SECTION 4

F.M. DRIVE BAY EQUIPMENT BA13/10

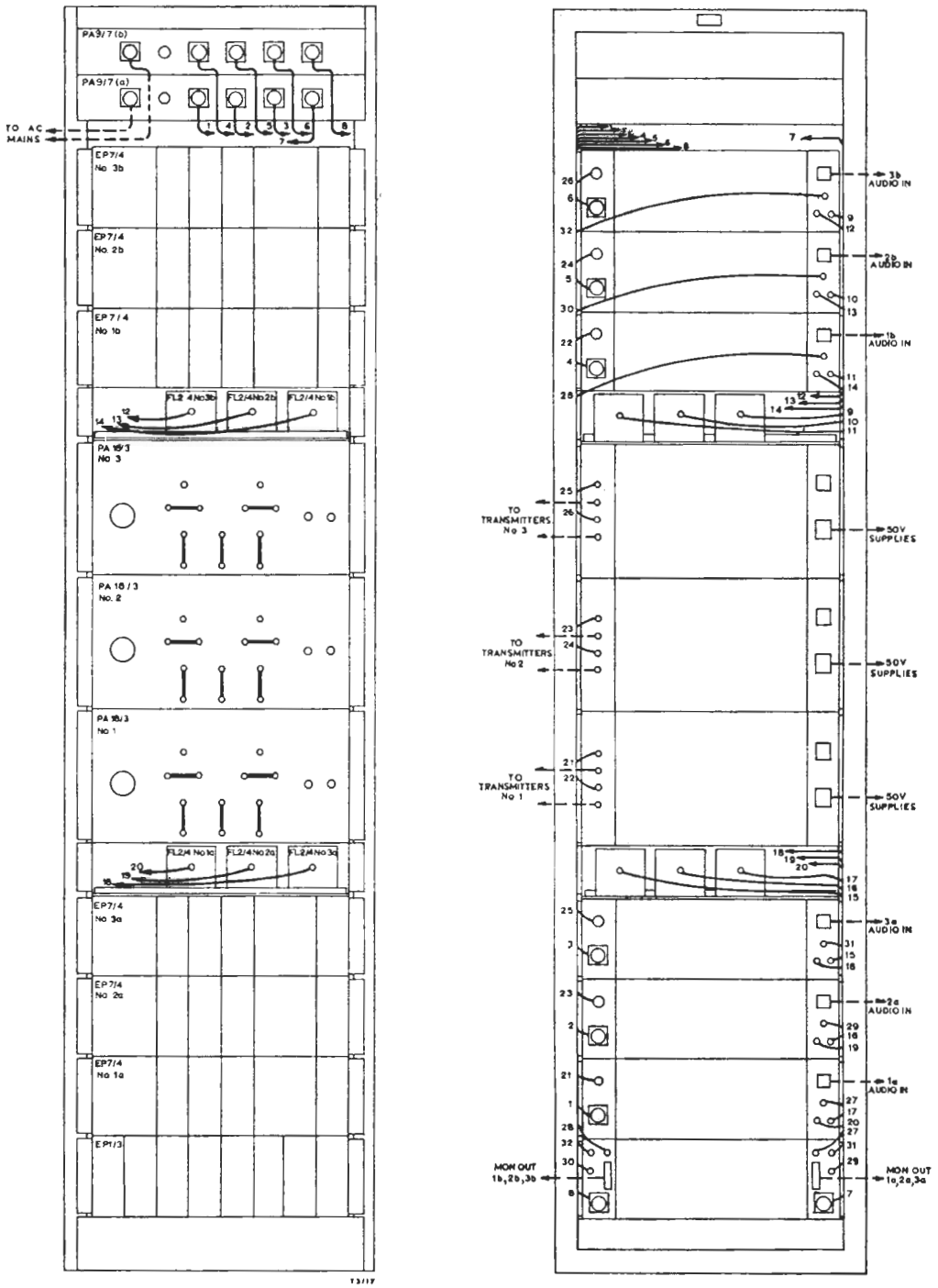


Fig. 4.1. BA13/10: Views of Front (left) and Rear

SECTION 4

F.M. DRIVE BAY EQUIPMENT BA13/10

4.1. Introduction

The equipment is mounted on a standard bay framework, FW2/1, which is supplied without doors. The bay accommodates six EP7/4 or EP7/4A drive units, together with auxiliary apparatus forming the complete main and standby drives for three Band-II transmitter channels. The auxiliary equipment includes three drive change-over panels, PA18/3, monitoring panel EP1/3, six filters (type FL2/4) and two mains distribution panels PA9/7. The PA18/3 is described in Section 2 of this Instruction.

