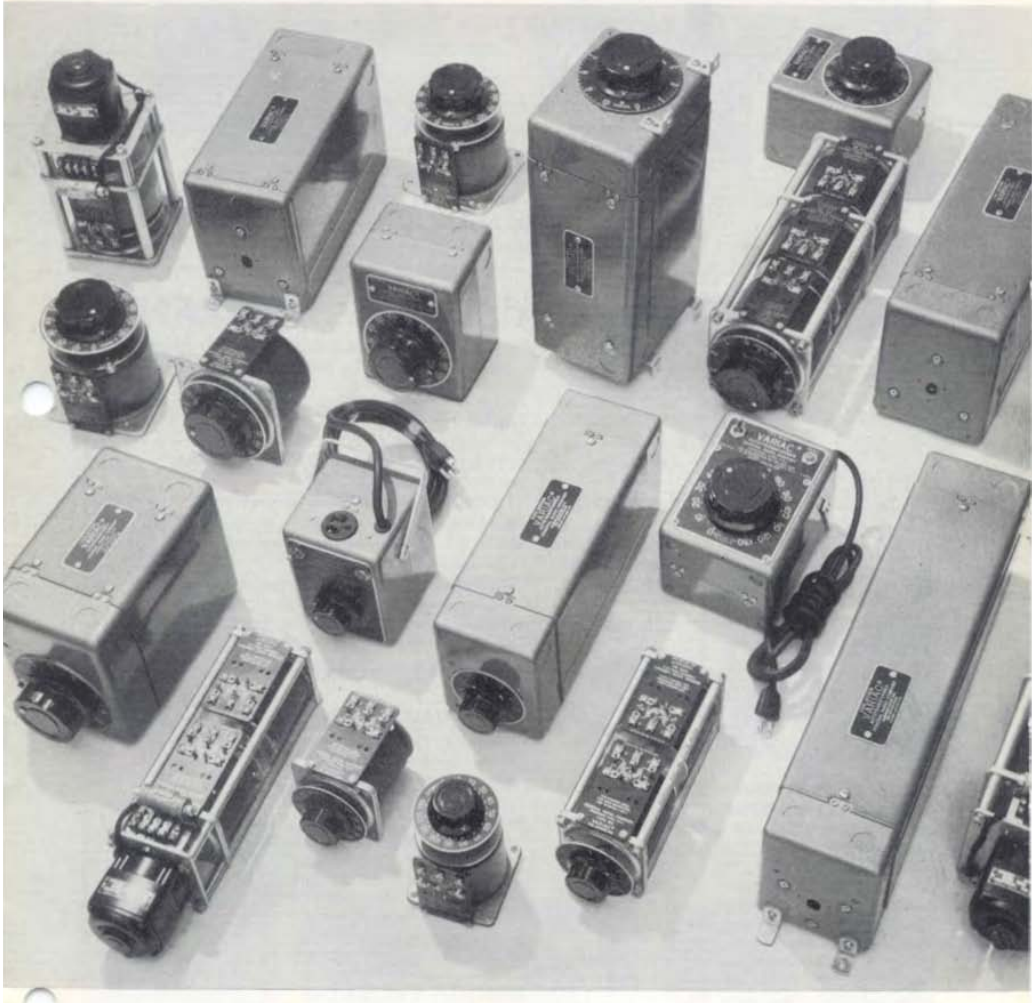
the GENERAL RADIO Experimenter

Since 1915 — Manufacturers of Electronic Apparatus for Science and Industry

VOLUME 33 No. 1 JANUARY, 1959



In This Issue

the GENERAL RADIO Experimenter

Published Monthly by the General Radio Company

VOLUME 33 · NUMBER 1 JANUARY, 1959

CONTENTS

The General Radio EXPERIMENTER is mailed without charge each month to engineers, scientists, technicians, and others interested in electronic techniques in measurement. When sending requests for subscriptions and address-change notices, please supply the following information: name, company address, type of business company is engaged in, and title or position of individual.

