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TEST AND MEASURING EQUIPMENT

OSC 30

OSCILLOSCOPE PM 3262

Already published: OSC 25

Subject : Input attenuator units A and B

In the /03/ version of the PM 3262 oscilloscope a new type of input attenuator unit is introduced. This new unit contains the A channel as well as the B channel attenuator.

Circuit description

The input stage comprises two identical attenuator circuits which are combined in one unit (unit 2). Each attenuator consists of a triple high-ohmic voltage divider followed by an impedance converter. The latter consists of an a.c. path and a d.c. path which is also used in conjunction with a drift correction circuit. The impedance converter provides an output at zero level, which can be adjusted by potentiometer R129, followed by a low-ohmic attenuator with attenuation factors of 1, 2 and 5.

For convenience, only one attenuator circuit is described.

Input coupling switch S17 (AC - 0 - DC) forms part of the input attenuator stage. When the AC position is selected, capacitor C102 is in series with the input and reduces the lower frequency limit to 10 Hz.

When the DC position is selected, C104 is bypassed by resistor R101. Selection of 0 provides an earth path for the impedance converter input. In addition, it isolates any external signals applied to the Y input.

The overall attenuation of the input stage is determined by the combination of the selected sections of both voltage dividers.

The various combinations are selected by the position of the front-panel attenuator switch S9.

The high-ohmic voltage divider sections attenuate by a factor of x1, x10 and x100. The low ohmic divider D102 following the impedance converter, V102, V103, V104 gives attenuations of x1, x2 and x5 at the output. With the overall combinations of attenuation, eleven Y deflection coefficients are realised from 2 mV/DIV to 5 V/DIV in a 1-2-5 sequence.

In the positions 2 mV/DIV and 5 mV/DIV the intermediate amplifier will have a different gain factor. In position 2 mV/DIV no negative voltage (-5,2V) is supplied via switch S9 to R241 and R242. In the position 5 mV/DIV, -5,2V is applied via switch S9 to R242 only and in all the remaining positions -5,2V is applied via switch S9 to R241. (See further the relevant description in the Service Manual).

Constant input capacitance for the various attenuator positions is achieved by trimmers C101, C104 and C109. The high-ohmic voltage divider sections are made independent of the input frequency (i.e., the capacitive attenuation for a.c. signals is adjusted to the resistive attenuation for d.c. signals) by means of trimmers C107 and C112.

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A diode clipper V101, in the gate circuit of field-effect transistor V102 protects the input source-follower of the impedance converter from excessive voltage swings.

The high frequency path of the input signal consists of capacitor C114 and field-effect transistor V102 connected in a source-follower configuration. The low frequency path of the input signal consists of error amplifier D101, which samples the input and output signals of the impedance converter over a frequency range from d.c. to 1 kHz.

The error amplifier generates a correction signal on pin 6 which is fed to the impedance converter to replace the missing low frequency components of the high frequency path.

The gain of the low frequency path is set by adjusting the resistor divider ratio from which the output is sampled. Preset R132 (L.F. corr.) is adjusted so that the ratio of the network R134/R132 is the same as the ratio of the network R122/R123. The off-set voltage of the error amplifier is corrected by preset R124.

After low-ohmic attenuator switching, the output from the impedance converter provides a correct impedance match for the coaxial cable to the intermediate amplifier.

Adjusting procedure

0-DC balance

See chapter 3.4.7.1. of the Service Manual and read R124 (ch. A.) or R174 (ch. B.) instead of R129 A (B).

Attenuator balance

See chapter 3.4.7.2. of the Service Manual and read R129 (ch. A.) or R179 (ch. B.) instead of R135 A(B).

L.F. corr. amplifier

See chapter 3.4.10.1. of the Service Manual and read R132 (ch. A.) or R182 (ch. B.) instead of R132 A (B).

Square wave response

See chapter 3.4.10.2. of the Service Manual and read C107 (ch. A.) or C157 (ch. B.) instead of C101 A (B) and C112 (ch. A.) or C162 (ch. B.) instead of C109 A (B).

