

DISCRIMINATOR UN15/501

Introduction

The UN15/501 compares two signals, having nominally the same frequency. A d.c. control potential is developed, proportional to any phase difference between the signals. The unit has been designed as part of the MD1/502 Wide Band Sound and Vision Modulator. It is mounted in a CH1/12A chassis with index pegs 11 and 29.

Circuit Description

The circuit diagram is given in Fig. 1. The standard signal, normally derived from line drive in an associated divider unit, has a frequency of 5.208 kHz. The compared signal on 41.66 kHz, also derived in the same divider unit, is divided down to 5.208 kHz by three parametric regenerative dividers, each of which divides by 2. The dividers are mounted on separate circuit boards A, B and C. These are identical except for the collector circuits which are tuned to half the frequency of the signal on the base. The signal from the final divider is amplified and then fed via an emitter follower to the centre point of the secondary winding of the discriminator transformer T1. This transformer, which is also fed with the standard 5.208 kHz signal, forms with the diodes D1, D2 and D3 a phase discriminator. The d.c. output of the discriminator, developed across C7, remains steady as long as the two inputs are in phase, but if one signal wanders with respect to the other, there is a net output and the potential on C7 changes. This change forms the output signal, smoothed by L1 and C8.

The parametric dividers are used in preference to binary counters to avoid interference problems

which might otherwise arise due to the output frequency of the divider falling within the range of normal sound modulation frequencies.

Maintenance

Routine maintenance is not required but the following checks may be made occasionally.

1. Check that the frequency range of the dividers is approximately centred about the input frequency. To do this, connect a source of 41.66 kHz at approximately 5 V p-p to PLA6 and connect an oscilloscope with probe to the output of board A. Adjust the value of C3 until the range is correctly positioned. The limits of the division range are indicated by the points at which the fundamental frequency just appears. The nominal value of C3 is 560 pF. Repeat for boards B and C, with the probe connected first to board B then to board C. The nominal value for C3 on these boards is 1500 pF (B) and 4000 pF (C).
2. Transfer the probe to the output of board D and adjust the value of C4 to give maximum output; this should be greater than 5 volts p-p. If this level of output is not obtained, check that the gain of each divider is unity. If the gain of a divider is low, TR2 is the probable cause.
3. Final tests on the unit are carried out in conjunction with associated units in the parent MD1/502.

Reference

1. Designs Department Specification No. 4.24(65). AIB 4/70

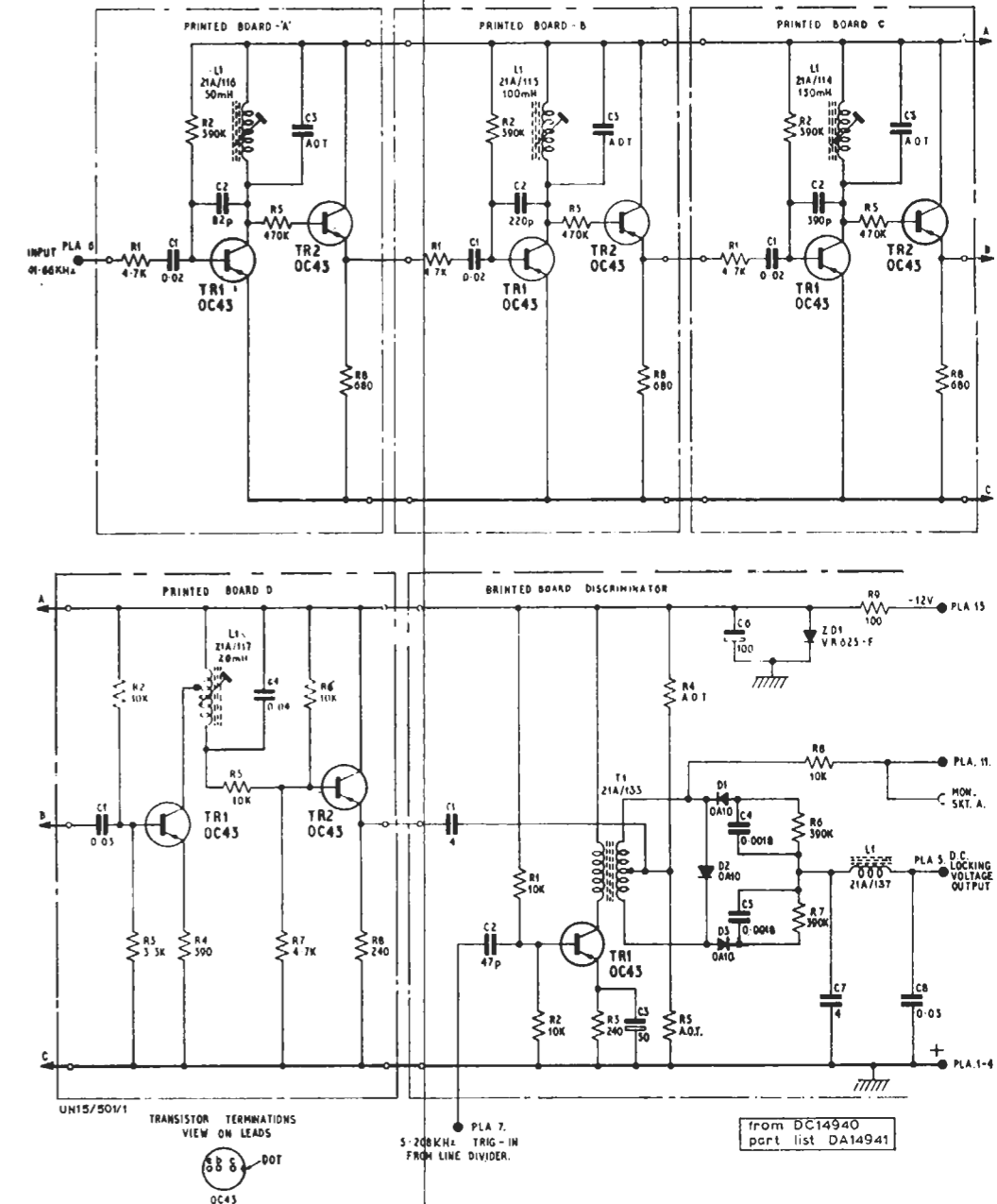


Fig. 1. Circuit of the Discriminator UN15/501