SECTION 7

TELEVISION EQUALISERS, TV/EQ/6 and TV/EQ/6A

Introduction

The equalisers TV/EQ/6 and TV/EQ/6A differ only in detail. The following description is of the TV/EQ/6; the points of difference are described later.

Television Equaliser TV/EQ/6

The equaliser forms part of the equalising apparatus used with the balanced cable employed for the transmission of television signals. The apparatus is described in general in Section 3 of this Instruction. This sections deals with the phase-correcting unit, which provides a fine adjustment of the overall equalised characteristic. In general, the preceding equalising units over-correct the phase-frequency characteristic of the line. The unit has six controls, each having maximum effect in a particular part of the spectrum.

The equaliser is mounted on a 19-inch panel, suitable for bay mounting. It is designed to work between 75-ohms terminations, and presents a constant input resistance when terminated by a resistance of 75 ohms.

Circuit Description

A complete circuit diagram of the unit is given in Fig. 5. The equaliser comprises a number of sections of the ' all-pass ' type, which can be switched in or out of circuit as required. The theory of this type of network is discussed in detail in ' Television Engineering ' Vol. 2, Chap. 9. Briefly, each section, whilst passing all components of the input signal without attenuation, introduces a ' step ' in the phase response of 360 degrees, as shown in Fig. 7.1. The phase shift-frequency characteristic is symmetrical about the frequency

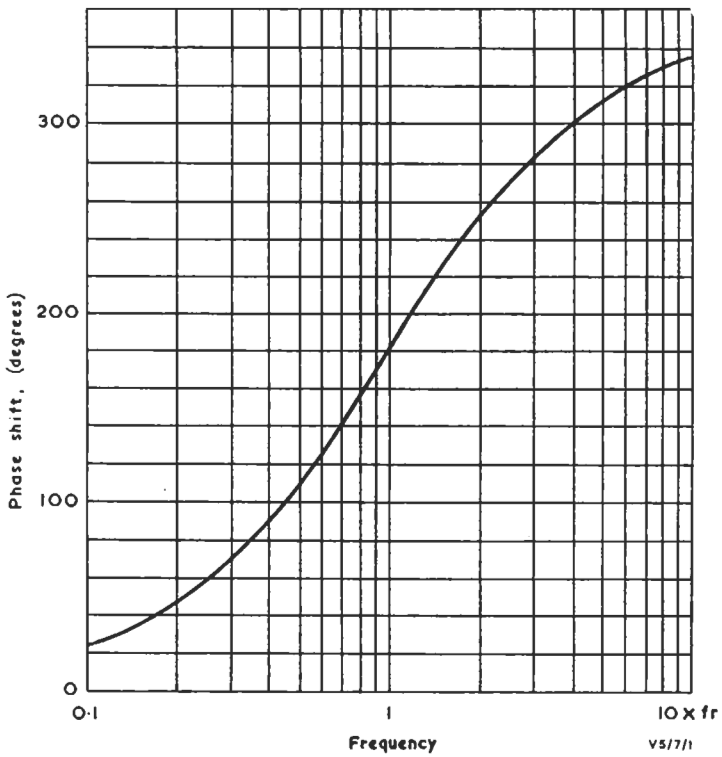


Fig. 7.1. Phase Shift plotted against Frequency for Phase-correcting Section

at which the phase shift is 180 degrees, and this centre frequency is the resonant frequency of the parallel-tuned circuit embodied in the network. For this reason, each section is characterised by the resonant frequency (f_r) of this circuit. The group delay characteristic for this type of network is shown in Fig. 7.2 for a value of f_r of 3 Mc/s.

The characteristic resonant frequencies of the networks are 1·9 Mc/s, 2·1 Mc/s, 2·4 Mc/s, 3 Mc/s and 3·9 Mc/s. A further control introduces into circuit two circuits (f_r = 3·9 Mc/s) in tandem.

Television Equaliser TV/EQ/6A

The TV/EQ/6A differs from the TV/EQ/6 only in that certain capacitors (C1, C3, C,5 C7, C9 and C11) are made up by a combination of a fixed and a variable component in the TV/EQ/6A, whereas fixed components only are used in the TV/EQ/6.

