The GENERAL RADIO EXPERIMENTER

VOL. 3 NO. 2 JULY, 1928

The General Radio Experimenter is published each month for the purpose of supplying information of particular interest pertaining to radio apparatus design and application not commonly found in the popular style of radio magazine.

There is no subscription fee connected with the General Radio "Experimenter." To have your name included in our mailing list to receive future copies, simply address a request to the GENERAL RADIO CO., Cambridge, Mass.

A Direct to Consumer Policy

Important Sales Policy Changes

Eighteen months ago, we made an important change in the method of distribution of our laboratory apparatus. At that time, we discontinued sales of such equipment through dealers and inaugurated the direct from our factory to the consumer plan of selling. This change seemed desirable because of the technical nature of the equipment and because of the engineering correspondence that was often involved.

The plan has worked very successfully. At the time the plan went into effect, another important change was made, namely, all discounts on this class of equipment were abolished. In place of these discounts, we reduced the list price so that consumers were paying no more than formerly.

At the time this plan was put into effect, it did not seem advisable to make a change to cover our line of radio parts. Conditions in the broadcast receiver situation have changed greatly in the past year and a half. It has become increasingly difficult for the novice to build his own set. There are, however, a vast number of people who are interested in experimental radio. For the most part, these people are engineers, or are associated with engineering organizations, and are able to purchase at a courtesy discount. Just as it seemed foolish to continue with a discount on laboratory apparatus, it now seems foolish to continue with a fictitious list and a courtesy discount on radio parts. To correct this situation, we have revised our radio parts prices downward, and, effective July 1, all discounts on both laboratory apparatus and radio parts have been abolished. On page 4 will be found a complete revised price list of both laboratory apparatus and radio parts.

Coincident with this change, another radical departure from previous methods has been made. We are specializing in equipment for the radio experimenter and the professional laboratory carrying on work at radio and audio frequencies. It is often desirable for the experimenter to ask technical questions regarding the equipment before he purchases it. With the present methods of distribution of radio parts, it is often impossible to get this information from the local dealer. We feel, accordingly, that little is to be gained by selling our parts through such channels. After July 1, all sales of our equipment will be made on a direct from the factory to consumer basis.

Except for a few standard items regularly carried by dealers in metropolitan areas, there will not be any delay due to the necessity of writing to the factory. When orders were placed with dealers for much

During July we will have ready for distribution two new catalogs. The first will contain items of interest to the radio experimenter. It will replace our current bulletin on radio parts. Every radio experimenter will be interested in this catalog.

The second will cover all of our standard items of manufacture, both laboratory apparatus and radio parts. It contains all items listed in the radio bulletin referred to above. It is available for distribution to technical laboratories and to engineers. In requesting this second catalog, please give your business affiliation.

Either catalog will be sent on request. Just ask for:

BULLETIN 930 (Radio)

This issue has been sent to 20,000 experimenters not on our regular mailing list. If you are one of this group receiving a copy of The General Radio Experimenter for the first time, and you desire to receive future copies, just fill out the coupon below and mail it to us. If you do not want to mutilate this copy by clipping the coupon, a post card or letter giving your name and address and requesting that you be placed on The Experimenter mailing list will bring future issues. There is no charge for "The Experimenter."

GENERAL RADIO COMPANY,
30 State Street,
Cambridge, Mass.

GENTLEMEN:

Please place my name on "The Experimenter" mailing list.

Name .....

Street and No. .....

City and State .....

Please typewrite or print your name and address

of our equipment the dealer had to write to the factory. This often caused a longer delay than if the experimenter had written himself. Our commercial department is so organized that orders receive immediate attention, and no delay is occasioned by the necessity of handling them here.

We hope that this new method of distribution will give you a service that you have not obtained before. We hope that you will feel that you are closer to the factory, and will write us regarding your problems.

It should not be understood that we do not believe in the jobber-dealer method of distribution. It is ideal when the volume of sales warrants the support of such a system. When, however, a very large number of items are required to be stocked, and individual sales on any one item are relatively small, it is very difficult, without increasing costs unreasonably, to carry out the jobber-dealer method. It is to give the consumer a service at a lower price that we are going on a direct to the consumer basis. Service men and professional set builders will find the mail order method convenient and will note that the new list prices are approximately the same as the former list prices with their professional discount deducted.

