SECTION 23

AMPLIFIER AMC/5

General

The AMC/5 is derived from the general purpose amplifier GPA/4 described in Section 21, and embodies improvements on the GPA/4 input circuit which give the highest practicable ratio of signal to thermal-agitation noise. The AMC/5 was originally developed to replace the GPA/4 where used as a microphone amplifier, but to avoid the continuance of two separate types it input impedance has been obtained by means of parallel-connected voltage negative feedback* applied via R5 to the grid of V1A. To provide a point from which this parallel feedback could be obtained, the resistors in the main feedback chain have been re-arranged. A new input transformer, TR 1, with a slightly smaller turns ratio and a lower winding resistance than before, has also been supplied.

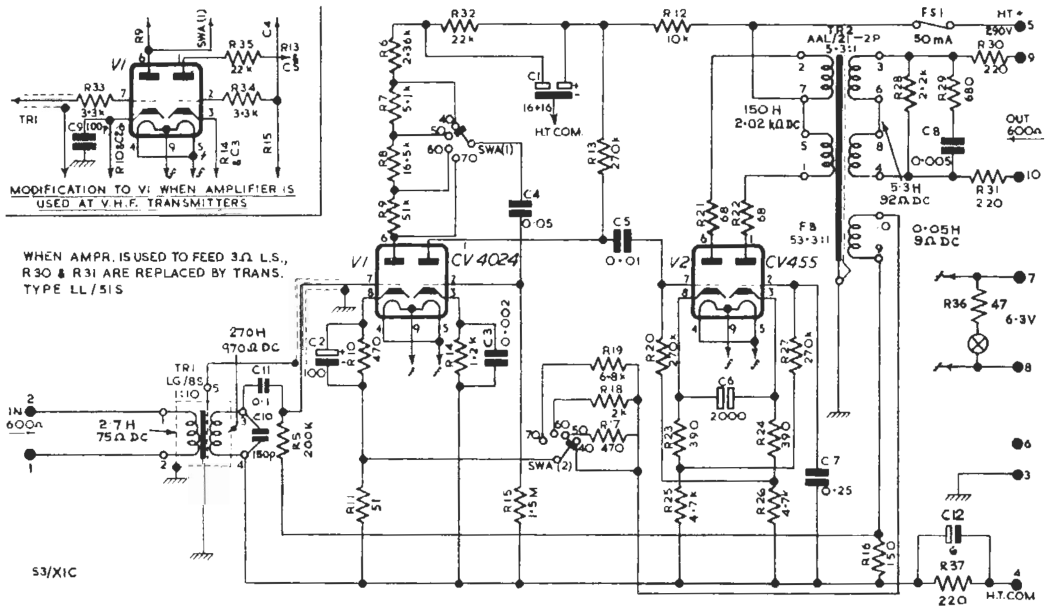


Fig. 23.1 Amplifier AMC/5: Circuit

Drawing No. DA 3697

has been decided to employ the AMC/5 in all applications.

The AMC/5 carries an amber-coloured pilot-lamp, in contrast to the white pilot-lamp fitted to the GPA/4.

Circuit Description (Fig.23.1)

The circuit of the AMC/5 is shown in Fig. 23.1, and the layout of the components in Fig. 55. The resistive loading on the primary and secondary sides of the GPA/4 input transformer TR 1 has been removed, and an artificially derived 600-ohm

The use of the artificially derived input impedance and the reduction in TR 1 winding resistance give an improvement in the signal to thermal-agitation noise ratio of the order of 5 dB. The resulting noise level of the input circuit is within about 1 dB of the lowest theoretically obtainable with a source of 600 ohms, and the amplifier is thus very suitable for use with low-output microphones or comparably attenuated grams.

* See *Engineering Training Supplement No. 3*, Issue 2, pages 45–47.

A capacitor, C10, has been connected across TR 1 secondary winding to improve the frequency response, which was found to be affected by the winding capacitance of the new transformer. A further capacitor, C11, is used to introduce a slight phase-change in the feedback path to the grid of V1A with the object of improving stability. Various minor changes in component values have also been made to enable stock preferred values to be used.

