



NIM Model 3001 Multichannel Analyzer

The Model 3001 is a research grade multichannel analyzer which provides exceptional versatility at relatively low cost. The Model 3001 features:

- * 3-Mode Analysis-Charge (Q, area) and voltage (V, peak) analog-to-digital conversion and time-to-digital conversion (T, start/stop) modes mean direct compatibility with photomultiplier anodes and elimination of charge-sensitive preamps and time-to-amplitude converters (TAC's).

- * High Sensitivity-Q = 0.25 pC sensitivity in charge mode, V = 1 mV resolution in peak mode (0 to 1 or 0 to 10 volt inputs), and T = 100 psec resolution in time mode mean direct compatibility with low-level signals from a variety of sources and the ability to precisely measure short time intervals.

- * Segmentable Memory-4 x 256 (quadrants) or 1 x 1024 (full scale) gives the flexibility to accumulate, display, and compare up to four different spectra or to display quadrants of a full 1024-channel spectrum.

- * High Count Capacity-216 - 1 (65,535) counts capacity permits enough data accumulation to satisfy applications including cosmic ray and high energy experiments and many nuclear spectroscopy and Mossbauer applications.

- * Nanosecond Logic Functions-Internal

triggering mode permits the 3001 to be used as a stand-alone device, while the external modes permit either internal gate generation upon application of an external trigger, or direct application of an external gate signal.

- * Choice of I/O-Interfaces, through accessory modules, to an X-Y plotter, line printer, or the CAMAC dataway.

- * Compact Packaging-Complete 1024-channel analyzer, compactly packaged in a #2 NIM-standard module, gives greater portability, lower cost, and enhanced reliability.

- * Versatile Display-Highly accurate digitally derived logarithmic and linear display permits viewing the memory content at optimum amplitude resolution.
- * Drives Any X-Y Scope-The use of the 3001 with any external X-Y scope in your lab means smaller basic analyzer size, greater mobility, and saves you the expense of a built-in scope which you may already have available.

SPECIFICATIONS

NIM Model 3001 qVt MULTICHANNEL ANALYZER

GENERAL OPERATIONAL CHARACTERISTICS	
Analysis Modes:	
• 0:	Current integrating (charge sensitive); integration interval 20 nsec to 1 usec; full scale, 256 pC +/- 10% sensitivity, 0.25 pC/channel.
• V:	Peak voltage; input signal rise time, ≥ 50 nsec; full scale, + 1 volt or + 10 volt +/- 10%; resolution, 1 mV or 10 mV/channel; external gate width, 100 nsec minimum to 1 usec or switch selectable 5 /sec maximum.
• T:	Time interval (Start/Stop); full scale internally switch-selectable, 102 or 1024* nsec +/- 10%; resolution, 100 psec and 1 nsec respectively.
Number of Channels:	1024 (10-bits); 256 (8-bits) in quadrants; overflow counts are stored in the last address of the selected memory segment.
Memory Size:	16 bits - 1 per channel (65,535 counts).
Digitizing Time:	12 usec + 0.05 usec/channel.
Temperature Stability:	+/- .03% of full scale/OC.
Long-Term Stability:	+/- 0.2% of full scale/week, maximum.
Integral Non-linearity:	+/- 0.25% of reading +/- 2 channels.
Display:	100 sweeps/second
Channel Intensification:	Every 10th or 50th channel, front-panel selectable.
PHYSICAL CHARACTERISTICS	
Packaging:	#2 width, RF-shielded NIM-standard module, conforming to specifications outlined in AEC Report TID-20893.
Voltages Used:	+/- 24 volts, +/- 12 volts (Note: a rear-panel switch permits operation from +/- 6 volts (if available) instead of +/- 12 volts.)
Current Requirements:	+24 V at 24 mA -24 V at 125 mA + 12 V at 06 mA - 12 V at 127 mA + 6 V at 1.35 A - 6 V at 510 mA Note: +/- 6 V requirements add to +/- 12 V requirements when +/- 6 V option is unused.
Front-Panel Connectors:	BNC.
INPUT CHARACTERISTICS	
Analog Input (Q and V Modes):	Direct-coupled; impedance, 50 Ohm optionally, 93 Ohm in V mode; protected to +/- 100 volts for 1 Asec; linear range, 0 to - 1 volt in Q mode, 0 to + 1 volt in V mode.
External Gate/External Trigger Start/Internal	One Common front-panel connector; functionally controlled by trigger mode switch; requires - 600 mV signal into 50 Ohm.

