Beckman Industrial™

Universal Counter
MODEL UC10

Operator's Manual

CIRCUITMATE™

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A Subsidiary of Emerson Electric Company

Instrumentation Products Division • Beckman Industrial Corporation • Brea, CA 92621

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Section One
INTRODUCTION

The Model UC10 Universal Counter is a general-purpose, feature-packed instrument. It is designed to deliver reliable, high-quality operation in a wide variety of applications: production test, education and training, laboratory, service and repair, as well as calibration.

The Model UC10 includes the following standard features:

1. Two-channel input
2. Measures frequency, period, frequency ratio, time interval, and unit count
3. Fourteen LED indicators
4. Eight-digit, 0.313-inch LED display
5. Built-in attenuator
6. Four gate time selections
7. Beeper indicating function or gate time selections
8. Self extinguishing plastic case, test leads, and power cord.

Section Two
UNPACKING

The box should contain the following items:

1. Model UC10 Universal Counter
2. Power cord
3. Coaxial test lead (2 each)
4. Operator's manual
5. Warranty card

Section Three
SAFETY PRECAUTIONS

Always strictly observe the following precautions when operating this instrument.

1. The maximum input voltage which can be applied to the input depends on the frequency of the input and the position of the attenuator switch. This relationship is shown graphically in Figure 2, and the values given in this figure must be strictly observed. To reduce the chance of damaging the input circuit, start with the attenuator in the X 0.1 position. If the counter doesn't count, then switch the attenuator to the X 1 position.
2. Use this instrument within an ambient temperature range of 0°C to 50°C. Do not place the counter on top of high-temperature equipment.
3. Never permit water to enter the interior of this instrument.
4. Never subject this instrument to severe shock.

Section Four
FEATURE DESCRIPTION

For features described in this section, refer to Figure 1. It is HIGHLY RECOMMENDED that the user become familiar with the controls, indicators, and connectors described below before operating the instrument.

1. "B" INPUT
   Use this input only for Frequency Ratio and Time Interval measurements.

2. "A" INPUT
   Use this input for Frequency, Period, Frequency Ratio, Time Interval, and Unit Count measurements.

3. ATTENUATOR Switch
   Pushing this switch in will provide a 10:1 attenuation on the "A" input only. This feature will attenuate high frequency noise components to prevent false triggering.

4. "OVER" LED Indicator
   This LED will come on whenever the value of the display requires more than eight digits. When this overflow condition exists, the display could be meaningless. If the overflow condition happens in frequency, period, frequency ratio, or time interval measurements, it can possibly be rectified by selecting a smaller gate time, which in turn will decrease the number of decimal places so that a larger value of eight digits can be displayed.

5. "GATE" LED Indicator
   This LED will come on whenever the counter is counting or making a conversion. The length of time that the LED is on is proportional to the gate time selected. This feature allows one to know whether the electronic gate is operating or not.

6. "KHZ" LED Indicator
   This LED comes on whenever a frequency measurement is displayed.