On all orders where the current list price accompanies the order, we will make shipments anywhere in the United States or Canada at our expense. This will make it unnecessary to compute express or parcel post charges.

In anticipation of an increased service to our clients, we are increasing our laboratory facilities, and more particularly, our engineering personnel. We shall continue to feature special equipment for research laboratories and the special problems of the experimenter. We shall not, however, neglect continued improvements in the design of standard equipment. Particular attention is called to the fact that we shall have available the latest equipment in the way of measuring instruments and standard parts required by the transmitting amateur.

While direct distribution has for many years been common on specialized equipment requiring technical correspondence, it has not been introduced very generally into the experimental radio field. We feel that it should be successful. It would help us in making it successful if you would write us, giving your ideas or suggestions regarding the plan.

New Transformers

In conjunction with its new policy of furnishing a particularly high-grade line of parts directly to experimenters, the General Radio Company is announcing a new line of high quality audio frequency transformers. The transformers in the group include not only inter-stage coupling transformers, but microphone transformers and output transformers for low and high impedance speakers. These transformers, together with the Type 284 line amplifier transformers provide all the necessary units for audio frequency amplifiers handling powers up to the output of type 250 tubes in push-pull.

The 585-D and 585-H transformers are high quality inter-stage coupling transformers for use with tubes of plate impedance not exceeding approximately 10,000 ohms. The 585-D with approximately a 1:2 ratio has a particularly flat amplification curve over a wide range of frequencies. The curve shows no variation from eighty to seven thousand cycles. Below eighty cycles, the curve drops very gradually. At thirty cycles the voltage amplification is 85% that at the straight portion of the characteristic. A variation of this magnitude is imperceptible. In the H transformer, evenness of amplification has been sacrificed slightly in order to obtain a greater gain, about 1:3.4. The flat section of this curve extends from two hundred to about five thousand cycles. Amplification of 85% of that at the flat portion is obtained at seventy cycles as compared with thirty in the case of the lower ratio transformer. At thirty cycles the amplification is 62%. This drop would generally be just perceptible.

The new group of transformers provides a variety of choice for the last or power stage. A new push-pull input transformer of improved characteristics, the type 541-A may be used to feed any type of amplifier tube in a push-pull stage. An unusually good characteristic for a push-pull input transformer has been obtained for the 541-A. This type of transformer offers considerable difficulty to the designer owing to the double secondary, each half of which must have equal coupling to the primary. A sandwich type of coil construction used on the 541-A permits a good characteristic despite this difficulty. The curve is flat from 100 to 10,000 cycles, dropping to about 75% of the maximum at thirty cycles.

A complete line of output transformers is provided for both push-pull amplifier stages and those of the conventional type. Push-pull output transformers are provided both for high impedance speakers (type 541-B) and for low impedance speakers of the "dynamic" type (type 541-C). These transformers are designed to have the proper impedance ratio for the speaker designated, and have sufficiently high impedance to minimize shunting effects by the transformer. The frequency characteristic of such a transformer when connected to a load is of course dependent on that of the load.

The push-pull transformers will be supplied in packages containing two units, i. e. a 541-A and a 541-B transformer, and a 541-A and a 541-C transformer.

The push-pull output transformers are so designed that they may be used with the high plate currents of the type 250 tubes. The removal of one tube will not damage the transformer.

Output transformers or filters are required for the power tubes. Filters are used where no change in impedance is necessary, their function being only to protect the speaker from the current in the power tube plate circuit.

A new speaker filter for the type 250 tube, the 587-B supplants the 587-A which is being discontinued. This filter is designed for use with either the 171 or 250 tube both of which have about the same plate impedance.

In the 587-B filter, both the inductance of the coil and the capacity

of the condenser have been increased as compared with the 587-A, resulting in an improvement in its frequency characteristic. The type 387-A speaker filter is still available for use with the 171 type tube only.