4.2. Assembly

Referring to Fig. 4.1, the a.c. mains supply is distributed by means of the panels PA9/7 (a and b) to the power units in the EP7/4's and to the monitor panel, EP1/3. Home, Light and Third change-over panels (PA18/3) are mounted at the centre of the bay, with main and standby drives mounted below and above them respectively. The monitor equipment EP1/3 is situated at the bottom of the bay. UR43 coaxial-cable interconnections are terminated in type C or BNC connectors. Chassis extenders CH1A/5 and CH1A/3 are supplied with each bay.

4.3. Description of Bay Equipment

Main and standby drive units are as described in Section 3 of this Instruction. Automatic change-over from main to standby drive is effected in the panel PA18/3 described in Section 2. The i.f. bandpass filters FL2/4 are an essential part of the drive unit and are described in Instruction T.12, Section 3.

4.3.1. Mains Distribution Panel PA9/7

Two of these panels are used to distribute a.c. mains to the active units. Four 4-way Cannon sockets and a 4-way plug are mounted on a 3½-in. mild-steel panel, together with a Painton d.p. toggle switch. Mains supply is fed into the panel via the plug (Mains) to the left of the switch, and distributed from paralleled sockets numerically identified by *Out* labels.

4.3.2. Monitoring Equipment EP1/3

This is included where duplicate equipment is used. It is a standard nesting box assembly comprising a panel PN3/23, in which are mounted six monitors MN4/1 and two power suppliers PS2/13H. The monitors are divided into two separate groups, monitoring the three main and three standby drive equipments. The wiring arrangement is given in Fig. 4.2.

The MN4/1 is a transistor f.m. demodulator, which reproduces the modulating signal from a frequency-modulated 10·7-MHz i.f. signal. It is constructed on a book-type chassis CH1/27. The 10·7-MHz input signal is obtained from a special output on the drive first-mixer chassis.

Although its main purpose is to provide the feed to a programme failure monitor MN1/1, the MN4/1 has a high-quality output that can be used with high-grade monitors or for measurement purposes.

The MN4/1 requires an input of 25 mV into 50 ohms, and provides a nominal output level of +12 dB from a signal modulated to ± 75-MHz deviation.

Referring to Fig. 4.3, the monitor contains three sub-sub units, a limiter AM6/2, a discriminator UN15/1A and an a.f. amplifier AM10/4. The limiter and discriminator are each enclosed in a copper screening box (1½ in. by 2 in. by 3⅞ in.) and the a.f. amplifier takes the form of a printed board attached directly to the CH1/27 chassis.

Interconnections are made via 16-way Thorn connectors in which the coaxial No. 1 input connects the 10·7-MHz signal to the input of the AM6/2; see Instruction T.12, Section 2 for details of this amplifier. It is followed by a discriminator unit UN15/1A, embodying a standard Foster-Seeley arrangement in the circuit as given in Fig. 4.4. The discriminator output is fed at high impedance to the input of an a.f. amplifier AM10/4. Referring to Fig. 4.5, this is a standard transistor amplifier with a Darlington-pair balanced output circuit, an explanation of which is available in Instruction S.10, Section 7 and in BBC Engineering Monograph No. 26.

