



nuclear • chicago

nuclear instrument and chemical corporation



ONE YEAR WARRANTY

The Nuclear-Chicago original one year warranty is your assurance for a full year after purchase that the instrument we supply you will give full satisfaction and reliability. With the exception of such items as geiger tubes, vacuum tubes and batteries, the company warrants all equipment manufactured by it to be free from defects in workmanship or materials under normal use and service for a full year. If any part of such equipment proves to be defective in workmanship or materials, within one year after original date of shipment, it will be repaired or replaced without charge.



NINETY DAY WARRANTY

Some Nuclear-Chicago products such as geiger tubes, are inherently of shorter life than equipment such as scalars, and are, therefore, warranted for a shorter period. To safeguard you against defects, all geiger tubes, Super Sniffers, and a few other items are warranted to provide satisfactory operation for 90 days after date of shipment, and repair or replacement of any defective product will be made at no charge within that period.

TERMS OF WARRANTY — All repairs or replacements under the above warranties are furnished f.o.b. company's factory, or company's authorized service

representative. If any question arises within these warranty periods, contact the company or its nearest district office for assistance or instructions. Please note that our obligation is limited to repair or replacement, but does not include shipping costs.

In the following catalog pages a footnote indicates the warranty which applies to each product.



THIRTY DAY COURTESY PERIOD

In order to provide you with complete assurance that the instrument you receive is in perfect operating condition, our exclusive 30 day courtesy period provides you with any necessary calls, repairs, or replacements, including shipping costs, *without* charge, up to 30 days after date of original shipment. It is, therefore, recommended that you make an operational check of any unit received by you immediately after receipt from the carrier.

SHIPPING DAMAGE — The company is not responsible for instrument damage which occurs during shipment, but it is our practice to make every effort to obtain restitution from the carrier. If you receive an instrument which is damaged in any respect, an immediate inspection by the carrier should be requested. The carrier's inspection report should then be sent to us and we will make arrangements for repair or replacement of the equipment. You will be promptly advised as to whether the equipment should be returned to us or a repair or replacement made by us or our service representative so that you may obtain the use of your counting equipment at the earliest possible moment.

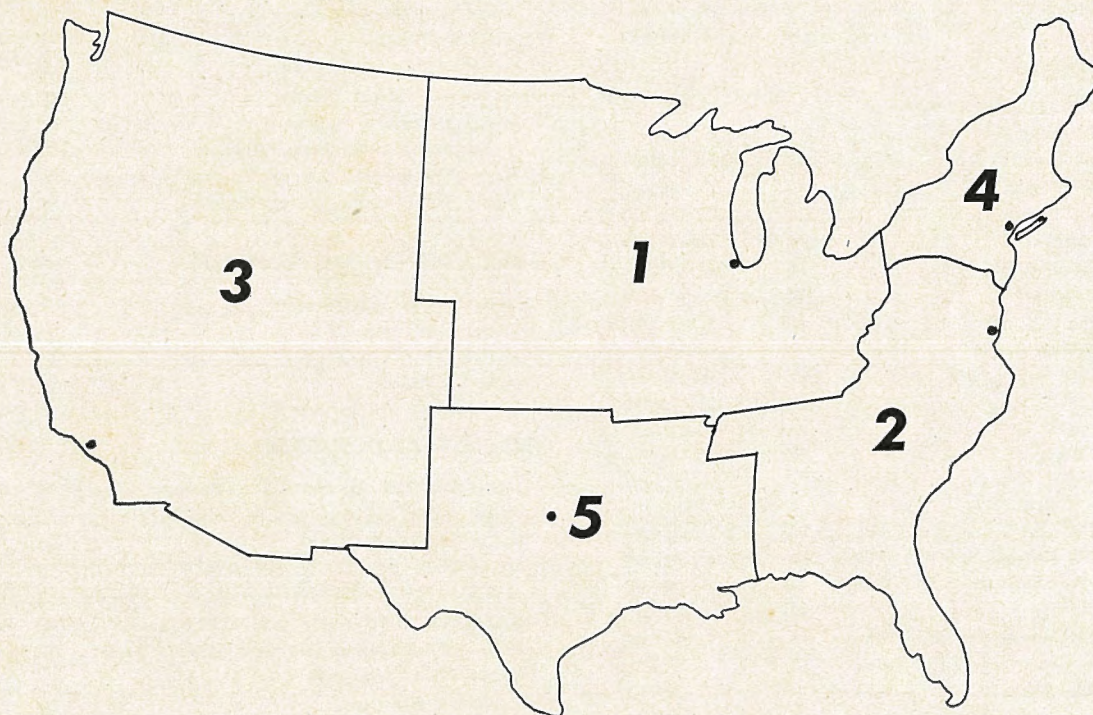
Effective November 10, 1954



nuclear - chicago

Catalog N Price List

The five districts and District Sales Offices of the **Nuclear Instrument and Chemical Corporation** are shown below. Your orders and inquiries will be expedited by contacting the branch manager serving your area.



DISTRICT	BRANCH MANAGER	SERVING
1	Edward Reible 223 West Erie Street Chicago 10, Illinois DElaware 7-3060	Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin.
2	Melvin E. Shepherd 8208 Fenton Street Silver Spring, Maryland JU niper 9-3699	Alabama, Delaware, D.C., Florida, Georgia, Maryland, North Carolina, South Carolina, Tennessee, Virginia, West Virginia and southwestern Pennsylvania.
3	William J. Palenscar 1063 Colorado Blvd. Los Angeles 41, Calif. ALbany 4711	Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming.
4	L. Gordon Grinnell 13 East 40th Street New York 16, New York LExington 2-8338	Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and all of Pennsylvania except southwestern counties.
5	Earl Lipscomb 5103 West Lovers Lane Dallas 9, Texas ELmhurst 5345	Arkansas, Louisiana, Mississippi, Oklahoma, Texas.

CATALOG N PRICE LIST

SUGGESTED INSTRUMENT GROUPS			DETECTORS		
	Catalog Page	Price		Catalog Page	Price
Complete All-Purpose Laboratory No. 1	2	on request	Model D47 Gas Flow Counter	23	\$460.00
Basic All-Purpose Laboratory No. 2	3	on request	Model D47P (includes preamplifier circuit)	23	550.00
Carbon-14 Laboratory No. 3	4	on request	Extra Micromil* Window	23	15.00
SCALING UNITS			Model T3 Time Delay Circuit for Model C-110	23	90.00
Model 182 Ampli-Count Scaler	8	\$ 850.00	(necessary only when Model D47 is used as a Windowless Counter with Model C-110)		
Model 182A Ampli-Count Scaler	8	750.00	Model DS-1 Scintillation Counter	24	450.00
Model 182X Ampli-Count Scaler	8	900.00	Model DS-3 Scintillation Well Counter	25	975.00
Model 182AX Ampli-Count Scaler	8	800.00	Model D33 Mica Window Counter	26	37.50
Model 183 Count-O-Matic Scaler	9	850.00	Model D34 Mica Window Counter	26	47.50
Model 183A Count-O-Matic Scaler	9	750.00	Model D35 Mica Window Counter	26	50.00
Model 192 Ultrascaler	10	1295.00	Model D36 Mica Window Counter	26	50.00
Model 192X Ultrascaler	10	1360.00	Model D12 Geiger Counter	26	15.00
Model 181 Decade Scaler	11	585.00	Model D22 Geiger Counter	26	15.00
Model 161A Basic Scaler	12	495.00	Model D50 Geiger Counter	26	12.00
Model 180 Rediscaler	12	275.00	Model D51 Geiger Counter	26	11.50
COUNTING SYSTEMS			Model D52 Geiger Counter	26	15.00
Model C-110 Automatic Sample Changer	13	1075.00	Model D76 Geiger Counter	26	5.00
Model C-111 Printing Timer			Model AP2 Alpha Proportional Counter		
with 4 digits (99.99 max)	13	660.00	(see listing under Model 2111)	22	35.00
with 5 digits (999.99 max)	13	685.00	Model B12 Bismuth Cathode Counter	27	75.00
with 6 digits (9999.99 max)	13	710.00	Model B13 Bismuth Cathode Counter	27	95.00
Model C-100 "Actigraph"	16	295.00	EDUCATIONAL INSTRUMENTS		
Model LC-1 Liquid Counter Set	35	45.00	Model 1613A "Classmaster"	28	169.50
Model LB-1 Marinelli Beaker	35	6.00	Model MR-1 Meter	28	45.00
Model LT-1 Test Tube	35	2.00/doz.	Model 1413 "Cloudmaster"	29	99.00
Bernstein-Ballentine Glassware			Model 1413C	29	49.50
Tube	27	19.00	MOUNTS AND SHIELDS		
Radiator	27	20.50	Model 3031B Shield and Manual Sample Changer	30	215.00
Calibrator	27	8.00	Model 3035E Shielded Isotope Carrier	30	45.00
Methane Leveling Bottle	27	85.00	Model 3036 Lead Shield	30	205.00
RATE METERS			Model 3037 Lead Shield (for Model C-110 only)	13	175.00
Model 1615B Analytical Rate Meter	14	350.00	Model 3037B Lead Shield (for Model C-110 only)	13	150.00
Model 1615B with D33 Counter and P11 Probe	14	425.00	Model 3029A Adjustable Lead Shield (Base)	30	90.00
Model 1615B with D34 Counter and P11 Probe	14	435.00	Model 3029B-E Adjustable Lead Shield (Center)	30	50.00
Model 1619 "Labitron"	15	230.00	Model 3029C Adjustable Lead Shield		
Model 1619 with D33 Counter and P11 Probe	15	305.00	(Center with door)	30	125.00
Model 1619 with D34 Counter and P11 Probe	15	315.00	Model 3029D Adjustable Lead Shield (Top)	30	90.00
Model 1620 Count Rate Meter	—	425.00	Model 3038 Rectangular Lead Brick	35	11.00
AREA MONITORS			Model 3039A Long Corner Brick	35	10.00
Model MR-10 Alarm Circuit	15	not available	Model 3039B Short Corner Brick	35	3.50
Model 3782 Neutron Thermopile	17	275.00	Model 3039C Side Brick	35	7.00
Model 3783 Moderator	17	on request	Model 3039D Base Filler	35	5.00
Model 1310 Remote Monitron	—	800.00	Model M2 Mount	30	45.00
PERSONNEL PROTECTION			Model M3 "Soil-o-Cator" Mount	—	125.00
Model 1500 Hand and Foot Monitor	17	3500.00	Model M4 Bernstein-Ballentine Mount	27	25.00
Film Badges	18	see following page	ELECTRONIC ACCESSORIES		
Model 362 Pocket Chamber	19	8.00	Model 1090A High Voltage Supply	31	500.00
Model 541A Dosimeter	19	45.00	Model 2091A Vibrator Power Supply	31	45.00
Model 2050A Charger-Reader	19	225.00	Model 1022 Pulse Generator	31	200.00
Model 561 Charger	19	50.00	Model S-100 Plug-in Scaler	31	60.00
PORTABLE SURVEY INSTRUMENTS			TIMERS		
Model 2610A Count Rate Meter	—	225.00	Model T1 Timer	32	102.00
Model 2611 Count Rate Meter	—	280.00	Model T-101 Timer	32	55.00
Model 2612 Count Rate Meter			RECORDERS AND REGISTERS		
with P2 Probe and D50 Counter	20	235.00	Model EC84 Register	32	on request
with P12 Probe and D35 Counter	20	265.00	Esterline-Angus Recorder	32	310.00
Model 2585 "Cutie Pie"	21	245.00	Ametron Count Recorder	32	on request
Model 2582 "Samson"	21	350.00	*Trademark		
Model 2111 "Pee Wee"	22	515.00			
Model 2111 with Model AP2 Counter	22	550.00			
Model 2715 "Nemo"	22	995.00			
Model 2302 "Super Sniffer"	29	49.50			

CATALOG N PRICE LIST

SAMPLE HANDLING

	Catalog Page	Price
Model PM-1 Sample Spinner	33	\$45.00
Model PM-2	33	15.00
Model PM-3	33	7.50
Model N4 Sample Storage Cabinet	33	45.00
Model C-101 Absorbers	33	85.00
Model AF-12 Flat Aluminum Sample Pan	33	20.00/M
Model AC-12 Cupped Aluminum Sample Pan	33	25.00/M
Model PC-12 Cupped Plastic Sample Pan	33	4.00/c
Model SC-12 Stainless Steel Cupped Sample Pan	—	6.00/c

PROBES

Model P2 Probe	34	30.00
Model P10 Probe	34	75.00
Model P11 Probe	34	40.00
Model P12 Probe	34	25.00
Model 3033A Shielded Probe	34	55.00
Model 3033B Shielded Probe	34	85.00

CABLES

Model PC2	34	10.00
Model PC3	34	12.00
Model PC4	34	12.00
Model PC5	34	12.00
Model PC6	34	6.00
Model PC7	34	8.00
Model PC8	34	8.00
Model PC9	34	12.00
Model PC23	34	8.00
Model PC24	34	8.00
Model PC25	34	7.00
Model PC26	34	10.00
Model PC28	34	16.00

REFERENCE SOURCES

	Catalog Page	Price
Model R2	35	\$5.00
Model R20	35	7.50
Model R4	35	1.00

MISCELLANEOUS ACCESSORIES

"Q"-Gas and Cylinder	32	53.00
"Q"-Gas Refill	32	21.00
"PR"-Gas and Cylinder	32	63.00
"PR"-Gas Refill	32	31.00
Model CA2 Scaler Cart	35	37.50
Model CA3 Scaler Cart	35	54.50
Model CA4 "Carette"	35	395.00
Model N1 Nuclearule	36	5.00
Model N2 Warning Tape	36	6.00
Model N5A Warning Signs	36	2.00/pkg.
Model N5B Warning Stickers	36	2.00/pkg.

BATTERIES FOR PORTABLES

Model BA-002	36	.75
Model BA-003	36	1.65
Model BA-005	36	2.50
Model BA-006	36	11.00
Model BA-010	36	.50
Model BA-011	36	65.00
Model BA-015	36	.60
Model BA-026	36	1.00
Model BA-027	36	3.00
Model BA-028	36	4.00

All prices are f.o.b. factory (Chicago). All prices subject to change without notice. Prices quoted do not include any State, Local Sales, Use Tax or Federal Excise Tax. All Taxes imposed on items involved herein, if payable by seller, will be added to the price shown. Invoice terms are 1% ten days, net thirty days.

Packing—packed in cartons. Wood case packing, if required and specified in order, is charged extra at cost.

FILM BADGES

Prices for the NUCLIBADGE service are as follows:

No. of Badges per Week	Weekly Charge per Badge
1	\$1.00 each
2	.875 each
3-24	.65 each
25-49	.60 each
50-99	.55 each
Over 99	.50 each

The minimum weekly contract is for 13 weeks. * Customers will be billed for the contract period on a prepaid basis. There will be a 5% discount on the above prices for a one year contract.

Lost or damaged badges will be charged for at the rate of \$1.00 per badge. Nuclibadges remain the property of Nuclear-Chicago and the only charge is for the service.

* If necessary, different schedules can be arranged for special needs. Prices on request.

Nuclear-Chicago Authorized Factory Service Representatives

Nuclear-Chicago instruments should operate for years without need of repair except for occasional replacement of vacuum tubes. If trouble should develop in your instrument, time loss and inconvenience can be minimized by utilizing the services of your nearest service representative. These men understand our instruments and their correct application in a wide variety of medical, industrial, scientific and research problems. Their services are available at any time.

When repair work is needed, please write or call your nearest service representative before shipping your instrument. In many cases our representatives will be able to determine the cause of your trouble without seeing the instrument. If repair work is necessary, you will be promptly advised.

Authorized factory service representatives are:

EAST

Herman Glasser, Radiological Serv. Co.,
95-15 172nd St., Jamaica 32, N.Y., REpublic 9-7339

Fred Timperley & Co., 43 Clover St.,
Milford, Conn.

John Kane, Univ. of Penn., Randal Morgan Lab.
Philadelphia 4, Pa., EVergreen 6-0100, Ext. 1103

Melvin E. Shepherd, 8208 Fenton St.,
Silver Spring, Maryland, JUniper 9-3699

Electronic Research Laboratories
P. Nicholas, 85 Surrey St.,
Brighton, Massachusetts, STadium 2-3116

L. Gordon Grinnell, 13 East 40th St.,
New York 16, New York, LExington 2-8338

William J. Mueller, State U. of New York
Physiology Dept., 766 Irving Ave., Syracuse, N. Y.

MIDWEST

Engineering Specialties, 7706 Shawnee Run Rd.,
Madeira, Ohio, Locust 9926

Anthony J. Pierce, 3316 New Brighton Road,
St. Paul 13, Minnesota

Missouri Electronics Corp., 6058 Maple Ave.,
St. Louis 12, Missouri, Delmar 0043

SOUTH

Burley H. McCraw, 1707 Vista Street,
Durham, North Carolina

William B. Miller, Jr., 795 Martina Drive, N.E.,
Atlanta, Georgia

B. P. Mackay, Room 2A, 875 Monroe St.,
Memphis, Tennessee

Workshop for Electronics, 621 Classen Blvd.,
Oklahoma City 6, Oklahoma

Earl Lipscomb Associates, 5103 W. Lovers Lane,
Dallas 9, Texas, Elmhurst 5345

E. G. Byers, P.O. Box 6573,
Houston 5, Texas, Linden 9303

Custom Electronics, 813 Chartres St.,
New Orleans, Louisiana

WEST

John E. Scott, Jr., Scott Instrument Lab.,
3927 Third Ave., San Diego 3, Calif., W-6926

L. F. Deckard, 13 Highland Blvd.,
Berkeley 8, Calif., Landscape 6-5754

Don W. Fox, Hawthorne Electronics,
700 S.E. Hawthorne Blvd., Portland 14, Oregon

Garth Westenscow, Radiobiology Dept.,
Univ. of Utah, Salt Lake City 1, Utah

William Palenscar, 1063 Colorado Blvd.,
Los Angeles, Calif., Albany 4711

CANADA

R. Spencer Soanes, Canadian Research Inst.,
46 St. George St., Toronto 5, Ontario, Canada

W. L. Oliver, Phys. Enterprises, 1629 Dundas St.,
East London, Ontario, Fairmont 7629J

nuclear INSTRUMENT AND CHEMICAL CORPORATION

223 West Erie Street, Chicago 10, Illinois



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Radiochemical Price List

Nuclear-Chicago is proud to present for your consideration the most complete listing of carbon-14 labeled compounds available from any source. Many of the items are exclusive with us, and all are prepared to meet the highest standards of chemical and radiochemical purity. Careful inventory control together with a high sales volume insure that stocks are fresh and available in most cases "off the shelf". Purities are carefully checked by paper chromatographic methods and by dilution analysis to assure you that your tracer experiments will not be invalidated by unsuspected impurities.

Radiochemicals are available in a variety of con-

venient package sizes at the highest possible specific activities consistent with purity and radiation stability. We invite your inquiry for special compounds and your advice on additions to our constantly expanding list. We are always happy to advise you on the use of radiochemicals in your individual problem.

Nuclear-Chicago is an outstanding supplier of fine nuclear instrumentation and maintains an excellent staff of physicists, chemists and engineers to help you in the application of nuclear techniques to problems in industrial, medical and academic fields.

Nuclear-Chicago should be your first stop for chemicals, instrumentation or service in the nucleonic field.

PACKAGING

Dry materials are generally supplied in screw-capped vials except where protection from the atmosphere is required. Non-volatile liquids are supplied

in sealed tubes. Volatile compounds are supplied in sealed tubes equipped with break-off tips suitable for manipulation in a vacuum system.

ORDERING INFORMATION

Radiochemicals may be shipped only with U. S. Atomic Energy Commission authorization. Application Form AEC-313 should be submitted in triplicate to the Isotopes Division, Atomic Energy Commission, Oak Ridge, Tennessee.

One copy of the approval form AEC-374 must be submitted with your order. If you wish, you may ask that the approval form be sent directly to us by the Isotopes Division.

