NATLOCK FREQUENCY CONVERTERS CO2/524 AND CO2/524A

Introduction

The CO2/524 and CO2/524A form part of the CO2/523 Natlock-to-PAL Converter and the CO2/548 PAL-to-Natlock Converter respectively. The CO2/524 and CO2/524A each accept a Natlock-frequency sinewave and derive from it a square wave of nominal frequency 147·421875 kHz. Each unit also provides an output of amplified Natlock frequency. The Natlock-frequency input of the CO2/524 is internally terminated in 75 ohms whereas the input of the A version is unterminated. Otherwise the units are identical

The CO2/524 and CO2/524A are each constructed on a CH1/26A Chassis with index-peg positions 3 and 41, and require power at −12 volts, 270 mA.

General Specification

Signal Input		Natlock-frequency sinewave
Input Level		1 volt p-p
Input Impedance		
CO2/524		75 ohms
CO2/524A		high with respect to 75 ohms
Signal Outputs:		
(i)	*on pin 14*	amplifier Natlock-frequency sinewave
	Output Level	5·5 ±0·5 volts p-p
(ii)	*on pin 4*	147·421875-kHz squarewave
	Output Level	4·5 ±0·5 volts p-p
Power Requirements		12 volts, 270 mA d.c. positive earth
Weight		0·85 kg (1 lb. 14 oz.)