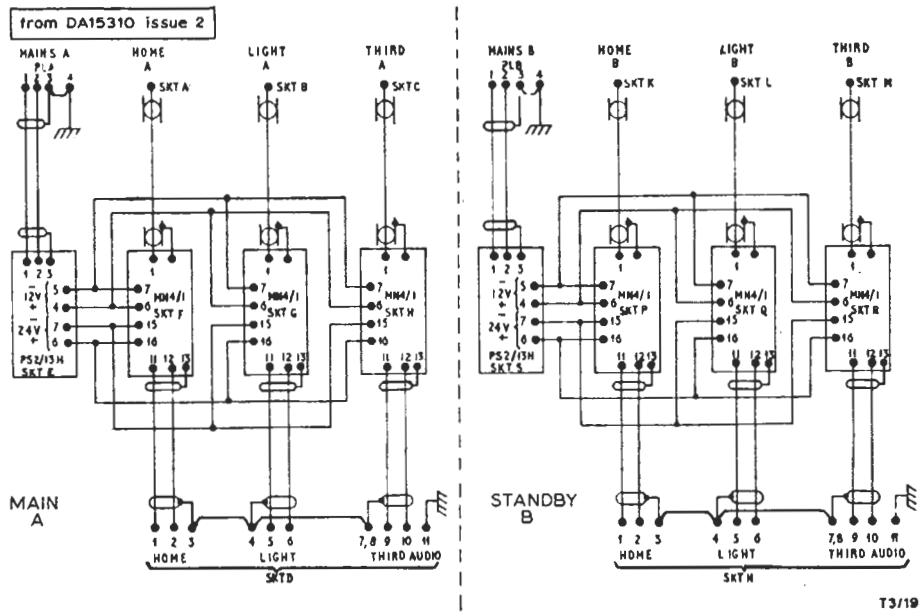


Fig. 4.2. EP1/3: Wiring Arrangement

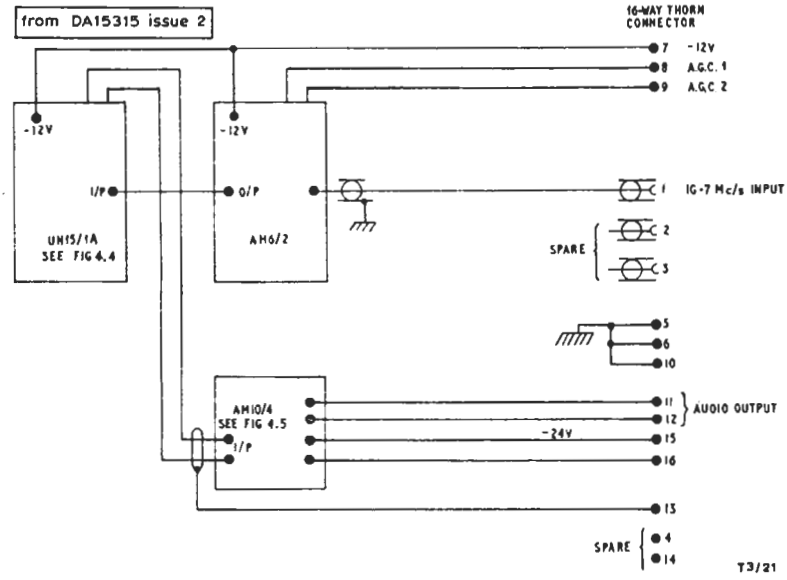


Fig. 4.3. MN4/1: Wiring Arrangement

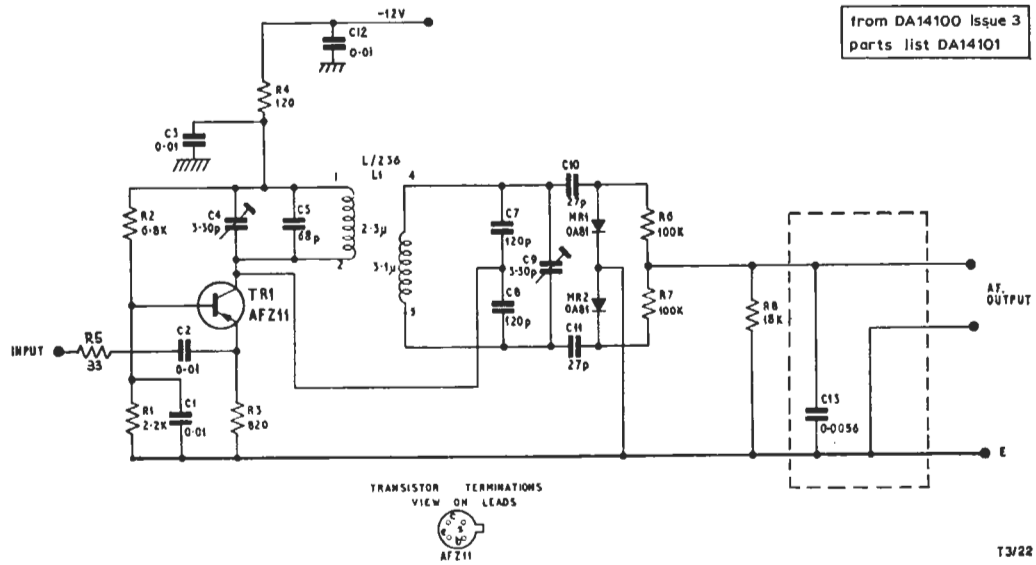


Fig. 4.4. UN15/1A (Discriminator Unit): Circuit

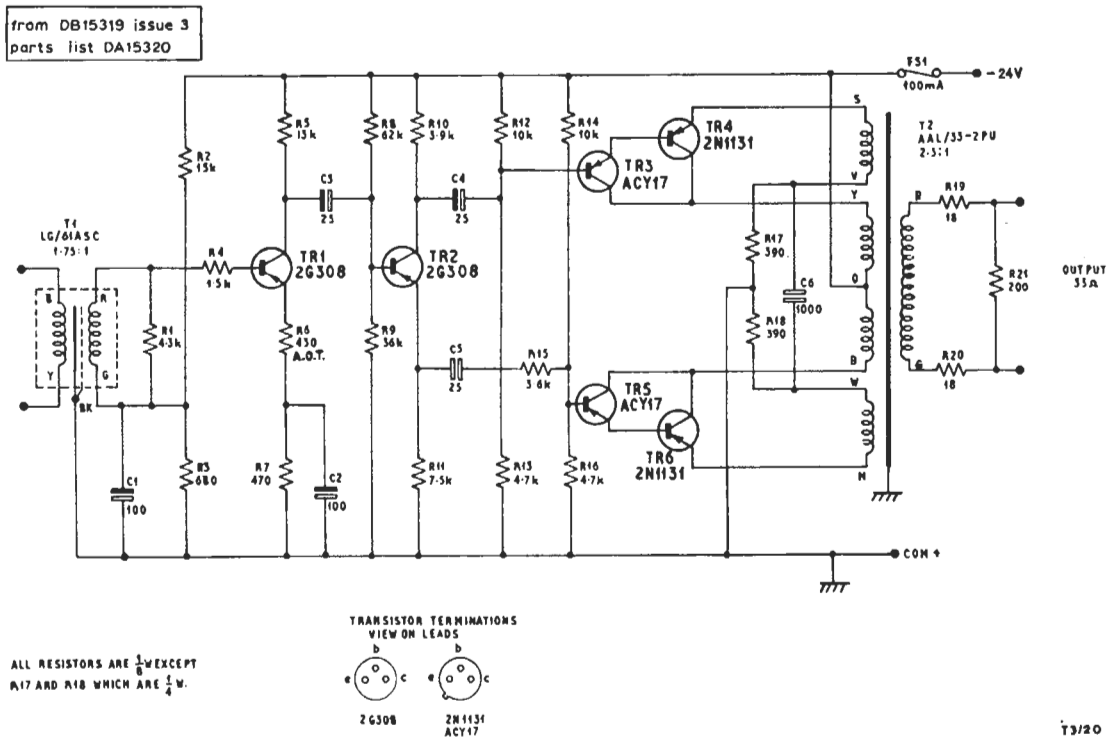


Fig. 4.5. AM10/4 (Monitoring Amplifier): Circuit

Power supply requirements for an MN4/1 are 12 volts at 25 milliamperes and 24 volts at 45 milliamperes. Three units are therefore supplied from each PS2/13H. Information about the PS2/13 suppliers is in Instruction G.2.

4.4. Unit Testing

Tests are described for AM10/4, UN15/1A and AM6/2, in addition to overall testing.

4.4.1. Test Equipment Required

Avometer Model 8.
F.M. Deviation Meter (Marconi TF 934 or TF 791D).
Signal Generator (Marconi TF 955A, with Terminating Unit TM 4308).
Valve-voltmeter (Marconi TF 1041C).
Polyskop (Rhode and Schwarz BN 4244).
Harmonic Routine Tester FHP/3, or suitable analyser.
Test Programme Meter TPM/3.
Amplifier-detector AD/4.
Tone Source (PTS/12 or suitable oscillator).
Two 300-ohm resistors.

