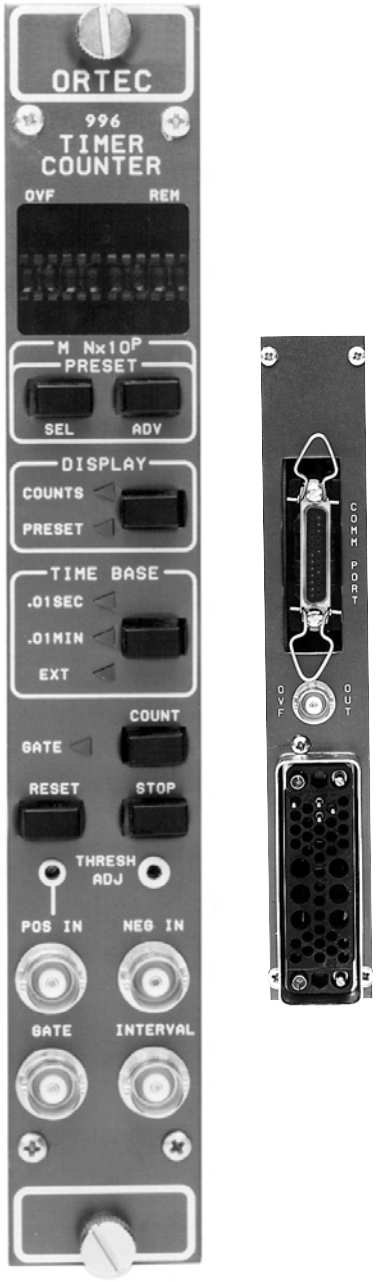
ORTEC®

996

CCNIM Timer and Counter

(Blind Preset Timer and 100-MHz, 8-Decade Counter)

- **100-MHz, 8-decade counter and a blind timer**
- **Field-installable output options to serve a variety of measurement needs**
- **Available as a nonprinting counter and timer**
- **RS-232-C plug-in option providing CCNIM™ capability with full computer control and readout**
- **Can directly drive printers having RS-232-C port**



The ORTEC Model 996 Timer and Counter incorporates a 100-MHz, 8-decade counter and a blind preset timer. The basic model offers visual readout via an 8-decade LED display. By plugging in field-installable options, considerably enhanced readout and control capability can be added at any time.

The full power of CCNIM™ (Computer Controlled NIM) is obtainable by adding the RS-232-C option. This plug-in board yields computer control of all functions normally selectable from the front panel, including start and stop count, readout, reset, setting the preset value, displaying the preset value, displaying the counter contents, and selecting the desired time base. To eliminate accidental operator interference, the computer can disable all front-panel controls in the remote mode. Computer readout with the CCNIM option includes the contents of the counter, the preset value, and the current display mode. The CCNIM option can directly drive printers having RS-232-C ports.

Excellent flexibility in setting the preset value is offered by the MN X 10^P selection. The M and N values provide two-digit precision, while P selects the decade. Presets can be chosen in the ranges of 0.01 to 990,000 seconds, 0.01 to 990,000 minutes, or 1 to 99,000,000 counts. In the external (EXT) time base mode, the 996 becomes a displayed, preset counter. The 996 can function as a displayed, preset timer by changing the position of a circuit board jumper and using the 0.01-SEC or 0.01-MIN time base.

Both positive and negative sensing inputs to the counter are available on the front panel. The negative input is designed to accept NIM-standard fast negative logic pulses with a fixed threshold of –250 mV on a 50-Ω input impedance. The negative input can handle counting rates up to 100 MHz. The positive input can accept counting rates up to 25 MHz on a 1000-Ω input impedance. To enhance the flexibility of the positive input, a precision discriminator is included. The discriminator threshold is variable over the range of +100 mV to +9.5 V using a front-panel, 25-turn trimpot. The threshold can be adjusted to suit the amplitude of a specific source of logic pulses or used as a precision integral discriminator on analog pulses. For the latter application, the TTL logic output of the discriminator is provided as a test point on the front panel. This output can be used to trigger an oscilloscope while viewing the analog signal at the counter input on the oscilloscope. The oscilloscope trace will show the signals that are being counted by the Model 996, thus permitting a very selective adjustment of the threshold.

All the commonly used functions are conveniently accessible on the front panel. Manual control of the COUNT, STOP, and RESET functions is via three push-buttons. The GATE LED is illuminated when the Model 996 is enabled to count. Selection of the 0.01-s, 0.01-min, or external time base is made by the TIME BASE push button. In the external mode, the preset counter counts the events from the front-panel positive or negative inputs.

The DISPLAY push-button switches the display to show the contents of the counter or the preset stop value. To change the preset value, the preset mode must first be selected with the DISPLAY push button. Subsequently, the PRESET SELECT push button is used to choose M, N, or P for adjustment. Changing the value of M, N, or P is accomplished with the PRESET ADVANCE push button. The display contains LED flags to indicate whether M, N, or P has been selected, to warn when an overflow has occurred in the counter, and to advise when the front-panel controls are disabled by the computer in the remote mode.

