



# FOREWORD

Progress in the very new field of radioactivity has been and will continue to be largely dependent on commercial suppliers of apparatus, supplies, and services. As one of the leaders in this new industry, NUCLEAR recognizes its responsibility and has made significant contributions to the rapid advancement of measurement techniques. Only by continued contributions can instrumentation suppliers satisfy the need and justify their existence commercially.

Many of the leading members of our staff were connected with the Manhattan Project from 1943 to 1946. In the latter year the pile-produced isotopes were first made available for non-military use, and the founders of this company commenced commercial manufacture of the instruments which are so vital to this new field. Our present design engineers, thoroughly trained and supervised by the men from the Project, control the quality and development of our instruments. This background of experience, plus a desire to constantly improve our products, produces a combination that is uniquely qualified to render a complete service to users of NUCLEAR instruments.

The research staff of NUCLEAR Instrument and Chemical Corporation is at your service at all times, not only to match our standard apparatus and supplies to your particular requirements, but also to develop special products and techniques to suit your specific need.

It is our earnest hope that the products described in the following pages will win the hearty approval of our friends everywhere.

*James A. Schoke* President

# PRECISION INSTRUMENTS

*for Nuclear*



To efficiently employ precious scientific effort, too much thought cannot be given to the selection of the proper tools. "NUCLEAR" products are designed with convenience second only to accuracy and reliability, so that the user is assured maximum usability.

**ENGINEERING & DEVELOPMENT:** The engineering and development of new and better instruments for nuclear measurement is the prime activity of our Engineering Department. It is in this department that a new product has dependability built into it. Here, also, the catalog instruments are kept "modern" by design improvements.

**MANUFACTURING:** On the Production line, where carefully trained personnel build all cataloged instruments, extreme care is taken to mount all parts

rigidly, to cable all wiring neatly, to individually select certain components where necessary, and to take other precautions to assure outstanding quality and performance.

**QUALITY CONTROL:** A very small but important link in the manufacturing system is the Quality Control Department, where the components which we do not make ourselves are constantly tested to be sure that they meet our exacting specifications.

**INSPECTION & TESTING:** The quality of work done in the Inspection and Testing Department is reflected over the entire manufacturing process because the degree of care a worker exercises is directly proportional to the stiffness of the inspection he anticipates. In view of this fact, we have built up very stringent test procedures. Tests are made on all instruments to be sure they meet performance specifica-



Constant development work assures outstanding products



Customer satisfaction is the first duty of every employee

# ENTATION *Measurements*

tions. As an additional precaution, all instruments are run continuously for several days and then retested before shipment.

**SHIPPING:** Final inspection includes attachment, to the shipment, of the Instruction Manual, cables, extra connectors, etc. After careful checking and packing, the instruments are ready for shipment to the customer.

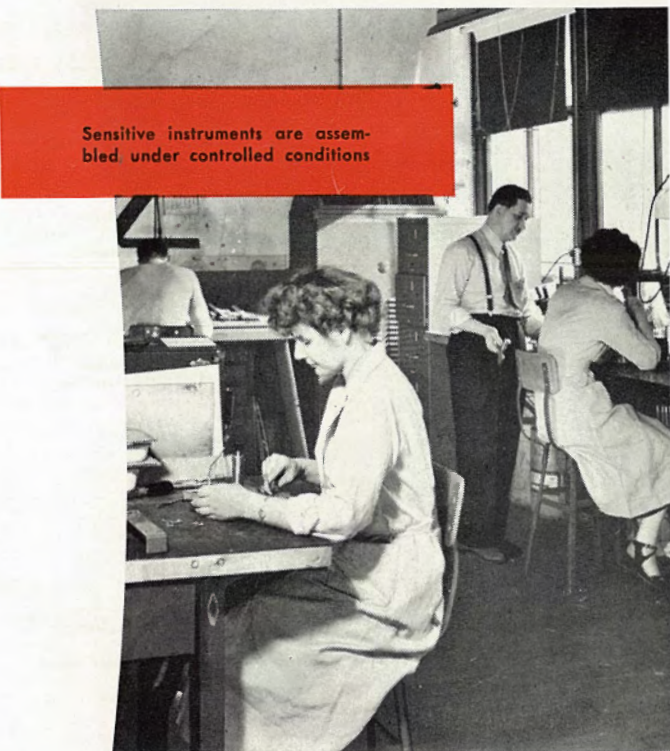
**SPECIAL PRODUCTS:** Although NUCLEAR'S line of catalog products will fit most radioactivity instrumentation problems, there are some measurement techniques that require tailor-made tools. Our thoroughly trained engineering staff is at your service, not only to modify standard products to fit your needs, but also in the development of special instruments for specific purposes.

**CHEMISTRY DIVISION:** As research in nuclear science daily penetrates more deeply into applications, especially in the medical field, the need for more available radioactive isotopes and compounds has grown. We are setting up a complete Chemistry Division to complement the services of the Instrument Division. As this catalog is prepared no final list of chemical products is available; this will be published when adequate facilities are ready to provide quick service to users.

Carefully controlled manufacture provides "built-in" quality

Sensitive instruments are assembled under controlled conditions

Radioactive compounds will complete NUCLEAR'S services



# OUR CUSTOMER LIST *is world-wide*

The following is a partial list of our customers, drawn from a total list of thousands. It is a cross-section view of the people — all over the world — who confidently use "Nuclear" instruments and services in all kinds of radioactivity research.

Abbott Laboratories  
Able Scientific Glass Apparatus Co.  
African Metals Corporation  
Air Reduction Sales Company  
Alabama Polytechnic Institute  
University of Alabama  
American Chemical Society  
American Cyanamid Company  
American District Telegraph  
American Medical Association  
American Scientific Company  
Amperex Electronic Company  
Anaconda Wire and Cable Company  
Antioch College  
Armaur Research Foundation  
Argonne National Laboratory  
Barber-Colman Company  
Bartol Research Foundation  
Batelle Memorial Institute  
Baylor University  
Beloit College  
Bell Telephone Laboratories  
Big Spring Hospital Corporation  
British Supply Office  
Brookhaven National Laboratory  
University of Buffalo  
Boston University  
University of California  
California Cedar Products  
Cape Cod Hospital  
Carnegie Institute of Technology  
Canadian Radium & Uranium Corp.  
University of Chicago  
University of Cincinnati  
Colorado School of Mines  
Columbia University  
Copperweld Steel  
Cornell University  
Cornell University Medical School  
Cutler-Hammer, Inc.  
Daw Chemical Company  
E. I. DuPont Company  
Eastman Kodak  
Farnsworth Radio Company  
Federal Telecommunications Labs.  
University of Florida  
Florida Agriculture Experiment Station  
Fordham University  
General Electric Company  
General Foods Corporation  
Harper Hospital  
Harvard University  
Hektoen Institute  
High Voltage Engineering Company  
Johns Hopkins University  
Howard University  
Illinois Institute of Technology  
State of Illinois  
University of Illinois  
Indiana University  
Institute of Textile Technology  
State University of Iowa  
Iowa State College  
Johnson Radio Laboratory  
University of Kansas  
Kelley-Koett Manufacturing Company  
Kelly Clinic  
Lakeside Laboratories  
Leeds and Northrup  
Eli Lilly Company  
Arthur D. Little, Inc.  
Louisiana State University

Loyola University  
Magneon Company  
Magnolia Petroleum Company  
Marquette University  
Marietta College  
H. S. Martin Company  
University of Maryland  
Massachusetts General Hospital  
Massachusetts Institute of Technology  
Mayo Clinic  
Medical Products Company  
Meharry Medical College  
Memorial Hospital, Sloan-Kettering  
Institute  
Michigan State College  
University of Michigan  
Miles Laboratories  
University of Minnesota  
University of Missouri  
Monsanto Chemical Company  
National Technical Laboratories  
Michael Reese Hospital  
Maimonides Hospital  
New York University  
North American Aviation, Inc.  
North Carolina State College  
Northwestern University  
Notre Dame University  
New England Deaconess Hospital  
City College of New York  
Oberlin College  
Ohio Agriculture Experiment Station  
Ohio State University  
Ohio University  
Ordnance Department  
University of Oregon  
Parke Davis Company  
University of Pennsylvania  
Pennsylvania State College  
Philco Corporation  
Presbyterian Hospital  
Princeton University  
Purdue University  
Queens College  
Radiation Counter Laboratories  
Radio Corporation of America  
Radium and Radon Corporation  
Reed Institute  
Raytheon Manufacturing Company  
Reed Research, Inc.  
Rensselaer Polytechnic Institute  
Rice Institute  
St. Louis University  
Sinclair Refining Company  
Socony-Vacuum Oil Company  
Southern Research Institute  
Stanolind Pipe Line Company  
Syracuse University  
Technical Material Corporation  
Technical Products International  
University of Tennessee  
University of Texas  
Tulane University of Louisiana  
Union College  
United Shoe Machinery Corporation  
U.S. Department of Agriculture  
U.S. Department of Commerce  
U.S. Department of the Interior  
U.S. Navy  
U.S. Naval Gun Factory  
U.S. Atomic Energy Commission  
U.S. Public Health Service

U.S. Radium Corporation  
U.S. Rubber Company  
U.S. Treasury Department  
Upjohn Company  
University of Utah  
Vanadium Corporation  
Vanderbilt University  
Vassar College  
University of Virginia  
Virginia Medical College  
War Department  
Washington University  
University of Washington  
State College of Washington  
Waukesha Motor Company  
Wesleyan University  
Westinghouse Electric Corporation  
University of West Virginia  
Wheaton College  
University of Wisconsin  
Veterans Administration of St. Paul  
Veterans Administration of Hines  
Veterans Administration of Dallas, Tex.  
Yale University  
Wake Forest College  
Industrial Testing and Welding Lab.  
Joslyn Manufacturing and Supply Co.  
Texas State Research Foundation  
Rockefeller Foundation  
Gilbert X-Ray Company of Dallas  
E. J. Davis Engineering Company  
Dept. of Trade & Commerce—Canada  
Canadian Commercial Corporation  
University of Basel, Switzerland  
Eldorado Mining & Refining Ltd.  
Instrumental Otico, Rio de Janeiro  
Manitoba Cancer Relief & Research  
Institute  
McGill University  
McMaster University  
National Research Council  
New Zealand Government Trade  
Commission  
Queen's University  
University of Saskatchewan  
University of Toronto  
Connaught Laboratories  
Fysisk Institut, Trondheim, Norway  
Geophysics Institute, Bergen, Norway  
Fysiska Institutionen, Upsala, Sweden  
Chalmers Institute of Technology,  
Goteborg, Sweden  
Department of Mines and Resources,  
Canada  
Academia Sinica, Nanking, China  
Department of Agriculture, Canada  
French Supply Council  
Honolulu Experiment Station  
Laboratoire des Applications  
Radiations, Paris, France  
Montreal General Hospital  
Swedish Consulate General  
L'Ecole Polytechnique, Paris, France  
Province of Saskatchewan  
Forsknings Institutet for Fysik,  
Stockholm, Sweden  
Stenhardt Engineering Company,  
Stockholm, Sweden  
Union Miniere du Haut-Katanga,  
Brussels, Belgium  
University of Calcutta, India



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## *Certificate of Quality*

This is a quality instrument. The circuit is simple, practical, and of the fewest parts consistent with reliability. It was made by expert craftsmen, proud of their workmanship, and of the reputation of their company for producing the optimum in quality.

