SECTION 9

PULSE DELAY NETWORK NE1/507

Introduction

Pulse delay network NE1/507 is a unit which can be arranged to introduce a delay time of up to about 1·3 μs. Its input and output impedance is 75 ohms.

The unit is designed to contain up to a total of 19 individual delay networks, known as Turner sections, together with matching input and output half-sections, mounted on a printed-wiring board. The delay of each Turner section is about 70 ns and the total delay of the unit depends on the number of sections included in circuit. Unwanted sections are disconnected and bypassed. If it is known beforehand that some sections will not be required, the components of the unwanted sections may be omitted when the unit is first prepared for installation.

is shown in Fig. 9.1. One of the filters is an unbridged T-network and the other is a bridged T-network. In both instances there is mutual inductance between the two series arms. The relationship between the component values in the two networks and those in a conventional prototype T-network is indicated on the diagram. The design has been described in detail by A. H. Turner in the *R.C.A. Review*.*

In a Turner section, the variation of the delay with respect to frequency in the T-network can be compensated by an almost equal and opposite variation in the bridged T-network when suitable values of m are chosen. A particularly satisfactory combination of networks occurs when both networks have an m value of 1·49, because in this arrangement the compensation is substantially

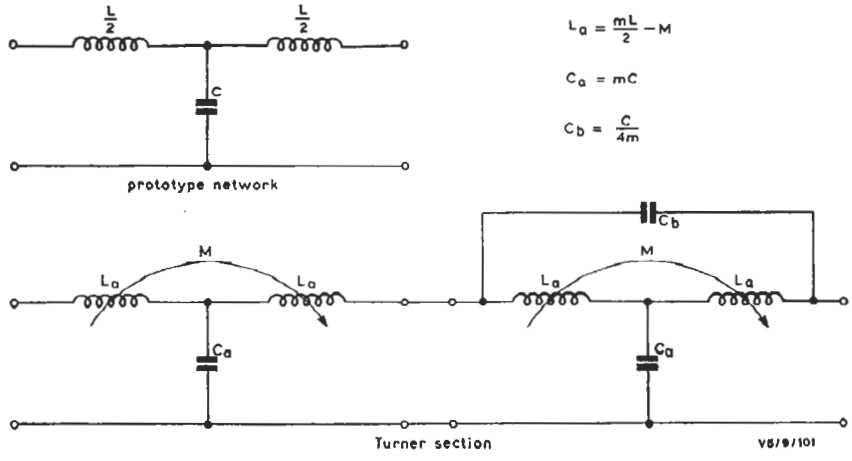

Fig. 9.1. Turner Section related to Prototype Network

The chassis of the NE1/507 has the same size as the standard CH1/12 chassis but is intended to be bolted permanently to a PN3/23 mounting panel. Musa plugs are normally fitted for the input and output connections, but permanent connections via lead-through adaptors (with O-clips) may be used as an alternative.

Design Considerations

The schematic of a Turner section, which consists of two m-derived filter networks in series, maintained up to 0·85 times the cut-off frequency, f_c, of the networks, and practical construction is simplified since all the inductance values are identical. Fig. 9.2 shows the delay versus frequency

* Turner, A. H. Artificial Lines for Video Distribution and Delay. *R.C.A. Review*, vol. X, no. 4, Dec. 1949, pp. 477 to 489. The use of (unbridged) T-networks with mutual inductance for delay purposes is also discussed in the BBC Manual, *Television Engineering*, vol. 4, 2nd ed., pp. 119 to 128, where L1/2 corresponds to L_a in Fig. 9.1.