When the Model 996 is used without a plug-in option, jumpers on the circuit board can select automatic recycling of the counting interval with a display dwell time of either 1 or 10 s at the end of each counting interval. The plug-in options disable the dwell/automatic recycle function, when enabled by an external controller.

The counting function of the entire module can be disabled by holding the GATE input below +1.5 V using an external signal source. This condition also turns off the GATE LED. Open circuit or greater than +3 V at the GATE input allows the instrument to count, if the COUNT mode has been activated. The INTERVAL output of another ORTEC timer can perform this function to synchronize the Model 996 counting with the other timer. The INTERVAL outputs on all ORTEC timers provide nominally +5 V when counting and less than +0.5 V when counting is inhibited.

The interface connector for the plug-in RS-232-C option is located on the rear panel. The overflow output for the counter is also located on the rear panel. Counting these overflows on another counter effectively extends the counting capacity of the Model 996.

The Model 996 derives its power from the ±12 V, and +6 V supplies in a standard NIM bin with power supply.

Specifications

PERFORMANCE

COUNT CAPACITY 8 decades for counts ranging from 0 to 99,999,999.

MAXIMUM COUNTING RATE 100 MHz for negative input; 25 MHz for positive input.

TIME BASE 10-MHz clock with minimum preset or displayed intervals of 0.01 s or 0.01 min. Synchronizing error is nominally 100 ns. Also accepts an external input from the counter input when the EXT (external) mode is selected.

TIME BASE ACCURACY Within ±0.0025% over the 0–50°C operating temperature range.

PRESET TIME/COUNTS The module stops counting when the preset value MN X 10^P is reached on the blind preset register. M and N are digits ranging from 0 to 9. P is a digit ranging from 0 to 6. With the 0.01-SEC time base, preset times from 0.01 to 990,000 s can be used. Preset times from 0.01 to 990,000 min are available using the 0.01-MIN time base. In the EXT time base mode, preset counts in the range of 1 to 99,000,000 can be used.

POSITIVE INPUT DISCRIMINATOR Threshold variable from +100 mV to +9.5 V with a 25-turn trimpot.

PULSE PAIR RESOLUTION <10 ns for negative input; <40 ns for positive input.

INDICATORS

COUNTER DISPLAY 8-digit, 7-segment LED display with leading zero suppression. When displaying time, two digits to the right of a decimal point are included.

OVERFLOW INDICATOR An LED indicator labeled OVF illuminates when the counter exceeds its capacity of 8 decades. The indicator remains on until a reset is generated.

M, N, AND P INDICATORS Three LED indicators aid in the selection of the preset value. When the PRESET display function is activated, the SEL (select) push-button will select which of the three LEDs is illuminated. When one of these LEDs is on, that digit of the preset value can be incremented using the ADV (advance) push-button.

DISPLAY Two LEDs labeled COUNTS and PRESET indicate the information being displayed in the counter display. The counter or the PRESET value may be displayed by repeatedly pressing the DISPLAY push-button until the desired LED is illuminated.

TIME BASE Three LEDs indicate the selected time base source. By repeatedly pressing the TIME BASE push-button, 0.01 SEC, 0.01 MIN, or the EXT mode can be chosen.

GATE A single LED indicates that the entire instrument is enabled to count. For the GATE LED to be illuminated, the module must be placed in the COUNT mode (either manually or via the interface option), the GATE input must be above +3 V or open circuit, and the preset stop condition must not have been reached.

REMOTE A single LED labeled REM indicates that the Model 996 is under computer control and that all front-panel controls are disabled. This mode is set by the ENABLE_REMOTE command.

CONTROLS

DISPLAY Push-button selects the contents of the counter or the PRESET value for presentation in the 8-decade display. Repeatedly pushing the button alternates the selection between the two choices as indicated by the COUNTS and PRESET LEDs.

SEL (Select) Push-button chooses the M, N, or P digit in the display of the preset value. Pushing the button advances the selection through the three choices as indicated by the illuminated LED. The SEL push-button operates only if the PRESET mode has been selected by the DISPLAY push-button.

ADV (Advance) Push-button increments the preset digit selected by the SEL push-button once each time the ADV button is depressed. The M and N digit ranges are both 0 to 9. The P digit range is from 0 to 6. The ADV push-button operates only if the PRESET mode has been selected by the DISPLAY push- button.

TIME BASE Each push on this button advances the selection one step through the three time base choices (0.01 SEC, 0.01 MIN, and EXT) to determine the time base source for the preset register.

STOP This push-button stops all sections of the instrument from counting.

RESET Depressing this button resets the counter to zero counts and turns off the overflow indicator. It also clears any counts accumulated in the blind preset register, but does not change the selected preset value. When power to the module is turned on, a RESET is automatically generated.