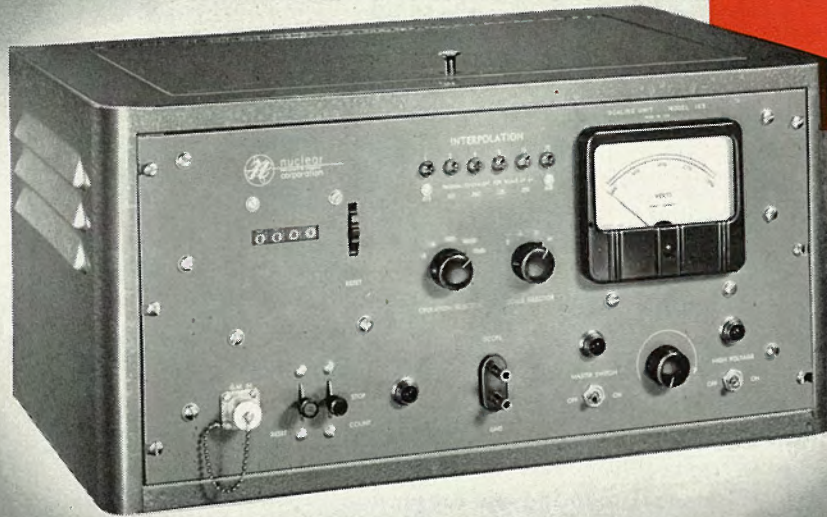
This instrument (except for tubes and batteries) is guaranteed to be free from defects due to faulty material or workmanship for a period of one year from date of shipment. Irregularities developing within this period will be corrected without charge. Be assured that the performance of this instrument will continue to be of vital interest to us.

**NUCLEAR INSTRUMENT AND CHEMICAL CORP.**  
**CHICAGO 10, ILL.**

Every NUCLEAR instrument on which this certificate appears is guaranteed, for one year after receipt by the customer, against faulty construction of any kind. In addition, we are ready to provide low-cost service to every customer regardless of the age of his instrument.

## MODEL 163

# Scaling Unit



### VERSATILE COUNT-O-MATIC

- Count-o-matic switch for predetermined count operation.
- Counting for predetermined time with a relay-type timer.
- Easy-to-read 4" meter.
- Scale selection by panel switch.
- Provision for quenching circuits.
- Reliable Higinbotham scaling circuit.
- Built-in number register.

Model 163 Scaling Unit is NUCLEAR'S most versatile scaling instrument for use in counting with Geiger-Mueller radiation detectors. While it may be used for manual operation, and contains all of the basic features necessary for such work, this unit also provides complete facilities for predetermined count and predetermined time operation when used with Model T1 Timer.

The basic electronic circuit of Model 163 is the dependable Higinbotham circuit, which has a wide-spread reputation for dependable operation over long periods of time. This is the same circuit used in many "NUCLEAR" and "idl" scalers which have been in satisfactory service for years.





## OPERATION

NUCLEAR Model 163 offers four distinct counting methods. Thus, it is possible to use the most convenient technique and method of counting for the type of sample which is being analyzed.

The scaler can be set to count automatically a predetermined number of counts and indicate, on an attached electric timer, the duration of time required to register the preset number of counts. It is possible to arrange the scaler switches so that it will automatically shut off after 160, 320, 640, 1600, 3200, 6400, 16,000, 32,000, or 64,000 counts.

Counting for a predetermined length of time, and recording the number of counts in that period of time, can be accomplished with this instrument by connecting a relay-type electric timer, such as NUCLEAR Model T1. This timer closes the circuit of the automatic shut-off after a preset period of time has passed.

In addition to these two extremely precise methods of counting, Model 163 can also be operated manually, or it can be used as a monitor by switching to the scaling factor of two and listening to the clicks of the register as an aural indication. The latter method is especially practicable when using a probe such as NUCLEAR'S Model P1 which can be attached directly to the scaler.

No preamplifier is required with this scaler for cables up to four feet in length if self-quenching Geiger tubes are used. Connectors are provided on the rear of the chassis so that Model 163-1 (Neher-Harper) or Model 163-2 (Neher-Pickering) quenching circuits can be used with non-self-quenching counters.

## FEATURES

Model 163 Scaler can be operated with ease, either as an automatic scaler or as a manually operated instrument. The following design features indicate the scope and versatility of the instrument:

**HIGH VOLTAGE SUPPLY** is variable from 650 to 2500 volts, with electronic regulation of 0.01% per percent change in line voltage.

**HIGH VOLTAGE METER** has depressed zero with the scale calibrated from 650 to 2500. Thus, the 4-inch meter has no wasted portion of its scale, and maximum accuracy and readability are obtained. A time delay relay providing automatic warm-up of the high voltage control tube prevents accidental over-voltage on the Geiger counter.

**DEGENERATIVE AMPLIFIER** built into the unit permits viewing the Geiger pulse on an oscilloscope without loading the counter.

**SCALE SELECTING SWITCH** is provided to select scaling factors of 2,16,32, or 64.

**COUNT-O-MATIC SWITCH** offers selection of 10, 100, or 1000 times the selected scaling factor for a predetermined count. This switch has a position for manual counting and for predetermined time counting.

**PREDETERMINED TIME** circuit operates in conjunction with a relay-type timer. Connector is on rear of chassis.

**TIME CLOCK** plugs conveniently into the rear of the chassis and is synchronized with the stop-count switch and automatic shut-off.

**SCALING STAGES** are Higinbotham trigger circuits noted for their reliability in continuous operation.

**RESOLVING TIME** is less than 5 microseconds, much shorter than resolving time of the Geiger counter.

**INTERPOLATION LAMPS** are provided for determining exact count between multiples of the scaling factor. These lamps, as well as all pilot lamps, are easily replaced from the front of the unit.

**OUTPUT STAGE** will drive the built-in register at up to 10 to 15 numbers per second. This four-digit register is easily read, and is simply reset to zero at the start of a "count."

*Shipping weight — 66 lbs.*

## MODEL 164 *Scaling Unit*



Model 164 Scaling Unit is similar to Model 163 except that the predetermined count feature is omitted. In every other respect it utilizes the same basic features and is of equal quality throughout.

Model 164 is often selected for use where the predetermined count feature is not felt to be necessary. However, caution should be exercised in specifying this scaler, since the additional feature of Model 163 cannot be added after production. Future work programs of the user may require, or at least make desirable, the convenient switching arrangement which permits a predetermined count to be made automatically without attention by the operator.

## MODEL 162

# Scaling Unit

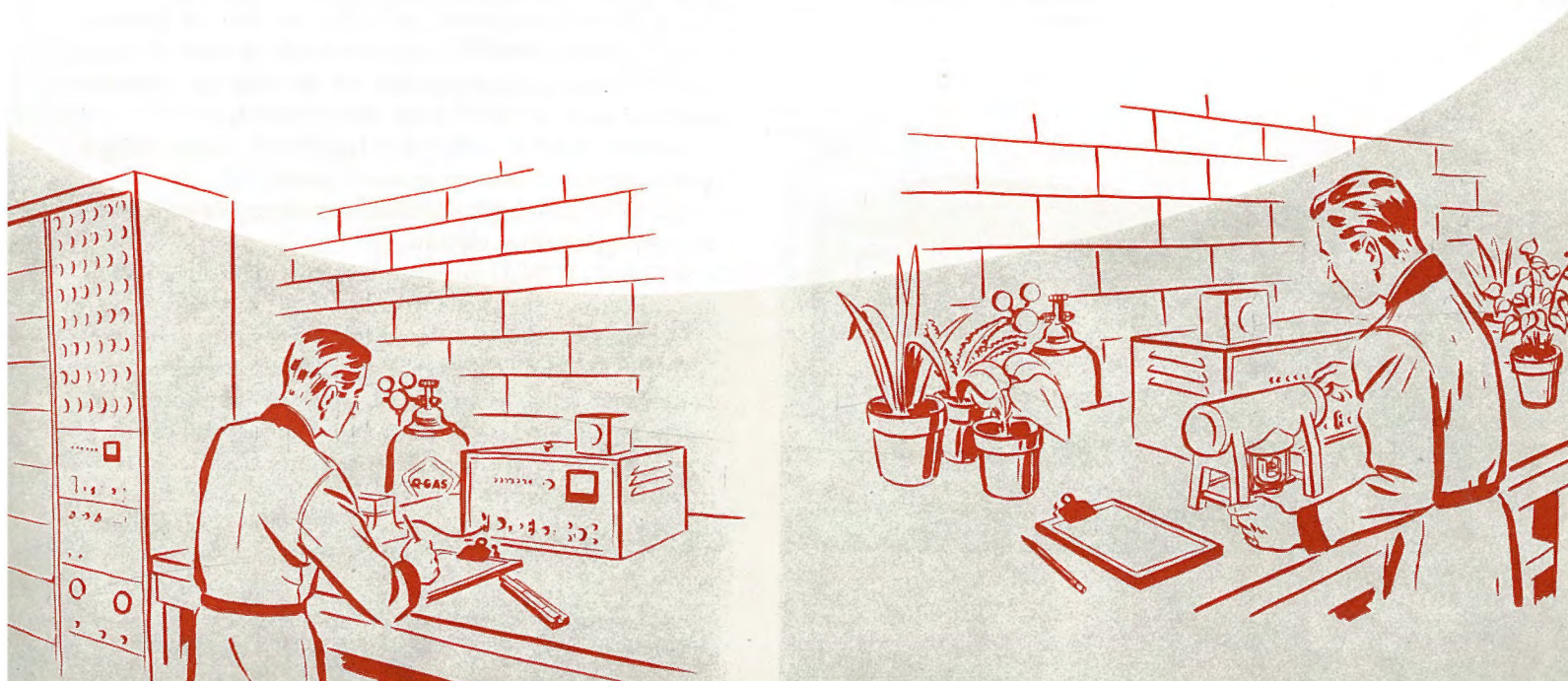


### GEIGER, PROPORTIONAL, SCINTILLATION COUNTING

- Fast scaler for low resolution loss.
- Both G-M and linear amplifier inputs provided.
- Dual range, well stabilized high voltage supply.
- Scale of 128 Higinbotham circuit.