4.4.2. AM10/4

1. Carry out d.c. measurements. The total current should be 40 mA ± 3 mA at 24 volts ± 0·5 volt. The following typical emitter-earth voltages, measured on an Avometer, may be useful during fault-finding:

TR1	TR2	TR4	TR6
0·8	8·0	7·0	7·0

2. Prepare for the following a.c. tests, by plugging the amplifier into an extender so as to leave the input and output circuits isolated at printed board tags.
3. Use the tone source, padded to provide a 300-ohm source, in a measurement of gain. The amplifier output should be zero dB, working into a load of 15 kilohms. The normal voltage gain should be 27 dB ± 1 dB.
4. Check the frequency response by measuring output level while applying a constant input level. Between 40 Hz and 15 kHz the response should be ±0·5 dB relative to that at 1 kHz.
5. Measure the distortion with an output voltage level of +12 dB. This should not exceed 1 per cent at 100 Hz and 1 kHz.
6. Measure the noise level on the TPM/3, peaking to 6. It should not exceed −70 dB relative to the +12-dB output.
7. Restore the AM10/4 input and output wiring.

4.4.3. UN15/1A

It is important that the discriminator is aligned with both covers in position.

1. Connect the Polyskop r.f. output to the discriminator input. This should be fed via the disconnected linking wire from the AM6/2.
2. Connect the Polyskop probe input to the a.f. output tag of the UN15/1A.
3. Connect the signal generator (TF 995A) to the external marker socket of the Polyskop, and set the generator to 10·7 MHz ± 5 kHz and 100 mV output.
4. Set the Polyskop to display 10·7 MHz at the centre of the screen, with the display occupying a width of 1 MHz.
5. Adjust the Polyskop zero-line control to bring the baseline to the centre of the screen.
6. Set the Polyskop output attenuators to 20 dB. Then adjust C4 and C9 to obtain the familiar S-characteristic as shown in Fig. 4.6.

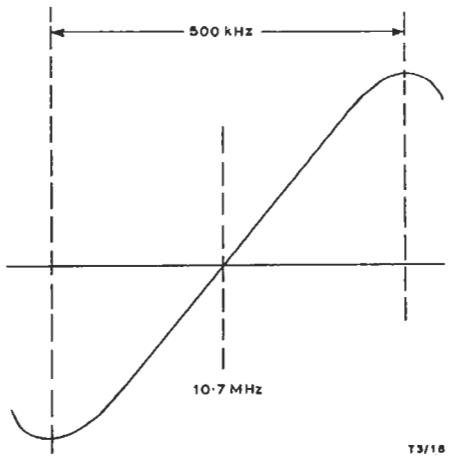


Fig. 4.6. Discriminator Response Curve

Note: The curve should cross the baseline at 10·7 MHz. The peak separation should be approximately 500 kHz and this is dependent upon the spacing between L1 primary and secondary. The correct spacing is found during production testing before the coil is sealed. This seal should not be broken.

7. Disconnect the Polyskop.
8. Externally modulate the signal generator, still tuned to 10·7 MHz, with a 1-kHz signal at a depth of 20 kHz. Check the modulation depth by means of the deviation meter (TF 791D).

9. Set the generator output to 100 mV and connect it to the input of the discriminator via the AM6/2 lead. Check the audio output level (AM10/4 output tags), which should be −3 dB ± 3 dB.
10. Remove the 1-kHz modulation from the generator and check that its output frequency is 10·7 MHz ± 3 kHz.
11. Disconnect the a.f. output line from the R8/C13 junction and connect the valve-voltmeter, switched to centre zero, to this point.
12. Trim C9 for a zero reading on the meter.
13. Disconnect the meter and reconnect the a.f. output circuit.
14. Measure distortion at the output, with the generator modulated with 1 kHz at ± 75 kHz. Trim C4 for minimum distortion. Distortion level should not exceed −46 dB.

4.4.4. AM6/2

1. Connect the Polyskop r.f. input to the AM6/2 output tag, which should still be disconnected from the UN15/1A. Set the Polyskop attenuator to 20 dB.
2. Connect the Polyskop output to the EP1/3 input. Make use of the signal generator as an external marker, set to 10·7 MHz ± 3 kHz.
3. Adjust the displayed response curve by tuning L1 (in the AM6/2) so that the curve peaks at 10·7 MHz.

Note: The coil is fitted with a 6 B.A. locking nut, and care should be taken to see that the tuning position is not altered when the nut is tightened.