COUNT Pushing this button enables the counting condition for the entire instrument, providing the GATE input is not held below +1.5 V and the preset value has not been reached.

THRESH ADJ Front-panel mounted, 25-turn trimpot to adjust the positive input threshold for the counter. The range is from +100 mV to +9.5 V. Adjacent test point provides the TTL logic signal output from the discriminator to facilitate adjustment using an oscilloscope.

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AUTOMATIC RECYCLE WITH DISPLAY DWELL Normally the Model 996 stops counting at the end of a counting interval and displays the contents of the counter until the RESET button is pushed. Alternatively, an automatic recycle counting mode can be enabled using jumper W1 on the printed circuit board. When the automatic recycle mode is selected, the display dwells for 1 or 10 seconds at the end of the counting interval. At the end of the display dwell period, the Model 996 is reset and the next counting/display dwell cycle begins. Using jumper W2 on the printed circuit board, either a 1- or 10-s display dwell can be chosen. The display dwell/automatic recycle mode is disabled automatically when the Model 996 is under print loop control or computer control.

COUNTER/TIMER JUMPER A two-position jumper (W3) located on the printed circuit board determines the information accumulated and displayed by the counter. With W3 in the COUNTER position, the counter always counts and displays the events connected to the front-panel input (POS IN, NEG IN). With W3 set to the TIMER position, the counter counts and displays the time if either the 0.01-SEC or the 0.01-MIN time base is selected. If the EXT time base is selected, the counter will count and display the events from the front-panel inputs (POS IN or NEG IN).

1 CYCLE/RECYCLE Selection of either the 1 CYCLE or the RECYCLE mode can be made via an 8-pin DIP switch on the RS-232-C interface board. The RECYCLE mode can be used when the computer is able to respond with a data transfer when the Model 996 reaches the preset value. Upon reaching preset the Model 996 latches its data into a buffer, resets the counters, and starts the next counting interval. This process takes approximately 50 µs. The computer reads the data in the buffer before the next counting interval ends. In the 1 CYCLE mode the Model 996 simply stops counting and waits for further commands when the preset value is reached.

INPUTS

POS IN (Positive Input) Front-panel BNC connector for the counter input accepts positive unipolar signals with a minimum width above threshold of 20 ns at a 50% duty cycle. Threshold is adjustable from +100 mV to +9.5 V via a front-panel 25-turn trimpot. Z_{in} = 1000 Ω to ground; dc-coupled.

NEG IN (Negative Input) Front-panel BNC connector for the counter to accept NIM-standard, fast-negative logic signals –600 to –1800 mV with a fixed discriminator threshold of –250 mV. Z_{in} = 50 Ω; dc-coupled. Minimum pulse width above threshold is 4 ns.

GATE Front-panel BNC input connector accepts NIM-standard slow positive logic pulses to control the counting condition of the entire module. A level of >+3 V or open circuit allows counting provided the instrument is in the COUNT mode and has not reached the preset value. A level of <+1.5 V inhibits counting. The driving source must be capable of sinking 5 mA of positive current during inhibit. The input is protected to +25 V.

OUTPUTS

INTERVAL Front-panel output BNC connector furnishes a positive level during the counting interval. The level is nominally +5 V when counting is enabled and <+0.5 V when counting is disabled. Z_o ~ 30 Ω.

OVFL Rear-panel output BNC connector provides a NIM-standard slow positive logic signal each time the counter overflows its 8-decade capacity. The signal has a nominal amplitude of +5 V; width ~20 µs.

INTERFACE

SERIAL When the RS-232-C option board is plugged in, it furnishes a rear-panel, 25-pin, male, D connector containing all signals for standard RS-232-C communications. It also contains connections for 20-mA current loop communications. The field-installable RS-232-C option provides computer control of the following functions: COUNT, STOP, RESET, REMOTE, setting the preset value, selecting the display mode, and selecting the desired time base. In the remote mode the computer can disable all front-panel controls. Computer readout includes: counts, the preset value, and the display mode.

ELECTRICAL AND MECHANICAL

DIMENSIONS NIM-standard single-width module, 3.43 X 22.13 cm (1.35 X 8.714 in.) front panel per DOE/ER-0457T.

WEIGHT
Net 0.908 kg (2.0 lb)
Shipping 1.4 kg (3.1 lb)

POWER REQUIRED The Model 996 and the plug-in options derive power from a NIM bin furnishing ±12 V and +6 V. The power required depends on the installed option as shown in the Power Requirements Table.

POWER REQUIREMENTS TABLE

	+12 V	–12 V	+6 V
Basic Model 996	25 mA	50 mA	475 mA
996 plus RS-232-C option	45 mA	70 mA	1000 mA

Ordering Information

Model	Description
996	Basic module without plug-in options.
99X-1	RS-232-C Interface option (cable not included).
C-75	Female-to-female RS-232-C null modem cable (3-m length).
C-80	Male-to-female RS-232-C extension cable (3-meter length).

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Specifications subject to change
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