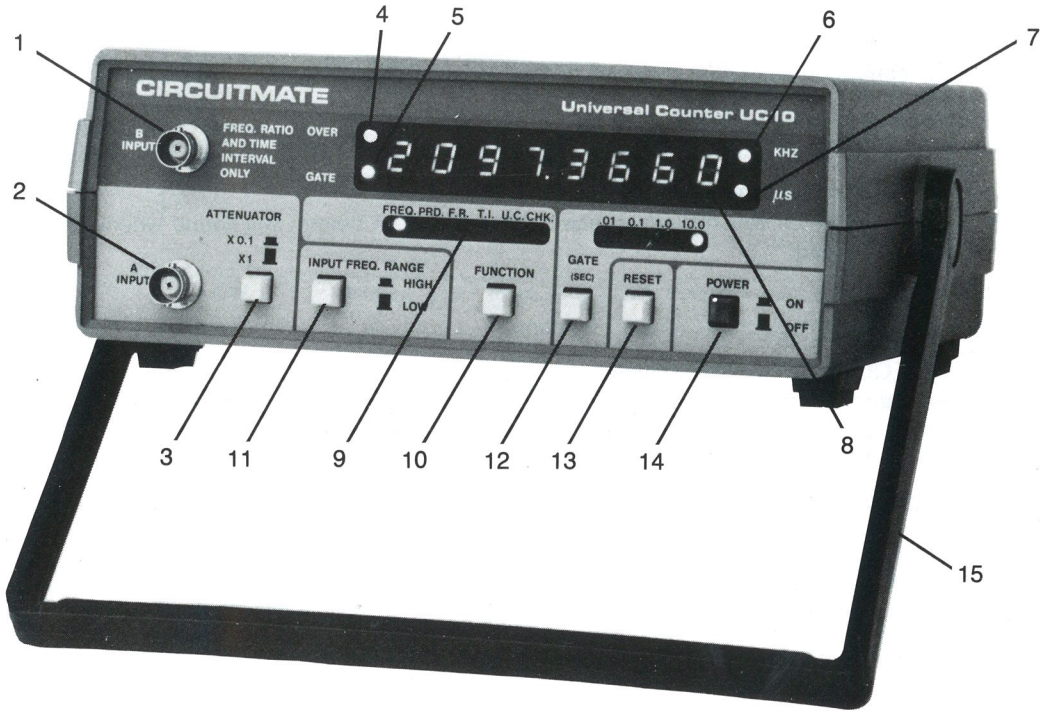


Figure 1. Model UC10 Universal Counter

7. "μS" LED Indicator
   This LED comes on whenever a period or time interval measurement is displayed.

8. Digital Display
   Eight digit, 0.313-inch LED display.

9. Function Indicators
   LED position indicates which function has been selected. A beeper will sound whenever the function selection is changed.

10. FUNCTION Switch
    Push this button to select the desired function.

11. INPUT FREQUENCY RANGE Selector
    Sets the frequency range limits for both "A" and "B" inputs.
    Switch in: "A" input is up to 100 MHz
    "B" input is up to 25 MHz
    Switch out: "A" input is up to 10 MHz
    "B" input is up to 2.5 MHz

12. GATE TIME Selector
    This sets the electronic measurement window.

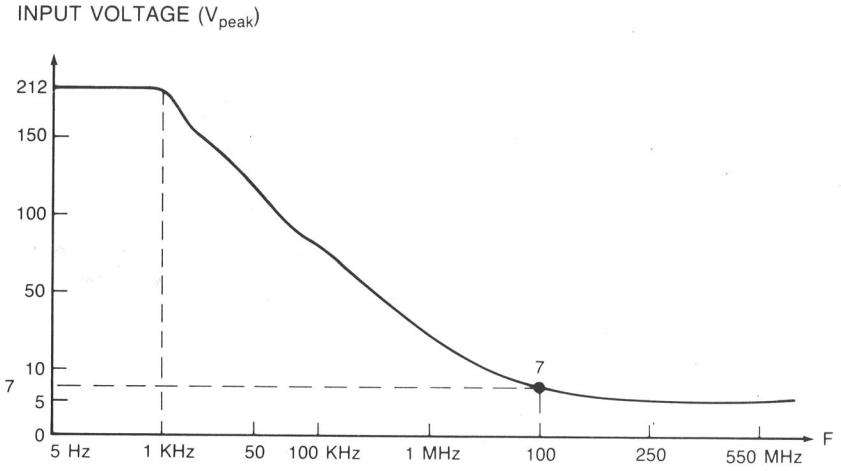
13. RESET Button
    It clears the display, lights all display segments and on release, activates a new measurement.

