SECTION 3

F.M. TRANSLATOR BAY EQUIPMENT BA13/9, BA13/11 AND BA13/12

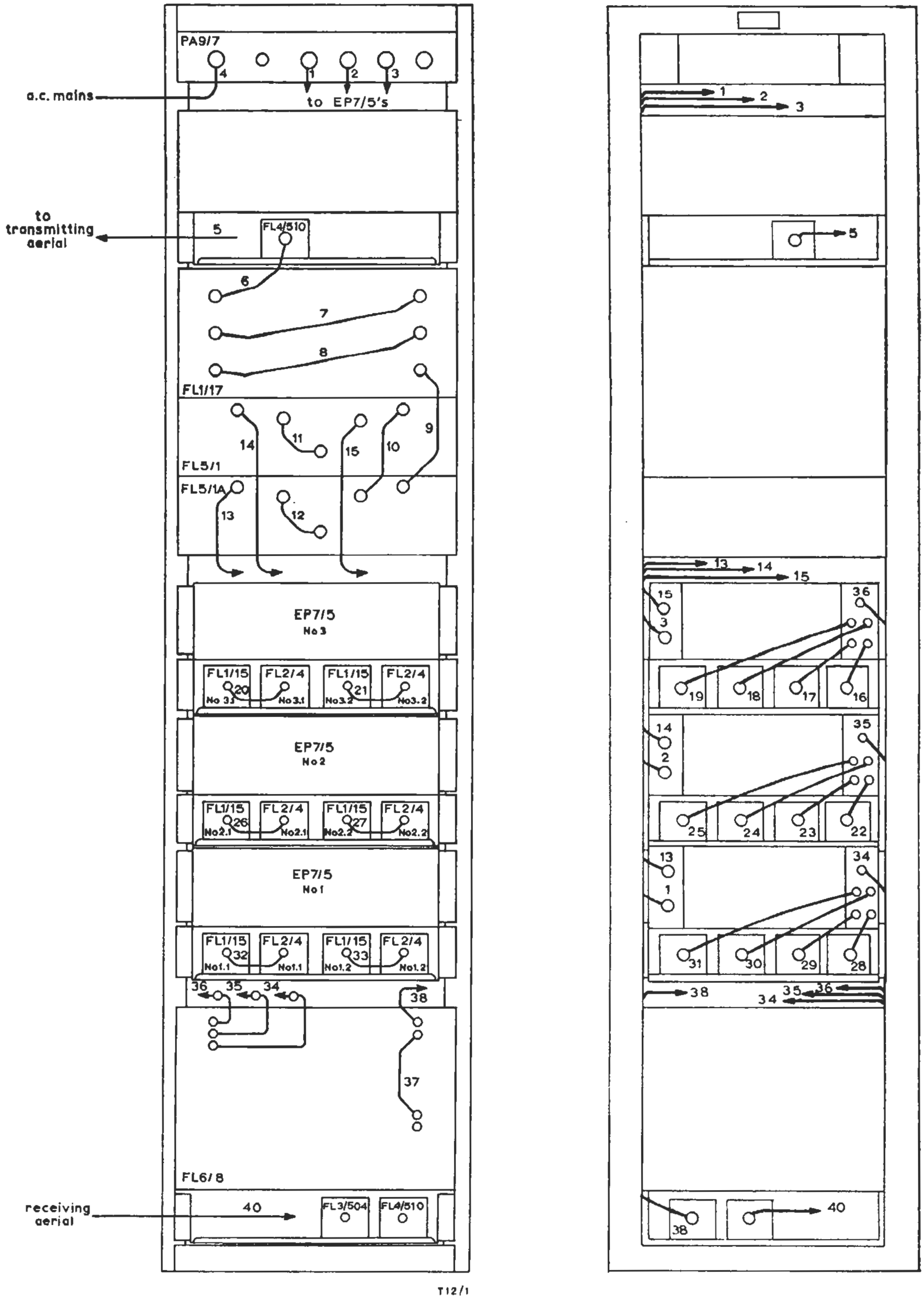


Fig. 3.1 BA13/9 Assembly: Front (left) and Rear Views

SECTION 3

F.M. TRANSLATOR BAY EQUIPMENT BA13/9, BA13/11 AND BA13/12

3.1 Introduction

This equipment is mounted on the standard bay framework, FW2/1, which is supplied without doors. A single bay, coded BA13/9, accommodates three translators EP7/5, together with ancillary equipment required for a three-channel v.h.f./f.m. assembly, as shown in Fig. 1.1. From this it is seen that most of the additional equipment provides filtration in various forms. This is clearly important in a system that contains six separate input and output circuits, each operating at a different frequency, and mixing circuits associated with a total of six different oscillator frequencies. Single-bay installations have three unmounted spare units, specified in 3.2.

A double bay of equipment, coded BA13/11 and BA13/12, accommodates the main and standby translators and the necessary additional equipment required for automatic change-over operation.

Referring to Fig. 1.1, the received Home, Light and Third Band-II signals are fed into a bandpass filter, consisting of an FL3/504 and FL4/510 connected in tandem. The pass-band of the input circuits is thereby restricted to Band-II frequencies. The filters are followed by splitter and notch filters contained in an FL6/8 unit. The notches introduce at least 60 dB of attenuation at translator output frequencies, and the splitters pass only the Home, Light and Third received signal into the appropriate translator. Since the input impedances of the EP7/5's are 50 ohms, coaxial-line transformers are provided to match the output of the filters to the translator inputs. After translation, the three signals are combined in the units FL5/1 and FL5/1A, before passing to the transmitting aerial via notch filters FL1/17, which attenuate any signals at the input frequencies, and a harmonic filter FL4/510.

3.2 BA13/9 Assembly

A complete BA13/9 assembly, shown in Fig. 3.1, comprises:

- Three F.M. Translators, EP7/5
- Six I.F. Notch Filters, FL1/15 } mounted on
- Six I.F. Filters, FL2/4 } shelves SH2/5
- Notch and Splitting Filter, FL6/8
- Combining Unit Panel, FL5/1
- Combining Unit Panel, FL5/1A
- Notch Filter, FL1/17
- L.P. Output Filter, FL4/510
- L.P. Input Filter, FL4/510
- H.P. Input Filter, FL3/504
- Three coaxial matching cables
- Mains Distribution Panel, PA9/7

Also provided are two chassis extenders, CH1A/3 and CH1A/5, to facilitate servicing of the CH1/27 and CH1/28 type units, which can thereby be operated under power obtained from their normal chassis connectors. The spare EP7/5 constituents issued to single-bay installations are one each of the UN1/39, UN1/40 and AM14/3.

Mains supply is distributed to the translators, EP7/5, from the distribution panel PA9/7. The receiving aerial is connected to the input filter at the bottom of the bay and the transmitting aerial is fed from the output filter near the top of the bay. Unit interconnections are by means of coaxial cable and type BNC or C connectors.

