VARIABLE EQUALISER AMPLIFIER EQ1/505

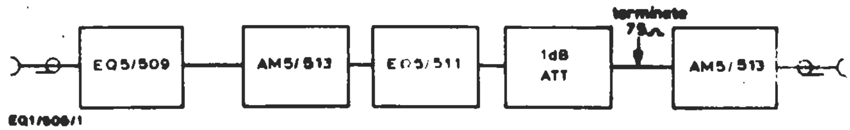

Fig. 1 Block Diagram of the EQ1/505

Introduction

The EQ1/505 is a portable variable equaliser which provides attenuation and phase correction for coaxial cables to make them suitable for the transmission of 625-line colour signals.

The equaliser comprises an EQ5/509, an EQ5/511 and two AM5/513 amplifiers. These units are mounted on a chassis type CH1/13D.

General Specification

Input Level	1 volt p-p
Output Level	1 volt p-p
Input Impedance	75 ohms ±3 per cent
Output Impedance (return loss w.r.t. 75 ohms)	
10 kHz	greater than 60 dB
5·5 MHz	greater than 30 dB
Gain	0 dB if cable loss does not exceed 20 dB at 10 MHz.
Gain Adjustment	±1 dB continuously variable
Pulse and Bar Response (*k* rating)	less than 1 per cent
50-Hz Square Wave Response	2 per cent tilt
Signal to Noise Ratio p-p picture signal relative to unweighted r.m.s. noise, 5·5 MHz bandwidth	greater than 68 dB
Signal to Hum Ratio p-p picture signal relative to p-p 50-Hz noise	greater than 44 dB
Picture-signal Distortion	less than 2 per cent
Differential-phase Distortion	less than 0·2 degree
Differential-gain Distortion	less than 2 per cent
Low-frequency Bump (d.c. step at input)	less than 18 per cent overshoot
Operating Temperature	10 to 40 degrees C
Mains Supply	210 to 250 volts r.m.s., 50 Hz
Power Consumption	80 mA at 240 volts
Size	$9\frac{1}{4}$ in wide, $10\frac{1}{2}$ in high, $14\frac{1}{2}$ in deep
Weight	17 lb

General Description

Fig. 1 is a block diagram of the EQ1/505. The equaliser provides an equalised 0-dB gain circuit and is suitable for use with coaxial cables or other unbalanced systems having similar loss characteristics. The gain of the unit is sufficient to correct cables with losses not exceeding 20 dB at 10 MHz.

If desired the EQ1/505 can be replaced by a fixed equaliser with component values that have been determined from the settings of the variable equaliser; see Designs Department Technical Memorandum 6.19(58).

Input and output connections are made at the rear of the chassis via Canon SO239 fixed coaxial sockets. A 240-volt mains supply is introduced by means of a four-pin F. and E. plug. A double-pole mains switch and two fuse-holders are fitted to the rear of the chassis also.

The circuit of the wiring on the chassis is given in Fig. 2.

counter-clockwise. Using the change-over box, adjust the *Input Att* control so that the bar amplitude after passing through the EQ1/505 is the same as the bar amplitude measured directly. This setting should be between 0·4 dB and 0·8 dB.

4. The pulse/bar ratio should be 99 per cent ± 1 per cent.

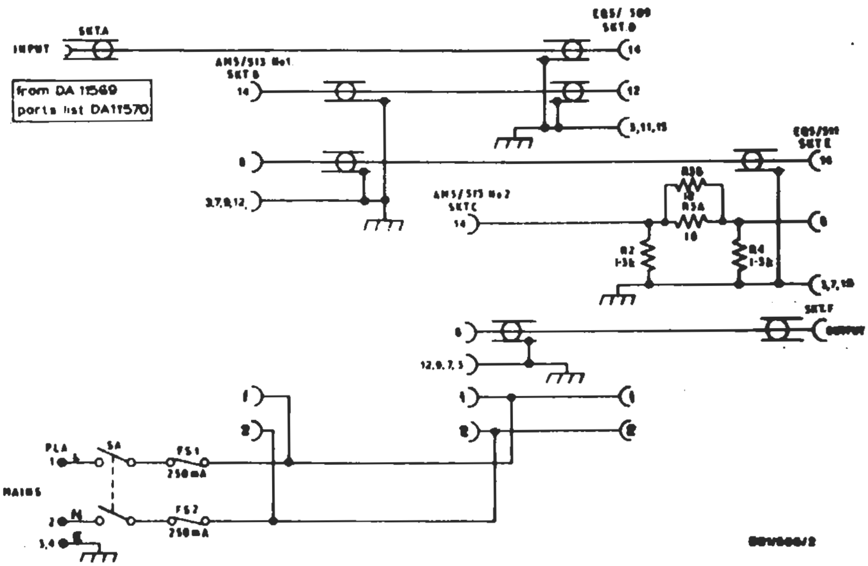

Fig. 2 Circuit of the Chassis Wiring of EQ1/505

Test Schedule

Apparatus Required

High grade oscilloscope.

625-line sine-squared-pulse and bar generator.

Video double-pole changeover box.

Two 75-ohm terminations to fit input and output sockets of EQ1/505.

Philips low-frequency amplifier type GM4574.

