THE General Radio EXPERIMENTER

VOLUME XVII No. 7 DECEMBER, 1942

ELECTRICAL MEASUREMENTS AND THEIR INDUSTRIAL APPLICATIONS

IN THIS ISSUE

COVER PHOTOGRAPH.
Checking the CLASS C-21-HLD Primary Frequency Standard against radio time signals.

ORDER NOW FOR FUTURE DELIVERY

● **TO MANUFACTURE** the several hundred items of test equipment, instruments, and component parts that are in continuous production at General Radio we must have an unbelievable variety of materials. Nearly all of them are, unfortunately, very scarce, and, for the most part, there are no known substitutes. They are available only on orders bearing the highest priority ratings, and even then they must be ordered months in advance of actual production.

A complete production cycle including the procurement of materials is planned many months in advance. This same procedure is, of course, used in peacetime, too, but normally the cycle takes only a few months, rather than eight to ten months as is now required. In peacetime the material goes on the shelf and is available for immediate delivery. In wartime things are different, and it is impossible to produce equipment fast enough to fill all needs from "off the shelf."

In order to include your requirements in future production, we naturally must know what they are. You can be much better assured of delivery on time if you will estimate your requirements for test equipment when you are planning your general production. Unfortunately test equipment is sometimes overlooked in production planning, perhaps because for so many years it has been available for immediate delivery. If you will give us all the advance notice that you can of your test equipment requirements and will specify delivery at approximately the date when you will need the equipment, we will, as a general rule, be able to meet your needs.

Please do not specify early delivery if later delivery will do. This only prevents someone else from getting his equipment on time and will interfere with the general war effort.

If your order is for a quantity of parts such as Variacs, rheostats, plugs, etc., which are to be built into your equipment, specify the rate at which the material will be needed, so that we can schedule our production of parts correctly to meet your requirements. Please ask for continuing deliveries as you need the material so that it will not pile up in your stock room and thus be idle for a long time before it is finally used. We are sure that careful planning along these lines will help immeasurably to make deliveries on *required* schedules and will eliminate delays both in your production and in ours.

All of our production facilities are now completely allocated for delivery during the balance of this year and for early in 1943. Your order should be placed now for material that you will require in the late spring, summer, and fall of 1943.

VOLTAGE REGULATION OF VARIACS

● **USERS OF VARIACS** occasionally desire quantitative information regarding the variation of output voltage with changes in load, and so we are publishing here a rather complete picture of the regulation of all the current models.

The accompanying curves show the variation of output voltage as obtained from actual measurement with resistive loads drawing the currents indicated on the various curves. Plots are given of voltage drop versus dial setting, which is the no-load voltage when the nominal value of input voltage, 115 or 230 volts, is used.

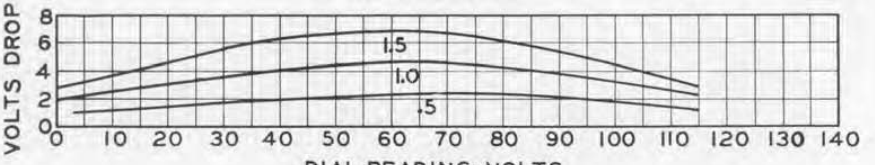
Some inaccuracy in the data is to be expected since the voltage drop is a difference reading of two relatively large voltages. Furthermore, the brush drop varies not only with current but also with particular position and number of turns bridged. The brush drop is naturally most important at low currents and at voltages near zero and line voltage. At other settings and for the higher currents the leakage reactance and resistance of the Variac winding cause the major part of the drop.

When 230-volt models are operated at 115 volts input, very high reactance drops occur near maximum output voltage. Consequently, this connection should not be used for high output voltages except at very low output current.

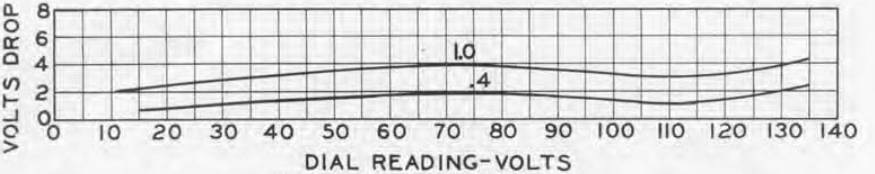
It should be pointed out that for some conditions data are given for currents in excess of the rated current of the Variac. This is done to give a more complete picture of performance, especially since some users may have applications where maximum current will be drawn near the mid-point for short periods of time only.

