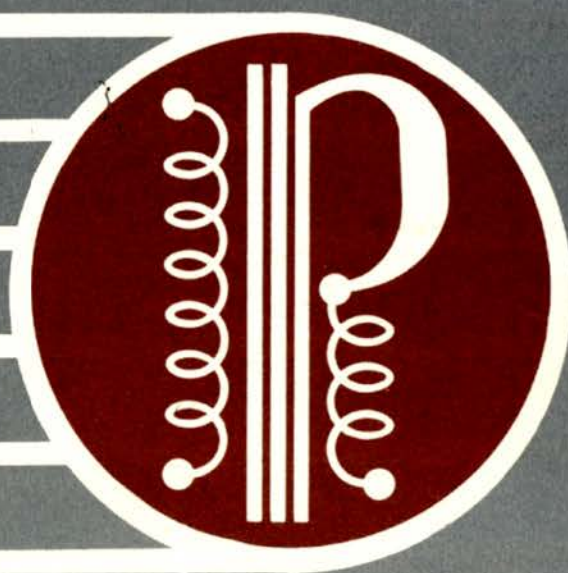


PEERLESS



TRANSFORMERS

CATALOG 1950

PEERLESS ELECTRICAL PRODUCTS

DIVISION OF

1161 N. VINEST.
HOLLYWOOD 38
CALIFORNIA



161 SIXTH AVE.
NEW YORK 13
NEW YORK



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F Filament Transformers	Q Plate Reactors (Audio) and Modulation Reactors	W Swinging Chokes
G Interstage Transformers		X Replacement Output
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How to use this catalog

This catalog has been specially designed for your convenience. The following notes will help you to take advantage of the unusual features:

Broad classifications will be found at the top, outside corner of each page. Sub-classifications, or special notes are in the outside margins.—*Related types* are placed on opposite pages, wherever possible, for easy cross-reference in laying out a system.—*Type numbers* are on the outside margins of all pages, so that they may be found without opening pages all the way to the fold.—*Case types* are indicated by symbols at the top of each page, each type over a separate column. A tinted circle in the data for any transformer indicates availability in the case type symbolized at the head of the column. Photographs of typical cases, with case type symbols, will be found on page 18.—*Filament voltages* for combination plate and filament transformers are listed in separate voltage columns. By following down appropriate voltage columns, any available combination may be found.—*Special data* and information on ratings are found with the 20-20 Audio section on pages 8 to 11, and on data pages 16 and 17.

NOTE: Items marked "on order" are available from the factory, but are not usually stocked by jobbers.



POWER

COMBINATION PLATE AND FILAMENT TRANSFORMERS R

Type Number	High Voltage Secondary		Filament Current, Amperes			Dimensions, In.			Wt. Lb.	
	A.C. Volts	D.C. MA	2.5 V.-C.T.	5 V.	6.3 V.-C.T.	H	D	W		
R-080-A	275-0-275	20			2.	3 1/8	2 3/8	2 1/8	2 1/4	
R-080-Q	275-0-275	20			2.	4 1/8	3 3/8	3 1/8	3	
R-160-A	275-0-275	40		2.	2.	3 1/8	3 1/8	2 3/8	2 3/4	
R-160-G	275-0-275	40		2.	2.	3 3/8	3 1/8	2 3/8	2 3/4	
R-196-A	300-0-300	50		2.	2.5	3 1/8	3 3/8	2 3/8	3 1/4	
R-196-G	300-0-300	50		2.	2.5	3 3/8	3 1/8	2 3/8	3 1/4	
R-319-A	325-0-325	70	7.5	3.		3 1/2	3 3/8	2 3/8	4	
R-320-A	325-0-325	70		3.	3.	3 1/2	3 3/8	2 3/8	4	
R-320-G	325-0-325	70		3.	3.	3 3/8	3 3/8	2 3/8	4	
R-399-A	350-0-350	90	10.	3.		4 1/8	3 3/8	3 3/4	6 1/4	
R-400-A	350-0-350	90		3.	4.	4 1/8	3 3/8	3 3/4	6 1/4	
R-400-G	350-0-350	90		3.	4.	4 1/8	4 1/8	3 3/8	6 1/4	
R-400-Q	350-0-350	90		3.	4.	5	4 1/8	4 1/8	7 1/2	
R-401-A	350-0-350	90	3.5	3.	2.5	4 1/8	3 3/8	3 3/4	6 1/4	
R-479-A	350-0-350	120	12.5	3.		4	3 1/2	3 3/4	4	
R-480-A	350-0-350	120		3.	5.	4	3 1/2	3 3/4	4	
R-480-G	350-0-350	120		3.	5.	3 3/4	3 3/4	3 3/8	4	
R-480-Q	350-0-350	120		3.	5.	5	4 5/8	4 1/8	8	
R-481-A	350-0-350	120	3.5	3.	3.5	4	3 1/2	3 3/4	4	
R-482-A	350-0-350	120		3.	3. - 3.	4	3 1/2	3 3/4	4	
R-559-A	400-0-400	200	5. - 10.	3.		5	4 3/8	4 3/8	11 3/4	
R-560-A	400-0-400	200		3.	6.	5	4 3/8	4 3/8	11 3/4	
R-560-Q	400-0-400	200		3.	6.	6	5 1/8	5 1/8	17	
R-561-A	400-0-400	200		3.	2. - 4.	5	4 3/8	4 3/8	11 3/4	
R-620-A	385-0-385	225		3.	18. - 11.3	4 3/4	4 3/8	3 3/8	10 1/4	
R-640-A	575-0-575	225		3.		5	6	4 3/8	15 1/4	
R-720-A	750-700-0-700-750	200-250 [†]		3.		5	6 1/4	4 3/8	16 1/2	
R-800-A	400-0-400	300		4.	4. - 5.	5	6 1/4	4 3/8	16 1/2	
	High-Voltage Secondary			Filament Current-Amperes						
	A.C. Volts	D.C. MA	D.C. Volts	Rect. 2.5 V.	6.3 V. Tapped 2.5 V.					
R-870-A	1775	2	2500	1.75	.6	2.1	4 1/8	3 1/2	3 3/4	6 1/4
R-960-Q	4600	2	6500	1.75	.6	2.1	4 1/2	4 5/8	4 1/8	8 1/2

TELEVISION

CATHODE RAY & TELEVISION

*On order only from factory stock.

†Choke input only.

‡Low flux-density core for pre-amplifiers.

All primaries are 117 v. 60 cycles.

All transformers in R group are supplied with electro-static shield.

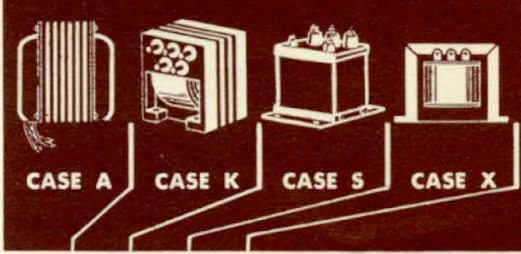
Transformers with ratings listed above can be supplied for 234 v. and/or 25 cycle operation. Quotations (based on quantity) furnished on request.

▲ Furnished with leads extending from grommet holes. No terminal board.

†No C.T. on these windings.

NOTE: See data section on page 16 for additional information on power transformers.

PEERLESS TRANSFORMERS



POWER

PLATE TRANSFORMERS P

Wt. Lb.	Dimensions, In.			PRI Volts 60 Cycle	D.C. MA*		D.C.* Volts	Secondary A.C. Volts	Type Number
	H	D	W		CCS ¹	ICAS ²			
25	7	8	5 3/4	117	300	425	600-750	900-725-0-725-900	P-110-K
34	9	8	6 1/4	117	300	425	600-750	900-725-0-725-900	P-110-S
27	7	8 1/2	5 3/4	117	300	425	750-1000	1175-880-0-880-1175	P-330-K
37	9	8	6 1/4	117	300	425	750-1000	1175-880-0-880-1175	P-330-S
47	7	10	7 3/4	117-234	325	450	1250-1500	1750-1450-0-1450-1750	P-440-K
60	9	8	8 1/4	117-234	325	450	1250-1500	1750-1450-0-1450-1750	P-440-S
57	7	10 3/4	7 3/4	117-234	400	550	1500-2000	2300-1725-0-1725-2300	P-550-K
75	10	9	8 1/4	117-234	400	550	1500-2000	2300-1725-0-1725-2300	P-550-S
70	9 1/4	11 1/2	9 1/4	117-234	450	625	2000-2500	2850-2275-0-2275-2850	P-660-K
100	12 1/4	11	10	117-234	450	625	2000-2500	2850-2275-0-2275-2850	P-660-S
92	9 1/4	13	9 1/4	117-234	600	800	2000-2500-3000	3375-2800-2250-0-2250-2800-3375	P-770-K
120	12 1/4	11	10	117-234	600	800	2000-2500-3000	3375-2800-2250-0-2250-2800-3375	P-770-S
135	9 1/4	15 1/4	9 1/4	117-234	1000	1250	2000-2500-3000	3350-2800-2250-0-2250-2800-3350	P-880-K
180	12 1/4	14	10	117-234	1000	1250	2000-2500-3000	3350-2800-2250-0-2250-2800-3350	P-880-S
1	2 5/8	2 1/2	2 1/4	6-8 V. D.C. 115 Cycle Vibrator	40		180		V-950-A
3 1/4	3 1/8	3 3/8	2 5/8		80		300		V-970-A
10	5	4 1/2	4 3/8		135		350		V-980-A
Separate Primary for 117 V. 50/60 C.									

