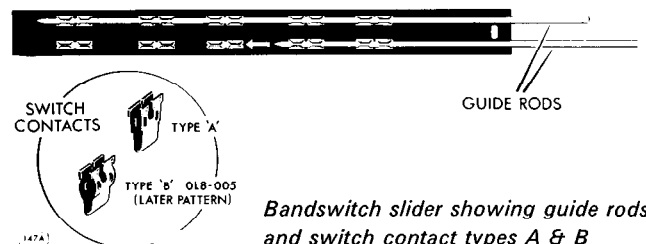
Bandswitch slider removal

Lubricant should not be applied to Type 'A' contacts. The following symptoms are consistent with poor switch contact:

- Poor reset accuracy, i.e. a different tuning point is obtained when a channel is reselected. Before suspecting the bandswitch check that the selector slide plate is returning fully against the push-button stop. If the return spring (2 in illustration) is weak remove some turns to increase tension. Also check the AGC switch for correct operation.
- Intermittently noisy or grainy picture associated with push-button reselection. This fault would tend to be more obvious in areas of low signal strength. Again the selector slide plate should be checked for unsprung movement. Also check that the gang rotator is bearing against the end of the selected spindle.

BANDSWITCH SLIDER

Slider removal is a simple operation, but a pair of guide rods (or needles) will be necessary when refitting to avoid damage to the slider contacts. The rods should be at least six inches long and pointed at one end for easy insertion, as shown. Use 16 gauge wire for Type 'A' contacts or 15 gauge for Type 'B'. Steel wire or needles are recommended to ensure that bending does not occur.



Bandswitch slider showing guide rods and switch contact types A & B

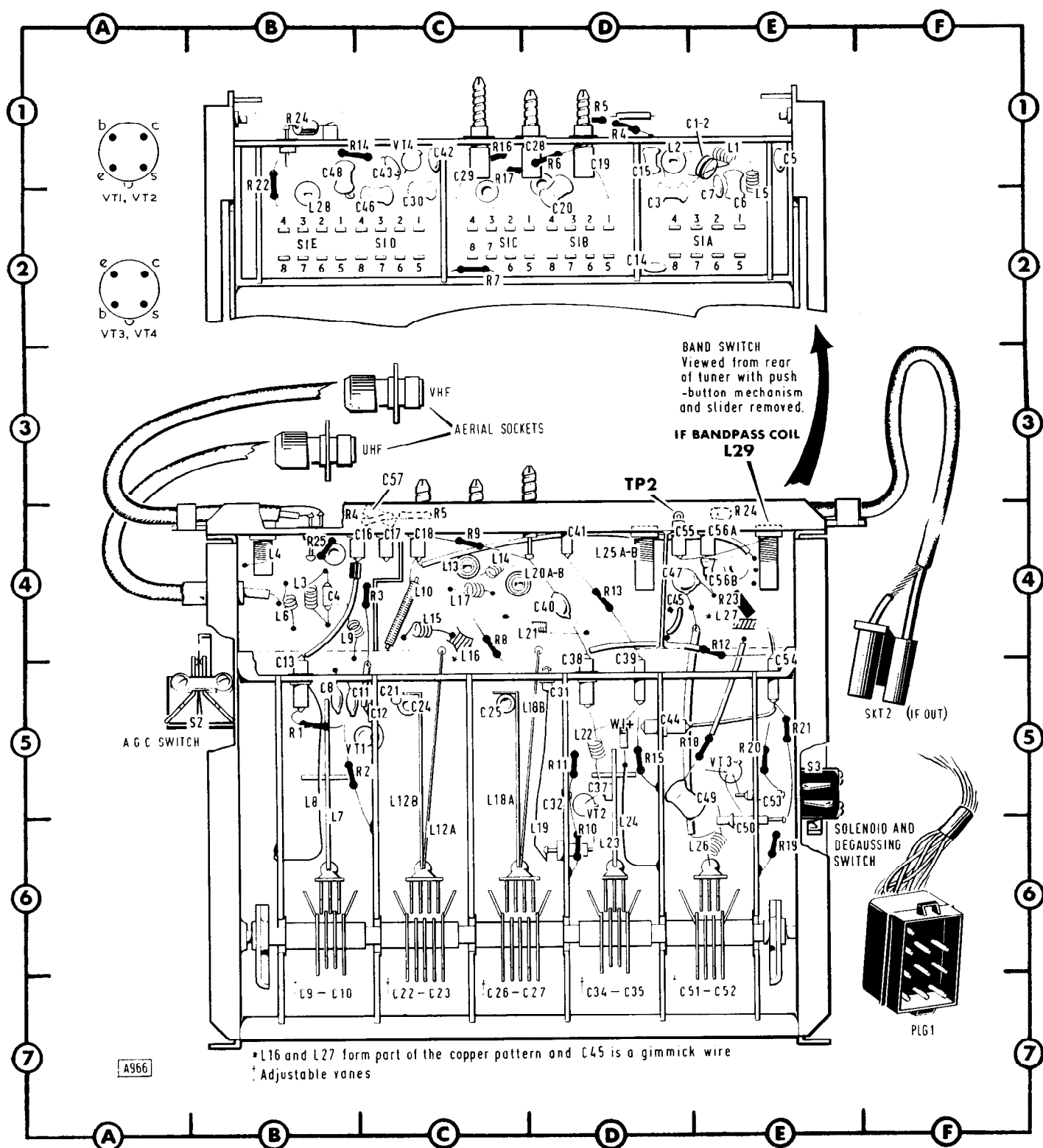
Detach the tuner from the cabinet and disconnect all leads. With all buttons in the 'out' position, remove screw (1) and unhook spring (2) from the selector slide plate. Disengage the selector slide plate stud from the slot in the bandswitch slider and withdraw the plate from the tuner body. Carefully withdraw the bandswitch slider. Inspect the contacts for damage or spreading—if an individual pair is damaged beyond repair a new contact may be fitted (Part No. 018-005).