Where a dynamic or other type of speaker having an impedance widely different from that of the tube used, an output transformer must be used. The type 587-O transformer is of proper design to adapt impedances of the order of 10 ohms to tubes of 2000-6000 ohms impedance. The transformer is designed to operate with 55 mils plate current without impairment of quality and it is thus adapted to work out of the type 250 tube.

Speech amplifiers for group address systems and remote studios are also included in the new line of transformers. The 585-M and 585 M2, are designed to work out of standard (200 ohm) single and double button microphones respectively. These transformers replace corresponding instruments of the 284 type over which they represent a considerable improvement in quality.

The type 585-D and H may be used in line amplifier or group address systems, as of course may the push-pull and output transformers. This line of transformers is completed by transformers of the 284 type already listed, i. e. Type 284-E, line to grid type and 284-D, plate to line transformers, for line amplifiers.

Essential data on the new transformers follows:

Type	585D	585H
Ratio	1:2	1:3.5
D. C. Pri. Resistance	2000 ohms	2000 ohms
D. C. Sec. Resistance	9300 ohms	11000 ohms
Sec. Ind. 60 cycles	316H	866H
Pri. Ind. 60 cycles	79H	71H

See Page 4 for Prices.

J. K. Clapp Joins Staff

It is with great pleasure that we announce that Mr. J. K. Clapp, so well known in the amateur field, joined our engineering staff on July 1. Mr. Clapp is a graduate of the Department of Electrical Engineering of the Massachusetts Institute of Technology, class of 1923. Since graduation, he has been engaged in instruction at Technology, and in consulting work.

During the war, Mr. Clapp served in the Navy on radio problems, holding the rank of ensign.

A New Amateur Wavemeter

The new amateur assignments will become effective January 1, 1929, and if present indications are worth anything, more drastic regulations will be made to require a strict adherence to the band limits. In the past, the Department of Commerce has been rather lenient, for off-band operation was not particularly serious. But increased commercial operation is changing this, and off-band operation will not be tolerated. The 37 to 42.8 meter band is probably the one in most general use, and when we consider how liberal many operators are with regard to those limits, it may seem to be an almost impossible task to compress the present inhabitants of this band into the new limits of 41 to 42.8 meters. But it seemed equally impossible to get everyone below 200 meters, to impose quiet hours where necessary, and to accomplish many other things that are now history, and these same things have proved to be the necessary driving force to make progress and keep alive the fascination of the game.

The thing of first importance is to keep the transmitter wave within the band, and this requires an accurate wavemeter. Thanks to the Standard Frequency Transmissions, most stations are now equipped with a wavemeter which has been considered to be sufficiently accurate. Usually these wavemeters consist of a condenser of low capacitance and an appropriate coil. One scale division amounts to more than one percent of the wavelength being measured. But 42.8 meters is only about 4½% more than 41 meters, and the entire band is contained within about four scale divisions. Obviously this is not good enough, and the operator is able to tell only that he is within the band, and even this is doubtful if he is working near one end.

It was with these facts in mind that the Type 558 Amateur Band Wavemeter was designed. This meter follows a design generally used for broadcasting station frequency meters in that the variable condenser is shunted by a fixed condenser, greatly reducing the tuning range. This, of course, means more divisions per meter, and greater accuracy of setting. The rotor proper consists of two rotor plates of the straight line wavelength type, and two circular rotors. The

capacitance varies with the setting of the S. L. W. plates, while the circular plates cause no change as they rotate, but act like a fixed condenser. The whole condenser is enclosed in a crackle finished metal can. The spreading of wavelengths by this method is such that one scale division represents about ¼ of 1 percent of the wavelength being measured. It is possible to set the scale closer, with care.

The indicator is of the neon type, especially made for this purpose. It has a low ignition voltage, and draws so little current that it produces a negligible change of calibration when lighted.

There are five coils four of which are wound on bakelite tubing threaded for the spaced turn coils. These coils cover the 10, 20, 40, and 80 meter bands. The five meter coil is a simple loop of heavy brass rod.

