CANBERRA
Model 2058
DELAY
NANOSECOND

NANOSECOND DELAY
Model 2058

Instruction Manual
February, 1978

CANBERRA INDUSTRIES, INC.
45 Gracey Avenue
Meriden, Connecticut 06450

Telephone: (203) 238-2351

BASIC WARRANTY

CANBERRA - MANUFACTURED EQUIPMENT

Equipment manufactured by Canberra Industries, Inc. is warranteed against defects in materials and workmanship for a period of twelve months from date of shipment, provided that the equipment has been used in a proper manner as detailed in the instruction manuals. During the warranty period, repairs or replacement will be made at Canberra's option on a return to factory basis. The transportation cost, including insurance, to and from Canberra, is the responsibility of the Customer. Except for defects discovered upon initial operation, shipping expense to Canberra is to be paid by the customer; shipping expense to return the repaired equipment will be paid by Canberra.

The customer must obtain shipping instructions, including an Authorized Return Number (ARN), before returning any equipment to the Canberra factory. *Compliance with this provision by the customer shall be a condition of this warranty.* In giving shipping instructions, Canberra shall not be deemed to have assumed any responsibility or liability in connection with the shipment. If, upon receipt of the equipment, Canberra determines that such equipment is not defective within the terms of this warranty, the customer shall pay to Canberra, upon invoice, the cost of diagnosis at the then prevailing Canberra repair rate and the cost of return transportation.

The Canberra Basic Warranty applies only to equipment manufactured by Canberra which is returned to the factory. If equipment must be repaired at the customer's site, the actual repair labor and parts will be provided at no charge during the warranty period. However, travel expenses to and from the customer's site, and living expenses while on site, shall be paid by the customer unless an On-Site Warranty Option has been purchased. This option may only be purchased prior to shipment of the equipment to the customer.

This warranty shall not apply to Canberra equipment that has been modified or serviced by other than Canberra Service Personnel, or to failures of Canberra equipment caused by defective equipment not manufactured by Canberra.

The Express warranties set forth herein are the only warranties with respect to the products, or any materials or components purchased from others and furnished by Canberra, and there are no other warranties, expressed or implied. The warranty of merchantibility is expressly limited as herein provided and all warranties of fitness are expressly disclaimed and excluded. Canberra shall have no liability for any special, indirect or consequential damages, whether from loss of production or otherwise, arising from any breach of warranty hereunder or defect or failure of any product or products sold hereunder.

EXCLUSIONS

Warranty service is contingent upon the proper use of all equipment and does not cover equipment which has been modified without Canberra's written approval or which has been subjected to unusual physical or electrical stress as determined by Canberra Service personnel. Canberra Industries shall be under no obligation to furnish warranty service (preventive or remedial): (1) if adjustment, repair or parts replacement is required because of accident, neglect, misuse, failure of electrical power, air conditioning, humidity control, transportation, or causes other than ordinary use: (2) if the equipment is maintained or repaired or if attempts to repair or service equipment are made by other than Canberra personnel without the prior approval of Canberra.

This warranty does not cover detector damage caused by warm-up or by neutrons or heavy charged particles. Damage from these causes is readily identifiable as described in the manual accompanying each detector.

EQUIPMENT NOT MANUFACTURED BY CANBERRA

Canberra's basic one-year warranty applies only to equipment manufactured by Canberra. Although Canberra may frequently supply, as part of systems, equipment manufactured by other companies, the only warranty that shall apply to such non-Canberra equipment is that warranty offered by the original manufacturer if any.

Canberra will, upon request, offer, as an option, warranty coverage for non-Canberra equipment such as computers and peripherals sold as part of a system supplied by Canberra. Quotations on this coverage may be obtained by contacting Canberra Nuclear Systems Division.

SOFTWARE

Canberra warrants proper system operation *only* with programs developed by Canberra using the operating system supplied to the customer. Canberra assumes no responsibility for user-written programs or programs published as part of information exchange in Canberra periodicals.

Engineering assistance for software development is available and can be contracted through the Canberra Nuclear Systems Division Sales Department.

INSTALLATION

Installation of equipment purchased from Canberra shall be the sole responsibility of the customer unless the installation is specifically contracted for at the prevailing Canberra field service rates. To insure timely installation after receipt of equipment, it is recommended that installation be contracted for at the time the equipment is ordered.

ON-SITE WARRANTY OPTION

The On-Site Warranty Option provides for free on-site warranty work (Canberra pays all travel and living expenses) within the first 90 days after delivery of equipment to the customer. If installation is ordered from Canberra, the 90 day period commences upon completion of the initial installation. After the 90 day period, labor and materials used on site will still be covered by the basic warranty, but the customer shall pay for all travel and living expenses incurred for any on-site service.

A maintenance contract may be purchased covering the period after the 90 days on-site warranty period, or after initial installation of the equipment. This is to be contracted through Canberra's Nuclear Systems Division.

