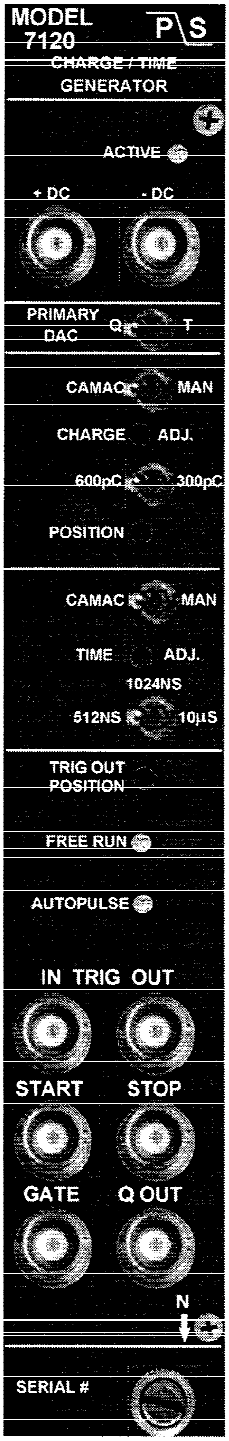
Phillips Scientific

Precision Charge/Time Generator

CAMAC MODEL 7120

FEATURES

* Calibrated CHARGE and TIME outputs
* MANUAL or CAMAC control of either or both CHARGE and TIME outputs
* 16-Bit DAC reference for precise CAMAC control of primary outputs
* CHARGE OUT simulates fast PMT and wire chamber signals
* –300 pC and –600 pC full scale CHARGE ranges
* CHARGE OUT timing relative to GATE OUT is variable
* GATE OUT is width programmable 0 - 10µSec, 3 ranges
* START and STOP OUT coincident with leading and trailing edges of GATE
* ±DC OUT track selected Primary DAC output, ±5V or ±10V full scale
* CAMAC triggering, external triggering, or FREE RUN modes
* VARIABLE delay TTL TRIGGER OUT provides a flexible scope trigger
* BNC connectors used for all signals
* Autopulse Mode for Verification of Discriminator Thresholds



DESCRIPTION

The Model 7120 is a calibrated programmable Charge Source/Time Interval generator packaged in a double width CAMAC module. It was specifically designed for testing and calibrating charge-to-digital and time-to-digital converter circuits.

The various full scale ranges and operating modes of the Model 7120 are selected by front panel switches which provide full manual control of all operating modes. The positions of these switches can be read out via CAMAC. Control of CHARGE and TIME outputs is either MANUAL via front panel 15-turn potentiometers or CAMAC via internal Digital to Analog Converters (DACs).

The 7120 contains a Primary DAC (16 bits) and a Secondary DAC (8 bits) for precise CAMAC control of its outputs. A two-position toggle switch (PRIMARY OUT) is used to select whether the CHARGE output or the TIME outputs (GATE, START, STOP) will be connected to the Primary DAC. The non-primary section (TIME or CHARGE) gets connected to the SECONDARY DAC. When testing a gated current integrating ADC, the PRIMARY DAC output would normally be CHARGE, so as to provide finer control over the CHARGE OUT signal as compared to the GATE signal. The TIME outputs would be selected as Primary when testing TDCs, or whenever finer control over the time interval is desired. The ±DC outputs always track the section designated as the Primary DAC, regardless of the position of its CAMAC/MANUAL switch.

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OUTPUT CHARACTERISTICS

Charge Output : *Negative going pulse very similar in shape to typical fast PMT signals (see plot on last page). There are two full scale charge ranges, selected by a front panel toggle switch: –600 pC and –300 pC, which deliver –3.5 Volts and –1.75 Volt respectively into 50 ohms. Timing of Q OUT relative to the leading edge of the GATE output is controlled by a 15-turn pot. The charge pulse can be positioned to precede the GATE by at least 20nSec or to occur anywhere within the selected full scale time range.*

Gate Output : *-32mA current source back terminated with 50 ohms; produces -1.6 V into high- impedance load (1K ohm), and –800mV into 50 ohms. Rise and fall times less than 1.5nSec. The GATE output is active from the leading edge of the START output to the leading edge of the STOP output. Note that due to finite rise and fall times gates with widths less than 4nSec will start to lose amplitude.*