VIBRATOR TRANSFORMERS V

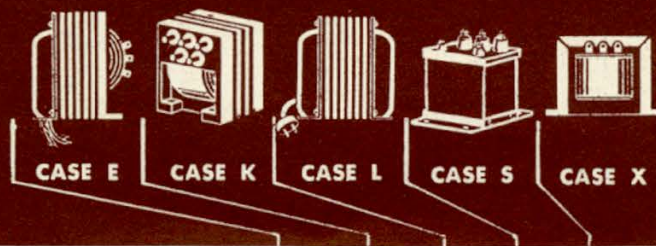
				Test Volts R.M.S.	Resistance Ohms	Inductance Henrys	Current D.C. MA	
3/8	1 1/4	2 1/2	1 1/2	1500	1800	25	20	C-065-X
1/2	1 3/8	2 7/8	1 3/8	1500	950	15	40	C-130-X
1	2	3 1/2	2	1500	360	15/10	50/70	C-195-X
1 1/2	2 3/8	3 3/4	2 1/4	1500	285	10	90	C-305-X
1 3/4	2 3/8	3 3/4	2 1/2	1500	80	3	225	C-315-X
2 1/4	3 1/8	2 7/8	2 1/4	1500	240	10	120	C-325-A
2 1/8	2 5/8	4 1/4	2 1/2	1500	240	10	120	C-325-X
5 1/2	4 3/8	3 3/4	3 3/4	1500	150	10	200	C-390-A
6 1/2	4 3/8	3 3/4	3 3/4	2500	110	10	250	C-455-A
9 1/4	5	4 1/4	4 3/8	4100	110	10/8.5	300/325	C-520-A
10 1/2	5 1/2	5 3/4	4 3/8	4100	110	10/8.5	300/325	C-520-K
9 1/2	6 7/8	4 7/8	4 3/8	4100	110	10/8.5	300/325	C-520-S
25	7	7 1/4	5 3/4	6500	65	10/8.5	450/500	C-585-K
40	9	8	6 1/4	6500	65	10/8.5	450/500	C-585-S
40	7	9	7 3/4	7500	45	10	600	C-650-K
52	9	8	8 1/4	7500	45	10	600	C-650-S
80	9 1/4	11 1/4	9 1/4	7500	25	10	1000	C-715-K
110	12 1/4	11	10	7500	25	10	1000	C-715-S
9 1/4	5	4 1/4	4 3/8	4100	110	20/4	30/300	W-519-A
10 1/2	5 1/2	5 3/4	4 3/8	4100	110	20/4	30/300	W-519-K
9 1/2	6 7/8	4 7/8	4 3/8	4100	110	20/4	30/300	W-519-S
30	7	7 1/4	5 3/4	6500	65	20/4	45/450	W-584-K
40	9	8	6 1/4	6500	65	20/4	45/450	W-584-S
40	7	9	7 3/4	7500	45	20/4	60/600	W-649-K
52	9	8	8 1/4	7500	45	20/4	60/600	W-649-S
80	9 1/4	11 1/4	9 1/4	7500	25	20/4	100/1000	W-714-K
110	12 1/4	11	10	7500	25	20/4	100/1000	W-714-S

SMOOTHING CHOKES C TELEVISION

SWINGING CHOKES W

*All D.C. values in P group are for choke input.
¹CCS—continuous duty.
²ICAS—Intermittent duty. (20% duty cycle.)
 All transformers in P and V groups have electro-static shield.
 Transformers with above listed ratings can be supplied for 25 cycle operation. Quotations (based on quantity) furnished on request.
 NOTE: See data section on page 16 for additional information on power transformers and chokes.

PEERLESS TRANSFORMERS



POWER

FILAMENT TRANSFORMERS

F

Type Number	Secondary Current, Amperes					Test Volts R.M.S.	PRI. Volts 60 Cycle	Dimensions, In.			Wt. Lb.
	2.5V. C.T.	5V. C.T.	6.3V. C.T.	7.5V. C.T.	10V. C.T.			H	D	W	
F-012-X			1.			2000	117	1 1/8	2 7/8	1 1/8	1 1/2
F-024-X	4.					2000	117	2	3 1/2	2	1
F-036-X			1.8			2000	117	2	3 1/2	2	1
F-048-X	5.					7500	117	2 3/8	3 3/4	2 1/4	1 1/2
F-060-X		4.				2000	117	2 3/8	3 3/4	2 1/4	1 1/2
F-072-X			3.6			2000	117	2 3/8	3 3/4	2 1/4	1 1/2
F-096-X	10.					7500	117	2 5/8	4 1/4	2 1/2	2 1/8
F-096-S	10.					7500	117	6 3/8	4 3/8	3 3/8	6
F-104-X			5.			2000	117	2 5/8	4 1/4	2 1/2	2 1/8
F-120-X				5.		2000	117	2 5/8	4 1/4	2 1/2	2 1/8
F-121-X	15.					7500	117	2 5/8	4 1/4	2 1/2	2 1/8
F-138-E		10.				2000	117	3 1/2	3 3/8	2 7/8	3 1/2
F-139-E			8.			2000	117	3 1/2	3 3/8	2 7/8	3 1/2
F-140-E					5.	2000	117	3 1/2	3 3/8	2 7/8	3 1/2
F-156-E				10.		2000	117	3 1/2	3 3/4	2 7/8	3 3/4
F-168-E					10.	2000	117	4 3/16	3 3/4	3 3/8	5 1/4
F-169-S		20.				10,000	117	7 1/2	4 7/8	5 3/8	9
F-180-E				15.		2000	117	4 3/16	3 3/4	3 3/8	6 1/4
F-192-E	10.				10.	7500-2000	117	5	4 1/4	4 3/8	9 1/4
F-192-S	10.				10.	7500-2000	117	7 1/2	4 7/8	5 3/8	9 1/2

ISOLATION TRANSFORMERS

T

	Primary Volts A.C. 60 C.	Secondary Volts A.C.	V. A. Continuous				
T-111-L	117	117	75		3 3/8	3 3/8	3 1/8
T-112-L	234	117	75		3 3/8	3 3/8	3 1/8
T-311-L	117	117	150		4	3 3/8	3 1/4
T-312-L	234	117	150		4	3 3/8	3 1/4
T-511-L	117	117	250		4 3/4	4	3 3/8
T-512-L	234	117	250		4 3/4	4	3 3/8

AUTOFORMERS STEP-DOWN

A

LINE VOLTAGE CORRECTING

	Input Volts A.C. 60 C.	Output Volts A.C.					
A-014-L	234	117	75		3 3/8	2 5/8	2 1/16
A-028-L	234	117	150		3 3/8	3 3/8	3 1/8
A-042-L	234	117	300		4	3 3/8	3 1/4
A-056-L	234	117	500		4 3/4	4	3 3/8
Voltages A.C. 60 Cycles							
A-070-E	0-100-105-110-115-120-125		250		4 3/16	3 3/4	3 3/8
A-084-K	0-100-105-110-115-120-125		500		5 1/2	4 3/4	4 3/8
A-098-K	0-100-105-110-115-120-125		1000		5 1/2	5 1/2	4 3/8
A-114-K	0-100-105-110-115-120-125		2000		7	6 3/8	5 3/4

*On order only from factory.

▲Output connection is at end of short cord.

All transformers in T group are supplied with electro-static shield.

Transformers with above listed ratings can be supplied for 234 V. and/or 25 cycle operation. Quotations (based on quantity) furnished on request.

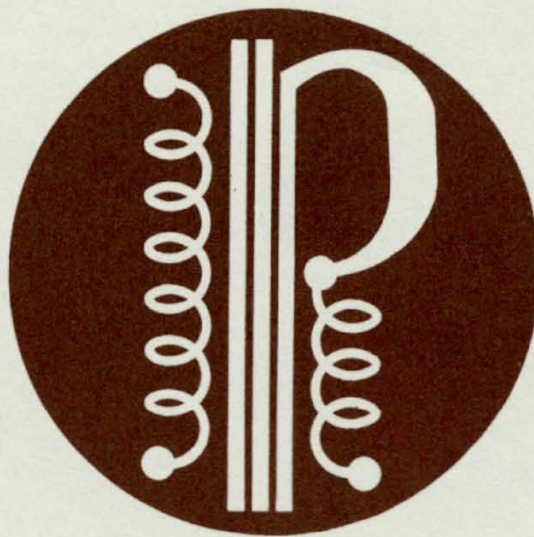
NOTE: See data section on page 16 for additional information on power transformers.

PEERLESS'

8

Superb New Audio Line

20-20
SUPPLEMENT



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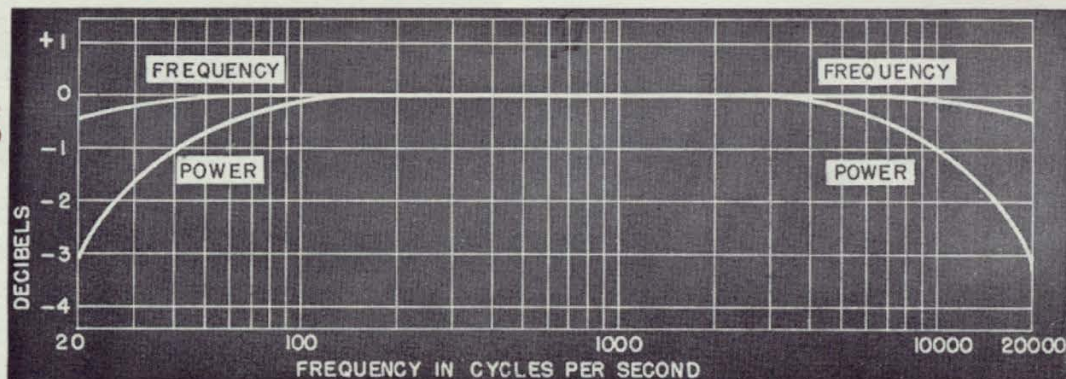
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DATA

AUDIO
TRANSFORMERS

This curve represents the maximum expected power and frequency deviation from the rated mid-range value for Peerless 20-20 transformers.



In presenting the frequency and power response curves for Peerless 20-20 transformers, which are shown above, it may be well to mention some points of general interest regarding such curves.

While the frequency curve is shown only from 20 c.p.s. to 20,000 c.p.s., the actual response, particularly of output transformers, extends smoothly from 10 c.p.s. to 60,000 c.p.s. This response, far beyond the useful (audible) range, is important for two reasons. First, because in negative feed-back circuits the response of the amplifier must be much broader than the useful frequency range desired. (*Transmission in the feed-back loop must be controlled over a surprisingly wide range if instability is to be avoided.*) Second, because a smooth frequency response lends itself more readily to circuit manipulation. (*Many transformers have a relationship between*

leakage reactance and distributed capacity which causes resonance at some relatively low high-frequency. This is done purposely to hold up response at the useful high-frequency end. The practice can usually be detected from a rise or hump in the frequency response curve if the curve is extended over a sufficient range. In some transformers the rise is apparent in the useful part of the curve. In others the rise has been carefully calculated so as just to maintain linear response through the audible range, but the curve will drop sharply above the resonant frequency. Excellent frequency response may be obtained in this way, but high impedance secondaries become very sensitive to the loads into which they work, considerably limiting circuit flexibility. The Peerless 20-20 curve does not show this characteristic because Peerless 20-20 transformers are designed for a very wide-range frequency response.) Note that the curve just begins to leave the zero line at 10,000 c.p.s., and is down only about $\frac{1}{2}$ db. at 20,000 c.p.s. Beyond that point, it declines gradually to 60,000 c.p.s. This curve is even more impressive when it is realized that this frequency characteristic is maintained through an operating power range of as much as 60 db. This excellence cannot always be attained with multiple-tapped windings, and their absence will be noted in types which would be adversely affected.

