

**Model GG8020
Octal Gate and Delay Generator
Hardware Manual**

Advanced Measurement Technology, Inc.

a/k/a/ ORTEC[®], a subsidiary of AMETEK[®], Inc.

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Quality Control

Before being approved for shipment, each ORTEC instrument must pass a stringent set of quality control tests designed to expose any flaws in materials or workmanship. Permanent records of these tests are maintained for use in warranty repair and as a source of statistical information for design improvements.

Repair Service

If it becomes necessary to return this instrument for repair, it is essential that Customer Services be contacted in advance of its return so that a Return Authorization Number can be assigned to the unit. Also, ORTEC must be informed, either in writing, by telephone [(865) 482-4411] or by facsimile transmission [(865) 483-2133], of the nature of the fault of the instrument being returned and of the model, serial, and revision ("Rev" on rear panel) numbers. Failure to do so may cause unnecessary delays in getting the unit repaired. The ORTEC standard procedure requires that instruments returned for repair pass the same quality control tests that are used for new-production instruments. Instruments that are returned should be packed so that they will withstand normal transit handling and must be shipped PREPAID via Air Parcel Post or United Parcel Service to the designated ORTEC repair center. The address label and the package should include the Return Authorization Number assigned. Instruments being returned that are damaged in transit due to inadequate packing will be repaired at the sender's expense, and it will be the sender's responsibility to make claim with the shipper. Instruments not in warranty should follow the same procedure and ORTEC will provide a quotation.

Damage in Transit

Shipments should be examined immediately upon receipt for evidence of external or concealed damage. The carrier making delivery should be notified immediately of any such damage, since the carrier is normally liable for damage in shipment. Packing materials, waybills, and other such documentation should be preserved in order to establish claims. After such notification to the carrier, please notify ORTEC of the circumstances so that assistance can be provided in making damage claims and in providing replacement equipment, if necessary.

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SAFETY INSTRUCTIONS AND SYMBOLS

This manual contains up to three levels of safety instructions that must be observed in order to avoid personal injury and/or damage to equipment or other property. These are:

DANGER Indicates a hazard that could result in death or serious bodily harm if the safety instruction is not observed.

WARNING Indicates a hazard that could result in bodily harm if the safety instruction is not observed.

CAUTION Indicates a hazard that could result in property damage if the safety instruction is not observed.

Please read all safety instructions carefully and make sure you understand them fully before attempting to use this product.

In addition, the following symbol may appear on the product:



ATTENTION – Refer to Manual



DANGER – High Voltage

Please read all safety instructions carefully and make sure you understand them fully before attempting to use this product.

SAFETY WARNINGS AND CLEANING INSTRUCTIONS

DANGER Opening the cover of this instrument is likely to expose dangerous voltages. Disconnect the instrument from all voltage sources while it is being opened.

WARNING Using this instrument in a manner not specified by the manufacturer may impair the protection provided by the instrument.

Cleaning Instructions

To clean the instrument exterior:

- Unplug the instrument from the ac power supply.
- Remove loose dust on the outside of the instrument with a lint-free cloth.
- Remove remaining dirt with a lint-free cloth dampened in a general-purpose detergent and water solution. Do not use abrasive cleaners.

CAUTION To prevent moisture inside of the instrument during external cleaning, use only enough liquid to dampen the cloth or applicator.

- Allow the instrument to dry completely before reconnecting it to the power source.



ORTEC MODEL GG8020 OCTAL GATE AND DELAY GENERATOR

1. DESCRIPTION

1.1. INTRODUCTION

The ORTEC model GG8020 Octal Gate and Delay Generator provides a compact and versatile solution for gating and coincidence logic requirements in large experiments, or in measurements requiring multiple delays and pulse widths. It contains eight independent channels of gate and delay generators in a single-width NIM module.

Each channel accepts NIM-standard, fast negative logic pulses at its input. The leading edge of the input signal triggers a delay period that can be adjusted separately for each channel. At the end of the delay period, an output pulse is generated. The width of this output pulse can be adjusted independently for each channel. Delay ranges from 70 to 1000 ns, or from 0.4 to 10 μ s can be selected separately for each channel by one of eight jumpers

on the printed wiring board. A second set of eight jumpers independently select ranges from 70 to 1000 ns, or 0.4 to 10 μ s for the output pulse widths.

Each channel produces two NIM-standard, fast negative logic pulse outputs, and one positive TTL output. The fast negative outputs provide fan-out capability, and are particularly useful for driving overlap coincidence modules that require NIM-standard, fast negative logic levels. They can also be used as delayed inputs to timing instruments, or as gating signals on modules that require fast negative inputs. The TTL output is compatible with modules requiring either TTL inputs, or NIM-standard, slow positive logic pulses. The TTL output is ideal for gating ADCs and multichannel analyzers.

2. SPECIFICATIONS

2.1. PERFORMANCE

NUMBER OF IDENTICAL CHANNELS 8.

OUTPUT DELAY Adjustable from <70 ns to >1000 ns, or from <0.4 to > 10 μ s. Temperature coefficient <0.04%/°C from 0 to 50°C.