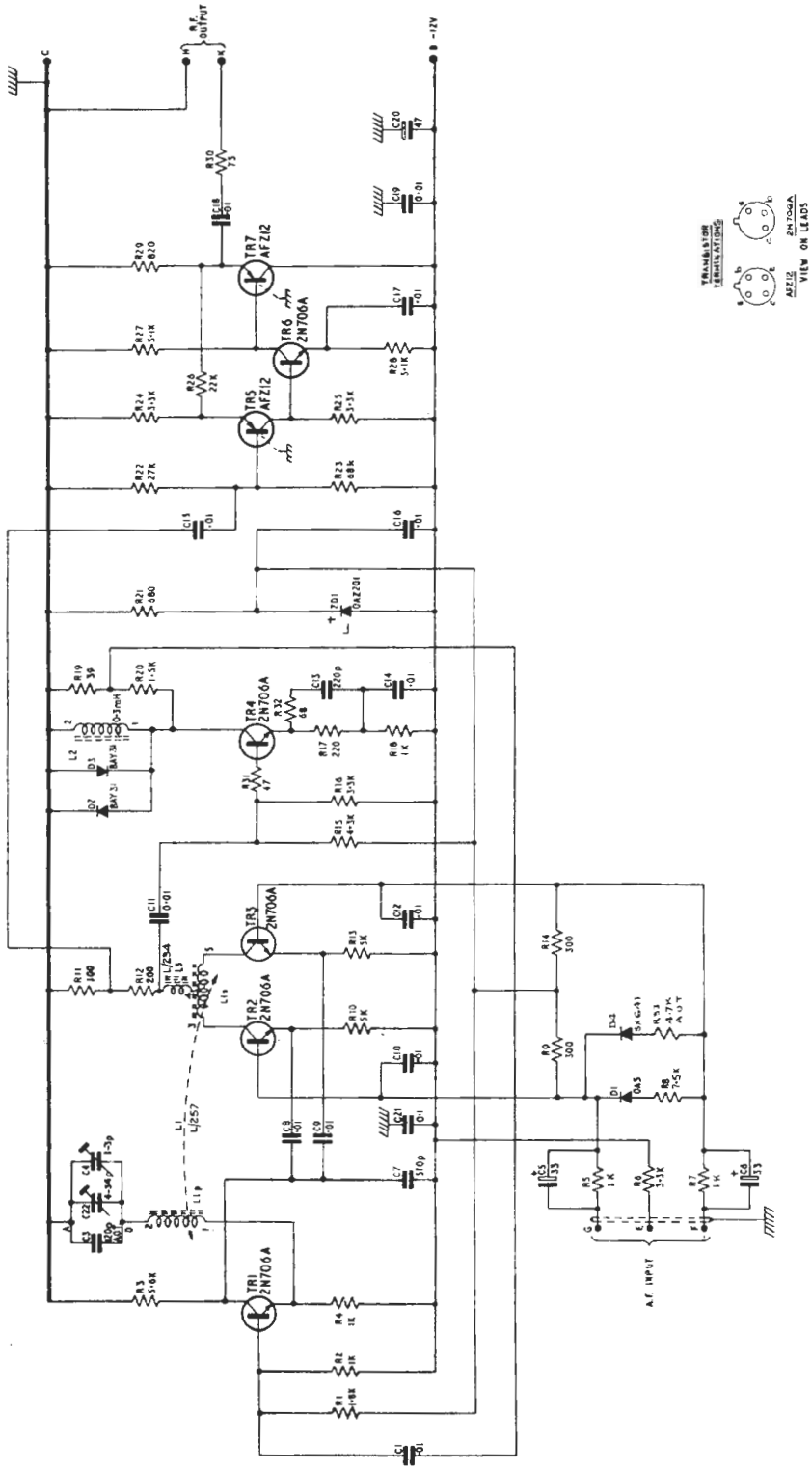
4.4.5. Overall Tests

1. Restore all MN4/1 wiring to normal.
2. Terminate the signal generator in the 52-ohm terminating unit (TM 4308) and set it to 10·7 MHz, modulated with 1 kHz at ± 75 kHz. The output should be 50 mV.
3. Connect the generator to the input of one MN4/1.
4. Measure the MN4/1 output level, which should be +12 dB. If necessary, adjust the value of R6 of the AM10/4 to obtain that output level.
5. Measure the distortion at the +12 dB output; it should not exceed 1 per cent at 100 Hz and 1 kHz. If necessary C4 can be readjusted for minimum distortion.
6. Switch the generator to c.w. and measure the noise level on the TPM/3, with reference to the +12-dB output. The noise should not exceed −60 dB.
7. Continue tests by repeating items 3—6 for the other MN4/1 units.