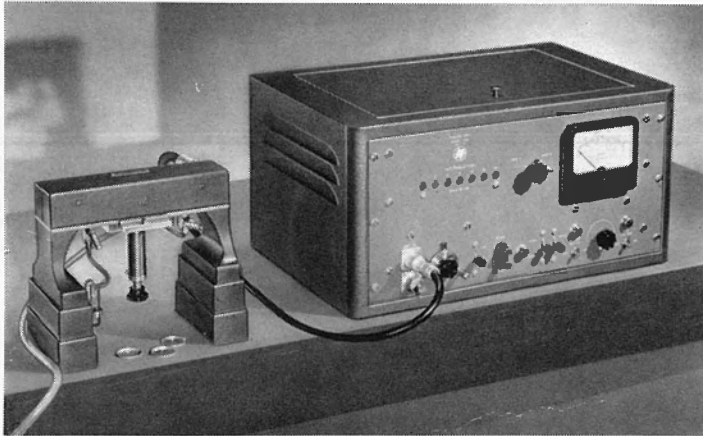
Model 162 Scaling Unit is an unusually adaptable instrument because it permits the user to do Geiger, proportional, or scintillation counting. Its wide adaptability makes it an excellent choice for research work where the work program is not always predictable for a long period ahead.

Most nuclear research work today is done with Geiger and proportional counters, but the trend in research is increasingly toward the use of scintillation counters. NUCLEAR'S Model 162 is already in use in many laboratories doing these three types of counting. It is a wise choice, especially for a research program.





Model 162 Scaler with Model M2 Mount and Model D31 Geiger Counter.



Model 162 Scaler With Model D45 Proportional Counter (above), and an experimental scintillation counter (below).



## OPERATION

Model 162 Scaling Circuit can be used with any Geiger counter by attaching the counter to the appropriate connector on the front of the panel. It can also be used as a proportional counter by use of the input connector to a linear amplifier with one millivolt sensitivity. With certain types of counters, such as NUCLEAR Model D46 "Q-Gas" Counter, this change from Geiger to proportional counting can be accomplished with no more trouble than making this connector change and adjusting the built-in high voltage.

Pulse height selection is easily controlled by means of a dial on the panel. Calibrations are provided to permit accurate reproduction of dial settings.

## FEATURES

The following design features make the Model 162 outstanding for use in nuclear research:

**G-M INPUT** to amplifier of fixed .25 volt sensitivity.

**LINEAR AMPLIFIER** with maximum sensitivity of one millivolt and flat frequency response from 10,000 cycles to two megacycles.

**ATTENUATION SWITCH** on panel provides attenuation ratios of 10:1, 5:1, and 1:1.

**PULSE HEIGHT CONTROL** on panel for pulse height selection. Calibrated dial enables settings to be reproduced accurately.

**HIGINBOTHAM TYPE SCALE** of 128 has resolution time of two microseconds in the first two stages, and five microseconds in the next five stages. This is a proven circuit, known for its reliability.

**STABILIZED HIGH VOLTAGE SUPPLY** with two ranges. Either 500 to 1500 volts or 650 to 2500 volts obtainable over a continuously variable scale.

**HIGH VOLTAGE** is read on a double scale, four inch meter for good reading accuracy. The high voltage primary circuit is fused and a spare fuse is mounted on the chassis.

**STOP-COUNT** switch is synchronized with a time clock circuit connected to outlet on rear of chassis.

**OUTPUT CIRCUIT**, to connector on rear of chassis, delivers pulses capable of driving an impulse register such as NUCLEAR Model EC84.

**NEON LAMP INTERPOLATION** with lamps easily replaceable from front of panel.

**CONNECTOR PROVIDED** for plugging in Neher-Harper quenching circuit.

**OPERATION** is independent of line voltage variation between 95 and 130 volts.

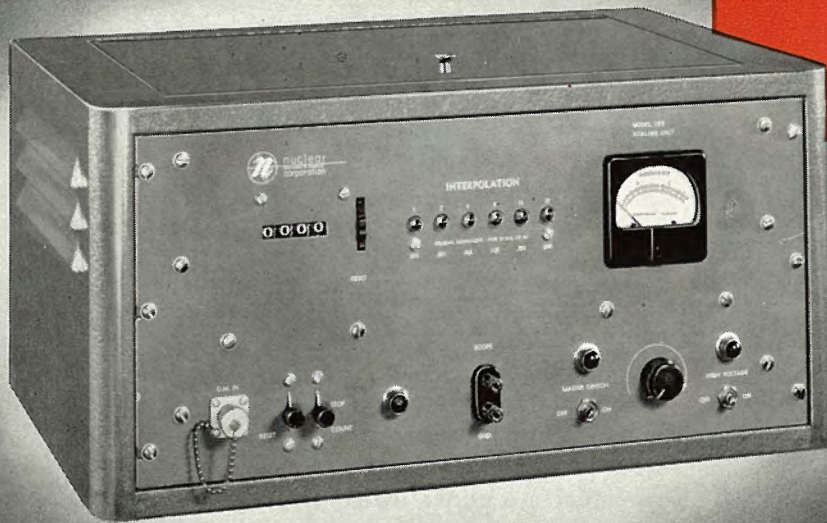
**CHASSIS** cadmium plated for corrosion resistance.

**ATTRACTIVE CABINET** with a smooth, simulated hammered finish is provided, and the instrument fits a standard relay rack when removed from the cabinet. Smooth surface of the cabinet permits easy decontamination when necessary.

*Shipping Weight — 62 lbs.*

## MODEL 165

# Scaling Unit



### BASIC SCALER FOR GEIGER COUNTING

- Built-in impulse register and scale of 64.
- Self-contained, well stabilized high voltage supply.
- Reliable Higinbotham scaling circuit for trouble-free operation.
- Provision for external timing clock.

Model 165 is a basic instrument for both research work and routine counting of radiation. It may be used for diagnostic or therapeutic purposes in medical applications; for qualitative or quantitative work in chemistry; for tracing, identifying, or checking the homogeneity of alloys in metallurgy; for geological assaying; for monitoring work with a Model P1 probe; and for many other research or routine counting jobs. It is designed for easy operation by inexperienced personnel, and is a complete electronic unit which requires no preamplifier for cables of normal length. The only accessories needed for most counting problems are a Geiger counter and an accurate timer.



## OPERATION

Operation of the Model 165 Scaler is easily accomplished, even by untrained personnel. The register and interpolation lamps are first reset, and the stop-count switch is then turned to count. When the desired time has elapsed, the switch is returned to STOP position, automatically stopping the attached timer.

(For complete description of this scaler with its related accessories, see Model L-165 Packaged Laboratory on page 18).

## FEATURES

Careful engineering design and the reliable basic circuits provide dependable operation of this scaling unit, which has the following important features:

**SCALE OF 64**, with impulse register which shows number of counts divided by 64.

**HIGINBOTHAM TRIGGER CIRCUITS** used in scaling stages. This circuit is noted for its reliability in continuous operation.

**RESOLVING TIME** is better than five microseconds.

**NO PREAMPLIFIER NEEDED** for cables of normal length (less than 4 feet).

**THE SELF-CONTAINED HIGH VOLTAGE SUPPLY** is well filtered and stabilized. It is continuously variable from 600 to 1500 volts d-c.

**OUTPUT STAGE** drives register mounted conveniently in front panel.

**PULSE HEIGHT SELECTOR** is set at 0.25 volt sensitivity for Geiger counting.

**NO QUENCHING CIRCUIT** is normally needed. Connector on rear of scaler provides necessary voltages for quench circuit if needed for non-self-quenching Geiger tubes.

**INTERPOLATION LAMPS** are provided for showing exact count between multiples of 64. All lamps are easily replaced from the front of the unit.

**EXTERNAL TIMING CLOCK** can be plugged into a convenient a-c outlet which is controlled by the stop-count switch, thus providing automatic shut-off when counting is stopped.

**ATTRACTIVE CABINET** has a smooth, simulated hammered finish which makes decontamination easy. Chassis is cadmium plated for resistance to corrosion. Instrument fits standard rack when removed from cabinet.

*Shipping weight — 59 lbs.*

## MODEL 161 *Scaling Unit*

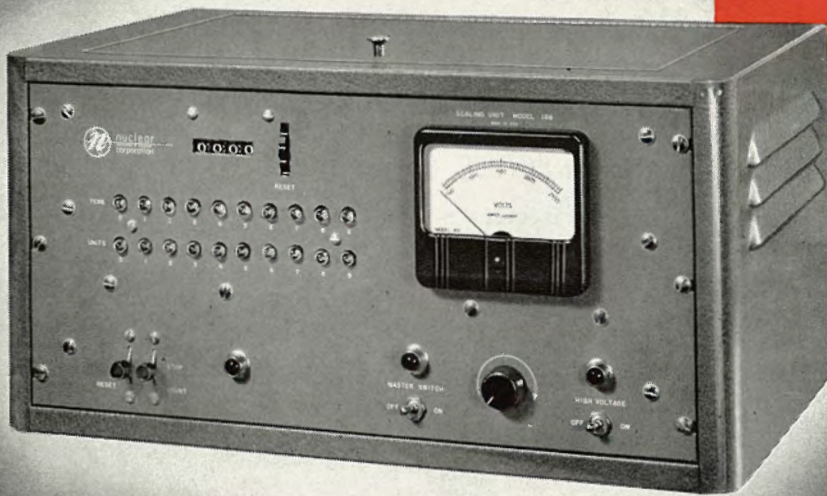


Model 161 is NUCLEAR'S "custom" scaler. It is identical to Model 165 except that no impulse register is built into it. A connector is provided on the rear of chassis for attaching one of several types of recorders. In addition, many special features can be built into this instrument on request. For example, a special, high voltage supply giving d-c voltage up to 2500 volts can be built in, or scales other than the standard scale of 64 can be provided, as well as a multi-position scale selector switch. Special relays can also be built into this instrument for providing predetermined time operation in conjunction with an external timer such as NUCLEAR Model T1.

Model 161 is the only scaling instrument which is not always standard, and is included in the NUCLEAR line of quality instruments to permit the addition of special design features for unusual research projects.

# MODEL 166

## Scaling Unit



### DECADE TYPE NO ADDITION REQUIRED

- Completely new, reliable decade circuit\*.
- Indicating lights arranged for easy reading of total counts without cumbersome interpolation.
- Simple to operate for Geiger counting.
- Built-in impulse register.

For those who prefer the simplicity of readings available in a decade scaler, NUCLEAR has developed Model 166 Scaling Unit, based on a completely new decade circuit.\* Since previous decades were felt to be inferior to the Higginbotham scale-of-two circuit with respect to reliability, NUCLEAR engineers would not previously build any units of that type.