3.3 Description of Bay Equipment

The units described elsewhere are:

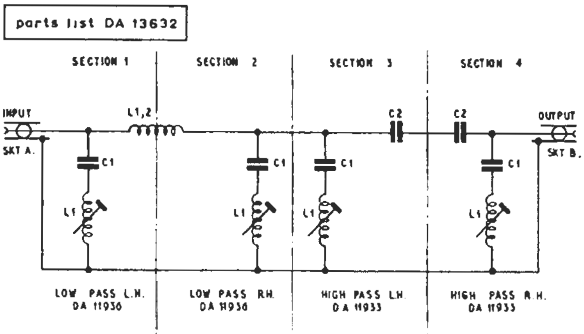
Code	*Instruction*	*Section*
FL6/8	T.12	4
EP7/5	T.12	2
FL3/504	T.13	2
FL4/510	T.13	2
FL5/1,1A	T.13	2
PA9/7	T.3	4

Units not already described are as follows.

3.3.1 I.F. Notch Filter, FL1/15, and I.F. Bandpass Filter, FL2/4

These are essential parts of the translator unit EP7/5, but are mounted on the bay on shelves SH2/5. They are used in pairs to provide bandpass shaping at the input and output of the i.f. amplifiers, as shown in Fig. 1.1.

The FL1/15 (Fig. 3.2) is an m-derived filter, consisting of two high-pass half-sections providing an attenuation maximum at 10·45 MHz, and two low-pass half-sections providing another attenuation notch at 10·95 MHz. The filter matches into 50 ohms over the frequency range 10·6 to 10·8 MHz, and it increases the response-curve skirt selectivity. This filter is assembled in a copper box and is



COMPONENT CHART FOR EACH SECTION

	SECTION 1	SECTION 2	SECTION 3	SECTION 4
L1	BBC TYPE L/140	BBC TYPE L/140	BBC TYPE L/139	BBC TYPE L/139
L1,L2	SEE DD SPEC			
C1	11·0pF	11·0pF	11·6 pF	11·6 pF
C2			600pF	600pF

T12/3

Fig. 3.2 Filter FL1/15: Circuit

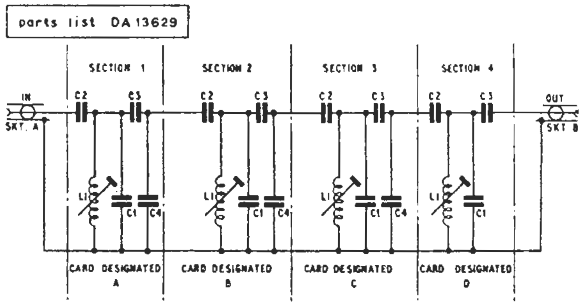


TABLE OF CAPACITORS

REF	A	B	C	D
C1	225pF	264pF	264pF	225pF
C2	52·3pF	36·3pF	30·9pF	36·3pF
C3	36·3pF	30·9pF	36·3pF	52·2pF
C4	136pF	156pF	150pF	

ALL INDUCTANCES ARE 0·7 μH

T12/2

Fig. 3.3 Filter FL2/4: Circuit

similar mechanically to the FL3/504, described in Instruction T.13, Section 2.

The FL2/4 (Fig. 3.3) is a non-dissipative bandpass filter, which matches into 50 ohms and has no recovery region outside the pass-band. Due to the resonant-circuit-coupling design used, the attenuation characteristic is slightly asymmetric, attenuation increasing more rapidly on the low-frequency side of the pass-band than on the high-frequency side. The filter is used to provide i.f. selectivity and to shape the i.f.-response curve in the pass-band. The assembly is mounted in a copper box and is similar in construction to the FL1/15.

3.3.2 Notch Filter FL1/17

Referring to Fig. 3.4, this assembly consists of helical resonator sections, providing attenuation notches in the combining-unit output at each translator-input frequency. The resonators are similar in construction and design to those used in the FL6/8; see Fig. 4.7 and associated description.

The FL1/17 replaces the tubular filters used in the EP7/1 translator, which are connected in pairs in the combining-unit outputs, as described in Section 4. A disadvantage of this system, as compared with that in the EP7/1, is that the FL1/17 power losses are all placed in the combined-output circuit. The system has the advantage, however, of placing filters for the three channels in the common aerial-input line.

The six resonator sections are carried on a mild steel panel (19 in. by 8¾ in. by $\frac{3}{32}$ in.). The tuning adjustments are accessible as screwdriver slots through the panel. Front and rear covers are fitted.

3.4 Performance Specification

This is as shown in Section 2 for the EP7/5, with the following exceptions and additions:

Input Impedance	75 ohms unbalanced (v.s.w.r. not greater than 1·3)
Output impedance	50 ohms unbalanced
Output power	8·2—12·5 watts per channel (dependent on frequency)
Stability of frequency translation	Within 500 Hz
Figure of merit	60 dB (after filtration and assuming at least 0·6-MHz spacing). See DSKA.7098
Power consumption	250 VA (approx.)

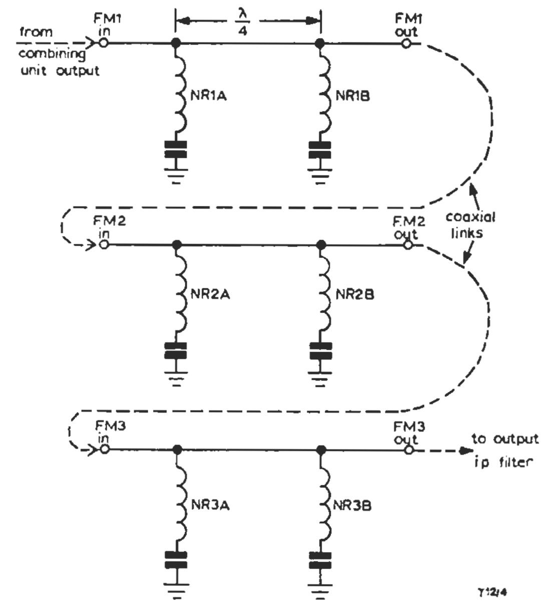


Fig. 3.4 Filter FL1/17 Arrangement

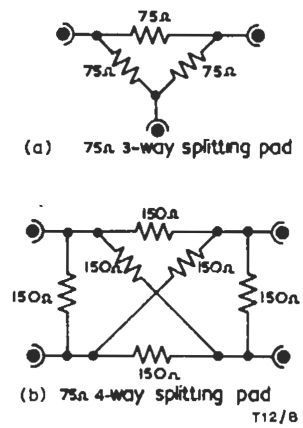


Fig. 3.5 Details of Splitting Pads

3.5 Tests on Bay Equipment

Complete bay tests are described here, and it is assumed that sufficient test equipment will be available on site to carry out all or some of the tests.