14. POWER Switch
    This switch turns the instrument on or off.

15. Handle
    It can be used to carry the instrument with or to set up the instrument for different viewing angles.

Section Five
BASIC MEASUREMENT INSTRUCTIONS

FUNCTION	INPUT MAGNITUDE	RANGE SETTING	GATE TIME SETTING	INPUT CONNECTION	REMARKS
Frequency	5Hz to 10MHz	LOW	Select	Input A	1. Observe maximum input voltage limits (see Figure 2). 2. When low frequencies are measured, a low pass filter, as illustrated in Figure 3, can be inserted between the signal input and the counter input to attenuate high frequency components that may cause false triggering. 3. For low frequency measurements see remark #2 under "Period."
	10MHz to 100MHz	HIGH			
Period	5Hz to 2.5MHz	LOW	Select	Input A	1. Period (in seconds) is the inverse of frequency (in Hz). 2. Period measurements may be used to determine low frequency more quickly and accurately.
	2.5MHz to 25MHz	HIGH			
Frequency Ratio	Input A: 5Hz to 10MHz Input B: 5Hz to 2.5MHz	LOW	Select	Input A & Input B	1. Put the lower of the two input frequencies on Input B.
	Input A: 50Hz to 100MHz Input B: 50Hz to 25MHz	HIGH			
Time Interval	Input A: 5Hz to 10MHz Input B: 5Hz to 2.5MHz	LOW	Select	Input A & Input B	1. This feature operates with Input A going low at the start of the event, to be followed by Input B going low at the end of the event.
Unit Count	5Hz to 10MHz	LOW	N/A	Input A	
Check	None	N/A	N/A	None	



NOTE: These values must not be exceeded when the signal contains a DC component (V_{peak} = DC Voltage + Peak AC Voltage). When there is no DC component, V_{peak} = Peak AC Voltage.

Figure 2. Maximum Input Voltage versus Frequency

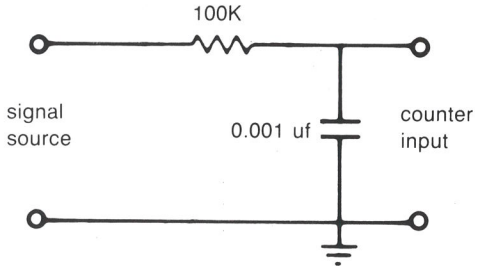


Figure 3. Low-Pass Filter

Section Six
SPECIFICATIONS

Specifications are subject to change without notice.

6.1 GENERAL SPECIFICATIONS

Display	8-digit, 0.313-inch high LED display
Functions	Frequency, period, frequency ratio, time interval, unit count, check
Indicators	14 LEDs: KHz, μS, OVER, GATE, 6 functions, 4 gate times
Operating Temperature	0°C to 50°C, 80% R.H.
Storage Temperature	−40°C to 70°C
Time Base Temperature Stability	±5ppm (25°C ±5°C) ±20ppm (0°C to 50°C)
Initial Time Base Calibration	±5ppm max. at 23°C
Aging Rate	1ppm per month max.
Weight	5.55 lb. (2.5kg) typical
Dimensions	237mm wide × 85mm high × 284mm long
Accessories	Test leads (2 each), AC power cord and fuse (3 each, 1 installed)

6.2 ELECTRICAL SPECIFICATIONS

At 23°C ±5°C, 70% R.H. Max.

Frequency Input

Low Range	Input A: 5 Hz to 10 MHz Input B: 5 Hz to 2.5 MHz	High Range	Input A: 50 Hz to 100 MHz Input B: 50 Hz to 25 MHz

Frequency Measurement (Input A only)

Range	5 Hz to 100 MHz
Gate Time	Selectable 0.01 sec, 0.1 sec, 1.0 sec, 10 sec

Frequency Measurement (Input A only) (Continued)

Resolution	
5 Hz to 10 MHz	100 Hz, 10 Hz, 1 Hz, 0.1 Hz
50 Hz to 100 MHz	1000 Hz, 100 Hz, 10 Hz, 1 Hz
Accuracy	±(Time base stability + 1 count)

Period Measurement (Input A only)

Range	0.04 μsec to 0.2 sec
Gate Time	Selectable 0.01 sec, 0.1 sec, 1.0 sec, 10 sec
Resolution	
5 Hz to 2.5 MHz	0.1 nsec, 1.0 nsec, 10 nsec, 100 nsec
2.5 MHz to 25 MHz	0.01 nsec, 0.1 nsec, 1.0 nsec, 10 nsec
Accuracy	±1 count ±time base stability ±trigger error of signal

Frequency Ratio (Input A ÷ Input B)