Test Procedure

1. Connect the output of the pulse and bar generator to the input of the EQ1/505 via the change-over box.
   Connect the output of the EQ1/505 to the input of the oscilloscope via the second pole of the change-over box.
2. Bypass the EQ1/505 by means of the change-over box and adjust the pulse/bar ratio of a 1-T pulse and bar to be 100 per cent.
3. Set all the controls on the EQ1/505 fully counter-clockwise. Using the change-over box, adjust the *Input Att* control so that the bar amplitude after passing through the EQ1/505 is the same as the bar amplitude measured directly. This setting should be between 0·4 dB and 0·8 dB.
5. Set the *Max Corr* control to *2 dB*, *L11* to *0 pH* and *C11* to *240 pF*. The pulse/bar ratio should be 110 per cent ±2 per cent.
6. Set the *Section 1* control to *4 MHz*. The pulse/bar ratio should be 100 per cent ±2 per cent.
7. Terminate the input and output of the EQ1/505 with 75 ohm terminations.
   Connect the Philips amplifier across the output termination. With the aid of the oscilloscope measure the 50-Hz signal. This should not exceed 5 mV p-p.

Use of the EQ1/505

General

If only a small amount of correction is required the signal at the input of the EQ1/505 should be one volt p-p. As the correction is increased the gain of the equaliser increases until, at the maximum correction of 20 dB, the gain at low frequencies is increased by 2·5 dB. In this condition the signal

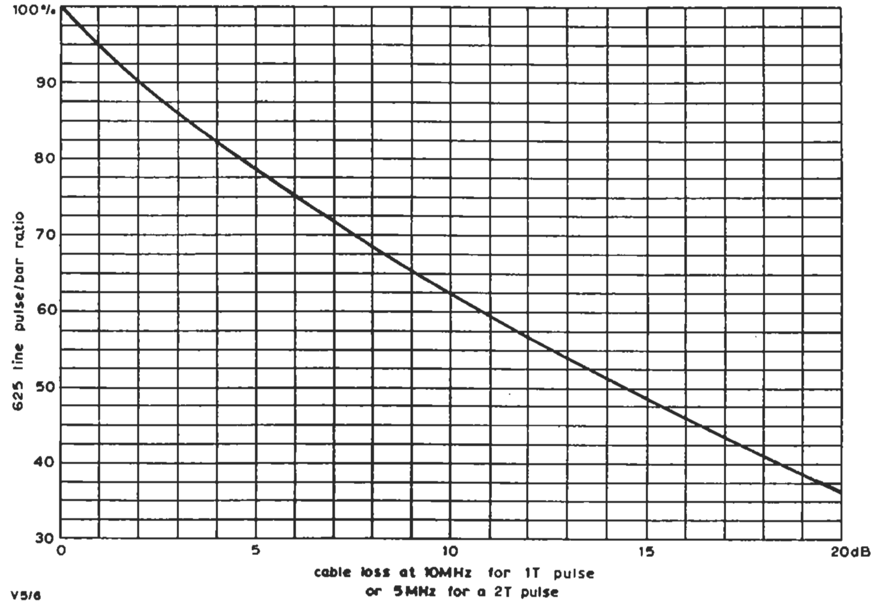

Fig. 5.3 Cable Loss Plotted Against Pulse/Bar Ratio for Use with the EQ1/505

level at the input should be 0·75 volts p-p. This variation in gain is provided to compensate for the increase in cable loss at low frequencies because of the increased length. If the variation in cable loss is within the range of adjustment of the *Input Att* control (±1 dB) the signal level at the output should be adjusted to be one volt p-p.

The equaliser may be set either from a table of values, fixed inside the lid of the unit, or in conjunction with a sine-squared-pulse and bar test signal. Check first that the oscilloscope and the pulse-and-bar generator together give a correct pulse-and-bar waveform. If a 1T pulse-and-bar signal is used, and the equaliser adjusted to give a rectangular bar and a 100 per cent pulse/bar ratio, the cable is equalised to almost 10 MHz. Where the cable losses at 10 MHz exceed 20 dB the equaliser cannot be adjusted to give a perfect 1T pulse response. Under these conditions a 5·8-MHz low-pass filter may be used to limit the high frequency components of the 1T pulse-and-bar signal. The response of the filter should be checked with the pulse-and-bar generator and the oscilloscope before the generator is connected to the sending end of the cable. The use of a filter is preferred to the use of a 2T pulse-and-bar signal because the 2T pulse does not contain enough information to enable the high frequency sections of the equaliser to be set accurately.

Procedure

1. If the cable loss is not known measure the pulse-and-bar ratio of a 1T pulse-and-bar signal transmitted over the unequalised cable. The cable loss can then be obtained from Fig. 5.3.
2. Set the *Max Corr.* control to the nearest value above this figure.
3. Set the *R* and *C* controls to mid-scale.
4. Adjust the *R* and *C* controls to give the correct pulse shape, bar shape and pulse/bar ratio.
   The low numbers of *R* and *C* affect the high frequencies, and the high numbers of *R* and *C* affect the low frequencies.
   Note: If any *R* control is set to ∞ all succeeding sections are inoperative.
5. If the correct pulse/bar ratio cannot be achieved without producing overshoot on the bar, turn control *L11* beyond its zero position and repeat step 4.
   If *L11* has to be increased by a large amount there may be skew-symmetrical overshoots on the pulse-and-bar waveform at the optimum position. If this is so adjust the associated EQ5/511 to reduce the skew-symmetry to a minimum.