Phillips Scientific
Quad Gate/Delay Generator
NIM MODEL 794

FEATURES
* Four Independent Gate/Delay Channels
* Wide Range, 50 nSec to over 10 Seconds
* NIM, TTL Inputs; NIM, TTL, ECL Outputs
* Deadtimeless Operation
* Set/Reset Flip-Flop Mode
* Remote Programming via a 0 Volt to 10 Volt Input
* Easily Configured as an Oscillator or a Pulser
* Provides Bin Gate for Host NIMBIN

GENERAL DESCRIPTION

The Quad Gate/Delay Generator, Model 794, complies fully with the NIM specification TID-20893 and is packaged in a single width module. In monostable mode, Gate/Delay periods may be adjusted either locally or remotely from less than 50nSec to more than 10 seconds. Each channel also operates in a Set/Reset flip-flop mode. A bright LED indicates an active gate condition. Versatile input and output structures provide compatibility with NIM, ECL, and TTL standards. Further flexibility is afforded by programming jumpers mounted on the printed circuit board. These jumpers allow selected inputs and outputs to be assigned alternate logic functions or polarities.

Time-Base Section

The model 794 time-base circuit is non-updating and exhibits essentially no deadtime. Monostable Gate/Delay periods are selected by a combination of the RANGE switch and an analog programming input. A monitor test point provides a 0 to 1 Volt output which is proportional to the Gate/Delay period. Setting the Gate/Delay period with an oscilloscope is easily accomplished by pushing the TRIGGER pushbutton. Depressing this switch for more than 0.5 seconds causes the time-base to retrigger at a 1 KHz rate. In the bistable mode, the Gate/Delay period is equal to the interval between the arrival of the trigger and reset functions. The DELAY output always occurs at the trailing edge of the GATE output and it's output width may be adjusted by a front panel potentiometer.

Input Section

There are three ways to trigger the Model 794: (1) TRIGGER Input; (2) OR Input; (3) TRIGGER pushbutton. These functions are enabled in both monostable and bistable modes.

(1), The TRIGGER input is compatible with both positive TTL levels and negative NIM logic. This input presents a high impedance to positive signals and 50 ohms to negative signals. The time-base triggers on the leading edge of the input pulse regardless of its logic type. The gate period is independent of the TRIGGER pulse width.
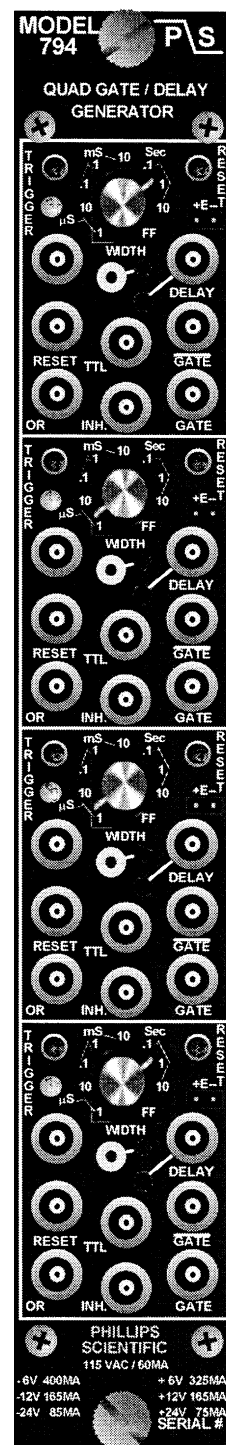
Input Section (Continued)

(2), OR is a negative NIM logic input which is configured with program jumpers. The OR input is always logically OR'ed with the time base output. Assuming a quiescent time base, the GATE output width is equal to the OR input width. A program jumper enables an alternate OR mode in which the OR input also triggers the time-base. This mode produces a GATE output equal to the width of the OR input or the preset time, whichever is greater. An additional jumper allows OR to be a high impedance or 50 ohms. Note that the high impedance OR input allows multiple channels or multiple modules to be easily daisy-chained and triggered from a single source.

(3), The TRIGGER pushbutton offers two operating modes for manual triggering. In the single trigger pulse mode, a single output is produced by pushing and releasing the switch in less than 0.5 seconds. In retrigger mode, by pushing and holding the switch for more than 0.5 seconds produces a continuous pulse train of 1 KHz as long as the pusbutton is depressed.

In the bistable (FF) position, when the channel is triggered or SET, it remains in that state until reset by the negative NIM compatible RESET input or the RESET pushbutton. The TRIGGER and OR inputs are inhibited from setting the channel when RESET is present. The RESET input is enabled only in the bistable mode.

INHIBIT is a negative NIM compatible input. All outputs are forced to their quiescent state whenever INHIBIT is present. GATE transitions resulting from INHIBIT do not generate DELAY outputs.

A special feature of the Model 794 is the ANALOG PROGRAMMING input. Enabled by program jumpers, each input accepts 0 to +10 Volt levels and produces a 5% to 105% adjustment of the selected range. The analog voltage is received differentially to relieve the noise and common mode offsets associated with long cable runs.