Input Frequency

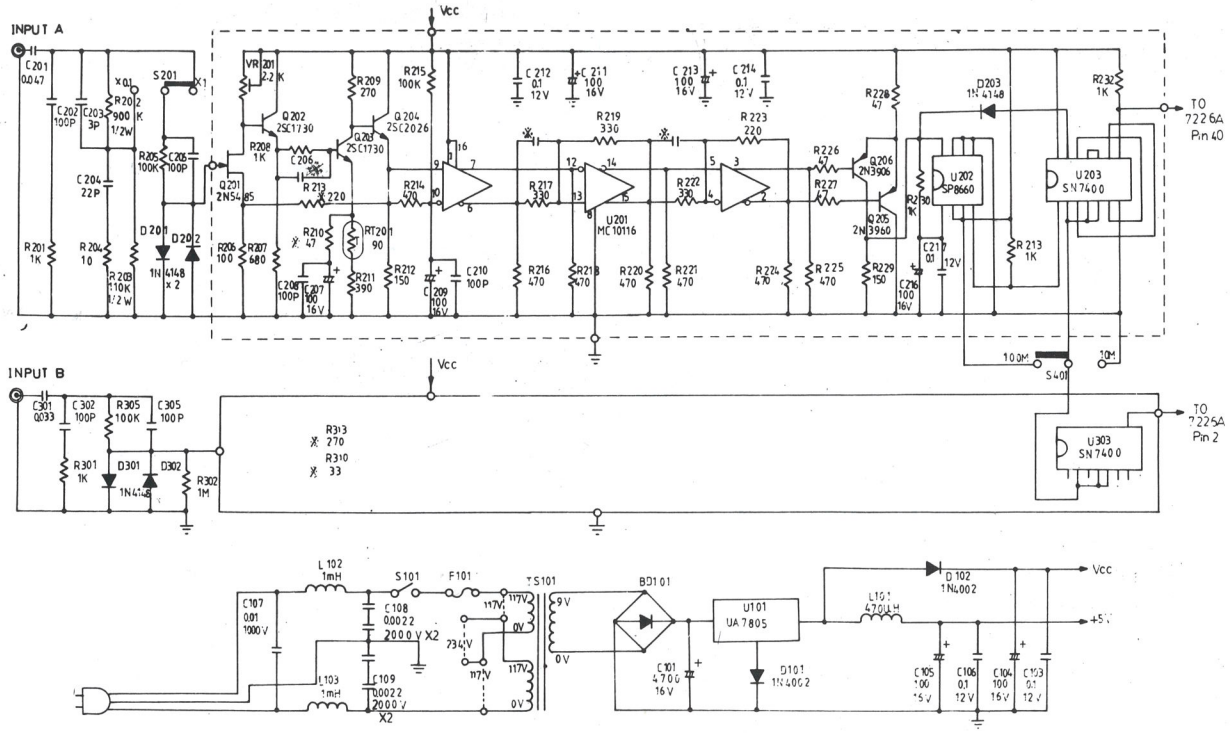
Low Range	Input A: 5 Hz to 10 MHz	High Range	Input A: 50 Hz to 100 MHz
	Input B: 5 Hz to 2.5 MHz		Input B: 50 Hz to 25 MHz
Acccuracy	±1 count of input A + trigger error of input B		

Time Interval (Input A to Input B)