3.5.1 Apparatus Required (for complete tests)

Three F.M./A.M. Signal Generators (Marconi TF. 995 or equivalent)
R.F. Power Meter: 50 ohms (Marconi TF.1152/1)
Carrier Deviation Meter (Marconi TF.791D)
R.F. Wave Analyser (Airmec 248)
Frequency Counter
Push-button Attenuator: 0—90 dB (S.T.C.)
Push-button Attenuator: 0—9 dB (S.T.C.)
Avometer
R.F. Oscilloscope (Tektronix 585)
F.M. rebroadcast receiver (RC5/3, RC5/4 or equivalent)
Filter FL1/17
Three tone sources (TS/10 or equivalent)
Harmonic Routine Tester FHP/3
Aural Sensitivity Network ASN/4
A.C. Test Meter ATM/1
Three repeating coils (LL/6 or equivalent)
Test-load attenuator; see Fig. 3.11 in Instruction T.3
Two 3-way splitting pads; see Fig. 3.5(a)
4-way splitting pad; see Fig. 3.5(b)
50-ohms test lead
Receiver for 9—12 MHz (for example, Eddystone S750)
Two matching pads (50—75 ohms)

3.5.2 FL1/15 and FL2/4

All sections of the filters have been aligned during initial testing. On-site tests of performance can be made as follows.

1. Connect the filter under test into test circuit 1 (Fig. 3.6).

Note: It is essential that the source and load matching of the filter should be 50 ohms; the two matching pads have been included for this purpose. The 10-dB pad following the generator will be required if its output impedance is not 75 ohms.

2. Place a short-circuit, by means of a coaxial link, across the filter.
3. Adjust the generator and receiver to 10·7 MHz and, with the variable attenuator set to 50 dB, set the receiver S-meter (or signal-level meter)

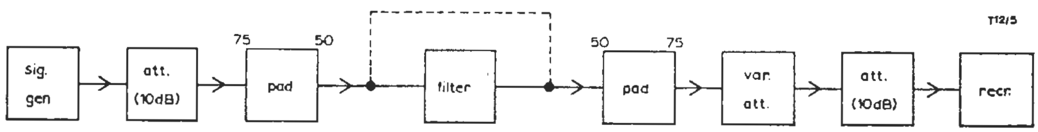


Fig. 3.6 Filter Test Circuit 1

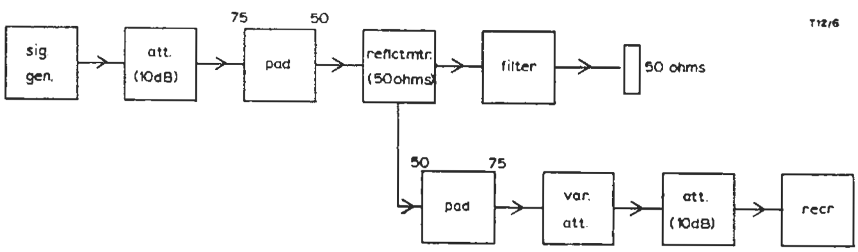


Fig. 3.7 Filter Test Circuit 2

to a convenient reading.

4. Remove the short-circuit across the filter and reduce the variable-attenuator setting until the S-meter is as in 3. This is the insertion loss of the filter at 10·7 MHz.
5. Check the variable-attenuator settings at frequencies appropriate to FL1/15 or FL2/4 (as shown in Tables 1 and 2), maintaining a constant S-meter reading as in 3. Passband and out-of-band insertion losses, relative to 10·7 MHz, are obtained from these measurements, and results should be as shown in the tables.
6. Measure the reflection coefficient, using a reflectometer connected as in test circuit 2 (Fig. 3.7).

Table 1: Test Results for FL1/15

F (MHz)	10·6	10·7	10·8	10·45	10·95
**Loss (dB)*	< 1·5	†	< 1·5	> 19	> 16
	‡Passband			Attenuation Notches	

*Relative to 10·7-MHz loss
†Should be 2·5 dB
‡Reflection coefficient over passband (200 kHz) should be better than 10 dB

3.5.3 FL1/17

Insertion loss and reflection coefficient can be measured by the methods used in 3.5.2.

Insertion loss and v.s.w.r. with the resonators connected as in Fig. 3.4 depends upon the frequency spacing between NR1, NR2 and NR3, but the loss should lie between 0·6 dB and 1·7 dB, and the v.s.w.r. should be better than 1·2—1·7 for spacings between 1·5 MHz and 600 kHz.

Notch attenuation should be 28—34 dB.

Table 2: Test Results for FL2/4

F (MHz)	10·6	10·7	10·8	9·5	9·9	10·1	10·3	11·1	11·3	11·5	12·0
**Loss (dB)*	1·0	†	1·0	60	60	50	34	31	43	53	53

*Relative to 10·7-MHz loss
†Should be 5 dB ± 1 dB
Reflection coefficient should be better than 10 dB over 200-kHz passband

3.5.4 Overall BA13/9 Tests

These tests relate to a complete three-channel system, bay-mounted. It is assumed that the EP7/5's have been tested, and that the filters and combining units are set up to appropriate frequencies.

The input notch filters should have been set to reject each of the output-carrier frequencies and each pair of output notches should have been set to reject the appropriate input-carrier frequencies.

1. Connect the bay into a test circuit as shown in Fig. 3.8.
2. Set the carrier-alarm control on each channel (UN1/41 escutcheon) to operate at 80 μV input.
3. Set the signal generators to the appropriate three input-carrier frequencies and adjust the output levels so that a 125-μV signal is delivered to each channel input filter.
4. Connect the 50-ohm power meter to the output of the FL4/510 and measure the output of each channel in turn; this should be set to 8·5 W.

Note: The variable r.f. attenuator in the feedback path should be set to an attenuation *A* which varies between Stations and can be derived from the figure-of-merit expression:

$$M = S_m - L_m - 6,$$

where M depends upon the input- and output-channel separation, and has a minimum value of

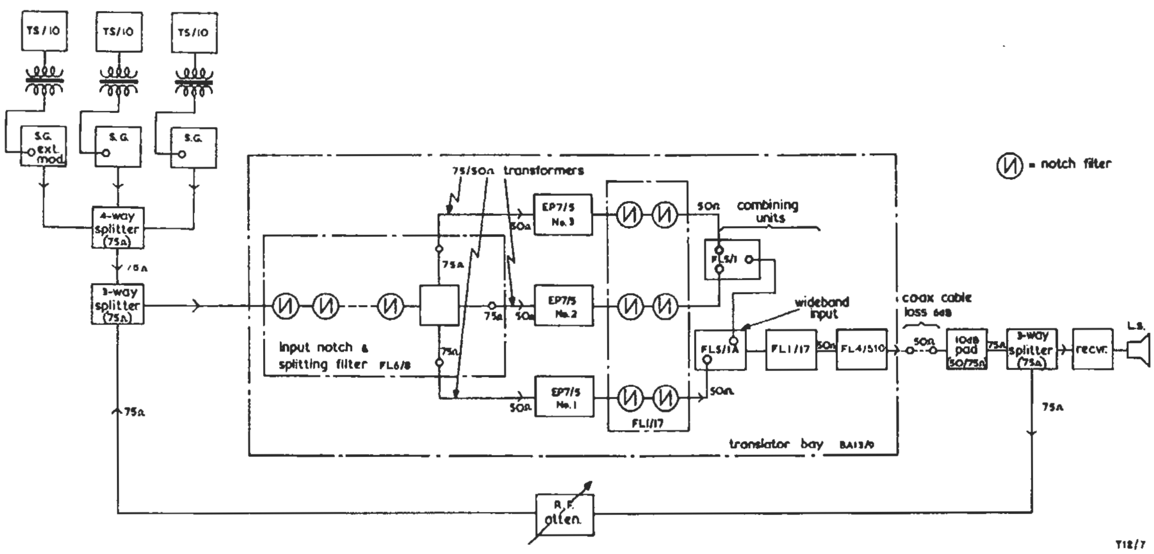


Fig. 3.8 Test Arrangement for BA13/9

60 at 0·6-MHz spacing; see Fig. 3.9.