GENERAL RADIO COMPANY

275 Massachusetts Avenue, Cambridge 39, Mass.
Telephone: TRowbridge 6-4400

NEW YORK:	Broad Avenue at Linden, Ridgefield, New Jersey *Telephone — N. Y., WOrth 4-2722* *N. J., WHitney 3-3140*
CHICAGO:	6605 West North Avenue, Oak Park, Illinois *Telephone — VIllage 8-9400*
PHILADELPHIA:	1150 York Road, Abington, Pennsylvania *Telephone — HAncock 4-7419*
WASHINGTON:	8055 13th St., Silver Spring, Maryland *Telephone — JUniper 5-1088*
LOS ANGELES:	1000 North Seward St., Los Angeles 38, Calif. *Telephone — HOllywood 9-6201*
SAN FRANCISCO:	1182 Los Altos Ave., Los Altos, Calif. *Telephone — WHitecliff 8-8233*
CANADA:	99 Floral Parkway, Toronto 15, Ontario *Telephone — CHerry 6-2171*

REPAIR SERVICES

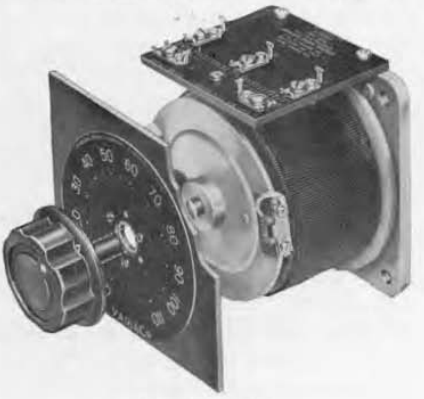
EAST COAST:	General Radio Co., Service Dept., 22 Baker Avenue, West Concord, Mass. *Telephone — Concord, EMerson 9-4400* *Lincoln, CLearwater 9-8900*
NEW YORK:	General Radio Co., Service Dept., Broad Ave. at Linden, Ridgefield, New Jersey *Telephone — N. Y., WOrth 4-2722* *N. J., WHitney 3-3140*
MIDWEST:	General Radio Co., Service Dept., 6605 West North Ave., Oak Park, Illinois *Telephone — VIllage 8-9400*
WEST COAST:	Western Instrument Co., 826 North Victory Boulevard, Burbank, Calif. *Telephone — VIctoria 9-3013*
CANADA:	Bayly Engineering, Ltd., First St., Ajax, Ontario *Telephone — Toronto EMpire 2-3741*

COVER

VARIAC® Adjustable Autotransformers are now available in a uniform design in 60-cycle ratings from 0.36 KVA to 52 KVA, in panel-mounting, wall-mounting, and portable models, with or without cases, and for either manual or motorized operation. High-frequency units for 350- to 1200-cycle service have ratings from 0.34 kva to 10 kva.

NEW TYPE W10 VARIAC® AUTOTRANSFORMER

Type W10M Variac



Type W10 Variac

The General Radio Variac® Autotransformer, one of the most widely copied products in the electrical industry, has been constantly improved since its introduction to the industry over 25 years ago. Frequent improvements not noticeable to the user are made to assure greater reliability and better performance while, at intervals of several years, complete model changes are made which incorporate the result of years of development work. Through a continuous program of development, General Radio engineers are constantly seeking new materials, design techniques, and manufacturing methods and applying them to the building of better Variacs.

One of the fruits of this program is the *Duratrak* contact surface; another is the "W" Variac design, of which the 10-ampere Type W10 (115 volts) and 4-ampere Type W10H (230 volts) are the latest examples, replacing the Type V-10 series. The features of "W" Variacs have been described in detail previously.[1] Improved heat transfer, improved insulation for better electrical performance; the substitution of wrought metal for castings to improve mechanical properties; disc radiators to protect the brush track, etc. Now, all General Radio Variacs bear a strong family resemblance

[1] "More New Variacs®," *General Radio Experimenter*, 30, 12, May, 1956, pp. 13-15.
"The Type W5 Variac® — A New and Better Variable Autotransformer," *General Radio Experimenter*, 30, 7, December, 1955, pp. 1-10.
"The Type W20 — A New 20-Ampere Variac® Autotransformer," *General Radio Experimenter*, 32, 15 and 16, August-September, 1958, pp. 3-5.
"New '50' Size Variacs® — Types W50 and W50H," *General Radio Experimenter*, 31, 11, April, 1957, pp. 3-9.

The "W" family of Variacs. Cased 115-volt models shown (*left to right*) have current ratings of 40, 20, 10, 5, and 2 amperes, respectively.

based on the application of the same sound principles to all models, differing only in particulars necessitated mainly by differences in power-handling capacity. That the development program has been a complete success has been amply demonstrated not only by consumer acceptance, but by that most sincere form of flattery, imitation.