Any high-quality audio transformer should show a good frequency response curve, but for output transformers the power curve is often more important. The increased use of the intermodulation method of measuring amplifiers, which so plainly reveals operating defects, emphasizes the importance of this output transformer characteristic. As power curves are not generally supplied with transformers reaching the regular trade, some explanation is in order.

Power is important in an output transformer because all materials must be worked at densities very near the useful limit. Interstage and input transformer materials generally work at low densities. This may be demonstrated from any catalog. The weight of an output transformer is only about four times that of an interstage transformer, but it must handle 25 to 1000 times as much power. For this reason the output transformer is a critical element in the amplifier. Output transformers could be designed for low-density operation, but multiplying size, cost, or weight by ten would not com-



DATA

AUDIO TRANSFORMERS

compensate for relatively slight gains. Making the transformer larger is a procedure which obeys the law of diminishing returns. It becomes the designer's task (along with his concern over frequency characteristics) to choose the optimum quantity of materials, to see that these work as efficiently as possible, and to see that the greatest efficiency occurs in the most useful part of the frequency range. The degree to which Altec Lansing engineers have succeeded is shown clearly by the power curve.

On the power curve, the zero line represents the level at full rated power output. The curve gives the maximum power of which the transformer is capable without attenuating or distorting the wave form. Thus it shows the maximum useful power at any frequency.

Obviously a flat power characteristic is much more difficult to achieve than a flat frequency characteristic. It cannot be too emphatically stated that *the power output is not a direct function of the frequency characteristic*. It is quite possible to have a transformer with a frequency response almost as flat as the one shown above, and to find the power output down 20 db. at 10,000 c.p.s. Power and frequency curves for the Peerless 20-20 line are almost identical in general shape, with the power curve dropping more decidedly at the ends. Note that both curves show almost identical drops at 20 c.p.s. and 20,000 c.p.s.: graphic evidence that greatest efficiency occurs exactly in the middle of the desired range.

The advantages of exceptional power characteristics are immediately apparent to the ear in "A-B" tests with suitable speakers. Volume peaks in music are a severe test because they usually occur in the very low frequencies which require most power (drums) or in the very high overtones of cymbals or brass.

A good power characteristic is of exceptional importance in recording amplifiers. Those acquainted with recording studios are familiar with the sight of a fifty-watt amplifier driving a nominal one-watt recording head. The answer to this apparently wasteful situation is largely in the power characteristic of the output transformer. As an example, let us take a recording head which requires one watt, the signal being up 6 db. at 10,000 c.p.s. to compensate for record resilience. If the amplifier power output is down 10 db. at 10,000 c.p.s. (by no means an extreme case, even with flat frequency response) we need an output 16 db. above the required average driving power to allow for necessary compensation. So, in order to obtain a suitable one watt, we must have a 40-watt amplifier. As a comparison, the Peerless 20-20 power curve (which can be made the over-all power curve for the amplifier) is down only 1 db. at 10,000 c.p.s. This, plus 6 db. for the head, requires only 7 db. compensation, and we can obtain the required one watt from a 5-watt amplifier.

Special Note:

Transformers are only one part of a system. Any system is only as good as its poorest component. Unless you intend to use Peerless 20-20 transformers with other components of equal quality, in a circuit with inherently good characteristics, you cannot expect to get the benefit of their exceptional quality. Peerless emphatically does not recommend the use of 20-20 transformers in any but the finest amplifiers. Peerless expressly disclaims any implication that these transformers can be used indiscriminately in any kind of circuit to produce the results shown in the above curves. For replacement, or for use in standard-quality equipment, your attention is invited to the less expensive transformers which will be found on other pages of the catalog.

PEERLESS TRANSFORMERS



20-20

20-20 TRANSFORMERS OFFERED IN Q CASE ONLY

**INPUT
TRANSFORMERS**
LOW LEVEL

K

LINE LEVEL

HIGH LEVEL

**INTERSTAGE
TRANSFORMERS**
LOW LEVEL

G

LINE LEVEL

Type Number	Descriptive Data	Impedance, Ohms		Max. Level *	PRI. D.C. MA Per Winding		Dimensions, In.			Wt. Lb.
		Pri.	Sec.		Max.	Unbal.	H	D	W	
K-221-Q	Secondary may be used single ended or in Push-Pull—has two secondary windings with balanced capacitance to ground. Electro-static shield is provided between primary and secondary. Has 90 db electro-magnetic shielding.	500	70,000	-20 db	0	—	3½	2¾	2½	1½
		250 30 or 600 300 36								
⊖ K-221-D	Same data as K-221-Q except has only 30 db electro-magnetic shielding.	500 250 30 or 600 300 36	70,000 or 84,000 †	-20 db	0	—	2¾	1¾	1¾	1½
K-231-Q	Same as K-221-Q.	250, 125 62½, 31 or 300, 150 75, 37½	70,000 or 84,000 †	-20 db	0	—	3½	2¾	2½	1½
K-251-Q	Same as K-221-Q except has 30 db electro-magnetic shielding.	500, 250 125, 62½ or 600, 300 150, 75	40,000 or 48,000 †	+15 db	0	—	4¾	3¾	3¼	2¾
K-281-Q	For Push-Pull arrangement only —has two secondary windings with balanced capacitance to ground.	500, 220 125, 56, 14 or 600, 265 150, 67 17	30,000 or 36,000 †	+30 db	0	—	4¾	3¾	3½	5½
G-212-Q	Both primary and secondary may be used single-ended or in Push-Pull — has two secondary windings with balanced capacitance to ground — has electro-static shield between primary and secondary — parallel feed is recommended. Has 90 db electro-magnetic shield.	10,000 2,500	40,000 10,000	-20 db	5	0.5	3½	2¾	2½	1½
⊖ G-212-D	Same data as G-212-Q except has only 30 db electro-magnetic shielding.	10,000 2,500	40,000 10,000	-20 db	5	0.5	2¾	1¾	1¾	1½
G-252-Q	Same as G-212-Q except has 30 db electro-magnetic shield.	10,000 2,500	40,000 10,000	+15 db	10	1.0	4¾	3¾	3¼	2¾

†Secondary impedance is total of two separate windings.

*Maximum operating level, 6 mw reference.

⊖ See photograph of D case on page 18.



PEERLESS TRANSFORMERS

10

**20-20 TRANSFORMERS
OFFERED IN Q CASE ONLY**

20-20

Wt. Lb.	Dimensions, In.			PRI. D.C. MA Per Winding		Maximum Level *	Impedance, Ohms		Descriptive Data	Type Number
	H	D	W	Max.	Unbal.		Pri.	Sec.		
2 1/8	4 1/8	3 3/16	3 1/16	15	0	+15 db	20,000 5000 or 24,000 6000	500, 250 125, 62 1/2 or 600, 300 150, 75	Primary may be used single ended or in push-pull—has two secondary windings with balanced capacitance to ground—parallel feed is recommended—has 60 db electro-magnetic shield.	S-215-Q
2 1/8	4 1/8	3 3/16	3 1/16	15	0	+15 db	12,500 3125 or 15,000 3750	500, 250 125, 62 1/2 or 600, 300 150, 75	Same as S-215-Q.	S-220-Q
2 3/4	4 1/8	3 3/16	3 1/16	12	12	+18 db	8000 2000 or 9600 2400	500, 250 125, 62 1/2 or 600, 300 150, 75	Primary may be used single ended or in push-pull. Will carry tube plate current. Has two secondary windings with balanced capacitance to ground. Has 40 db electro-magnetic shield.	S-225-Q
6	4 5/8	3 3/8	3 1/2	70	7	+35 db (20 watts)	6600 C.T.	16, 8 4, 2 †	Secondary may be operated with one end grounded	S-230-Q
6	4 5/8	3 3/8	3 1/2	70	7	+35 db (20 watts)	6600 C.T.	500, 250 125, 62 1/2	Secondary should be operated balanced to ground.	S-235-Q
6	4 5/8	3 3/8	3 1/2	90	9	+35 db (20 watts)	5000 C.T.	16, 8, 4, 2 †	Same as S-230-Q	S-240-Q
6	4 5/8	3 3/8	3 1/2	90	9	+35 db (20 watts)	5000 C.T.	500, 250 125, 62 1/2	Same as S-235-Q	S-242-Q
6	4 5/8	3 3/8	3 1/2	110	11	+35 db (20 watts)	3000 C.T.	16, 8, 4 2 †	Same as S-230-Q	S-245-Q
6	4 5/8	3 3/8	3 1/2	110	11	+35 db (20 watts)	3000 C.T.	500, 250 125, 62 1/2	Same as S-235-Q	S-250-Q
10	5	4 1/16	4 1/16	110 220	11 22	+38 db (40 watts)	10,000 C.T. 2500 C.T.	16, 8 4, 2 †	Two center-tapped primaries may be used in series or parallel. Secondary may be operated with one end grounded.	S-265-Q
10	5	4 1/16	4 1/16	110 220	11 22	+38 db (40 watts)	10,000 C.T. 2500 C.T.	500, 250 125, 62 1/2	Same as S-265-Q except secondary should be operated balanced to ground.	S-270-Q
24	6	6	5 3/8	120	12	+41 db (80 watts) See Data	4000 C.T. to 12,000 C.T.	16, 8, 4, 2 to 48, 24, 12, 6	For operation from triodes. Load impedances may be varied over range of 3 to 1. May be operated at 100 watts in restricted freq. range 25-16,000 cps.	S-275-S
24	6	6	5 3/8	120	12	+41 db (80 watts) See Data	4000 C.T. to 12,000 C.T.	125, 62 1/2 31, 15 1/2 to 375, 187 1/2 93, 46 1/2	Same data as S-275-S	S-280-S

**OUTPUT
TRANSFORMERS
LINE LEVEL**



HIGH LEVEL

†All low-impedance secondary windings of high-level output transformers may be worked into loads within ±20% of the rated impedance.

■ Maximum operating level, 6 mw reference level.
For RMA standardized 70 volt line.

● See photograph of S case on page 18.