Spreading of the double contacts can be cured by gently pinching them with the guide rods inserted. Ordinary switch cleaning fluid may be used but lubricant must not be applied to the Type 'A' contacts. The recommended lubricant for Type 'B' contacts is Rykon EP2 grease, available under Part No. 0N4-006. Slide the guide rods endwise through the double contacts, as illustrated, and using a minimum of force, insert the slider into the tuner. Finally refit the selector slide plate.

If complete access to the fixed contacts is required, the push-button mechanism must be removed.

Component Locations and Details

Transistor connections shown are as viewed from transistor base.



Ensure that the receiver is switched off before disconnecting plugs and sockets.
When refitting the tuner ensure that the tuner to main chassis-frame bonding strip is reconnected.

Although capacitors and resistors with ratings in excess of the required maxima are fitted, the maximum rating required for any capacitor is 30V and for any resistor 0.1W.

RESISTORS

REF.	DESCRIPTION	LOC.
R1	15K Ω , 5%, 0.125W	B5
R2	1.8K Ω , 5%, 0.125W	C5
R3	100 Ω , 20%, 0.25W	C4
R4	18K Ω , 10%, 0.25W	BC4
R5	47K Ω , 10%, 0.125W	C4
R6	2.2K Ω , 20%, 0.25W	D1
R7	8.2K Ω , 20%, 0.25W	C2
R8	1K Ω , 10%, 0.25W	C4
R9	680 Ω , 20%, 0.25W	C4
R10	2.7K Ω , 5%, 0.125W	D6
R11	27K Ω , 5%, 0.125W	D5
R12	10K Ω , 10%, 0.25W	E4
R13	100K Ω , 5%, 0.125W	D4
R14	5.6K Ω , 10%, 0.25W	BC1
R15	56K Ω , 5%, 0.125W	D5
R16	12K Ω , 10%, 0.25W	C1
R17	18K Ω , 10%, 0.25W	C1
R18	1.5K Ω , 10%, 0.25W	DE5
R19	4.7K Ω , 10%, 0.25W	E5
R20	5.6K Ω , 10%, 0.25W	E5
R21	22K Ω , 10%, 0.25W	E5
R22	220 Ω , 20%, 0.25W	B1,2
R23	470 Ω , 10%, 0.25W	E4
R24	27 Ω , 10%, 0.25W	E4
R25	39K Ω , 20%, 0.1W	B4