Motor drives can be furnished on TYPE W10 single or ganged Variacs for servo work and for remote positioning applications.

Fully enclosed, two-phase, gear-reduction motors of the servo type are used. For servo applications, the motor has low moment of inertia and high angular acceleration. For remote positioning, the same servo motor assembly with a different shaft speed is used. The low moment of inertia is useful to avoid overshoot.

Single, two-gang, and three-gang units can be equipped to provide traverse rates of 8, 16, 32, and 64 seconds for 320° of travel for either servo or remote positioning applications and 128-second traverse for remote positioning only. The single units (Types W10 and W10H) can also be equipped to provide 4-second traverse rate for servo applications only.

The Type W10 series of Variacs is available in a wide assortment of models, 115- and 230-volt input, line or overvoltage output, single or ganged, open or cased, with or without ball bearings and motor drive as well as cased portable models with cord (two- or three-wire), off-on switch, outlet, protector, and carrying handle.

— GILBERT SMILEY

Portable model with convenient handle is available in 2- and 3-wire models.

Cased model for wall mounting has conduit knockouts.

Uncased model for panel mounting.

Overload protector, a feature on portable models, is reset from front panel.

VARIAC RATINGS

SINGLE PHASE	KVA	Type
115-VOLT INPUT		
	0.36	W2
	0.9	W5
	1.5	W10
	3	W20
	5.75	W50
	6	W20G2
	9	W20G3
	11.50	W50G2
	17.25	W50G3
	23	W50G4BB
	34.5	W50G6BB
230-VOLT INPUT		
	0.6	W5H
		W2G2
	1.2	W10H
	1.8	W5G2
	2.4	W20H
	3	W10G2
	4.8	W20HG2
	6	W20G2
	7.5	W50H
	15	W50HG2
	22.5	W50HG3
	30	W50HG4BB
	45	W50HG6BB
460-VOLT INPUT		
	1.2	W5HG2
	2.4	W10HG2
	4.8	W20HG2
	15	W50HG2
	30	W50HG4BB
	45	W50HG6BB

THREE PHASE	KVA	Type
230-VOLT INPUT		
	1.0	W5HG2
	1.25	W2G3
	2.1	W10HG2
	3.1	W5G3
	4.1	W20HG2
	5.2	W10G3
	10.4	W20G3
	13	W50HG2
	20	W50G3
	26	W50HG4BB
	40	W50G6BB
460-VOLT INPUT		
	2.1	W5HG3
	4.1	W10HG3
	8.2	W20HG3
	26	W50HG3
	52	W50HG6BB

(Right) **Cover of cased model is easily removable for access to terminals, mounting holes, etc.**

(For right) **Shaft is easily adjusted or replaced without disturbance to the rest of the assembly.**

Type and Mounting	Input Voltage	Line-Voltage Connection: Rated Output Current—Amp.	Line-Voltage Connection: Output Voltage	Line-Voltage Connection: Maximum Current—Amp.	Line-Voltage Connection: Output KVA	Overvoltage Connection: Output Voltage	Overvoltage Connection: Rated Output Current—Amp.	60-cycle no-load loss-watts	Driving torque oz.-in.	Net Wt. lbs.	Code Word	Price
W10 Open	115	10	0–115	13	1.5	0–135	10	17	30–60	12½	DOGAL	**$31.00**
W10M With case	115	10	0–115	13	1.5	0–135	10	17	30–60	15	DOGER	**44.00**
W10MT Portable 2-wire	115	See note[1] below				0–135	10	17	30–60	16	DOGIC	**48.00**
W10MT3 Portable 3-wire	115	See note[1] below				0–135	10	17	30–60	16	DOGOM	**51.00**
W10H Open	230	4	0–230	5.2	1.2	0–270	4	17	30–60	12	LUTAL	**33.00**
	115	2				0–270	2					
W10HM With case	230	4	0–230	5.2	1.2	0–270	4	17	30–60	14½	LUTER	**46.00**
	115	2				0–270	2					
W10HMT Portable 2-wire	230	See note[1] below				0–270	4	17	30–60	15½	LUTIC	**50.00**
W10HMT3 Portable 3-wire	230	See note[1] below				0–270	4	17	30–60	15½	LUTOM	**53.00**
VBT-10	Replacement Brush for Type W10, per set											**1.25**
VBT-11	Replacement Brush for Type W10H, per set											**1.25**

[1]MT and MT3 models have overvoltage connection and corresponding dial scales, but can be supplied on special order with line voltage connections and dial scales.