PEERLESS TRANSFORMERS



20-20

20-20 TRANSFORMERS OFFERED IN Q CASE ONLY

BRIDGING TRANSFORMERS

Type Number	Descriptive Data	Impedance, Ohms		Unmatched Bridging 500/600 Ohm Line		Matched Bridging 500/600 Line			Dimensions, Ins.			Wt. Lbs.
		Sec.	Pri.	Bridged Line Max. Level *	Bridging Loss db	Bridged Line Max. Level *	Bridging Loss db	Resist. 2 Req. (1 watt)	H	D	W	
K-221-Q	Has electrostatic shield and 90 db electro-magnetic shield.	500/600	70,000	+1db	21½	+7db	28½	33,000	3½	2¾	2½	1½
		250/300 30/36	17,500	-5 db	15½	0 db	21	7500				
⊖ K-221-D	Has electrostatic shield and 30 db electro-magnetic shield.	500/600	70,000	+1db	21½	+7db	28½	33,000	2¾	1¾	1¾	1½
		250/300 30/36	17,500	-5db	15½	0 db	21	7500				
K-231-Q	Same data as K-221-Q	250/300	70,000	+1db	21½	+7db	28½	33,000	3½	2¾	2½	1½
		125/150 62½/75 31/37½	17,500	-5db	15½	0 db	21	7500				
G-212-Q	Same data as K-221-Q	40,000 10,000	10,000	-7db	6 (Gain)	0 db	0	4150	3½	2¾	2½	1½
⊖ G-212-D	Same data as K-221-D	40,000 10,000	10,000	-7db	6 (Gain)	0 db	0	4150	2¾	1¾	1¾	1½
G-252-Q	Same data as K-221-D	40,000 10,000	10,000	+28db	6 (Gain)	+35db	0	3600	4½	3¾	3¼	2¾
S-220-Q	Has 60 db electro-magnetic shield.	500/600 250/300 125/150 62½/75	12,500	+29db	13½	+34db	19½	6000	4½	3¾	3¼	2½

HYBRID TRANSFORMERS

H

Type Number	Descriptive Data	Impedance, Ohms				Maxi. Level *	H	D	W	Wt. Lbs.
		Total Pri.	Pri. 1	Pri. 2	Sec.					
H-228-Q	Transformer designed to operate from two 500/600 ohm sources. Balancing resistor of approximately 250/300 ohms required in primary circuit. For maximum attenuation between sources the exact value of resistor should be determined from measurements made in circuit where transformer is used. Correct value will yield minimum attenuation of 27 to 30 db over frequency range between 20 cps. and 10,000 cps. with a maximum attenuation of approximately 50 db at some point between 500 cps. and 1000 cps. Frequency response from either source is flat within 1 db from 20 cps. to 10,000 cps. and within 2 db from 20 cps. to 20,000 cps. Is astatically balanced to attenuate magnetic pickup approximately 30 db.	1000 or 1200	500 or 600	500 or 600	500 125 or 600 150	+15db	4½	3¾	3¼	2¾
E-203-Q	This precise matching transformer is an excellent hybrid unit for operation from two 250/300 or two 125/150 ohm sources. Balancing resistor of approximately 125/150 or 62/75 ohms required in primary circuit. For maximum attenuation between sources the exact value of resistor should be determined from measurements made in circuit where transformer is used. Correct value will yield minimum attenuation of 27 to 30 db over frequency range between 20 cps. and 10,000 cps. with a maximum attenuation of approximately 50 db at some point between 500 cps. and 1000 cps. Frequency response from either source is flat within 1 db from 20 cps. to 10,000 cps. and within 2 db from 20 cps. to 20,000 cps. Is astatically balanced and shielded to attenuate magnetic pickup approximately 40 db. Has electro-static shield.	500 250 or 600 300	250 125 or 300 150	250 125 or 300 150	500 250 125 62½ or 600 300 150 75	+15 db	4½	3¾	3¼	2¾

*Maximum operating level, 6 mw.
⊖ See photograph of D case on page 18.



PEERLESS TRANSFORMERS

20-20 TRANSFORMERS OFFERED IN Q CASE ONLY

20-20

DRIVER TRANSFORMERS
D

Wt. Lb.	Dimensions, In.			Turns Ratio Pri./½ Sec.	Pri. DC. MA. per Winding		Maximum Level *	Impedance, Ohms		Descriptive Data	Type Number
	H	D	W		Max.	Unbal.		Pri.	Sec.		
6	4 5/8	3 3/8	3 1/2	2.8 3.45	70	7	+ 35 db (20 watts)	6600 C.T.	3000 C.T. 2000 C.T.	Push-pull plates to push-pull grids only.	D-237-Q
6	4 5/8	3 3/8	3 1/2	—	—	—	+ 35 db (20 watts)	500, 250 125, 62 1/2	3000 C.T.	Line to push-pull grids.	S-250-Q
10	5	4 1/8	4 1/8	4.6 6.0 2.3 3.0	110 220	11 22	+ 38 db (40 watts)	10,000 C.T. 2500 C.T.	2000 C.T. 1100 C.T.	Push-pull plates to push-pull grids only.	D-267-Q
24	6 1/4	6	5 5/8	3.5 4.2	120	12	+ 41 db (80 watts) See data	4000 C.T. to 12,000 C.T.	1300 C.T. 900 C.T. to 3900 C.T. 2700 C.T.	Push-pull plates to push-pull grids only. May be operated at 100 watts in restricted frequency range 25-16,000 cps.	D-277-S
				Watt Power RMA 70vLine							
2 3/4	4 1/8	3 3/8	3 1/8	—	—	—	+ 15 db	500, 250 125, 62 1/2 or 600, 300 150, 75	500, 250 125, 62 1/2 or 600, 300 150, 75	Astatically balanced. Electro-static shield. Has 40 db electromagnetic shield. Attenuates longitudinal currents more than 70 db in frequency range up to 40,000 cps.	E-203-Q
2 3/4	4 1/8	3 3/8	3 1/8	1 1/4, 1 3/8 2 1/2, 5 10	—	—	+ 32 db (10 watts)	4000 C.T. 3000 2000 C.T. 1000 500	16, 12 8, 4, 2 †	Line to speaker. Primary impedances designed to conform with RMA 70v line. Insertion loss less than 1/4 db. Flanged mounting plate furnished.	E-233-Q
6	4 5/8	3 3/8	3 1/2	5, 6 3/8 10, 20	—	—	+ 35 db (20 watts)	1000 C.T. 750, 500 C.T. 250, 125	16, 12 8, 4, 2 †	Same data as E-233-Q except insertion loss less than 3/4 db.	E-243-Q
10	5	4 1/8	4 1/8	10, 13 3/8 20, 40	—	—	+ 38 db (40 watts)	500 C.T. 375, 250 C.T. 125, 62 1/2	16, 12 8, 4, 2 †	Same data as E-233-Q except insertion loss less than 1/2 db.	E-253-Q

IMPEDANCE MATCHING TRANSFORMERS REPEAT COIL
E

Descriptive Data

Kit to build Peerless A-100-A, 15 watt, Triode Amplifier. Consists of

1 R-480-Q Transformer	1 10581 Terminal Board	
1 S-240-Q Transformer	1 10723 Chassis	2 10724 Part, schematic
1 X-432-X Transformer	1 10726 Plate, Chassis Bottom	(1 cemented on 10726 plate)
1 L-370-D Reactor	1 10725 Part, Wiring Diagram	

10722

(Standard parts, such as condensers, resistors, sockets, etc., not included. Procure from your parts supplier.)

Specifications of completed amplifier

Power: Rated, 15 watts—at 5% harmonics (100 and 5000 cps.), 18 watts—at 8% 1M (40-2000 cps), 17 watts.

Frequency Response: Within 1 db, 20-20,000 cps. Note: Phono input equalized for variable reluctance pickup.

Gain, 1000 cps.: Radio input 77 db—Phono input 101 db.

Impedances: Input, 500,000 ohms each—Output, 16 ohms (can be connected for 8, 4, or 2 ohms).

Tubes: 2—6J7, 1—6J5, 2—6SN7, 2—6A5G, 1—5V4G.

Controls: 1—gain, 1—low frequency boost (continuously variable), 1—high frequency droop (4 step pi type), 1—channel selector, 1—A.C. switch.

Chassis: 14"x10"x3" high (8" overall).

Shipping Weight: 32 lbs.

TRIODE AMPLIFIER KIT

† All low-impedance secondary windings of high-level impedance matching transformers may be worked into loads within ± 20% of the rated impedance.

■ For RMA standardized 70 volt line.

● See photograph of S case on page 18.

* Maximum operating level, 6 mw reference.



20-20

MODULATION TRANSFORMERS

M

Type Number	Companion Modulation Reactor	Max. Level *	Approximate Dimensions, In.			Approx. Wt. Lbs.	Descriptive Data for			
			H	D	W		M-283-S	M-288-S	M-293-S	M-298-S
● M-283-S	Q-284-S	+42 db (100 watts)	6¼	6	5¾	26	20-20 Modulation Transformers are tailored to transmitter requirements. Intended to be used with a companion 20-20 Modulation Reactor. Primary designed for Class B operation. Has two windings. Furnished with any ordered plate-to-plate impedance up to 10,000 ohms. Secondary designed for single ended operation. Will not carry D.C. Has two taps. Furnished with any ordered impedance up to 8000 ohms. Tap impedances must be not less than 80% of total. Higher primary and secondary impedances can be furnished at additional cost.			
● M-288-S	Q-289-S	+46 db (250 watts)	13	10	14	90				
● M-293-S	Q-294-S	+49 db (500 watts)	13	13	14	180				
● M-298-S	Q-299-S	+52 db (1000 watts)	13	16	20	350				
	For Use With Modulation Transformer	Test Volts R.M.S.					Descriptive Data for			
							Q-284-S	Q-289-S	Q-294-S	Q-299-S
● Q-284-S	M-283-S	5000	6¼	6	5¾	26	20-20 Modulation Reactors are for use with companion 20-20 Modulation Transformers. Inductance correct when so used. Furnished with two windings. Specify D.C. current rating and circuit impedance. Peerless will recommend coupling capacitor value.			
● Q-289-S	M-288-S	5000	13	10	14	90				
● Q-294-S	M-293-S	12,000	13	13	14	180				
● Q-299-S	M-298-S	12,000	13	16	20	350				