— MARTIN A. GILMAN

TYPE 200-B

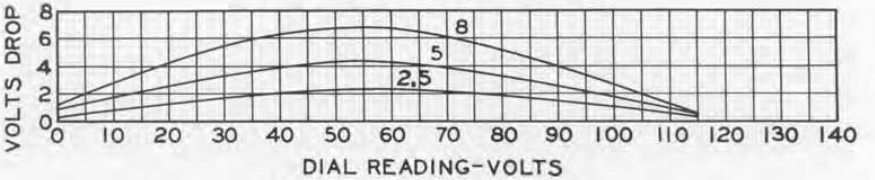


115 volts in; 0 to 115 volts out



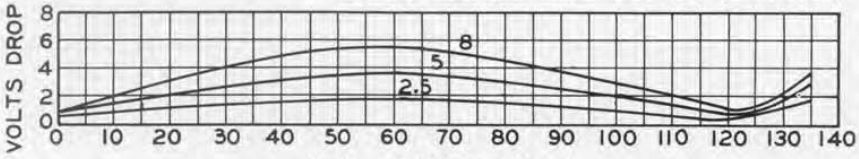
115 volts in; 0 to 135 volts out

TYPES 200-CM AND 200-CU



115 volts in; 0 to 115 volts out

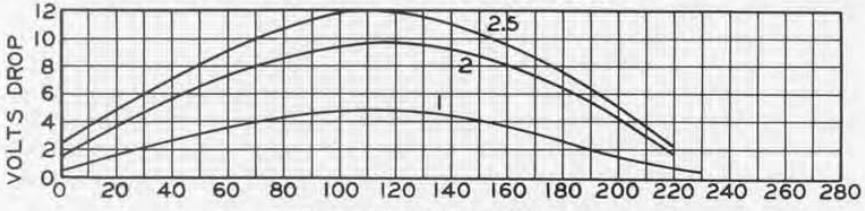
TYPES 200-CM AND 200-CU (continued)



DIAL READING-VOLTS

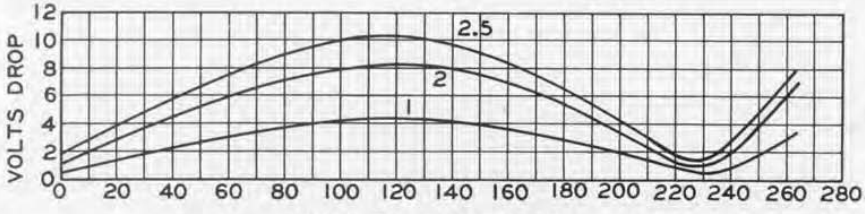
115 volts in; 0 to 135 volts out

TYPES 200-CUH AND CMH



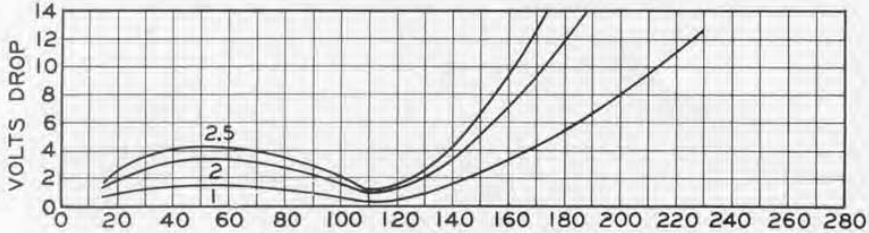
DIAL READING-VOLTS

230 volts in; 0 to 230 volts out



DIAL READING-VOLTS

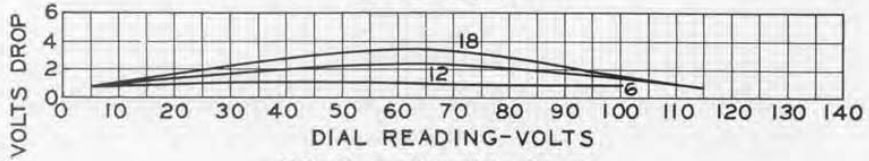
230 volts in; 0 to 270 volts out



DIAL READING-VOLTS

115 volts in; 0 to 230 volts out

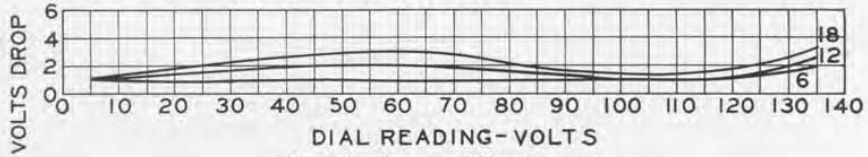
TYPE 100-Q



DIAL READING-VOLTS

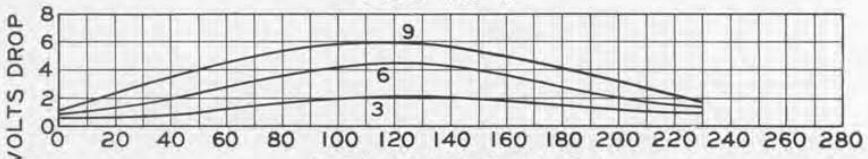
115 volts in; 0 to 115 volts out

TYPE 100-Q (continued)