If the radioactive material is intended for drug use or investigation on experimental animals or human

beings, your order must also include one completed copy of Certificate or Compliance with Federal Food, Drug, and Cosmetic Act (Form AEC-465). If your use of the radioactive material DOES NOT require consumption by animals or humans, PLEASE SO STATE ON YOUR ORDER.

Copies of Forms AEC-313 and AEC-465 and assistance in fulfilling AEC requirements are available at all Nuclear-Chicago offices and from the U.S. Atomic Energy Commission, Isotopes Division, Oak Ridge, Tennessee.

Please Contact Your Nearest Nuclear-Chicago Office For Further Information

223 West Erie Street
Chicago 10, Illinois
DElaware 7-3060

8208 Fenton Street
Silver Spring, Maryland
JUUniper 9-3699

1063 Colorado Blvd.
Los Angeles 41, Calif.
ALbany 4711

13 East 40th Street
New York 16, New York
LExington 2-8338

5103 West Lovers Lane
Dallas 9, Texas
ELmhurst 5345

NUCLEAR-CHICAGO RADIOCHEMICAL PRICE LIST

Number	Compound	Activity (millicuries/ millimole)	Package Price			
			1	0.5	0.1	0.05
millicurie						
INORGANIC COMPOUNDS						
CFA 75	Carbon-C ¹⁴ (amorphous)	1	\$200	\$100	\$35	
CFA 76	Carbon-C ¹⁴ (amorphous) low specific activity	0.01	165	95	30	
CFA 2	Sodium carbonate-C ¹⁴	1 - 4	100	60	20	
CFA 3	Sodium bicarbonate-C ¹⁴	1 - 4	100	60	20	
CFA 4	Barium carbide-C ¹⁴	2 - 8	100			
CFA 5	Potassium cyanide-C ¹⁴	1 - 2	140			
CFA 6	Carbon-C ¹⁴ monoxide	1 - 4	145			
ALCOHOLS AND DERIVATIVES						
CFA 7	Methanol-C ¹⁴	1 - 7	200	110		
CFA 8	Methyl-C ¹⁴ iodide	1 - 7	225	112.50	35	
CFA 16	Methyl-C ¹⁴ cyanide (Acetonitrile)	1 - 4	250	125		
CFA 44	Ethanol-1-C ¹⁴	1 - 4	300	150		
CFA 46	Ethyl-1-C ¹⁴ iodide	1 - 4	350	175	50	
CFA 9	Isopropyl alcohol (2-Propanol-1,3-C ¹⁴)	1 - 4	325	162.50		
CFA 10	Isopropyl iodide (2-Iodopropane-1,3-C ¹⁴)	1 - 4	350	175		
CFA 47	Glycerol-1-C ¹⁴	1	750	375	75	
CFA 70	Cetyl-1-C ¹⁴ alcohol	0.5-1.0	450	225	55	
ACIDS AND DERIVATIVES						
CFA 11	Formic-C ¹⁴ acid (Sodium salt)	1 - 2	165	90	30	
CFA 12	Formic-C ¹⁴ acid (Lead salt)	1 - 2	165			
CFA 13	Acetic-1-C ¹⁴ acid (Sodium salt)	1 - 7	150	80	25	
CFA 14	Acetic-2-C ¹⁴ acid (Sodium salt)	1 - 7	250	125	35	
CFA 52	Acetyl-1-C ¹⁴ bromide	1	250	125		
CFA 53	Acetyl-2-C ¹⁴ bromide	1	340	170		
CFA 17	Bromoacetic-1-C ¹⁴ acid	1	275	137.50	40	
CFA 18	Bromoacetic-2-C ¹⁴ acid	1	300	150	42	
CFA 19	Cyanoacetic-2-C ¹⁴ acid (Sodium salt)	1	300	150	42	
CFA 20	Methyl cyanoacetate-2-C ¹⁴	1	375	187.50	50	
CFA 48	Propionic-1-C ¹⁴ acid (Sodium salt)	1	190	105	30	
CFA 15	Butyric-1-C ¹⁴ acid (Sodium salt)	1 - 4	250	125	35	
CFA 77	Isocaproic-1-C ¹⁴ acid (Sodium salt)	1	250	125	35	
CFA 23	Palmitic-1-C ¹⁴ acid	1	190	105	30	
CFA 24	Stearic-1-C ¹⁴ acid	1	250	125	35	
CFA 25	Stearic-2-C ¹⁴ acid	1	725	362.50	72.50	46
CFA 62	Margaric-1-C ¹⁴ acid	0.5 - 1.0	250	125	35	
CFA 26	Benzoic-carboxyl-C ¹⁴ acid	1 - 4	190	105	30	
CFA 54	Cyclohexane(carboxylic-C ¹⁴) acid	1	250	125	35	
CFA 79	Pyruvic-2-C ¹⁴ acid (Sodium salt)	1	650	325	65	43
CFA 80	Pyruvic-3-C ¹⁴ acid (Sodium salt)	1	760	380	76	48
CFA 22	Diethyl (malonate-1-C ¹⁴)	1 - 4	375	187.50	50	
CFA 21	Diethyl (malonate-2-C ¹⁴)	1 - 4	375	187.50	50	
CFA 66	Succinic-1-C ¹⁴ acid	2	375	187.50	50	
CFA 67	Fumaric-1-C ¹⁴ acid	2	450	225	55	
CFA 69	Phenylacetic-1-C ¹⁴ acid	1 - 2	210	115	30	
CFA 68	Maleic-1-C ¹⁴ anhydride	2	500	250	50	

Number	Compound	Activity (millicuries/ millimole)	Package Price			
			1	0.5	0.1	0.05
RING-LABELED AROMATIC COMPOUNDS						
CFA 58	Benzene (uniformly labeled)	1 - 4	\$600	\$300	\$60	
CFA 59	Toluene (uniformly labeled)	1	500	250	50	
CFA 60	Benzaldehyde (uniformly labeled)	0.1	565	282.50	56.50	
CFA 61	Benzoic acid (uniformly labeled)	1	550	275	55	
CFA 71	Aniline-C ¹⁴ (uniformly labeled)	1	735	367.50	73.50	
CFA 36	Naphthalene-1-C ¹⁴	2 - 3	650	325	65	
CFA 37	1-Naphthol-1-C ¹⁴	2 - 3	700	350	70	
CFA 38	2-Naphthol-8-C ¹⁴	2 - 3	725	362.50	72.50	
CFA 39	2-Naphthylamine-8-C ¹⁴	2 - 3	725	362.50	72.50	
MISCELLANEOUS COMPOUNDS						
CFA 40	Acetylene-C ¹⁴	2 - 8	150			
CFA 41	Urea-C ¹⁴	1 - 2	165	95	30	
CFA 42	Acetone-1,3-C ¹⁴	1 - 4	300	150	42	
CFA 43	Acetone-2-C ¹⁴	1	450	225	55	
CFA 49	Adenine-8-C ¹⁴	1 - 2	450	225	55	
CFA 28	2,4-Dichlorophenoxy(acetic-1-C ¹⁴) acid	1	500	250	60	
CFA 27	2,4-Dichlorophenoxy(acetic-2-C ¹⁴) acid	1	500	250	60	
CFA 29	3-(<i>p</i> -methoxyphenyl)- <i>n</i> -butyric-1-C ¹⁴ acid	2 - 3	350	175		
FATS						
CFA 64	Tripalmitin (Glyceryl tripalmitate-1-C ¹⁴)	1 - 4	380	190	50	
CFA 63	Tristearin (Glyceryl tristearate-1-C ¹⁴)	1 - 4	380	190	50	
CFA 65	Tristearin (Glyceryl tristearate-2-C ¹⁴)	1 - 4	650	325	65	
AMINO ACIDS (Specifically Labeled)						
CFA 30	Glycine-1-C ¹⁴	1 - 4	325	162.50	45	
CFA 31	Glycine-2-C ¹⁴	1 - 4	375	187.50	50	
CFA 45	DL-Glutamic-1-C ¹⁴ acid	2 - 4	500	250	60	
CFA 34	DL-Valine-4-C ¹⁴	0.1	1,210	605	121	
CFA 78	DL-Leucine-1-C ¹⁴	1	380	190	50	
CFA 35	DL-3-Phenylalanine-2-C ¹⁴	0.5 - 1.0	675	337.50	67.50	
CFA 55	DL-Tyrosine-2-C ¹⁴	0.5	1,120	560	112	
CFA 56	DL-3-(3,4-Dihydroxyphenyl)alanine-2-C ¹⁴	0.5	1,470	735	147	
CFA 57	Iminodi(acetic-2-C ¹⁴) acid	2 - 4	420	210	55	
CFA 32	<i>N</i> -Benzoyl(glycine-1-C ¹⁴) (Hippuric acid)	1	450	225	55	
CFA 33	<i>N</i> -Benzoyl(glycine-2-C ¹⁴) (Hippuric acid)	1	500	250	60	
CARBOHYDRATES (Specifically Labeled)						
CFA 72	D-Glucose-1-C ¹⁴	2	890	445	89	55
CFA 73	D-Glucono- δ -lactone-1-C ¹⁴	1	890	445	89	55
CFA 74	D-Mannose-1-C ¹⁴	1	890	445	89	55

Number	Compound	Activity (millicuries/ millimole)	Package Price			
			1	0.5 millicurie	0.1	0.01
AMINO ACIDS (Uniformly Labeled)						
CFB 11	Glycine	2	\$ 350	\$175	\$ 50	
CFB 7	L-Alanine	3	1,475	737.50	147.50	42
CFB 8	L-Arginine	6	1,475	737.50	147.50	42
CFB 9	L-Aspartic acid	4	1,475	737.50	147.50	42
CFB 10	L-Glutamic acid	5	1,475	737.50	147.50	42
CFB 12	L-Histidine	6	1,475	737.50	147.50	42
CFB 13	L-Leucine	6	1,475	737.50	147.50	42
CFB 14	L-isoLeucine	6	1,475	737.50	147.50	42
CFB 15	L-Lysine	6	1,475	737.50	147.50	42
CFB 16	L-Phenylalanine	9	1,475	737.50	147.50	42
CFB 17	L-Proline	5	1,475	737.50	147.50	42
CFB 18	L-Serine	3	1,475	737.50	147.50	42
CFB 19	L-Threonine	4	1,475	737.50	147.50	42
CFB 20	L-Tyrosine	9	1,475	737.50	147.50	42
CFB 21	L-Valine	5	1,475	737.50	147.50	42
CFB 6	Algal protein	30	420	210	55	

Number	Compound	Activity (microcuries/ mg.)	Package Price			
			1	0.5 millicurie	0.1	0.02
CARBOHYDRATES (Uniformly Labeled)						
CFB 2	D-Glucose	1	\$1,080	\$540	\$145	\$35
CFB 3	D-Fructose	1	890	445	95	25
CFB 4	Sucrose	1	640	320	89	
CFB 1	Starch (Tobacco)	10	840	420	84	

PLANT MATERIALS

CFB 5	Dried algae (<i>Chlorella vulgaris</i> , freeze-dried)	2	210	118	35	
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PLASTIC REFERENCE SOURCES

CFP 1	Polymethyl-C ¹⁴ methacrylate sheets 3 cm.x3 cm.x1 mm (approximately 1.75 g.)	0.1 microcuries/gram	\$ 6
CFP 2		1.0 microcuries/gram	12
CFP 3		10.0 microcuries/gram	18

OIL SOLUBLE COBALT SALT

CFX 2	Cobalt-60 naphthenate	1 millicurie	\$100
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September, 1954 — Prices subject to change without notice.

All quantities listed are standard stock packages. Other quantities and activities available on special order. Quantity discount available on orders of 2 millicuries or more.

NUCLEAR INSTRUMENT AND CHEMICAL CORPORATION, 223 W. Erie Street, Chicago 10, Ill.

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COMPLETE ALL-PURPOSE LABORATORY

This research laboratory group includes the most versatile and complete equipment available for automatic counting of radiation ranging from alphas and very low energy betas to penetrating gammas. Heart of all this all-purpose laboratory is the Model 192 Scaler (A) designed for either Geiger or proportional counting with automatic features which permit manual, predetermined count, or predetermined time operation. Model 192 Scaler may be connected directly to Model C-110 Automatic Sample Changer (B) to measure, record, and change as many as 50 liquid or solid radioactive samples without attention. The length of time required to accumulate a preset number of counts on each sample is printed on a paper tape by Model C-111 printing timer.

Model C-110 Automatic Sample Changer may be used with thin window G-M counters, Model DS-1 Scintillation Counter, or with Model D47 Gas Flow Counter. Model D47 is recommended for this laboratory because of its great versatility. It may be used either as a windowless or extremely thin window counter in both the Geiger and proportional regions, and is ideal for soft beta emitters such as tritium, carbon 14, sulfur 35, in addition to both alphas and hard ionizing radiations.

Gamma emitting liquid or solid samples are best counted in Model DS-3 Scintillation Well Counter (C) where extremely high overall efficiencies may be realized. Model DS-3 connects to Model 192 Scaler or

to Model 1615B Rate Meter without modification.

Model 1615B Analytical Rate Meter (D) with its magnetic probe containing a thin window G-M tube can be used to quickly assay radioactive samples, to monitor radiation in the laboratory, or can be modified to attach to the scaler to provide a continuous count rate indication while a count is progressing. It may be used with G-M or scintillation detectors to simplify many radioactivity measurements where the precision of a scaler is not needed.

Model 2612 Portable Count Rate Meter (E) is a laboratory standard for general low level alpha, beta, or gamma survey work. Its probe is conveniently mounted in the handle and is easily removed for surveying. Model 2585 "Cutie Pie" (F), is an ion-chamber survey meter for surveying gamma intensities above those measured by the 2612.

It is important in all radioisotope laboratories to provide personnel protection. Film badges or personal dosimeters (see pages 18 and 19) allow frequent personnel checks on accumulated exposure.

To order the complete all-purpose laboratory consisting of Model 192 Scaler, Model C-110 Sample Changer and Lead Shield, Model C-111 Timer, Model D47 Flow Counter and one tank of Q-gas, Model DS-3 Scintillation Well Counter, Model 1615B Rate Meter, Model 2612 Portable Survey Meter, and Model 2585 "Cutie Pie" as a group at a reduced cost, specify Laboratory No. 1.



BASIC ALL-PURPOSE LABORATORY

This basic radioisotope laboratory consisting of a scaler, sample mount and detector, timer, and survey meter, contains all the equipment needed for general purpose laboratory work involving medium or higher energy emitters. It is a complete system capable of rapid and precise radiation measurements, yet flexible enough so that as the volume of work in the laboratory increases, additional equipment may be purchased without making these basic instruments obsolete.

The heart of this economical basic laboratory is the Model 161A scaler (A). This instrument, designed for use with either Geiger or scintillation detectors, incorporates a built-in mechanical register, scale of 256 for fast and reliable counting, and wide scale selection. A Model D34 Mica End Window Counter is mounted in Model 3031B Lead Shield (B) and connected directly to the scaler. This manual sample changer provides approximately two inches of lead for the detector and materially cuts down "background". Radioactive samples may be inserted from either side of the shield by means of the two sample holders furnished with the shield. The D34 Geiger counter has long life characteristics and a window thickness of only 1.4 mg/cm² for counting alphas and soft betas as well as harder ionizing radiations.

Model T-101 timer (C) is connected to the scaler and indicates the counting time in minutes and hundredths of a minute. If predetermined time counting is desired, one may purchase Model T1 timer (page 32)

at slight additional cost. Model T1 may be set to any time from two seconds to 60 minutes and will automatically stop the scaler at the end of this time interval so that the total count may be read.

Model 2612 Portable Survey Meter (D) is battery operated and an excellent choice for a laboratory monitor. It is available with choice of probes for general low level alpha, beta, gamma survey work.

Film badges or pocket dosimeters should be worn at all times by personnel working in the radioisotope laboratory (see pages 18 and 19).

When the number of samples to be counted increases, a good investment for saving technician time is the Model C-110 Automatic Sample Changer (page 13). Model C-110 will connect to the 161A Scaler without modification, and permits automatic counting of any number of radioactive samples from 1 to 50. At a later date, you might wish to utilize the extreme efficiency of Model D47 Gas Flow Counter (page 23). This counter operates in the Geiger region and may be connected directly to the 161A Scaler. In this manner, your original basic laboratory becomes a very complete, efficient, and automatic counting system without a large expenditure at any one time.

To order this basic laboratory, consisting of Model 161A Scaler, Model 3031B Lead Shield, Model D34 G-M tube, Model T-101 Timer, and Model 2612 Portable Survey Meter as a group at a reduced price, specify Laboratory No. 2.



CARBON 14 LABORATORY

Carbon-14 is probably the most useful isotope available for research today, especially in biological applications, and it requires specialized equipment for measurement of its low energy betas. The group of instruments shown above represents the most complete and versatile laboratory ever assembled for the measurement of carbon-14, as well as other soft or hard ionizing radiations. This laboratory permits manual or automatic counting of liquid or solid radioactive samples, automatic scanning of paper radiochromatographic strips, and routine monitoring for any alpha, beta, or gamma contamination.

Model 182X Scaler (A) has been chosen because its wide range linear amplifier permits geiger, proportional, or scintillation counting. Its 5000 volt power supply permits use of the Bernstein-Ballentine proportional counter for counting carbon-14 in the gaseous phase (see page 27).

Model 182X Scaler is shown with Model D47 Gas Flow Counter and Model C-110 Automatic Sample Changer (B). The flow counter allows windowless or thin window counting in both the Geiger and proportional regions, and is especially useful for the efficient measurement of carbon-14, tritium, sulfur-35 and other beta emitters. When it is used with Model C-110, any number of radioactive samples from 1 to 50 may be counted automatically. Model C-111 Printing Timer records the length of time required for each sample to reach a preset number of counts.

The 1619 "Labitron" (C) is an extremely versatile

unit for routine surveying and measurement of alpha, beta, or gamma radiation. It is ordinarily used with a D34 thin window G-M tube and a P11 probe for surveying, or with the "Actigraph" (below). An Esterline-Angus chart recorder (D) is connected to the 1619 and provides a continuous record of the count-rate.

For automatic scanning of strip chromatograms, the 1619 is used with a D34 geiger tube mounted within a 3031B lead shield which, in turn, rests on Model C-100 Actigraph (E). Radiochromatograms are inserted into this strip feeder and drawn under the thin window G-M tube by rubber rollers. The movement of the paper strip is synchronized with the movement of the Esterline-Angus recording chart so that any radiolabeled components separated on the chromatogram are accurately located and measured.

Model 2612 Count Rate Meter (F) offers a choice of probes for general low level alpha, beta, or gamma monitoring. Battery operated, it is especially designed with a thin window probe for soft beta emitters. The probe is easily lifted out of its mount for surveying areas suspected of contamination.

To order this complete carbon-14 laboratory — consisting of Models 182X Scaler, D47 Flow Counter, C-110 Automatic Sample Changer with 3037 Lead Shield, C-111 Printing Timer, 1619 Labitron, D34 Geiger Counter, P11 Probe, Esterline-Angus Recorder, 3031B Lead Shield, C-100 Strip Feeder, and the 2612 Portable Survey Meter — as a group at a reduced cost, specify Laboratory No. 3.



Photo courtesy of Veterans Administration Research Hospital, Chicago, Illinois

CLINICAL RADIOISOTOPE LABORATORY

One of the most important uses of radioactive isotopes today is found in medicine. Radioisotopes of iodine, phosphorus, sodium and gold are now used regularly in a number of hospitals for certain clinical tests and for treatment of selected patients. The Radioisotope Laboratory has become an integral part of every progressive hospital or clinic.