REPAIRS

Any Canberra-manufactured instrument no longer in its warranty period may be returned, freight prepaid, to our factory for repair and realignment. When returning instruments for repair, contact the Customer Service Department for shipping instructions and an Authorized Return Number (ARN).

All correspondence concerning repairs should include Model Number and a description of the problem observed.

Once repaired, all equipment passes through our normal pre-shipment checkout procedure. Return shipping expense on out-of-warranty repairs will be charged to the customer.

For instruments out of warranty, the customer must supply a purchase order number for the repair before the item will be returned to him.

SHIPPING DAMAGE

Shipments should be carefully examined when received for evidence of damage caused by shipping. If damage is found, immediately notify Canberra and the carrier making delivery, as the carrier is normally responsible for damage caused in shipment. Carefully preserve all documentation to establish your claim. Canberra will provide all possible assistance in processing damage claims.

Due to the delicate nature of cooled detectors [Ge(Li) and Si(Li)] Canberra requires that delivery to and from air freight terminals be handled with special care. Do not ship such Detectors without first obtaining advice from our Traffic Department.

REVISION B
July 1, 1978

CANBERRA

Model 2058 Nanosecond Delay

Features

- Up to 63.5 nanoseconds output delay selected in 0.5 nanosecond increments
- Typical ±20 picosecond calibrated delay accuracy

Description

The Canberra Model 2058 Nanosecond Delay permits the delay of linear or logic signals in 0.5 nanosecond steps, in a range of up to 63.5 nanoseconds. As the delays are accomplished by means of interconnected coaxial cables, no power is required for operation of the module.

Seven front panel toggle switches allow the selection of 0.5, 1, 2, 4, 8 16 or 32 nanoseconds of delay time. These delays may be added in any combination. Delay times greater than 63.5 nanoseconds may be obtained by cascading several Nanosecond Delay units.

The Model 2058 is useful in the alignment of fast timing channels which operate coincidence circuits or time to pulse height converters. The high degree of accuracy in delay time selection is an aid to the calibration of such equipment.

Specifications

INPUTS

INPUT - accepts positive or negative Slow/Fast NIM logic or linear pulses, ±600 volts maximum; impedance 50 ohms; isolated front panel BNC connector

OUTPUTS

OUTPUT - provides delayed pulse, amount of delay being equal to sum of IN switches; impedance 50 ohms; isolated front panel BNC connector

CONTROLS

DELAY - seven front panel toggle switches to select delay of 0.5, 1, 2, 4, 8, 16 or 32 nanoseconds; may be added in any combination; maximum delay of 63.5 nanoseconds

PERFORMANCE

DELAY RANGE - switch selectable 0.5 to 63.5 nanoseconds in 0.5 nanosecond increments beyond minimum delay

MINIMUM DELAY - 2.0 nanoseconds (all switches in OUT position)

DELAY ACCURACY - typical ±20 picoseconds for each IN delay switch, ±100 picoseconds maximum

TEMPERATURE OPERATING RANGE - 0 - 50°C

CONNECTORS

SIGNAL INPUT, SIGNAL OUTPUT - front panel, BNC, UG-1094/U

POWER

No power required for operation

PHYSICAL

SIZE - standard single-width NIM module (1.35 x 8.714 inches) (3.5 cm x 22.1 cm) per TID-20893 (rev.)

NET WEIGHT - 1.5 lbs. (0.7 kg)

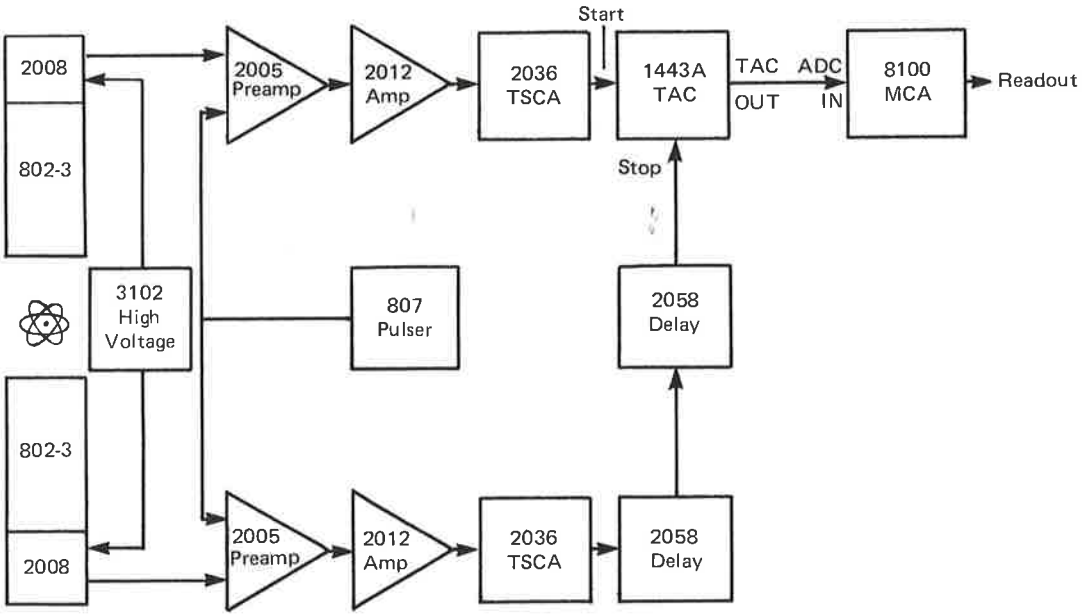
SHIPPING WEIGHT - 6.5 lbs. (2.9 kgs)