Model 166 embodies a completely new circuit which provides decade indication and still retains the high standard of dependability for which NUCLEAR instruments are known. The NUCLEAR decade circuit is basically a ring of five, followed by a scale of two.

This instrument is easily operated by non-technical personnel, and is applicable

\*—Patent applied for



to both research work and routine counting. It may be used with any Geiger-Mueller counter which provides a pulse of .25 volt or greater. It may be used in medical applications for diagnostic or therapeutic purposes; for qualitative or quantitative work; for identifying or checking homogeneity of alloys in metallurgy; for geological assaying; for monitoring with a Model P1 probe; and for many other research or routine counting jobs. No preamplifier is required for cables of normal length.

### OPERATION

Operation of Model 166 Scaling Unit is very simple. Stabilized high voltage supply is controlled from the front panel, and a stop-count switch controls the counting procedure. An electric timer such as NUCLEAR SM60 can be attached to the scaler so that it is controlled by the stop-count switch.

Reading the count recorded by Model 166 is easy. Merely record the register reading followed by the reading of tens and units. No interpolation or addition is necessary. This feature makes the decade scaler an extremely simple one to operate.

### FEATURES

The special NUCLEAR decade circuit which has been developed for Model 166 makes this instrument reliable and easy to use. Some of the important features are:

**BUILT-IN IMPULSE REGISTER** shows number of hundreds of counts.

**TWO ROWS OF LIGHTS** complete the count reading without addition of interpolation numbers.

**RESOLVING TIME** is better than 5 microseconds. This is less than resolution time of Geiger counters.

**NO PREAMPLIFIER NEEDED** for cables of normal length.

**SELF-CONTAINED**, well-stabilized high voltage supply variable from 600 to 2500 volts, easily read on large 4" meter.

**PULSE HEIGHT SELECTION** is set at 0.25 volt sensitivity for Geiger counters.

**NO QUENCHING CIRCUIT** is normally needed. Connector on rear of scaler provides necessary voltage for quenching circuit if needed for non-self-quenching Geiger tubes.

**ALL LAMPS** are easily replaced from the front of the panel.

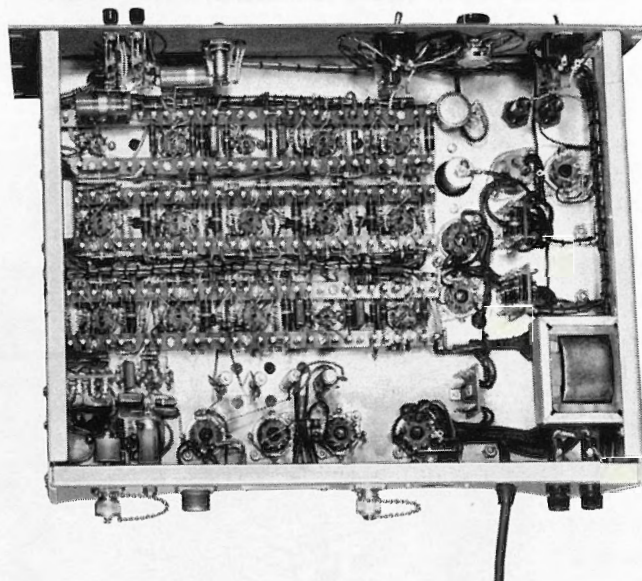
**EXTERNAL TIMING CLOCK** can be plugged into a convenient a-c outlet controlled by the stop-count switch, thus providing automatic shut-off when counting is stopped.

**ATTRACTIVE CABINET** has a smooth, simulated hammered finish which is easily decontaminated when necessary.

**CHASSIS IS CADMIUM PLATED** for resistance to corrosion.

**INSTRUMENT FITS STANDARD RELAY RACK** when removed from cabinet.

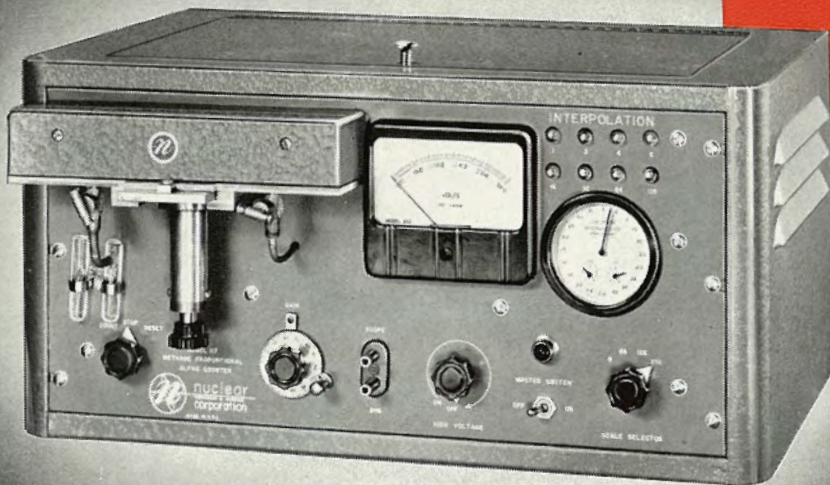
*Shipping weight — 60 lbs.*



Bottom view of Model 166 Scaling Unit

## MODEL 117

# Counting System

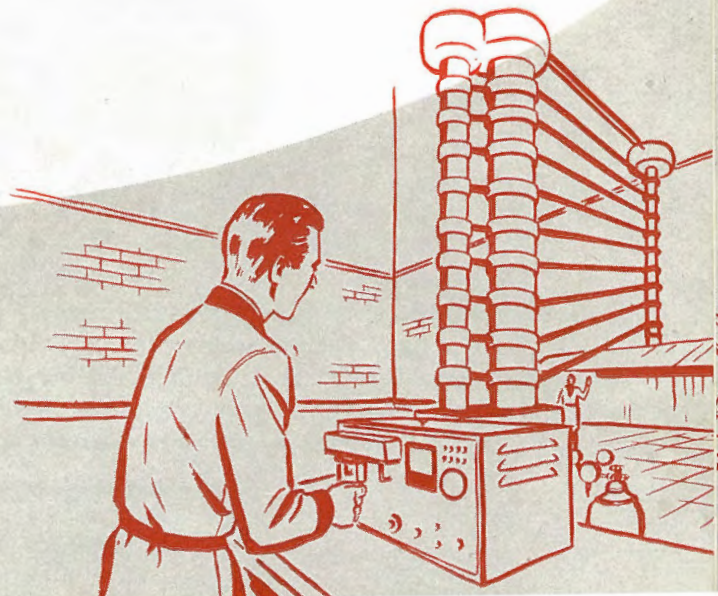
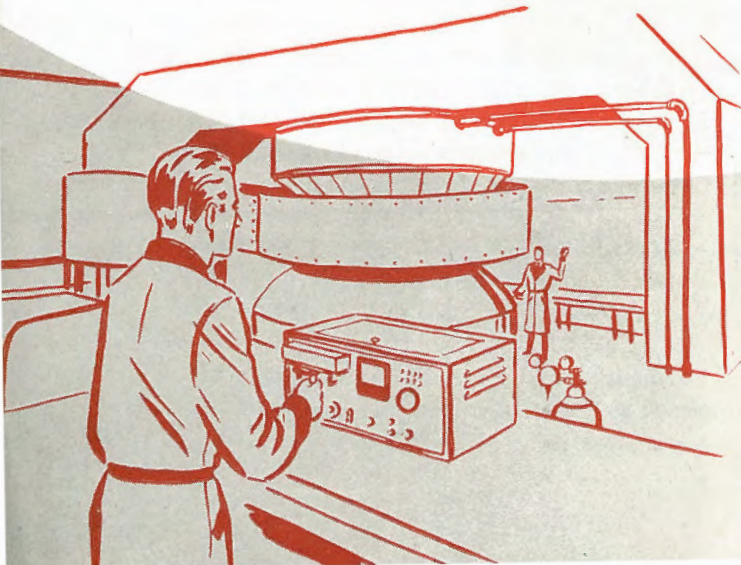


### METHANE FLOW ALPHA PROPORTIONAL COUNTER

- Counts alphas in the presence of high beta activity.
- Includes all parts of a complete counting system.
- Higinbotham scaling circuit chosen for reliability.
- Will accurately record 500,000 counts per minute.
- Built-in, stabilized high voltage supply.
- Built-in proportional counter with variable geometry sample holder.

Model 117 Methane Flow Alpha Proportional Counter is a complete counting system for counting alpha particles in the presence of strong beta activity. It is the only commercial instrument of its kind, and was perfected by NUCLEAR engineers in cooperation with the Atomic Energy Commission and some of the nation's foremost nuclear scientists.

Model 117 Counting System embodies the features of several instruments and accessories in one cabinet. It consists of: (1) a methane flow proportional counter with sample holder, attached to the front of the cabinet for greatest convenience; (2) a built-in, variable gain, high gain linear amplifier, with control knob calibrated for reference; (3) a Higinbotham-type scaling circuit of 256 to 1;





(4) a built-in high speed impulse recorder; and (5) a variable, stabilized high voltage supply. The present instrument represents many improvements over earlier instruments of this type.

**COUNTING CHAMBER:** The counting chamber has a very highly polished cylindrical cathode and a .002" tungsten wire anode mounted between glass insulators. The sample holder provided allows the use of standard one inch diameter samples, and includes a means for raising the sample up into the counting volume for improved geometry. A bubbler is connected to the exhaust valve of the chamber to monitor the rate of methane gas flow through the chamber.

**AMPLIFIER:** The high gain linear amplifier, with a flat frequency response between ten thousand cycles and two megacycles, has variable gain. The gain is controlled and set on the panel by a dial which is calibrated for reference purposes. It can be set so that pulses from the counter exceeding any desired amplitude between two and twenty millivolts will trip the scaler. This pulse height selection allows discrimination between the pulses caused by beta particles and those of alpha particles.

**SCALING CIRCUIT:** The scaling circuit is of the binary Higinbotham type, and is employed chiefly because of its reliability. There are eight scaling

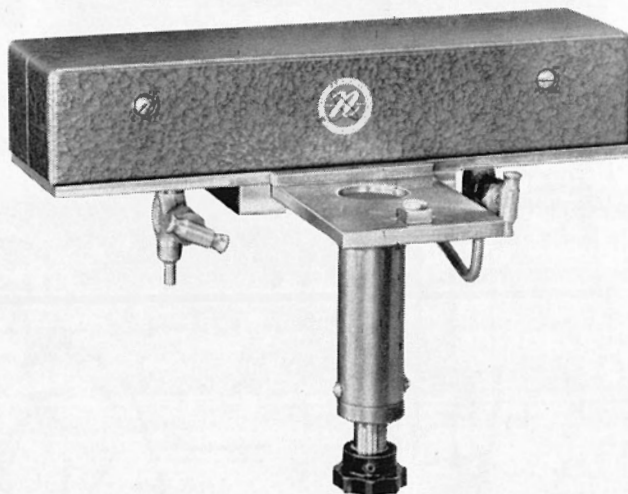
stages, giving a scaling factor of 256 to 1. The first two stages of the scaler have a resolving time of 2 microseconds, while the remaining six stages will resolve pulses 5 microseconds apart. A scale selecting switch, permitting selection of scaling factors of 8, 64, 128, or 256, is mounted on the front panel.