INDUCTORS

REF.	DESCRIPTION	LOC.
L1	Part high pass filter	E1
L2	Part IF rejector	D1
L3	Part IF rejector	B4
L4	Part IF rejector	B4
L5	Part Band III aerial input filter	E2
L6	Part Band III aerial input filter	B4
L7	$\frac{1}{2}$ -wave line, image rejector	B5,6
L8	UHF input coupling loop	B5
L9	Part Band I aerial input filter	B4
L10	VT1 collector feed choke	C4
L12A	Connecting line to bandswitch	C6
L12B	UHF $\frac{1}{2}$ -wave primary bandpass	C5
L13	Band I primary bandpass	C4
L14	Band I bandpass coupling	C4
L15	Band III primary bandpass	C4
L16	Band III bandpass coupling	C4
L17	Band III secondary bandpass	C4
L18A	UHF $\frac{1}{2}$ -wave secondary bandpass	C5
L18B	Connecting line to bandswitch	D5
L19	UHF mixer coupling loop	D6
L20A	Band I secondary bandpass	D4
L20B	Band I bandpass-to-mixer coupling	D4
L21	Band III bandpass-to-mixer coupling	CD4
L22	UHF filter choke	D5
L23	UHF oscillator $\frac{1}{2}$ -wave line	D6
L24	AFC coupling loop	D6
L25A-B	VT2 to VT4 IF coupling	D4
L26	Band III oscillator coil	E6
L27	Part Band III oscillator circuit	E4
L28	Band I oscillator coil	B2
L29	IF output coil	E3

CAPACITORS

REF.	DESCRIPTION	LOC.
C1	56pF } Special disc assembly... ..	E1
C2	56pF }	
C3	15pF, 10%, 350V	D2
C4	220pF, 5%, 50V	B4
C5	15pF, 10%, 350V	E1
C6	10pF, 10%, 350V	E2
C7	15pF, 10%, 350V	E1,2
C8	1000pF, 20 \pm 80%, 350V	B5
C9*	Preset	B7
C10	Variable	B7
C11	2pF, \pm 0.25pF, 350V	C5
C12	1000pF, 20 \pm 80%, 350V	C5
C13	1000pF, 20 \pm 80%, 350V	B4,5
C14	2pF, \pm 0.25pF, 350V	D2
C15	33pF, 10%, 350V	D1
C16	1000pF, 20 \pm 80%, 350V	C4
C17	1000pF, 20 \pm 80%, 350V	C4
C18	1000pF, 20 \pm 80%, 350V	C4
C19	1-8pF, Preset	D1
C20	3pF, 10%, 350V	D2
C21	1000pF, 20 \pm 80%, 350V	C5
C22*	Preset	C7
C23	Variable	C7
C24	3-13pF, Preset	C5
C25	3-13pF, Preset	C5
C26*	Preset	C7
C27	Variable	D7
C28	1-8pF, Preset	D1
C29	1-8pF, Preset	C1
C30	4pF, 10%, 350V	C2
C31	150pF, 20%, 350V	D5
C32	220pF, 20%, 350V	D5
C34*	Preset	D7
C35	Variable	D7
C37	7pF, \pm 1pF, 350V	D5
C38	10pF, 10%, 350V	D4,5
C39	150pF, 20%, 350V	D4,5
C40	1000pF, 20 \pm 80%, 350V	D4
C41	1000pF, 20 \pm 80%, 350V	D4
C42	220pF, 10%, 350V	C1
C43	1000pF, 20 \pm 80%, 350V	C1
C44	1000pF, 20 \pm 80%, 350V	D5
C45	'Gimmick' wire	D4
C46	3pF, 10%, 350V	C2
C47	47pF, 10%, 350V	D4
C48	2.7pF, 5%, 350V	B1
C49	2.7pF, \pm 0.25pF, 350V	E5
C50	1000pF, 20 \pm 80%, 350V	E6
C51*	Preset	DE7
C52	Variable	E7
C53	1000pF, 20 \pm 80%, 350V	E5
C54	1000pF, 20 \pm 80%, 350V	E4,5
C55	10pF, 10%, 350V	D4
C56A	10pF, 10%, 350V	E4
C56B	1000pF, 20 \pm 80%, 350V	E4
C57	0.01 μ F, 20%, 250V	C3