In broadcast stations, it is common practise to have a resonance indicator permanently tuned to the station wave. This shows the operator that he is at least near the proper wavelength, and that his output is about normal. The Type 558 wavemeter is very useful to the amateur operator for the same purpose. It gives a fair indication of wavelength, output power, and accuracy of keying if mounted near the transmitter, and within sight of the operating desk.

The Type 558 Wavemeter is provided in a strong packing case with positions for the condenser, five coils, and a calibration chart. Accuracy of calibration is to within ¼ of 1%. The price of the Type 558 Wavemeter is $20.00.

Price Changes Effective July 1, 1928

Type		Description	Old Price	New Price
102	D	Decade Resistance	$ 22.00	$ 22.00
102	E	Decade Resistance	24.00	24.00
102	H	Decade Resistance	25.00	25.00
102	F	Decade Resistance	30.00	30.00
102	G	Decade Resistance	32.00	32.00
102	K	Decade Resistance	42.00	42.00
102	J	Decade Resistance	50.00	50.00
102	L	Decade Resistance	85.00	85.00
106	L	Inductance Standard	24.00	25.00
106	G	Inductance Standard	24.00	25.00
106	J	Inductance Standard	24.00	25.00
106	K	Inductance Standard	24.00	25.00
107	F	Variometer	25.00	27.00
107	G	Variometer	25.00	27.00
107	H	Variometer	25.00	27.00
125	A	Phantom Antenna	15.00	18.00
125	G	Phantom Antenna	28.00	32.00
127	A	Hot Wire Galvanometer	7.25	6.75
127	A	Hot Wire Meter	7.75	6.00
127	B	Hot Wire Galvanometer	7.25	5.75
127	B	Hot Wire Meter	7.75	6.00
127	C	Hot Wire Galvanometer	8.50	6.25
127	C	Hot Wire Meter	9.00	6.50
133	A to F	Resistance Standard	6.00	6.00
133	G	Resistance Standard	7.00	7.00
133	H	Resistance Standard	10.00	10.00
133	K	Resistance Standard	20.00	20.00
134		Thermo Couple	6.00	Drop
137	D	Knob, without pointer	.30	.25
137	D	Knob, with pointer	.35	.30
137	H	Knob	.75	.50
137	J	Knob, without pointer	.20	.15
137	J	Knob, with pointer	.25	.20
137	K	Knob	.25	.15
138	A	Insulated Binding Post	.25	.18
138	B	Switch Contact	.05	.04
138	C	Switch Contact, 5/16"	.05	.04
138	D	Switch Contact, 3/16"	.04	.03
138	Q	Switch Stop	.05	.04
138	U	Jack Top Binding Post	.10	.10
138	T	Jack Top Binding Post	.20	.16
138	W	Binding Post	.12	.08
138	Y	Binding Post	.15	.14
138	Z	Binding Post	.10	.07
139	A	Switch	.95	.50
156		Socket	1.00	.75
164		Audibility Meter	32.00	34.00
166		Telephone Transformer	7.00	7.00
170		Hot Wire Meter	20.00	20.00
171	F	Switch	.40	.30