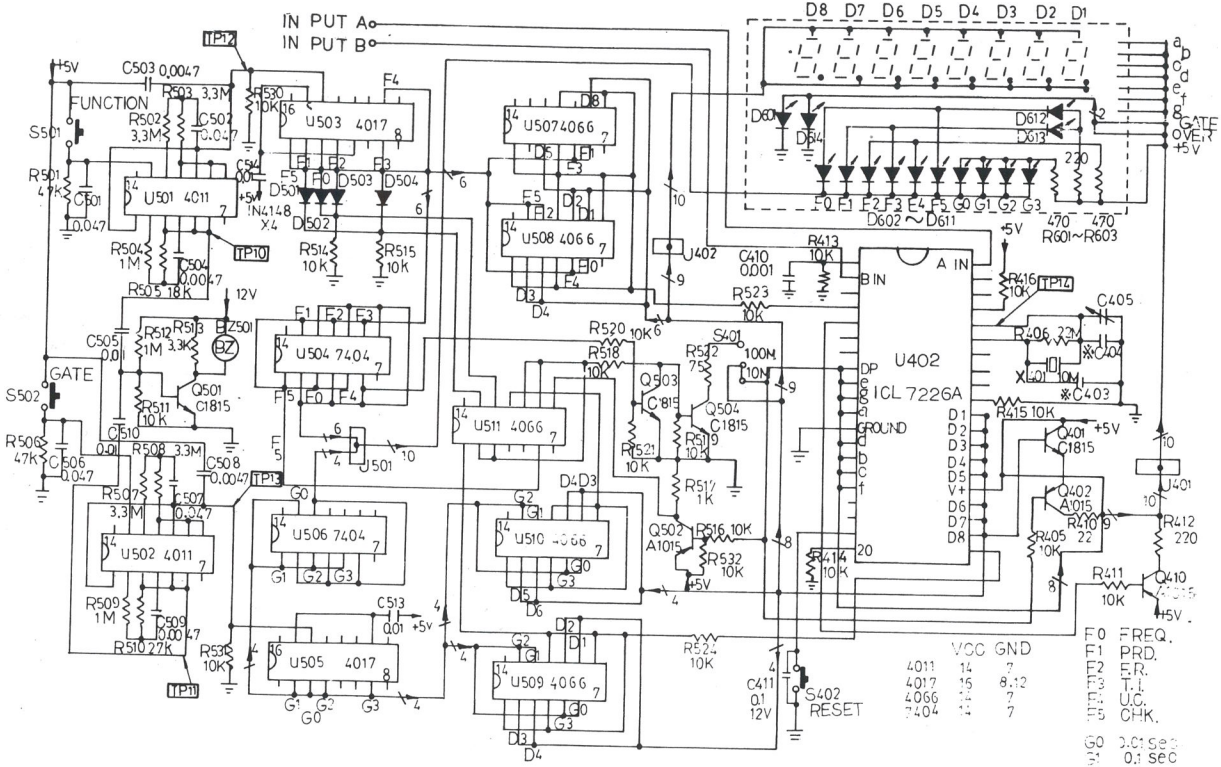
Input Frequency (Low Range only)	5 Hz to 2.5 MHz
Range	0.4 μsec to 0.2 sec
Gate time	Selectable 0.01 sec, 0.1 sec, 1.0 sec, 10 sec
Resolution	100 nsec, 10 nsec, 1.0 nsec, 0.1 nsec
Accuracy	±1 count ±time base accuracy ±trigger error

Unit Count	
Input Frequency (Low Range only)	5 Hz to 10 MHz
Count Capacity	99999999
Self Check	Checks and displays the internal time base oscillator frequency
Input Sensitivity	
Input A: (Low Range: 5 Hz to 10 MHz; High Range: 5 MHz to 100 MHz)	
Attenuator X1.0	20 mV RMS
X0.1	200 mV RMS
Input B: (Low Range: 5 Hz to 2.5 MHz; High Range: 2 MHz to 25 MHz)	20mV RMS
Input Impedance (Input A and Input B)	Constant 1 meg ohm ±50 kilo ohm shunted by less than 30 pF over frequency range and attenuator position
Max. Input Peak Voltage (DC + AC Peak)	
5 Hz to 1 KHz	212 Volts
At 100 MHz	7 Volts
Power Consumption	15 VA max. at 117 VAC

Section Seven
SCHEMATIC CIRCUIT DIAGRAMS



Power Supply and Input Channels Schematic



Counter and Control Logic Schematic

Section Eight
SERVICE

8.1 FUSE REPLACEMENT

1. Disconnect AC power cord.
2. Open instrument case by loosening the four screws in the middle of the rubber feet.
3. Replace fuse (located on printed circuit board, next to the transformer) with only the proper size fuse, as specified below:

   For 115V version—0.3A, 250V fuse
   For 230V version—0.2A, 250V fuse.

4. Re-secure instrument case.

8.2 OTHER SERVICES

WARNING

Attempts to service this instrument by unauthorized personnel will void the warranty.

For other service needs, please consult our Customer Service Department.

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