Canberra Industries, Inc. 45 Gracey Ave. Meriden, Connecticut 06450 Tel. 203-238-2351 TWX: 710-461-0192 Cable: CANBERRA

TYPICAL APPLICATION

COINCIDENCE COUNTING TECHNIQUE

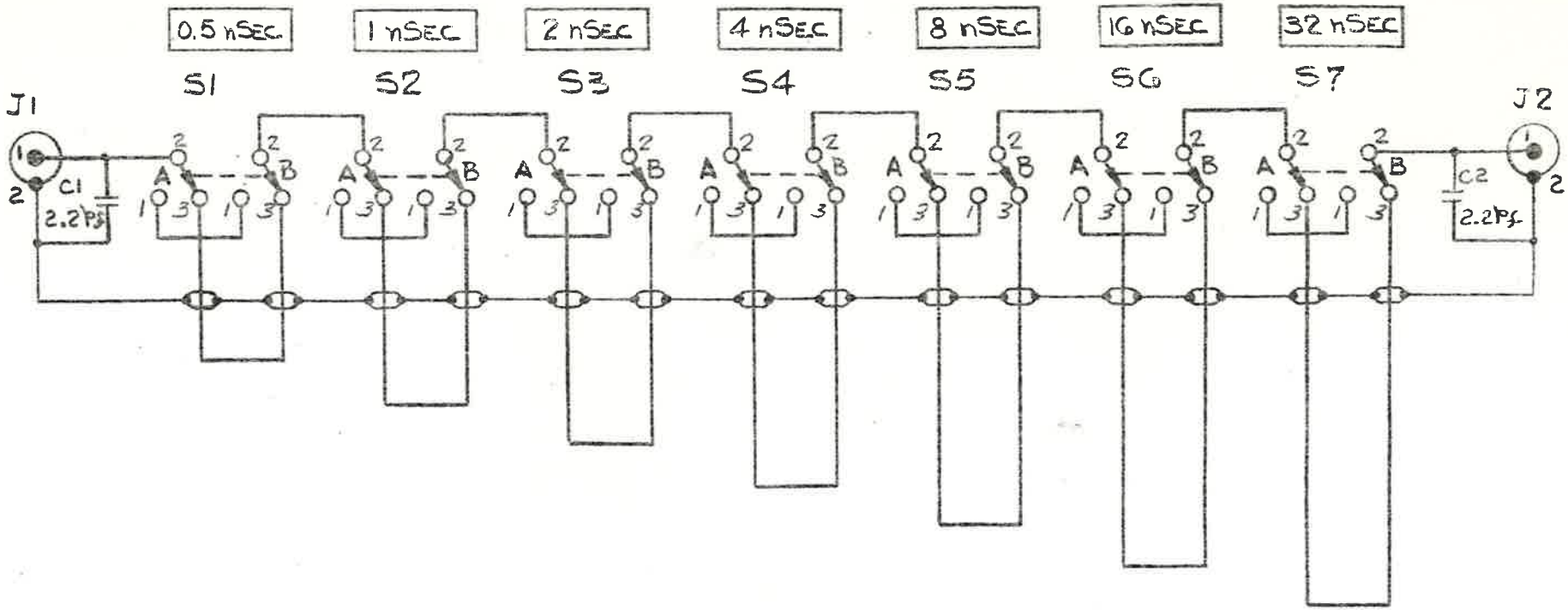
Many nuclear processes, such as decay of an excited state by gamma ray emission occur in very short times, so that a sequence of events is essentially simultaneous. The determination that two nuclear events occur at the same time is made electronically with a coincidence circuit. The coincidence circuit operates on standardized pulses and determines whether they occur within a certain time interval. The figure below illustrates a typical coincidence measurement system where the Model 2058 is used to store a spectrum in the Multichannel Analyzer calibrated in nanoseconds.



REV	CHANGE	ECN	BY	DATE	APP
A	REVISED	2546A	RAM	7-7-80	

(TYP.) ALL SWITCHES !

DELAY OUT ←- - - - - - - → DELAY IN



NOTE:

ALL CABLES ARE RG-316

DRAWN Z. PERUN	DATE 3-1-78	
CHKD	3-3-78	
APPD MECH		
APPD ELEC	3-3-78	
NEXT ASSY		

USED ON

SCHEMATIC DIAGRAM

NSEC DELAY

MODEL 2058

SCALE — DO NOT TEMPLATE DRAWING

CANBERRA

DRAWING NO. A-1717G REV. A

SHT 1 OF 1