Output Section

Each channel has five (5) outputs. GATE, complemented GATE, and DELAY are negative NIM current source outputs governed by the trigger rules described above. TTL is a TTL compatible output which can be assigned to either the GATE or DELAY function. A second jumper associated with TTL provides a true or complement feature. ECL is a differential ECL output conforming to CERN Note EP 79-01 and is jumper programmed to be identical to either GATE or DELAY outputs.

Bin Gate Description

The model 794 is capable of driving the bin gate of the host bin. A switch mounted on the rear panel enables or disables the BIN GATE feature. Individual channels are selected to supply this gate signal via program jumpers. More than one channel may be selected resulting in a Bin Gate which is the logical OR of the selected channels.

MANUAL CONTROL SUMMARY

Range Switch :

A ten position rotary switch selects one of eight full scale times for the monostable range. The remaining two positions are for bi-stable (FF) mode. RANGE positions are: 1µSec, 10µSec, 0.1mSec, 1mSec, 10mSec, 0.1 Sec, 1 Sec, 10 Sec, and two Flip-Flop positions.

Trigger Pushbutton :

Provides a manual trigger function. Single trigger mode is implemented by pressing and releasing in less than 0.5 Seconds. Retrigger mode is implemented by pressing and holding for more than 0.5 Sec. A LED indicates a triggered condition.

Reset Pushbutton :

Provides a manual reset function.

Gate Width Potentiometer :

A 15-turn screwdriver adjustment controls the monostable time-base from approximately 5% to 105% of the selected range in local programming mode. The potentiometer is disabled in remote programming and bistable modes.

Delay Output Width :

A 15-turn screwdriver adjustment controls the width of the delay output from 10nSec to 100nSec. Ocurrs at the trailing edge of the GATE time.

PHILLIPS SCIENTIFIC MODEL 794
FUNCTIONAL BLOCK DIAGRAM

ONE OF 4 CHANNELS
PROGRAM JUMPERS SHOWN 'AS SHIPPED'

COMMON TO ALL CHANNELS
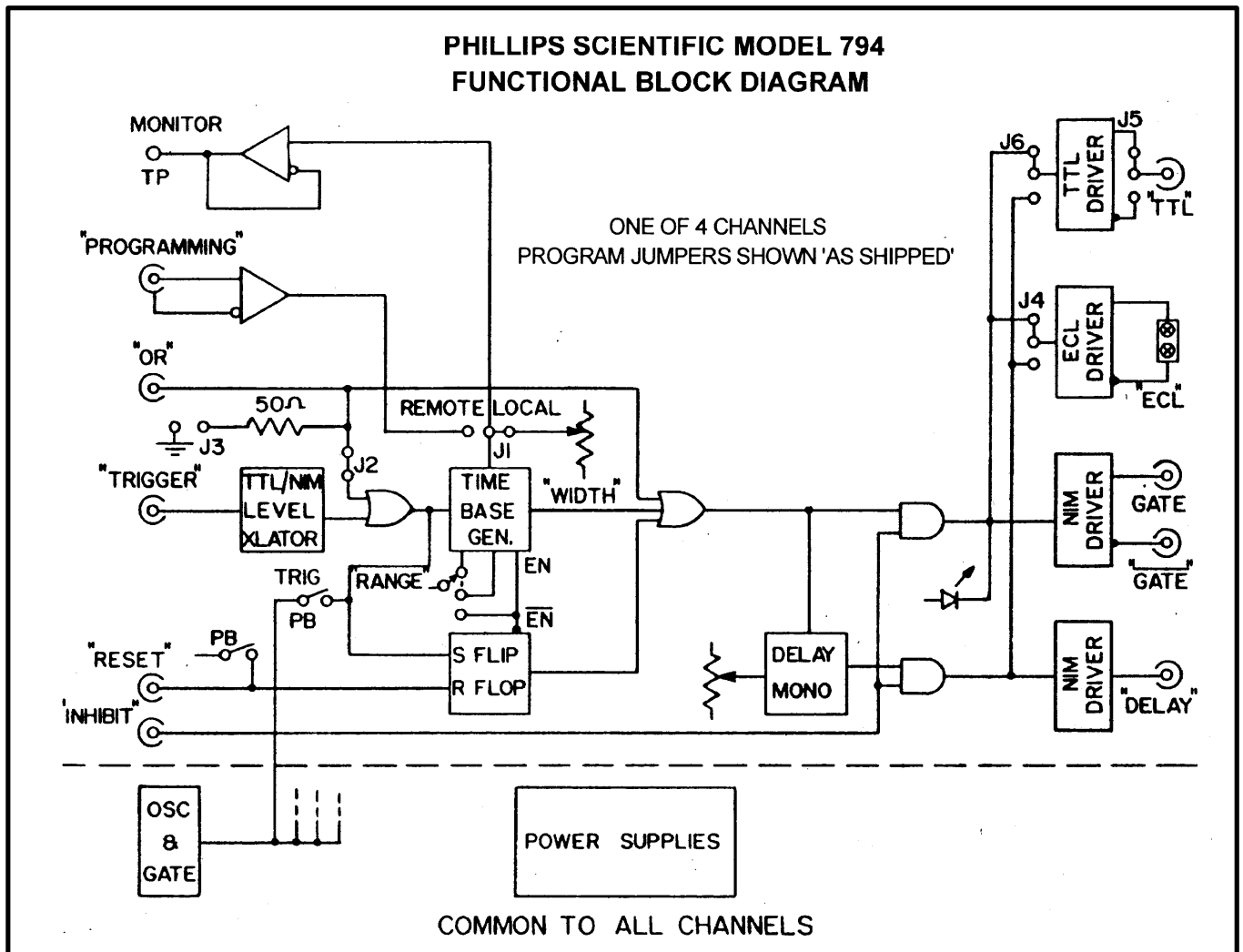
INPUT CHARACTERISTICS