Gate View:	
<ul style="list-style-type: none"> Q and V Modes: 	In External Gate (EXT. GATE) mode, the gate width is equal to the duration of the gate pulse applied to this connector. In External Trigger mode (EXT. TRIG), the internal gate is triggered by the leading edge of a fast NIM signal applied to this connector (min. trigger width, 10 nsec). In Internal (INT) mode, the internally-generated gate may be viewed at this connector. Amplitude - 100 mV.
<ul style="list-style-type: none"> Q Mode: 	Usable gate duration, 20 nsec to usec.
<ul style="list-style-type: none"> V Mode: 	Minimum duration, 1 00 nsec. Maximum duration, 5usec. (Gate must enclose peak of input signal to be measured.)
<ul style="list-style-type: none"> T Mode: 	The leading edge of Start input begins the start-stop time measurement; minimum pulse width, 10 nsec. External trigger mode only.
Inhibit/Stop:	One common front-panel connector; requires - 600 mV into 50 Ohm.
<ul style="list-style-type: none"> Q and V Modes: 	Conversion is inhibited by application of a NIM inhibit signal. This level must be established before, and persist at least 20 nsec after the leading edge of the gate trigger. Inhibit is ignored after conversion is begun.
<ul style="list-style-type: none"> T Mode: 	Leading edge of stop pulse terminates the interval measurement; minimum pulse width, 10 nsec.
FRONT PANEL CONTROLS	
Gate Width	Front-panel multiturn gate width control for Internal and External Trigger mode operation with range of 20 nsec to 1 usec (5 usec switch-selectable in longer time range). getting stability +/- 1 % or 1 nsec, whichever is greater. Output monitors permit switch-selectable viewing of internal gate pulse for precise adjustment. Lower level discriminator triggers internal gate.
<i>Note: 'Range 120 to 1120 nsec for above.</i>	
Threshold:	Front-panel screwdriver-adjustable potentiometer determines threshold setting in internal trigger (INT) mode. Range, - 1 mV to - 15 mV in Q mode, + 1 mV to + 15 mV in V mode. Front-panel monitor point gives output voltage equal to 1000X actual threshold setting. Threshold stability < 0.2%/°C over 20°C to 60°C operating range.
Operating Mode:	One of the three analysis modes (Q, V, or T) is selected by a 3-position switch.
Trigger Mode:	A 3-position switch selects internal trigger operation (INT), External Trigger operation (EXT TRIG), or operation via an externally-applied gate pulse (EXT GATE).
Continuous/Stop at Overflow:	A 2-position switch either permits continuous data collection and display or limits each channel to a full scale capacity.
Intensify:	Either every 10th or every 50th channel is intensified on the display, determined by a front-panel 2-position switch.
Display LIN/LOG:	Selects linear or logarithmic display.
Start/Stop:	Front-panel two-position, spring-return toggle switch. Start position initiates new measurement cycle after a Stop or Clear. Stop position stops measurement cycle.
Clear:	Front-panel spring-return toggle clears all memory and register. Start/Stop switch must be simultaneously placed in stop position.
Memory Select:	In the Full position, all 1024 channels accept and display input data. Full-1/4-2/4-3/4-% In the 1/4 position, the first quadrant (256 channels) accepts and displays input data. Full-scale range settings remain the same (i.e., 256 pC, + 1 volt, and 102 or 1024 nsec); similar for 2/4, %, %.
Vertical Gain:	In LIN (linear) mode, an 8-position switch selects a maximum number of counts to be displayed per channel, between 512 and 65 k.
FRONT PANEL INPUTS	