S_m = 106·5 dB and is the maximum power gain for 8·5 W output and 120 μV input.

L_m = A + minimum circuit attenuation included in the feedback path, which from Fig. 3.9 is 28 dB.

M therefore is given by:

$$M = 106{\cdot}5 - (A + 28) - 6,$$

and since M is always greater than 60 the maximum test figure for A is given by:

$$A = 106{\cdot}5 - 60 - 6 - 28 = 13 \text{ dB approximately.}$$

5. Apply and remove the input signal to each channel in turn, checking that the translator is muted when the signal is removed. The RV1 pre-set control on each UN1/41 may be adjusted if necessary, to achieve correct muting.
6. Repeat operation 5 with input signal applied simultaneously to all three channels, removing the signal from each channel in turn.
7. With the input carrier deviated to ± 75 kHz at a modulation frequency of 1 kHz, check the figure-of-merit (M) for each channel translator, with the other channels muted.

Note: This figure is obtained by ascertaining the feedback-path attenuation A which will just produce discernible change in noise and/or distortion in the demodulated output. The figure-of-merit can then be calculated from the expression under item 4.

8. Repeat operation 7 with two and then three channels powered simultaneously and deviated to ± 75 kHz. The figure-of-merit for each channel should again be at least 60 dB.

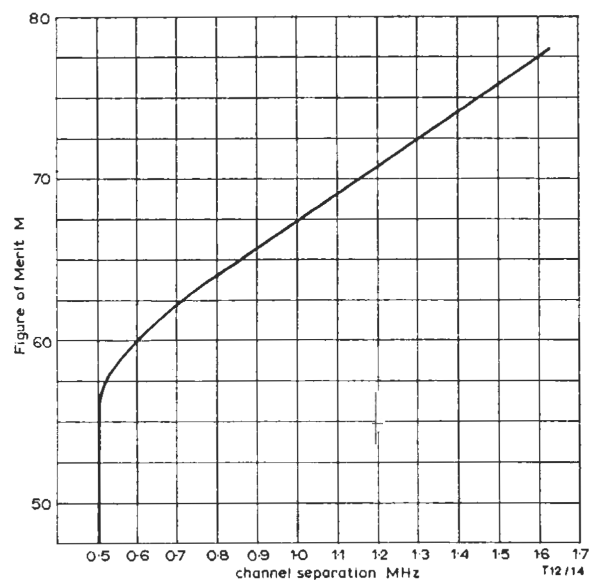


Fig. 3.9 Figure of Merit Curve

Harmonic Distortion

9. Set the feedback attenuator to a loss 6-dB greater than the value *A* obtained in operation 4 (that is, not exceeding 19 dB).
10. With all three channels deviated to ± 75 kHz at either 1-kHz or 100-Hz modulation, measure the harmonic distortion in the output of each channel.

Note: Distortion should not exceed −45 dB at 1 kHz and −40 dB at 100 Hz. The accuracy of this measurement is limited by the inherent distortion in the TF.995 generator used. Distortion level in these generators varies between units, but is typically −40 dB to −45 dB.

Signal-to-Noise Ratio

11. With the modulated signal applied to all channels, measure the noise level in the demodulated output of each channel, with modulation removed from the measured channel only.

Note: The noise level measured on a P.P.M. should not exceed −50 dB unweighted or −60 dB weighted, relative to ± 75-kHz deviation.

12. Repeat the preceding measurement with modulation removed from all channels simultaneously. The level of *burbles* is usually well below noise level and should not be objectionable aurally.

Amplitude Modulation

13. With the ±75-kHz modulation restored, inspect the output waveform of each channel for amplitude modulation, using a Tektronix 585 oscilloscope. The a.m. should not exceed 2 per cent of mean carrier amplitude.

Spurious Terms in Output

14. Connect the bay into a test circuit as shown in Fig. 3.10.
15. With modulation removed from all channels, measure the spurious terms throughout the spectrum.
16. With the signal generator connected to the bay input, adjust the FL1/17 for maximum attenuation at carrier frequency. This attenuation figure will be approximately 40 dB. Note the value (*i*).
17. With the analyser adjusted for a convenient reference level at carrier frequency, measure the level at each spurious frequency. Note the values (*ii*).
18. Connect the signal generator into the FL1/17, as shown dotted in Fig. 3.10, and calibrate the measuring system at each significant frequency. Note the values (*iii*).
19. Estimate the level of each spurious term, as given by (*i*) + (*ii*) − (*iii*), which should not exceed −60 dB relative to carrier level.

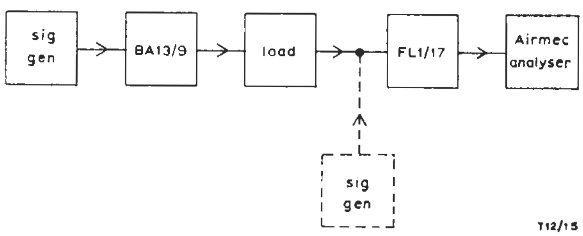


Fig. 3.10 Test Circuit for Measuring Spurious Terms

3.6 BA13/11 and BA13/12 Assemblies

Figs. 3.11 and 3.12 shows the assembly and inter-unit wiring of the two bays used for automatic change-over installations. Standard frameworks FW2/1's are used, less doors.

The equipment mounted on the BA13/11 comprises:

Three F.M. Translators, EP7/5
Splitting Filter, FL6/8
Change-over Panel
Attenuator Panel (containing three attenuators)
Filter, FL3/504
Filter, FL4/510
Six I.F. Filters, FL1/15
Six I.F. Filters, FL2/4
Six Notch Filters, FL1/7
Mains Distribution Panel, PA9/7

Equipment mounted on the BA13/12 comprises:

Three F.M. Translators, EP7/5
Load panel (containing three loads)
Low-power coaxial relay panel (containing three relays)
Detector and relay panel (containing three detector boxes and three relay boxes)
Six I.F. Filters, FL1/15
Six I.F. Filters, FL2/4
Three Output Filters, FL4/510
Transformer Panel
Mains Distribution Panel, PA9/7

3.6.1 General Description of Mark-II Change-over System

This system has been designed for use on t.v. and f.m. stations using 100-watt Marconi amplifiers and