Start and Stop Outputs : *-32mA current sources back terminated with 50 ohms; produces -1.6 V into high-impedance load (1K ohm), and –800mV into 50 ohms. Rise and fall times less than 1.5nSec; pulse widths 50nSec. START to STOP full scale time interval as measured from leading edge to leading edge is determined by the TIME RANGE switch setting. Linearity is 11 bits (0.05%), accuracy is ±2% of selected full scale. START to STOP time jitter is less than 50pSec RMS on the 512nSec range, and proportionately greater on the other time ranges.*

±DC Outputs : *Positive and negative DC voltage outputs, current limited to 100mA. Output magnitudes of either can be set via internal jumpers to be 0 to 10V or 0 to 5V. The position of these jumpers may be read by CAMAC. The magnitude of the output voltages is determined by the TIME or CHARGE section designated to be Primary and will, therefore, be set by the Primary DAC when in CAMAC mode or by the appropriate front panel pot when in MANUAL mode. Output slew rate is typically 1 V/mSec.*

Trigger Output : *Positive-going pulse, quiescently at 0 V, approximately 20nSec wide, risetime less than 3nSec; capable of delivering 4 Volts into 50 ohms. The position of the output pulse relative to the leading edge of the GATE and START outputs is variable anywhere within and slightly exceeding the selected time range via a 15-turn pot.*

INPUT CHARACTERISTICS

Trigger Input : *Accepts a standard (-16 mA) NIM pulse, 50 ohm input impedance. The leading edge of the TRIGGER IN signal will cause the 7120 to execute one cycle. This input will also terminate the FREE RUN mode. Input rates should not exceed 10KHz to maintain settling time requirements within the module.*

FRONT PANEL CONTROLS

Primary Out : *A two position toggle switch determines which section (CHARGE or TIME) is controlled by the 16-bit DAC when under CAMAC control.*

Charge Mode : *Two position toggle switch selects either CAMAC or MANUAL control of Q OUT.*

Charge Adjust : *15-turn pot, active when charge mode is MANUAL. Allows for manual adjustment of Q OUT from 0 pC to the selected full scale Charge range.*

Charge Range : *Two position toggle switch selects either -300pC or -600pC full scale for Q OUT.*

Time Mode : *A two position toggle switch selects either CAMAC or MANUAL control of the GATE and START/STOP outputs.*

FRONT PANEL CONTROLS (continued)

Time Adjust : *15-turn pot, active when Time mode is MANUAL. Allows for manual adjustment of the GATE and START/STOP time intervals over the selected TIME full scale range.*

Time Range : *Three position toggle switch, selects the full scale time interval for the GATE and START/STOP intervals: 512nSec, 1024nSec, or 10µSec.*

Trigger Out Position : *15-turn pot, position the TRIG OUT pulse relative to the leading edge of the GATE OUT signal.*

Free Run : *Momentary pushbutton, causes the 7120 to cycle at a 10KHz rate. Amplitudes and intervals are as they were before this mode was entered. Free run mode is automatically terminated upon receipt of a CAMAC execute command or a TRIG IN signal.*

Autopulse : *Momentary pushbutton, causes the 7120 to enter the Autopulse mode. The 7120 will automatically cycle at a 10KHz rate, with its Primary amplitude ramping from 0 to its full scale value in approximately 1 second. If an external TRIG IN is received during this time, the ramp will stop at its current value and the AUTOPULSE light will go on. Reading the value of ±DC OUT will indicate the ramp's value, which will correspond to the current TIME or CHARGE output.*
This mode is useful for quickly checking the thresholds of discriminators. Connect the Q OUT or DC OUT to the input of the discriminator; the discriminator output goes to the TRIG IN connector. When the light goes on, the ±DC outputs will correspond to the discriminator's threshold.

CAMAC COMMANDS

F0·A0 : *Reads the state of the switches and jumpers controlling the module. Q and X are always true.*

R8	R7	R6	R5	R4	R3	R2 R1
+DC OUT	–DC OUT	Charge Mode	Primary DAC	Time Mode	Charge Range	Time Range
Logic 0 : 5V F.S.		0 : CAMAC	0 : Charge Mode	0 : CAMAC	0 : 600pC	0 0 : Not Valid
Logic 1 : 10V F.S.		1 : Manual	1 : Time Mode	1 : Manual	1 : 300pC	0 1 : 10 µSec.
						1 0 : 512nSec
						1 1 : 1024nS.