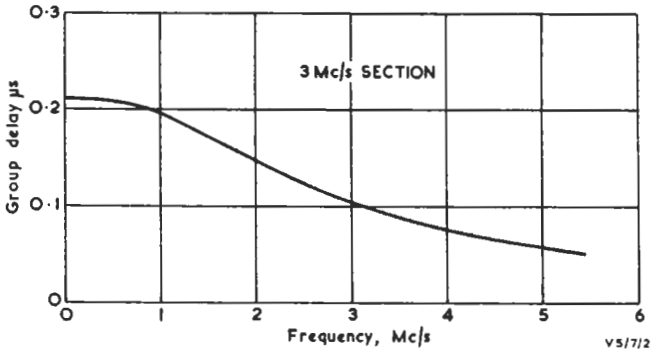


Fig. 7.2. Group Delay plotted against Frequency for 3-Mc/s Phase-correcting Section

These capacitors are adjusted on test to be within one per cent of their nominal values.

Lining-up Procedure (TV/EQ/6 and TV/EQ/6A)

Apparatus required:—
- Variable-frequency Oscillator
- Frequency Meter
- Valve Voltmeter
- Video Amplifier with high input impedance*
- A.C. Bridge capable of measurement to accuracy of 1 per cent
- A.C. Impedance Bridge
- Tuned Detector

1. The values of the series arm inductors (L1, etc.) should be checked on a bridge using a test frequency below 500 kc/s. Each inductance should be within one per cent of its nominal value; if it is not, the position of the core should be altered until this requirement is met. After adjustment to the correct position, the core should be fixed with benzene or amyl-acetate.

2. The values of the shunt-arm capacitors (C2, etc.) should be checked. Each capacitance should be within one per cent of its nominal value; if it is not, the value should be changed, using silvered mica or ceramic capacitors.

3. Connect the series-arm network (L1, C1, etc.) in the circuit of Fig. 7.3(a). Adjust the value of C1 by means of a parallel-connected trimmer until the circuit is resonant at its nominal frequency, as indicated by maximum valve voltmeter reading. After adjustment the trimmer rotor should be locked in position. Repeat for coils of the other sections. The minimum values of the resistors R of Fig. 7.3(a) and the tolerance in the resonant frequencies are given in the Table below.

Nominal Resonant Frequency (Mc/s)	*R Kilohms*	*Tolerance in Resonant Frequency (kc/s)*
1·9	470	±10
2·1	470	±10
2·4	470	±10
3·0	470	±15
3·9	470	±15

4. To adjust the value of the shunt-arm inductance (L2, etc.), the series and shunt arms should be connected in the circuit of Fig. 7.3(b). Adjust the position of the core of L2 until the circuit is resonant at its nominal frequency, as indicated by

* The amplifier may be type TV/A/1, modified by disconnecting the input grid capacitor C1, and applying the input to the grid of V1 through a capacitance of 0.01 μF.

maximum valve-voltmeter reading. After adjustment, the core of the inductor should be fixed in position with benzene or amyl-acetate. The minimum values of the resistors R of Fig. 7.3(b) and the tolerance in the resonant frequencies are given in the Table below.