MODULATION REACTORS

Q

HI-Q EQUALIZING REACTORS

L

HIGH FREQUENCY

LOW FREQUENCY

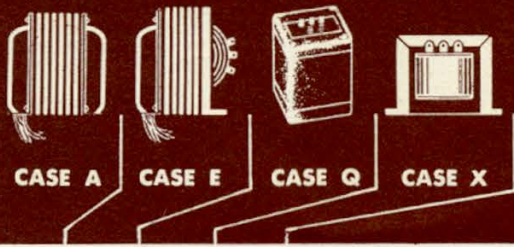
<p>In the design of audio circuits for broadcasting, television, and recording, it often becomes necessary to use equalizers and filters so as to modify the characteristics of the circuit in accordance with its use. These equalizers and filters are normally used for high or low frequencies. For this reason reactors must be used which have been designed for high Q at either the high frequency or low frequency portion of the band. The first group of these equalizer reactors is intended for high frequency operation and has its maximum Q around 4000 cps. The second group is intended for low frequency operation and has its maximum Q around 125 cps.</p>							
	Inductance Millihenrys	Dimensions, In.			Wt. Lbs.	Descriptive Data for	
		H	D	W		L-821-D L-822-D L-823-D L-824-D L-825-D L-826-D	
⊖	L-821-D	1, 2, 4, 5.8, 8	2¼	2	1	½	Designed for use in frequency range 500-10,000 cps. At 1000 cps. RMS maximum current through 1 Mh. = .75 ampere, through 448 Mh. = .035 ampere. Q greater than 25 at 500 cps., 50 at 1000 cps., 100 at 4000-5000 cps., and 80 at 10,000 cps.
⊖	L-822-D	3, 6, 12, 17.5, 24	2¼	2	1	½	
⊖	L-823-D	5, 10, 20, 29.2, 40	2¼	2	1	½	
⊖	L-824-D	16, 32, 64, 93.5, 128	2¼	2	1	½	
⊖	L-825-D	48, 96, 192, 280, 384	2¼	2	1	½	
⊖	L-826-D	56, 112, 224, 327, 448	2¼	2	1	½	
	Inductance Henrys					Descriptive Data for	
						L-921-Q L-922-Q L-923-Q L-924-Q L-925-Q L-926-Q	
	L-921-Q	.05, .1, .2, .29, .4	4¾	3¾	3½	6	Designed for use in frequency range 30-500 cps. At 250 cps. RMS maximum current through .05 H = .125 ampere, through 20H = .006 ampere. Q greater than 10 at 30 cps., 25 at 125 cps., and 15 at 500 cps.
	L-922-Q	.075, .15, .3, .44, .6	4¾	3¾	3½	6	
	L-923-Q	.125, .25, .5, .73, 1.0	4¾	3¾	3½	6	
	L-924-Q	.175, .35, .7, 1.0, 1.4	4¾	3¾	3½	6	
	L-925-Q	2.0, 4.0, 8.0, 11.7, 16.0	4¾	3¾	3½	6	
	L-926-Q	2.5, 5, 10, 14.6, 20	4¾	3¾	3½	6	

*Maximum operating level, 6 mw reference.

● See photograph of S case on page 18.

⊖ See photographs of D cases on page 18.

PEERLESS TRANSFORMERS



AUDIO

INPUT TRANSFORMERS

LOW LEVEL

K

HIGH LEVEL TRANSCEIVER

INTERSTAGE TRANSFORMERS

G

IMPEDANCE MATCHING TRANSFORMERS

E

Wt. Lb.	Dimensions, In.			Impedance, Ohms		Turns Ratio	Freq. Range ± 1 db	Application	Type Number
	H	D	W	Pri.	Sec.				
1/2	1 1/8	2 3/8	1 3/8	100	700,000 C.T.	1:84	Voice	Single-Button Microphone to 1 or 2 Grids	K-007-X
1	2	3 1/2	2	200 C.T.	100,000 C.T.	1:22 1/2	100 5000	Double-Button Microphone or Line to 1 or 2 Grids	K-021-X
1	2	3 1/2	2	500 C.T.	100,000 C.T.	1:14	100 5000	Double-Button Microphone or Line to 1 or 2 Grids	K-035-X
1	2 3/8	1 3/4	1 3/4	500 C.T.-333 250-200 C.T. 125-50	60,000		20 20,000	Line, Mixer or Microphone to Single Grid. Max. Level=0db* 30 db Magnetic Shielding	K-049-D
1 1/2	3 1/2	2 3/8	2 1/2	500 C.T.-333 250-200 C.T. 125-50	60,000		20 20,000	Same as K-049-D except has 90 db Magnetic Shielding	K-049-Q
1 1/2	3 1/2	2 3/8	2 1/2	500 C.T.-333 250-200 C.T. 125-50	70,000 ▲		20 20,000	Line, Mixer, or Microphone to 2 Grids Max. Level = +10db* 30 db Shielding	K-054-Q
3/8	1 7/8	2 1/2	1 1/2	4	25,000	1:80	Voice	Voice Coil to Grid (An Output Transformer Reversed)	X-420-X
2 1/2	3 3/8	3	2 3/8	500 C.T. 125	12,500 ▲		30 15,000	Line to Push-Pull Grids Max. Level = 34 db*	K-063-A
1/4	1 1/4	1 1 3/8	1 1/4	10,000 100	40,000	1:2 1:20	Voice	Single-Button Microphone and Single Plate to Grid	K-077-X
1/2	1 1/8	2 3/8	1 3/8	10,000	96,000 C.T.	1:3.1	100 5000	Single Plate to 1 or 2 Grids	G-306-X
1	2 3/8	1 3/4	1 3/4	10,000	60,000		20 20,000	Single Plate to Single Grid. Maximum Level = 0 db* 30 db Magnetic Shielding	G-318-D
1 1/2	3 1/2	2 3/8	2 1/2	20,000 ▲	70,000 ▲		20 20,000	1 or 2 Plates to 2 Grids Max. Level = +10db* 30 db Shielding.	G-322-Q
1 3/8	2 1 3/8	2 1 1/8	2 1/4	10,000	60,000 ▲	1:2.45	40 10,000	Single Plate to 1 or Grids	G-324-A
1 3/8	2 1 3/8	2 1 1/8	2 1/4	20,000 C.T.	30,000 C.T.		40 10,000	Push-Pull Plates to 1 or Grids	G-336-A

Wt. Lbs.	Dimensions, In.			Audio, Watts		Impedance, Ohms		Freq. Range	Application	Type Number
	H	D	W	Max.	70 V Line	Pri.	Sec.			
1 1/2	3 1/2	2 3/8	2 1/2	+10 db*	—	500 C.T.-333 250-200 C.T. 125-50	500 C.T.-333 250-200 C.T. 125-50	20 20,000	Repeat Coil.—Electro-static Shield between Pri. & Sec.—60 db Magnetic Shield	E-372-Q
2 1/4	4 1/8	3 3/8	3 1/8	4	1/4 - 1/2 3/8 - 1 2-4	10,000 C.T. 7500 5000 C.T. 2500 1250	16-12-8 4-2	30 15,000	Line to Speaker—RMA Standardized line for Sound Distribution. Insertion Loss 0.6 db—1/4 watt tap for lines of 500 or less ohms.	E-374-Q
1 3/4	2 3/8	3 3/4	2 1/4	4	1/4 - 1/2 3/8 - 1 2-4	10,000 C.T. 7500 5000 C.T. 2500 1250	16-12-8 4-2	30 15,000	Same Data as E-374-Q	E-374-X
1	2	3 1/2	2	5	—	500	16-8	40 10,000	Line to Speaker	E-377-X
4 1/4	3 3/8	3	3 1/4	24	3-4 6-12 24	1600 C.T. 1200 800 C.T. 400-200	16-12-8 4-2	30 15,000	Line to Speaker—RMA Standardized line for Sound Distribution. Insertion Loss 0.6 db Max.	E-386-E
6	4 3/8	3 3/8	3 1/2	24	3-4 6-12 24	1600 C.T. 1200 800 C.T. 400-200	16-12-8 4-2	30 15,000	Same Data as EK-386-E	E-386-Q
9	4 3/4	4 3/8	3 3/8	64	8-11 16-32 64	625 C.T.-470 312 C.T.-156 78	16-12-8 4-2	30 15,000	Same Data as E-386-E	E-392-E
11 1/4	5 3/8	4 3/8	5 3/8	64	8-11 16-32 64	625 C.T.-470 312 C.T.-156 78	16-12-8 4-2	30 15,000	Same Data as E-386-E	E-392-S

*Maximum operating level, 6mw reference.
 †See also Driver Transformers.
 ‡Two separate primary windings.
 ▲Total of two separate windings.

⊖ See photographs of D cases on page 18.
 ● See photograph of S case on page 18.
 ■ For RMA standardized 70 volt line.



CASE Q

CASE A

CASE K

CASE S

CASE X

AUDIO

DRIVER TRANSFORMERS

D

Type Number	Driver Tubes	Output Tubes	Turns Ratio Pri./½ Sec.	PRI. Current MA D.C.	Dimensions, In.			Wt. Lb.
					H	D	W	
D-001-X	1-H4,1 30, 1G4G	1-1J6G, 1G6G or 2-1H4G	2.66:1	15	1¼	1½	1¼	¼
D-006-X	1-6J5, 6A6, 6N7, 76, 30	2-6A6, 6N7, 19, 30	2.66:1	25	2	3½	2	1
D-011-X	1-6F6, 42, 2A5, 45	2-6L6, 2A3, 6F6, 45, 6V6	1.33:1	50		3½	2¼	1¼
D-016-X	2-6C5, 6J5, 76, 56, or 1-6F6, 42, 45, 6A6, 6N7	2-6L6, 2A3, 6F6, 45, 6V6, 6A6, 6N7	4.4, 2.8:1 2.2, 1.4:1	15 Per Winding	2¾	3¾	2¼	1½
D-026-A	Universal Driver Plates to B or AB Grids. 15 Watts Audio	Any Grids	2.0:1 2.9:1	70 Per Winding	3½	3	2½	2½
D-031-A	Universal Driver Plates to B or AB Grids. 30 Watts Audio	Any Grids	2.0:1 2.9:1	160 Per Winding	3½	3¾	2¾	4¼
K-063-A	500 Ohm or 125 Ohm line. 15 Watts Audio	Any Grids			3½	3	2½	2½

LINE DRIVER

MODULATION TRANSFORMERS

M

Type Number	Tubes Used	Audio Watts	Impedance, Ohms		SEC. Current MA D.C.	H	D	W	Wt. Lb.
			Primary	Secondary					
M-003-X	1-1S6G, 1G6G or 2-1H4G etc.	2	10,000 C.T.	10,000-8000 5000	25	1¼	1½	1¼	¼
M-008-X	1-19, 6N7, 6A6	5	10,000 C.T.	8000-5000 3500	50	1¾	2¾	1¾	½
M-013-X	1-6N7, 6A6, 53 or 2-6F6, 42, 2A5	10	10,000 C.T.	8000-5000 3500	100	2¾	3¾	2¼	1½

UNIVERSAL MODULATION TRANSFORMERS

Type Number	Audio Watts	Primary Current D.C. MA Per Side	Secondary Current D.C. MA		H	D	W	Wt. Lb.
			Series	Parallel				
M-303-A	20	80	80	160	3½	3	2½	2½
M-328-A	40	100	100	200	4½	3½	3¾	6
M-353-A	60	130	130	260	5	4¼	4¾	9½
M-353-S	60	130	130	260	6¾	4¾	4¾	9½
M-378-A	85	160	160	320	5	4¾	4¾	11¾
M-403-S	150	200	200	400	8	6	7¾	35
M-429-K	375	325	325	650	7	9½	5¾	31
M-453-K	650	500	500	1000	7	10½	7¾	51
M-453-S	650	500	500	1000	10	9	8¼	68
M-478-K	1000	650	650	1300	9¼	14	9¼	110