**IMPULSE RECORDER:** The built-in Impulse Recorder is a clock type unit driven by the last scaling stage. Utilizing the built-in scale of 256, the impulse recorder will accurately register an input counting rate of 500,000 counts per minute.

**HIGH VOLTAGE SUPPLY:** High voltage for the proportional counter is supplied by a built-in, stabilized, variable voltage supply. High voltage is available from 1500 to 3000 volts, and is read on a 4" depressed zero meter.

The complete unit is conveniently constructed on a single chassis. It is mounted in a steel cabinet attractively painted with smooth, simulated, hammered effect gray enamel. This enamel has a high gloss to make decontamination easy when necessary. When the chassis is removed from the cabinet, it fits a standard relay rack. Overall dimensions of the cabinet are 10-1/2" x 21-1/2" x 14".

*Shipping weight — 100 lbs.*



Closeup of chamber and sample holder, with slide pulled out.

## MODEL 111

# Counting System

### PARALLEL PLATE ALPHA PULSE CHAMBER

- Pulse type ion chamber for low activity alphas.
- Accommodates samples up to two inches.
- Low background count.

Model 111 Alpha Counting System is a parallel plate counter for counting low activity alpha samples with relatively large area. It consists of two major units: (1) the counting chamber unit which comprises the parallel plate "pulse" type ion chamber and a three-stage preamplifier; plus (2) the scaling unit, including the reliable Higinbotham scale of 64 scaling circuit, high voltage supply, input amplifier, and output stage.

Main features of this counting system are:

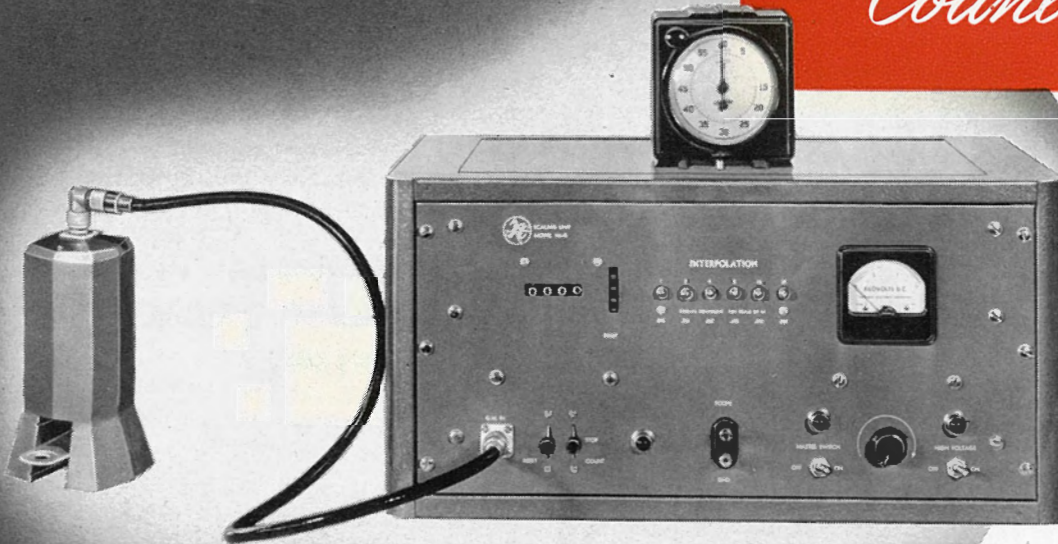
- (1) Chamber will accommodate samples up to two inches in diameter.
- (2) Low background of 20 to 30 counts per hour.
- (3) Resolution loss is approximately 0.8% per thousand counts per minute.
- (4) System operates reliably on a-c power supply between 95 and 130 volts.
- (5) Variable high voltage supply of 600 to 1500 volts has regulation of 0.01% per percent change in line voltage, and less than 0.05% drift per hour.
- (6) Chamber designed for easy cleaning.
- (7) Plug on rear of chassis for connecting impulse register.

Accessories supplied with the system include a line cord, cable for impulse register, high voltage cable to the chamber, multiple conductor cable for the chamber output and power source, and a stand providing vibration isolation of the chamber.

*Shipping weight — 66 lbs.*

# MODEL L-165

## Counting System



### PACKAGED LABORATORY

- Simple, reliable operation.
- Designed for standard laboratory counting and monitoring.
- Ideal for classrooms, demonstration, teaching.

Model L-165 Packaged Laboratory is a suggested grouping of instruments which will permit a laboratory worker to do precise research or to monitor radioisotope containers, laboratory table tops, etc. It includes a complete scaling unit, a thin mica end window tube for detecting, and the necessary tube mount, cables, and sample dishes to permit radio-tracer research.

This group of instruments is adaptable to both research and teaching purposes. It contains all the essential equipment for demonstration, as well as actual laboratory work.

Monitoring is accomplished with this group by attaching the Model D31 End Window Counter to the Model 165 Scaler with the cable provided. The counter is light in weight and easily used as a probe. Quantitative exploration can also be accomplished in this manner.

For precise research work, the counter is placed in the Model M2 Mount and Sample Holder, which is then attached on a different cable to the same input connection on the scaler.

Model SM60 Timer, shown on top of the scaler above, is not included in Model L-165 because many users already have a suitable timer. It should be ordered in addition to Model L-165 on a new installation of instruments.

(Note: Do not order Model T1 for use with Model 165 scaler. These instruments are not constructed to operate together.)

The items included in Model L-165 are:

- 1 Model 165 Scaling Unit Complete
- 1 Model M2 Mount and Sample Holder
- 1 Model D31 Mica End Window Counter
- 1 Model PC2 Probe Cable
- 12 Model SA125 Cupped Sample Pans (1-1/4")
- 12 Model SB125 Flat Sample Pans (1-1/4")

Shipping weight — 66 lbs.

## MODEL L-163

# Counting System

### RADIOISOTOPE ANALYST

- Counts soft radiation efficiently.
- Will discriminately detect alpha, beta, and gamma radiation.
- Count-o-matic switch for predetermined count operation.
- Use with Model T1 Timer for predetermined time operation.

Model L-163 Radioisotope Analyst is another complete group of laboratory instruments, especially planned for the analysis of radioactivity. It consists of Model 163 Scaler and NUCLEAR'S exclusive Model D46 "Q-Gas" Counter which can be used either as a Geiger counter or in the limited proportional region to discriminate between alphas and betas. Extremely precise and complete research work can be done with these instruments, working with either hard or soft radiation. When this combination is used with Model T1 Dual Timer, either predetermined time or predetermined count operation can be accomplished.

Complete descriptions of these two instruments can be found on the respective pages devoted to them. Model 163 is NUCLEAR'S most complete scaling unit, incorporating scale selection and Count-o-matic switches. Model D46 Counter is a flow counter with extremely good characteristics for Geiger counting. The necessary high voltage signal cable is supplied with Model 163.

This group of instruments has proven very popular in laboratories all over the world because of the many

variations in counting technique which are possible. The only necessary addition in setting up a working laboratory is that of a monitor.

In order to complete your laboratory set-up, the Model 2610 Portable Count-Rate Meter, described on Page 21, should be added for use as a monitor. Such a monitor is much more convenient than a probe type detector attached to a scale, and can also be used as a portable tracing instrument.

If the user does not already have a suitable timer, one should be included when ordering this group. Model T1 Timer is recommended because it provides predetermined time operation with Model 163 Scaler.

*Shipping weight — 81 lbs. plus 75 lb. tank.*

## MODEL 2111

*Monitoring Instrument*

### ALPHA PORTABLE COUNT RATE METER



Model 2111 Portable Alpha Proportional Counter is an easily portable instrument designed for detection of alpha particles only. It may be used to determine alpha activity in laboratories, on table tops and hands, and in similar locations.

With the probe attached to the instrument, it will detect only alpha radiation in the presence of other radiation and produce a popping noise in the ear-phones. In addition, the integrating circuit will show on the meter the average count-rate between a range of 0 and 20,000 counts per minute. There are two count-rate scales; 0 to 2,000 counts per minute and 0 to 20,000 counts per minute.

As an operating convenience, a pushbutton is provided to immediately reset the meter after exposure to a strong alpha source, which would otherwise require considerable delay before the meter returned to zero.

The instrument is well balanced for ease in carrying, and a canvas bag with strap holders into which the instrument will fit is available at extra cost. Ear-phones are supplied with the instrument. The necessary operating voltages are supplied by the following batteries: two 1200 volt batteries for the proportional counter with arrangement for voltage adjustment; B

- Detects only alpha in presence of other radiation.
- Entire circuit easily removable as a unit.
- Convenient reset button.

plus voltages are supplied by one 67-1/2 volt battery; and filament power is supplied by two 1-1/2 volt batteries.

One of the unusual features of the Model 2111 is the plug-in 4-tube circuit chassis. The entire circuit is easily removed for servicing in case of damage or tube failure. Servicing is greatly simplified by this arrangement.

The Model 2111 circuit and power supply is housed in one all-aluminum gray anodized case measuring 5-3/8" X 8" X 11-7/8". The smooth finish makes the surface easy to decontaminate and also prevents accumulation of foreign matter.

The complete instrument is convenient to carry and weighs only 16 pounds.

*Shipping weight — 18 lbs.*

## MODEL 2610

# *Monitoring Instrument*

### **BETA-GAMMA PORTABLE COUNT RATE METER**

- Light-weight for easy portability.
- Will detect cosmic ray background as well as intensities above health tolerance level.
- Large, easy-to-read meter shows intensity.
- Removable probe with 4-foot cable.
- Shield for beta and gamma differentiation.

The Model 2610 Count Rate Meter is a light, dependable, easily portable instrument designed for general survey work and for the location of small amounts of radioactive materials. It may be used to provide notice of self-hazard due to radioactivity in rooms, laboratories, on desks, laboratory coats, and similar areas. It has also been found useful for X-ray monitoring and geological surveying for radioactive ore.

The handle is positioned on the instrument so that it is well balanced for ease in carrying. Strap holders are also included so that a shoulder strap can be used if desired. Earphones are supplied with the meter, which includes its own batteries. The necessary high voltage for the Geiger-Mueller tube is supplied by



three 300-volt battery packs as shown in the view at the bottom of the page.

