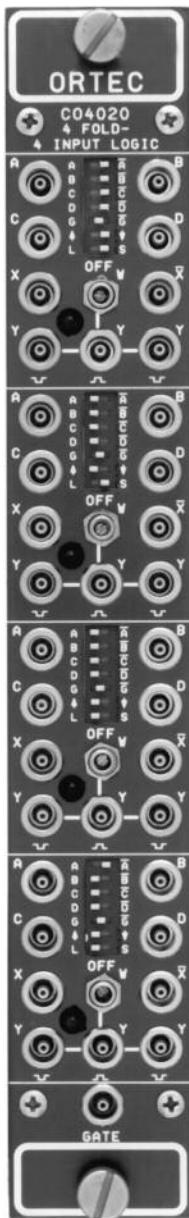


- General-purpose logic module for AND, OR, Veto, Fan-Out, and Gating functions
- Four independent channels
- Overlap outputs and adjustable-width outputs
- 3-ns overlap resolution
- TTL and fast negative NIM outputs



The ORTEC Model CO4020 Quad 4-Input Logic Unit has the flexibility to satisfy the logic requirements of most coincidence experiments without additional logic modules. The logic functions it can perform are: coincidence (AND), anticoincidence (veto), fan-in (OR), fan-out, fast negative NIM-to-TTL conversion, and pulse lengthening. The Model CO4020 contains four identical, independent channels of 4-input logic in a single-width NIM module.

Each of the four inputs (A, B, C, and D) accepts NIM fast negative logic pulses. Front-panel, three-position slide switches select the logic requirements separately for each input. The various combinations of logic functions that can be implemented are illustrated in Fig. 1 and in the specifications for the control switches.

The X output is a NIM fast negative logic pulse whose width is determined by the width and overlap of the active input pulses. The complement of the X output is available at the  $\bar{X}$  output. The updating Y outputs can be set to trigger on either the leading edge or the trailing edge of the X output pulse. The width of the Y outputs can be adjusted from 40 ns to 40  $\mu$ s in two selectable ranges. Two of the Y outputs provide NIM fast negative logic pulses. The third output delivers a positive TTL logic pulse that is

suitable for gating ADCs and multichannel analyzers. Front-panel LEDs indicate which channel is generating an output.

## Specifications

The Model CO4020 incorporates four separate channels with identical functions. The specifications apply to each of the four channels unless stated otherwise.

### PERFORMANCE

#### NUMBER OF IDENTICAL CHANNELS 4.

#### MAXIMUM COUNT RATE

X and  $\bar{X}$  Outputs 100 MHz.

Y Outputs 1/(1.1 X width).

#### MINIMUM PULSE OVERLAP 3 ns.

#### PROPAGATION DELAY

Input to X,  $\bar{X}$  < 8 ns.

Input to Y (Neg) < 13 ns.

Input to Y (Pos) < 20 ns.

#### DEAD TIME OF Y OUTPUTS 110% of width setting.

### CONTROLS AND INDICATORS

**WIDTH ADJUST (W)** Front-panel screwdriver adjustment allows width adjustment of Y outputs. Two ranges can be selected by the front-panel slide switch: S (40–1200 ns) or L (1–40  $\mu$ s).

**LED INDICATOR** Front-panel, red LED lights when output has been activated.

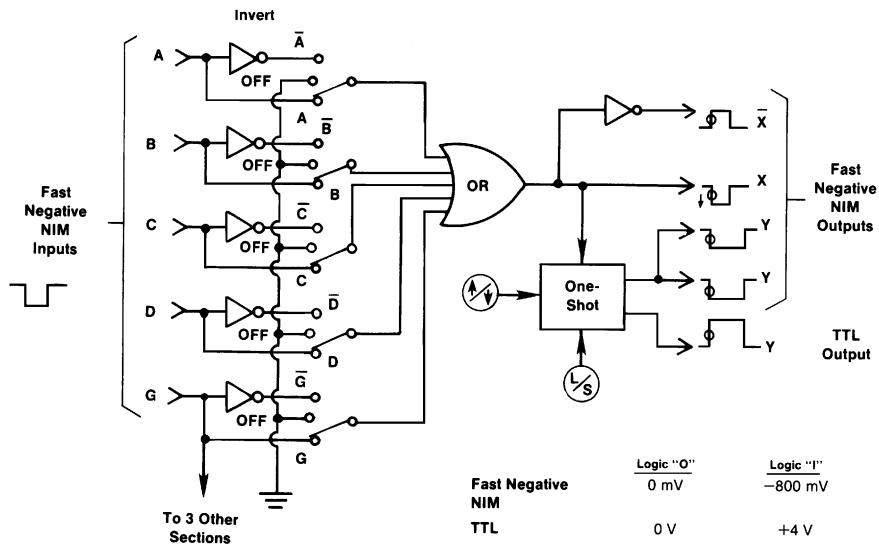


Fig. 1. Block Diagram of the Model CO4020 Logic Unit.