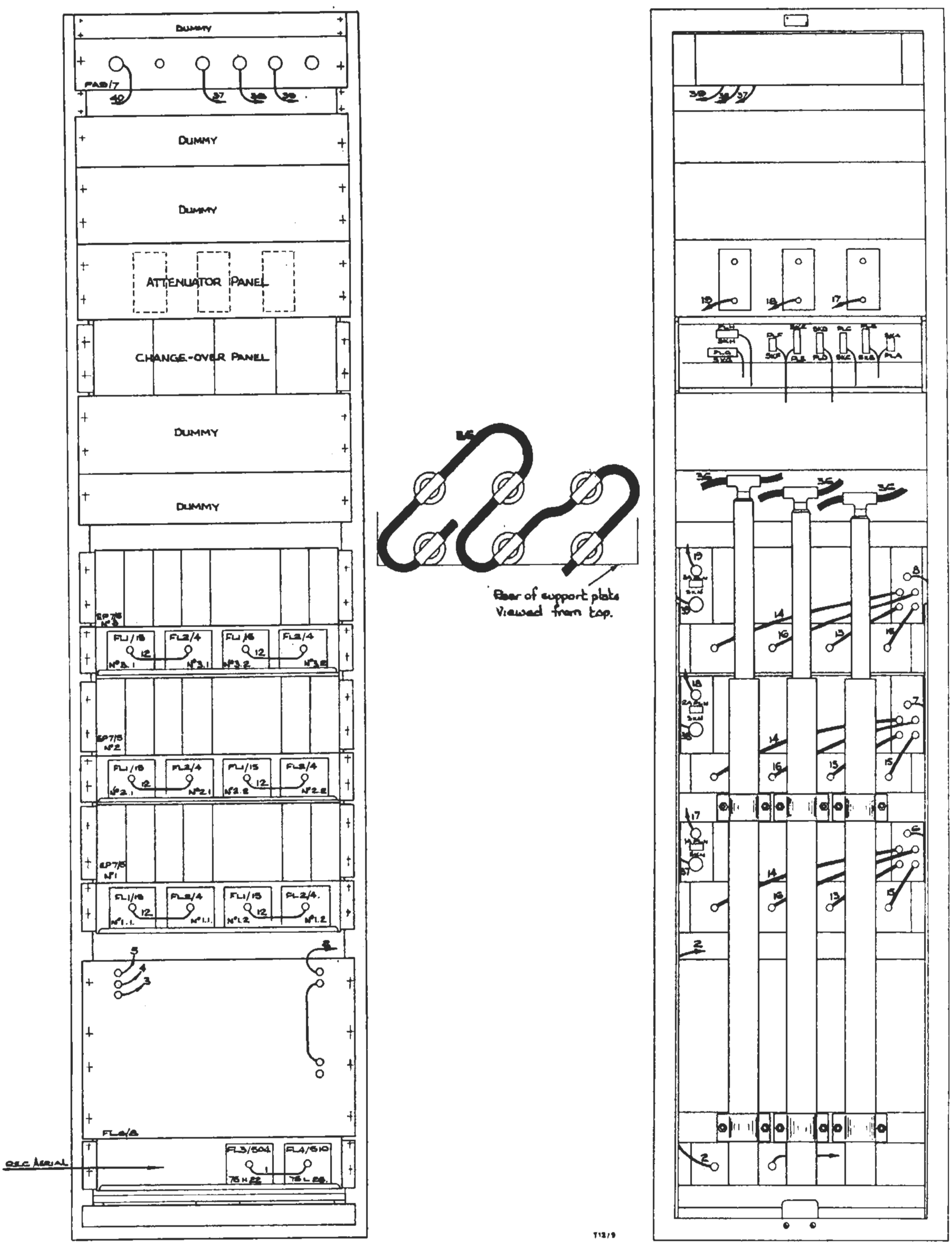


Fig. 3.11 BA13/11 Assembly: Front (left) and Rear Views

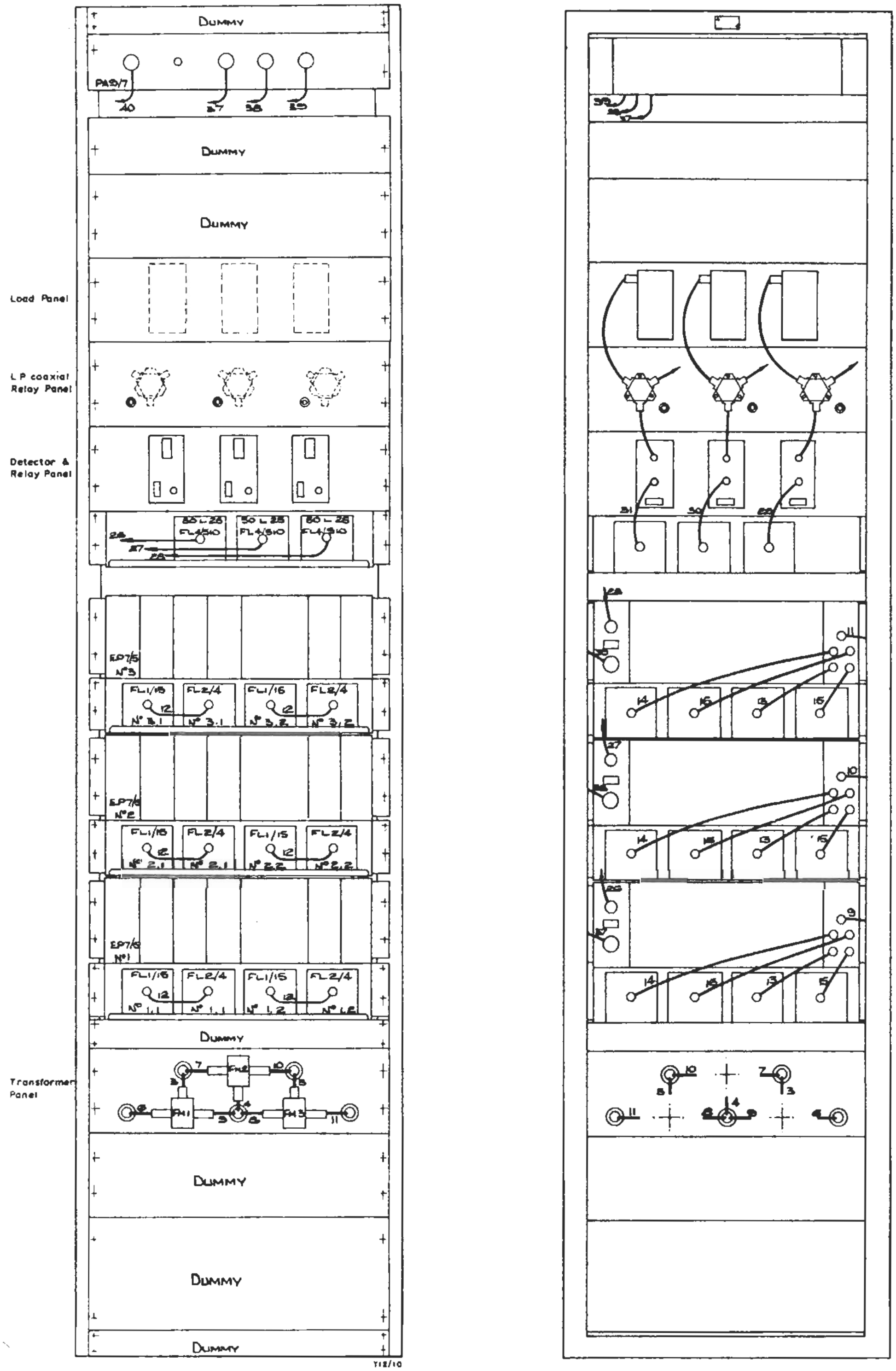


Fig. 3.12 BA13/12 Assembly: Front (left) and Rear Views

Designs Department transistored translators.