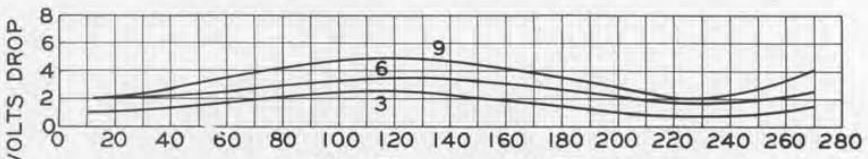


115 volts in; 0 to 135 volts out

TYPE 100-R



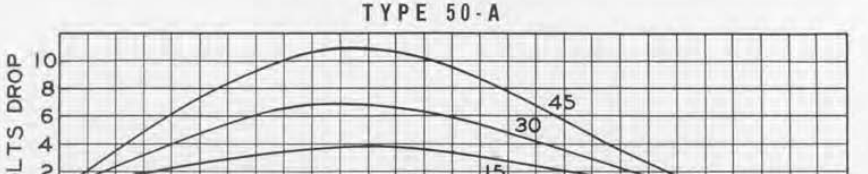
230 volts in; 0 to 230 volts out



230 volts in; 0 to 270 volts out

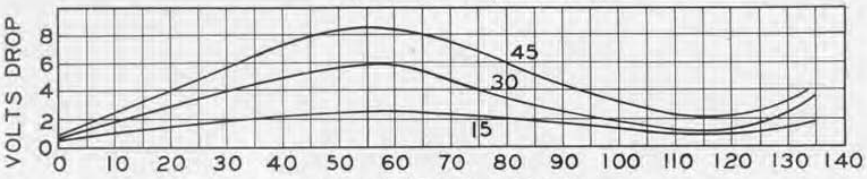
115 volts in; 0 to 230 volts out

TYPE 50-A



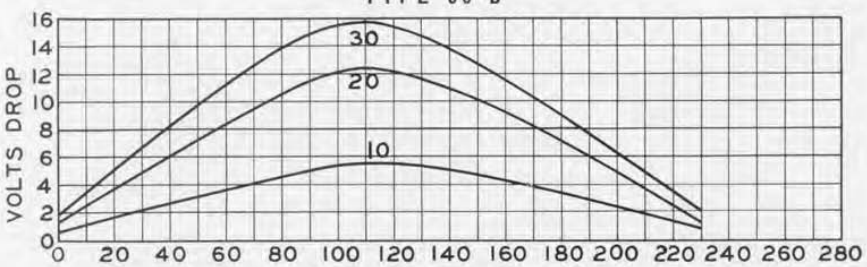
115 volts in; 0 to 115 volts out

TYPE 50-A (continued)

