SECTION 1

AMPLIFIER DETECTOR AD 4

The Amplifier Detector AD/4 is essentially a valve voltmeter designed to read levels of + 10 db to − 55 db. Its input impedance is 30 kilohms which is sufficiently high to permit its connection across most circuits without altering the voltage or operating conditions of the sending circuit.

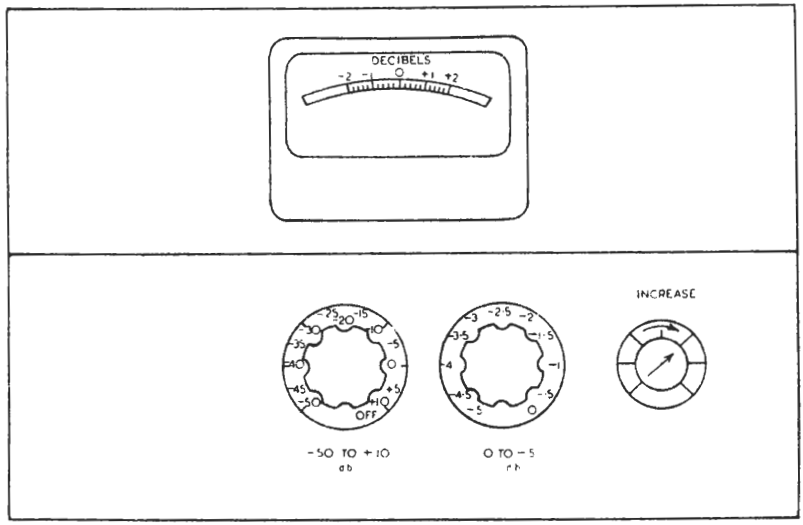

Fig. 1.1. Face Panel AD 4 with Simpson Meter

Circuit Description (Fig. 1)

The input to the unit is taken via an input transformer, T1, to a 10-kilohm potentiometer, P 65P, having 14 studs, calibrated in steps of 5 db, with an off position. This is followed by two resistance-capacitance coupled stages which use high-gain pentodes.

The output stage to the rectifier and meter circuits consists of a triode, worked at low anode voltage. This results in the valve working near the overload point; to minimise instability of the anode voltage, a stabiliser, consisting of a Metrosil disk working in conjunction with R19, is included in the h.t. supply circuit of V3.

Negative Feedback

The high gain available from V1 and V2 permits the use of a considerable amount of feedback. With V1, series feedback of 12 db is developed across R2, to compensate for high-frequency loss, the feedback is reduced by about 0·1 db at 10 kc/s and by about 0·2 db at 15 kc/s. This reduction is effected by shunting C8 and R20 across R2.

Variable series feedback is used over V2, V3 and provides a ready means of adjusting the working gain and for lining up the meter. The feedback voltage is developed in the cathode circuit of V2 across R15 and R8; R8 is variable to provide an

adjust-gain control; its adjustment varies the output current of V3 which flows through the rectifier-meter circuit.

Gain Controls

The calibrated gain controls used for taking measurements consist of the two potentiometers P/65P and P/64P. The P/65P is variable in steps of 5 db over a range of − 50 to + 10 db; the P/64P is variable in steps of 0·5 db over a range of 0 to − 5 db.

Meter Circuits

The anode of the third stage feeds into a 1 mA Westinghouse bridge-connected metal rectifier of the meter type via a 20-kilohm resistor R14 and a 4-microfarad capacitor C6. The output of this rectifier is taken to the terminals of an appropriate type of indicating meter.

Two types of indicating meter can be used, the Simpson type, with normal vertical scale requiring a feed of 1 mA for full scale deflection, or the Elliott edgewise type as used on the Transmission Measuring Set TM/1. The Simpson type meter is connected direct to the rectifier output, but the Elliott type requires to be shunted by a 30-ohm resistor. The alternative connections are shown in Fig. 1.

Both meters are calibrated for zero at mid-scale deflection, the scale being extended to cover a 2-db swing either side of zero, the calibration being in steps of 0·2 db. Hence it is possible to obtain readings the accuracy of which can be measured to within ± 0·2 db, provided that the meter readings be correctly interpolated between the readings of the calibrated potentiometers.

Operation

Whenever possible, the amplifier detector should be switched on for at least ten minutes before use in order to ensure stability.

Calibration

Set the *Adjust Gain* potentiometer to its extreme anti-clockwise or minimum-gain position. Connect the input of the AD/4 to the output of a tone source having a calibrated output level (e.g. CAL/1). Set the AD/4 calibrated potentiometers to zero or + 10 db, according to the sending level, and turn up the *Adjust Gain* potentiometer until the meter reads zero. This operation must be performed carefully and cannot be hurried, since the meter movement is relatively slow.

Measuring Levels

It should be clearly understood that the AD/4 was designed primarily for the measurement of tone level as distinct from programme volume, for which latter purpose a test programme meter is more suitable. To check a given level, set the calibrated controls to correspond with this level, wherever possible setting the 0-5 *db* control to zero. Adjust the fine control until the meter reads as near to mid-scale deflection as possible. The level is then obtained by the algebraic sum of the readings of the two controls and the scale reading of the meter.

For example, if it be required to measure a level which should normally be + 10 db, set the coarse control to + 10 db and the fine control to zero db. If the meter reads well off mid-scale, adjust the fine control accordingly. If the nearest adjustment is at − 2 db, on the fine control, and the meter reads + 0·4 db, then the actual level is + 10 − 2 + 0·4 = + 8·4 db.

Supplies

The unit is designed to work from a 250-volt or a 300-volt battery or a rectified h.t. supply. The l.t. supply may be taken from batteries or from the mains, except in cases of instruments having serial numbers below 136. These earlier models have an unscreened input transformer and are subject to a certain amount of hum pick-up. Present practice is for new installations to be provided with a mains unit, Type MU/16.

Valve Data

Valve	*Anode Current mA.*	*Screen Current mA*	*Fil Volts*	*Fil. Amps.*
Stage 1, AC/SP3A	1·2	0·35	4	1
Stage 2, AC/SP3B	1·6	0·4	4	1
Stage 3, AC2/HL	1·6	—	4	1

Metrosil Current 6 mA.
Total Feed, 11·15 mA.
H.T. Supply, 300 V or 250 V.
L.T. Supply, 4 V a.c. or 6 V d.c.

General Data

Potentiometers

	Type	*Resistance*	*No. of Studs*	*Loss per Stud*
Coarse Adjustment	P/65P	10 kΩ	14	5 db.
Fine Adjustment	P/64P	100 kΩ	11	0·5 db.

Adjust Gain

Type, Reliance TW.

Resistance, 0-100 Ω.

Impedances

Input Z = 30 kΩ

Amplifier Detectors AD/4A, AD/4B, AD/4C, AD/4D

All these models use the same basic circuit as the AD/4, but are mounted on 9-inch panels instead of the normal 6½-inch panel.

AD/4A is a converted AD/2.

AD/4B is a converted AD/3, with Muirhead potentiometers.

AD/4C is a converted AD/3 with Painton potentiometers.

AD/4D is an AD/4, modified for 9-inch panel mounting.