Input capacitance

See chapter 3.4.10.3. of the Service Manual and read:

C101 (ch. A.) or C151 (ch. B.) instead of C107 A (B)

C104 (ch. A.) or C154 (ch. B.) instead of C102 A (B)

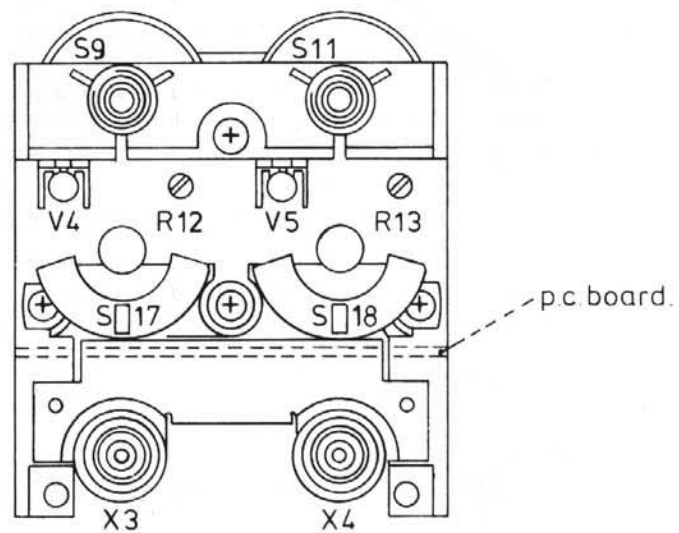
C109 (ch. A.) or C159 (ch. B.) instead of C111 A (B).

Other unit parts

On this unit are also located the ch. A. and ch. B. AMPL/DIV continuous controls and their CAL switches R8/S10 and R9/S12. Further more the uncal LED'S V4 and V5 and the gain adjusting potentiometers R12 and R13.

Spare parts list

V4 -V5	CQY 24A-1 (LED)	5322 130 34595
V101-V151	BAV 45	5322 130 34037
V102-V152	ON 471 (Marked M3)	5322 130 44605
V103	BFT 25R (Marked V4)	5322 130 44459
V153	BFT 25 (Marked V1)	5322 130 44458
V104	BFR 92 (Marked P1)	5322 130 44178
V154	BFR 92R (Marked P4)	5322 130 44606
D101-D151	LM 208T	5322 209 85475
R8 -R9	Potmeter 10K + switch	5322 101 44023
R12 -R13	Potmeter 10K	5322 101 24099



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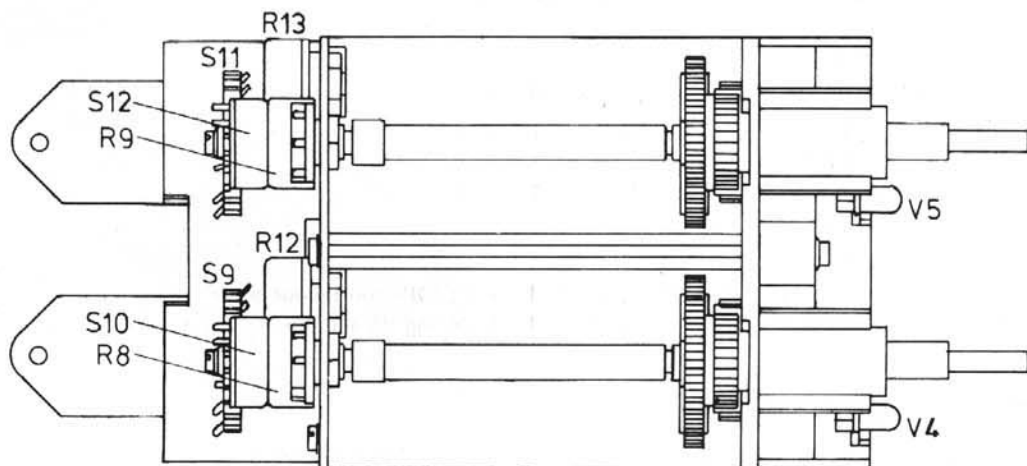