F16·A0 : *Loads the 16-bit Primary register and executes one cycle 100µSec after S1. If the Primary output is in the MANUAL mode the DAC register is still loaded, but the 7120 outputs will continue to be controlled by the manual control. Switching back to CAMAC will cause the new value of the DAC register to take control. Q is true when in CAMAC mode, false when in MANUAL. X is always returned true.*

F16·A2 : *Loads the 8-bit Secondary register. If the Secondary output is in the MANUAL mode the DAC register is still loaded, but the outputs will not change. Switching back to CAMAC will cause the new value of the DAC register to take control. Q is true when the selected Secondary section is in the CAMAC mode, false when in MANUAL. X is always returned true.*

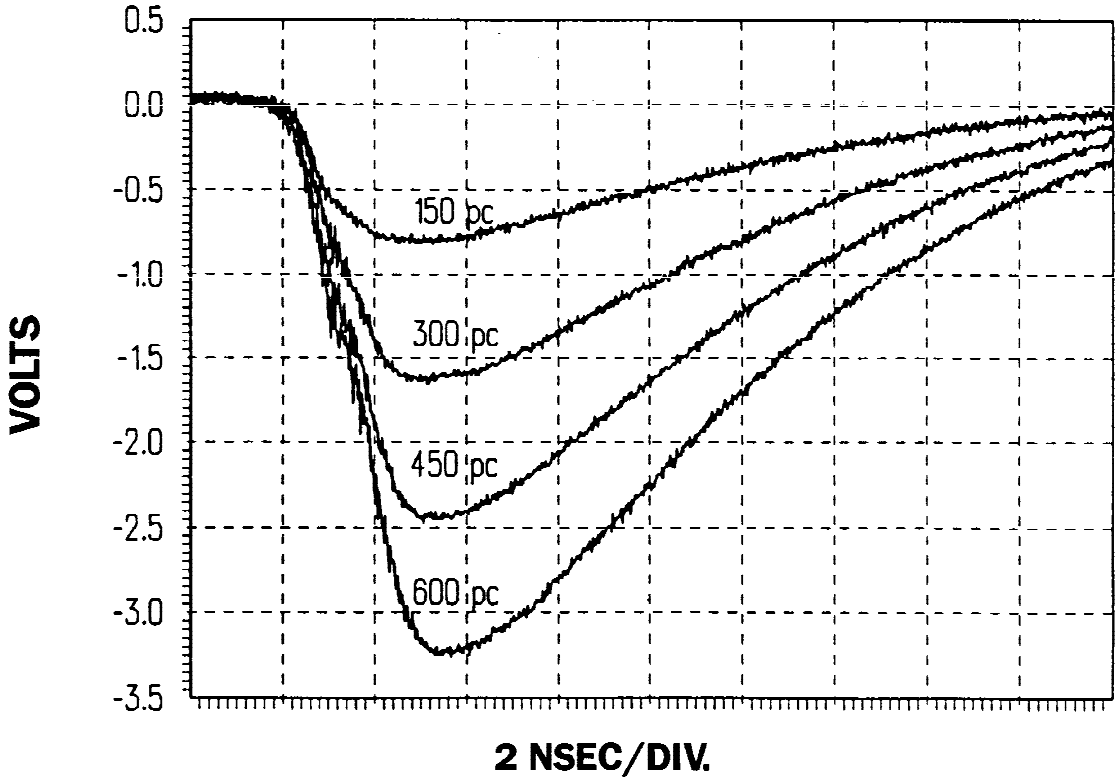
CAMAC COMMANDS (continued)

Z : *Clears both Primary and Secondary registers at S_2 time and causes a cycle to be generated. If in CAMAC mode the output value will be 0; if in MANUAL mode the value will correspond to the position of the appropriate potentiometer setting.*

GENERAL SPECIFICATIONS

Power Supply Requirements	: *+ 6V @ 1 Amp*	*+24V @ 400 mA*
	– 6V @ 1 Amp	*–24V @ 400 mA*
Operating Temperature	: *0 °C to 70 °C ambient.*	
Packaging	: *Double width CAMAC module in accordance with ESONE Report EUR 4100.*	
Quality Control	: *Standard 36 hour cycled burn-in with switched power cycles.*	

MODEL 7120 CHARGE OUTPUT INTO 50 OHMS



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