GANGED MODELS

Type		Load Rating KVA: Parallel	Series	Delta	Wye	Input Line Volts	Code Word	Price
W10G2	**2-gang W10**	3.0		2.6		115	DOGALGANDU	**$ 72.00**
			3.0			230		
W10G2M	**2-gang W10 cased**	Same as W10G2					DOGALBONDU	**93.00**
W10G3	**3-gang W10**	4.5				115	DOGALGANTY	**105.00**
					5.2	230		
W10G3M	**3-gang W10 cased**	Same as W10G3					DOGALBONTY	**128.00**
W10HG2	**2-gang W10H**	2.4		2.1		230	LUTALGANDU	**76.00**
			2.4			460		
W10HG2M	**2-gang W10H cased**	Same as W10HG2					LUTALBONDU	**97.00**
W10HG3	**3-gang W10H**	3.6				230	LUTALGANTY	**111.00**
					4.2	460		
W10HG3M	**3-gang W10H cased**	Same as W10HG3					LUTALBONTY	**134.00**

NEW CONNECTORS FOR THE LABORATORY

PATCH CORDS, SHIELDED PLUGS, ADAPTORS, INSULATORS

Connectors for interconnecting instruments are an important part of any measurement system. These connectors are properly a concern of the instrument designer, because the proper functioning of his product may depend upon the type and quality of the means used to connect it to other devices and circuits.

Poor-quality terminal insulators, high-loss or noisy cables, and loose plug-and-jack combinations that make erratic contact can ruin many a measurement, however accurate the measuring instrument may be.

Binding posts, plugs and jacks, patch cords, and similar devices have always been made available by the General Radio Company. These have been used not only with General Radio instruments but also with those of other manufacturers, since nearly all have adopted the General Radio standard of jack-top binding posts, spaced ¾ inch on centers.

The TYPE 274 Plugs, Jacks, and Patch Cords, together with the TYPE 938 Binding Posts in their several combinations, are an integrated set of low-frequency connecting devices, which are used on and supplied with General Radio instruments and are also sold separately. A number of these have recently been redesigned to have greater flexibility and adaptability than previous designs.

The well-known Double Plug, Type 274-MB, molded in polymethylstyrene, is now supplied with a cross hole through its center portion to provide strain relief for attached leads or cables up to 0.2 inch diameter.

The TYPE 274-NK Shielded Double Plug is a new design having an anodized aluminum shell, ceramic insulation, and providing strain relief for coaxial cables of 0.200 and 0.250 inch outside diameter. A wide variety of military and other coaxial cables is made in this range of sizes.

Type 274-MB Double Plug of low-loss, heat-and-impact-resistant polymethylstyrene.

(At right) **Type 274-NK Shielded Double Plug shown with shielded cable attached. Plugs directly into ¾″ spaced Type 938 Binding Posts with metal housing providing shield.**

For single-wire connection, the TYPE 274-DB Single Plugs are still available in both red and black polymethylstyrene.

A combination of four assembled cords with connectors on the ends suitable for the type of connections commonly made, and a versatile cord capable of adaption to many types of terminals, satisfies practically every need met in the laboratory, at frequencies up to several megacycles.

For complete shielding, the TYPE 274-NL Patch Cord connects two pairs of binding posts, adding less than 100 $\mu\mu f$ to the circuit. If complete shielding is not required and more than one connection is desired at one pair of binding posts, the TYPE 274-NP serves the purpose. It has high-grade insulating materials throughout and less than 100 $\mu\mu f$ capacitance. The double plugs are molded to the ends and can be stacked for multiple connections. Metal parts are bright-alloy-plated beryllium copper.

Type 274-NL Patch Cord for shielded connection between ¾" spaced binding posts.