Fig. 1 Vertical attenuator assembly (Unit 2)

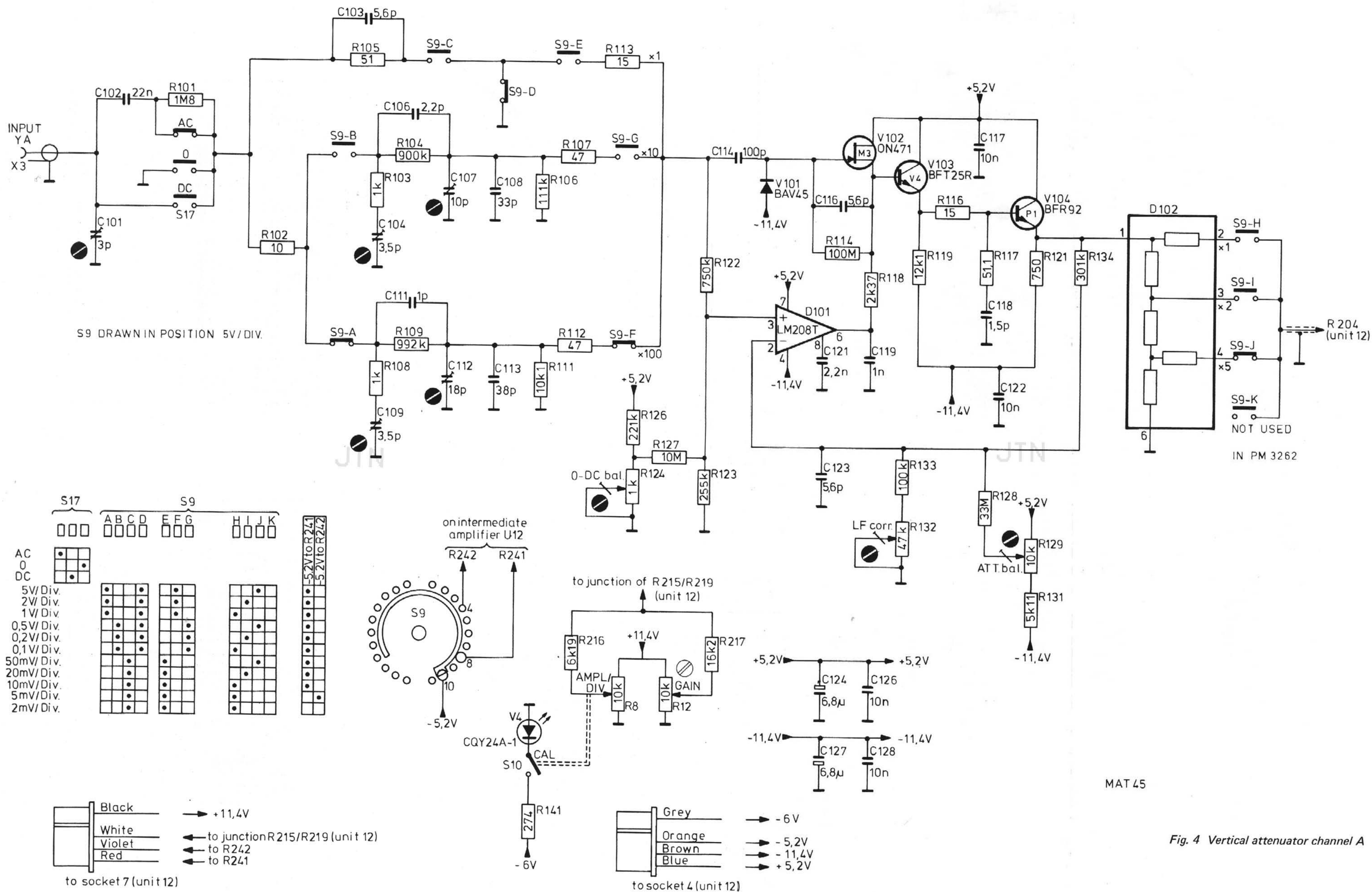