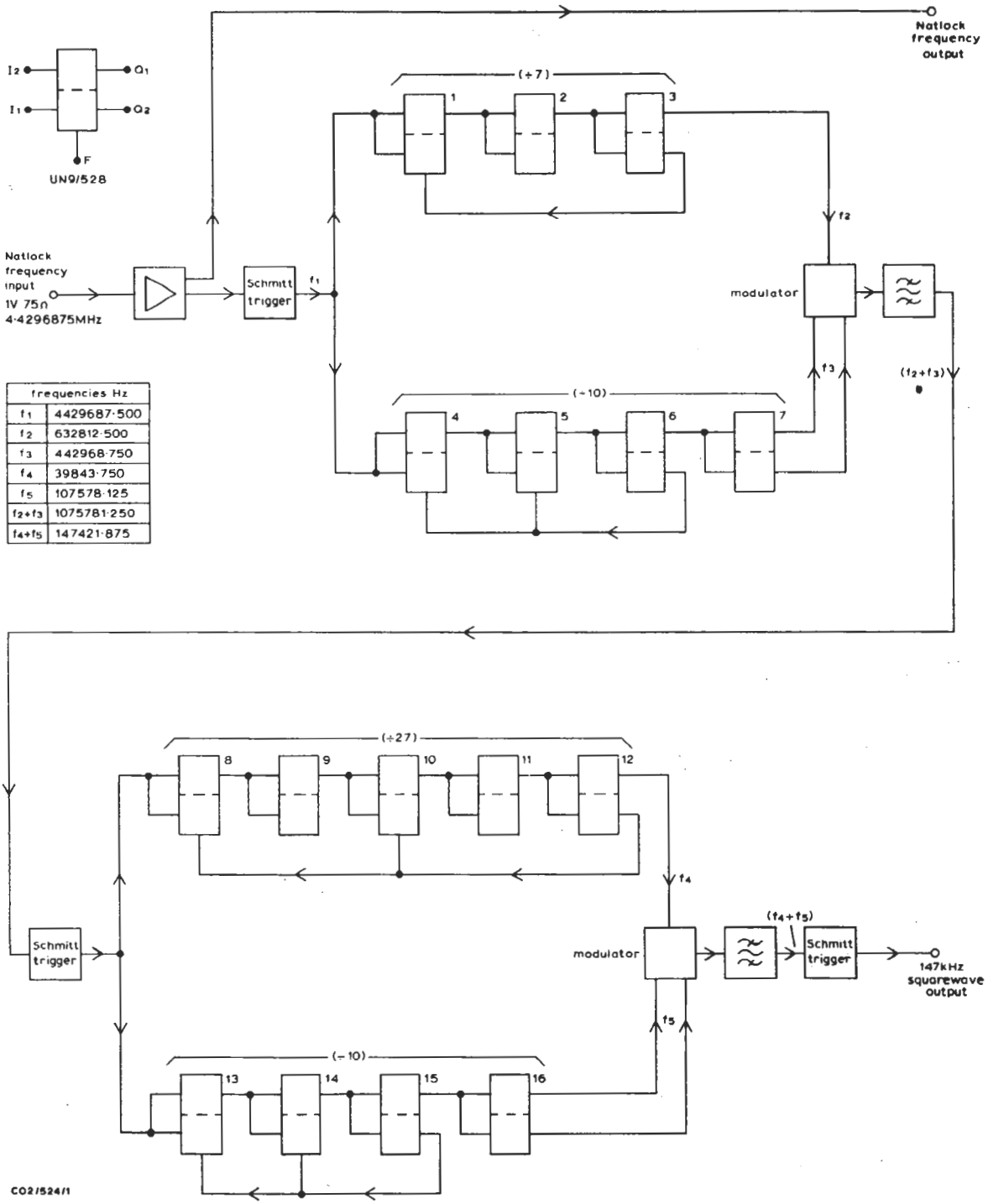


Fig. 1. Block Diagram of the CO2/524

General Description

A block diagram of the Converter is shown in Fig. 1. The required division ratio is provided by a pair of divider-modulators[1] the first of which divides by 70/71 and the second by 270/37. The divider chains each consist of a number of UN9/528 Bistable Units connected as binary dividers, each chain employing knockback to obtain the required division radio.

Circuit Description

The circuit of the Converter is shown in Fig. 2. The Natlock-frequency input signal is amplified by TR1 and applied to emitter follower TR2. Feedback from the emitter of TR2 to the base of TR1 reduces the voltage gain of TR1 to about 5. The output of TR2 provides the amplified Natlock frequency output of the unit and also drives a Schmitt trigger circuit, TR3 and TR4.

The Natlock-frequency squarewave from the collector of TR4 drives a divide-by-7 system comprising binaries 1, 2 and 3. The output of binary 3 is integrated by R18 and C9 so that a roughly triangular wave is applied to TR5.

TR4 output also drives a divide-by-10 system comprising binaries 4, 5, 6 and 7. Binary 7 outputs are antiphased square waves of one-tenth Natlock frequency and are used to switch TR6 and TR7.

TR5, TR6, TR7 and associated circuitry form a modulator, waveforms for which are shown in Fig. 3. Waveform (c) at the base of TR5 is amplified and applied to a tuned circuit C11 T1. This circuit is tuned to the fundamental frequency of waveform (c) and so an approximately sinusoidal waveform (d) appears at the collector of TR5. Binary 7 outputs, waveforms (e) and (f), switch transistors TR6 and TR7 which alternately earth the ends of T1 secondary. The result is waveform (g) at the centre tap of T1 secondary which is amplified by TR8 and applied to the tuned circuit formed by C15 and T2. This circuit is tuned to the upper sideband of the modulator output and so the waveform at the collector of TR8 is approximately sinusoidal and of a frequency equal to the sum of the divider output frequencies; see waveform (h). The output of TR8 is fed via emitter follower TR9 to Schmitt trigger TR10 and TR11 which produces waveform (i)

Waveform (i) is applied to two divider systems; binaries 8 to 12 which divide by 27 and binaries 13 to 16 which divide by 10. The outputs of these