# CO4020

## Quad 4-Input Logic Unit

**CONTROL SWITCHES** Front-panel 7- by 3-position slide switch selects logic function definition, gate operation, Y output trigger point, and Y output width adjustment range as follows:

**Input Logic Switches (A/OFF/ $\bar{A}$ , B/OFF/ $\bar{B}$ , C/OFF/ $\bar{C}$ , D/OFF/ $\bar{D}$ , AND G/OFF/ $\bar{G}$ )** As defined in Fig. 1, these switches select variations of the following basic logic functions. In the OFF position, the state of that input is ignored. With switches set to the A, B, C, D, and G positions, the module performs the OR function at the  $\bar{X}$  output.

$$X = A + B + C + D + G$$

Setting the switches to the  $\bar{A}$ ,  $\bar{B}$ ,  $\bar{C}$ ,  $\bar{D}$ , and  $\bar{G}$  positions provide the AND (coincidence) function at the  $\bar{X}$  output.

$$\bar{X} = A \cdot B \cdot C \cdot D \cdot G$$

Changing the  $\bar{G}$  switch to G implements the common-gate veto (anticoincidence).

$$\bar{X} = A \cdot B \cdot C \cdot D \cdot \bar{G}$$

See Fig. 1 to determine other possible logic combinations.

**Trigger Switch for Y Outputs ( $\downarrow$  or  $\uparrow$ )** Allows either the negative transition ( $\downarrow$ ) or the positive transition ( $\uparrow$ ) of the X output to trigger the constant-width Y outputs.

**Y Output Width Range Switch** Sets either to S (40–1200 ns) or L (1–40  $\mu$ s).

### INPUTS

**A, B, C, AND D INPUTS** Front-panel LEMO connectors accept negative fast-NIM logic signals.

**Minimum Amplitude** –600 mV.

**Minimum Width** 3 ns.

**Input Impedance** 50  $\Omega$ .

**GATE INPUT (G)** Front-panel LEMO connector accepts negative Fast-NIM logic signals. The GATE input is delivered to all four sections.

**Minimum Amplitude** –600 mV.

**Minimum Width** 3 ns.

**Input Impedance** 50  $\Omega$ .

### OUTPUTS

**X AND  $\bar{X}$  OUTPUTS** Front-panel LEMO connectors provide the noninverted (X) and the inverted ( $\bar{X}$ ) result of the logic satisfied by the input signals. Logic requirements are set by the front-panel slide switches A/OFF/ $\bar{A}$ , B/OFF/ $\bar{B}$ , C/OFF/ $\bar{C}$ , D/OFF/ $\bar{D}$ , and G/OFF/ $\bar{G}$ . X and  $\bar{X}$  are Fast-NIM logic signals.

**Amplitude** –20 mA.

**Rise Time** <4 ns.

**Output Width** Determined by duration of input signals and logic selection.

**Y OUTPUTS (L and  $\bar{L}$ )** Front-panel LEMO connectors provide two updating Fast-NIM logic outputs ( $\bar{L}$ ) and one updating positive TTL logic output (L) per channel. Output width of all three Y outputs is set by WIDTH adjustment. Y outputs are triggered by either the negative transition ( $\downarrow$ ) or positive transition ( $\uparrow$ ) of the X overlap output as selected by the front-panel slide switch.

### ELECTRICAL AND MECHANICAL

**POWER REQUIRED** The Model CO4020 derives its power from a standard NIM bin and power supply. The required power is +6 V, 200 mA; –6 V, 1000 mA.

### WEIGHT

**Net** 1.3 kg (2.3 lb).

**Shipping** 2.2 kg (4.8 lb).

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

### Ordering Information

To order, specify:

Model	Description
<b>CO4020</b>	Quad 4-Input Logic Unit

Specifications subject to change  
111919

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