* Adjustable vanes on tuning gang

MISCELLANEOUS

REF.	DESCRIPTION	LOC.
PLG1	12-way cableform connector	F7
SKT2	2-way IF connector	F5
S1A-E	Band switch	E2
S2	AGC switch	B5
S3	Line system solenoid switch	E5
VT1	Type BF180, Common UHF VHF RF Amplifier	BC5
VT2	Type BF181, UHF Oscillator and Mixer	D5
VT3	Type BF115, VHF Oscillator	E5
VT4	Type BF115, VHF Mixer and UHF IF Amplifier	C1
W1	Type BA138, Vari-cap diode... ..	D5

Circuit Description

The tuner operates from a stabilized +30V supply and employs four NPN transistors connected in grounded base configuration. A combination of three of these is employed for VHF and UHF respectively with two of the three common to both modes of operation, see block diagram (a) of transistor functions. Band switching and signal paths are shown in the simplified block diagram (b) below. A five-section gang capacitor is used as a common tuning element on both VHF and UHF and is controlled by a push-button unit. Automatic frequency control is employed on UHF.

UHF OPERATION

In the UHF mode of operation, (as shown in the main circuit diagram) VT1 operates as an RF amplifier with forward AGC applied at the base. The tuning lines are end capacity tuned by four sections of the gang capacitor to provide complete coverage of the UHF bands. The first gang section C10 tunes the $\frac{1}{4}$ -wave line L7 to form a shunt image rejector.

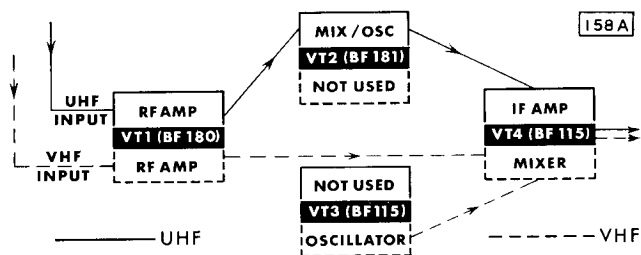
VT2 is a self-oscillating mixer, the IF being selected by L25 in the collector circuit and coupled via the bandswitch into the emitter of VT4 which operates as an IF amplifier. The collector circuit forms the first part of an IF bandpass network which is connected via SKT2 to the input circuit on the IF board which forms the second part.

The frequency of the UHF oscillator is controlled by vari-cap diode W1 which is coupled into the oscillator line L23 by coupling loop L24. The capacity of the diode is varied by applying a reverse voltage which is derived from the AFC circuits on the IF board.

The AFC circuits on the IF board are adjusted for a reading of 13V on the AFC line under no-signal conditions, see Section C. Variations in the oscillator frequency (relative to the incoming signal frequency) cause the AFC circuits to produce a correction voltage which appears as a positive or negative change on the 13V line.

VHF OPERATION

In the VHF mode of operation (e.g. with the bandswitch in the Band I position, see below) VT1 again operates as an AGC controlled RF amplifier.



(a) Block Diagram showing transistor functions

The VHF aerial input circuit includes a static discharge resistor R25 followed by a high-pass filter (C1, L1 and C2) providing rejection at frequencies below Band I. C3-C5 and L2-L4 form an IF rejector whilst C14-C15-L9 function as a switched Band I low-pass filter providing rejection at Band III frequencies. A switched Band III high-pass filter and Band I rejector is formed by C6-C7-L5-L6.