Q Input:	Analog input; 50 Ohm impedance; dc coupled. Accepts input charge of 0 to 256 pC. Protected to +/- 1 00 volts.																
V Input:	Analog input 50 Ohm impedance (93 optional). Accepts input voltage of 0 to + 1 V (with switch selection 0 to 1 0 V range). Protected to +/- 1 00 volts.																
Gate Input/Output:	Multifunctional connector. Acts as trigger or gate input/output in Q or V mode. Acts as start input in T mode. Input impedance 50 Ohm. Accepts NIM fast signals. (See detailed specifications.)																
Inhibit/Stop	Accepts fast NIM signals. Acts as inhibit in Q or V mode and stop input in T mode. Impedance 50 Ohm.																
FRONT PANEL OUTPUTS																	
Threshold Test Point:	Reads 1000X preset threshold value in Internal mode operation.																
Internal Gate View:	Internally generated gate is available for oscilloscope monitoring on the Gate Connector when Internal Trigger is selected. Amplitude: - 1 00 mV.																
Internal Gate Test Point:	Internally-generated gate is available for oscilloscope monitoring when Internal or External Trigger mode is selected. Amplitude: - 200 mV.																
Busy:	TTL low level output during conversion time.																
Horizontal Out:	Horizontal deflection voltage for CAT proportional to channel number; 0-5 volts for full or quadrant display. Minimum load impedance 1 kOhm.																
Vertical Out:	Vertical deflection voltage for CRT proportional to number of counts. Linearity +/- 0.2% of full scale. Full-scale output of 5 volts corresponds to 200 db/volt in the log mode. Minimum load impedance 1 kOhm.																
REAR PANEL OUTPUTS																	
Connector Type:	44-contact card-edge connector; mates with AMP 582358-2 (hood number 530087-4).																
Memory Overflow (22):	A high TTL level* indicates channel overflow. Available during memory load only.																
External Enable (4):	Low TTL level* enables external functions accessed by the rear connector.																
External Memory Address Latch (R):	The trailing edge of a positive-going TTL-compatible* pulse of minimum duration 200 nsec. latches the address applied to the 10 Memory Address lines (A,B,C,D,E,F,G,H,J,K,L), corresponding to 20 to 29 respectively.																
Memory Enable (21):	TTL-Compatible high level* causes the contents of the memory address latched in lines A-L to be loaded into the internal incrementing register. A low level permits loading of the 16-External Data Input levels** into the Incrementing Register.																
	<table><tr><td>**Pin 6 2^0</td><td>Pin 10 2^4</td><td>Pin 14 2^8</td><td>Pin 18 2^12</td></tr><tr><td>5 2^1</td><td>9 2^5</td><td>13 2^9</td><td>17 2^13</td></tr><tr><td>7 2^2</td><td>11 2^6</td><td>15 2^10</td><td>19 2^14</td></tr><tr><td>8 2^3</td><td>12 2^7</td><td>16 11^11</td><td>20 2^15</td></tr></table>	**Pin 6 2^0	Pin 10 2^4	Pin 14 2^8	Pin 18 2^12	5 2^1	9 2^5	13 2^9	17 2^13	7 2^2	11 2^6	15 2^10	19 2^14	8 2^3	12 2^7	16 11^11	20 2^15
**Pin 6 2^0	Pin 10 2^4	Pin 14 2^8	Pin 18 2^12														
5 2^1	9 2^5	13 2^9	17 2^13														
7 2^2	11 2^6	15 2^10	19 2^14														
8 2^3	12 2^7	16 11^11	20 2^15														
External Load (N):	A low level* latches the Internal Incrementing Register. Data must be quiescent during load interval. Minimum duration 200 nsec.																
External Read/Write (M):	Causes data to be read from the memory to the Internal Incrementing Register or written in memory from the Internal Incrementing Register. Low for read, high for write.*																
Incrementing Register (P):	Leading edge of positive-going TTL level causes the contents of the incrementing register to be incremented by 1.																
*TTL levels Low: - 0.8 V; High 2.0 V																	