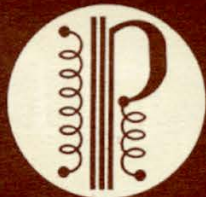
EQUALIZING REACTORS

L

Type Number	Note: See Equalizer Circuits on Page 17	Res. Ohms	Ind. Henrys	D.C. MA		H	D	W	Wt. Lb.
				Normal	Max.				
L-350-X	Simple Pentode Equalizer for High Frequency Peak	90	2	2	10	1½	2¾	1½	½
L-355-X	Simple Pentode Equalizer for Low Frequency Peak	4200	160	2	10	1½	2¾	1½	½
L-360-D	Tone Control (Cathode Circuit)	220	23	0	0	2¾	1½	Round	½
L-365-Q	L-350 and L-355 Potted Together with 30 db Shielding	90 4200	2 160	2 2	10 10	4¾	3¾	3½	3
L-370-D	Low Pass Filter Peerless Kit	725	4	0	10	1¾	1½	Round	¾
Q-370-X	To Isolate D.C. from Interstage Transformers	4000	275	5	10	1½	2¾	1½	½

PARALLEL FEED REACTOR

Q



AUDIO

DRIVER AND MODULATOR COMBINATIONS

Proper layout of high power amplifiers for modulator use involves several problems not usually considered in amplifiers designed for other purposes. The fixed load offered by the class "C" stage makes possible the use of hi-voltage, high efficiency, class B or AB amplifiers, thus permitting relatively small output tubes and power supplies. Use of these amplifiers demands, however, that the driver stage be of high output and good regulation. Use of the recommended tubes, or of similar types with the same characteristics, will assure optimum results with Peerless transformers.

Driver Trans.	Driver Tubes	Mod. Trans.	Modulator Tubes	Plate Volts	Audio Watts
D-001-X	1-1G4G	M-003-X	1-1G6G	90	0.5
D-001-X	1-1H4G	M-003-X	1-1J6G	135	2.1
D-006-X	1-31	M-008-X	2-49	180	3.5
D-006-X	1-6J5	M-008-X	1-6Z7G	180	4.2
D-006-X	1-6J5	M-013-X	2-HY60	250	9
D-006-X	1-6N7	M-013-X	1-6N7	300	10
D-006-X	1-6F6	M-013-X	2-6F6 or 2-6V6	350	14
D-011-X	1-6F6	M-303-A	2-2A3	300	15
D-011-X	1-46	M-303-A	2-46	400	20
D-026-A	2-2A3	M-328-A	2-801	500	36
D-026-A	2-2A3	M-328-A	2-6L6	400	40
D-026-A	2-2A3	M-328-A	2-HK24	500	45
D-026-A	2-2A3	M-353-A or S	2-TZ20	600	50
D-011-X	1-6F6	M-353-A or S	4-6L6	400	60
D-026-A	2-2A3	M-353-A or S	2-807 or 2-809	500	60
D-026-A	2-2A3	M-378-A	2-TZ20 or 2-HK24	750	70
D-026-A	2-2A3	M-378-A	2-807	600	80
D-026-A	2-2A3	M-403-S	2-809	750	100
D-026-A	2-2A3	M-403-S	2-HK54 or 2-T756	850	100
D-026-A	2-2A3	M-403-S	2-WE304B or 2-800 or 2-TZ40 or 2-RK18	1000	100
D-026-A	2-2A3	M-403-S	2-845	1250	105
D-026-A	2-2A3	M-403-S	2-35T	1000	115
D-026-A	2-2A3	M-403-S	2-830B	800	135
D-026-A	2-2A3	M-403-S	2-RK31	1000	160
D-026-A	2-2A3	M-429-K	2-830B or 2-TZ40	1000	175
D-026-A	2-2A3	M-429-K	2-812 or 2-811	1250	175
D-026-A	2-2A3	M-429-K	2-K54 or 2-HK54	1250	190
D-026-A	2-2A3	M-429-K	2-811 or 2-812	1500	225
D-026-A	2-2A3	M-429-K	2-RK52 or 2-HF100	1250	250
D-026-A	2-2A3	M-429-K	2-211, 2-203A, 2-838, 2-ZB120, 2-203Z	1250	260
D-026-A	2-2A3	M-429-K	2-805 or 2-RK57	1250	300
D-026-A	2-2A3	M-429-K	2-75T or 2-100TH	1500	300
D-026-A	2-2A3	M-429-K	2-RK38 or 2-HK254	2000	330
D-026-A	2-2A3	M-429-K	2-805 or 2-RK57 or 2-150T or 2-5514	1500	370
D-026-A	2-2A3	M-453-K or S	2-203A	1500	400
D-026-A	2-2A3	M-453-K or S	2-75T	2000	400
D-031-A	4-2A3	M-453-K or S	2-T155 or 2-HD203A	1750	500
D-031-A	4-2A3	M-453-K or S	2-HF200	2000	500
D-031-A	4-2A3	M-453-K or S	2-810	1500	510
D-031-A	4-2A3	M-453-K or S	2-806	2000	535
D-031-A	4-2A3	M-453-K or S	2-810	2000	590
D-031-A	4-2A3	M-453-K or S	2-HK354 or 2-RK38 or 2-250TH or 2-806	2500	600
D-031-A	4-2A3	M-453-K or S	2-204A or 2-HK300	2500	650
D-031-A	4-2A3	M-478-K	2-806	3000	700

PEERLESS TRANSFORMERS



CASE A



CASE Q



CASE X

AUDIO

REPLACEMENT OUTPUT TRANSFORMERS

X

Type Number	Application	Turns Ratio	Impedance, Ohms		Max. PRI. MA D.C.	Audio Watts	Dimensions, In.			Wt. Lb.
			Primary	Secondary			H	D	W	
X-404-X	1-1Q5, 3Q5, 1G6, 1S4, 3S4, 1C5, etc.	50:1	8000	4 to 2½ 3.2 Nominal	15	1	1¼	1½	1¼	¼
X-408-X	1-25L6, 35L6, 50L6, 25B6, etc.		2500-2000 1500	6 to 2	60	5	1½	2½	1½	¾
X-412-X	1-6F6, 6V6, 41, 6K6, 6G6, 6A4, 25A6, etc.		10,000-7000 5000-3500	6 to 2	40	5	1½	2½	1½	¾
X-416-X	1-1S4, 1C5, 3Q5, 1Q5, 1T5, etc.		14,000 8000	6 to 2	20	5	1½	2½	1½	¾
X-420-X	1-1A5	80:1	25,000	6 to 2 4 Nominal	10	5	1½	2½	1½	¾
X-424-X	1 or 2-41, 42, 6K6, 6V6, etc.		10,000-7000 5000-3500 C.T.	6 to 1.04	40	7	1½	2¾	1½	½
X-428-X	Universal 1 or 2 tubes		14,000-10,000 7000-5000 4000 C.T.	16 to .13	50	10	2	3½	2	1
X-432-X	2-6F6, 6V6, 6K6, 42, 2A5, 45, 71, 50, 6L6		10,000 8000 C.T.	10-6 4-2½	50	15	2¾	3¾	2¼	1½

STANDARD OUTPUT TRANSFORMERS

S

Type Number	Application	Freq. Range ± 1 db	Impedance, Ohms		Pri. D.C. MA Per Winding		Audio Watts	Dimensions, In.			Wt. Lb.
			Primary	Secondary	Max.	Unbal.		H	D	W	
S-448-Q	Single or push-pull plates to line: 30 db hum bucking	20 20,000	20,000 C.T. 12,500 C.T. 5000 3125	500 C.T. 200 C.T. 333-250 125-50	15	2	+ 10 db*	3½	2¾	2½	1½
S-456-X	Single or push-pull plates to line	Voice	8000 C.T.	500-200 50	10	2	1	1¼	1½	1¼	¼
S-464-X	Single or push-pull plates to line	100 5000	18,000 C.T.	500-200 50	10	2	5	1½	2¾	1½	½
S-472-X	Single plate to speaker or line	100 5000	7000	500-200-15 8-4-2½	40	40	10	2¾	3¾	2¼	1½
S-508-A	Push-pull plates to speaker	30 15,000	8000 C.T.	16-12-8-4	45	5	10	2½	2½	2¼	1¾
S-516-A	Push-pull plates to speaker	30 15,000	6600 C.T.	16-12-8-4	70	7	20	3½	3	2½	2½
S-524-A	Push-pull plates to speaker or line	30 15,000	6600 C.T. 5000 C.T.	500 C.T. 125 16-12-8-4	70	7	20	3½	3¼	2¾	3
S-530-A	Push-pull plates to speaker or line.	30 15,000	5000 C.T. 3000 C.T.	500 C.T. 125 16-12-8-4	90	9	20	3½	3¼	2¾	3
S-532-A	Push-pull plates to speaker	30 15,000	5000 C.T. 3000 C.T.	16-12-8-4	90	9	20	3½	3	2½	2½
S-540-A	Push-pull plates to speaker or line	30 15,000	2500 C.T. 1500 C.T.	500 C.T. 125 16-12-8-4	200	20	40	4¾	3¾	3¾	6¼
S-548-A	Push-pull plates to speaker or line	30 15,000	3800 C.T. 3200 C.T.	500 C.T. 125 16-12-8-4	250	25	60	4¾	4¾	3¾	9
S-552-A	Push-pull plates to speaker or line.	30 15,000	3800 C.T. 3200 C.T.	330, 82½ 16-12-8-4-2	250	25	60	4¾	4¾	3¾	9

*Maximum recommended operating level is +10 db above 6 mw reference.

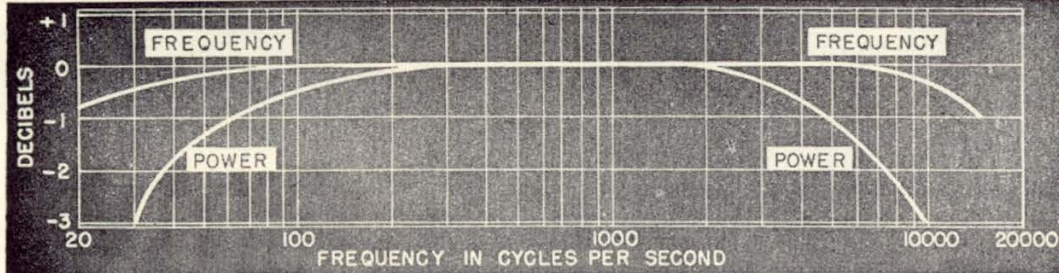
■For RMA standardized 70 volt line.