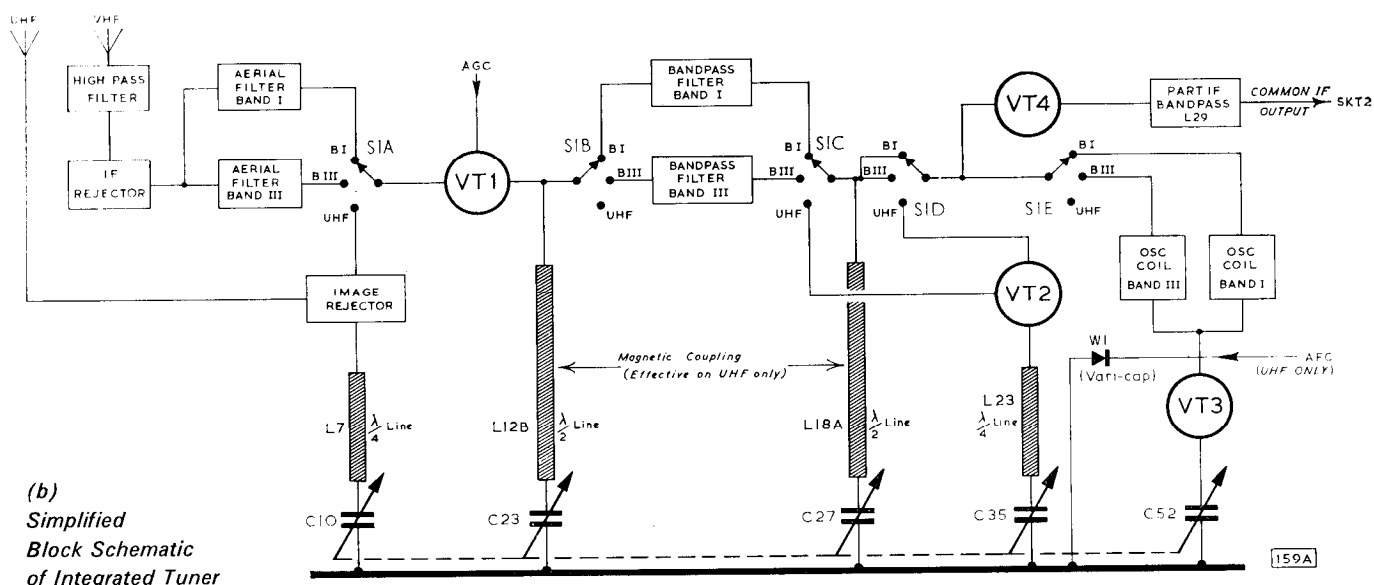
The appropriate bandpass and oscillator coils are selected by the bandswitch and tuned by gang sections C23, C27 and C52. During VHF reception the tuning lines do not function as tuning elements but provide connections between the tuning coils and appropriate gang sections. Mixing takes place in VT4 and the IF is taken to the IF board through the common bandpass network.