A shielded connection between any combination of binding posts on ¾ inch centers, binding posts at other than ¾ inch centers, "bread boards," and TYPE 874 Coaxial Connectors can easily be made by use of the TYPE 274-NO Universal Patch Cord. This cord consists of a coaxial cable, with a TYPE 274 Plug on each end of the center conductor, a metal ferrule on each end of the shield, and a pigtail lead, with TYPE 274 Plug attached to the ferrule at each end of the cord. These plugs can go directly into jack-top binding posts or jacks spaced up to three inches apart. By addition of the TYPE 274-NT Shell, a completely shielded connection can be made to a pair of binding posts as in the TYPE 274-NL Patch Cord. Addition of the TYPE 874-QN6 to this universal cord adapts it for connection to the widely used TYPE 874 Coaxial Connectors. Lastly, the addition of TYPE 838-B Alligator Clips permits connection directly to any point in experimental or other circuits.

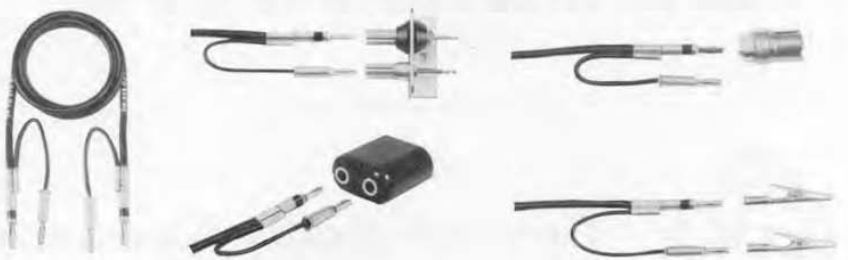
Bridging the gap from the TYPE 874 Coaxial System to the TYPE 274 Plug-Jack System is the TYPE 874-R34 Patch Cord. With it a pair of binding posts can be connected to a TYPE 874 Coaxial Connector with complete shielding. All the versatility of the TYPE 274-NO Cord described above can be had on one end of the TYPE 874-R33 Patch Cord while the other end is plugged into a TYPE 874 Connector. This latter cord used with the TYPE 874-Q line of adaptors will connect virtually anything to anything.

Type 274-NP Patch Cord connects between ¾" spaced binding posts, allowing for multiple connections.

Type 874-R34 Patch Cord

To add still further flexibility to the system, the new TYPE 274-QBJ Adaptor provides a means of connecting a pair of

(*Far left*) Type 274-NO Universal Patch Cord. (*Below*) shown with (*left*) Type 938 Binding Posts, Type 274-NT Shell; (*right*) Type 874-QN6 Adaptor, Type 838-B Alligator Clips.



jack-top binding posts to the popular BNC-type connector.

Another new design is the TYPE 938-YB Double Binding Post Insulator. It is

(*Left*) Type 274-QBJ Adaptor to BNC. (*Right*) Type 938-YB Double Binding Post Insulator.

in every way compatible with the well-established TYPE 938-WR, 938-WB, and 938-P Jack-top Binding Posts, but can be conveniently mounted on panels up to $\frac{5}{16}$ inch thickness in two $\frac{1}{2}$ inch diameter holes. The black polymethylstyrene material gives it a voltage rating of 4000 peak with less than 1 $\mu\mu f$ capacitance between binding posts.

These new connectors, plus the TYPE 938 Binding Posts and the TYPE 874 Coaxial Connectors and Adaptors, provide well-designed, high-quality interconnection systems for all kinds of electronic equipment operating at frequencies from dc up to about 5000 megacycles.

— H. C. LITTLEJOHN

Type		*Code Word*	*Price*
274-MB	Insulated Double Plug	STANPARBUG	$0.65
274-NK	Shielded Double Plug	STAPLUGNUT	1.35
274-NL	Patch Cord	STAPLUGBAT	4.50
274-NP	Patch Cord	STANPARYAK	3.50
874-R34	Patch Cord	COAXFITTER	5.50
874-R33	Patch Cord	COAXLINKER	5.00
274-NO	Universal Patch Cord	STANPARKID	3.25
274-QBJ	Adaptor to BNC	STANPARMUG	2.50
874-QN6	Adaptor to 874	COAXCHOSER	1.00
938-YB	Double Insulators	STANPARPAN	.20
838-B	Alligator Clip	STANPARNIP	10 for 1.50

WINTER MEETING AND EXHIBIT

American Physical Society — American Association of Physics Teachers

HOTEL NEW YORKER -:- NEW YORK, N. Y.

JANUARY 28 to 31

General Radio will exhibit electronic instruments and standards in Booths 14 and 15.

General Radio Company

PRINTED IN U.S.A.