PWG(X) 07/67

from DC12157 issue 3
parts list DA12158

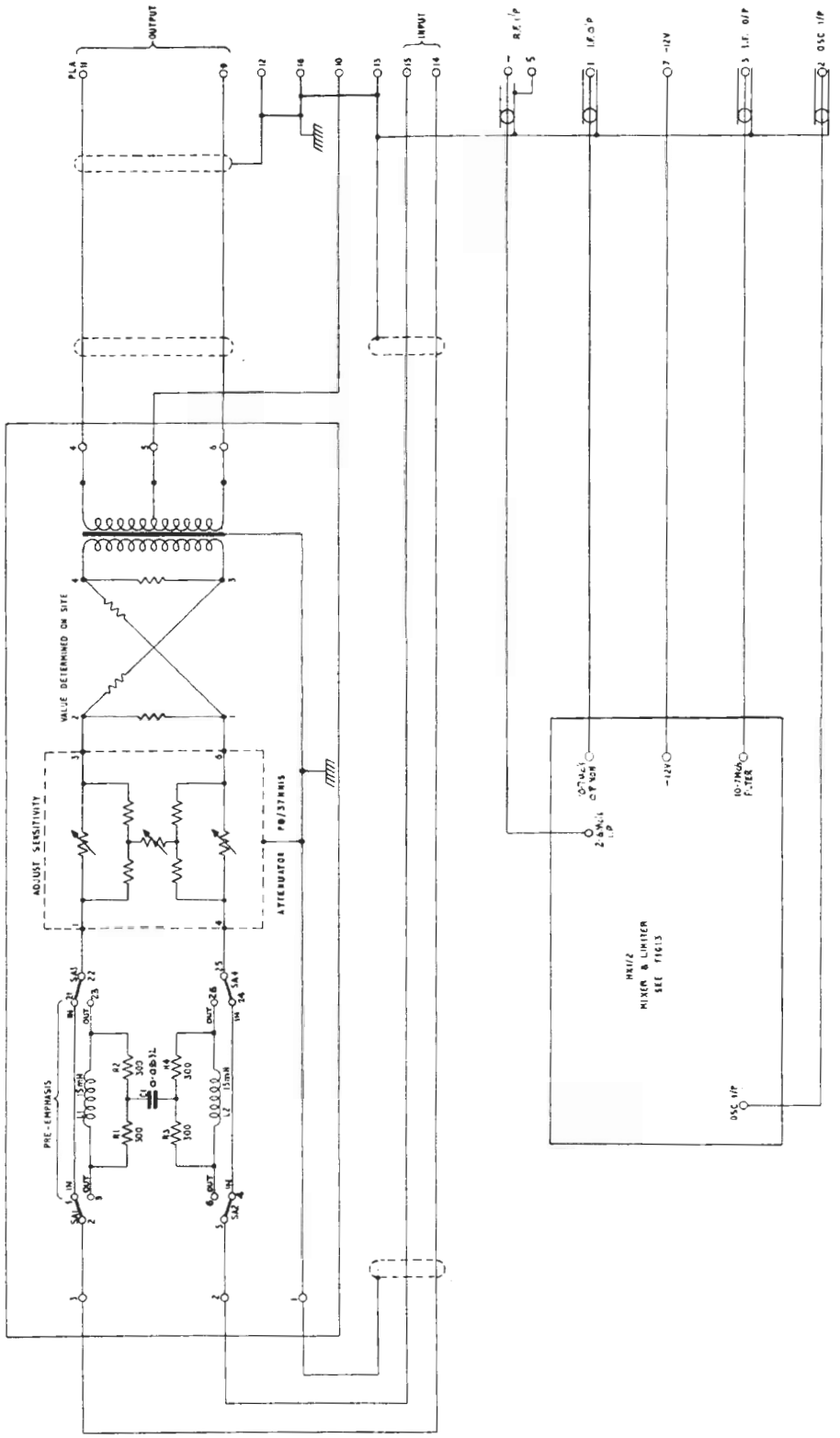
FIG 11



VARIABLE INDUCTANCE FREQUENCY MODULATOR MD3/1A : CIRCUIT

from DC12311 issue 2 (rev)