SWITCHES

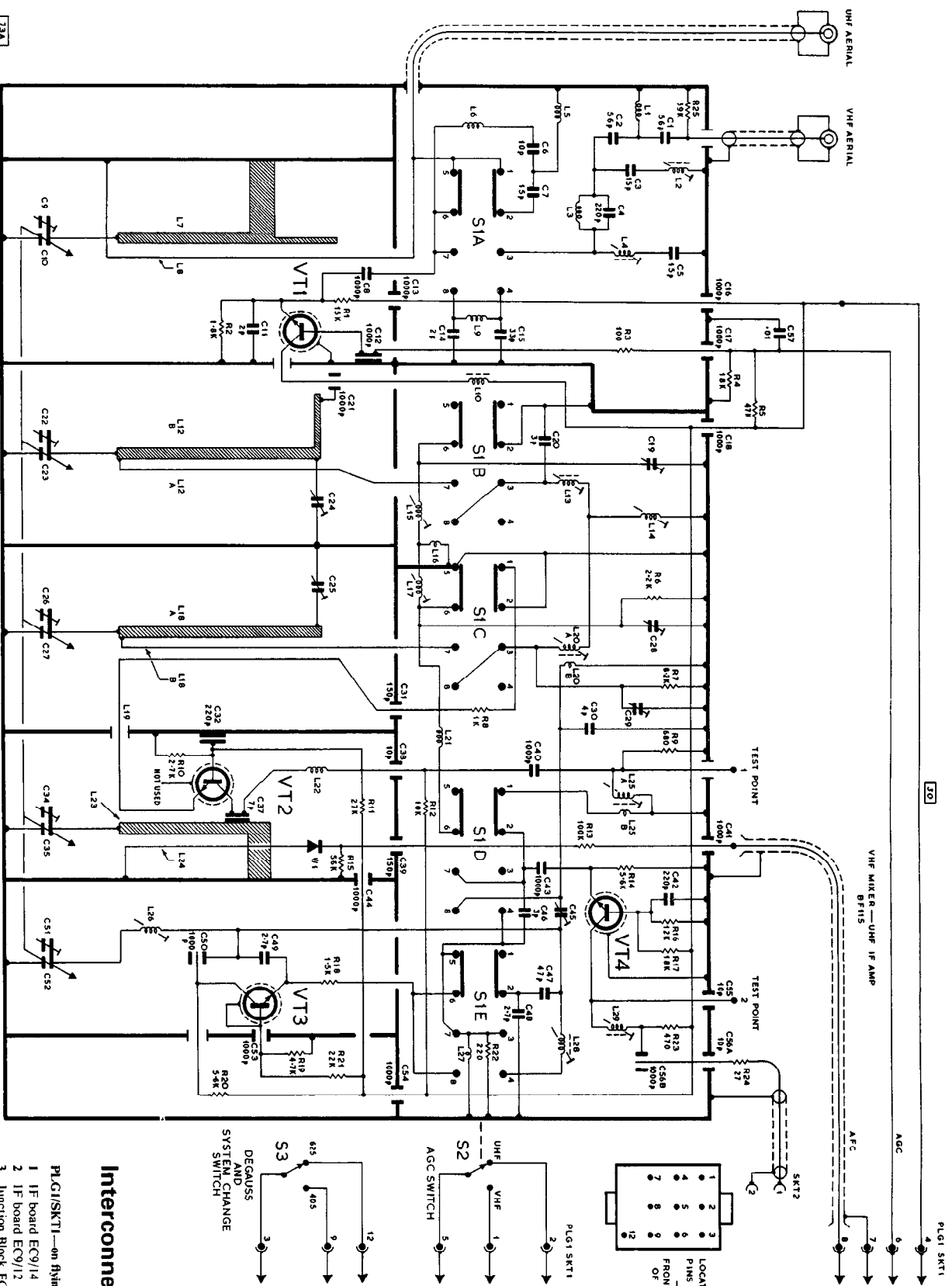
S1A-E. Sliding bandswitch operated by the push-buttons which act on adjustable band selectors.

S2. AGC switch actuated by the sliding bandswitch or selector slide plate which bears on it in the UHF position.

S3. Degauss and system change switch which is actuated by spring(s) fitted under the appropriate push-button(s). Each spring is retained on the push-button spindle by a 'C' clip and acts on a hinged plate which in turn operates the switch via a spring loaded push-rod, See Section A, page 6.



(b)
Simplified
Block Schematic
of Integrated Tuner



Interconnection Details

PLG1/SKT1—on flying leads

- 1 IF board EC9/14
- 2 IF board EC9/12
- 3 Junction Block EC3/17
- 4 Junction Block EC3/2 and top end of Contrast network
- 5 IF board EC9/13
- 6 IF board EC9/15
- 7 IF board EC9/17
- 8 IF board EC9/16
- 9 Junction Block EC3/11 and Auto-Deauss EC1/5
- 10 & 11 not used
- 12 Junction Block EC3/15 and Auto-Deauss EC1/1

SKT2—on flying co-axial lead

- 1 inner } IF out to IF board
- 2 screen }

Note - S1A-E is shown in UHF position.
In Band 3 position contacts 2,3 and 6,7 are closed.
In Band 1 position contacts 3,4 and 7,8 are closed.

Integrated Tuner