#### OPERATION:

Operation of the Model 2610 Count Rate Meter is extremely simple. The Geiger-Mueller counter tube may be used in its attached position, or removed for probing in confined spaces. An "off" position (meter shorted for protection in off position) and three ranges are provided (0.2, 2, and 20 milliroentgens per hour full scale) on a selector switch. The unit is calibrated with radium gamma radiation. Tolerance level (12.5 mr/hr for an 8-hour day) is slightly over half scale on the 20 mr range.

The Model 2610 meter is sensitive enough for detection of the normal cosmic ray background. At the same time it will read intensities well above the health tolerance level.

#### PHYSICAL DESCRIPTION:

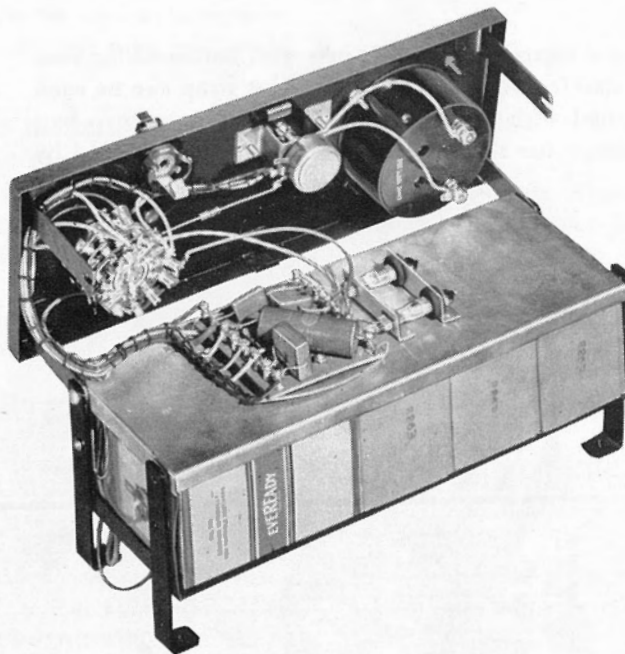
The Model 2610 Count Rate Meter is housed in an attractive gray steel case 6 in. x 11 in. x 4 in. The

smooth finish makes the surface easy to decontaminate, and also prevents accumulation of dust or dirt. The complete instrument is easy to carry because it weighs only 11-1/2 pounds.

A sliding shield is provided on the chromium plated probe so that a distinction between beta particles and gamma rays may be made. When the shield covers the windows of the probe, beta particles are prevented from reaching the Geiger Mueller tube so that only gamma rays are counted.

All components are chosen to insure low battery drain. Two hearing aid-type tubes, a twenty micro-ampere meter, and crystal earphones are used in the Model 2610 meter. These parts make possible a battery life of over 250 hours when operated four hours a day. Removal or replacement of these parts is easily accomplished without soldering.

A small radium source is included with the instrument for convenience in periodic calibration.  
*Shipping weight — 15 lbs.*



View of Model 2610 with case removed. Hinged supports make circuit checking easy, and batteries can be replaced simply.

## MODEL 2050 and MODEL 3340

*Monitoring*

*Instruments*

### FOR PERSONNEL PROTECTION

- Light-weight, rugged, hermetically sealed pocket chamber.
- Diaphragm prevents accidental discharge of chamber.
- Model 2050 reads and charges simultaneously.
- All-electronic charge-read meter for durability.

Laboratory personnel working near or in the presence of X or gamma radiation need sensitive monitoring detectors to provide reliable indication of dosage to which they have been subjected. In order to provide protection of this sort to those handling radioactive materials, as well as X-ray technicians and scientists, NUCLEAR has developed an efficient instrument team.

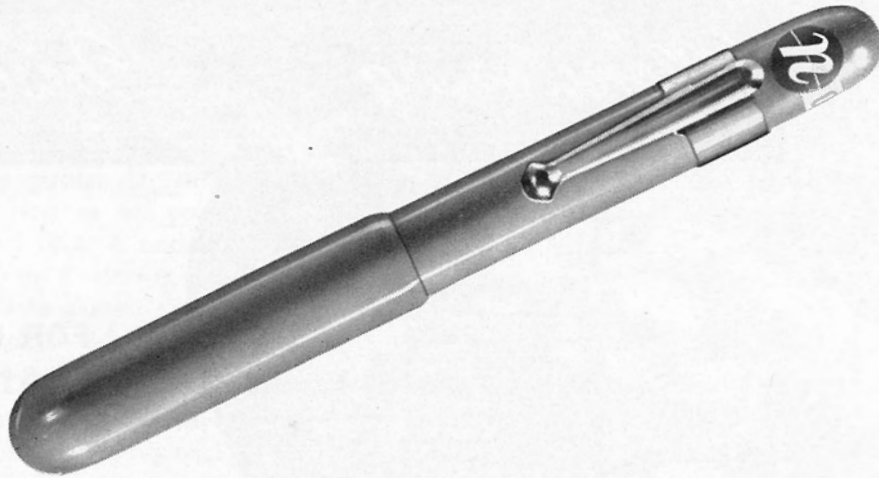
Model 3340 Pocket Chamber is a sealed ionization chamber similar in size and appearance to a fountain pen. It provides a continuous record of the amount of gamma or X-Radiation to which the carrier has been exposed and clips onto shirt or coat pocket. Its light weight, only 1/2 ounce, makes it convenient to carry and use. It measures up to a capacity .2r dosage.

The instrument case is attractive gray plastic with diaphragm and stainless steel contact ring molded in. This construction produces an exceptionally durable unit that is hermetically sealed and is not affected by atmospheric conditions. Severe shock tests, as well as moisture resistance tests with and without applied pressure, have proven the ruggedness of this chamber. A drop of 30 feet did no material damage.

The cathode of the chamber is made of a special conducting material which simulates the radiation absorption of the human system. The cathode can not flake or shed particles into the chamber volume.

The center electrode is an aluminum rod which will not be accidentally discharged easily because it does not reach outside the chamber. The stainless steel contact button on the outside of the diaphragm does not touch this electrode until the contact is depressed.





Model 3340 Pocket Chamber has a clip for fastening to clothing.

A special spring clip, designed to hold firmly, secures the chamber to the clothing, and the safety cap is held onto the case by friction ribs. Each chamber is numbered for convenience in registration and recording.

Model 2050 Charge-Read Meter is an all-electronic device on which the Model 3340 Chamber can be read and recharged for further use. This meter will also charge and read meters of other manufacture.

A major feature of Model 2050 Charge-Read Meter is the ease with which it can be operated by non-technical personnel. With the instrument in use, the only procedure necessary to read and recharge any pocket chamber is to place the pocket chamber in the receptacle provided, press one button to charge the cap or contact button, and then push the pocket

chamber down to make contact. This operation instantly shows the amount of charge left on the pocket chamber, and at the same time recharges the chamber so that it is ready for further use. Stable operation is provided at any voltage between 95 and 130 volts.

This charge-read meter is vacuum tube operated and therefore extremely rugged with long operating life. Because of its vacuum tube operation, servicing can be accomplished by any competent repair man. No special instruments or fixtures are required to replace tubes or check operation.

The metal case of the Model 2050 has a smooth finish to make decontamination easy. Convenient storage is provided for up to seven pocket chambers within the cover of the instrument.

*Shipping weight of Model 2050 — 13 lbs.*



Model 2050 is an easily portable unit with provision for carrying pocket chambers inside.

## MODEL D46

# Detector

### "Q-GAS" FLOW COUNTER

- Provides maximum efficiency for counting soft radiation.
- Low potential and atmospheric pressure.
- Complete with gas, sample holder, sample pans, and regulators ready for simple connection to scaler.
- Simple arrangement for rapid pre-flushing when changing samples.

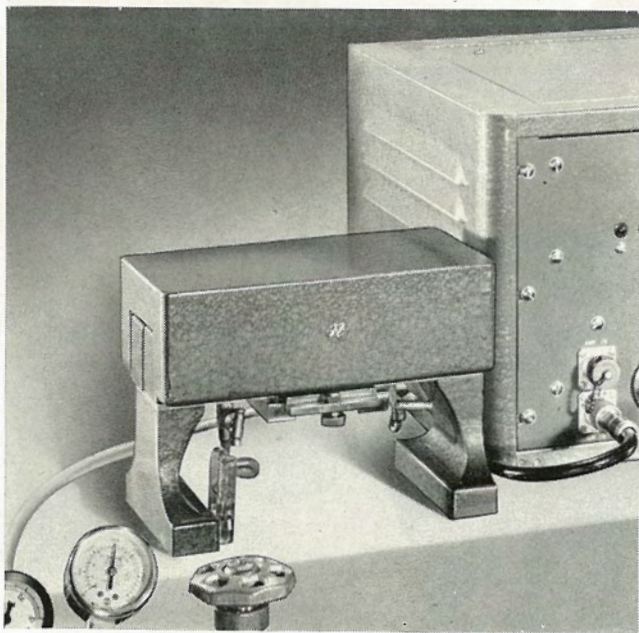
Model D46 "Q-Gas" Counter is a combination of a specially constructed counting chamber and a specially formulated counting gas for the efficient detection of soft ionizing radiation like that of  $C^{14}$  and  $S^{35}$ . It is used primarily to detect alpha particles and very soft beta radiation — simply and with maximum efficiency. Efficient counting is possible because it operates at atmospheric pressure with the sample placed within the counting chamber. The counter operates with an anode potential of only 1450 volts.

Model D46 is relatively insensitive to temperature or atmospheric pressure changes, and has a pulse output that will operate any scaling unit with an input sensitivity of .25 volts.

The "Q-Gas" Counter is primarily a Geiger counter and requires no high gain pulse amplifier. It operates equally well whether the gas is flowing or static, although the usual operating procedure is to allow the gas to flow slowly to eliminate the possibility of air leakage.

An unusually long plateau is another attractive feature of the "Q-Gas" Counter. Counting starts at 1050 volts. Plateau threshold is at 1250 volts. The plateau is 500 volts long with an overall slope of about 10%. In addition, a range from 1400 to 1600 volts has practically no slope at all. This characteristic permits counting without critical voltage control.

The "Q-Gas" Counter has also been used as a limited proportional counter to count alpha particles in the presence of beta particles and gamma rays. Normal



Model D46 Q-Gas Counter shielded with Model 3032 Lead Shield to minimize background count.

cosmic ray background is 75 counts per minute unshielded. When used with Model 3032 Lead Shield the background count is reduced to about 50 counts per minute.

The polished brass counting chamber is simple in design, and all surfaces are easily cleansed. The sample holder is 1-1/4" in diameter and is mounted in a stainless steel slide. It will accommodate sample trays with rims up to 1/8" in height. Provision is also made for the use of suitable absorbers.