Referring to the schematic, Fig. 3.13, the three main (or A) translators are connected directly to 100-watt amplifiers, which are normally mounted on an adjacent bay. The three B translators form the standby equipment with outputs of 10 watts. The heart of the change-over system is the change-over panel, containing a number of relay circuits which are triggered into operation by external *indicating* signals. These signals originate in:

(a) detector and relay panels, which provide a return path across a pair of terminals when normal r.f. output is present at the B translator output,
(b) carrier detectors (in the 100-watt amplifiers) providing return paths when r.f. power is present at the amplifier outputs,
(c) carrier detectors (in the translator i.f. units) which switch the 100-watt amplifiers on and off.

The change-over panel feeds out signals to other equipment through circuits for:

(a) return paths which make or break A or B translator d.c. supplies,
(b) return paths which switch on the 100-watt amplifiers,
(c) completing a 50-volt supply which operates coaxial relays,
(d) passing information to remote TIP/2's, indicating the operational state of the main and standby translators.

The following is an operational description of a single f.m. channel. In the absence of an incoming signal, both main and standby translators are on and in the night-time condition. The aerial is switched to the amplifier output, and the B translator is connected to a 50-ohm load.

When an incoming signal appears, the r.f.-output *indication* from the A translator starts the amplifier; the B translator registers a *pre-test* condition and

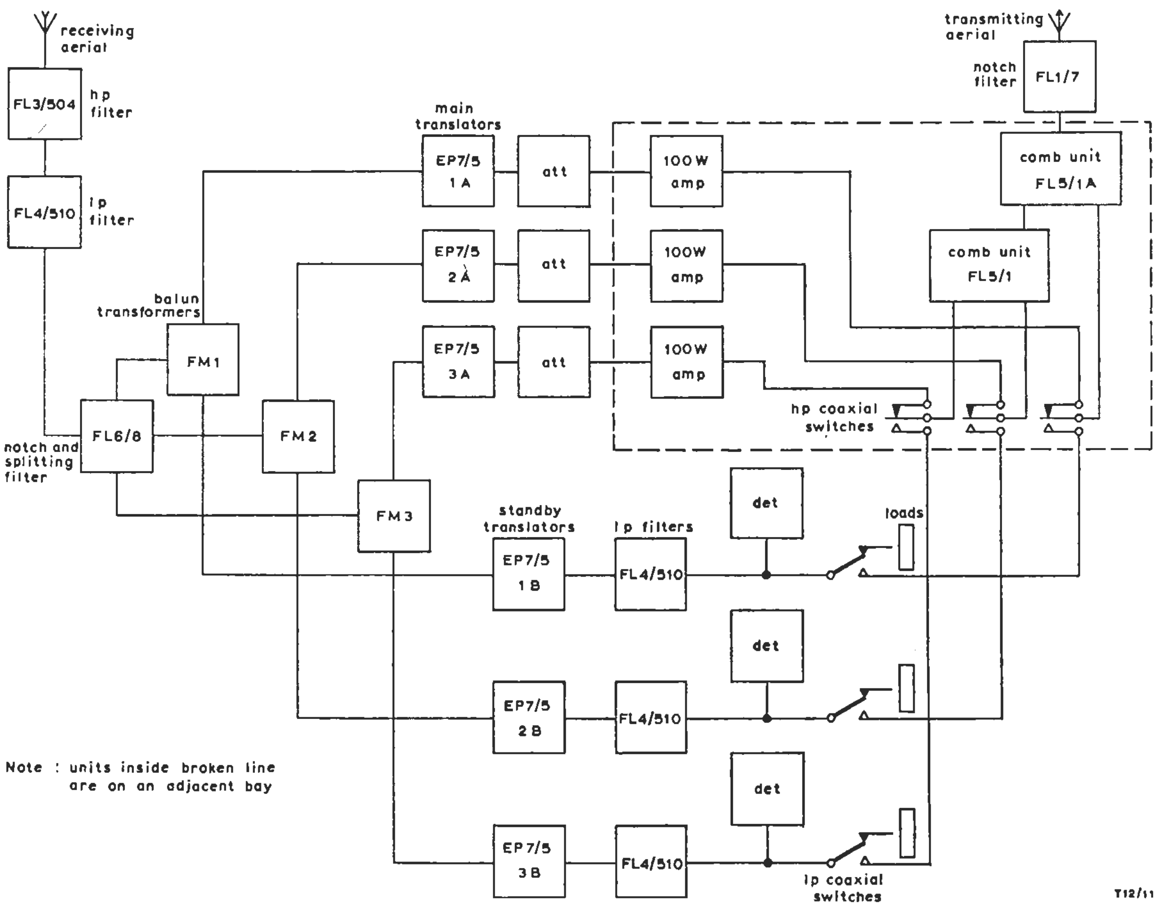


Fig. 3.13 Schematic of Mark-II Change-over System

continues to work into the load. If the amplifier produces power at its output within 90 seconds, the B pre-test is held and the B-translator supply is muted.

If the amplifier fails to produce power, the change-over unit mutes the A- and B-translator supplies, closes down the amplifier, changes over the coaxial relays in order to connect the B translator to the aerial, and then restores the B supply.

If either the A translator or the amplifier fails during operational service, and if the fault continues for more than 10 seconds, the B supply is restored. If r.f. is present at its output, the B translator registers a pre-test and automatic change-over occurs. If, due to a fault condition or close-down of the incoming signal, there is no r.f. at the B-translator output, pre-test is not registered and the system remains in the night-time condition.

Once the B translator has been switched to the aerial, no further change is possible unless that translator fails. When the master station closes down, the system reverts to the night-time condition.

The change-over sequence has a four-seconds delay between switching off the translator supplies and operating the coaxial relays, and a further one-second delay before reconnecting the supply. This is a precaution against switching amplifier-powered coaxial relays. It also avoids possible damage to output transistors due to powering translators into an open circuit.

The unit provides TIP/2 information of:

(a) Amplifier r.f. output.
(b) B translator pre-test.
(c) Change-over over-ride switch in *Auto* position.

These conditions are lamp-indicated on the unit front-panel.

There follows description of various units contained in the BA13/11 and BA13/12 bays, and for which information is not available elsewhere.