Some of the most valuable radioactive isotopes and their applications are: radioiodine-131 — used for thyroid gland evaluation tests, for treatment of hyperthyroid conditions, for brain tumor localization, and for blood volume studies; radiophosphorus-32 — used to treat leukemia or polycythemia vera, to localize rapidly growing soft tissue masses, and to determine the extent of tumors during brain surgery; radio-sodium-24 — used for diagnostic tests involving blood flow, for radiocardiography, and for determining the rates of electrolyte diffusion through tissue; radio-gold-198 — used in treatment of certain cancers of the lymphatic system and of the body cavities.

Nuclear-Chicago pioneered in the design and construction of specialized equipment for such diagnostic techniques and standard Nuclear-Chicago equipment is widely used in many clinical and hospital laboratories.

The counting equipment pictured above is a representative group of units selected for an actual application where both clinical and laboratory determinations will be carried out. Most of the laboratory units, including the scalers, sample changer, and count rate meters are described in this catalog, but many of the

clinical counting units, for use with patients, are so specialized in design for their particular application that a special Medical Catalog has been prepared describing these. This catalog is available on request.

Some of the more specialized counting units provide predetermined count or predetermined time operation for automatic measurements on patients, some scalers provide a percentage result reading with the use of comparative techniques, and the new Model 131 Scaler is specifically designed for thyroid uptake measurements using iodine-131. It offers a simple and easy method of measurement quite acceptable to both doctor and patient, and at the same time permits determinations to be made with scaler accuracy. This instrument is a unique Nuclear-Chicago development which provides the doctor with a direct answer to the percentage of iodine in both the gland and the urine without any calculations.

Count rate instruments are also available, if desired, and several representative groups of these units are described in the Medical Catalog. They have the advantage of presenting a direct reading of the count rate.

Nuclear-Chicago has had wide experience in setting up large and small medical radioisotope laboratories throughout the world. We will be happy to offer our assistance and recommendations to those establishing their own radioisotope program or enlarging their present facilities. Any questions with regard to such instrumentation should be referred to the nearest Nuclear-Chicago district office or to the home office.

SPECIAL PRODUCTS AND SERVICES

Nuclear-Chicago is equipped to supply a wide variety of services and special products in the nucleonics field. An excellent staff of physicists, chemists and engineers is available to advise on instrumentation of a standard or special nature and on the application of nuclear techniques to problems in industrial, medical and academic fields. We invite inquiries regarding the solution of individual problems.

CONSULTING SERVICE

Owing to the shortage of personnel trained in nucleonics, institutions entering the field frequently require professional advice on generalized problems such as laboratory design, instrumentation, health precautions, waste disposal, etc. The Nuclear-Chicago staff has provided scientific and engineering consultation for such groups, and assistance in setting up a nucleonic program for the solution of specific problems. Such arrangements usually result in the saving of time, effort and expense and have been utilized in the past on such problems as *control of plating baths, detergency efficiency investigations, diffusion studies, leakage detection and control, etc.*

RESEARCH AND DEVELOPMENT INVESTIGATIONS

Frequently companies find it economical to call upon laboratories other than their own to investigate specific problems or to design special equipment utilizing nuclear techniques. Nuclear-Chicago offers its facilities for such work, and has been outstandingly successful in the past in carrying out such investigations, whether the work was carried out in our own laboratories, in the field, or by collaboration. A few examples are *the design of liquid metal level control instruments, the design of quality control equipment used in cigarette manufacture, the evaluation of automatic washing machines, and the determination of decontamination efficiencies of commercial floor cleaners.*

BETA SOURCE APPLICATIONS

The chemistry department of Nuclear-Chicago has developed a unique type of hermetically sealed uniform strontium source. Its flexible design makes it available in a wide variety of sizes and shapes for special applications. For example, it is available as a single source, as a "balanced" source in which the radiation intensities from two sides are equal, or as a large area source. It has already found use *in thickness gauges, instruments for H/C ratio determination in hydrocarbons, medical irradiations, etc.*

RADIOCHEMICALS

Nuclear-Chicago supplies the largest number of carbon-14 compounds available from any source, and new compounds are being added constantly. All are of high purity, in a wide variety of package sizes, and most are available "off the shelf". We invite inquiries for special compounds and advice on additions to our list. We are happy to advise you on the use of radiochemicals in individual problems of research, development, analysis and process control.

Further details on radiochemicals or their applications are available on inquiry.

RADIOCHEMICALS

Number	Compound	Activity (millicuries/ millimole)	Number	Compound	Activity (millicuries/ millimole)
INORGANIC COMPOUNDS			AMINO ACIDS (Specifically labeled)		
CFX 1	Carbon-C ¹⁴ (amorphous)	1	CFA 30	Glycine-1-C ¹⁴	1
CFA 2	Sodium carbonate-C ¹⁴	1 - 4	CFA 31	Glycine-2-C ¹⁴	1 - 4
CFA 3	Sodium bicarbonate-C ¹⁴	1 - 4	CFA 45	DL-Glutamic-1-C ¹⁴ acid	1
CFA 4	Barium carbide-C ¹⁴ *	2 - 8	CFA 34	DL-Valine-4-C ¹⁴	0.1
CFA 5	Potassium cyanide-C ¹⁴ *	1 - 2	CFA 35	DL-3-Phenylalanine-2-C ¹⁴	0.5 - 1.0
CFA 6	Carbon-C ¹⁴ monoxide *	1 - 4	CFA 55	DL-Tyrosine-2-C ¹⁴	0.5
ALCOHOLS AND DERIVATIVES			CFA 56	DL-3-(3,4-Dihydroxyphenyl)alanine-2-C ¹⁴	0.5
CFA 7	Methanol-C ¹⁴ **	1 - 7	CFA 57	Iminodi(acetic-2-C ¹⁴) acid	2 - 4
CFA 8	Methyl-C ¹⁴ iodide *	1 - 7	CFA 32	N-Benzoyl(glycine-1-C ¹⁴) (Hippuric acid)	1
CFA 16	Methyl-C ¹⁴ cyanide (Acetonitrile) **	1	CFA 33	N-Benzoyl(glycine-2-C ¹⁴) (Hippuric acid)	1
CFA 44	Ethanol-1-C ¹⁴ **	1	AMINO ACIDS (Uniformly labeled)		
CFA 46	Ethyl-1-C ¹⁴ iodide **	1	CFB 11	Glycine	2
CFA 9	Isopropyl alcohol (2-Propanol-1,3-C ¹⁴) **	1	CFB 7	L-Alanine †	3
CFA 10	Isopropyl iodide (2-Iodopropane-1,3-C ¹⁴) **	1	CFB 8	L-Arginine †	6
CFA 47	Glycerol-1-C ¹⁴	1	CFB 9	L-Aspartic acid †	4
CFA 70	Cetyl-1-C ¹⁴ alcohol	0.5 - 1.0	CFB 10	L-Glutamic acid †	5
ACIDS AND DERIVATIVES			CFB 12	L-Histidine †	6
CFA 11	Sodium formate-C ¹⁴	1 - 2	CFB 13	L-Leucine †	6
CFA 12	Lead formate-C ¹⁴ *	1 - 2	CFB 14	L-isoLeucine †	6
CFA 13	Sodium acetate-1-C ¹⁴	1 - 4	CFB 15	L-Lysine †	6
CFA 14	Sodium acetate-2-C ¹⁴	1 - 7	CFB 16	L-Phenylalanine †	9
CFA 52	Acetyl-1-C ¹⁴ bromide **	1	CFB 17	L-Proline †	5
CFA 53	Acetyl-2-C ¹⁴ bromide **	1	CFB 18	L-Serine †	3
CFA 17	Bromoacetic-1-C ¹⁴ acid	1	CFB 19	L-Threonine †	4
CFA 18	Bromoacetic-2-C ¹⁴ acid	1	CFB 20	L-Tyrosine †	9
CFA 19	Sodium cyanoacetate-2-C ¹⁴	1	CFB 21	L-Valine †	5
CFA 20	Methyl cyanoacetate-2-C ¹⁴	1	CFB 6	Algal Protein	30
CFA 48	Sodium propionate-1-C ¹⁴	1	Activity (microcuries/mg.)		
CFA 15	Sodium-n-butyrate-1-C ¹⁴	1 - 4	CARBOHYDRATES (Uniformly labeled)		
CFA 23	Palmitic-1-C ¹⁴ acid	0.1 - 0.5	CFB 2	D-Glucose ‡	0.5 - 1.0
CFA 24	Stearic-1-C ¹⁴ acid	0.1 - 0.5	CFB 3	D-Fructose ‡	0.5 - 1.0
CFA 25	Stearic-2-C ¹⁴ acid	0.1	CFB 4	Sucrose	0.5 - 1.0
CFA 62	Margaric-1-C ¹⁴ acid	0.5 - 1.0	CFB 1	Starch (Tobacco)	10
CFA 26	Benzoic-carboxyl-C ¹⁴ acid	1 - 4	PLANT MATERIALS		
CFA 54	Cyclohexane(carboxylic-C ¹⁴) acid	1	CFB 5	Dried Algae (<i>Chorella vulgaris</i> , freeze-dried)	2
CFA 50	Pyruvamide-2-C ¹⁴	1	Activity (microcuries/gr.)		
CFA 51	Pyruvamide-3-C ¹⁴	1	PLASTIC REFERENCE SOURCES		
CFA 22	Diethyl (malonate-1-C ¹⁴)	1	CFP 1 } Polymethyl-C ¹⁴ methacrylate sheets	0.1	
CFA 21	Diethyl (malonate-2-C ¹⁴)	1	CFP 2 } 3 cm. x 3 cm. x 1 mm.	1	
CFA 66	Succinic-1-C ¹⁴ acid	2	CFP 3 }	10	
CFA 67	Fumaric-1-C ¹⁴ acid	2	OIL SOLUBLE COBALT SALT		
CFA 69	Phenylacetic-1-C ¹⁴ acid	1 - 2	Cobalt-60 Napthenate		
CFA 68	Maleic-1-C ¹⁴ anhydride	2	ORDERING INFORMATION		
RING-LABELED AROMATIC COMPOUNDS			Standard stock packages are 1, 0.5, and 0.1 millicuries except where indicated. Other quantities and activities available on special order. Quantity discount available on orders of 2 millicuries or more.		
CFA 58	Benzene (uniformly labeled)	1	Orders for radiochemicals must be accompanied by authorization of the Atomic Energy Commission (form AEC-313) and a signed copy of Form AEC 465, if applicable.		
CFA 59	Toluene (uniformly labeled)	0.1	Form AEC-313 should be submitted in triplicate to the Isotopes Division, Atomic Energy Commission, Oak Ridge, Tennessee. When the approved form is returned, send one copy with your order to Nuclear-Chicago.		
CFA 60	Benzaldehyde (uniformly labeled)	0.1	If the radioactive material is to be injected or otherwise consumed by either humans or animals, your order must also include one completed copy of Certificate of Compliance with Federal Food, Drug and Cosmetic Act (Form AEC-465). If your use of the radioactive material DOES NOT require consumption by humans or animals, please so state on your order.		
CFA 61	Benzoic Acid (uniformly labeled)	1	Copies of Forms AEC-313 and AEC-465 are available at all Nuclear-Chicago offices and from the U.S. Atomic Energy Commission, Isotopes Branch, Oak Ridge, Tennessee.		
CFA 36	Naphthalene-1-C ¹⁴	2 - 3			
CFA 37	1-Naphthol-1-C ¹⁴	2 - 3			
CFA 38	2-Naphthol-8-C ¹⁴	2 - 3			
CFA 39	2-Naphthylamine-8-C ¹⁴	2 - 3			
MISCELLANEOUS COMPOUNDS					
CFA 40	Acetylene-C ¹⁴ *	2 - 8			
CFA 41	Urea-C ¹⁴	1 - 2			
CFA 42	Acetone-1,3-C ¹⁴ **	1			
CFA 43	Acetone-2-C ¹⁴ **	1			
CFA 49	Adenine-8-C ¹⁴	1			
CFA 28	2,4-Dichlorophenoxy(acetic-1-C ¹⁴) acid	1			
CFA 27	2,4-Dichlorophenoxy(acetic-2-C ¹⁴) acid	1			
CFA 29	3-p-methoxyphenyl-n-(butyric-1-C ¹⁴) acid **	2 - 3			
FATS					
CFA 64	Tripalmitin (Glyceryl tripalmitate-1-C ¹⁴)	1 - 2			
CFA 63	Tristearin (Glyceryl tristearate-1-C ¹⁴)	1 - 2			
CFA 65	Tristearin (Glyceryl tristearate-2-C ¹⁴)	1 - 2			

* Available only in 1 millicurie package
 ** Available only in 1 and 0.5 millicurie package
 † Available in 1, 0.5, 0.1 and 0.01 millicurie package
 ‡ Available in 1, 0.5, 0.1 and 0.02 millicurie package

MODEL

182

*Ampli-Count
Scaler*



Model 182 "Ampli-Count" scaler is a logical choice for a diversified work program where Geiger, proportional, or scintillation counters may be used. It is a fast scaler ideally suited for high counting rates, with a resolution time of 2 microseconds and an amplifier circuit having a rise time of only 0.25 microsecond. The built-in, wide range linear amplifier has good overload characteristics. Normal counter pulses 1000 times greater than the triggering level do not produce double pulsing or harmful blocking effects in the amplifier. It is an excellent scaler for gaseous-phase C-14 counting with a Bernstein-Ballentine proportional counter (see page 27), for Model D47 used as a proportional counter (see page 23), or any other technique requiring a fast scaler with good amplifier characteristics.

Both a register and drum type timer are built into Model 182, and a 60 cycle test pulse is provided. A single switch provides automatic electrical reset of interpolation lights, register, and timer. An external Model T1 timer (page 32) can be utilized to provide automatic preset time operation if desired. In addition, this scaler may be connected directly to Model C-110 sample changer (page 13) for routine automatic counting of as many as 50 radioactive samples. The electronically stabilized high voltage supply provides 500 to 2500 volts for the detector. This instrument is also available without the timer and with manual register reset as Model 182A. Either Model 182 or 182A is available with 5000 volt supply. Specify by adding X to the model number.

Specifications

- Range** — Higinbotham scale of 256, with scale selection of 4, 8, 16, 32, 64, 128, and 256, and six digit register.
- Resolving time** — Two microseconds for pulse pairs. Up to 300,000 cpm result in less than 1% coincidence loss.
- Sensitivity** — 1 mv to 1 volt, with 0.1-1.0 volt setting for G-M pulses. X1, X10, and X100 attenuation switch, with a calibrated continuously variable discrimination control.
- Amplifier** — Shock mounted input circuit. Amplifier rise time 0.25 microsecond. Dynamic range greater than 1000 at all gain settings for normal pulses.
- High voltage** — 500 to 2500 volts, with coarse and fine controls, mounted on "Bolt-on" chassis. (5000 volts optional). Four inch expanded scale meter. Potted transformer for reliability. Less than .002% change for 1% line voltage change between 95 and 130 volts. Rectifier tubes sub-mounted. Uses "flutter-free" 5651 tube for reference voltage.
- Timer** — Indicates elapsed time in minutes and hundredths to 9999.99.
- Reset** — One switch electrically resets interpolation lights, register, and timer. (Available without timer and with manual reset as Model 182A or 182AX).
- Operation Control** — One switch provides OFF, ON (not high voltage), 60 CYCLE TEST (input and scaling stages), STAND-BY (high voltage filaments and 60-cycle pulsing), and HV (at value set by high voltage controls) indicated on illuminated panel. Separate STOP-COUNT switch.
- Connectors** — Input, auxiliary, preamplifier, high voltage, oscilloscope connectors on rear of chassis.
- Mounting** — Chassis and panel slope-mounted in well ventilated cabinet, may be rack mounted if desired. Recessed handles on side facilitate moving.
- Power** — 200 watts, 95-130 or 190-260 volts, 50-60 cycles.
- Weight** — 80 lbs., shipping weight 90 lbs.
- Supplied with** PC7, 8 and 9 cables and instruction manual.





MODEL

183

Count-o-Matic
Scaler

Specifications

Range — Higinbotham scale of 256, with scale selection of 4, 8, 16, 32, 64, 128, and 256, and four digit register.

Resolving Time — Two microseconds for pulse pairs. Up to 300,000 cpm result in less than 1% coincidence loss.

Sensitivity — Factory set at 0.25 volt (adjustable from 0.15 to 0.5 volt).

Count-o-Matic control — Counts 10, 100, or 1000 times any scaling factor, or any predetermined time up to 60 minutes with Model T1 Dual Timer.

High voltage — 500 to 2500 volts, with coarse and fine controls, mounted on "Bolt-on" chassis. Four inch expanded scale meter. Potted transformer for reliability. Less than .002% change for 1% line voltage change between 95 and 130 volts. Rectifier tubes submounted. Uses "flutter-free" 5651 tube as reference voltage.

Timer — Indicates elapsed time in minutes and hundredths to 9999.99.

Reset — One switch electrically resets interpolation lights, register, and timer. (Available without timer and with manual reset as Model 183A).

Operation Control — One switch provides OFF, ON (not high voltage), 60 CYCLE TEST (input and scaling stages), STAND-BY (high voltage filaments and 60-cycle pulsing), and HV (at value set by high voltage controls) indicated on illuminated panel. Separate STOP-COUNT switch.

Connectors — Input, auxiliary, preamplifier, high voltage, oscilloscope connectors on rear of chassis.

Mounting — Chassis and panel slope-mounted in a well ventilated cabinet, may be rack mounted if desired. Recessed handles on side facilitate moving.

Power — 200 watts, 95-130 or 190-260 volts, 50-60 cycles.

Dimensions — 12¼" x 20" x 20.

Weight — 80 lbs., shipping weight 90 lbs.

Supplied with high voltage cable and instruction manual.

Model 183 "Count-o-Matic" is an automatic G-M scaler widely used for routine counting because both preset count and preset time operation is available. Excellent for operation with Model C-110 Automatic Sample Changer (see page 13) and for use with all geiger counters and with scintillation counters having an output pulse of 0.15 volt or greater. It may be connected directly to Model DS-1 or DS-3 Scintillation Counter (pages 24 and 25), and should be chosen wherever automatic Geiger or scintillation counting is advantageous.

The exclusive "Count-o-Matic" controls allow operation for a predetermined number of counts or a predetermined length of time. Ideal for automatic comparative percentage measurements. A Higinbotham scale of 256 permits counting samples of high activity, and scale selection of 4, 8, 16, 32, 64, 124 and 256, coupled with a "Count-o-Matic" operation switch of 10, 100, or 1,000 times the scaling factor, permit a wide flexibility of preset count settings. An additional switch position permits predetermined time counting from 2 seconds to 60 minutes with an external Model T1 Timer (page 32).

The high voltage range is 500-2500 volts, with Coarse and Fine controls. A built in timer provides elapsed time indication, and a single switch operates electrical reset of register, timer, and interpolation lights. This scaler is also available without timer and with manual reset as Model 183A.



ONE YEAR WARRANTY

SCALING UNITS

MODEL

192

Ultrascaler



Model 192 Ultrascaler is the most versatile scaler commercially available in one complete unit. It is the recommended choice for any complete all-purpose laboratory (see page 2) because of its great adaptability. Its wide sensitivity range and well regulated high voltage supply permit its use with all Geiger, scintillation, or proportional counters. Automatic counting features include (1) both *predetermined time* and *predetermined count* operation, (2) "Time-Count" operation where the count will be stopped at a preset time or preset number of counts depending upon which appears first, and (3) *electrically reset* timer, register, and Eagle preset time clock. In addition, (4) the count may be manually controlled by the operator or (5) by a remote device such as Nuclear-Chicago's Model C-110 automatic sample changer (see page 13).

The Model 192 is provided with direct reading decade plug-in units. A six position scale selector switch coupled with a "pre-count" selector switch of 10, 100, or 1000 times the scaling factor permit a wide range of predetermined count settings. For predetermined time operation, the Eagle time clock may be set to any preset time from nine seconds to 60 minutes. The clock will be automatically reset at the end of a counting run. Total count is indicated on a four digit register, while the built-in drum type timer indicates elapsed time to 9999.99 minutes. This scaler is available with 5000 volt supply by specifying Model 192X.