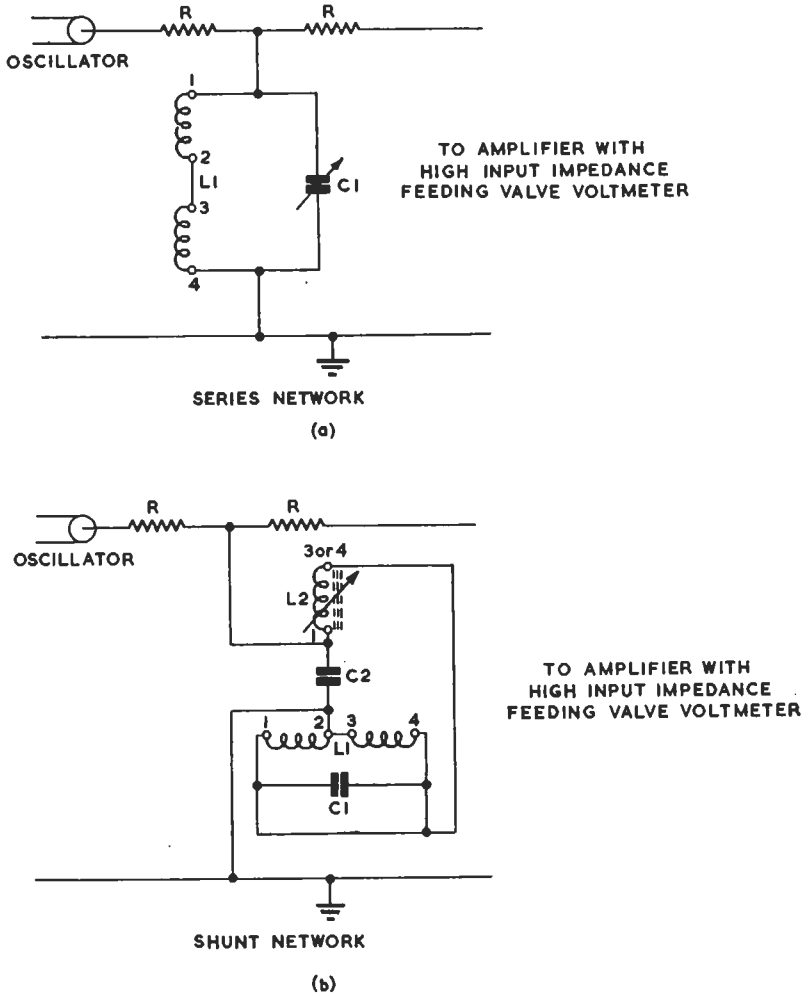


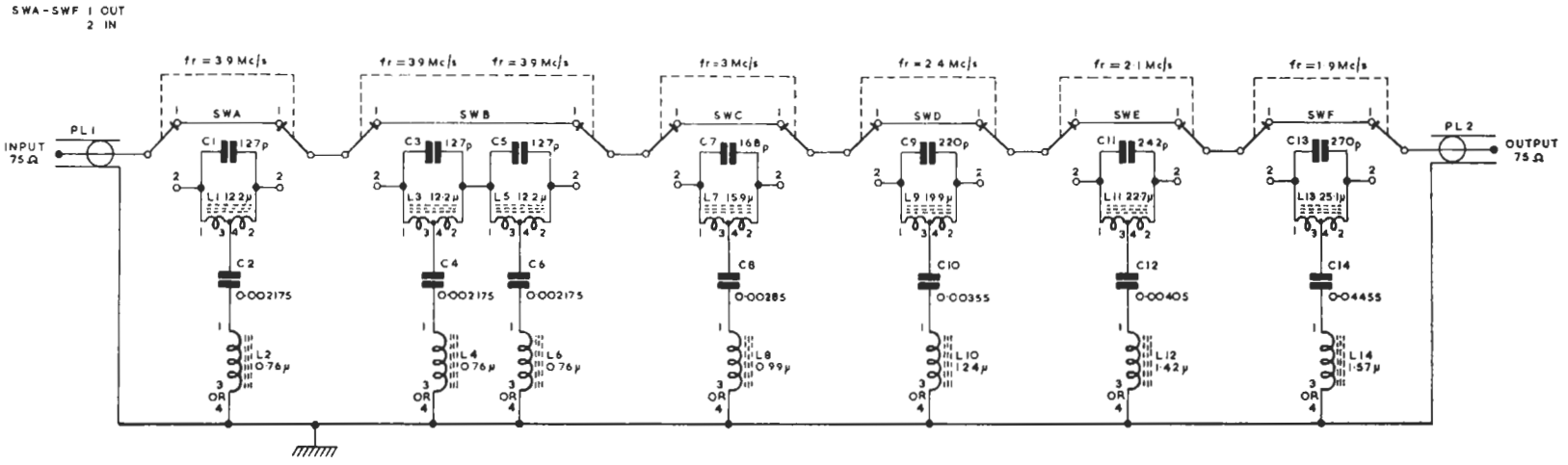
Fig. 7.3. Circuit Arrangement for Alignment of Phase-correcting Sections

5. With the output terminated in a resistance of 75 ± 1 ohms, the input impedance should be $(75 \pm 4) + j(0 \pm 5)$ at all frequencies below 1 Mc/s, and should be $(75 \pm 5) + j(0 \pm 10)$ at all frequencies below 3 Mc/s.

6. The insertion loss should be measured with a terminating resistance of 75 ± 1 ohm. Each section should be switched in circuit in turn, and the insertion loss checked at 0·5 Mc/s, 1 Mc/s and 3 Mc/s.

At 0·5 Mc/s and 1 Mc/s the loss should be less than 0·2 db and at 2 Mc/s and 3 Mc/s should be less than 0·3 db.

Nominal Resonant Frequency (Mc/s)	*R Kilohms*	*Tolerance in Resonant Frequency (kc/s)*
1·9	47	±12
2·1	47	±12
2·9	47	±12
3·0	47	±15
3·9	39	±15



NOTE : L2, L4, L6 ETC (NOMINAL VALUES GIVEN) ARE ADJUSTED ON TEST

f_r = RESONANT FREQUENCY

TELEVISION PHASE EQUALISER TV/EQ/6 & 6A : CIRCUIT

FIG 5
ISSUE 2

V5