OUTPUT PULSE WIDTH Adjustable from <70 ns to >1000 ns, or from <0.4 μ s to >10 μ s. Temperature coefficient <0.04%/°C from 0 to 50°C.

DEAD TIME Typically equal to the Delay plus the Output Pulse Width plus 20 ns.

DELAY JITTER <0.04% of the selected delay.

2.2. CONTROLS

DELAY Jumpers Eight jumpers on the printed wiring board permit independent selection of a Short (S) or Long (L) delay time range for each channel. The delay range is 70 to 1000 ns on the short setting and 0.4 to 10 μ s on the long setting.

DELAY Eight front-panel, 12-turn, screwdriver adjustments provide independent fine adjustment of

the delay within the range selected by the respective S or L DELAY jumper.

WIDTH Jumpers Eight jumpers on the printed wiring board permit independent selection of a short (S) or long (L) width range for each channel. The width range is 70 to 1000 ns on the short setting and 0.4 to 10 μ s on the long setting.

WIDTH Eight front-panel, 12-turn, screwdriver adjustments provide independent fine adjustment of the width within the range selected by the respective S or L WIDTH jumper.

2.3. INPUTS

IN Eight front-panel LEMO connectors (one for each channel) accept NIM-standard, fast negative logic signals to trigger the delayed output pulses. The input pulse minimum amplitude is -600 mV; minimum width is 10 ns. The input is dc-coupled with 50 Ω input impedance.

2.4. OUTPUTS

OUT Two front-panel LEMO output connectors for each channel deliver NIM-standard, fast negative logic signals. The output delay relative to the input is set by the DELAY adjustment, and the output duration is set by the WIDTH control. The outputs are typically -16 mA (-800 mV in a $50\ \Omega$ load), with rise and fall times $<4\text{ ns}$.

TTL One front-panel LEMO connector for each channel delivers a TTL version of the signal from the OUT connectors. The TTL output provides $<+0.4\text{ V}$ in the quiescent state, and nominally $+4\text{ V}$ into a $50\ \Omega$ load during the output pulse. The rise time is $<20\text{ ns}$.

2.5. ELECTRICAL AND MECHANICAL

POWER REQUIRED The Model GG8020 derives its power from a standard NIM bin and power supply. The required power is $+6\text{ V}$ at 150 mA , and -6 V at 2 A .

WEIGHT

Net 1.3 kg (2.3 lb).

Shipping 2.2 kg (4.8 lb).

DIMENSIONS NIM-standard, single-width module, $3.43\text{ cm} \times 22.13\text{ cm}$ ($1.35\text{ in.} \times 8.714\text{ in.}$) front panel per DOE/ER-0457T.

3. INSTALLATION

Carefully unpack the Model GG8020 and inspect it thoroughly for evidence of damage in shipment. If it has been damaged, refer to the Warranty section of this manual for further instructions.

The Model GG8020 operates on power from a NIM bin/power supply such as the ORTEC Model 4001C/4002E. **Always turn off the power to the power supply before inserting or removing the module.** After all modules have been installed in the

bin, check the dc voltage levels from the power supply to ensure that no overload exists.

The bin/power supply is designed for relay rack mounting. If the equipment is rack mounted, be sure that adequate ventilation is provided to prevent any localized heating of components used in the Model GG8020. The temperature should not exceed 50°C .

4. OPERATION

Operating the ORTEC Model GG8020 is very simple and straightforward. Once the unit is installed in the bin/power supply, apply power to the module. You need only furnish a NIM-standard fast negative pulse to the input and select the desired range of delay and width. To adjust the delay and width, trigger an oscilloscope on the input pulse and monitor the output of the Model GG8020 with the oscilloscope. The input to the oscilloscope must be terminated in $50\ \Omega$. Using the appropriate DELAY and WIDTH jumper settings and adjustment pots (discussed below), adjust the delay and width of the output pulse to the desired values and the instrument is ready for use. Each of the eight channels is identical in function.

The printed wiring board contains eight DELAY jumpers, labeled 1J1 through 8J1; and eight WIDTH

jumpers, labeled 1J2 through 8J2, as illustrated in Fig. 1. For each channel, the DELAY jumpers allow you to select a delay value from trigger to start of output pulse ranging from 70 ns to 1000 ns in the S (short) position, or from $0.4\ \mu\text{s}$ to $10\ \mu\text{s}$ in the L (long) position. Use the corresponding front-panel, 12-turn, screwdriver-adjustable DELAY pot to fine-tune the delay for that channel within the selected range.

The WIDTH jumpers allow you to set the width of the output pulse in the range of 70 ns to 1000 ns in the S (short) position, or $0.4\ \mu\text{s}$ to $10\ \mu\text{s}$ in the L (long) position for a particular channel. The corresponding front-panel, 12-turn, screwdriver-adjustable WIDTH pot lets you adjust the output pulse width for that channel within the selected range.