Specifications

- Range** — Direct reading decade plug-in units with scale selection of 4, 10, 40, 100, 400, and 1000.
- Sensitivity** — From 1 millivolt to 800 millivolts in 18 steps. 0.25 volt position for G-M or scintillation counter pulses.
- Resolving Time** — Five microseconds for pulse pairs. Coincidence losses at 120,000 counts per minute are less than 1%.
- Amplifier** — Shock mounted, well shielded. Rise time 0.25 microsecond. Dynamic range at all gain settings is greater than 1000 to 1. Overload factors of this order produce negligible base line shift or increased dead time. Clipping time 3.3 microseconds. Gain controlled by fixed attenuators. Stable Schmitt discriminator circuit. Separate pre-amp input with 0.1 to 0.8 volt sensitivity.
- Pre-Time Controls** — Selects any predetermined time from 9 seconds to 60 minutes with built-in Eagle timer.
- High Voltage** — 500 to 2500 volts (500 to 5000 volts optional), with coarse and fine controls. Four inch meter. Potted transformer for reliability. Less than 0.002% change for 1% line voltage change between 95 and 130 volts. Rectifier tubes submounted. Uses "flutter-free" 5651 tube as reference voltage. High voltage "stand-by" switch.
- Operation Control** — Provides Manual, Pre-Count, Pre-Time, Count-Time, and Remote operation. Specifically designed to give great flexibility with the C-110 sample changer.
- 60 Cycle Test** — Switch provides 60 cycle test signal.
- Connectors** — Counter Input, Pre-Amplifier Power, Pre-Amp Signal Input, CRM, HV out, Auxiliary, Scope at rear.
- Mounting** — Both chassis mounted in well ventilated cabinet, may be rack mounted if desired.
- Power** — 200 watts, 95-130 or 190-260 volts, 50-60 cycles.
- Dimensions** — 20" x 20" x 21" high.
- Weight** — 135 lbs., shipping weight 150 lbs.
- Supplied with** chassis interconnecting cable, high voltage cable, cable adapter and instruction manual.





MODEL

181

*Decade
Scaler*

Specifications

Range — Decade scale of 10, 100 or 1000.

Resolving Time — Five microseconds for pulse pairs. 120,000 counts per minute result in less than 1% coincidence loss.

Sensitivity — Set for 0.25 volt at the factory. Can be adjusted from 0.1 to 1.0 volt by chassis potentiometer.

Amplifier — Non-overloading feedback amplifier with gain of 10.

High Voltage — R-F type high voltage supply. Well shielded. Range is 400 to 3000 volts. Stabilization is such that there is only 0.01% change in high voltage for 1% change in line voltage from 95 to 130 volts. High voltage supply will deliver 100 microamperes to load at 3000 volts. Continuously variable with coarse and fine controls. 250 volt adjustment provided by fine control. Stabilized B+ supply for amplifier and high voltage stabilizer.

Controls — Reset (decades and register), 60 cycle test, a.c. power, HV adjust, stop-count switch. Remote-Local operation switch at rear.

Connectors — Accessory connector for remote timer or sample changer, timer outlet, preamp power, oscilloscope, counter input connectors at rear of chassis.

Power Required — 100 watts, 95 to 130 volts.

Dimensions — 12 $\frac{1}{4}$ " x 20" x 20".

Weight — 45 lbs., shipping weight 50 lbs.

Supplied with instruction manual and high voltage cable.

Model D181 is a reliable decade scaler for Geiger and scintillation counting, with versatile features which include true decimal readout for ease in determining total number of counts. The instrument has a scale of 1000, with the register indicating thousands and the lighted neon lamps on the three plug-in decades indicating hundreds, tens, and units. If desired, scaling factors of 10 or 100 may be selected by means of the scale selector switch. The built-in 60 cycle test signal may be utilized to check proper operation of the plug-in scaling stages, and a single lever resets register and scaling stages.

Model D181 may be operated directly with the automatic sample changer (page 13) or with a Geiger or scintillation counter in an appropriate mount for manual sample changing. Model T-101 timer may be connected directly to the unit to indicate elapsed time, or Model T1 dual timer may be used with the instrument if predetermined time operation is desired (see page 32). The stable, wide range high voltage supply is continuously variable by means of coarse and fine controls from 400 to 3000 volts. Low power dissipation, minimum number of tube types, and reliably rated circuit components tend to provide long operational life. This scaler is an excellent choice for any clinical or research laboratory because of simplicity of readings and trouble-free operation. A separate output pulse is provided for a remote register or for cascading scalars.



SCALING UNITS

MODEL 161A Basic Scaler

Model 161A is a basic instrument for both research work and routine counting of radiation. It may be used with G-M or scintillation counters for diagnostic or therapeutic purposes in medical applications; qualitative or quantitative work in chemistry; for monitoring work; and for many other routine counting jobs. It is designed for easy operation by inexperienced personnel, and is a complete electronic unit requiring only a G-M or scintillation detector and an accurate timer.

This scaler is designed for manual counting, although it may be connected directly to Model C-110 automatic sample changer (page 13) for automatic counting of as many as 50 radioactive samples. It is recommended as part of the Basic Radioisotope Laboratory (page 3). An external Model T-101 timer (page 32) can be controlled with the stop-count switch, or Model T1 dual timer (page 32) permits predetermined time counting.



Specifications

Range — Higinbotham scale of 256 with seven position scale selection switch.
Sensitivity — Factory set at 0.25 volts.
Resolution Time — Five microseconds for paired pulses. 120,000 counts per minute result in only 1% coincidence loss.
High Voltage — Well filtered and stabilized high voltage supply is continuously variable from 600 to 2500 volts with single front panel control. Less than 0.01% change in high voltage for 1% change in line voltage between 95 and 130 volts.
Reset — Manual reset switch extinguishes neon interpolation lamps. Six digit resettable register.

Stop-Count Switch — Single switch to start or stop the counting action.
Connectors — G-M Input on front panel, Pre-Amp, Timer, HV, Auxiliary, Normal-Remote reset switch at rear. Line fuses at rear; high voltage fuses on chassis.
Mounting — Slope mounted in well ventilated cabinet with recessed handles to facilitate moving. Chassis may be rack mounted, if desired.
Dimensions — 12¼" x 20" x 20".
Weight — 69 lbs., shipping weight 74 lbs.
Power — 150 watts, 95-130 volts, 50-60 cycles.
Supplied with high voltage cable and instruction manual.

Specifications

Range — Scale of 10, with fast register that permits counting to 6500 cpm with only 2% loss.
Sensitivity — Factory set at 0.25 volts.
Decade — Utilizes Dekatron glow transfer tube.
Register — Non-resettable register counts to 99999.
High Voltage — Stabilized in four steps: 900, 950, 1000, and 1050 volts. Other ranges starting at 700 up to 2000 volts

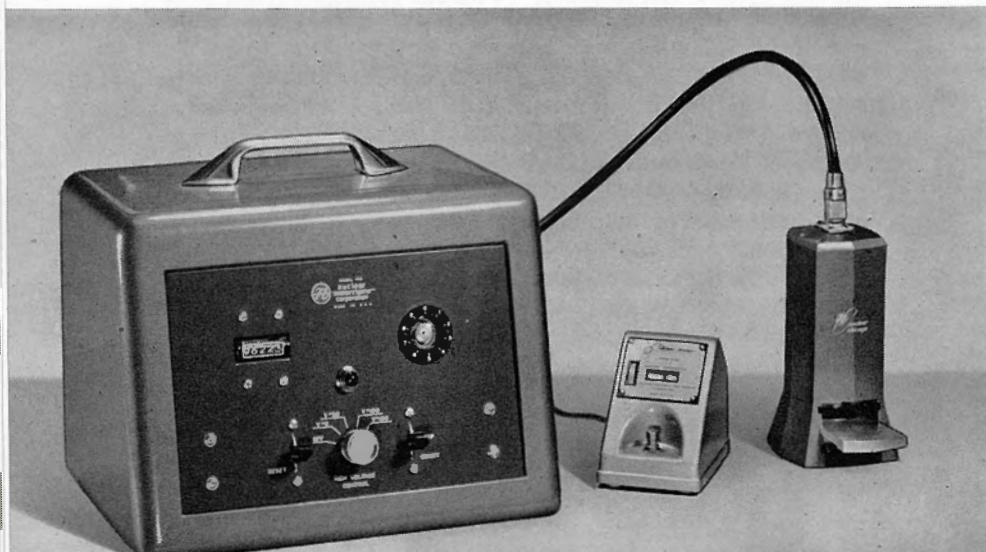
by changing the voltage regulator tube.
Reset — Switch resets glow decade to "0" if desired.
Connectors — Input and timer connectors at rear. Removing 2X2 plate cap removes high voltage at input, permitting use of Model 180 as a high speed register.
Power — 55 watts, 105 to 130 volts, 60 cycles.
Weight — 21 lbs., shipping weight 27 lbs.
Supplied with high voltage cable and instruction manual.

MODEL 180 Rediscaler

Model 180 "Rediscaler" incorporates only the essential features of a G-M scaling unit — providing count indication and a well stabilized high voltage supply — yet it is as reliable and accurate as a more expensive instrument. It is specifically designed for tracer counting, and is recommended for counting rates less than 7500 counts per minute. High voltage is variable in 4 fifty volt steps from 900 volts. The instrument features a decade glow transfer tube followed by a built-in register for direct indication of counts received. Its low cost makes it the answer to many budget purposes, and its decade indication makes it ideal for teaching purposes.

Model 180 Rediscaler with Models M2 Mount, T-101 Timer and either D33 or D34 G-M counter (page 26) provide a complete counting group.

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ONE YEAR WARRANTY



MODEL **C-110** *Sample Changer*

Model C-110 Sample Changer eliminates the tedious and time-consuming job of counting many radioactive samples. This compact unit, used with a lead shield, Model C-111 Printing Timer, and a Scaler, is extremely flexible because it counts any number of samples up to 50 at one loading, and recounts them automatically if desired. The system provides automatic detection, counting, and recording of the length of time required for each sample to reach a preset number of counts. It is the only available commercial unit which may be used interchangeably with a mica window, scintillation, or gas flow counter.

Model C-110 may be connected directly to any current model Nuclear-Chicago scaler except Model 180. Lead shields are available for use with (1) Model D47 gas flow counter (page 23), (2) Model D34 Geiger counter (page 26), or (3) Model DS-1 scintillation counter (page 24).

Heart of the automatic changer is a simple three-position turntable which sequentially elevates a sample into counting position within the shield, selects the next sample, and places the counted sample in the storage magazine.

Fifty numbered sample carriers are provided which load into one of the chrome-plated magazines. The changer may be set to count all samples, with or without final background count, or to repeat the complete count as desired. The C-111 printer stamps the elapsed time on a paper tape, together with the "identity" number of the sample.

Specifications

MODEL C-110 CHANGER

- Capacity** — Fifty numbered aluminum carriers for counting up to fifty 1" or 1¼" x ⅛" samples.
- Cycle Time** — Fifteen seconds per change.
- Operation Selector** — Selects complete cycle and stop, continuous cycling in proper order, or count with background. Separate Start-Reject switch interrupts or starts operation. Line-Off-Scaler switch provides power from a. c. line or from scaler.
- Count Selector** — Presets 5, 10, 20, 40, 80, or 100 times scaling factor, and provides switch positions for preset time or scaler controlled operation.
- Connectors** — Nine-pin to scaler, nine-pin to Printing-Timer. Separate line input also provided for testing.
- Power** — 100 to 130 volts, 60 cycles (50 cycles on request).
- Dimensions** — 14¼" x 15" x 18½" high.
- Weight** — 50 lbs., shipping weight 60 lbs.

MODEL C-111 PRINTING TIMER

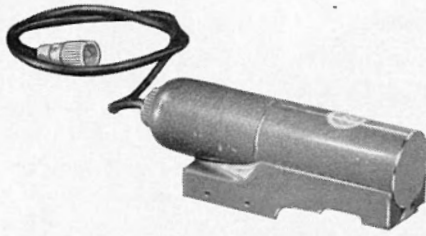
- Capacity** — 99 samples to 99.99 minutes each.
- Accuracy** — Prints time within .01 minute.
- Record** — Prints time in minutes and hundredths with sample number on paper tape.
- Power** — 50 millisecond signal pulse and 115 volt, 60 cycle, power from Model C-110.
- Connector** — 9-pin cable from Model C-110.
- Dimensions** — 9¼" x 14" x 12".
- Weight** — 32 lbs., shipping weight 35 lbs.

LEAD SHIELDS

- Model 3037** — For use with Models D33, D34 or similar G-M counters. Provides 2" lead with knurled knob for vertically positioning G-M tube.
- Model 3037B** — For use with DS-1 scintillation counters or D47 gas flow counter.
- Order** — C-110, C-111, Lead Shield, detector, and scaler for complete system.



ONE YEAR WARRANTY



MODEL 1615-B Rate Meter

Model 1615B Analytical Rate Meter is a precision integrating instrument to provide quantitative measurement of radioactivity for such purposes as thyroid uptake studies, medical diagnosis, tracer work, process control, monitoring, etc. It is designed to simplify many radioactivity measurements formerly requiring a scaler. For such purposes, it may be connected directly to an Esterline-Angus chart recorder (page 32) for maintaining a continuous record of the count rate.

The instrument is ordinarily supplied with Model D34 mica window counter (page 26) and Model P11 probe at a "package" price. This probe has a three foot cable and an exclusive built-in magnet for mounting on any ferromagnetic surface (see page 34). Model P10 probe is a similar probe with a ten foot cable and built-in preamplifier for monitoring a large area. For use in uptake studies in clinics or hospitals Model P10 may be used, or the instrument may be connected directly to Models DS-1 or DS-3 scintillation counter (pages 24 and 25) if desired.

Model 1615B incorporates a well stabilized high voltage supply continuously variable with a front panel control from 650 to 1500 volts. Regulation is such that there is less than a 0.1% change in the high voltage for a 1% line voltage change between 95 and

130 volts. The CRM-HV control switches the meter to read in volts instead of counts per minute, so that the high voltage applied to the detector may be read easily.

Five full scale meter ranges of 500, 1500, 5000, 15000, and 50000 counts per minute are provided, permitting exceptional accuracy in meter reading over a wide range of counting rates. Statistical Error switch selects either 2%, 5%, or 15% "standard error" accuracies for each range. The 1615B contains a built-in loud speaker with volume control at the back of the chassis for aural monitoring of the pulses produced by the detector.

A quick check for zero-set of the meter and calibration of the instrument may be made from the front panel, while potentiometers at the back of the chassis are used in zero-setting or calibration. A recorder On-Off switch on the front panel is used for switching an external Esterline-Angus recorder (page 32) in and out of the circuit.

This instrument, because of its wide versatility, is suggested as part of the Complete All-Purpose Laboratory (page 2). It is also recommended for use with the Model C-100 radiochromatogram scanner shown on page 17.

Specifications

Range — Five ranges, 500, 1500, 5000, 15,000, and 50,000 cpm full scale, with choice of 2, 5, or 15% statistical accuracy on each range.

Sensitivity — Factory set at 1/2 volt.

Controls — Range switch selects range, also "line-locked" calibration and zero set positions. Three position switch selects statistical accuracy by time constant change. High voltage control, OFF-ON switch, and CRM-HV switch for meter also provided. Speaker volume, calibration, and zero set adjustments on rear.

Recorder OFF-ON switch on panel.

Pilot lights indicate instrument on and recorder on.

High voltage — Continuously variable 650 to 1500 volts, with 4" meter. Less than 0.1% change for 1% line voltage change between 95 and 130 volts.

Connectors — Input, six-pin preamplifier, HV out, and recorder connector on rear. For use with scaler specify model.

Power — 60 watts, 95 to 130 volts, 50 — 60 cycles.

Dimensions — 13 1/2" x 11" x 9 1/2".

Weight — 27 lbs., shipping weight 33 lbs.

Supplied with instruction manual, recorder cable, also probe and detector as specified.



MODEL 1619 *Labitron*

Model 1619 Labitron is a laboratory monitor for use with a Geiger-Mueller counter and an appropriate probe for (1) routine surveying for alpha, beta, or gamma contamination in radioisotope laboratories, (2) detecting large fluctuations in laboratory "background", and (3) routine measurements of radioactivity for medical diagnosis, tracer work, or process control where the precision and high accuracy of a scaler is not necessary. The simplicity of the design is such to insure high reliability. The Labitron is ordinarily used with a Model D34 thin window Geiger tube (page 26) and a Model P11 probe (page 34) but may also be used with the D34 and Model 3031B lead shield (page 30) for manual sample changing.

Specifications

- Range** — Four ranges; 0-500, 0-2000, 0-5000, and 0-20,000 cpm. Individual range calibration for evenly spaced pulses is within 5%.
- Resolution** — Resolution loss for random pulses approximately 10% at 20,000 cpm. Negligible on lower ranges.
- Controls** — On-Off-Volume control, four position range selector switch, high voltage adjust, Recorder on-off switch at rear. Screw-driver calibration controls.
- High Voltage** — Plus 900 volts, corona tube regulation with 200 volt adjustment. Less than 0.1% high voltage change for 1% line voltage change between 95 and 130 volts.
- Connectors** — Input, recorder connectors, line cord at rear.
- Power** — 36 watts, 95 to 130 volts, 50-60 cycles.
- Dimensions** — 13½" by 11" by 9½".
- Weight** — 23 lbs., Shipping weight 29 lbs.
- Supplied with instruction manual, P11 probe, and Model D33 or D34 G-M tube as specified.**

The Labitron provides four convenient full scale ranges covering any radiation intensity up to 20,000 counts per minute. Time constants of the rate circuit are chosen to provide the best compromise between probable error in reading and speed of response. The effective time constant is changed by the range switch. There is absolutely no zero drift and the calibration of the instrument will remain stable for long periods of time. The calibration is also unaffected by line voltage fluctuations. A built-in loud speaker is provided for aural monitoring of the pulses produced by the G-M tube. A recorder connector is provided for driving an Esterline-Angus chart type recorder (page 32) or an external meter. Model 1619 Labitron is recommended as part of the Carbon-14 Laboratory (page 4).



MODEL MR-10 *Alarm Circuit*

Model MR-10 Alarm Circuit is essentially an electronic relay to energize any convenient 110 volt signal. It operates from either Model 1615B or 1619 and incorporates a contact type meter which may be set for a predetermined warning level. Can be used with bell, buzzer, howler, or light alarm. Alarm remains energized until manually reset.

Specifications

- Meter** — Contact type, calibrated 0-5 and 0-1.5.
- Controls** — Meter contact adjustment, off-on, and alarm reset.
- Connectors** — Signal input, power input, and alarm output on rear.
- Dimensions** — 8" x 8" x 8".
- Weight** — 5 lbs., shipping weight 7 lbs.

GUARDITRON MONITORING SYSTEM

The Guarditron system is excellent for protection or to warn against any sudden large background changes during sample counting. It utilizes 1615B or 1619 and MR-10 to monitor low levels of gamma flux. It will reliably indicate an increase of 10% above normal background, using a 2" x 24" (Model 80) geiger counter for detection. Either manual or automatic reset can be provided. "Fail-Safe" operation is available by using an additional Model MR-10 circuit to gain low level control.





MODEL C-100 *Actigraph*

Nuclear-Chicago's exclusive "Actigraph" system permits automatic scanning of strip chromatograms for radiolabeled spots — thus completely eliminating dissection of the chromatogram or time-consuming elution and assay of successive segments along the strip. Separated radioactive components are accurately located and the Esterline-Angus recorder chart provides a parallel record of the measured radioactivity.

The complete system consists of a strip feeder, a lead shield which contains a thin window counter and collimating slit, an analytical count rate meter, and a chart type recorder. A strip chromatogram is taped to the long metal strip table, its leading edge passed through the lead shield under the Geiger tube, and through the rubber rollers of the strip feeder. These rollers are driven by a cable from the recorder at the exact speed of the recorder chart, thus assuring precise correlation between the graph and the radiolabeled spots on the chromatogram.