Desired flow rate and pressure of "Q-Gas" are controlled with a small valve, and a specially designed bubbler is provided for monitoring the rate of gas flow.

Model D46 "Q-Gas" Counter is supplied complete with one tank of gas, pressure regulator, one dozen sample pans, and the necessary plastic tubing. A dryer is mounted on one end of the counter to insure freedom of the gas from moisture. Additional supplies of "Q-Gas" are available from stock.

*Shipping weight — 15 lbs. plus 75 lb. tank.*

## MODEL D45

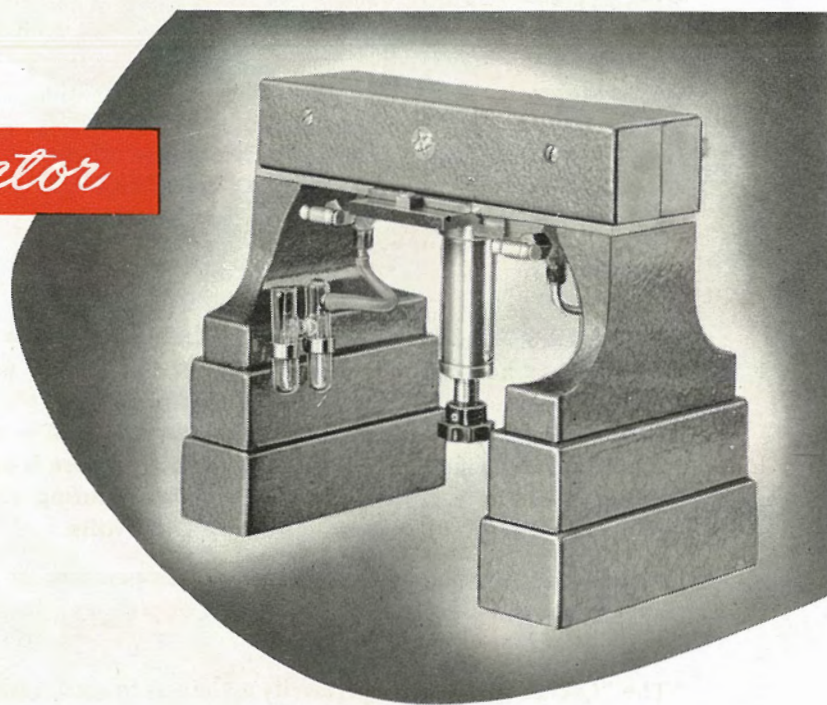
## Detector

### METHANE FLOW ALPHA COUNTER

- Counts alphas in presence of high beta activity.
- Variable geometry up to 50%.

Model D45 Methane Flow Proportional Counter is designed to count alpha particles in the presence of high beta activity with 50% geometry and low coincidence losses. When used with a high gain linear amplifier and a relatively fast scaler (such as NUCLEAR Model 162), it is possible to count alpha particles in the presence of beta activity in the range of  $5(10)^9$  disintegrations per minute. Measurements of this type are particularly useful in chemical and biological research.

The counter chamber has a highly polished cylindrical cathode with an anode of .002" diameter tung-



sten wire mounted in glass insulators. Decontamination is easily accomplished. The sample holder, mounted in a stainless steel sample changer, is designed for 1" diameter samples which may be raised up into the counting volume for improved geometry. Flow of methane gas is controlled by means of valves and a bubbler.

*Shipping Weight — 15 lbs.*

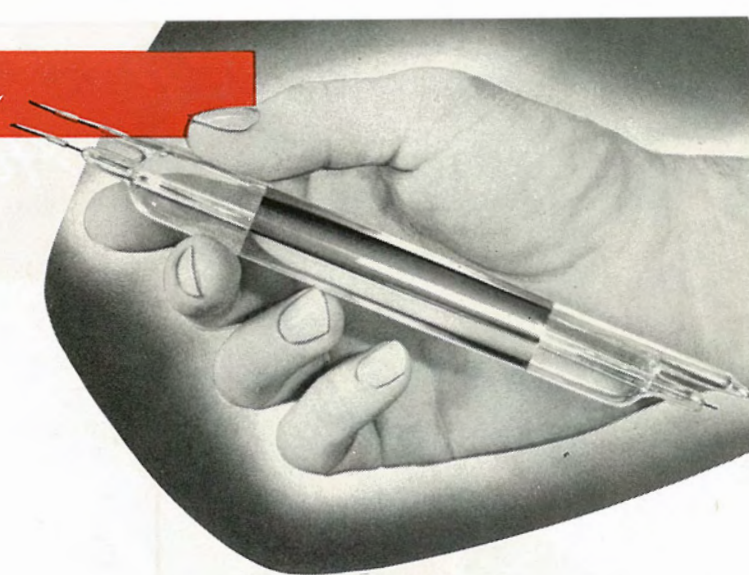
**BETA AND GAMMA  
GLASS WALL  
GEIGER COUNTERS**

*Detector*

NUCLEAR glass self-quenching Geiger Counters may be obtained for beta-gamma counting with window thickness of 35 milligrams per square centimeter, and beta or gamma radiation of over .3 mev is detected. For gamma detection only, heavy wall Model D21 Counters are available. Overall dimensions are 8" x 3/4" dia., with an active length of 3". Cathode material may be specified as copper or silver, and the central wire is .004" polished tungsten.

These counters have a plateau of approximately 250 volts with a slope of only 2% per hundred volts. Threshold voltage is 850 to 950 volts and minimum life is 10<sup>8</sup> counts.

*Shipping Weight — Varies with quantity.*



Model D11S — Thin wall, silver cathode, amyl acetate filling.  
Model D11C — Thin wall, copper cathode, amyl acetate filling.  
Model D12S — Thin wall, silver cathode, ethyl ether filling.  
Model D12C — Thin wall, copper cathode, ethyl ether filling.  
Model D21S — Thick wall, silver cathode, amyl acetate filling.

**MODELS D31-D32**

*Detector*

Model D31 Thin Mica End Window Counter is a very stable counter with long counting life and negligible leakage. Counting life of the tube is at least 10<sup>8</sup> counts, and plateau length is 200 to 300 volts with 2% per hundred volts slope. Threshold voltage is between 1050 and 1300 volts. Each tube is fitted with a four prong socket which will plug into NUCLEAR Model PC2 Cable, Model M2 Mount and Sample Holder, or Model 3031 Vertical Lead Shield.

Window thickness is 2 to 3.5 milligrams per sq. cm.

Model D32 Counter is identical to Model D31 except that window thickness is between 1.5 and 2.0 mg. per sq. cm.

*Shipping weight in hermetically sealed package — 2 lbs.*



**MODEL  
1090**

*High Voltage Supply*

Model 1090 High Voltage Supply is continuously variable from 0 to 5000 volts, plus or minus, for ionization measurements and other low drain applications. Output voltage varies less than 0.1% for line voltage change from 95 to 130 volts, over the entire range.

Dependable operation is assured by a special stabilizing circuit utilizing a saturable core reactor as the control element. A 4" meter indicates output voltage.

The cadmium-plated steel chassis with gray panel fits a standard relay rack when removed from its cabinet. The 10 1/2" x 21 1/2" x 14" steel cabinet is finished in gray, simulated hammered effect enamel.

*Shipping weight — 75 lbs.*





# Accessories

## MODEL M2 Mount



NUCLEAR Model M2 Mount and Sample Holder provides a support for Model D31 or D32 Mica End Window Tube, and contains several slots for pre-determined geometries. It is lightweight aluminum, finished in a smooth gray enamel. A plug-in connector for the mica window tube is provided. When used within a lead brick wall, it produces extremely good shielding because the aluminum mount reduces scatter radiation background to a minimum.

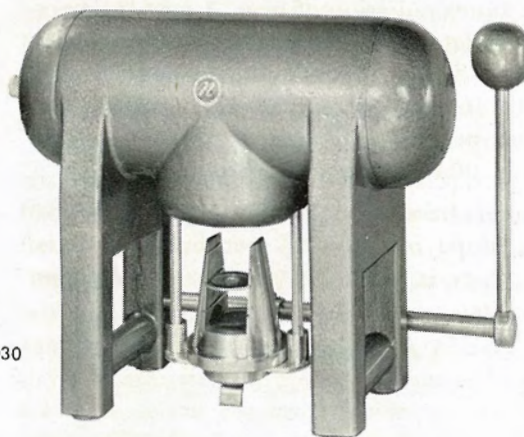
*Shipping weight—16 lbs.*

## MODEL 3033



Model 3033 Shield permits use of Model D31 Counter as a directional probe. It includes a three foot cable and connector, and has a socket for plugging in the counter.

*Shipping weight—8 lbs.*



Model 3030

## LEAD Background Shields

Three lead shields are available for use with specific types of Geiger tubes. Each one provides lead shielding to reduce cosmic ray and other background count. Where a sample must be inserted through the shield, convenient provision is made for this purpose.

Model 3030 Horizontal Lead Shield is a cylindrical shield mounted horizontally on four legs spaced to give stability. An aluminum lining reduces scatter radiation. The shield is designed for use with a standard glass wall counter and includes simple provision for connecting the counter to a cable. A sample-lifting mechanism is provided with accurately reproducible geometries.

*Shipping weight—106 lbs.*



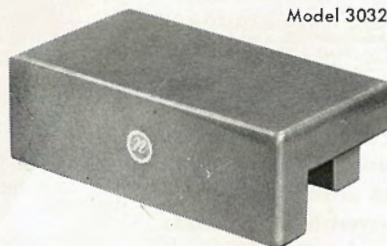
Model 3031

Model 3031 Vertical Lead Shield is designed for use with Model D31 or D32 Mica End Window Counter. The counter is plugged into a socket at the top of the vertical cylinder, and a simple slide arrangement is provided at the base of the shield for placing the sample below the mica window. Several reproducible geometries are possible. Lining of the shield is aluminum.

*Shipping weight—106 lbs.*

Model 3032 Lead Shield fits over Model D46 "Q-Gas" Counter and can be used only with this counter. In use it reduces background count of the "Q-Gas" Counter approximately 40%. A cut-out position at one end prevents interference with the connection on the counter.

*Shipping weight—54 lbs.*



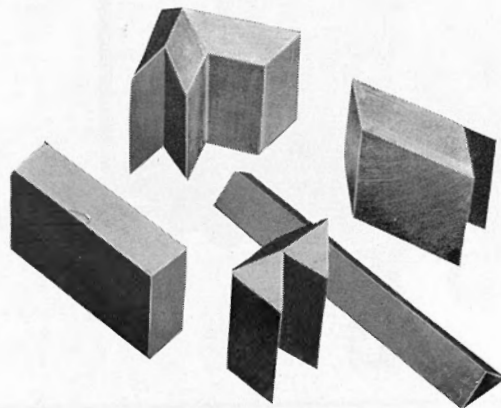
Model 3032

## LEAD BRICKS *for Shielding*

NUCLEAR Lead Bricks are available in two types. Model 3038 Bricks are rectangular in shape and weigh 26 lbs. each. Dimensions are 2" X 4" X 8". These bricks are usable for most shielding problems.