Note that in spite of the improvement in thermal noise, the *measured* noise may not differ significantly from that of the GPA/4. The measured noise, however, is largely hum, which is much less audible than thermal noise. C12 and R37 in the common h.t. lead put a slight bias on the valve heaters; this tends to reduce the hum and makes the selection of the first stage valve less critical. Apart from the question of noise, the general performance of the AMC/5 is similar to that of the GPA/4, as given on page 21.7 of this instruction except that the gain at each setting is increased by 1 dB and that tolerances on gain and frequency response are not quite so rigidly maintained. The detailed effect on the amplifier performance specification can be seen by comparing the figures for the GPA/4 with those for the AMC/5.

Use in Intercommunication and Talkback Circuits

The AMC/5 amplifier can be adapted for use in intercommunication and talkback circuits to feed a small loudspeaker direct from a microphone. For this purpose the 220-ohm building-out resistors R30 and R31 (Fig. 23.1) are strapped out and a 3½-in. 3-ohm loudspeaker is fed via a transformer Type LL/51S having an impedance ratio of 200 : 1.

Amplifiers on which R30 and R31 are strapped out are marked with a transfer letter *A* below the indicator-lamp on the chassis beneath the cover.

Modifications at V.H.F. and Short-wave Transmitters

Existing amplifiers in use at v.h.f. transmitters have the circuit of V1 modified as shown by the sketch inset in Fig. 23.1, and are marked with a transfer letter *C*. New amplifiers at v.h.f. and short-wave stations have a capacitor C9 with a value of 0·001 μF instead of the 100 pF shown and are marked with a transfer letter *B*.

Test Data:

General

The power supplies required and the valve feeds are the same as those for the GPA/4. The electrical performance should conform to the limits given in Section 21 for the GPA/4 except as set out below:—

Gain

The 600/600-ohms gain at 1 kc/s should be 44, 54, 64 or 74 dB ±0·5 dB according to the gain-switch setting.

Frequency Response

At the maximum gain setting and an output level of 0 dB the 600/600-ohms frequency response should be within the following limits relative to the gain at 1 kc/s:—

60 c/s to 10 kc/s, ± 0·5 dB
30 c/s to 15 kc/s, ± 0·8 dB.

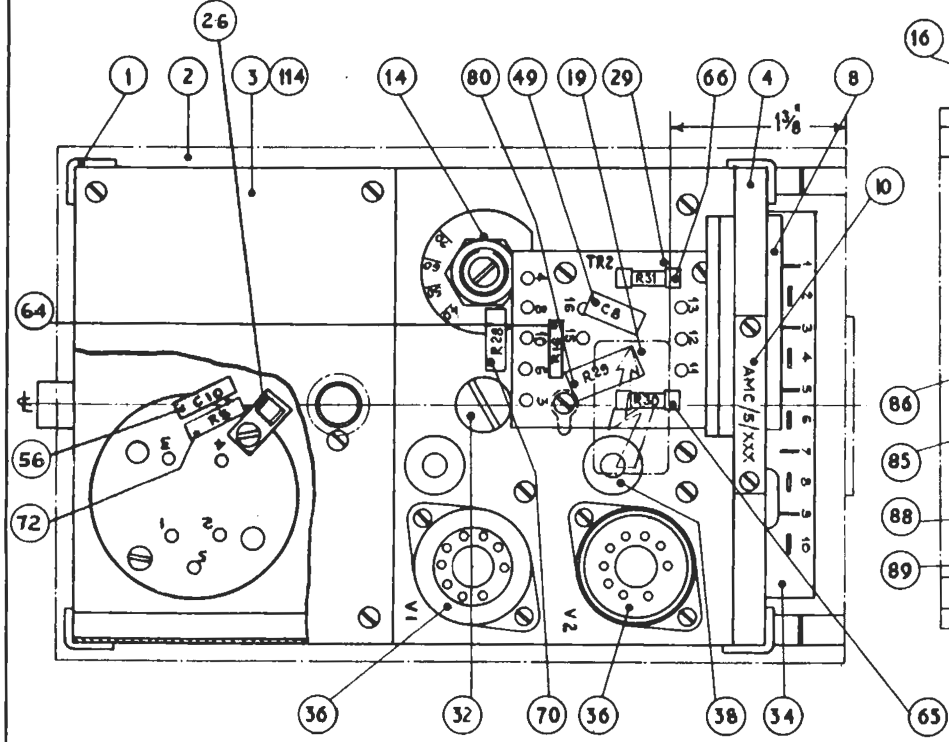
Input Impedance

When measured by resistance substitution across a 600/600-ohms circuit, the input impedance should appear to be 600 ohms ± 10 per cent at 1 kc/s. This test must be made at a sufficiently low level with the amplifier switched on. The amplifier gain should, for convenience, be at minimum.