NOTE: See data section on pages 16 & 17 for additional information and performance curves on Peerless Standard Output Transformers.



DATA

STANDARD OUTPUT TRANSFORMERS



This curve represents the maximum expected power and frequency deviation from the rated mid-range value for Peerless Standard (30-15,000) output transformers.

The increased use of the intermodulation method of measuring amplifiers, which so plainly reveals operating defects, emphasizes the importance of the output transformer to good amplifier performance. This is especially true for the case where the transformer is included in the feedback loop. To satisfy the requirements implied above and to keep the price competitive, Peerless Electrical Products has developed a complete new line of output transformers for both manufacturers and jobbers.

These output transformers have a frequency transmission range of 30-15,000 c.p.s. (plus or minus 1 db) which will hold over a range of 50 db in power, and a power handling capacity which is down from mid-range rating 1 db at 60 and 5,000 c.p.s., 2 db at 37 and 7,500 c.p.s., and 3 db at 30 and 10,000 c.p.s. This ability to handle rated power, together with low phase shift at extended high frequencies, insures low intermodulation products in an amplifier output circuit. (The importance of the power characteristic is more fully discussed in the text of the 20-20 transformers.)

Most of the published characteristics of a power transformer can be verified with a voltmeter. If the transformer delivers rated current at the rated voltage, without undue temperature rise, it is probably satisfactory. Safe operating temperatures are limited by the properties of insulating materials, and are influenced by two factors: the heat generated by power losses, and the ability to dissipate this heat. For any temperature, the quantity of heat that can be dissipated is a function of size.

Power is lost in the copper wire due to resistance (copper loss), and in the core due to constant reversal of magnetic flux (hysteresis loss) and to currents induced in the core (eddy current loss). The term "core loss" includes both types. It is well established that the most efficient use of materials occurs when allowable power loss is equally divided between core-loss and copper-loss. This is the condition under which greatest power output is obtained with the smallest quantity of materials, and without exceeding safe temperatures.

All Peerless power transformers have been checked for this desirable equality of losses. That is, they are made in the smallest sizes consistent with dependability and good engineering practice. They are designed so as to operate below the 55° C. maximum temperature rise recommended by the A.I.E.E., when used on 60 cycle lines.

All ratings assume that the transformer is to be operated in substantially free air. Peerless engineers urgently recommend installation which allows for efficient cooling. Avoid: poor ventilation, high air temperatures, close proximity to other sources of heat, etc. If such a condition cannot be avoided, choose a transformer of higher current rating (larger size). This precaution is especially important for reliability. A transformer, unless it is grossly overloaded, seldom burns out immediately. Less severe overloading results in slow deterioration which may extend over a period of months before eventual failure.

There are, as yet, no generally accepted standard methods of rating filter chokes. As very few customers have access to the means for checking ratings, the methods used by Peerless may be of some interest.

A filter reactor carries both d.c. (the principal output of the rectifier) and a.c. (a super-imposed ripple). There can be no reactance to a steady flow of d.c., but this flow does polarize the core of the reactor, resulting in partial saturation of the magnetic material. To the extent that the core is thus saturated by d.c. it exhibits less effective reactance to the a.c. of the ripple. Efficient design demands that the relationships between these factors be properly adjusted. Calculated values must be carefully tested because core materials are often "worked" near the critical point. Minute variations in magnetic properties can cause relatively great changes in operating characteristics.

POWER TRANSFORMERS

POWER CHOKES



DATA

(continued from page 16)

Significant rating tests must be carried out under simulated conditions of use. That is, the core must be polarized with direct current and inductance measurements must then be taken on super-imposed alternating current. Several circuits may be used. Most production testing at Peerless is done with impedance bridges which are periodically calibrated against a Hay bridge. Actual inductance values will not drop below catalog ratings by more than 10%.

RMA 70v. LINE
FOR SOUND
DISTRIBUTION

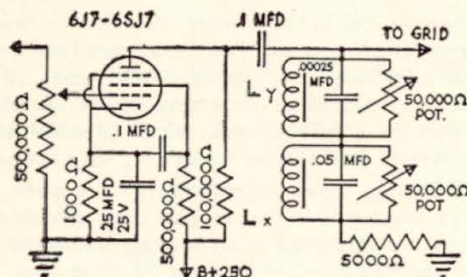
The RMA has standardized the output circuits of power amplifiers for sound distribution systems on the basis of a 70-volt loudspeaker line. This means that an amplifier should have an output impedance such that, under test conditions, it will supply 70 volts of single frequency power at its maximum rated output. The 70-volt system works as follows:

- 1.) A matching transformer is required for each loudspeaker. The secondary of the transformer is tapped to match the loudspeaker impedance (such as 4, 8, 12, and 16 ohms.)
- 2.) The primary of the transformer is tapped over a suitable range of impedances which are bracketed somewhat by the power rating of the unit. Depending upon the power required by the loudspeaker, the proper primary impedance tap is chosen so that the loudspeaker will draw the required watts when 70 volts is applied to it. In practice, the connection for a number of loudspeakers then becomes simple. First, the power needed for each loudspeaker location is determined. Second, a matching transformer of adequate power rating is chosen. Third, the primary impedance is selected which will give the desired power when connected across a 70-volt circuit.
- 3.) The power requirements for all loudspeakers are added up and an amplifier chosen which is capable of supplying at least this power. All loudspeaker transformer inputs may then be connected in parallel to the 70-volt output of the amplifier.
- 4.) The use of this system implies that the output operates at substantially a constant potential. That is, if all the loads are disconnected, the output voltage will not rise more than 3 db. Therefore amplifiers used for this services should have an internal impedance sufficiently low to meet this requirement.

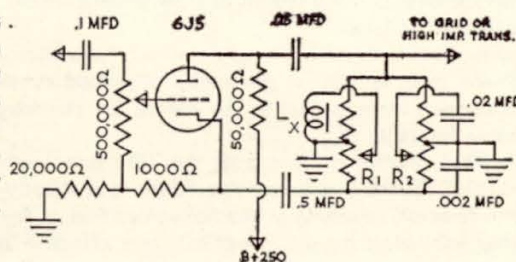
Output (S) and Matching (E) Transformers suitable for 70-volt line operation, are identified by (■) in the page margin and correlated footnote. They will be found on Pages 10, 10B, 12 and 15.

EQUALIZER
CIRCUITS

This simple pentode equalizer depends for its results upon the fact that the voltage gain of a pentode tube is proportional to the value of its plate load. By causing this plate load to vary with frequency it is possible to attain considerable frequency correction. In Fig. 1 the L-365-Q dual reactor or combination of L-350-X and L-355-X may be used for the tuning chokes. This equalizer is adaptable only where it may be used in a low-level, single-ended, resistance-coupled stage. It should not be used if more than 2 or 3 volts output is needed, and will permit an input of less than one-half volt; less than the output of a crystal pickup.



The negative-feedback equalizing circuit operates by allowing the amount of negative feedback to vary with frequency. It is more universal in that it may be operated at higher levels and may be used with a transformer load. It may thus be used directly from high output phonograph pickups without pre-attenuation and may be used as a driver for push-pull stages or to feed a line. The inductance Lx is L-360-D.



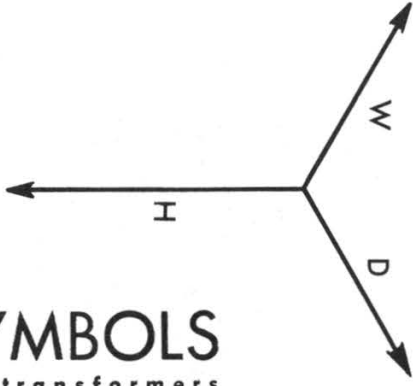
$$R_1 = R_2 = 1 \text{ meg. C. T.}$$

Case types are identified by the suffix letter in the type number.

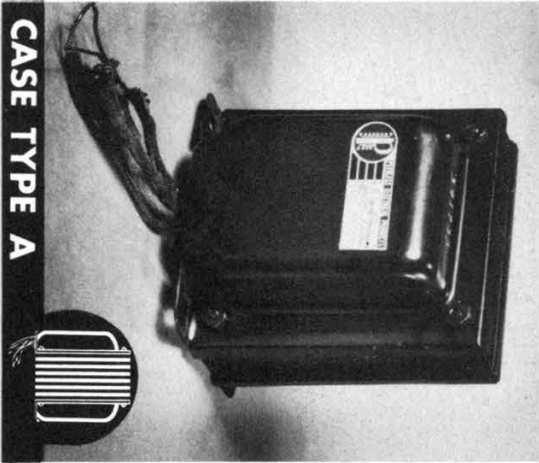
Case dimensions include terminals and mounting flanges.

CASE TYPE PHOTOGRAPHS AND SYMBOLS

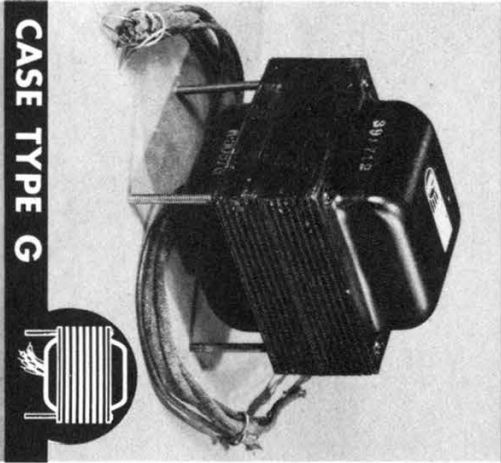
These are actual un-retouched photographs of Peerless production transformers