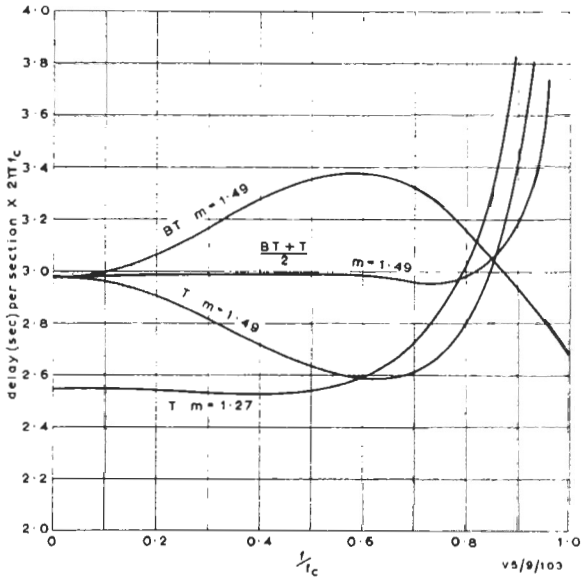

Fig. 9.2. The delay of a T-network (T) and a bridged T-network (BT), and half the delay of the two in series, where m = 1·49. The delay of a T-network where m = 1·27 is also shown

curves (derived from the *R.C.A. Review*) for a T-network (T) and a bridged T-network (BT) individually, and for the two in series, when m equals 1·49. The best curve for T-networks alone is obtained when m is 1·27 (as described in *Television Engineering*) and this is shown in Fig. 9.2 for comparison.

Circuit Description

The circuit diagram of an NE1/507 is represented by Fig. 9.3, which shows the two matching end half-sections ($m = 0{\cdot}6$) and one of the Turner sections with the component values used. In a particular NE1/507 there are a number of identical Turner sections in series, up to 19, depending on the delay required.

Frequency Response and Equalisation

The frequency response of a full NE1/507 unit, giving a delay of about 1·3 μs, is almost flat up to 3 Mc/s and falls about 1 dB between 3 Mc/s and 4 Mc/s. On such a unit, a k rating of better than 2 per cent can be expected with a 405-line 2T pulse and bar test signal.

Some equalisation may be necessary, particularly where more than one unit is installed in series. The required equalisation is determined by inspection using pulse-and-bar methods. The equalisation may be initially effected by a variable equaliser EQ5/501, for which a fixed EQ5/510 is subsequently substituted. It is common practice to adjust the auxiliary attenuator pad in the EQ5/510 so that the total attenuation of the delay networks and the equaliser is 6 dB, and a 6-dB amplifier is used to restore the signal to its original level.

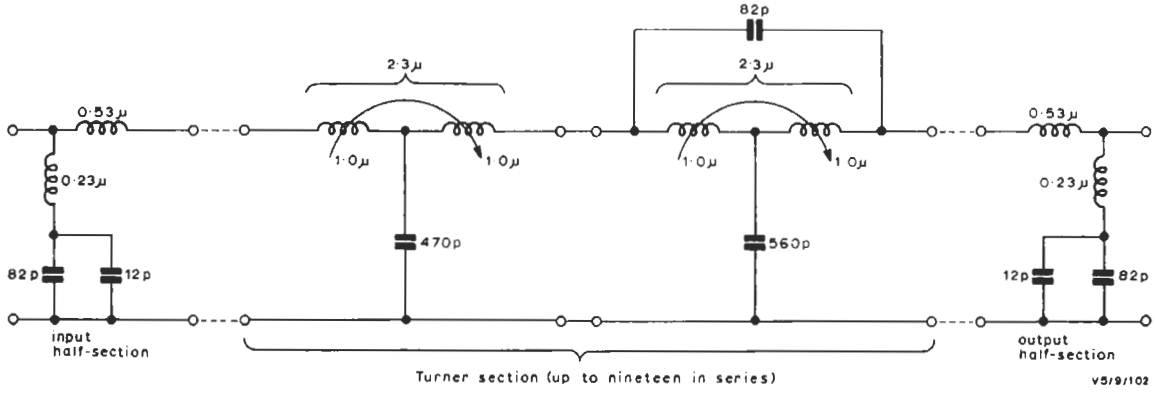

Fig. 9.3. NE1/507: Basic Circuit