3.6.2 100W./10W. Change-over Unit, Mark II (Fig. 7)

This is a transistor unit, constructed on a CH1/12B chassis. Three operational units and one spare unit are mounted in a PN3/23 chassis. The circuit diagram, Fig. 7, gives the D.C.C. code and title, but they may not appear on the equipment.

Referring to Fig. 7, the operation of the main and standby translators is controlled by the over-ride switch SW1. This can select to *Auto* in its central position, lock to translator A in the clockwise position (4—5), and lock to translator B in the counter-clockwise position (1—2). The functions of the individual switch sections are:

SW1A controls the A-translator d.c. supply.
SW1B controls the B-translator d.c. supply.
SW1C controls the coaxial relays, which are locked on for the *B* position and off for the *A* position.
SW1D controls the automatic change-over circuits which are operative only in the *Auto* position.
SW1E controls the relay RLD (B) and prevents application of the B supply during a change-over period.
SW1F gives TIP/2 indications of the *Auto* position, and disconnects the indicator lamps when at other positions.

The change-over operation depends upon:

(a) the presence or absence of a return-path indication across PLY9 and PLY10. The indication is supplied from the carrier-detector in the 100-watt amplifier when r.f. power appears at the amplifier output.
(b) a similar indication across PLZ3 and PLZ4 when normal output is supplied by the B translator.

Referring to Fig. 7, the functioning of the control circuits can be divided into five operational states as follows.

(*a*) *Night-time Condition*

No signal is present at the outputs of the A and B translators. Relays RLA, RLB and RLC are therefore unoperated. The method of using double-winding relay RLD is such that the contacts are unoperated, as in Fig. 7, when both windings are energised equally, and operated when only one winding is energised. In the night-time condition, coil A is supplied with 50-volts via the coils of the coaxial relays and R12. Coil B remains unenergised because of the open RLC5 contact. RLD is therefore closed. D.C. is therefore applied to both translators via contacts RLD3 and RLC3. The pre-test lamps are extinguished and night-time indication is fed to the TIP/2.

The coaxial relays are not energised. Consequently the A translator and the amplifier are prepared to feed the aerial, and the B translator is connected to load.

The amplifier is closed down in the absence of an indication from the translator-A i.f. unit. Extra contacts in the amplifier-start circuit are connected to the i.f. unit. When the amplifier is closed down, the lamp on the front panel of the i.f. unit is extinguished.

(*b*) *Both Translators producing R.F. Output*

The A-translator output-indication starts the amplifier via the RLC4 circuit and the associated circuit in connection with PLY3 and PLY7.

The B-translator output indication energises RLB, opening contact RLB2. The 50-volt supply is thereby removed from C3, which discharges after 90 seconds through R8 and RV1; the last-mentioned provides a means of presetting the delay time. During the 90-second delay period, which is a warm-up interval, TR3 remains on and RLC is held off. If the amplifier is faulty and fails to produce power within the 90-seconds interval, TR3 becomes non-conductive and RLC is energised. Change-over then takes place as described subsequently under (d).

(*c*) *Amplifier produces Power Output*

The *indication* which completes the PLY9-PLY10 circuit causes RLA4 to open and remove d.c. from the B translator. RLA5 holds the B pre-test, and RLA1 ensures that TR3 remains conductive in order to keep RLC de-energised. RLA6 provides rapid discharge of C3 by connecting R25 across it. RLA2 causes the *Main* indicating lamp to light and RLA3 feeds information to the TIP/2.

The system is now in the normal operational state, with the main translator A feeding the aerial via the 100-watt amplifier, and the standby translator B muted and terminated in the 50-ohm load.

(*d*) *Fault resulting in Loss of Signal at Amplifier Output*

RLA is de-energised and restores d.c. to the B translator via RLA4. RLA5 releases the self-hold on RLB. With r.f. still present at the B-translator output, there is a 10-seconds delay before C4 charges sufficiently to cut off TR3 and so energise RLC. RLC3 and RLC4 break the Amp. Start circuit and the A-translator supply, respectively. RLC5 makes the energising supply to coil B of RLD, causing contacts of that relay to assume their unoperated positions. Thus the B d.c. supply is removed by RLD3 and the B pre-test is held via RLD1.

RLC2 applies −50 volts, taken via RLB1, to the delay circuit formed of C2, R2 and R3, and after 2—3 seconds the coaxial relays are energised via TR1 and TR2. TR2 acts as a dual-purpose switch, which effectively completes the coaxial-relay coil earth-return and places a short-circuit across the RLD A-coil after a one-second delay period. Relay RLD therefore closes again and restores the B supply via RLD3. RLB can no longer switch 50 volts to TR3, and therefore RLC remains energised.

The system has now changed over to the standby condition, with translator B feeding 10 watts into the aerial, and translator A and its amplifier closed down.

(*e*) *Subsequent B Failure or Scheduled Close-down*

When there is no output from the B translator there is no *indication* at PLZ3-PLZ4, so RLB opens after 3 seconds. RLB1 breaks the supply to the delay circuit preceding TR1. RLB3 opens to de-energise coil B of RLD, so the contacts of that relay become unoperated and RLD3 removes d.c. from the B translator.

After 2—3 seconds, the delay circuit (C2, R2 and R3) shuts off TR1 and the coaxial relays are de-energised. After one second, coil A of RLD is energised and RLD3 restores d.c. to the B translator. RLD2 closes and, by connecting the operating supply available through RLB2, makes TR3 conductive. Consequently RLC is de-energised.

The system is now in the night-time condition, as under (a).

(*f*) *Summary of Fault Conditions*

Translator A faults result in loss of power at the amplifier output, thus initiating change-over to translator B.

Once the amplifier is producing power, any faults on translator B are ineffective because it is closed down.

Reversion to the night-time condition occurs if the B translator fails while it is operational.

A B failure during the night-time condition makes RLB incapable of operation, so when eventually the amplifier operates RLA there is no B pre-test.

3.6.3 Detector and Relay Panel

This panel serves to provide the change-over panels with *indications* that normal r.f. power is present at the B translator outputs. Three carrier-fail detector boxes and three relay boxes are mounted on this 5¼-in. panel.

The detector, a simple choke-and-rectifier circuit as in Fig. 3.14(a), is mounted in a standard Eddystone box, type 896. A copper strip (2 in. by 1 in. by 18 s w g) constitutes the through-path from output filter to load or aerial, and the detector is connected to its centre.