Model 3039 Interlocking Bricks are especially designed to eliminate the low density "joint space" between ordinary, smooth faced bricks. Interlocking sections are designed so that a complete dense wall may be obtained, and provision is made for corners and similar construction. Complete information, suggested construction, and instructions on how to order will be furnished on request.

*Shipping weight — Varies, depending on shape and size.*



## *Quenching Circuits*

Suitable quenching circuits are available for any NUCLEAR scaling instrument, including Models 161, 162, 163, 164, 165, and 166. These circuits are constructed of tested, high quality components and are carefully checked before shipment to assure satisfactory operation. They are designed for use where unusually long cables must be used between the detector and scaling instrument. In most normal use, NUCLEAR scaling instruments require no quenching circuits for satisfactory operation.

Model 161-1 (Neher-Harper for Model 161, 165, or 166 Scaler)  
Model 162-1 (Neher-Harper for Model 162 Scaler)  
Model 163-1 (Neher-Harper for Model 163 or 164 Scaler)  
Model 163-2 (Neher-Pickering for Model 163 or 164 Scaler)



## MODEL T1 *Dual Timer*

NUCLEAR Model T1 Dual Purpose Timer is designed especially for use with Model 163 Scaler. It will either signal by closing an external circuit after a preset time, or will show elapsed time for a predetermined number of counts. It will control from two seconds to 60 minutes, with increments as small as 1/2 second by interpolation between divisions.

Model T1 Timer is 4 1/2" on each edge and is operated by a 110 volt, 60 cycle, supply from the scaler. Connectors, cable, and instructions are furnished.

*Shipping Weight — 7 lbs.*

Model SM60 Timer (not shown) is an electric stop clock for showing elapsed time only.

*Shipping weight — 6 lbs.*

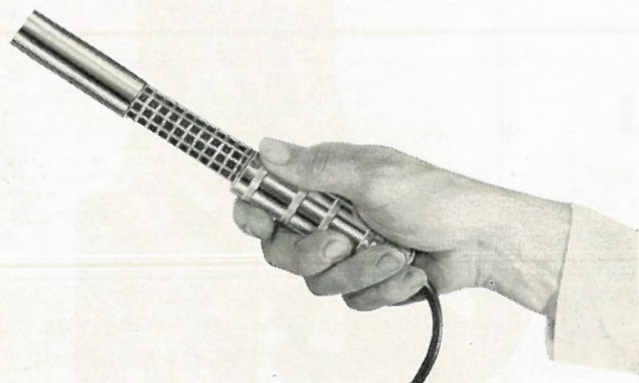




## MODEL CA1 *Scaler Cart*

Model CA1 Scaler Cart is designed to transport a scaling instrument and accessories around the laboratory or in a hospital. These carts have rugged steel construction and smooth, simulated, hammered effect gray enamel finish which is easy to decontaminate. The top shelf is intended for the scaler, and also has room for notebooks, pencils, counter, etc. A ridge around the outside prevents such items from falling off. Accessories may be stored on the lower shelf. Size of the cart is 18 in. by 24 in. by 32 in. high.

*Shipping weight — 35 lbs.*



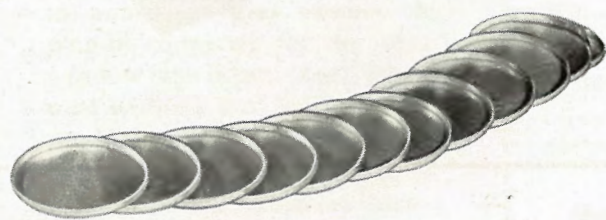
## MODEL P1 *Probe*

Model P1 Metal Probe is chromium-plated brass with a four-foot cable and connector for ease in handling. The window has a sliding shield for discriminating between beta and gamma radiation.

This probe is normally supplied with NUCLEAR Model D12S Geiger Counter. With this counter it can be used for monitoring, contamination surveying, or as a medical probe for tracing medium and high energy beta particles, X-rays, or gamma radiation. Be sure to specify the counter when ordering.

*Shipping weight — 2 lbs.*

Model PC2 Probe Cable for Model D31 or D32  
*Shipping weight — 1 lb.*



## *Sample Pans*

NUCLEAR Aluminum Sample Pans are available in two types: flat and cupped. Both are 1-1/4" in diameter, and the cupped pans are 1/8" deep. They are expressly designed to fit Model D46 Q-Gas Counter, but may also be used with other counters.



## *Radium Source*

This calibrating source consists of 3 to 5 micrograms of radium embedded in a plastic cube. When used to calibrate Model 2610, one face gives a reading of approximately 10 mr per hour and the other 1 mr per hour of beta-gamma radiation. Exact strength is stamped on the cube.

## *Other Accessories*

For any equipment not shown in this catalog, write the home office or call on one of the regional representatives located near you.

Other accessories available include mechanical registers, radiation absorbers, and other items which will increase the usefulness of NUCLEAR instruments.

## SEGRÉ CHART OF *Nuclear Properties*



The Segré Chart of Nuclear Properties is available in small quantities without charge. It is a valuable reference for the nuclear physicist and the engineer. It contains data on the constitution of the nuclei, the existence of isotopes, isomers, and isobars; stability; relative abundance; absorption and scattering; spin; magnetic moment; and radioactive properties. The chart is large enough (19"x33") so that data is readable and transmutations may be plotted.

In addition to manufacturing the above chart, we have a wide variety of special instruments and services available. We pride ourselves on the construction of special instruments and the solution of unusual instrumentation problems. Examples are the Differential Pulse Analyzer shown on the right, and the NUCLEAR Fission Demonstrator which has been used for teaching and demonstration purposes. The latter instrument has been designed for commercial manufacture as the result of many inquiries. Complete data will be furnished on request.

NUCLEAR PROPERTIES	NUCLEAR DATA	NUCLEAR REACTIONS
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Designers and Manufacturers of Instruments for Nuclear Measurement



**nuclear**  
Instruments & Services  
Corporation

225-524 WEST 18th ST., CHICAGO, ILLINOIS  
Formerly Instrument Development Laboratories, Inc.



## *Special Services*

In addition to the foregoing list of products, NUCLEAR also has available other research helps which will be provided for either a nominal charge, or without charge.

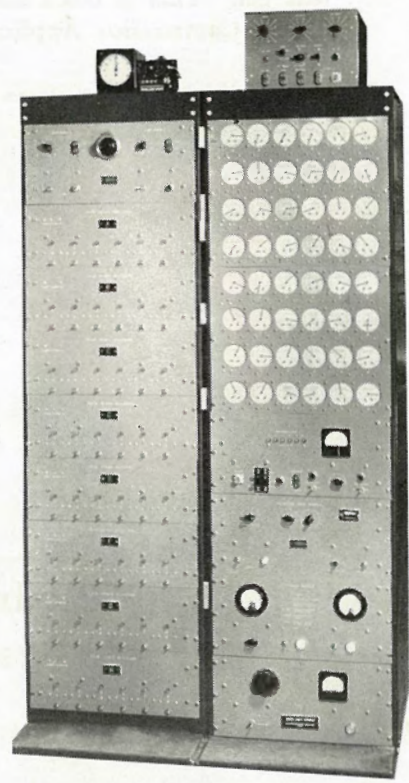
The *Segré Chart of Nuclear Properties* is available, on request, in small quantities without charge. This chart shows: constitution of the nuclei; existence of isotopes, isomers, and isobars; stability; relative abundance; absorption and scattering; spin; magnetic moment; and radioactive properties. The chart is large enough (19"x33") so that data is readable and transmutations may be plotted.

A *Table of Scaling Factors* speeds calculation of total count when using a binary scaler by eliminating multiplication by the scaling factor. This is available without charge.

NUCLEAR'S exclusive *Nuclearule* is a new combination of scales arranged in circular slide rule form. Available at a nominal charge, this rule will aid in determining the following: count rate, statistical error, coincidence loss, activity of sample versus half-life, radiation flux after passage through absorbers, and other data.

## *Special Instruments*

The services of NUCLEAR engineers are always available for surveying special needs or planning special instruments where such are needed. We pride ourselves on the construction of special instruments and the solution of unusual instrumentation problems. Examples are the Differential Pulse Analyzer shown on the right, and the NUCLEAR *Fission Demonstrator* which has been used for teaching and demonstration purposes. The latter instrument has been designed for commercial manufacture as the result of many inquiries. Complete data will be furnished on request.



Special 48 channel differential pulse analyzer constructed by NUCLEAR engineering personnel.



## Service Information

Nuclear Instrument and Chemical Corporation instruments rarely need servicing. However, when service is necessary, the instrument is given top priority and every effort is made to return it to the customer in first class condition as soon as possible. We feel that any instrument out of service for any reason is

a loss to its user as well as a reflection on its maker.

When you send an instrument in for repair or request guidance on servicing an instrument yourself, always give the model and serial number, together with full information about its behavior.

## Suggestions for Ordering

It is the desire of this company to have our products in use where they are well matched to the job. Occasionally, we learn that one of our instruments is being used where all of its features are not utilized and the particular tasks could be accomplished by another one of our instruments having fewer extra features and at a lower price. Therefore, we recommend that before ordering you give us a brief description of your projected work, and allow us to recommend a suitable complement of instruments to match your project.

When submitting a request for quotation or an order, do not forget to include the following information:

- (1) Model number (Upon receipt of your formal order and written request, we can also inform you of the serial number of the equipment you will get. This is often necessary for Atomic Energy Commission Application Number AEC 313).
- (2) Desired f.o.b. point (prices listed are all f.o.b. Chicago factory.)
- (3) Desired delivery.

- (4) Full information concerning address to which the order is to be shipped.
- (5) All shipments will be Railway Express unless otherwise specified.
- (6) Invoice terms are 1% 10 days, net 30 days, except in the case of foreign orders.

Many NUCLEAR products are in use in various foreign countries and we, of course, will be pleased to supply equipment to foreign customers. All foreign orders require an AEC Export License which we apply for upon receipt of your formal order. Time required to obtain an AEC Export License usually does not exceed ten days or two weeks. In general, each foreign order must be prepaid in U.S. funds before shipment.

It is our policy to quote and make deliveries on a first come — first serve basis. Should an urgent situation arise, we suggest you contact us giving the details of your particular situation via telephone, telegraph, TWX (our number is CG-250), cable, etc., and we will immediately do what we can do to assist you.



Nuclear Instrument and Chemical Corporation

223 West Erie St., Chicago 10, Illinois