CASE TYPE D



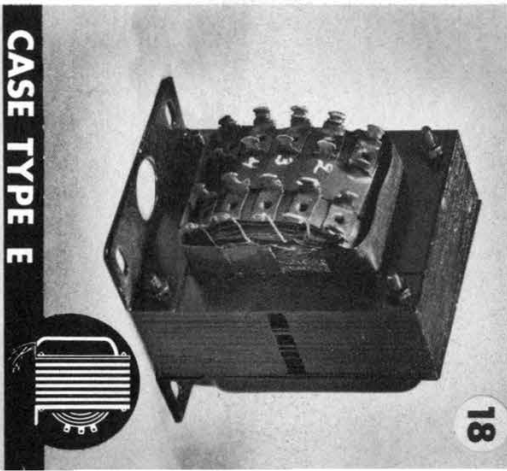
CASE TYPE A



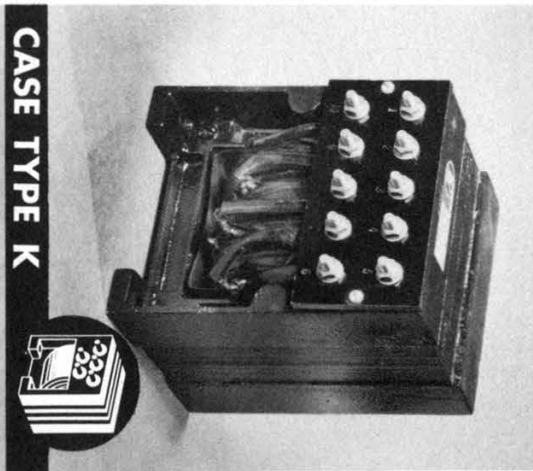
CASE TYPE G



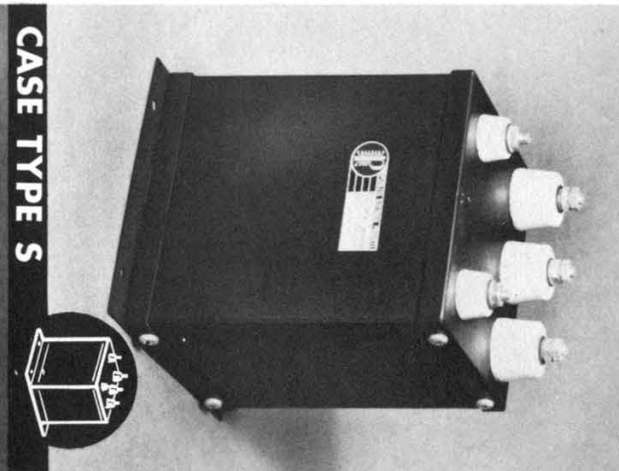
CASE TYPE L



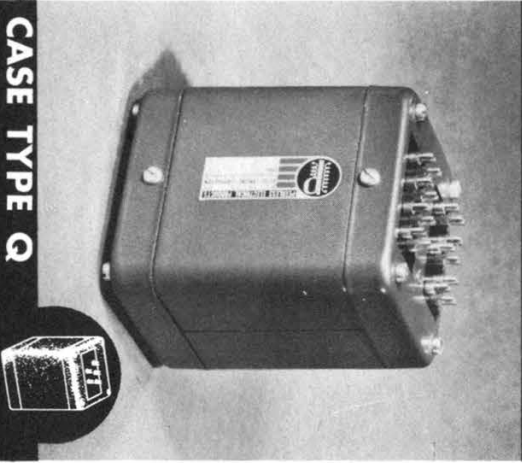
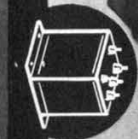
CASE TYPE E



CASE TYPE K



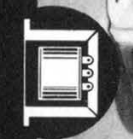
CASE TYPE S



CASE TYPE Q



CASE TYPE X



SUPPLEMENT "A" TO CATALOG 1950-1

-4090
net



PEERLESS ELECTRICAL PRODUCTS

DIVISION

1150 N. 1ST ST.
MILWAUKEE WIS 53233



161 SIXTH AVE.
NEW YORK 13
NEW YORK

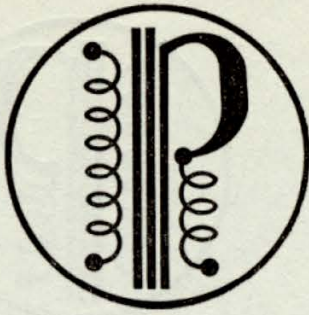


PRICE LIST EFFECTIVE JANUARY 1, 1950

SUPERSEDES PRICE LIST DATED FEBRUARY 1, 1949

Type Number	Page	List Price	Type Number	Page	List Price	Type Number	Page	List Price
A			E-253-Q	10B	45.00	K-035-X	12	3.80
A-014-L	7	9.75	E-372-Q	12	27.00	K-049-D	12	17.50
A-028-L	7	12.00	E-374-Q	12	19.00	K-049-Q	12	24.00
A-042-L	7	16.00	E-374-X	12	9.00	K-054-Q	12	23.50
A-056-L	7	20.50	E-377-X	12	4.50	K-063-A	12-13	11.75
A-070-E	7	13.50	E-386-E	12	18.50	K-077-X	12	3.50
A-084-K	7	24.50	E-386-Q	12	30.50	K-221-D	9-10A	30.00
A-098-K	7	40.00	E-392-E	12	28.00	K-221-Q	9-10A	36.50
A-114-K	7	55.00	E-392-S	12	39.50	K-231-Q	9-10A	36.50
C			F			K-251-Q	9	45.00
C-065-X	6	1.90	F-012-X	7	2.80	K-281-Q	9	52.50
C-130-X	6	2.00	F-024-X	7	3.60	KIT		
C-195-X	6	2.50	F-036-X	7	3.40	10722	10-B	78.00
C-305-X	6	2.85	F-048-X	7	5.20	L		
C-315-X	6	3.25	F-060-X	7	4.25	L-350-X	13	5.85
C-325-A	6	4.90	F-072-X	7	4.25	L-355-X	13	6.90
C-325-X	6	3.95	F-096-X	7	5.95	L-360-D	13	4.80
C-390-A	6	6.80	F-096-S	7	19.00	L-365-Q	13	19.50
C-455-A	6	9.55	F-104-X	7	6.00	L-370-D	13	10.00
C-520-A	6	13.00	F-120-X	7	6.00	L-821-D	11	26.00
C-520-K	6	20.00	F-121-X	7	8.00	L-822-D	11	27.00
C-520-S	6	27.00	F-138-E	7	6.95	L-823-D	11	29.00
C-585-K	6	25.50	F-139-E	7	6.95	L-824-D	11	31.50
C-585-S	6	37.50	F-140-E	7	6.95	L-825-D	11	34.00
C-650-K	6	47.00	F-156-E	7	7.25	L-826-D	11	34.00
C-650-S	6	70.00	F-168-E	7	8.20	L-921-Q	11	36.50
C-715-K	6	115.00	F-169-S	7	22.00	L-922-Q	11	36.50
C-715-S	6	155.00	F-180-E	7	9.50	L-923-Q	11	36.50
D			G			L-924-Q	11	36.50
D-001-X	13	3.00	G-212-D	9-10A	30.00	L-925-Q	11	36.50
D-006-X	13	4.40	G-212-Q	9-10A	36.50	L-926-Q	11	36.50
D-011-X	13	5.70	G-252-Q	9-10A	45.00	M		
D-016-X	13	6.50	G-306-X	12	3.05	M-003-X	13	3.90
D-026-A	13	10.75	G-318-D	12	16.00	M-008-X	13	3.35
D-031-A	13	14.75	G-322-Q	12	23.50	M-013-X	13	6.20
D-237-Q	10B	27.00	G-324-A	12	6.25	M-283-S	11	100.00
D-267-Q	10B	45.00	G-336-A	12	6.85	M-288-S	11	225.00
D-277-S	10B	80.00	H			M-293-S	11	400.00
E			H-228-Q	10A	40.75	M-298-S	11	750.00
E-203-Q	10A-10B	60.00	K			M-303-A	13	9.25
E-233-Q	10B	19.50	K-007-X	12	3.85	M-328-A	13	14.50
E-243-Q	10B	27.00	K-021-X	12	3.80	M-353-A	13	17.00
						M-353-S	13	24.75

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Type Number	Page	List Price	Type Number	Page	List Price	Type Number	Page	List Price
M-378-A	13	21.50	R-400-A	5	9.50	S-516-A	15	11.75
M-403-S	13	38.00	R-400-G	5	9.50	S-524-A	15	12.50
M-429-K	13	70.00	R-400-Q	5	19.00	S-530-A	15	12.50
M-453-K	13	110.00	R-401-A	5	9.50	S-532-A	15	12.00
M-453-S	13	135.00	R-479-A	5	11.15	S-540-A	15	18.50
M-478-K	13	220.00	R-480-A	5	10.90	S-548-A	15	29.00
P			R-480-G	5	10.90	S-552-A	15	29.00
P-110-K	6	37.00	R-480-Q	5	21.00	T		
P-110-S	6	48.00	R-481-A	5	11.25	T-111-L	7	13.00
P-330-K	6	40.00	R-482-A	5	11.25	T-112-L	7	14.00
P-330-S	6	58.00	R-559-A	5	16.75	T-311-L	7	19.00
P-440-K	6	60.00	R-560-A	5	15.50	T-312-L	7	20.50
P-440-S	6	85.00	R-560-Q	5	27.00	T-511-L	7	30.00
P-550-K	6	80.00	R-561-A	5	16.75	T-512-L	7	32.00
P-550-S	6	115.00	R-620-A	5	17.00	V		
P-660-K	6	110.00	R-640-A	5	19.50	V-950-A	6	5.70
P-660-S	6	160.00	R-720-A	5	23.00	V-970-A	6	7.25
P-770-K	6	200.00	R-800-A	5	24.00	V-980-A	6	12.50
P-770-S	6	260.00	R-870-A	5	15.00	W		
P-880-K	6	245.00	R-960-Q	5	24.75	W-519-A	6	13.00
P-880-S	6	360.00	S			W-519-K	6	20.00
Q			S-215-Q	10	45.00	W-519-S	6	27.00
Q-284-S	11	45.00	S-220-Q	10-10A	45.00	W-584-K	6	25.50
Q-289-S	11	90.00	S-225-Q	10	40.00	W-584-S	6	37.50
Q-294-S	11	160.00	S-230-Q	10	26.00	W-649-K	6	47.00
Q-299-S	11	300.00	S-235-Q	10	26.50	W-649-S	6	70.00
Q-370-X	13	3.90	S-240-Q	10	26.00	W-714-K	6	115.00
R			S-242-Q	10	26.50	W-714-S	6	155.00
R-080-A	5	8.75	S-245-Q	10	26.00	X		
R-080-Q	5	18.00	S-250-Q	10-10B	26.50	X-404-X	15	2.90
R-160-A	5	7.10	S-265-Q	10	45.00	X-408-X	15	2.90
R-160-G	5	7.10	S-270-Q	10	45.00	X-412-X	15	2.90
R-196-A	5	7.90	S-275-S	10	80.00	X-416-X	15	2.90
R-196-G	5	7.90	S-280-S	10	80.00	X-420-X	12-15	2.75
R-319-A	5	9.00	S-448-Q	15	20.00	X-424-X	15	3.00
R-320-A	5	8.60	S-456-X	15	3.85	X-428-X	15	3.75
R-320-G	5	8.60	S-464-X	15	4.15	X-432-X	15	4.25
R-399-A	5	9.85	S-472-X	15	6.50			
			S-508-A	15	9.25			

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