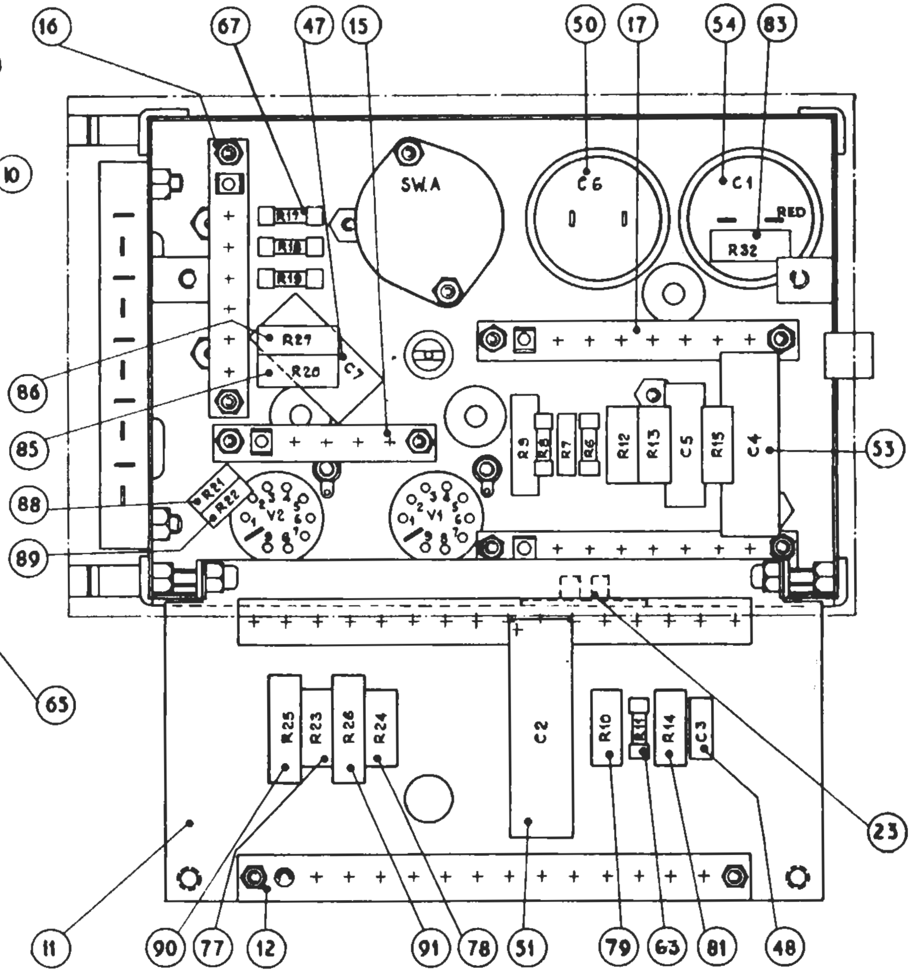
Valve Data*

	Avometer Model 40			Avometer Model 7		
Valve	*Anode Volts*	*Cathode Volts*	*Grid Volts*	*Anode Volts*	*Cathode Volts*	*Grid Volts*
V1A	68 (480) 36 (120)	0·3 (1·2)	0	57 (100)	0·5 (1)	0
V1B	40 (480) 18 (120)	0·14 (1·2)	0	31 (100)	0·27 (1)	0
V2A & B	280 (480)	29 (120)	0·0008 (0·12)	280 (400)	30 (100)	0·015 (1)
H.T.+	290 (480)			290 (400)		

* Measured from positive end of R37 to points stated. Figures in parentheses are Avometer voltage ranges.



FRONT VIEW



REAR VIEW WITH TRAY

NOTE NUMBERS SHOWN THUS ② REFER TO ITEM NUMBERS ON EQUIPMENT DEPT. PARTS LIST, DRAWING No. EA9271

AMPLIFIER AMC/5: COMPONENT LAYOUT

FIG 55