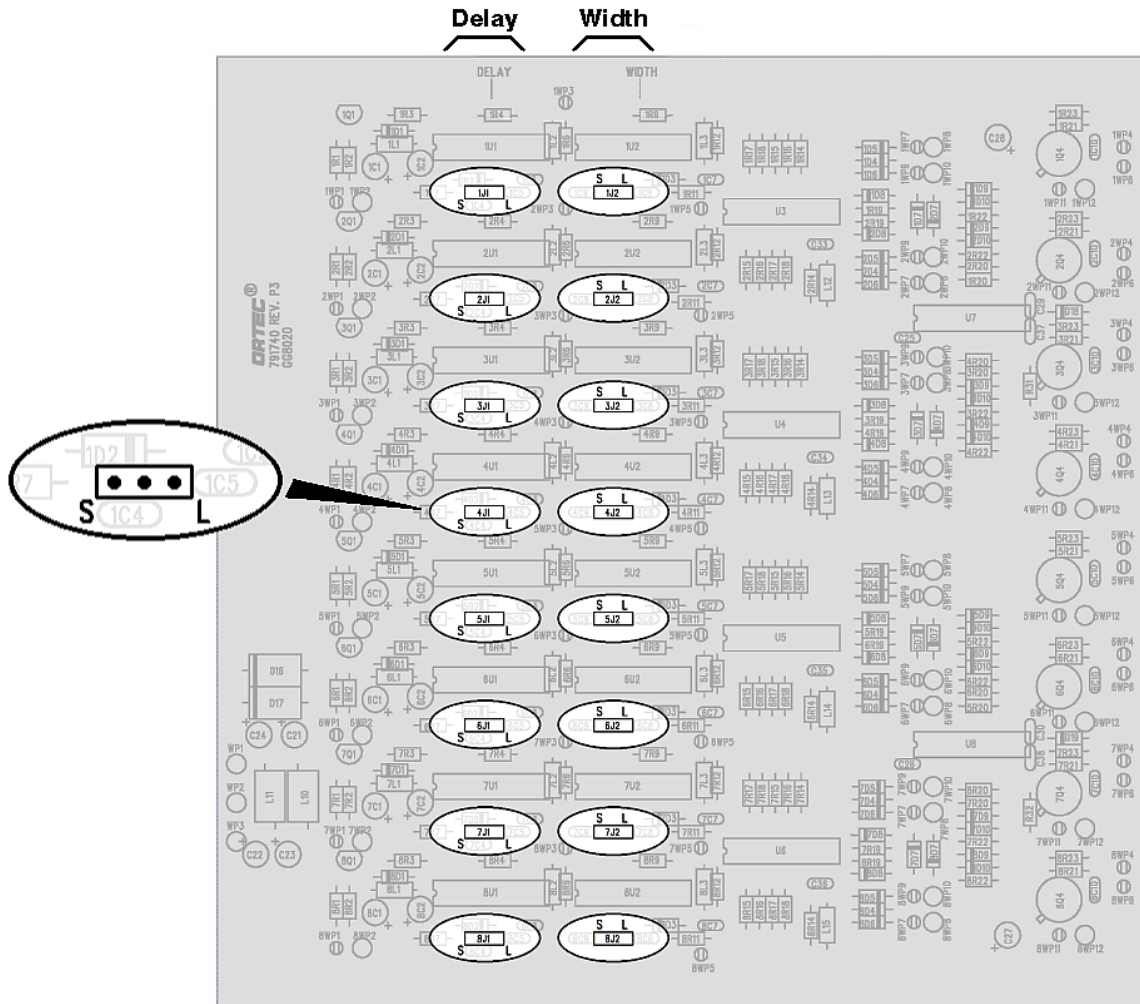


Fig. 1. Independent DELAY and WIDTH Jumpers for Each Channel.

To access the DELAY and WIDTH jumpers, remove the left side panel of the Model GG8020 (as viewed from the front).

Pay particular attention to the cables used to ensure that the cable impedance matches the 50 Ω input

impedance of the Model GG8020 and that the output is terminated in 50 Ω . Cable lengths should be kept as short as possible.

**Bin/Module Connector Pin Assignments
For Standard Nuclear Instrument Modules
per DOE/ER-0457T.**

Pin	Function	Pin	Function
1	+3 V	23	Reserved
2	-3 V	24	Reserved
3	Spare bus	25	Reserved
4	Reserved bus	26	Spare
5	Coaxial	27	Spare
6	Coaxial	*28	+24 V
7	Coaxial	*29	-24 V
8	200 V dc	30	Spare bus
9	Spare	31	Spare
*10	+6 V	32	Spare
*11	-6 V	*33	117 V ac (hot)
12	Reserved bus	*34	Power return ground
13	Spare	35	Reset (Scaler)
14	Spare	36	Gate
15	Reserved	37	Reset (Auxiliary)
*16	+12 V	38	Coaxial
*17	-12 V	39	Coaxial
18	Spare bus	40	Coaxial
19	Reserved bus	*41	117 V ac (neutral)
20	Spare	*42	High-quality ground
21	Spare	G	Ground guide pin
22	Reserved		

Pins marked (*) are installed and wired in ORTEC's 4001A and 4001C Modular System Bins.