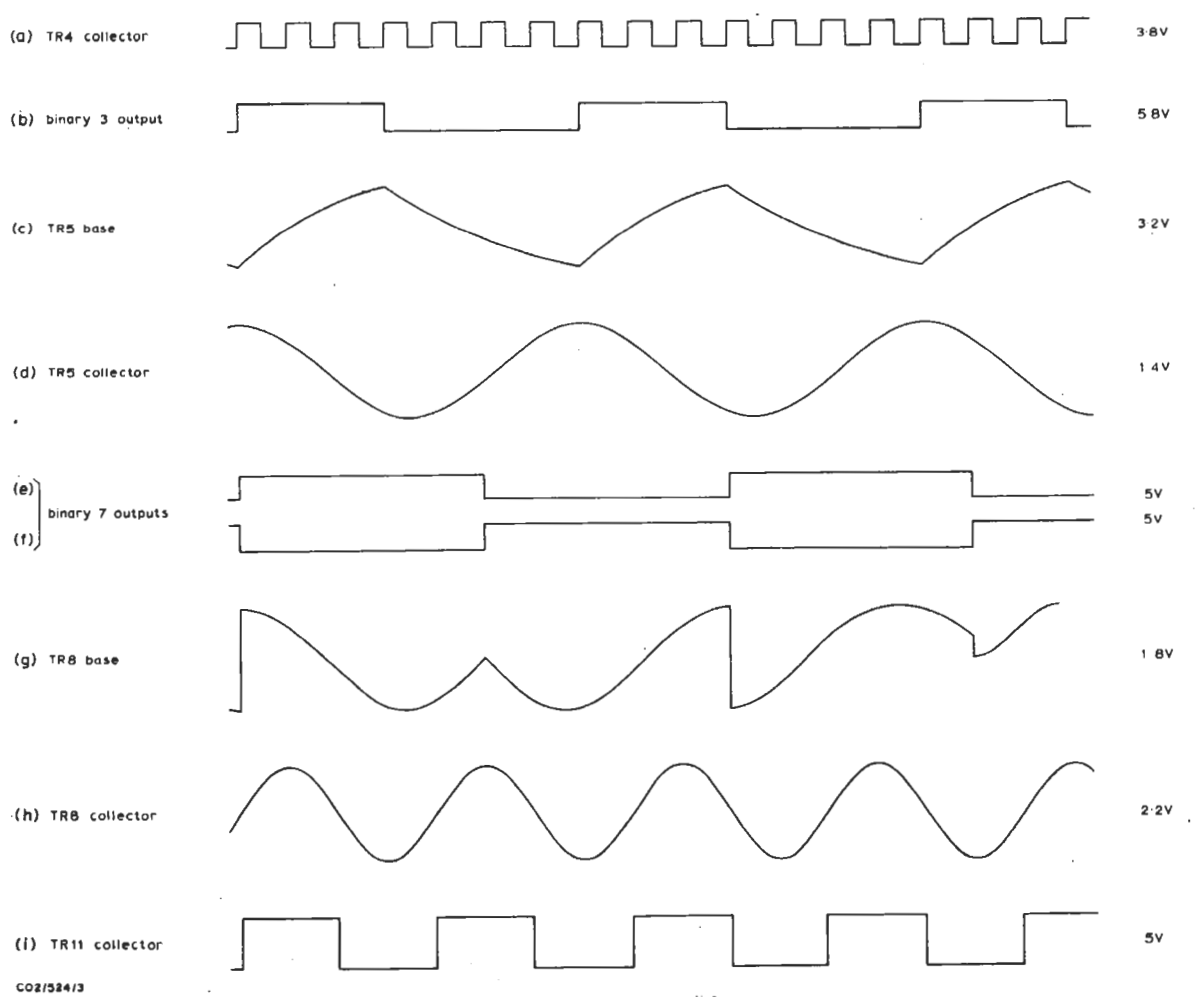


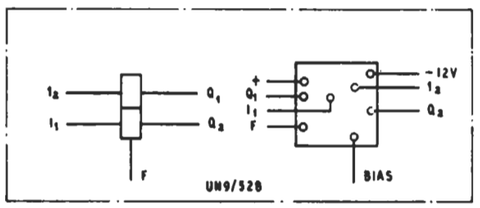
Fig. 3. Idealised Waveforms in the CO2/524

Notes: (a) Figures indicate approximate peak-to-peak amplitudes of waveforms.

(b) Binary outputs are measured at the collector of TR1 or TR2 on the appropriate UN9/528 Bistable Unit.

from D18639A2
parts list D18775A4

f omitted in CO2/524A



transistor terminations
view on leads

CO2/524/2T

Fig. 2. CO2/524: Circuit Diagram

divider chains are applied to another modulator which operates in the same way as that already described TR17 and TR18 form a Schmitt trigger which produces a square wave at frequency equal to the sum of the output frequencies of binaries 12 and 16. This is the 147-kHz square wave output of the unit.

Test Procedure

The CO2/524 is tested as part of its Parent Unit.

References

1. Instruction GP.3
   CO2/523 Natlock-to-PAL Converter
   CO2/527 PAL Subcarrier Converter
   CO2/548 PAL-to-Natlock Converter

JRWC 4/71