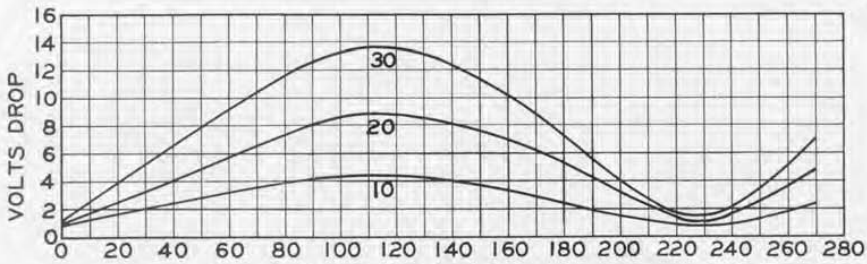


115 volts in; 0 to 135 volts out

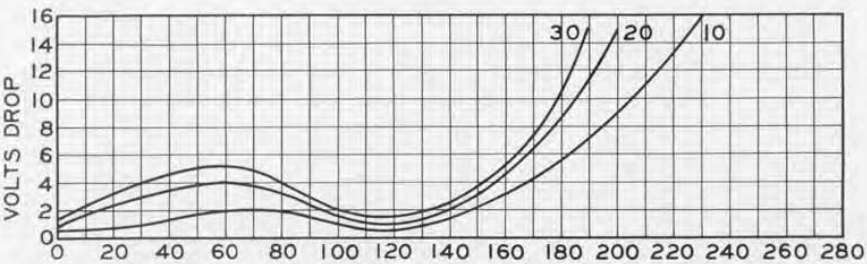
TYPE 50-B



230 volts in; 0 to 230 volts out



230 volts in; 0 to 270 volts out



115 volts in; 0 to 230 volts out

EFFECTS OF SUBSTITUTE MATERIALS

INSTRUMENT PERFORMANCE

● **IN THE DESIGN** of laboratory and communication test equipment the use of certain metals of construction is necessary for engineering reasons. Some of these metals, notably aluminum and brass, have become extremely scarce because of war conditions. Frequently, there is no substitute for the scarce materials, but in other cases zinc can be used for aluminum, and sheet steel for brass. Whenever possible the General Radio Company, in order to conserve the critical metals, uses the more plentiful substitute. These substitutes are selected to have as little effect upon the electrical performance characteristics of the equipment as possible. Generally speaking, the substitution of construction metals makes no difference in the electrical performance, but increases the weight substantially.

To achieve the maximum electrical performance the electrical components of General Radio instruments are carefully selected and are held to close manufacturing tolerances. The quantity production of component parts for war purposes has resulted in an inevitable loosening of production tolerances. Because of these wartime conditions and governmental regulations we are not always able to obtain components like resistors and capacitors to the close tolerances that we would like and must use them with wider tolerances. Vacuum tubes can no longer be selected or paired as they have been for some instruments. These factors sometimes adversely affect performance, but not enough to limit seriously the usefulness of the instrument.

A substantial part of our current engineering work is directed toward keeping instrument performance up to the highest standards in spite of the inferior materials that must be used even on the most vital war jobs. We have so far succeeded in maintaining General Radio performance standards and hope to be able to continue to do so, but if minor defects in appearance or performance occur, we hope our customers will understand that the causes are beyond our control.

FEWER ACCESSORIES

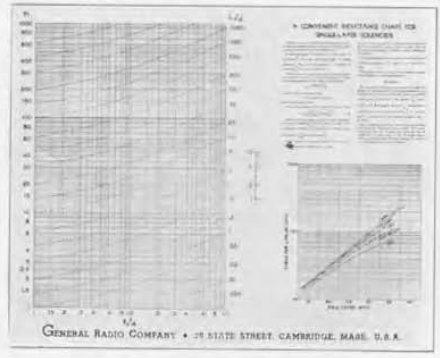
One obvious step in the conservation of scarce materials is the elimination of unnecessary spare parts and accessories.

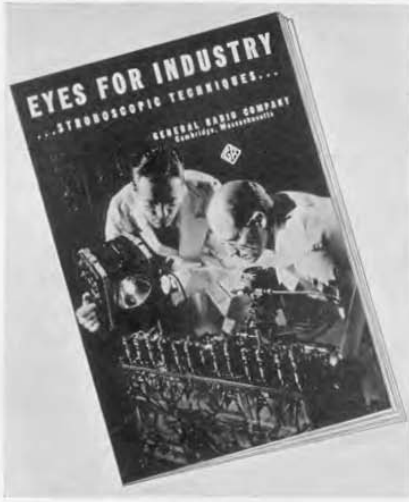
The TYPE 274-M Double Plug, for instance, is made from polystyrene, brass, and beryllium copper, all of which are scarce materials. A convenient but not essential accessory, this plug is no longer included in shipments of instruments with which it was formerly supplied free.

Other items no longer supplied are the metal shield cans for TYPE 510 and TYPE 668 Decade Resistance Units, the spare brushes formerly included as standard accessories with shipments of Variacs, and the replacement cables and power cords mentioned in last month's *Experimenter*.

ENLARGED INDUCTANCE CHART

The inductance chart for single-layer solenoids, originally published in the August, 1940, issue of the *Experimenter*, is now available in enlarged form, 17 x 22 inches overall, suitable for wall mounting. This chart indicates the number of turns required for a given inductance in terms of the length and diameter of the winding form. Write for a copy if you can use it. No charge, of course.





NEW BOOKLET ON STROBOSCOPE USES

This recently published 32-page booklet illustrates the use of General Radio stroboscopes in many branches of American industry. Slow-motion observations, speed measurements, and stroboscopic photography are discussed in detail. A copy is yours for the asking. This booklet will help you to get the maximum usefulness from your Strobotac and Strobolux.

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

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