

# TEKTRONIX®

This insert is provided as a supplement to the instruction manual furnished with this modified instrument. The information given in this insert supersedes that given in the manual.

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DC 510/DC 5010  
MOD WF

MODIFICATION INSERT

**DESCRIPTION**

The DC 510:DC 5010 MOD WF is a TEKTRONIX Type DC 510:DC 5010 Programmable Universal Counter-Timer plug-in unit having its display overflow logic changed to preserve the least significant digits in all displays, with flashing digits as an overflow indicator.

**REQUIREMENTS**

**Overflow Logic**

The internal display logic is modified to provide overflow of the most-significant digits and preservation of least-significant digits at any time more than 9 valid digits are available for display, in any operating mode.

**Overflow Indication**

The display flashes on and off whenever one or more most-significant digits are lost due to overflow.

**Clock Input**

The internal clock jumpers are set to EXT and 10 MHz, disconnecting the internal 10 MHz clock, prior to shipment.

**GPIB Facilities**

MOD WF does not affect the format or precision of readings transmitted via the GPIB.

**CHARACTERISTICS**

**Application**

The DC 510:DC 5010 MOD WF is intended specifically for the comparison of a 10.000 MHz input signal with a high-stability 10.000 MHz external reference clock applied via contact A14 of the plug-in interface connector. It may be usable for other functions and in other operating modes, subject to the limitations indicated below.

**Overflow Logic**

In various combinations of operating modes and data conditions, the sign, the decimal point or one or more of the most significant digits of the measurement will be omitted, and the display will flash to indicate that the data shown require reinterpretation, as indicated below:

**MODE**

**Frequency A**

The internal processor computes frequency from period measurement, and adds digits to the display as they are calculated to be valid, based on the basic resolution of time measurement (3.125 ns), the period being measured, and the number of measurements averaged. The number of valid digits will exceed nine under various predictable conditions, and the display will overflow.

In addition, there are two ranges of measurements in each decade in which overflow or the number of digits of overflow is not predictable. These will be frequency measurements having most-significant digits in the ranges 55 to 58 and 181 to 189. In these ranges, the display may switch back and forth unpredictably between 0 and 1 or 1 and 2 digits overflow.

**Digits Overflow for AVG Setting**

Frequency	10 <sup>7</sup>	10 <sup>8</sup>	10 <sup>9</sup>
190-350 MHz	None	None	None
181-189 MHz	0	0	0 or 1
100-180 MHz	0	0	1
59-99 MHz	0	0	0
55-58 MHz	0	0	0 or 1
19-54 MHz	0	0	1
18.1-18.9 MHz	0	0 or 1	1 or 2
10-18 MHz	0	1	2
5.9-9.9 MHz	0	0	1
5.5-5.8 MHz	0	0 or 1	1 or 2
1.9-5.4 MHz	0	1	2
1.81-1.89 MHz	0 or 1	1 or 2	*
1.0-1.8 MHz	1	2	*
0.59-9.99 MHz	0	1	
0.55-0.58 MHz	0 or 1	1 or 2	
0.19-0.54 MHz	1	2	
181-189 kHz	1 or 2	*	
100-180 kHz	2	*	
etc.			

\*Extended averaging times not generally used.

**Period A**

In PERIOD A mode, overflow occurs only at the predictable points relating to the number or periods averaged and the absolute period being measured:

## Digits Overflow for AVG Setting

Period	$10^3$	$10^4$	$10^5$	$10^6$	$10^7$	$10^8$	$10^9$
3-9.9 ns	0	0	0	0	0	0	0
10-99 ns	0	0	0	0	0	0	1
100-999 ns	0	0	0	0	0	1	2
1-9.9 $\mu$ s	0	0	0	0	1	2	*
10-99 $\mu$ s	0	0	0	1	2	*	*
100-999 $\mu$ s	0	0	1	2	*	*	*
1-9.9 ms	0	1	2	*	*	*	*
10-99 ms	1	2	*	*	*	*	*
100-999 ms	2	*	*	*	*	*	*
etc.							

\*Additional digits of overflow, but rarely encountered because of extended averaging time (minutes to hours).

## Width A

WIDTH A measurements are discontinuous (made singly and averaged) and except for measurements exceeding 100 ms, do not yield more than 9 valid digits for any reasonably small averaging time. Measurements of over 1 s will overflow in all cases.

## Digits Overflow for AVG Setting

Measured Width	$10^0$	$10^1$	$10^2$	$10^3$	$10^4$	$10^5$
1-9.9 ms	0	0	0	0	0	0
10-99 ms	0	0	0	0	0	*
100-999 ms	0	0	0	1	*	*
1-9.9 s	1	1	1	*	*	*

\*Averaging time 17 min to many hours, depending on waveform duty cycle.

## Time A -B

Overflow conditions for TIME A-B mode are essentially the same as for WIDTH A.

## Rise/Fall A

In normal application of the RISE/FALL A mode, display overflow is unlikely, even with long averaging intervals.

## Ratio B/A

In RATIO B/A mode, overflow occurs at predictable intervals much as for PERIOD mode, but with the period of the input to B determining the system resolution, and the period of the A input determining the time to perform the selected number of averages.