Collimating slits which may be inserted between the strip and the Geiger tube are provided to permit resolution into two or more components of what initially may have appeared as one broad peak. Since low activities require a slower scanning rate than high activities for the same statistical accuracy, color-coded gears are furnished so that the movement of the chart and strip may be set to any one of eight different speeds from 0.75 inches per hour to 6 inches per minute. When the scanning is complete, a switch is opened and the chart and strip are stopped.

A special accessory table included with the instrument permits use as a simple sample changer. This table will accommodate up to ten standard 1" or 1¼" by 1/16" sample pans. Another table which will hold eight 17/8" diameter absorbers is also included. Model C-101 Absorbers (page 33) can be automatically drawn over a radioactive sample placed under the Geiger tube to produce a characteristic absorption curve.

Specifications

MODEL C-100 STRIP FEEDER

Includes strip feeder with rubber rollers; change gears; strip, sample, and absorber tables; micro-switch and cable assembly, flexible coupling cable to recorder, collimating slits.

Dimensions — Feeder is 10" long by 6½" wide by 6" high. Mounting tables and strip holder are 36" long.

Weight — 11 lbs., shipping weight 14 lbs.

Shipped with instruction manual.

ORDER STRIP FEEDER, COUNT RATE METER, RECORDER, AND DETECTOR WITH LEAD SHIELD FOR COMPLETE SYSTEM.

COUNT RATE METER

Either Model 1615B Analytical Count Rate Meter (page 14) or Model 1619 Labitron (page 15) may be used.

LEAD SHIELD AND DETECTOR

Model D34 Geiger counter may be used with Model 3031B lead shield and either the 1615B and 1619 rate meters. Model D47 gas flow counter may be used with Model 3037B lead shield and with the 1615B rate meter only.

RECORDER

Esterline-Angus chart recorder (page 32).



PERSONNEL PROTECTION

MODEL

1500

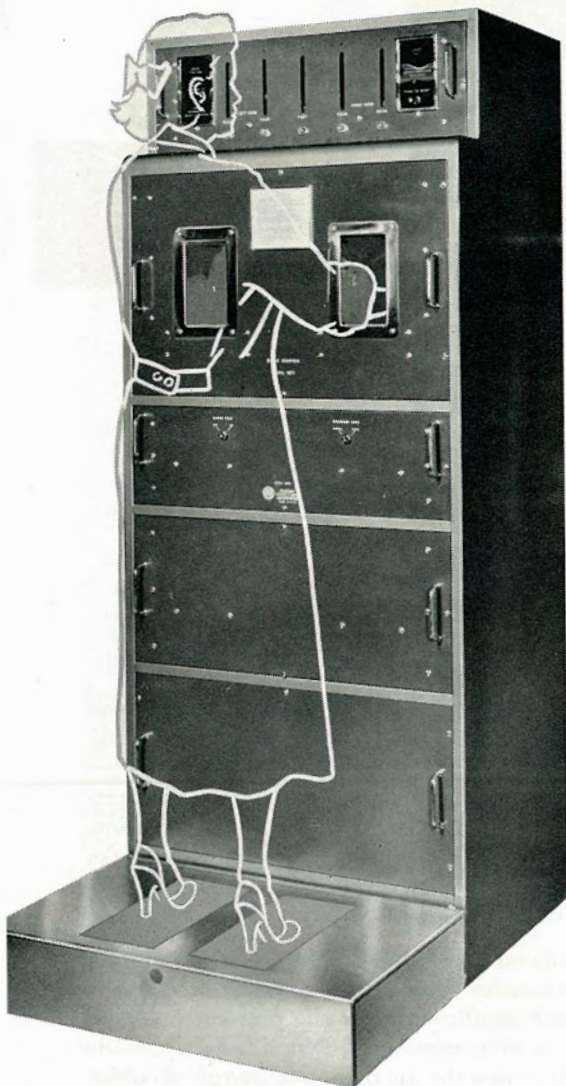
Hand and Foot Monitor

Model 1500 Hand and Foot Monitor provides completely automatic monitoring of beta-gamma contamination on the hands and feet of radiolaboratory technicians. Consists of a five channel scaler and power supply system with automatic controls to sequence and time counting operations. Lighted legends at eye level indicate operational stage or result of counting. One scaling channel is provided for each side of each hand, and one for the soles of both feet.

The automatic design of this unit makes it simple and foolproof to operate. The only exposed controls are the reset button and the switch placed in each hand slot. For safety, interlock switches disconnect the power from the entire unit when a chassis is unlocked and pulled out. Complete data available on request.

Specifications

Detectors — 16 thinwall (35-40 mg/sq. cm.) stainless steel halogen type GM counters. Nominal operating voltage — 900 volts.
Sensitivity — Minimum beta energy 200 Kev.
Tolerance — 10 cpm to 1200 cpm hands. 10 cpm to 2400 cpm feet.
Dimensions — 76" high, 32" wide, 24" deep without platform, 49" deep with platform.



MODEL

3782

Neutron Thermopile

Nuclear-Chicago's exclusive "Neutron Thermopile," Model 3782, is the only commercially available transducer for measuring high levels of thermal neutron flux. It measures from 10^7 to 10^{12} thermal neutrons/cm²/second, generating an EMF proportional to the neutron flux, and is insensitive to other radiation and temperature conditions. Detailed data on request.

MODEL 3783 MODERATOR

This special moderator adapts Model 3782 for measurement of fast neutrons. Detailed information on request.

17

Model 3782



ONE YEAR WARRANTY



FILM BADGES

Film badges should be worn by all persons exposed to hazardous external radiation from X-rays or radioactive materials. With the Nuclear-Chicago "Nuclibadge" service, routine personnel monitoring is provided for X-ray laboratories, industrial plants, radioisotope laboratories, and doctors' and dentists' offices. This service is a low cost, easy way to *warn* of overexposure, *protect* employer and employee, and *check* to be sure safe practices are observed.

A light-weight color-coded plastic Nuclibadge is furnished each user weekly. The badge number and the date the badge is to be worn are clearly printed at the window of the badge. This data is also marked on the film emulsion for permanent identification. If desired, the wearer's name or initials will also be printed. Accompanying each week's badges (if there are three or more) is a control badge to monitor radiation accumulated in transit and during off hours.

The badges are worn by personnel for one week at which time they are returned to Nuclear-Chicago and a new set, which arrives several days ahead of time, is put into use. The exposed badges are promptly processed under extremely well controlled conditions. A complete set of calibrated films of the same emulsion number are processed with each group of films and used in the evaluation. The user then receives a complete exposure report for his information and records. Nuclear-Chicago keeps a copy of the report and the films on file where they are readily available for inspection and evidence.

EXCLUSIVE NUCLIBADGE ADVANTAGES

The Nuclibadge film badge service utilizes a special multiple filter system and an extremely wide range

film packet. These exclusive features plus a new and carefully tested method of interpretation make possible the evaluation of a much wider range of types and energies of ionizing radiations than before, including hard beta radiation and X-rays and gamma rays from 30 kev to 5 mev. In addition, they make possible the evaluation of mixed exposure from any combination of radiations within this wide range.

The accumulated exposure can be given accurately without the necessity of overstating or underestimating the exposure in allowing for the possible presence of low energy X or gamma rays. Nuclibadges provide as much as 50 times the quantitative range of older badges. For gamma and X-ray radiation at most energies the film is read for *any* exposure from 50 mr to 500,000 mr (500 r).

HOW TO ORDER NUCLIBADGES

Please provide name, address, number of persons to be covered, identification desired on the badge, and number of weeks required (minimum 13 weeks). Also state starting date (at least 10 days after receipt of order) and whether you wish to be advised by telephone or telegraph of exposures greater than 300 mr.

To prevent loss of film badge service between orders we suggest placing a standing order subject to cancellation at the end of each 13 weeks period. A yearly service discount is available if you make the order subject to cancellation at the end of each one year period. The service is payable in advance for each quarter. Special schedules can be arranged. Oak Ridge type badges are also available. Write for further details.

POCKET CHAMBERS



Pocket chambers are compact detecting instruments designed to accurately indicate radiation exposure accumulated by laboratory personnel. They may be carried conveniently in a pocket and consist essentially of an ionization chamber which is charged to a specific voltage by a suitable charger. Ionization produced by any incident radiation then partially discharges the chamber, and the resultant change in charge is measured to indicate radiation dosage.

Model 362 is a 0 to 200 mr Victoreen indirect-reading pocket chamber charged *and* read on Model 2050A charger (below). Its primary application is in the routine monitoring of radiation where the probable amount of radiation received is low. Commonly used for untrained personnel who would not be required

to interpret a direct-reading instrument, it is an economical protection device where large numbers of people are to be monitored. Accuracy is $\pm 10\%$ from 40 kev to 1 mev. Energy dependence is 15% maximum above 40 kev. Size is $5\frac{1}{2}$ " long by $\frac{1}{2}$ " diameter.*

Model 541A dosimeter is a 0 to 200 mr Victoreen self-contained quartz fiber electrometer, complete with optical system. The dosimeter is read at any time by looking through it toward a light source. Thus the user can keep a continuous check on his accumulated dose and act accordingly. The chamber is charged on Model 561 or Model 2050A chargers (below). Energy dependence is $\pm 10\%$ of true dosage from 0.08 mev to 2.0 mev. Accuracy is $\pm 5\%$ on cobalt-60. It is 4" by $\frac{1}{2}$ " in diameter, weighs $\frac{1}{2}$ oz.*



Model 561 Charger is used to charge direct-reading dosimeters. It is powered by ten 22 $\frac{1}{2}$ volt and one 1 $\frac{1}{2}$ volt batteries, with an internal light source and one control knob. The charging socket is spring mounted to prevent possible damage to the dosimeter by the use of too much pressure. It supplies any voltage between 110 and 225 volts, and is especially designed for use with Model 541A. Dimensions — $5\frac{3}{4}$ " by $3\frac{3}{4}$ " by $4\frac{3}{4}$ " high. Weight — three lbs., shipping weight 5 lbs.*



Model 2050A Charger-Reader is an all-electronic unit for simultaneously reading and recharging direct and indirect reading pocket chambers. A large panel-mounted meter assures easy dosage reading. A light is provided behind the charging socket so that self-reading type dosimeters may be seen. Sensitivity is 200 mr full scale, charge-reading accuracy is 5% of full scale. Input impedance is greater than 10^{14} ohms. 95 — 130 volts, 60 cycles. Weight — 10 lbs., shipping weight 13 lbs.



ONE YEAR WARRANTY

*SIX MONTH WARRANTY



MODEL

2612

*Count Rate
Meter*

Specifications

Model 2612 is a portable, battery operated G-M survey meter for measuring alpha, beta and gamma radiation. It is provided with choice of probes utilizing either Model D50 thin wall Geiger counter for both beta and gamma radiation of over 0.2 mev, or Model D35 thin mica end window counter for alphas, betas and gammas. This instrument is highly recommended for general purpose survey work in radioisotope laboratories, and its rugged waterproof construction makes it ideal for geological surveying for radioactive ores (using Model D50 G-M tube).

The probe is conveniently mounted in the handle and may be easily removed for surveying. A single control knob turns the instrument on and selects one of three ranges. Counts-per-minute and milliroentgen indication is provided on the 2½" waterproof meter. An "on" light is provided. Its failure indicates batteries should be replaced.

The instrument is carefully calibrated at the factory, and a calibrated radiation source is mounted on the case for checking calibration at any time. Earphones are supplied for aural monitoring. Internal components are mounted on a hinged shelf for easy maintenance.

Model P2 probe (used with Model D50 glass wall counter) has a revolving beta shield which exposes a 180° angle. When closed, the shield effectively cuts out beta radiation. Model P12 probe (used with Model D35 mica end window counter) is provided with a probe cap which permits gamma surveying only. Removing cap exposes 1.4 mg/cm² window for monitoring alpha and beta radiation with energies as low as 40 kev.

Ranges — 0.2, 2, and 20 mr/hr and 600, 6,000 and 60,000 counts per minute full scale.

Circuit — Time constants are automatically changed by range selector switch to fastest response time consistent with statistical fluctuations. Absolutely no zero drift. Exclusive compensating circuit minimizes coincidence loss at high counting rates. The instrument does not use a vacuum tube voltmeter circuit.

Detector — Model D50 Geiger counter (see page 26) with Model P2 probe for general beta-gamma survey work and prospecting. Model D35 end window Geiger counter (see page 26) with Model P12 probe for alphas and soft beta emitters (carbon-14, sulfur-35, etc.)

Controls — Range switch operable by hand carrying the instrument. Off position and three scale ranges are provided. A sealed earphone jack and a set of double earphones are provided for aural monitoring.

Calibration — Instrument is carefully calibrated at the factory in terms of gamma rays from radium in equilibrium with its short-lived decay products. A calibrated radiation source is mounted on the instrument case.

Power — Uses 900 volt stabilized audio oscillator high voltage supply for the Geiger tube. Two 67½ volt batteries and two 1½ volt batteries. Battery life is 250 hours continuous operation or equal to shelf life when operated 2 hours per day.

Meter — 2½" waterproof meter with counts-per-minute and mr/hr scales.

Dimensions — 10" x 4¾" x 5¾".

Weight — 10 lbs., shipping weight 15 lbs.

Supplied with batteries, double earphones, radium calibrating source, probe and detector as specified, and instruction manual.

MODEL **2585** "Cutie Pie"

MODEL **2582** "Samson"



Model 2585 "Cutie Pie" is a beta-gamma ion chamber type survey meter — excellent for general area measurement with field intensities above those measured by Model 2612 (opposite page). The instrument is operated by means of a single 5-position switch located above the handle to permit one hand operation. An "adjust" position permits zero setting the rugged 2" meter in the presence of radiation.

The instrument measures gamma intensity, and has a 1 mg/cm² window at end of barrel with rotary shield permitting entry or exclusion of low energy beta particles. External calibration and meter zero adjustments are mounted on the top of the housing. The entire circuit and chamber are easily removed for access to batteries and low drain 1 tube circuit.

Specifications

- Range** — 50, 500, 5000 mr/hr. Beta window 1mg/sq.cm. can be exposed to permit entry of 22 kev betas.
- Circuit** — Trouble free one-tube circuit utilizes 5803 electrometer.
- Calibration** — In terms of radium in equilibrium with its short-lived decay products. Accuracy is 10% of full scale, maintained throughout specified battery life.
- Controls** — Thumb operated switch for OFF, ZERO SET, X100, X10, X1. Separate controls for zero adjustment and calibration.
- Power** — Four 22½ volt batteries and one 1½ volt mercury cell easily available for replacement. Battery life is 250 hours at two hours per day.
- Housing** — Light-weight cast aluminum case for good balance permits setting instrument upright.
- Dimensions** — 6" x 4" x 12½".
- Weight** — 6 lbs., shipping weight 8 lbs.
- Supplied with batteries and instruction manual.**

Model 2582 Samson is a completely self-contained, battery operated ionization type survey instrument for surface measurement of any low level alpha, beta, or gamma contamination (C¹⁴, I¹³¹, S³⁵, P³², radium, etc.). It features a 40 cubic inch ion chamber at the bottom of the case with an extremely thin 4" x 4¾" rubber hydrochloride window protected by a stainless steel grill. Three ranges are provided: 0-500, 0-2500, and 0-12,500 counts per minute for alphas. These ranges correspond to radium gamma ranges of approximately 0-0.7, 0-3.5, and 0-17.5 mr/hr. The Samson will detect alphas with energies as low as 1 mev or betas with energies as low as 15 kev.

All batteries are contained in a compact plug-in unit which may be easily removed through a door in the side of the case. Handle includes a neon flasher which indicates when the instrument is operating. When placed on a flat surface, the thin window at the bottom is only 7/32" above the surface to be monitored.

Specifications

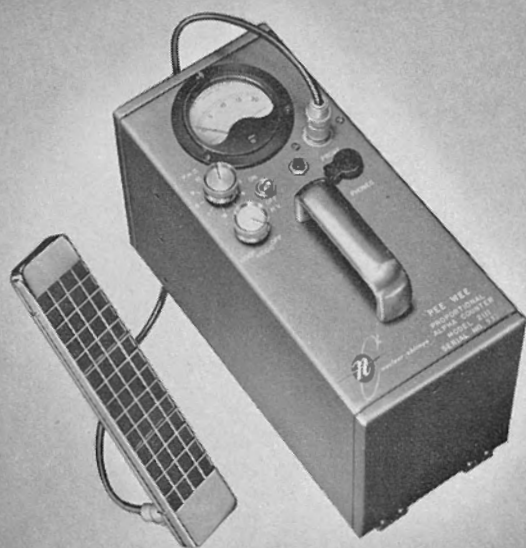
- Range** — 0-500, 0-2500, 0-12,500 cpm for alphas. This corresponds to radium gamma ranges of 0-0.7, 0-3.5, and 0-17.5 mr/hr.
- Circuit** — Three stage d.c. amplifier, 100% negative feedback, with electrometer input.
- Ion Chamber** — 4" x 4¾" window, 40 cubic inch volume, approximately 0.5 mg/cm² rubber hydrochloride window.
- Calibration** — Instrument is calibrated for uranium alphas.
- Power** — Battery powered. Life of mercury cells is 300 hours, B batteries 500-1000 hours.
- Response Time** — Approximately 5 seconds on all scales.
- Weight** — 8 lbs., Shipping weight 10 lbs.
- Supplied with batteries and instruction manual.**



MODEL

2111

"Pee Wee"



Model 2111 "PeeWee" is a portable proportional survey instrument used with Model AP2 alpha probe for the detection of alphas only in the presence of beta or gamma radiation. The amplifier has better than 2 millivolt sensitivity, and batteries provide up to 2400 volts d.c. for proportional counting. The easily read 3" meter shows count rate up to a maximum of 20,000 disintegrations per minute, and is calibrated for 20% overall detection efficiency. Convenient push button quickly returns meter to zero reading after exposure. The amplifier is mounted on a plug-in board, easily removable for servicing.

Model AP2 proportional counter is designed to count alphas by discriminating against beta or gamma background. Ordinarily used with the 2111, it may also be used with Models 182 or 192 scalers. It has a sensitive area of 75 sq. cm. with a 1 mg/cm² rubber hydrochloride window protected by a metal grill. It operates at 2350 volts; below the beta threshold.

Specifications

- Range** — 0 to 2000 and 0 to 20,000 dpm.
Amplifier — Two-stage, resistance coupled amplifier with two-tube trigger circuit mounted on plug-in terminal board. Meter reaches 90% of correct value in 20 seconds. Push button for reset to zero quickly after reading.
Discriminator — Pulse height selector permits counting alphas only in the presence of betas.
Power — Battery operated, two 1½ volt, one 67½ volt, and two 1200 volt batteries with arrangement for voltage adjustment.
Dimensions — 8" x 5½" x 12"
Weight — 36 lbs., shipping weight 40 lbs.
Supplied with cable, earphones, and instruction manual. Order probe separately. A canvas carrying case can be supplied for Model 2111 if desired. Details on request.

MODEL

2715

"Nemo"



Model 2715 "Nemo" is a battery operated survey meter for neutron measurement. It measures thermal and fast neutrons separately, and has a range of from 10 to 10⁴ neutrons per cm²/second. The unit contains two enriched BF₃ neutron detectors. One is used by itself for the detection of thermal neutrons. The other detector is surrounded by a block of paraffin and a cadmium shield. It is sensitive only to neutrons with energies above approximately 1 ev. It is insensitive to gamma radiation of approximately 1 r/hr.

Indication of proper operation, as well as a visual indication of low counting rates, is provided by a pair of neon lights which are alternately lit with each detected neutron. Earphones are provided for aural monitoring. Instrument controls consist of a simple 3-position radial switch marked Off, Thermal, and Fast. Special logarithmic scale indication. Circuit time constants are minimal consistent with statistical fluctuations.