parts list DA12312

FIG 12

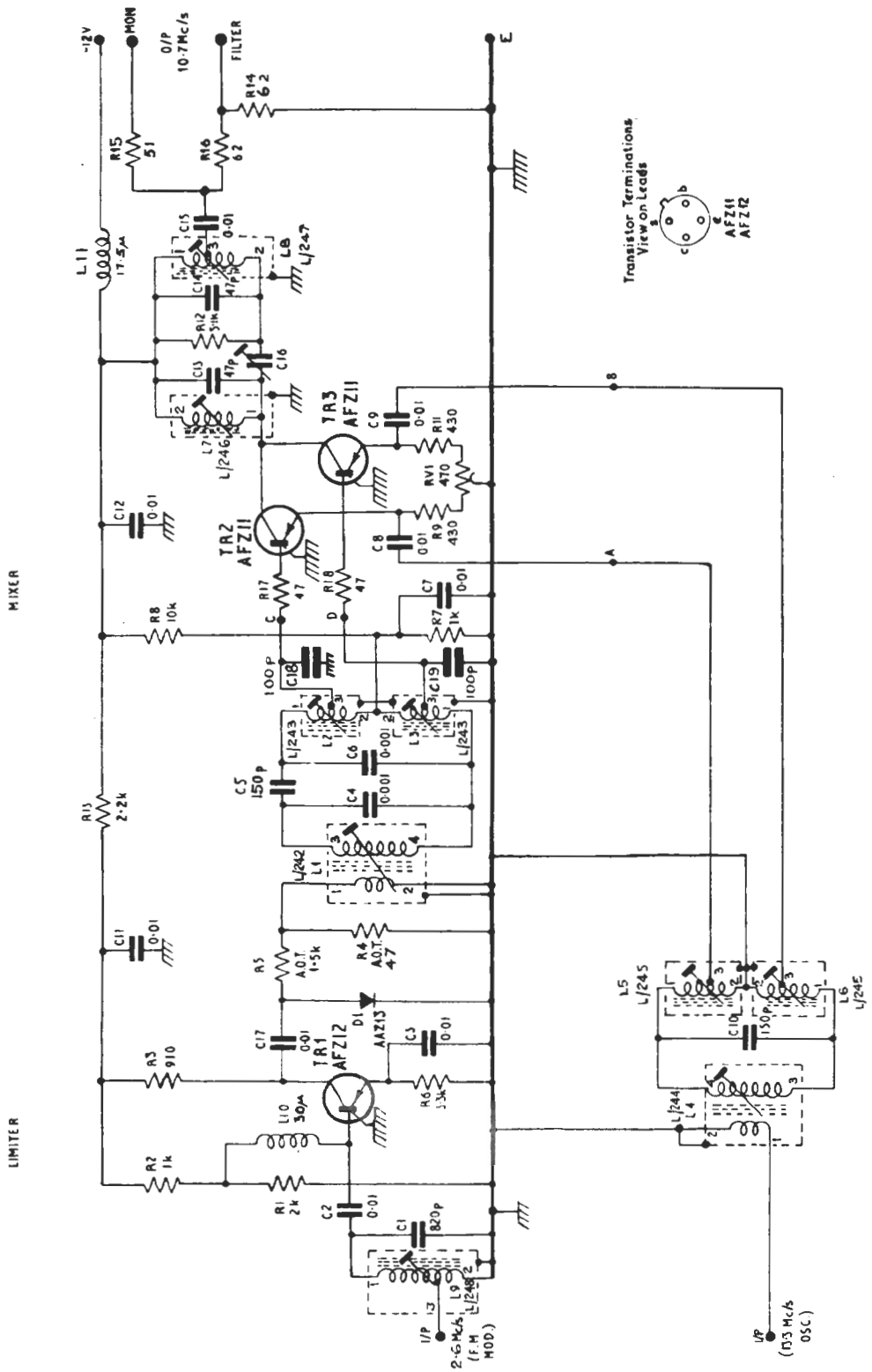


T3/5L

A.F. & MIXER UNIT UNI/33 : CIRCUIT

from DB12504 issue 4
parts list DA12505

FIG 13



T3/6L

MXI/2 (MIXER & LIMITER): CIRCUIT