174	C	Wavemeter	58.00	68.00
174	D	Wavemeter	58.00	68.00
189	E to L	Galvanometer	36.00	36.00
193		Decade Bridge	115.00	115.00
202		Switch	1.25	.75
210		Ratio Arm Box	28.00	28.00
213		Audio Oscillator	32.00	32.00
214	A	2500 Ohm Rheostat	3.00	2.25
214	A & B	Rheostat	2.25	1.50
214	A & B	Potentiometer	3.00	1.75
216		Capacity Bridge	150.00	175.00
219	F	Decade Condenser	40.00	40.00
219	G	Decade Condenser	60.00	60.00
222		Precision Condenser	80.00	90.00
224		Precision Wavemeter	190.00	190.00
224	L	Low Wave Precision Wavemeter	200.00	200.00
229		Galvanometer Shunt	15.00	15.00
239	E	Variable Air Condenser	17.00	18.00
239	F	Variable Air Condenser	14.00	15.00
239	G	Variable Air Condenser	13.50	10.00
239	H	Variable Air Condenser	10.00	7.00
239	J	Variable Air Condenser	20.00	21.50
239	K	Variable Air Condenser	17.00	18.50
239	L	Variable Air Condenser	16.50	13.50
239	M	Variable Air Condenser	13.00	10.50
240		Capacity Meter	80.00	85.00
246	L	Variable Air Condenser	30.00	38.00
246	M	Variable Air Condenser	34.00	45.00
246	P	Variable Air Condenser	38.00	54.00
247	E	Variable Air Condenser	6.25	5.00
247	F	Variable Air Condenser	4.00	3.00
247	G	Variable Air Condenser	7.25	5.75
247	H	Variable Air Condenser	5.00	3.75
247	J	Variable Air Condenser	5.75	4.50
247	K	Variable Air Condenser	3.50	2.50
247	L	Variable Air Condenser	7.00	5.25
247	M	Variable Air Condenser	4.50	3.25
247	N	Variable Air Condenser	3.75	2.75
247	P	Variable Air Condenser	4.75	3.50
247	W	Wavemeter	10.00	7.00
247	WX	Extension Coils	3.00	2.75
249	A	Attenuation Box	100.00	100.00
249	B	Attenuation Box	110.00	110.00
249	C	Attenuation Box	90.00	90.00
249	D	Attenuation Box	100.00	110.00
249	H	Attenuation Box	120.00	120.00
249	J	Attenuation Box	150.00	150.00
249	T	Attenuation Box	100.00	100.00
249	U	Attenuation Box	130.00	140.00
260		Insulator	.25	.20
268		Variocoupler	2.75	2.50
269		Variometer	5.00	3.50
274	A	3 Jack Base	.90	.60
274	B	4 Jack Base	1.00	.65
274	C	2 Jack Base	.75	.50
274	D	Single Insulated Plug	.25	.25
274	E	Single Plug	.20	.20
274	F	4 Plug Mounting Base	.75	.75
274	G	Open Double Plug	.80	.50
274	J	Jack	.10	.05
274	M	Insulated Double Plug	.50	.40
274	P	Plug	.10	.06
274	R	4 Gang Plug	.50	.50
274	S	Short Circuit Jack	.50	.50
274	T	Double Adjustable Jack	.50	.50
275		Piezo Electric Oscillator	60.00	60.00
276	A—160	Piezo Electric Crystal, 160 Meters	15.00	15.00
276	A—80	Piezo Electric Crystal, 80 Meters	25.00	25.00