Specifications

- Range** — 10 to 10⁴ neutrons per cm²/second.
Circuit — Four tube degenerative amplifier with exceptional high frequency response for a portable instrument. Good gamma discrimination. Pulse operated high voltage supply. Special logarithmic rate circuit is practically independent of tube and crystal characteristics.
Calibration — Screwdriver Sensitivity and Calibration controls.
Controls — Simple "Off-Thermal-Fast" radial switch.
Power — Battery powered; Uses four 45 volt, seven 1.35 volt mercury cells (four RG-4; three RG-1).
Dimensions — 6" x 6" x 13" (not including handle).
Paraffin Block Dimensions — 4½" x 4¼" x 1½".
Weight — 14 lbs., shipping weight 17 lbs.
Supplied with batteries, earphones and instruction manual.



MODEL **D47** Gas Flow Counter

Specifications

(When used with Model C-110 Automatic Sample Changer)

Sample Size — $3/32'' \times 1\frac{1}{4}''$ diameter. Automatic sample changer will accept up to 50 radioactive samples. Samples may be added or withdrawn from the changer without disturbing sample being counted.

Operating Potential — Geiger — approx. 1250 volts. Alpha proportional — approx. 1100 volts. Beta proportional — approx. 1900 volts.

Plateau Length — 200 volts.

Plateau Slope — Less than 2% per 100 volts.

Background — Geiger — 15 counts per minute. Alpha proportional — 8 counts per hour. Beta proportional — 15 counts per minute.

Resolving Time — Approximately 150 microseconds when operated as a Geiger counter.

Preamplifier — A preamplifier circuit is available so that the counter may be operated in the proportional region to discriminate between different types of radiation.

Micromil* Window — Micromil* window may be placed on end of counter in seconds, permitting use as an extremely thin window counter. Thickness is less than 120 micrograms/cm².

Anode Wire — Two mil tungsten loop is used for both Geiger and proportional counting.

Counting Gas — Geiger "Q-gas", 98.7% helium, 1.3% butane. Proportional "PR-gas", 90% argon, 10% methane.

Chamber Construction — Stainless steel for easy decontamination.

Dimensions — 3" in diameter x 7½" (without preamplifier).

Weight — 12 lbs., shipping weight 18 lbs.

Supplied with three "Micromil" windows, sealing ring, preamplifier circuit if specified, pressure regulator and one tank of Geiger or proportional gas as specified and instruction manual.



Model D47 Gas Flow Counter is an extremely low background radiation detector designed to operate as either a windowless or thin window counter in both the Geiger and proportional regions. While it may be used as a windowless counter with the automatic sample changer, it is most useful when used with the unique Micromil* window which is easily mounted over the counter chamber. This window is so thin that the total absorption loss for carbon-14 betas is less than 20%. The use of the Micromil window completely avoids common windowless counter problems such as chamber contamination, space charge effects, and moisture problems resulting from volatile samples.

Model D47 is especially useful with low energy beta emitters such as tritium, carbon-14, and sulfur-35. It is specifically intended for use with the automatic sample changer (page 13), but may also be used with a manual sample changer or with the "Actigraph" (page 16) for automatic scanning of strip radiochromatograms.

The gas system of the Model D47 is of extremely simple design to keep the gas free of contamination. All bubbler and valve adjustments have been completely eliminated from the counter itself.

Smallest possible size, stainless steel construction, and adequate shielding have combined to keep the background counting rate low. Extensive evaluation under conditions of actual use assure excellent reproducibility of counts.

*Trademark

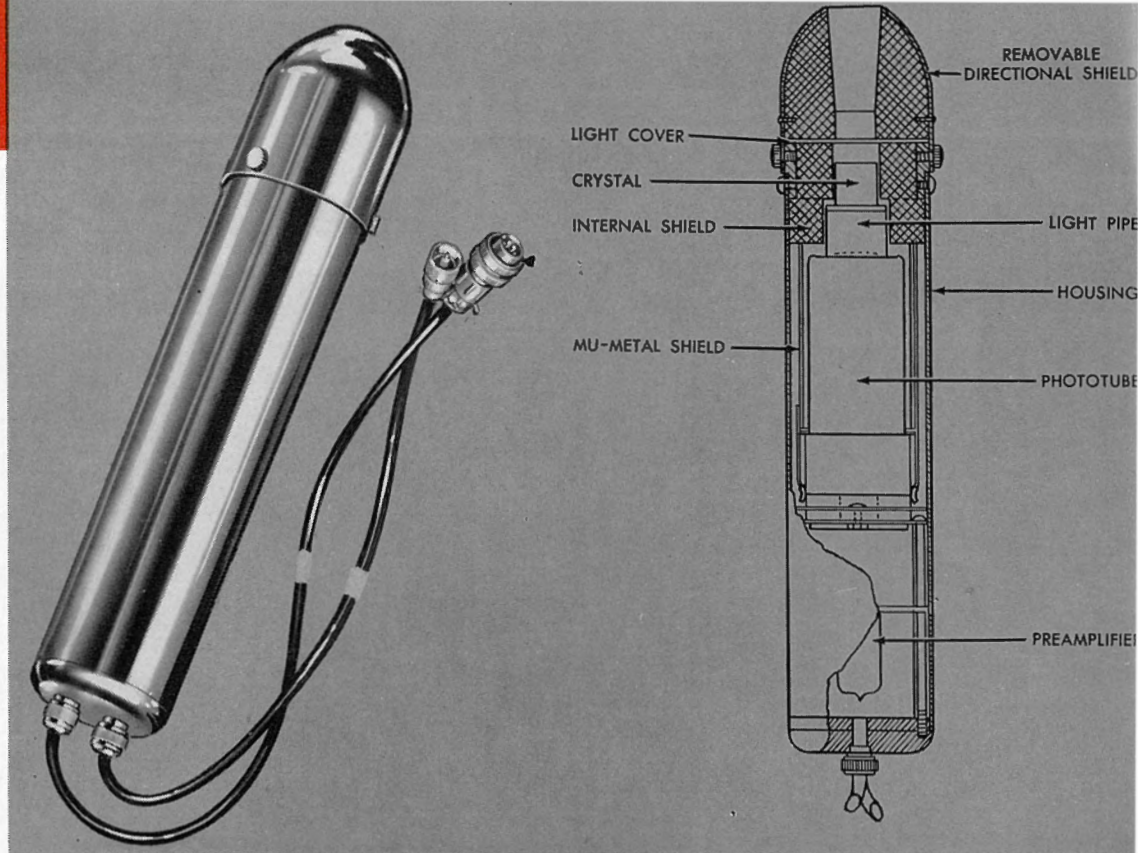


DETECTORS

MODEL

DS-1

*Scintillation
Counter*



Model DS-1 Scintillation Counter is designed for efficient gamma counting in both clinical and laboratory applications. It is primarily intended for use with iodine-131 in thyroid uptake studies with the directional shield removed, or in brain tumor localization and diagnosis with the directional shield in place. The directional shield discriminates sharply against activities more than 15° off the axis of the probe, and aids in localizing concentrations of radioactivity in the brain such as may be found in tumors after administration of radiiodiodo fluorescein, sodium iodide, or iodinated serum albumin.

Since the efficiency of the DS-1 is considerably higher than a conventional Geiger-Mueller counter, significantly smaller amounts of a given isotope may be administered. Shielding is arranged to provide excellent ratios of background to source counts. Additional shielding, such as Model 3036 lead shield (page 30), provides appropriate positioning for count-

ing samples on planchets and permits counting gamma activities as low as 10^{-10} curies.

The DS-1 may be used in conjunction with Model 1615B count rate meter, or with any Nuclear-Chicago scaler except Model 180. The unit requires a high voltage of approximately 1000 to 1500 volts. Plateau length is at least 250 volts, with a slope not exceeding 5% per 100 volts over that range using cobalt-60 as a source. Conservatively rated circuit components assure long operational life and reproducible counts.

Model DS-1 is recommended as part of any clinical laboratory specializing in thyroid work with iodine-131. It may be used with Model C-110 automatic sample changer (page 13) with Model 3037B lead shield.

For more information about the clinical application of Model DS-1, see the latest Nuclear-Chicago Medical Catalog.

Specifications

Efficiency without External Directional Shield —
for I^{131} , 60%

for Co^{60} , approx. 35% for each individual gamma

Effective Crystal Cross-Section —

for I^{131} , 1.7 cm²

for Co^{60} , approx. 1 cm² for each individual gamma

Plateau — Production tolerance requires plateau length of 250 volts and a slope not exceeding 5% per 100 volts over that range using cobalt-60 as a source.

Crystal — Sodium iodide, thallium activated, 3/4" x 3/4" diameter. Hermetically sealed in spun aluminum can with a glass window, lucite light pipe with DC200 optical coupling fluid between crystal and phototube.

Circuit — DuMont 6292 phototube magnetically protected by

a MuMetal shield. Built-in preamplifier circuit utilizing 6U8 triode pentode tube.

Output Pulse — Greater than 0.25 volt. "Coincidence losses" at 100,000 counts per minute are only 1.5%.

Background — Approximately 200 counts per minute. 50 cpm when used with Model 3036 lead shield.

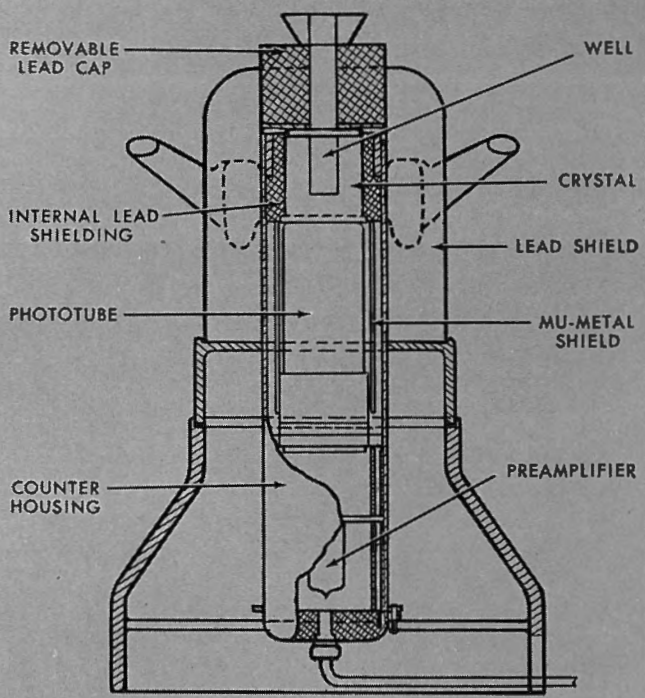
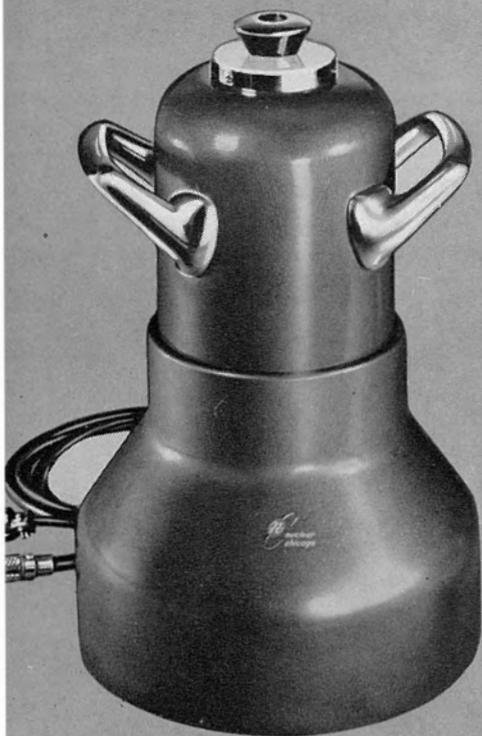
Power Requirements — High Voltage: 1000-1500 volts at 20 microamperes. Preamplifier voltages: 6.3 volts a.c., 150 volts d.c. at 8 ma.

Dimensions — 16" long with directional shield, 3" in diameter. Cable length 6 ft. long unless shorter cable requested.

Weight — 18 lbs., shipping weight 22 lbs.

Shipped with instruction manual.





MODEL
DS-3
Scintillation
Well
Counter

Model DS-3 Scintillation Well Counter features a large "well" crystal into which test tubes containing powdered or liquid gamma emitting samples may be inserted. Extremely high overall efficiency* is achieved because the sample is almost completely surrounded by the crystal. This excellent geometry allows much faster measurements for the same statistical accuracy. The length of time required to obtain a desired accuracy with very low activity gamma emitting samples is only about 1/750th of the time which would be required with a conventional scintillation detector.

The DS-3 well counter makes measurements of *very weak* sources practical and is widely employed in many routine clinical studies with iodine-131, chromium-51, iron-59, etc. It enables the user to *rapidly* obtain maximum statistical accuracy with *minimum* doses. It is thus an extremely useful tool in determining

blood volume, iron metabolism, and red blood cell mass; measuring protein bound iodine and urinary iodine; or assaying any gamma ray emitting isotope.

The DS-3 contains the same phototube and circuitry as the DS-1 on the opposite page. Excellent ratios of background counts to source counts are obtained because the crystal is completely surrounded by two inches of lead in all directions except for the "well." The counter is relatively insensitive to changes in the sample volume up to about 2 cc, and its high sensitivity allows activities as low as 10^{-11} curies to be detected. It may be used with all Nuclear-Chicago scalers except Model 180, or with Model 1615B Analytical Rate Meter.

Conservatively rated circuit components assure long life and reproducible counts. Model DS-3 is recommended as part of the Complete All-Purpose Laboratory on page two because of its great sensitivity to gamma radiation.

Specifications

- Overall Efficiency*** — For iodine-131, 50%; for cobalt-60, 45%.
- Plateau** — Production tolerance requires plateau length of 250 volts and a slope not exceeding 5% per 100 volts over that range using cobalt-60 as a source.
- Crystal** — Sodium iodide, thallium activated. Hermetically sealed in 1/32" spun aluminum can with a glass window. Dimensions: 1 7/8" diameter by 2 1/4"; well is 2 1/32" in diameter, 1 1/2" deep. DC200 optical coupling fluid between crystal and phototube.
- Circuit** — DuMont 6292 phototube magnetically protected by a MuMetal shield. Built-in preamplifier circuit utilizes 6U8 triode pentode tube.

- Output Pulse** — Greater than 0.25 volt. "Coincidence Losses" at 100,000 counts per minute are only 1.5%.
- Background** — Approximately 300 counts per minute.
- Power Requirements** — High voltage: 1000-1500 volts at 20 microamperes. Preamplifier voltages: 6.3 volts a.c., 150 volts d.c. at 8 ma.
- Dimensions** — 17 1/2" high, base is 11" in diameter.
- Weight** — 85 lbs., shipping weight 100 lbs.
- Shipped with instruction manual.**

*Overall Efficiency =
$$\frac{\text{Recorded number of counts/min} - \text{background.}}{\text{Actual number of disintegrations/minute.}}$$



ONE YEAR WARRANTY

MODEL D33-D34-D35-D36



D 33
D 34



D 36

Models D33, D34 and D35 are rugged halogen-quenched detectors with long life characteristics — guaranteed for 5×10^{10} counts or even overvoltage without change in characteristics. Models D34 and D35 have a window thickness of 1.4 mg/cm^2 for counting alpha and soft beta radiation. Model D33 has a window thickness of 3.5 mg/cm^2 .

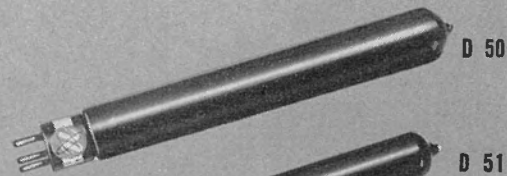
Model D36 is a self-quenching G-M tube filled with helium and an organic quenching gas. Thickness of the mica end window is between 1.4 and 2 mg/cm^2 for measuring low energy beta rays with high efficiency. It is 99% efficient for particles entering the counter.

Specifications

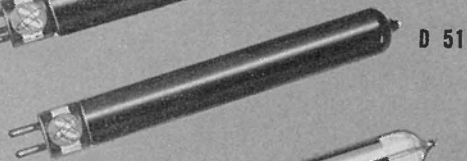
	D33-D34	D35*	D36
Operating Voltage	900	900	1100
Plateau Length	200 v.	180 v.	300 v.
Slope of Plateau	5%-10%/100 v.	10%/100 v.	1%/100 v.
Dead Time (approx.)	200 microsec.	150 microsec.	80 microsec.
Background — Shielded 2"			
Lead	50 cpm max.	75 cpm max.	20 cpm
Effective diameter of Mica Window	1-3/32"	25/32"	1-1/8"
Cathode Material	Stainless Steel	Stainless Steel	Stainless Steel
Base	4 pin	Miniature cap	4 pin
Overall Length	4-11/32"	6"	4 1/4"

*For Model 2612 only.

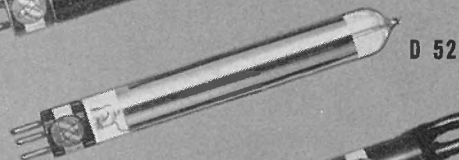
GEIGER COUNTERS



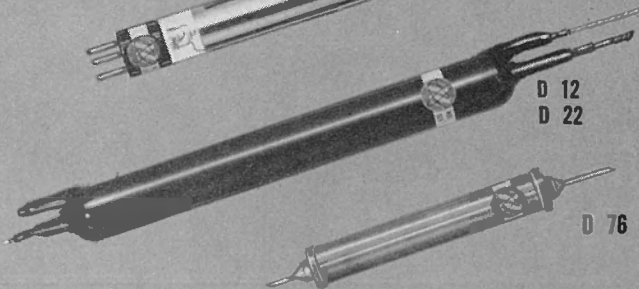
D 50



D 51



D 52



D 12
D 22

D 76

Nuclear-Chicago self-quenching G-M tubes are available in several types and dimensions. Model D22 is useful for gamma detection only. Models D12, D50, D51 and D52 detect both beta and gamma radiation of over .2 mev. Model D76 is brass and will detect all gamma rays, and also beta radiation with energy of .4 mev or greater. Maximum life is 10^8 counts. Cathode materials vary as listed below.