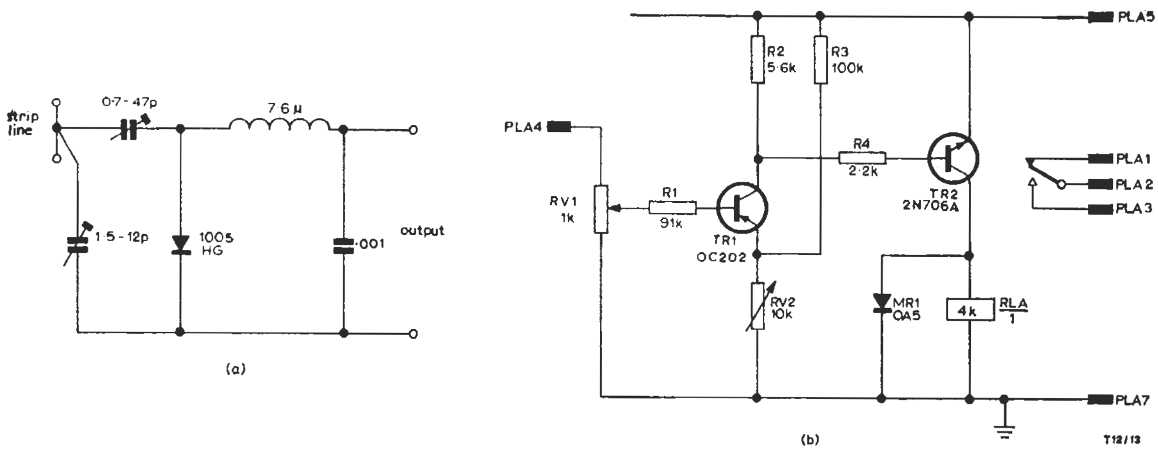


Fig. 3.14 Circuits of (a) Detector Unit and (b) Relay Unit

The detector d.c. output is fed via a through-tag to the input-tag, PLA4, of the relay box. This contains a simple two-stage transistor amplifier and a relay with its winding connected in the collector circuit of TR2; see Fig. 3.14(b). Components are mounted on Veroboard and assembled in a modified Eddystone box, type 896. Normal-power indication is provided by the short-circuit through PLA2 and PLA3 when the relay is energised. RV1 and RV2 provide the means of presetting the relay operational point.

3.6.4 High-power and Low-power Coaxial Relay Panels

The high-power relays are mounted on the amplifier bay and are used to switch the input of the combining units either to the amplifier outputs or to the B-translator outputs via the l.p. relays shown in the schematic Fig. 3.13. The low-power relays mounted on the BA13/12 are used to switch the B-translator outputs either to the load or to the combining-unit inputs via the high-power relays.

The relay panels are described in Section 4 of this Instruction. Note that in the Mark-II system the switching of the A output either to amplifier or to combining unit has been omitted. It is considered unlikely that a fault will occur in the amplifier and the B translator simultaneously.

3.6.5 Load Panel

Three load boxes are mounted on a 5¼-in. panel. Each resistive load, consisting of six paralleled 300-ohms Electrosil type-P4 resistors, is mounted in an Eddystone box. External connection is made via a Type-C connector.

3.6.6 Attenuator Panel

The panel is required in order to reduce the inputs to the amplifiers by 6 dB. The attenuator in each of the three boxes (Eddystone) on this 5¼-in. panel is a simple π-network of three Electrosil resistors. External connections are made via BNC connectors.

3.6.7 Transformer Panel

Since in this system three pairs of input circuits are required to be isolated, balun matching transformers are used and connected as shown in Fig. 3.13. The transformers are Hatfield Baluns and they introduce a loss of 3 dB per channel.

3.7 Tests on Bay Equipment

In addition to tests already described on BA13/9 equipment, the following tests can usefully be carried out on the change-over equipment.

3.7.1 100W./10W. Change-over Unit

The change-over cycle can conveniently be checked by operating the over-ride switch from its normal *Auto* position to *B*. The operation and timing of relays and the muting system can then be checked to information already given in 3.6.2. If desired, translator failure and consequent disappearance of the *indication* signals can be simulated by connection or disconnection of short-circuits across the appropriate panel connectors.

3.7.2 Detector and Relay Panel

RV1 and RV2 in the relay box should be set to their mid-points. The pre-set capacitor in the detector box should then be set to operate the corresponding relay when the translator output is reduced by 3 dB.

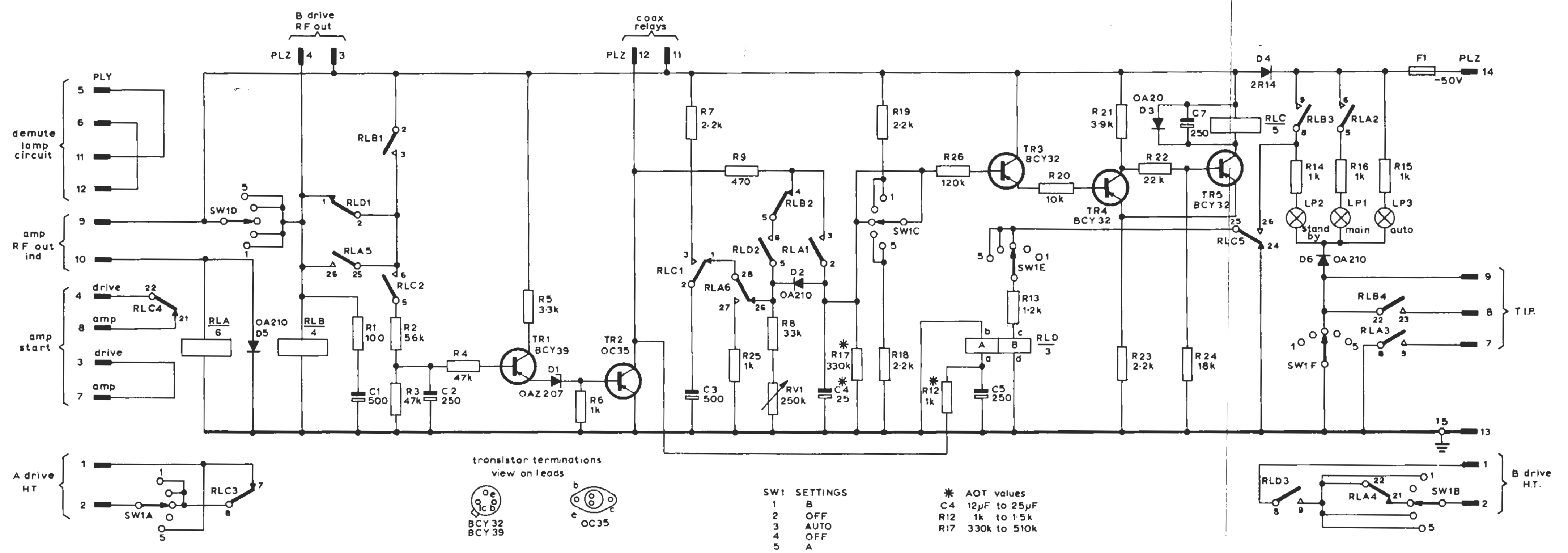
3.7.3 Muting Circuit

Check that when the input signal falls by 14 dB, the carrier relay in the translator-A i.f. unit de-operates, mutes the translator d.c. supply and extinguishes the lamp on the unit front-panel.

PWG(X)/JR/0367

from PID 9465.3.1A3 issue 2 (rev)
parts list PID 9465.1.2A,3A,4A4

FIG 7



100W/10W CHANGE-OVER UNIT MK II: CIRCUIT

The D.C.C. code and title of this equipment are UN21/4 and Translutor Change-over Relay Unit

T12/12L