Type		Description	Old Price	New Price
277	A to C	Coil	1.25	1.00
277	D	Coil	1.50	1.15
277	U	Coil Form	.75	.70
280		Insulator	.15	.12
284	D & E	Transformer	12.00	12.00
285	D	Amplifying Transformer	6.00	4.00
285	H	Amplifying Transformer	6.00	4.00
285	N	Transformer	8.00	8.00
285	T	Transformer	7.00	7.00
287	A	Ohmmeter	25.00	30.00
287	B	Ohmmeter	25.00	30.00
299		Socket	.50	.35
301		Rheostats	1.25	1.00
301		Resistance Strips	.25	.25
302		Dial	1.75	1.25
303		Dial	2.50	2.00
309		Tube Socket Cushion	.35	.25
310		Dial	.60	.50
317		Dial	1.50	1.00
329	H	Variable Attenuation Network	220.00	220.00
329	J	Variable Attenuation Network	240.00	240.00
329	K	Variable Attenuation Network	235.00	235.00
329	L	Variable Attenuation Network	255.00	255.00
329	M	Variable Attenuation Network	230.00	230.00
329	N	Variable Attenuation Network	250.00	250.00
329	O	Variable Attenuation Network	240.00	240.00
329	P	Variable Attenuation Network	260.00	260.00
332		Station Frequency Meter	90.00	90.00
334	F	Variable Air Condenser	4.25	3.25
334	H	Variable Air Condenser	5.25	4.00
334	K	Variable Air Condenser	3.75	2.75
334	M	Variable Air Condenser	4.75	3.50
334	N	Variable Air Condenser	4.00	3.00
334	P	Variable Air Condenser	5.00	3.75
334	T	Variable Air Condenser	4.25	2.75
334	V	Variable Air Condenser	3.75	2.50
337	A	DPDT Switch	2.75	3.00
337	B	4 PDT Switch	6.75	7.00
337	C	6 PDT Switch	9.50	10.00
338		Oscillograph	200.00	225.00
338	G	Galvanometer	140.00	160.00
340		Rheostat	16.00	20.00
346		Adaptor	.35	.20
349		Socket	.50	.35
355		Amplification Test Set	180.00	180.00
356		Piezo Plate Holder	1.00	1.50
358		Wavemeter	22.00	15.00
359	A to H	Transformer	15.00	20.00
361	B	Vacuum Tube Bridge	220.00	220.00
365		Plate Supply Transformer	8.00	6.00
366		Choke	8.00	5.00
367		Output Transformer	5.00	3.50
368	A	Micro Condenser	1.25	.75
368	B	Micro Condenser	1.50	1.00
369		Coupling Impedance	5.00	2.50
371		Potentiometer	5.00	5.00
373		Double Impedance	6.50	4.50
374	B	Variable Air Condenser	3.75	2.75
374	F	Variable Air Condenser	7.00	5.00
374	K	Variable Air Condenser	4.25	3.50
374	N	Variable Air Condenser	6.50	4.25
375		Piezo Oscillator	100.00	100.00
376	B	Piezo Electric Crystal	25.00	25.00
376	C	Piezo Electric Crystal	35.00	35.00
376	D	Piezo Electric Crystal	50.00	50.00
376	E	Piezo Electric Crystal	60.00	60.00
377		Low Frequency Oscillator	350.00	350.00
379	R	Radio Frequency Choke	2.00	1.25
379	T	Radio Frequency Choke	2.00	1.25
383	A	Capacity Bridge	80.00	80.00
383	B	Capacity Bridge	80.00	80.00
384		Radio Frequency Oscillator	80.00	90.00
384	A to D	Coils	3.00	3.00
384	E & F	Coils	4.00	4.00
384	H	Coils	8.00	8.50
384	D—8	Coils	4.00	4.50
384	G	Coils	5.00	5.00
387	A	Speaker Filter	6.00	4.50
390		Power Amplifier Kit	47.50	24.00
395		Power Amplifier Kit	50.00	25.00
400		Power Amplifier	68.00	35.00
405		Plate Supply Unit	40.00	20.00
410		Rheostat	1.25	1.00
410		Resistance Strips	.25	.25
410		Knob	.20	.20
411		Synchronous Motor	130.00	130.00
413		Beat Oscillator	210.00	210.00
415		Laboratory Amplifier	40.00	Drop
437		Adjustable Center Tap Resistance	.75	.50
438		Five Prong Socket	.50	.35
439		Center Tap Resistance	.60	.35
440	A	Filament Transformer	10.00	7.00
441		Push Pull Amplifier	20.00	15.00
445		Plate Supply Unit	55.00	35.00
446		Resistance Unit	4.00	2.75
458		5 Meter Wavemeter	8.00	8.00
513		A. C. Beat Frequency Oscillator	350.00	350.00
527		Rectifier Filter	25.00	17.50
541	A	High Quality Input Push Pull Transformer	15.00	15.00
541	B	High Quality Output Push Pull Trans. for Standard Speaker	10.00	10.00
541	C	High Quality Output Push Pull Trans. for Dynamic Speaker	10.00	10.00
558		Amateur Band Wavemeter	20.00	20.00
565	A	Half Wave Transformer	20.00	13.50
565	B	Full Wave Transformer	20.00	13.50
585	D	High Quality Audio Transformer 2:1	7.00	7.00
585	H	High Quality Audio Transformer 3.5:1	7.00	7.00
585	O	High Quality Output Transformer for Dynamic Speaker	7.00	7.00
585	M	Single Button Microphone to Grid Transformer	12.00	12.00
585	M2	Double Button Microphone to Grid Transformer	12.00	12.00
587	B	Power Speaker Filter	10.00	9.00