Specifications

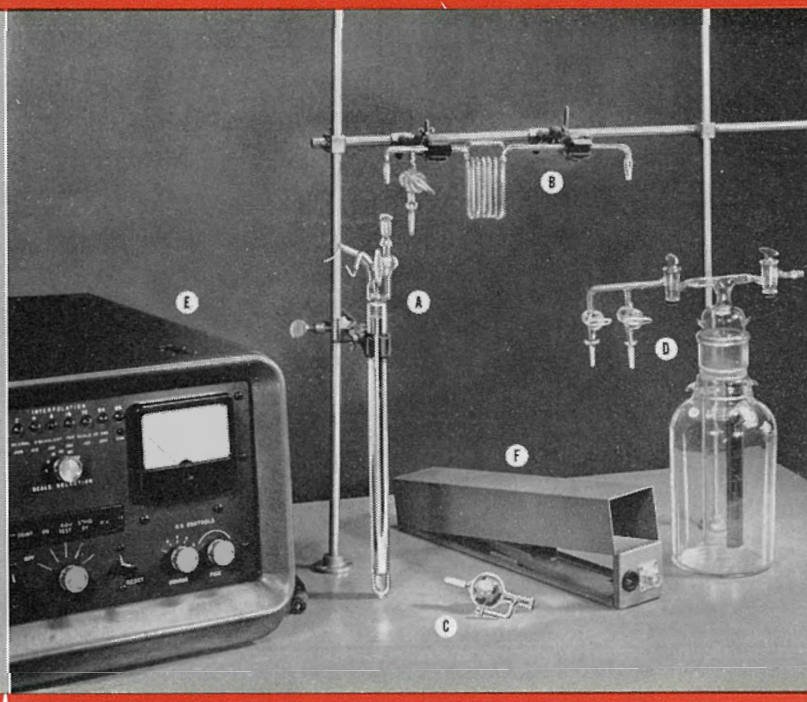
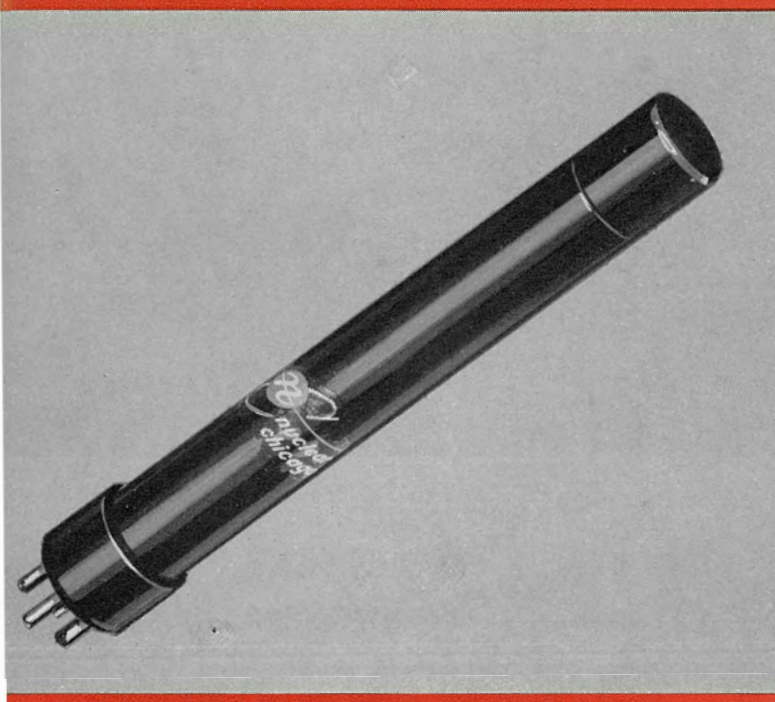
	D12	D22	D50	D51	D52*	D76
Max. Diameter (Inches)	13/16	13/16	3/4	21/32	21/32	9/16
Overall Length (Inches)	8 1/4	8 1/4	6	5 1/4	5 1/4	3 1/2
Cathode Length (Inches)	3	3	3	2 1/2	2 1/2	2 1/2
Cathode Material	Carbon	Carbon	Carbon	Carbon	Silver	Brass
Base	None	None	3 pin	3 pin	3 pin	None
Window Thickness (mg/cm²)	35	300	35	35	35	100
Plateau Length (Volts)	150	150	150	150	150	300
Plateau slope (%)	3	3	3	3	3	5
Operating Voltage	970	970	925	925	950	1200
Threshold Voltage	880	880	850	850	875	1050

*Model D52 is specially insulated for use as a dip counter.



BISMUTH CATHODE COUNTERS

BERNSTEIN-BALLENTINE COUNTING SYSTEM



Bismuth cathode counters provide high efficiency in the counting of gamma radiation and are thus especially useful for medical use. They are from 5 to 8 times as efficient for iodine-131 gammas as are similarly shaped mica window counters. Available in two models with "side window" or "end window" construction. Model B12 "side window" tube is shown above.

Both "end window" or "side window" tubes have standard 4 pin bases and may be used with any Nuclear-Chicago scaler or count rate meter.

Specifications

	Model B12 Side Window	Model B13 End Window
Operating Voltage	1100 v.	1100 v.
Plateau Length	300 v.	300 v.
Slope of Plateau	1%/100 v.	1%/100 v.
Window Thickness		300 mg/cm ²
Counting Life	10 ⁹ counts	10 ⁸ counts
Background — Shielded 2" Lead	40 cpm	30 cpm
Dead Time (approx)	80 microseconds	80 microseconds
Cathode Material	Bismuth	Bismuth
Base	4 pin	4 pin
Dimensions	8" x 1" dia.	3 3/4" x 1 1/2" dia.

Nuclear-Chicago offers the complete apparatus and instrumentation for the assay of carbon-14 in the gaseous phase by the Van Slyke-Steele procedure. This method involves the rapid combustion of radioactive organic samples by the Van Slyke-Folch technique and assay of the resultant carbon-14 dioxide with the Bernstein-Ballentine proportional counter.

Organic samples of from 0.1 to 15 mg. of carbon content can be combusted and the gas measured manometrically and transferred to the proportional tube in 15 minutes or less. The radioactivity of the carbon dioxide may then be determined with high sensitivity and precision using the Bernstein-Ballentine counter tube and Model 182X scaler or Model 192X scaler designed especially for this and similar proportional counting problems. The following equipment is required for this counting procedure, and is available from Nuclear-Chicago.

Bernstein-Ballentine Counter Tube (A)

The necessary glassware for gas transfer and tube fitting.

Radiator (B)

Calibrator (C)

Methane Leveling Bottle (D)

Model 182X scaler (E) or Model 192X scaler.

Model M4 shield and mount for the counter tube (F)

Write for additional details.



**DEMONSTRATE
RADIOACTIVITY**

MODEL 1613A "Classmaster"



Nuclear's Model 1613A "Classmaster" Radioactivity Demonstrator is the only such unit complete with all accessories to make it adaptable for lecture or demonstration use, or for a complete course in elementary nucleonics. The "Classmaster" includes, in addition to the electronic unit, a Model D51 geiger tube in a separate probe, a calibrated mounting board, radioactive sources, set of absorbers, and a complete manual of instructions and experiments.

The "Classmaster" provides triple indication of radioactivity. A neon light flashes and a built-in speaker clicks for each disintegration detected. In addition, the count rate is indicated on a large meter. Since results obtained with the "Classmaster" are easily reproducible, it is also useful as a laboratory monitor.

Specifications

- Range** — 0 to 15,000 counts per minute.
- Circuit** — Utilizes 6SN7 amplifier tube and a 2050 thyratron which drives the speaker, neon lamp, and count-rate meter. Voltage regulation is provided by a VR 150 tube.
- Controls** — Volume knob for loud speaker. Volts, Counts Per Minute switch controls meter indication.
- High Voltage** — Variable from 500 to 1200 volts.
- Power Supply** — 95-130 volts, 50-60 cycle, 60 watts.
- Dimensions** — Cabinet 10" x 13 $\frac{3}{4}$ " x 9 $\frac{1}{2}$ "
Calibrated board 3 $\frac{1}{8}$ " x 25 $\frac{7}{8}$ " x 1"
- Weight** — 24 $\frac{1}{2}$ lbs. Shipping weight 32 lbs.
- Accessories Supplied** — 1 calibrated board, 2 sources, 20 cardboard sheets, 10 lead sheets, 15 aluminum sheets, 1 cardboard tube, 1 lead tube, 1 aluminum tube, and 1 instruction manual.

**MODEL
MR-1**

Demonstration Meter

Model MR-1 is an important help for demonstrating radioactivity to a classroom. Use this seven-inch demonstration meter where a large group must be able to see the meter reading on the "Classmaster." The MR-1 plugs into a phone jack on the rear of Model 1613A.

- Current Requirement** — 0-1 milliamperes
- Dimensions** — 7 $\frac{1}{4}$ " x 7 $\frac{1}{4}$ " x 4 $\frac{3}{8}$ "
- Weight** — 3 $\frac{3}{4}$ lbs. Shipping weight 6 lbs.



**SEE
RADIOACTIVITY**



**MODEL
1413**

"Cloudmaster"



Specifications

- Voltage Supply** — Reliable one-tube vibrator power supply controlled by toggle switch. Completely shock-protected by 4.7 megohm "health" resistor. Supplies 1200 volts d. c. to chamber.
- Chamber** — 6-section unit with spun aluminum base. Black wrinkle finish on floor of chamber permits easy viewing of "tracks."
- Operation** — 2 lbs. of dry ice will operate chamber for approximately one hour.
- Power Supply** — 110-115 volts, 50-60 cycles.
- Dimensions** — Power Supply 4" x 4 1/4" x 5 1/4". Chamber 11 1/2" diameter, 8 1/2" high.
- Weight** — 16 lbs. Shipping weight 20 lbs.
- Supplied Complete** with all necessary components and instructions. No alcohol or dry ice.

Nuclear's exclusive Model 1413 "Cloudmaster" — a Continuous Cloud Chamber—provides a spectacular display of "tracks" caused by alpha, beta, gamma, and meson radiation. Vapor "tracks" occur in a sensitive layer about three-quarters of an inch thick near the floor of the chamber.

Recently introduced, it has become popular because of its simplicity and ease of operation. The sharp change in temperature necessary for the creation of the supersaturated "sensitive" layer is produced by easily-obtainable isopropyl alcohol and dry ice. Power unit provides necessary spot light and a 1200 volt d. c. "sweep voltage" to the cloud chamber. Completely safe electrical connections and radiation source. If suitable d. c. voltage supply is available, Model 1413C Cloud Chamber may be ordered separately.

MODEL 2302 *"Super Sniffer"*

Model 2302 Super Sniffer is especially designed for uranium prospecting and may also be used as a portable classroom geiger counter. It is a self-contained unit for detecting gamma rays, x-rays, and medium energy beta particles and indicates radioactivity by both earphone clicks and neon flashes. Model D76 thin wall Geiger tube (page 26) is located on the inside bottom of the case, allowing the whole unit to be used as a probe. The high sensitivity and rugged construction of this unit make it ideal for field use in seeking radioactive materials. Uses only two ordinary flashlight batteries for power.

Specifications

- Dimensions** — 7 3/8" x 4 1/8" x 2 1/2".
- Weight** — 2 lbs., shipping weight 4 lbs.
- Supplied with** earphones, batteries, radioactive checking source, U. S. Government prospecting book, and instructions.

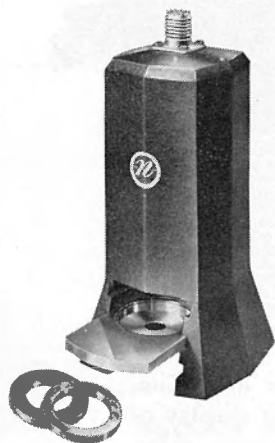


NINETY DAY WARRANTY

ACCESSORIES



Model 3031B



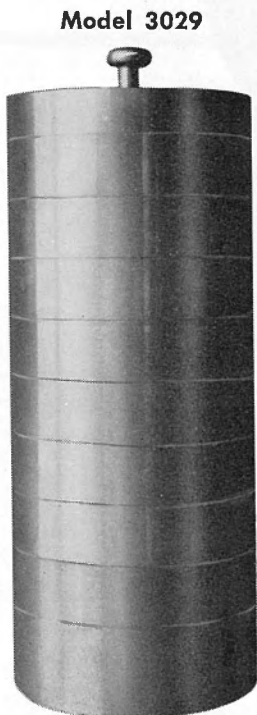
Model M2



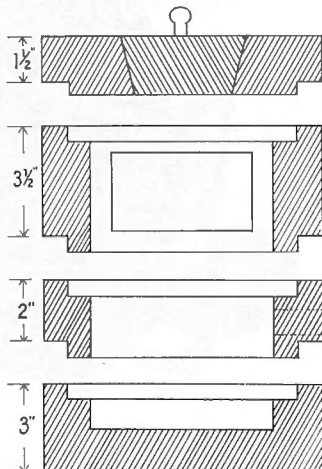
Model 3035E



Model 3036



Model 3029



MOUNTS AND SHIELDS

Model 3031B Shield and Manual Sample Changer provides approximately two inches of lead shielding for sample counting with end window counters. An aluminum liner and exclusive lucite scatter shields reduce backscatter to a minimum. Knurled knob raises or lowers G-M tube to permit optimum counting efficiency with tubes of different lengths. Three accurate sample positions are provided, and two sample holders provide a means of manually replacing samples rapidly when counting a series of samples, since samples can be introduced from either side of the shield.

Sample Size — 1" to 1 3/4"

Connector — Includes cable for scaler connection.

Dimensions — 6" diameter, by 12" high.

Weight — 94 lbs., shipping weight 107 lbs.

Supplied with two aluminum sample holders, 6 adaptor rings for 1", 1 1/4", and 1 1/2" samples, and 4 lucite scatter shields.

Model M2 Mount and Sample Holder provides an unshielded support for end window counters for counting well above background. Cast aluminum, with three accurate sample geometries, provides minimum backscatter. Can be shielded with lead bricks if desired.

Sample Size — 1" to 1 3/4"

Dimensions — 8" x 3 3/4" x 4"

Weight — 5 lbs., shipping weight 8 lbs.

Supplied with aluminum sample holder and three adapters for 1", 1 1/4", and 1 1/2" samples.

Model 3035E Shielded Carrier is used for handling bottled radioactive isotopes in medical or research laboratories. It features a key-operated locking mechanism and a "well" into which the bottle may be lowered. Spring platform raises the bottle when lock section at top of shield is removed.

Dimensions — 3 1/2" diameter by 6" high. Well is 1 1/2" diameter by 4 1/2" deep.

Weight — 20 lbs., shipping weight 25 lbs.

Model 3036 reduces background to about 50 cpm when used with Model DS-1 for gamma sample counting — permits detection of 10⁻¹⁰ curies of activity in urine and blood samples. Sample positions, dimensions, accessories supplied are similar to the 3031B shield (above).

Shielding — approximately 1 1/2" of lead.

Weight — 80 lbs., shipping weight 95 lbs.

Model 3029 Adjustable Lead Shield can be used either to enclose G-M or scintillation counters or for storage of beta or gamma emitters in 1 1/2" of lead. Its sectional construction makes it unusually flexible, since any reasonable height can be built up, with provision for bringing a cable in near the top or bottom by ordering one section 3029-E with each group of sections. Section 3029-C provides a side opening to permit using a counter inside or reaching in to grasp sources. Open inside diameter is 6".

Cast entirely of antimonial lead for hardness, with nickel alloy plating to prevent deformation of the sections with use. Detailed information on request.

Model 3029-A Base section — 56 lbs.

Model 3029-B Center section — 28 lbs.

Model 3029-C Center, with door — 55 lbs.

Model 3029-D Top, with plug — 46 lbs.

Model 3029-E Center with cable hole — 28 lbs.



HIGH VOLTAGE SUPPLIES

Model 1090A High Voltage Supply provides continuously variable d. c. from 0 to 5000 volts, plus or minus, for proportional counters and other low drain use.

Range — 0 to 5000 volts d. c., positive or negative. Maximum filtered output 200 microamperes.

Controls — OFF-ON switch with pilot, two-position switch for positive or negative output, and continuous high voltage adjustment controlled by panel knob. Voltage indicated on 4" meter.

Regulation — Less than 0.5% change for line voltage change from 95 to 130 volts. Ripple voltage less than 0.1 volt a. c. at 5000 volts d. c. Utilizes magnetic amplifier (saturable reactors) fed back for regulation.

Power — 100 watts, 95 to 130 volts, 60 cycles only.

Weight — 76 lbs., shipping weight 86 lbs.

Supplied with three foot high voltage cable and instruction manual.

Model 2091A Vibrator Voltage Supply replaces the three 300 volt batteries which are ordinarily used in Nuclear-Chicago's Models 2610A, 2611 and other portable survey instruments. It requires only two 1½ volt cells to drive it and eliminates the necessity for replacement of expensive 300 volt batteries. It provides lighter weight, economy, and greater convenience for the user.

Input — 2.2 to 3 volts at 50 milliamperes.

Output — 900 volts plus or minus 15 volts at 2 microamperes.

Regulation (3 to 2.2 volts input) — 1.5%.

Operating Life — 1000 hours minimum.

Operating Temperature — minus 50° to 120° F.

Dimensions — 2¾" x 3¾" x 2¼".

Weight — 21 oz. shipping weight 2 lbs.



Model 1090A



Model 2091A

PULSE GENERATOR

Model 1022 Pulse Generator provides positive or negative pulses for checking scaler or rate meter sensitivity, operation, and maximum repetition rate. Continuously variable pulse heights indicated on non-fluctuating direct reading meter. Two of these pulse generators can be coupled together to form an unusually flexible double-pulse generator for measurement of resolution and other properties of scalers and amplifiers.

Range — Three ranges of 0-.5, 0-5 and 0-20 volts, continuously variable, positive or negative.

Circuit — Stable, gives 1, 10, or 100 microsecond pulse width with 0.2 microsecond rise time and 0.4 microsecond decay time.

Pulse rate — 3600 cpm from line frequency, or may be used with external oscillator (such as Hewlett-Packard Model 200C) for repetition rates up to 200,000 cycles per second.

Connectors — Output post on front panel connected in parallel with connector on rear of chassis. Input post also on front.

Power — 70 watts, 110 to 125 volts, 50-60 cycles.

Weight — 22 lbs., shipping weight 27 lbs.

Supplied with instruction manual.



Model 1022

PLUG-IN SCALER

Decade plug-in scaling circuits are now available from Nuclear-Chicago. Exclusive circuit is easily connected for scale selection to scale of 4. Write for details.

Maximum Rate — 100,000 evenly spaced pulses per second.

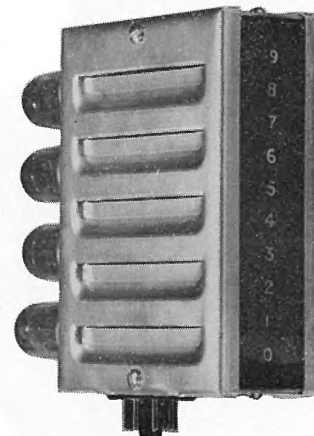
Resolving Time — Five microseconds.

Input Required — 80 to 100 volt negative pulse with one microsecond rise time or less and duration of two microseconds.

Power — 6.3 volts at 1.2 amp., 300 volts d.c. ± 20% at 15 ma.

Mounting — Standard octal socket.

Tubes — Four computer-type 5963 tubes.



Plug-in Scaler



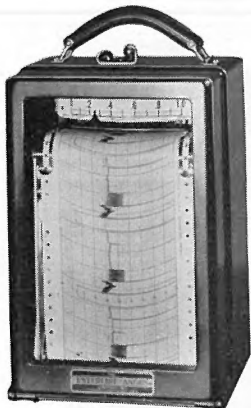
ACCESSORIES



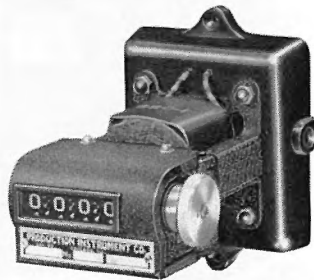
Model T1 ‡



Model T-101*



Esterline-Angus ‡



Model EC-84*



Ametron*

TIMERS

MODEL T1 DUAL TIMER provides either preset time or elapsed time from two seconds to 60 minutes with 1/2 second increments, when used with all Nuclear-Chicago scalers except Model 180. Uses 110 volt 60 cycle supply from the scaler, (50 cycle model available). Incorporates own switch for other control purposes. With connecting cable (specify scaler) and instructions. Dimensions 4 3/4" x 4 1/2" x 4 1/2". Shipping weight 6 lbs.

MODEL T-101 TIMER is a reliable five digit drum type timer which indicates elapsed time in minutes and hundredths of minutes. Operates with any Nuclear-Chicago scaler, or by itself directly from 110 volt 60 cycle line. Convenient push button on-off switch mounted in base. Complete with six foot cord and plug. Weight 2 1/2 lbs., shipping weight 4 lbs. Dimensions: 5" x 3 1/2" x 4 1/4" high.

RECORDERS

Model EC84 Register is an external four digit count recorder for use with any scaler without a built-in register. Manual reset. Rated over 600 counts per minute. Operates from pentode used as register driver or any type of switch or relay with low energy drain. Rated 230 volts.

Dimensions — Base 3 3/8" x 4 3/4". Height 5 3/8".
Weight — Shipping weight 4 lbs.

The Esterline-Angus Recorder Milliammeter gives a continuous chart record of radiation count rate, and plugs into Model 1615B (page 14). It is an integral part of the Model C-100 Radio-Actigraph (page 16). Supplied with carrying handle and synchronous motor for 120 volt, 60 cycle operation. Shipping weight 65 lbs. F.O.B. Indianapolis. Detailed specifications on request.