Trigger :

LEMO style connector; 1 K ohm impedance for positive TTL logic levels; 50 ohm for negative NIM logic; Positive LOGIC 0: less than +0.5 Volt; LOGIC 1: greater than +1.5 Volt. Negative NIM logic levels; LOGIC 0: less than ±1mA, (±50mV), LOGIC 1: –14mA, (–700mVolt).

OR :

LEMO style connector; Negative NIM level input, LOGIC 0 = ±50mVolts, LOGIC 1 = –700mVolts.
A jumper allows selection of 50 ohm or 1 K ohm input impedance;
"OR is shipped as high impedance input OR".

Inhibit :

LEMO style connector; Negative NIM input levels; 50 ohm impedance. Forces all outputs to their quiescent state.

Reset :

LEMO style connector; Negative NIM input levels; 50 ohms; Enabled only in bistable mode.

Analog Remote Programming :

Isolated ground LEMO style connector; High impedance, differentially received; An external analog input allows remote programming from 5% to 105% of selected range with 0 to +10 Volt input.
Maximum input voltage: Differential = –6 Volt to +12 Volts.
Common Mode = ±6 Volts.
Recommended Input Voltage: Differential = 0 to +10.0 Volts.
Common Mode = ±0.5 Volt.

OUTPUT CHARACTERISTICS

Gate :

Negative NIM current source output; –16mA, (–800mV into 50 ohms). Output duration equals the RANGE SWITCH setting in conjunction with the GATE WIDTH control setting.

Gate :

Negative NIM current source output; The complement of GATE output.

Delay :

Negative NIM output pulse; Begins at the trailing edge of GATE output; Width is adjustable from 10nSec to 100nSec.

TTL :

A TTL logic level output; Capable of driving a single 50 ohm load or up to 60 standard TTL inputs. LOGICAL 1 = 2.7 Volt min. @ 45mA max; LOGIC 0 = 0.5 Volt max. @ –100mA max; The TTL output can be jumper selected to be GATE, DELAY or their complements.
<p align="center">"<u>TTL is shipped as GATE</u>".</p>

ECL Outputs :

ECL is a two pin header; 0.025" posts on 0.1" centers. Output is a differential 100 ohm line driver. Jumper selected to be GATE, DELAY or their complements.
ECL + : Quiescently LOGIC 0 = –1.7 Volt typ. LOGIC 1 = –0.90 Volt typ.
ECL – : Quiescently LOGIC 0 = –0.90 Volt typ. LOGIC 1 = –1.7 Volt typ.
<p align="center">"<u>ECL is shipped as GATE</u>".</p>

PERFORMANCE SUMMARY

Propagation Delay :

TRIGGER to:	RESET to:
GATE = 11nSec max.	GATE = 11nSec max.
TTL = 20nSec max.	TTL = 20nSec max.
ECL = 11nSec max.	ECL = 11nSec max.
OR to:	INHIBIT to:
GATE = 8nSec max.	GATE = 6nSec max.
TTL = 15nSec max.	TTL = 15nSec max.
ECL = 8nSec max.	ECL = 8nSec max.

Dead Time :

The channel may be retriggered immediately upon the completion of the GATE output transition.

Time Jitter :

Less than 0.03% of range.

Temperature Stability :

Less than 400 ppm/ $^{\circ}$C from 20 $^{\circ}$C to 50 $^{\circ}$C.

Power Supply Rejection :

GATE width will not change by more than 0.04% of setting for ±5% change in any power supply.

Power Supply :
Requirements

+ 6V @ 325 mA	+12V @ 165 mA	+24V @ 75 mA
– 6V @ 400 mA	–12V @ 165 mA	–24V @ 85 mA
	115 VAC @ 60 mA	

Note: All currents are within NIM specification limits permitting a full powered bin to be operated without overloading.

Operating Temperature :

0 $^{\circ}$C to 70 $^{\circ}$C ambient.

Packaging :

Standard single width NIM module in accordance with TID-20893 and Section ND-524.

Quality Control :

36 hour cycled burn-in with switched power cycles.