Fig. 4 Vertical attenuator channel A

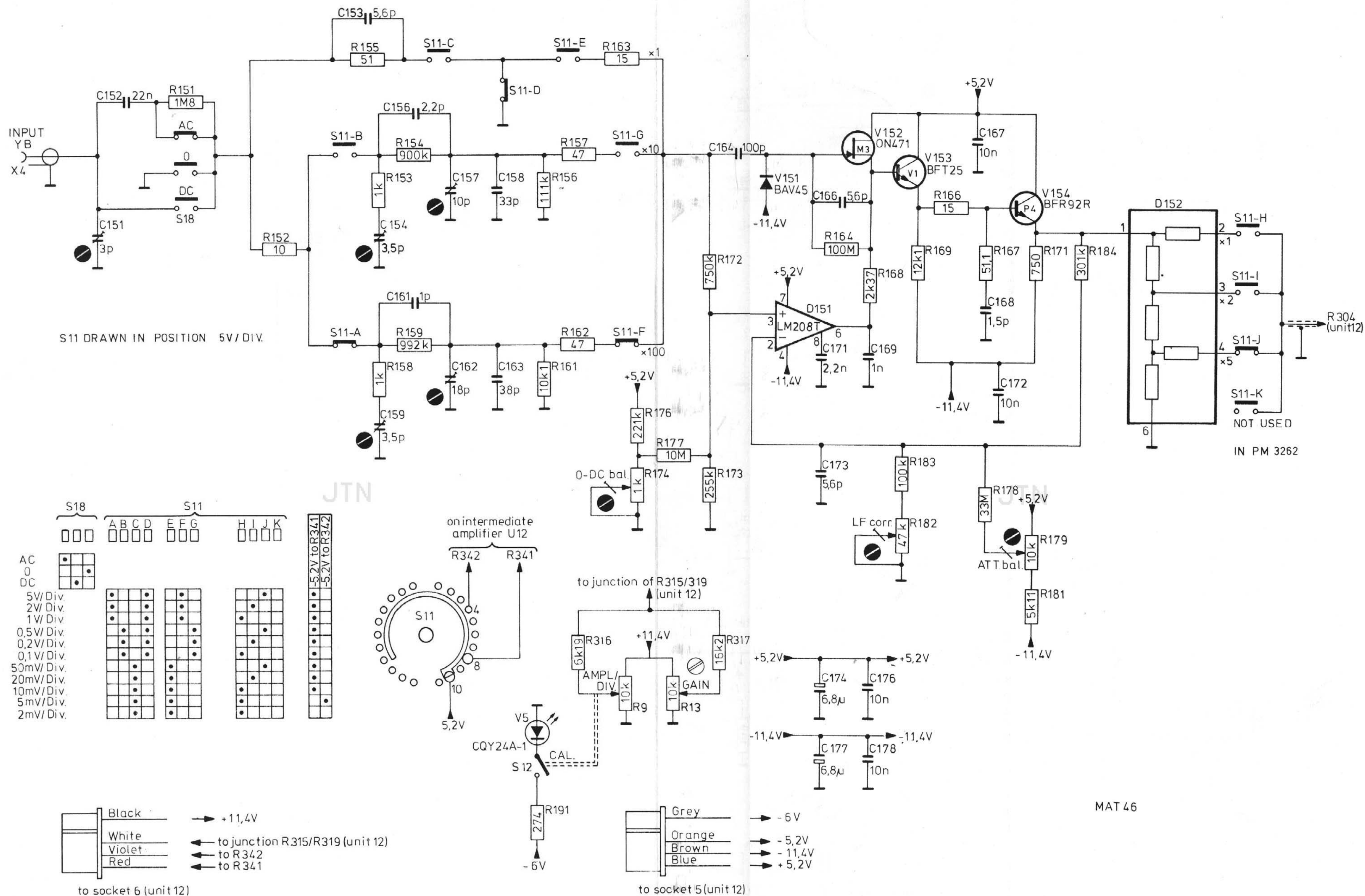


Fig. 5 Vertical attenuator channel B