The Ametron Count Recorder is used for counting and automatically recording register or other electrical impulses. Solenoid actuation is capable of 1000 counts per minute, and is actuated by the register driver of the scaler. Data recorded clearly on paper tape with figures 3/16" high. Available for predetermined time or count printing, in a variety of arrangements. Write for details.

Q-GAS AND PR-GAS

Nuclear-Chicago's exclusive "Q-Gas" † is a patented mixture of the highest purity, unexcelled as a geiger counting gas at atmospheric pressure. "PR-Gas" is used with Model D47 flow counter when used in the proportional region. Available in pressed steel cylinders with 855 cubic inch capacity, filled to approximately 1500 pounds pressure. When ordering, please specify whether you wish to purchase the tank or to receive it on a monthly demurrage basis, with a sixty day free period.

Q-gas Composition — 98.6% helium, 1.4% butane
PR-gas Composition — 90% argon, 10% methane
Shipping weight — 35 pounds

†Nuclear-Chicago is exclusive licensee under patent 2,519,864.

SAMPLE SPINNER

The exclusive Model PM-1 Sample Spinner is designed to simplify the problem of sample preparation. It consists of a constant-speed turntable rotating the sample pan at constant speed. You can rest your hand on the stationary top surface as you spread the sample material on the rotating pan. An air blower unit, Model PM-2, to aid in drying homogenous solutions evenly, and Model PM-3, consisting of an upright clamp, and socket to hold an infrared bulb (not supplied) should also be specified for a complete unit.

Turntable speed — 20 revolutions per minute.

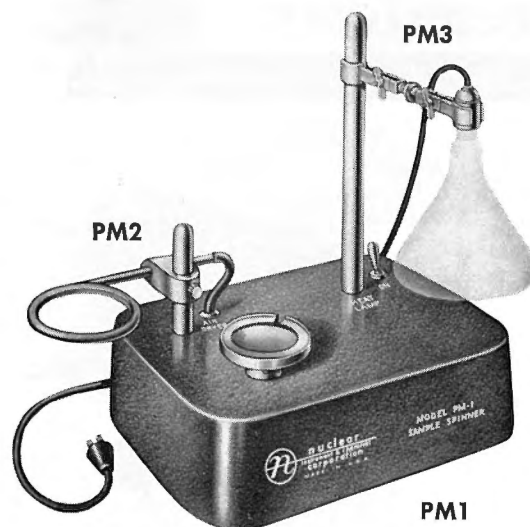
Sample size — Up to 2".

Connectors — Inlet for compressed air, nitrogen, etc., for Model PM-2 air blower unit. Line cord; two female plugs for powering other instruments. OFF-ON switch provided.

Power — 95 to 130 volts, 60 cycles.

Dimensions — Base 8½" x 6¼" x 2".

Weight — 9 lbs., shipping weight 15 lbs.



SAMPLE STORAGE CABINET

Model N4 Sample Storage Cabinet utilizes exclusive plastic Adapto-cups pressed into sample trays to accommodate 100 samples from 1" to 1⅜" in diameter. The 10 drawers each have 10 sample holders, each numbered for reference. Sample holders or trays easily replaced in case of contamination. Sturdy metal cabinet with tab holder on each drawer to permit labeling drawer contents. Measures 7" x 8" x 8". Plastic dust cover included. Shipping weight 7 lbs.

SAMPLE PANS

Nuclear sample pans are available in three types. Cupped models are 1/16" deep.

AF-12 Flat aluminum pans — 1¼" diameter.

AC-12 Cupped aluminum pans — 1¼" diameter.

PC-12 Cupped clear plastic pans — 1¼" diameter.

ABSORBERS

The Model C-101 Absorber Set provides a range of aluminum and lead absorbers from 1.7 to 6720 mg. per sq. cm. It may be used to determine the energies of photons and beta radiations, check isotope purity, identify radioactive species, study decay schemes, reduce counting rate of a sample, or to count one radioisotope in the presence of another. The set consists of 23 calibrated lead and aluminum discs mounted in uniform plastic rings. An additional empty ring is provided for zero absorption. The set is constructed for rugged, long-term duty and is housed in a handsome walnut case.

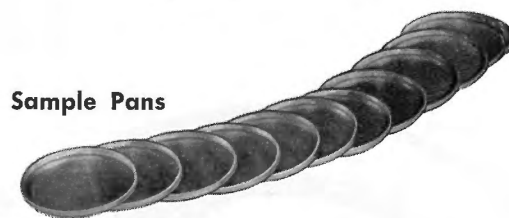
The absorbers are designed to be used on the top shelf of the Model 3031B Lead Shield or Model M2 Mount (page 30), thus minimizing the possibility of scattered betas. The plastic ring mounting serves to support the absorbers and assures a uniform geometry. The set may also be used with Model C-100 "Actigraph" when it is desired to obtain absorption curves automatically. Up to eight absorbers may be placed in the absorber table and will be automatically drawn over a radioactive source positioned within the lead shield.

Absorber Dimensions — 1⅜" in diameter by 3/16" thick.

Thickness — 17 aluminum absorbers ranging from 1.7 mg/cm² to 1670 mg/cm². Six lead absorbers ranging from 401 mg/cm² to 6720 mg/cm².

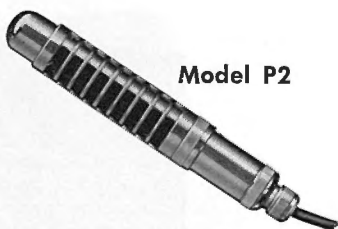
Case Dimensions — 7" x 10" x 2½".

Weight — 2 lbs., shipping weight 5 lbs.

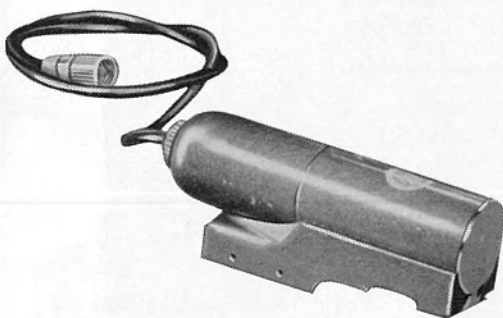




Model 3033A



Model P2



Model P11



PROBES

The Model 3033A Lead Shield permits the use of a mica end window or bismuth cathode counter as a directional probe with any Nuclear-Chicago scaler or count rate meter. Ideal for use in medical applications such as brain tumor and thyroid studies. Shield provides $\frac{1}{2}$ " of lead and is open at one end with rotating beta shield. Can be hand held or attached to a movable arm. Measures $2\frac{1}{2}$ " in diameter by $6\frac{1}{4}$ " long, with three foot cable. Shipping weight 8 lbs.

Model 3033B is similar to Model 3033A, but includes a pre-amplifier and 10 foot cable for satisfactory operation at a distance from the associated instrument. Shipping weight 10 lbs.

Geiger probes normally supplied with associated equipment are also available separately. Model P2 and P12 are chrome plated brass; P10 and P11 are finished in gray hammer tone paint. All probes furnished with cable and connector.

Model P2 probe (used on Model 2612) uses Model D50 counter, has revolving shield which exposes a 180° angle. Shipping weight 3 lbs.

Model P10 probe incorporates a preamplifier and ten-foot cable, accepts four-pin end window counters. Has built-in magnet for positioning on any ferromagnetic material. Shipping weight 6 lbs.

Model P11 probe (supplied with Model 1615B). Similar to Model P10 except this unit has a 3-foot cable and no pre-amplifier. Shipping weight 3 lbs.

Model P12 probe (used on Model 2612) uses Model D35 counter, has cap at end of probe for gamma surveying. Shipping weight 3 lbs.

CABLES

These cables, made for Nuclear-Chicago equipment, are assembled from the highest quality components. Coaxial connectors, chosen for required electrical properties, are standard equipment on all instruments.

- PC2 — Amphenol 83 series or equivalent connector and 4-pin female socket with four foot cable.
- PC3 — Amphenol 82 series or equivalent connector and 4-pin female socket with four foot cable.
- PC4 — Amphenol 82 series connector and 83 series connector or equivalents with three foot cable.
- PC5 — Probe cable for Model 2111. Two Amphenol 83 series or equivalent connectors, using Teflon insulation, with three foot flexible cable.
- PC6 — Amphenol 83 series or equivalent connector and 3-pin female miniature socket with four foot cable.
- PC7 — Adapter to convert scaler input from Amphenol 82 series to 83 series.
- PC8 — Two Amphenol 83 series or equivalent connectors with three foot cable.
- PC9 — Two Amphenol 82 series or equivalent connectors with three foot cable.
- PC23 — Register cable for Model EC-84.
- PC24 — Adapter to convert four-pin chassis connectors to six pin, with six inch cable.
- PC25 — Adapter to convert five-pin chassis connectors to six pin, with six inch cable.
- PC26 — Cable to connect T1 timer to "Auxiliary" connector on Nuclear-Chicago scalars. 5 pin female on one end; 9 pin male on other with 4 foot cable.
- PC28 — Ten conductor cable with 9 pin connectors on each end. For use with C-110 sample changer.

SCALER CARTS

Model CA3 is a heavy-duty, all-welded stainless steel laboratory cart, designed for moving the heaviest of scalers and associated equipment safely. Rubber wheel casters are 4" in diameter, and three deep tray shelves 18" x 32" with safety bars prevent accessories from rolling or sliding off open side. Equipped with push bar and rubber bumpers. 18" x 27" x 32". Shipping weight 52 lbs.

Model CA2 is a lighter-duty cart, with 3" rubber wheels and three shelves, the upper two with raised edges on three sides. Shipping weight 35 lbs.

Model CA4 "Carette" is similar to Model CA3, but has a flexible arm to allow positioning of a radiation detector around a patient's head on body. Full details are contained in our Medical catalog.



Model CA3

LEAD SHIELDING

Lead Bricks, available in two types, provide a constant density radiation barrier for gamma or strong beta radiation.

Model 3038 bricks are rectangular in shape, and offer a radiation barrier at least cost.

Model 3039 interlocking bricks eliminate the low density "joint space" found between smooth faced bricks. Available in side, long corner, short corner, and base filler shapes. Study the dimensions shown and plan your enclosure size carefully. or write for special bulletin.

Model 3038 Rectangular Brick, 2"x4"x8", ship. wt. 26 lbs. ea.

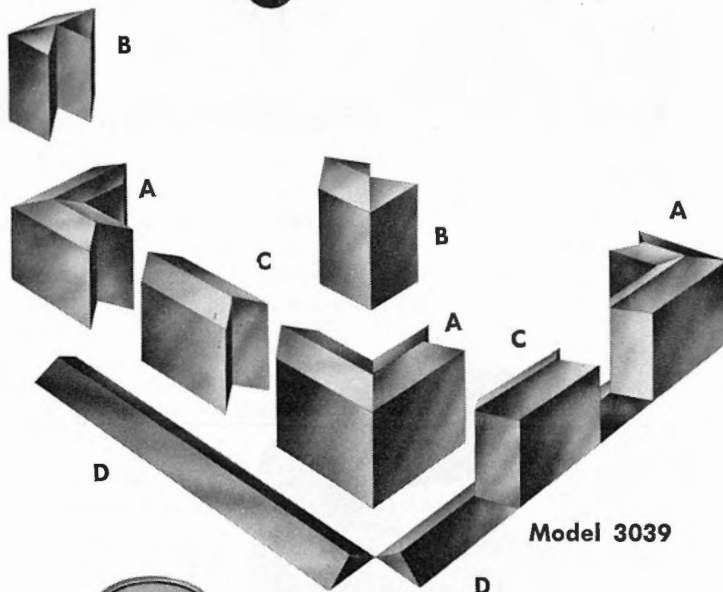
Model 3039A Long Corner, 4"x4"x2", Ship. wt. 20 lbs. ea.

Model 3039B Short Corner, 4"x2"x2", ship. wt. 7 lbs. ea.

Model 3039C Side Brick, 4"x4"x2", ship. wt. 14 lbs. ea.

Model 3039D Base Filler, 2' long, shipping wt. 10 lbs. ea.

Model 3029 Shield shown on page 30 may also be used for isotope storage.



Model 3039

REFERENCE SOURCES

Nuclear-Chicago offers three uncalibrated sources as references for instrument checking.

Model R2 is intended for checking Model 2610A and 2611. It contains 2 to 3 micrograms of radium in a plastic cylinder 1" in diameter by 1/2". One cylinder end gives approximately 10 times the radiation of the opposite end.

Model R20 is a Carbon-14 source giving approximately 200 disintegrations per minute, for checking sensitive counters such as Nuclear-Chicago Model D47. Housed in 1" diameter plastic disk 1/8" thick.

Model R4 is a weak source for checking the Super Sniffer and other prospecting and monitoring units. Contains extremely small amount of radium salts. 2" in diameter by 1/8" thick.



Model R2



Model R20

LIQUID COUNTER SET

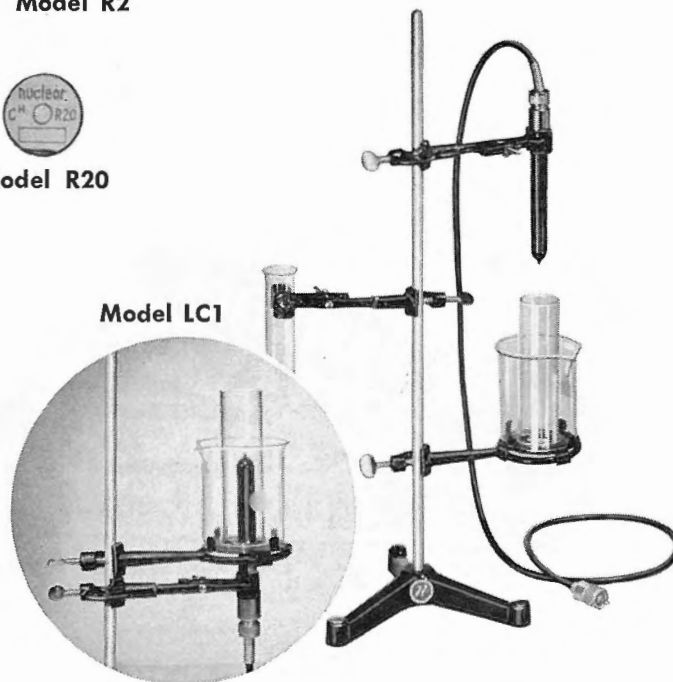
Model LC1 Liquid Counter Set is designed for counting radioactive material in solution. It consists of a laboratory stand, clamps, a ring support with a beaker support, Model D52 Geiger counter, Model PC6 cable, and one each Marinelli beaker and test tube. The Marinelli beaker has a glass tube sealed in through the center so that the counter may be surrounded by gamma emitting liquid without wetting the counter.

The test tube holds 20 cc of liquid when the counter is fully inserted, and the liquid will then surround the sensitive portion of the counter.

Shipping weight of Model LC1 is 7 lbs.

Model LB1 Marinelli Beaker for above set.

Model LT1 Test tube, available in dozen lots.



Model LC1



ACCESSORIES



Model N1



Model N2

Model N5B



SLIDE RULE

Nuclear-Chicago's exclusive Nuclearule is a special combination of scales arranged in circular slide rule form to simplify many calculations. It will quickly determine count rate, statistical error, coincidence loss, activity of sample versus half life, radiation flux after passage through absorbers, and other useful information. Measures $5\frac{3}{4}$ " diameter. Complete with instructions and carrying case. Specify Model N1.

RADIATION WARNING

Model N2 Radiation Warning Tape is a series of individual labels $1\frac{1}{2}$ " long by 1" wide, printed in standard AEC colors on a continuous roll of "Scotch" tape. A quick, convenient method of labeling small bottles, boxes and source containers. More than 1700 labels per roll.

Model N5A Radiation Warning Sign uses "glowing" color to warn personnel of radiation danger. Use of "glowing" color assures that the sign will stand out against any background, even in dim light. Reads "Radiation Hazard" with standard AEC symbol, and has space for writing in type or level of radiation. Printed on medium weight card stock, using AEC colors. Size 4" x 6". Shipped in packages of 12, weight 2 lbs.

Model N5B Radiation Warning Stickers have "Kleenstick" coating on back. Removable paper back protects adhesive until used. Size $2\frac{3}{4}$ " x 9". Shipped in packages of 6, weight 1 lb.

BATTERIES FOR PORTABLES

- BA-002—1½ v, Burgess 2F.
- BA-003—22½ v, Eveready 412E.
- BA-005—67½ v, Eveready 467.
- BA-006—300 v, Eveready 493.
- BA-010—1½ v, Burgess TE.
- BA-011—1224 v, Eveready W-5.
- BA-015—Mercury Cell, General RG-3.
- BA-026—1.3 v, Mallory RM12.
- BA-027—6.5 v, Mallory 302435 IRX.
- BA-028—9.1 v, Mallory 302437 IRX.

	FOR	ORDER
Model 2111	1—BA-005;	2—BA-010; 2—BA-011
Model 2582	7—BA-003;	4—BA-026; 1—BA-027; 1—BA-028
Model 2585	4—BA-003;	1—BA-015
Model 2610A	} 1—BA-002;	1—BA-005; 3—BA-006
Model 2611		
Model 2610AP	} 3—BA-002;	1—BA-005
Model 2611P		
Model 2612	2—BA-005; 2—BA-002;	

SERVICE INFORMATION

Our Customer Service Department, with headquarters in Chicago, has established authorized service representatives at many points throughout the U.S. and Canada. For information about the authorized service representative in your area, contact our nearest district office or write to the home office in Chicago. Time loss and inconvenience can be avoided by using the services of nearby service representatives, but where necessary, the factory is ready to make necessary repairs promptly. To minimize the time required to obtain a repair, please write your nearest Nuclear-Chicago office and describe your problem. State the reason for the instrument return

and the model and serial number of your instrument. In many cases we may be able to resolve your trouble without seeing the instrument. If repair is necessary, we will advise you promptly.

You can also speed the repair by issuing the necessary authorization or purchase order so that we receive it before the instrument arrives here. No charge will be made on repairs within warranty, but on other repairs it will be necessary to issue an invoice against your purchase authority. In each case, every effort is made to return instruments to you in first class operating condition as quickly as possible.

It is our desire to have our products in use where they are well matched to do the job. Therefore, wherever possible we suggest you give us a brief description of your projected work in advance of ordering, and allow us to recommend

a suitable complement of instruments to solve your counting problems most efficiently.

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

- 1) Model number (if requested upon receipt of your formal order, we can inform you of the equipment you will get. This is often necessary for Application Number AEC-313 used in procuring radioisotopes).
2. When ordering accessories please give the model and serial number of the instrument with which the accessories are to be used so we can furnish proper cable connectors or adapters.
- 3) Desired f.o.b. point (our published prices are all f.o.b. Chicago).
- 4) Desired delivery date.
- 5) Full information concerning shipping and billing addresses.
- 6) Method of shipment — all shipments will be Railway Express collect unless otherwise specified.

It is our policy to quote and make deliveries on a first come-first served basis. Should an urgent situation arise, we suggest you contact your near-

est sales office, giving the details of your particular situation, and we will immediately do whatever we can to assist you.

EXPORT ORDERS

Nuclear-Chicago products are in use in various countries throughout the world and we, of course, will be pleased to supply equipment to foreign customers. Orders and correspondence from

countries except the U.S., U.S. possessions, and Canada should be directed to our Export Department, listed below. All export orders are handled entirely by that department.

**SUGGESTIONS
for
ORDERING**

nuclear INSTRUMENT AND CHEMICAL CORPORATION

223 West Erie Street, Chicago 10, Illinois

Empire State Building
New York, New York

8208 Fenton St.
Silver Spring, Maryland

1063 Colorado Boulevard
Los Angeles 41, California

EXPORT DEPARTMENT — 13 East 40th Street, New York 16, New York
Cable Address: Arlab, New York