**Digits Overflow for AVG Setting**

Measured Ratio	10 <sup>4</sup>	10 <sup>5</sup>	10 <sup>6</sup>	10 <sup>7</sup>	10 <sup>8</sup>	10 <sup>9</sup>
0.0-0.99	0	0	0	0	0	0*
1.0-9.99	0	0	0	0	0	1
10-99.9	0	0	0	0	1	2
100-999	0	0	0	1	2	**
1000-9999	0	0	1	2	**	
10,000-99,999	0	1	2	**		
100,000-999,999	1	2	**			

\*Overflow signalled because decimal point lost. All valid digits are displayed, however.

\*\*Utility limited by time required to obtain reading.

**Totalizing**

In TOTAL A, TOTAL A + B, and TOTAL A - B modes, display overflow will occur when the display at the selected resolution reaches 10 significant digits (9 digits in TOTAL A - B if the rate of the B signal exceeds that of the A input and the minus sign is overwritten). However, the display may be scrolled right or left using the AVG controls both during and after counting without affecting the internal count. Thus, no digits are ever lost until the INTERNAL count registers (13 digits) overflow.

**Time Manual**

In TIME MANUALS mode, display overflow is not possible.

**Events B During A.**

In EVENTS B DURING A, a gating duration of 1 second and a B repetition rate of 100 MHz or more will generate overflow for 100 or more averaged measurements. In most applications, overflow will not be encountered in this measurement, because of its inherently limited resolution.

**Null Measurements**

In NULL mode operation, a comparison resulting in a negative number will indicate overflow if 9 digits are calculated to be valid and will thus overwrite the sign position. In this case, all displayed digits will be valid, but the sign will be missing. Note that in NULL mode, leading zeroes are considered significant if they are the result of subtracting significant digits in the original values, and the sign thus may be overwritten by a zero and produce an overflow indication. Comparisons resulting in a positive number will not overflow unless the calculated number of valid significant digits in one or both original values exceeded 9 (and would overflow if displayed).

**Overflow Indication**

The flashing of digits is halted by pressing nearly any front-panel pushbutton (except NULL or TEST) which might affect signal processing or measurement accuracy. The flashing will not restart until another overflow measurement is taken.

**Clock**

Internal diagnostics do not check the state of the internal 320 MHz phase-locked loop. With the internal crystal time-base disconnected, the PLL will free run at an uncontrolled rate in the absence of an external clock signal, or if the external clock amplitude or duty cycle is improper, and any frequency, width, period, rise/fall or time measurements undertaken may be grossly in error (events, totalize and ratio measurements will be unaffected).

**Diagnostics**

The first three levels of diagnostics (power-up self-test, real-time TEST MODE operation, and microprocessor-based signature analysis) are unaffected by MOD WF. If Kernel signature analysis is required for troubleshooting the internal microprocessor or its closely associated ROM and RAM components, the standard DC 510/DC 5010 ROM (p/n 160-1111-00) must be restored, to make use of the standard signature tables.

**PARTS LIST**

**Electrical**

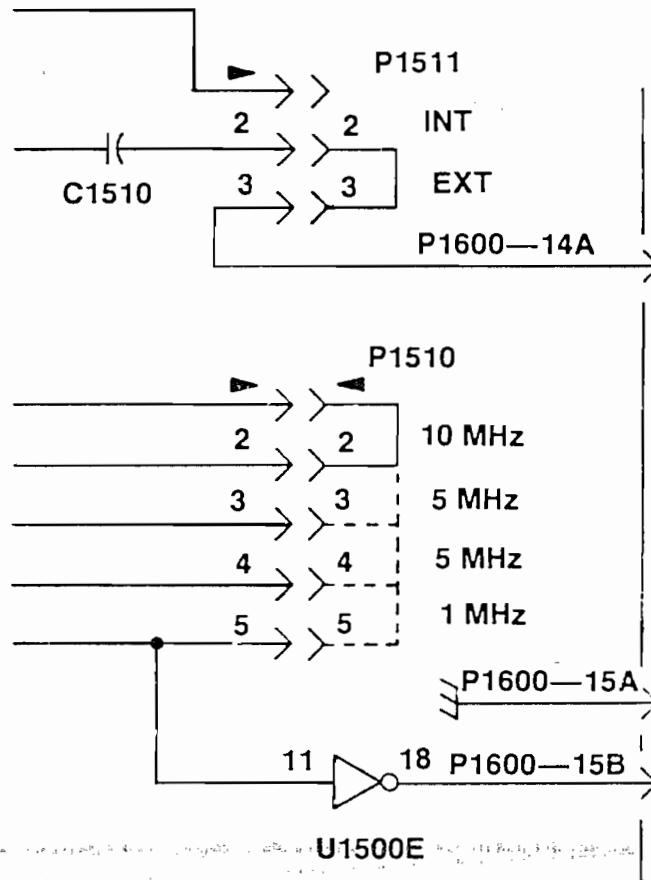
Change to:  
A16U1610      037-3045-00      EPROM, D2732A-3 24 Dip

**Standard Accessories**

1              061-2921-00      Insert, Manual DC 510 DC5010 MOD WF

Scan by Zenith

### DC 510/DC 5010 MOD WF



P/O A18 AUXILIARY BOARD

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